FIRST NATIONS FOOD, NUTRITION & ENVIRONMENT STUDY

Results from Alberta 2013

University of Ottawa | Université de Montréal | Assembly of First Nations 2016

"Healthy Environment and Healthy Foods for Healthy First Nations"

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Results from Alberta 2013
by University of Ottawa
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FOREWORD FROM THE NATIONAL CHIEF

Tansi:

I greet all of you in a humble and respectful way. As National Chief, my over-arching priority is to work for you to close the gap in the quality of life between our peoples and Canadians. This means working on many fronts, including advancing inherent Aboriginal and Treaty rights, enabling better access to education, helping to create more economic opportunities, protecting our lands and waters, and supporting good health.

While our quality of life is the result of many different factors, good health is a key pillar in achieving an optimal quality of life. Good health is not only our right; it is fundamental to building strong and thriving First Nation communities. Our teachings highlight the importance of our sacred connection to our lands, cultures, and communities to achieve an optimal state of health and well-being.

This is the focus we bring to all of our work, including the First Nations Food, Nutrition and Environment Study (FNFNES). The FNFNES is a ten-year project developed in partnership with our communities. It is an initiative that examines the safety of traditional foods and the drinking water that our citizens may be consuming. The results of this project aim to provide insight into the challenges that many of us are facing to achieve food security in accordance with a traditional diet.

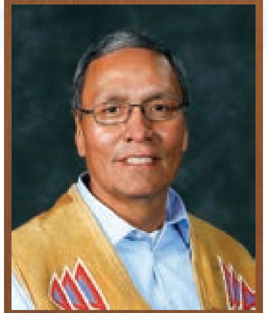
Given the variety of challenges that our peoples face in accessing traditional and safe foods, initiatives like FNFNES are important in enabling us to make informed food choices, and can serve as a benchmark to assess changes in the safety and availability of plants and animals that we harvest for future generations. For example, there are declines in the numbers of many of the species that we traditionally harvest for food. In other cases, some traditional foods, such as walleye and pike, are found to be contaminated with mercury and other toxic chemicals as a result of increasing and encroaching industrialization. And all of these factors are further aggravated by the ever-more apparent impacts of climate change. Unfortunately, all of these challenges have made it more difficult for our peoples to find and harvest safe traditional foods, in some cases leading them to depend on less nutritious diets. Understanding these challenges is the first step in our work to build healthier and stronger First Nation communities; communities that are able to sustain themselves and thrive in a way that our ancestors envisioned.

FNFNES is an example of an excellent collaborative project and, as such, I thank all of the First Nations that participated in this study – along with the Community Research Assistants, Nutrition Research Coordinators, Health Canada, and the many others that contributed to this work and report. The support and contributions of these organizations and individuals have been crucial to completing this stage of this research.

I look forward to future reports as this project continues to unfold, and hope that you share in my sense of optimism about what we can do for a brighter future.

Kinanâskomitin,
Perry Bellegarde
National Chief
Assembly of First Nations

FOREWORD FROM THE ALBERTA REGIONAL CHIEF



It is my pleasure to introduce the FNFNES Regional Report for Alberta. The First Nations Food, Nutrition and Environment Study is a national First Nations driven study, which provides First Nations with information on the relative risks and benefits of consuming market foods and consuming traditional foods. Learning about our ability to access traditional foods is an initial step to understand the barriers to a healthy, balanced, and prosperous lifestyle. When our communities are healthy so are our economies.

In Alberta, we are constantly faced with the challenge of balancing economic development while protecting our traditional ways of life, including access to traditional foods. While a balance can be achieved through promotion of traditional economies and sustainable development, currently this is not the case for our communities. This study identified a variety of barriers to accessing traditional foods which consequently have negative impacts upon nutrition, food security and our traditional way of life. Identifying these barriers and understanding the different variables that are at play in securing traditional foods will help our communities to be in a better position to be proactive and develop solutions that are community and evidence based. This is very valuable as First Nations rely on access to traditional foods for many of our teachings, for maintaining our culture, for provide healing in our communities and of course for a balanced healthy meal.

This report highlights some serious issues in our communities: issues which we as First Nations have been raising for years. It is truly beneficial to have this data to solidify our advocacy work as well as to inform our decisions as First Nations, and our advocacy with provincial and federal governments. The issue of food insecurity is significant in our communities as close to half of participating households are food insecure. The high price of food combined with a plethora of barriers to access traditional foods including lack of a hunter in the household, government regulations, and oil, gas and forestry operations, among other factors; contribute to food insecurity as well as heighten the risk of chronic disease. These finding while not surprising, are an important reminder of the urgent need to preserve and promote our traditional ways of life, as the path towards building stronger and healthier communities.

As a result of this project, ten First Nations now own data about environment, drinking water quality and community health. Data which can only be used or accessed with their free, prior and informed consent. The result of the regional report provides a valuable resource for other Alberta First Nations, government and industry to adopt evidence-based approaches to working with First Nations in the areas of resource development, environmental planning health promotion and nutrition.

I look forward to sharing these results and I encourage First Nations in Alberta to make use of this report to inform our day to day work in building stronger and healthier communities. Special thanks to all First Nations who were involved in this research, from the participants to the community coordinators, your hard work and commitment have made it possible to obtain this valuable information for our communities.

Craig Mackinaw
Regional Chief, Alberta
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ACRONYMNS AND ABBREVIATIONS

The following acronyms and abbreviations are used in this report:

AI: Adequate Intake
AFN: Assembly of First Nations
AMDR: Acceptable Macronutrient Distribution Ranges
AO: Aesthetic Objective
BMI: Body Mass Index
BW: Body weight
CALA: Canadian Association for Laboratory Accreditation
CCHS: Canadian Community Health Survey
CIHR: Canadian Institutes of Health Research
CWS: Community Water System
DDE: Dichlorodiphenyldichloroethylene
DRI: Dietary Reference Intakes
EAR: Estimated Average Requirements
EHO: Environmental Health Officer
FFQ: Food Frequency Questionnaire
FNFNES: First Nations Food, Nutrition and Environment Study
FNIHB: First Nations and Inuit Health Branch (Health Canada)
FS: Food Security
HCBs: Hexachlorobenzene
HH: Household
IR: Indian Reservation
IQR: Interquartile range
MAC: Maximum acceptable concentration
Max: Maximum or highest value
Min: Minimum or lowest value
mM: Molar Concentration-one thousandth of a mole
n: Number of participants surveyed or number of food, water or hair samples analyzed
PAH: Polycyclic aromatic hydrocarbons
PBDE: Polybrominateddiphenyl ethers
PCB: Polychlorinated biphenyls
PFC: Perfluorinated compounds
PFOS: Perfluorooctanesulfonic acid or perfluorooctane sulfonate
PI: Principal Investigator
POP: Persistent Organic Pollutant
PPCP: Pharmaceuticals and personal care products
PPM: Parts per million
PSU: Primary Sampling Unit
PWS: Public Water System
RDA: Recommended Dietary Allowance
SAS: Statistical Analysis System: software developed by SAS institute
SIDE: Software for Intake Distribution Estimation
SCC: Standards Council of Canada
SE: Standard error (see Glossary)
SHL: Socio/Health/Lifestyle Questionnaire
SSU: Secondary Sampling Unit
TDI/PTDI: Tolerable Daily Intake/Provisional Tolerable Daily Intake
TDS: Total Diet Studies
TF: Traditional food
TSU: Tertiary Sampling Unit
UL: Tolerable Upper Intake Level
USDA: United States Department of Agriculture

GLOSSARY

The following are definitions or illustrations of terms used in this report:

- **Aesthetic objective:** The level of substances in drinking water or characteristics of drinking water (such taste, odour, or colour) that can affect its acceptance by consumers. Aesthetic objective levels are below levels considered to be harmful to health.
- **Acceptable Macronutrient Distribution Ranges:** Expressed as a percentage of energy intake (total calories), the AMDRs are the range of intake for protein (10-35%), fat (20-35%), and carbohydrates (45-65%), associated with a reduced risk of chronic disease and provide adequate amounts of these nutrients.
- **Adequate Intake:** An AI is derived for a nutrient if there is inadequate evidence to establish an Estimated Average Requirement (EAR).
- **Arithmetic mean:** See mean.
- **Average:** See mean.
- **Background level:** The level of chemical (or other substances) that are normally found in the environment.
- **Body burden:** This refers to the total amount of any chemicals currently present in the human body at any given time. Some chemicals only stay present in the body for a short period of time while others remain within the body for 50 years or more.
- **Body Mass Index (BMI):** Calculated by dividing the weight (in kilograms) by the square of the height (in metres), this index is used to define normal weight (range of 18.5-24.9), overweight (25-29.9) and obesity (30 and over). Overweight and obesity are degrees of excess body weight carrying increasing risks of developing health problems such as diabetes and heart disease.
- **Bootstrapping:** A computer-based statistical method used to estimate a statistical parameter (e.g. standard error) by random sampling with replacement from the original dataset.
- **Cistern:** A water holding tank that provides storage for treated drinking water
- **Confidence Interval:** A range or interval of scores that reflects the margin of error (due to sampling and measurement errors) associated with the mean value of the parameter (characteristic of a population) under study. A 95% CI means that the true mean value falls within this interval 95% of the time.
- **Dietary Reference Intakes:** A set of nutrient-based reference values that are used to assess and plan the diets of healthy individuals and groups. The DRIs include the Estimated Average Requirements (EARs), the Recommended Dietary Allowance (RDA), the Adequate Intake (AI) and the Tolerable Upper Intake Level (UL).
- **Ecozone:** Regions/areas identified based on the distribution patterns of plants, animals, geographical characteristics and climate.
- **Estimated Average Requirement:** The estimated median daily nutrient intake level necessary to meet the nutrient needs of half of the healthy individuals in a gender or age group. It is a primary reference point used to assess the nutrient adequacy of groups
- **Food security:** Physical and economic access by all people to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life. Household food security can be estimated by a questionnaire.
- **Guideline value:** In Canada, guideline values are set for the protection of environmental and human health. For example, there are guidelines for human tissues (such as blood and hair), animal tissues (fish, mammals and birds), drinking water, recreational water, soil, as well as for the protection of aquatic life. These values are based on the most current scientific data available for the parameter of interest.

- **Groundwater:** Water located beneath the ground surface such as in porous soil spaces and fractures of rock formations. A unit of rock or an unconsolidated deposit is called an aquifer when it can yield a usable quantity of water.

- **Groundwater under the direct influence of surface water (GUDI):** groundwater that shows surface water characteristics. This can include water from a well that is not a drilled well or does not have a watertight casing and is up to 6 m in depth below ground level.

- **Individual Water System (IWS):** A system serving individual homes that each have their own pressurized water supply (e.g. a well), or is connected to a piped distribution system that has less than five housing units and does not include any public access buildings.

- **Interquartile range (IQR):** A statistical term used to describe the distribution around the median (25% above and below the median).

- **Maximum Acceptable Concentration (MAC):** The concentration or level of a particular substance at which exposure to may cause harmful effects on health.

- **Mean, arithmetic (AM or average):** A statistical term used to describe the value obtained by adding up all the values in a dataset and dividing by the number of observations.

- **Mean, geometric (GM):** To calculate a geometric mean, all observations [i.e. values] are multiplied together, and the nth root of the product is taken, where n is the number of observations. Geometric mean of skewed distribution such as hair mercury concentrations usually produces an estimate which is much closer to the true center of the distribution than would an arithmetic mean.

- **Median:** A statistical term used to describe the middle value obtained when all values in a dataset are placed in numerical order; at most half the observations in a dataset are below the median and at most half are above the median.

- **Oral Slope Factor:** An upper bound, approximating a 95% confidence limit, on the increased cancer risk from a lifetime oral exposure to an agent. This estimate, usually expressed in units of proportion (of a population) affected per mg/kg-day, is generally reserved for use in the low-dose region of the dose-response relationship, that is, for exposures corresponding to risks less than 1 in 100.

- **Public Water System:** a community water system with 5 or more connections, that has a distribution system (piped) and that may also have a truck fill station.

- **Private Well:** A well for drinking water serving a residence or house.

- **Recommended Dietary Allowance (RDI):** The estimated average daily nutrient intake level that meets the needs of nearly all (98%) healthy individuals in an age or gender group.

- **Semi Public Water System (SPWS):** is a well or cistern serving a public building(s) or where the public has a reasonable expectation of access and has less than 5 connections.

  Surface water (SW): All water situated above-ground (for example, rivers, lakes, ponds, reservoirs, streams, seas).

- **Standard error (SE):** A measure of variation to be expected from sampling strategy, measurement error, and natural variability in the calculated parameter (The parameter can be a percentage or a mean (average) for example).

- **Tolerable Daily Intake (TDI) or Provisional Tolerable Daily Intake (PTDI):** An estimate of the amount of a substance in air, food or drinking water that can be taken in daily over a lifetime without appreciable health risk. TDIs or PTDIs are calculated on the basis of laboratory toxicity data to which uncertainty factors are applied.

- **Tolerable Upper Intake Level (UL):** An estimate of the highest average daily nutrient intake level that is likely to pose no adverse health effects.

Photo by Stéphane Decelles

- **Wastewater (WW):** used water, including greywater (used water kitchen, laundry), blackwater (used water from bathroom containing human waste), or surface runoff or used water from an industrial, commercial or institutional facility that is mixed with blackwater).

- **Water treatment plant (WTP):** The facility that treats water so that it is clean and safe to drink.

- **Water treatment system (WTS):** Includes all water delivery components such as the raw water intake, water treatment plant, distribution system, hydrants, etc.

- **µg/g:** Micrograms (1 millionth or 1/1,000,000 of a gram) per gram; in the case of the mercury in hair results, this measurement represents the weight of mercury measured per gram of hair. In the food contaminant results, this represents the weight of contaminant per gram of food.

- **µg/L:** Micrograms (1 millionth or 1/1,000,000 of a gram) per litre; found in the drinking water results, this measurement represents the weight of trace metals measured per litre of water.

- **ng/g:** Nanograms (1 billionth or 1/1,000,000,000 of a gram) per gram; found in the food contaminant results, this measurement represents the weight of a contaminant measured per gram of food.

- **ppm:** Parts per million; A common unit typically used to describe the concentration of contaminants in food or environment. This is approximately equivalent to one drop of water diluted into 50 liters (roughly the fuel tank capacity of a small car).

- **ppb:** Parts per billion; this is approximately equivalent to one drop of water diluted into 250- 55 gallon containers.

- **pg/kg/day:** Pico grams (1 trillionth or 1/1,000,000,000,000 of a gram) per kilogram per day; in the food contaminant results, this represents the weight of contaminants per kilogram body weight that is being consumed per day. This value is used for risk assessment.

EXECUTIVE SUMMARY

First Nations have expressed concerns about the impacts of environmental pollution on the quality and safety of traditionally-harvested foods. However, very little is known about the composition of First Nations' diets, or about the level of contaminants in traditional foods. The goal of this study is to fill this gap in knowledge about the diet of First Nations peoples living on-reserve, south of the 60th parallel. In addition, baseline information on human and veterinary pharmaceuticals in surface waters is being collected, especially where fish are being harvested or where water is being taken for drinking purposes. To ensure that the cultural and ecosystem diversity of First Nations in Canada is represented in this study, communities are selected using an ecozone framework. South of the 60th parallel, there are eleven ecozones within the eight Assembly of First Nation regions. In Alberta, there are three ecozones.

This study, called the First Nations Food, Nutrition and Environment Study (FNFNES) is being implemented region by region across Canada over a 10-year period. Data collection started in 21 on-reserve First Nations communities in British Columbia in 2008-2009 followed by nine First Nations communities in Manitoba in 2010 and 18 communities in Ontario (2011-2012). Reports for these three AFN regions are available on the FNFNES website (www.fnfnes.ca).

In Alberta, data collection was conducted in ten First Nations communities during the fall of 2013. One community is located in the Taiga Plains ecozone, seven communities are located in the Boreal Plains ecozone, and two communities are located in the Prairies ecozone. Of these ten communities, nine communities were randomly sampled while one community was invited to participate because of contaminant concerns.

Due to the fact that only one community from the Taiga Plains was surveyed and could be easily identified, this report only presents the aggregated results from the 10 participating First Nations communities combined and two ecozones: Boreal Plains and Prairies. Results for the community in the Taiga Plains will be combined in a future report combining results by ecozone at the national level.

The FNFNES includes five components:

1. **Household interviews to collect information on dietary patterns, lifestyle and general health status, environmental concerns and food security;**
2. **Drinking water sampling for trace metals;**
3. **Hair sampling for exposure to mercury;**
4. **Surface water sampling for pharmaceuticals; and**
5. **Traditional food sampling for chemical contaminant content.**

This study was guided by *The Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans* and in particular Chapter 9 research involving the First Nations, Inuit and Métis Peoples of Canada (2010) and the First Nations principles of Ownership, Control, Access and Possession (OCAPTM) of data (Schnarch 2004). Ethical approval has been granted by the Research Ethics Boards of Health Canada, the University of Northern British Columbia, the University of Ottawa and the Université de Montréal.

Photo by Oborseth. Source: Wikimedia Commons

Results

In each community, households were randomly selected; one participant per household, 19 years and older, living on-reserve and who self-identified as a First Nation person, was invited to participate. There were a total of 609 participants (387 women and 222 men). The overall participation rate was 70% for questionnaires. Sixty-one percent of respondents (369) agreed to participate in hair testing for mercury. The average age of the participants was 39 years for both women and men. The median number of people living in a household was six: 65% were between the ages of 15 and 65, 30% were children under 15 years of age and 5% were elders (over 65 years of age).

Based on measured and/or self-reported height and weight data, 20% of adults were at a normal weight, while 34% of adults were overweight (32% of women and 37% of men) and 44% were obese (49% of women and 37% of men). Seventeen percent of adults reported that they had been told by a health professional that they had diabetes. Over half of all adults (56%) were smokers.

Traditional food appeared in the diet of almost all First Nations adults (94%). Over 100 different traditional foods were harvested during the year, with the types varying across communities. Most adults reported eating game (79%), and wild berries (80%). One out of three people reported eating fish (35%), wild birds (29%) and wild plants (40%) while few adults (6%) reported using foods from trees. One percent of adults reported eating wild mushrooms. The most frequently eaten traditional foods were moose, Saskatoon berries and raspberries. At the regional level, First Nations adults in Alberta consumed an average of 29 grams of traditional food a day while heavy consumers had up to 150 grams/day. Sixty-five percent of households reported harvesting traditional food in the last year and more than three-quarters of participants reported that they would like to have more traditional food. However, the key barriers to increased use included a lack of: equipment or transportation; a hunter in the household; and government regulations. Additional external factors that inhibited access to traditional food included oil/gas and forestry operations as well as climate change. Climate change was perceived by participants to have impacted both the seasonal round (lifecycle pattern of plants and animals and harvesting times) and the availability of traditional food.

In terms of overall diet quality, First Nations adults in Alberta do not meet the amounts and types of food recommended in Canada's Food Guide. The intake of food from the Meat and Alternatives group is higher than recommended. For the other three food groups (Milk and Alternatives, Vegetables and Fruit, and Grain Products), intakes are lower than recommended, particularly among women. Fibre and many nutrients that are needed for good health and prevention of disease, including vitamin A, vitamin B6, vitamin C, vitamin D, calcium, magnesium and folate, are at risk of insufficient intake.

Dietary quality was much improved on days when traditional foods were consumed, as traditional foods are important contributors of protein, iron, zinc, magnesium, and other essential nutrients. When only market food was consumed, intakes of saturated fat (the type of fat associated with heart disease), sugar, and sodium were significantly higher.

Forty-seven percent of households experienced food insecurity; 34% of the households were moderately food insecure and 13% were severely food insecure. Household food insecurity was higher in the Prairies ecozone, with 56% of households classified as food insecure. The high price of food is a contributing factor to food insecurity and the subsequent inability to eat a 'balanced meal'. The average cost of groceries per week for a family of four in Alberta was $216 ($229 in the Boreal Plains, $225 in the Taiga Plain and $174 in the Prairies). Costs at the community level ranged from $168 in southern Alberta to $377 in northern Alberta, compared to $204 in Edmonton. When asked about traditional food security, 44% of households said that they worried that their traditional food supplies would run out before they could get more.

In terms of water treatment systems, there were 19 water treatment systems located in and maintained by the communities. Four First Nations had agreements in place with nearby municipalities to provide treated water to some homes. In the twelve months preceding this study, five of the ten communities had issued drinking water advisories; one community issued more than one advisory within the year. In two communities, the boil water advisories were due to elevated levels of bacteria. The remaining drinking water advisories were due to high levels of manganese, a broken water main, sediment, and water reservoir issues.
Over half (62%) of households in the participating communities reported that they obtain their water from water treatment plants, while over a third (37%)

Photo by Stéphane Decelles

reported obtaining water from wells and 1% received their water from a spring. All participants reported that their households have tap water; 31% of households reported having water storage tanks. Seventy-three percent of participants reported that they use the tap water for drinking while 92% use it for cooking. Almost half (46%) of the participants said that the smell of chlorine always or sometimes prevented them from drinking the tap water. Of the 108 homes that had their tap water tested for metals, there were no exceedances in the flushed samples.

Testing for the presence of pharmaceuticals in surface water was undertaken in 10 communities: quantifiable pharmaceuticals were found in nine communities. Sixteen pharmaceuticals were found: seven pharmaceuticals were found in the surface water of one or more communities and 14 pharmaceuticals were found in the wastewater in the two communities where lagoons were sampled. The FNFNES results are considerably lower than those found in other wastewater and surface waters reported in Canada, the United States, Europe, Asia, Central America and Africa. However, the health effects of the mixtures of multiple pharmaceuticals in the surface water are unknown at this time.

Sixty-one percent of all participants (n=369) provided hair samples for mercury testing. There were two exceedances (one male in the 51-70 age category and one female of child bearing age) of Health Canada's mercury biomonitoring guidelines (0.5% of the sample). The average mercury concentration among adults was 0.19 µg/g (geometric mean was at 0.08 µg/g). However, as more than 40% of the sample was below the level of detection (LOD), these means are not reliable. The distribution of mercury in hair among the 90th and 95th percentile of Alberta First Nations adults living on reserves indicate that average mercury body burden is generally below the established Health Canada mercury guideline. The results suggest with some certainty that mercury exposure is not a significant issue for First Nations adults in Alberta.

A total of 467 food samples representing 37 different types of traditional foods were collected for contaminant analysis. Most of the contaminant concentrations found in the traditional foods were within the normal ranges that are typically found in Canada with no health concern associated with consumption. Some samples such as bison, rabbit and grouse had higher concentrations of lead, likely as a result of contamination from lead containing ammunition. It is recommended to use steel shot when hunting and to cut away the portion of meat surrounding the bullet entry area to decrease the risk of lead exposure. Additionally, within the Boreal Plains ecozone, heavy consumers of organ meats have an elevated risk of exposure to cadmium. As cigarettes are a source of cadmium, smokers who consumer large amounts of organ meat are at greater risk of cadmium toxicity. Some samples of dried meat, fish, mallard duck and rat root had elevated levels of polycyclic aromatic hydrocarbons (PAHs). The sources of PAHs need to be identified. A more comprehensive risk assessment is needed for those considered 'heavy consumers'.

Thus far, this study has been a valuable tool in addressing the gaps in knowledge about the diet, including both market and traditional food consumption and levels of environmental contaminants to which First Nations in Alberta are exposed. It should be noted that this is the first study of this type to be conducted on a regional level across the country. The data collected will serve as a benchmark for future studies to determine if changes in the environment are resulting in an increase or decrease in concentrations of chemicals of concerns and how diet quality will change over time.

INTRODUCTION

In Canada, there remain large gaps in health between First Nations and the non-Aboriginal population. First Nations continue to experience a lower life expectancy (Health Canada 2011), higher rates of chronic and infectious diseases, and mental health issues (Public Health Agency of Canada 2012; 2011; 2010). Rates of obesity, diabetes and heart disease among First Nation Peoples have reached epidemic levels (Ayach and Korda 2010; Belanger-Ducharme and Tremblay 2005; Young 1994). The well-being of individuals and communities is determined by a broad range of factors including diet and lifestyle, genetics, the state of the environment and the social determinants of health. The social determinants of health (social and economic factors including income, education, employment, early childhood development, social networks, food security, gender, ethnicity, disability that can result in inequities and exclusion) play a key role in health inequities: those who have more advantages tend to have better health (Frohlich, Ross and Richmond 2006; Mikkonen and Raphael 2010). For First Nation peoples, the history of colonization and the loss of jurisdiction over traditional territories is an additional dimension of the determinants of health (Egeland and Harrison 2013; Reading and Wein 2009).

For thousands of years, First Nation communities relied on ecozone-adapted traditional food systems (Waldram, Herring and Young 1995). Traditional food is nutritionally, culturally, and economically important for First Nation Peoples. Traditional foods are often more nutrient dense compared to market food replacements. First Nations communities are experiencing a dietary transition away from traditional foods that could be attributed to a multitude of factors including acculturation, harvesting restrictions, financial constraints and loss of time for harvesting activities, declining traditional food access and availability due to development, pollution and climate change (Kuhnlein, Erasmus, et al. 2013; Kuhnlein and Receveur 1996). As the proportion of traditional food decreases in the diet of First Nations, there is a risk of decrease in the nutritional quality of the diet and rise in nutrition related health problems such as anemia, heart disease, obesity, osteoporosis, cancer, infections, diabetes and tooth decay (Kuhnlein and Receveur 1996). The health and nutrition of First Nations peoples are strongly affected by social disparities, the erosion of a traditional lifestyle and the resulting high food insecurity and a poor quality diet (Adelson 2005; Kuhnlein and Receveur 1996; Power 2008; Willows, Veugelers, et al. 2011; Willows 2005).


Photo by Jayne Murdoch

Increasing industrialization in the last century has led to various degrees of pollution in all ecosystems. First Nations are particularly at risk to environmental contaminant exposure because of a traditional lifestyle with a close connection to the land and water, as well as a diet that includes traditional foods from the local environment. First Nations communities from different geographical areas in Canada face their own unique environmental problems due to the nature of the point sources of environmental pollution and the degree to which their diet is obtained from the local environment. It has been suggested that major health problems (e.g. cancer, diabetes, low infant weight) may be related to the amount of chemical contaminants in the environment (Hectors, et al. 2011; Lee, et al. 2011; Li, et al. 2006; Institute of Medicine 2007). There are also concerns of new or unknown health issues associated with the consumption of food contaminated with chemicals that have not been fully characterized. However, the risks and benefits of traditional food must be better understood before recommendations can be made. Unfortunately, there has been very limited information on both the nutritional composition of the average diet of most First Nations and the levels of contaminants in their traditional foods.

Exposure to food toxicants and environmental contaminants as well as nutritional imbalances have been associated with a range of human health conditions including; cancer, kidney and liver dysfunction, hormonal imbalance, immune system suppression, musculoskeletal disease, birth defects, premature births, impeded nervous and sensory system development, reproductive disorders, mental health problems, cardiovascular diseases, genito-urinary disease, old-age dementia, and learning disabilities(Birnbaum 2008). More information can be found online at Health Canada's webpage on environmental contaminants at http://www.hc-sc.gc.ca/ewh-semt/contaminants/index-eng.php. Toxicants in food can occur naturally or can enter during processing or through environmental contamination. Toxicants can be 'natural' or 'manufactured'. For example, some mushrooms produce toxins that can be harmful to human health. Toxic metals such as arsenic, cadmium, lead and mercury are found naturally in soil and rocks. However, they can also be emitted as a waste product (pollutant) of human activities such as mining and forestry and accumulate in animals and plants in high enough amounts that are harmful to the human consumers. The burning of wood and fossil fuels can release toxic chemicals such as polycyclic aromatic hydrocarbons (PAHs) and dioxins and furans into the environment. Man-made (anthropogenic) chemicals such as PCBs (derived from industrial activities), PBDEs and PFCs (used in consumer products) and organochlorine pesticides (used in agriculture and forestry) can also enter into the food system.

About 8,400,000 chemical substances are commercially available and 240,000 are reported to be inventoried/regulated chemicals. Combined with pesticides, food additives, drugs and cosmetics, over 100,000 chemicals have been registered for use in commerce in the United States in the past 30 years, with similar numbers in the EU and Japan (Muir and Howard 2006). Canada has compiled a list of approximately 23,000 chemicals manufactured, imported or used in Canada on a commercial scale and identified 4,300 chemicals as priorities for assessment. Meanwhile, new chemicals are introduced all the time: over a 10-month period in 2013, Canada received notification of 298 new chemicals under the New Substances Program (Environment Canada and Health Canada 2013). Some organic chemicals, such as pesticides, PCBs and dioxins, as well as organic lead and mercury, have physical and chemical characteristics that allow them to resist degradation and persist in the environment, to be transported globally via air and water currents and to bioaccumulate and biomagnify along biological food chains. These persistent organic pollutants (POPs) are of particular concern in aquatic environments since the aquatic food chains are usually longer than the terrestrial food chains, resulting in higher bioaccumulation in the top predators. Where these chemicals are present in fish, they will also accumulate in the animals, such as birds, marine mammals and bears that consume them, eventually reaching humans.

In the last few years, concern has also been raised about pharmaceuticals and personal care products (PPCPs) in the environment (Treadgold, Liu and Plant 2012). Some of these compounds, including human pharmaceuticals and veterinary drugs, are excreted intact or in conjugated form in urine and feces. These PPCPs have also been found in sewage treatment effluent and surface waters.

Health authorities usually employ four complementary approaches to assess and characterize risk and develop programs meant to minimize the potential health impact of toxic chemicals:

1. Monitor foods for compliance with national and international food safety regulatory standards. In Canada, this function is the responsibility of the Canadian Food Inspection Agency.

2. Conduct targeted surveys to identify and eliminate sources of high-priority 0s of public health concern, such as lead, dioxins and pesticides, from foods.

3. Estimate the actual consumption of chemicals in the diet by population at risk, and compare these intakes with toxicological reference points, such as the acceptable daily intake (ADI) or provisional tolerable weekly intake (PTWI). On a yearly basis, Health Canada purchases store bought food and analyses high-priority chemicals as part of the Total Diet Study (TDS).

4. Conduct biomonitoring projects by measuring the chemical concentrations in blood, urine breast milk, hair, nail clippings and/or fetal cords blood collected from the target population as indicators of exposure. The Canadian Health Measures Survey (CHMS) is an ongoing bio-monitoring surveillance study that began in 2007 (Statistics Canada, Health Canada, Public Health Agency of Canada 2014).

Canada is one of the global leaders in conducting Total Diet Studies (TDS). Health Canada (2013) has been collecting and analyzing store bought foods since 1969 to assess nutrient intake and exposure to chemical contaminants from these foods. In each TDS, a variety of store bought foods are purchased from several supermarkets in major cities and analysed for nutrients and chemical contaminants. This information is combined with available dietary data for Canadians to estimate exposure. Results of the studies have been published in the scientific literature. As the TDS only focuses on the chemical contaminants found in store-bought foods, the findings have limited value for First Nations communities that rely on traditionally harvested foods. A similar situation exists for the evaluation of food intake and diet quality. National dietary surveys, such as the 2004 Canadian Community Health Survey Cycle 2.2, Nutrition (Office of Nutrition Policy and Promotion, Health Canada 2007), do not include First Nation peoples living on-reserve.

There have been a number of dietary studies conducted in First Nations communities since the 1970s. They provide a general understanding of the types of foods eaten by some First Nations peoples living on-reserve. The data are not easily comparable as the studies were conducted at different times by different research teams that used different investigative tools to address a variety of research objectives. Relatively more complete information is available for First Nations, Inuit and Métis communities in the three northern territories. With the funding support from the Northern Contaminants Program, three comprehensive dietary surveys were conducted in the Yukon, the Northwest Territories and Nunavut in the 1990's providing information on the diets, the nutritional value of foods eaten and the food pathways of exposure to environmental chemicals (Kuhnlein, Receveur and Chan 2001). A comprehensive dietary study was conducted among Canadian Inuit as part of the Inuit Health Survey conducted in 2007-2009 (Saudny, Leggee and Egeland 2012). Diets have been shown consistently to be of greater nutritional quality when traditional food is consumed compared to when only market food is consumed. Furthermore, the nutritional, as well as cultural, benefits of traditional food repeatedly outweigh the risks from chemical contamination (Donaldson, et al. 2010; Kuhnlein, Receveur and Chan 2001; Laird, et al. 2013).

In summary, although there is a valuable but disparate patchwork of research that helps in assessing the contribution of nutrients from traditional foods to the diet and some major issues in regard to chemical exposures through food pathways, research to date has not succeeded in providing reliable regional information on First Nations' diets and the risk of chemical exposure through the consumption of locally-harvested foods in the 10 Canadian provinces. This gap is targeted by this study titled the First Nations Food, Nutrition and Environment Study (FNFNES).

The FNFNES goal is to provide information needed for the promotion of healthy environments and healthy foods for healthy First Nations. The measurement of baseline levels of key environmental chemicals of concern and an assessment of diet quality of First Nations on a regional level across the country are this study's main objectives. The FNFNES is measuring the chemicals of potential concern reported by Health Canada (1998) including arsenic, cadmium, lead, mercury, PCB and organochlorines, PAH, PBDE, dioxin and furans, and PFOS. Fact sheets of the contaminants measured in this study can be found in Appendix A. This study also aims to quantify the intake of metals through drinking water and the presence of various pharmaceutically-active compounds that may find their way into surface waters that are used for fishing or as a source for drinking water. Pharmaceuticals are emerging contaminants and the FNFNES is the first study to quantify them in waters on First Nation reserves.

Results of this study will be useful for the development of community-level dietary advice and food guidance for First Nations at the regional level. The information on background exposures to POPs, toxic metals and pharmaceutical products is also essential for First Nations as an enabling foundation for any future food monitoring at the community level. Results of this study will also empower communities to make informed decisions to address and mitigate environment health risks.

The FNFNES is being implemented, in the eight Assembly of First Nation regions, over a 10-year period and will be representative of all First Nations for regions south of the 60th parallel. The study was first undertaken in 21 First Nations communities in British Columbia in 2008 and 2009 (Chan, Receveur and Sharp, et al., 2011). In 2010, data collection occurred in nine Manitoba First Nations communities (Chan, Receveur and Sharp, et al. 2012). A total of 18 First Nations in Ontario participated in 2011 and 2012 (Chan, Receveur and Batal, et al. 2014).

The FNFNES started with a resolution passed by the Chiefs-in-Assembly at the Assembly of First Nations' (AFN) Annual General Assembly in Halifax, Nova Scotia on July 12, 2007. In the Alberta AFN region, FNFNES was presented to the Confederacy of Treaty 6 First Nations, Treaty 7 Management Corporation and Grand Council Treaty 8 prior to inviting communities to participate. In the fall of 2013, the study took place in 10 First Nations communities. After Ontario and British Columbia, Alberta has the third largest First Nations population in Canada. About half of the population live on-reserve in 45 communities while the other half live off-reserve, especially in Edmonton (Statistics Canada 2013a; 2010).

This phase of the study was led by four principal investigators: Dr. Laurie Chan from the University of Ottawa, Dr. Malek Batal and Dr. Olivier Receveur from the Université de Montréal, and William David from the Assembly of First Nations. This regional report, descriptive in its intent, was developed on the basis of aggregated information and has been provided to the communities that participated in the study, as well as to regional and national First Nations organizations.

The FNFNES reports are publicly available in print and online (www.fnfnes.ca). Preliminary results were disseminated through meetings with each participating community and feedback on the content of these reports is included in this report.

METHODOLOGY

The FNFNES will eventually be representative of all on-reserve First Nations in Canada for regions south of the 60th parallel. Within the eight AFN regions south of 60, there are 598 First Nations communities. The FNFNES is inviting approximately 100 communities to participate in this study.

Sampling

Only First Nations communities which have a population on reserve larger than zero were included (583 communities out of 598) in the sampling. For the purposes of this study, communities were sampled using an ecozone framework to ensure that the diversity of First Nations and ecosystems is represented in the sampling strategy.

Ecozones are large scale divisions of the earth's surface based on the distribution of plants and animals. Ecozones are separated by such features as oceans, deserts or high mountain ranges that form barriers to plant and animal migration. Within Canada, there are fifteen terrestrial ecozones and five aquatic ecozones. First Nations communities, south of the 60th parallel are located within eleven ecozones. In Alberta, First Nation communities were stratified into three ecozones (Taiga Shield, Boreal Plains and Prairies). Most First Nations (34) communities in Alberta are located in the Boreal Plains; one community is situated within the Taiga Plains and ten First Nations communities are located within the Prairies. Further information on ecozones can be found within the first National Ecological Framework Report, published by Agriculture and Agri-Food Canada (Smith and Marshall 1995), and at the Ecological Framework of Canada website (ecozones.ca). Table A provides a brief description of the three ecozones within the Alberta AFN region.

Table A. Description of the three ecozones within the Alberta AFN Region

Ecozone name	General description
Taiga Plains	The Taiga Plains is centred on Canada's largest river, the Mackenzie and its tributaries. Located primarily in the Northwest Territories, it extends into northeastern British Columbia, the Yukon Territory and northern Alberta. The ecozone is an area of low-lying plains and encompasses a wide diversity of plants, birds and mammals from the subarctic and the arctic.
Boreal Plains	The low-lying valleys and plains of the Boreal Plains cover almost two-thirds of Alberta and stretches into Manitoba and Saskatchewan. The majority of the surface waters are part of three watersheds: those of the Saskatchewan River, the Beaver River, and Peace, Athabasca, and Slave rivers' watershed.
Prairies	Most of this ecozone is located within the United States with the northern boundary spanning southern areas of Alberta, Saskatchewan and Manitoba. This ecozone consists of flat and rolling plains and foothills covered by mixed grassland. A forest of aspen and poplar trees borders the area between the Prairies and the Boreal Plains.

From the three ecozones, 10 First Nations communities in Alberta were allocated to participate using a systematic random sampling method with probability proportional to the size of communities. This selection method ensures that the most populated communities are more likely to be chosen in the sample rather than the smallest ones. The sampling strategy is similar to the one used by Leenen et al. (2008). The sole First Nation community located in the Taiga Plains was pre-selected while six communities from the Boreal Plains and three communities from the Prairies were randomly selected. One additional community from the Boreal Plains was invited to participate due to contaminant concerns from the oil sands. Among the nine communities randomly sampled, four decided not to, or could not participate and alternate communities were approached. By October 2013, 10 communities agreed to participate. Table B presents a summary of the collection effort in each ecozone.

Table B. Summary of collection effort for each ecozone in Alberta

Ecozone number	Ecozone	Total population on-reserve per stratum+	Total number of communities per stratum	Sample allocation	Sample actually collected	Total population on-reserve for participating communities
1	Taiga Plains	1,847	1	1	1	1,847
2	Boreal Plains	33,788	34	7	7	14,174
3	Prairies	27,741	10	3	2	5,072
	Total	**63,376**	**45**	**11**	**10**	**21,093**

+Total population at time of calculation was based on 2009 statistics

The FNFNES relies on data collected from probability samples of adult First Nations living on-reserve. Communities (Primary Sampling Units or PSUs), households (Secondary Sampling Units or SSUs) and individuals (Tertiary Sampling Unit or TSU in each household), were selected using random mechanisms by statisticians at Statistics Canada under the witness of representatives from the Assembly of First Nations.

Sampling in Alberta proceeded in three stages:

1. Primary Sampling Units (PSUs): Systematic random sampling of communities took place within each AFN Region. The number of communities allocated to each region was proportional to the square root of the number of communities within it. Over-sampling was carried out to account for potential community non-response.

2. Secondary Sampling Units (SSUs): Systematic random sampling of 125 households occurred within each selected community, with a target of 100 households to be surveyed. In communities with fewer than 125 households, all households were selected. A larger number of households than required (100) was allowed to adjust for expected non-response.

3. Tertiary Sampling Units (TSUs): In each household, one adult who met the following inclusion criteria was asked to participate:
   - 19 years of age or older;
   - able to provide written informed consent;
   - self-identified as being a First Nations person living on-reserve in Alberta; and
   - whose birthday was next.

The statistics produced for this study are derived from data obtained through random samples of communities, households and persons. For these statistics to be meaningful for an AFN Region, they need to reflect the whole population from which they were drawn and not merely the sample used to collect them. The process of going from the sample data to information about the parent population is called estimation.

The first step in estimation is the assignment of a design weight to each of the responding sampled units. The design weight can be thought of as the average number of units in the survey population that each sampled unit represents and is determined by the sample design. The design weight for a unit in the sample is the inverse of its inclusion probability. Note that for a multi-stage design, a unit's probability of selection is the combined probability of selection at each stage.

The final weight is the combination of many factors reflecting the probabilities of selection at the various stages of sampling and the response obtained at each stage. Final weights are the product of a design weight (the inverse of the selection probability) and of one or many adjustment factors (non-response and other random occurrences that could induce biases in the estimates). These design weights and adjustment factors are specific to each stage of the sample design and to each stratum used by the design.

Some communities may have been unable or unwilling to participate in the study. The design weight was adjusted based on the assumption that the responding communities represent both responding and non-responding communities. Assuming that non-response is not related to the topic of the study (missing at random), a non-response adjustment factor was calculated, within each stratum (see Appendix B for calculations).

Surveys with complex designs require special attention when it comes to estimation of the sampling error. Both the survey design and the unequal weights are needed to obtain (approximately) unbiased estimates of sampling error. Failing to do so can lead to severe underestimation of the sampling error. While exact formulae exist in theory for stratified PPS sample designs, the required computations become practically impossible as soon as the number of primary units (here, communities) selected per stratum exceeds two. The Bootstrap method was adopted for the estimation of the sampling error of the estimates produced for this study (see Appendix B for calculations).

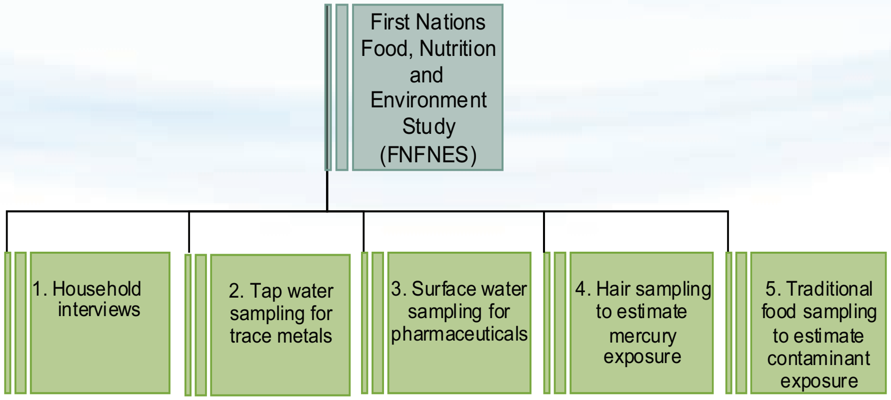
Sometimes, the sampling error might be difficult to interpret because the measure of precision is influenced by what is being estimated. For example, a sampling error of 100 would be considered large for measuring the average weight of people but would be considered small for estimating average annual income.

To resolve the apparent scale effect in the appreciation of sampling errors, coefficients of variation (cv) could be used. The cv of an estimate is a measure of the relative error rather than of the absolute error. It is very useful in comparing the precision of sample estimates, where their sizes or scale differ from one another. The cv is expressed as a percentage (see Appendix B for calculation).

In this report all results are weighted, unless stated otherwise. Their corresponding standard errors are reported unless it is greater than 33.3% of the estimated parameter, in which case the estimates parameter is identified as (-) for being unreliable.

Principle Study Components

The following chart shows the five components of the FNFNES:



1. Household interviews: Each participant is asked a series of questions that focus on foods consumed (both traditional and market food), health, lifestyle and socio-economic issues, and food security.
2. Tap water sampling for trace metals[1]: Two water samples are collected at the household level; one that has stagnated in the plumbing overnight and a second after a five minute flush. These are analyzed for trace metals.
3. Surface water sampling for pharmaceuticals: Water samples are collected from three separate sites chosen by the participating community to analyze for the presence and amount of agricultural and human pharmaceuticals and their metabolites.
4. Hair sampling to estimate mercury exposure: Hair samples are collected voluntarily from participants. Hair analysis for mercury allows estimation of the participants' exposure to mercury.
5. Traditional food sampling for contaminant[2] content: Traditional foods that are commonly consumed by members of the participating First Nation community are collected to analyze for the presence of environmental contaminants.

[1]This study determines the chemical safety of the community water supplies. The bacteriological safety is monitored by the Environmental Health Officers (EHOs).

[2]FNFNES is studying the chemical safety of traditional food. The bacteriological safety is monitored by the community's EHO.

Household Interviews

The household interview component of the FNFNES took approximately 45 minutes to complete. Participants were asked a series of questions in multiple sections described in further detail below.

Traditional Food Frequency Questionnaire

This questionnaire was developed based on previous work conducted with First Nations, Inuit and Métis in Canada (Kuhnlein, Receveur and Chan 2001). Questions sought information on frequencies of consumption of all identified traditional foods (retrospectively for the four past seasons). The traditional food list was constructed based on a review of existing literature for Alberta and input of representatives of each participant community. Table C shows the categories of frequency of consumption that were used as an aid when the respondent had difficulty recalling a more precise estimate. For the purposes of this study, each of the four seasons consisted of 90 days.

Table C. Categorization of frequency of consumption

Frequency	Average days/season
Very Rarely (< 1 day/month)	2 days/season
Rarely 1-2 days/month	6 days/season
Quite Often 1 day/week	12 days/season
Often 2-3 days/week	30 days/season
Very Frequently 4-5 days/week	54 days/season
Almost Every Day 5-7 days/week	72 days/season

24-Hour Diet Recall

The 24-hour diet recall was an "in-person" interview aimed at recording all foods and beverages (including their approximate quantities) consumed the previous day using food and beverage models.[3]

This interview used the multi-pass technique with 3 stages as follows:

1. Make a quick list of all foods consumed during a 24-hour period (the first pass);
2. Get a detailed description of the foods and beverages (brands, amounts, and amount eaten); and
3. Review the recall with the participant to see if anything was missed.

Photo by Suzanne Hajto

A subsample of 20% of the respondents were invited to complete a second 24-hr recall for later analyses using SIDE (see Data Analyses section) to partially adjust for intra-individual variation. This method allows for a better approximation of the usual diet.

[3]Plastic models that resemble food quantities to assist in determining amounts consumed.

Socio/Health/Lifestyle (SHL) Questionnaire

The SHL questionnaire incorporates several questions from the Canadian Community Health Survey 2.2 (CCHS 2.2) questionnaire (2004) and others derived from previous work with Aboriginal Peoples in Canada (Kuhnlein, Receveur and Chan 2001) as appropriate, including:

- General health
- Height and weight (either measured or self-reported)
- Vitamin and dietary supplement use
- Physical activity
- Smoking
- Food security
- Socio-demographic characteristics
- Economic activity

Photo by Kathleen Lindhorst

Food Security Questionnaire

Food security has been considered achieved by the Food and Agricultural Organization of the United Nations "... when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life" (Food and Agriculture Organization 2002).

The questionnaire used in this project is the income-related Household Food Security Survey Module (HFSSM) (Health Canada 2007) adapted from the food security module developed in the U.S. (Bickel, et al. 2000). Households are classified as food secure or food insecure (moderate or severe) based on their responses to the 18-question food-security module (10 questions for adults' status and an additional 8 questions for households with children).

Income-related food insecurity can present itself in many ways: it can range from worry about running out of food before there is more money to buy more, to the inability to afford a balanced diet, to cutting down or skipping meals or not eating for a whole day because of a lack of food or money for food. Households experiencing 'moderate food insecurity' may rely more on lower quality foods whereas 'severely food insecure' households would experience regular food shortages. To be classified as food secure, a household responded affirmatively to a maximum of one answer on either the 10 questions related to adult food security or the 8 questions related to child food security. Moderately insecure households were identified by 2-5 affirmed answers on the adult-related questions or 2-4 affirmed answers on the child-related questions and, severely food insecure households, by 6 or more affirmed answers on the adult survey section or 5 or more on the child survey section. Table D displays the categorization of food security status based on this three-category classification method.

Table D. Categorization of Food Security Status

Category labels	Category description	Score on 10-Item adult food security scale	Score on 8-item child food security scale
Food Secure	no, or one, indication of difficulty with income-related food access	0 or 1 affirmed responses	0 or 1 affirmed responses
Food Insecure, Moderate	indication of compromise in quality and/or quantity of food consumed	2 to 5 affirmed responses	2 to 4 affirmed responses
Food Insecure, Severe	indication of reduced food intake and disrupted eating patterns	≥6 affirmed responses	≥5 affirmed responses

More information on the household questionnaire is available on the FNFNES website: www.fnfnes.ca

Water Sampling for Trace Metals

Tap Water Sampling

The drinking water component aimed to collect tap water samples from 20 participating households in every community. Selection of sampling sites was based on what would be considered representative of the water distribution system, i.e. at the ends of pipelines and at miscellaneous points within the system. Maps were used to help in the selection. In addition, if a household in the community was accessing a source of drinking water that was not part of the community water supply system, such as a well, nearby spring, or a trucked water source, these were also sampled.[4]

The tap water analysis consisted of both sample collections for laboratory analysis of trace metals and on-site testing for several parameters that would assist in later interpretation of the laboratory data. At each home selected to participate in this component, two tap water samples were collected: the first draw sample was collected after the water had been sitting stagnant in the pipes for a minimum of four hours and a second draw sample was taken after running the water for five minutes, or until cold to flush out the water that had been sitting in the pipes.

[4]The Environmental Public Health Services, FNIHB, Health Canada monitors drinking water in First Nations Communities which includes weekly microbiologic monitoring, annual basic chemical monitoring and a comprehensive chemical and radiological monitoring on a five year cycle. The region maintains a database with complete and historic records on community drinking water quality and water system profiles for all the communities in Alberta.

Water Sample Preparation

Dissolved Metals: Prior to analysis, samples were filtered through a 0.45 micron pore size filter and acidified with nitric acid (using methodology based upon EPA Method # 200.1).

Total Metals: Prior to analysis samples were digested using nitric acid (using methodology based upon EPA Method # 200.2).

Analysis

In 2013, water samples were sent for analysis to ALS Global, in Waterloo, Ontario. The choice of the contract lab was based on a rigorous performance evaluation and a formal bidding process. A comprehensive quality assurance/ quality control (QA/QC) program was implemented by the analytical laboratory and the QA/QC results were verified and approved by the Principle Investigators (PIs) of the FNFNES.

Inductively Coupled Argon Plasma Mass Spectroscopy (ICP/MS) was used to perform all analysis for the elements requested (using methodology based upon EPA Method # 200.8). Mercury was determined using Cold Vapour Atomic Fluorescence Spectroscopy (using methodology based upon EPA Method # 245.7). All sample results are reported as micrograms per-litre "parts per billion" on either dissolved or total basis.

Please refer to Appendix C for detection limits.

Pharmaceuticals in Surface Water

In the last ten years there has been considerable interest concerning the occurrence of pharmaceuticals in surface water and drinking water (Aga 2008). These emerging chemicals that find their way into the environment have yet to be characterized in surface waters on-reserve.

Photo by Yongsheng Liang

This study component was undertaken to:

- Establish a baseline of agricultural, veterinary and human pharmaceuticals occurrence in surface water on-reserves in Canada;
- Determine the exposure of fish and shellfish (an important component of many First Nations' diets) to pharmaceuticals in surface water on-reserves in Canada; and
- Establish a pharmaceuticals priority list for future health and environmental effects studies.

In each community, three sampling sites were chosen by the First Nation. These sites were selected based on where fish may be harvested, at the drinking water supply intake, or other location of importance to the participating First Nation. Samples were collected by an Environmental Health Officer (EHO), from First Nations and Inuit Health Branch (FNIHB), Alberta region.

The criteria used for the selection of pharmaceuticals were: 1) levels of detection of the pharmaceuticals in the aquatic environment in previous studies; 2) frequency of detection of the pharmaceuticals in the environment in previous studies; and, 3) evidence of usage of the pharmaceuticals in First Nations communities. The First Nation usage information was provided by Non-Insured Health Benefits (NIHB), FNIHB (Booker and Gardner 2014). The FNFNES has chosen a list of 42 pharmaceuticals that meet the above criteria and can be analyzed by the laboratory that has been contracted by the FNFNES (Appendix C, Table C.10).

The pharmaceuticals in surface water samples were sent for analysis to ALS Global, in Waterloo, Ontario. The choice of the contract lab was based on a rigorous performance evaluation and a formal bidding process. A comprehensive quality assurance/quality control (QA/QC) program was implemented by the analytical laboratory and the QA/QC results were verified and approved by the PIs of the FNFNES.

Two separate 250 mL sample aliquots are required to analyze all of the target analytes. One aliquot is adjusted to pH 1.95-2.0 and mixed with 500 mg of $Na4EDTA \cdot 2H2O$. The sample is loaded onto a HLB solid phase extracting column. The column is washed with 10 mL water and eluted with 12 mL of methanol. The eluent is evaporated and reconstituted with 450 μL water and 50 μL internal standard. The extract is analyzed by LCMSMS in positive and negative ion mode. The second 250 mL aliquot is adjusted to pH 10 ± 0.5. The sample is loaded onto a HLB solid phase extracting column. The column is eluted with 6 mL of methanol followed by 9 mL of 2% formic acid in methanol. The eluent is evaporated and reconstituted with 450 μL acetonitrile and 50 μL internal standard. The extract is analyzed by LCMSMS in positive ion mode.

17α-Ethinylestradiol in Water

Ethinyl estradiol is a synthetic estrogen that is used in almost all formulations of oral contraceptive pills. Ethinyl estradiol is persistent in the aquatic environment and accumulates up the food chain. Thus, the presence of ethinyl estradiol in surface water can be harmful to aquatic life high in the food chain. For example, some species of male fish have become feminized by relatively low levels of this synthetic hormone (Nagpal and Meays, 2009).

A 20mL aliquot of the sample is loaded onto a HLB SPE column. The column is washed with 3mL of water and eluted with 3mL of methanol. The eluent is evaporated to dryness. 100 μL of 100mM sodium bicarbonate (pH 10.5) is added followed by 100 μL of 1 mg/mL Dansyl Chloride to derivatize the Ethinylestradiol. Samples are then incubated at 60°C for 6 minutes. After cooling to room temperature, the samples are diluted with 50μL of 1:1 acetonitrile: water. The extracts are analyzed by LCMSMS in positive ion mode.

Please refer to Appendix C for detection limits.

Hair Sampling for Mercury

Photo by Constantine Tikhonov

The FNFNES includes a non-invasive bio-monitoring component, relying on sampling of human hair for analysis for mercury (Hg). This sampling is done in order to use this information for additional validation of dietary assessments and to develop a new estimate of First Nations populations' exposure to mercury across Canada. The hair is collected in the early fall of each study year according to the established procedure of the Health Canada Regions and Programs Bureau Québec Region Laboratory in Longueuil, Québec. In essence, a 5 mm bundle of hair is isolated and cut from the occipital region (the back of the head), ensuring a minimal and most often unnoticeable effect on participants' aesthetics. The hair bundle (full length, as cut from the scalp) is placed in a polyethylene bag and fastened to the bag with staples near the scalp end of the hair bundle. For participants with short hair, a short hair sampling procedure is followed. For this procedure, approximately 10 milligrams of hair are trimmed from the base of the neck onto a piece of paper. The paper is then folded, stapled, and placed in a polyethylene bag.

All hair samples, accompanied by a duly filled in Chain of Custody form, are sent by the national study coordinator to the Health Canada Co-Investigator who entered the hair samples in a spreadsheet and then sends it to the Québec Region Laboratory in Longueuil, Québec for analysis. No information that could be used to identify the participant is included in the package sent to Health Canada.

In the laboratory, each hair bundle is cut into 1 cm segments, starting from the scalp end. Three segments are analyzed to provide the level of mercury in participants' hair for approximately the last three months. For short hair samples (less than 1 cm), the level of mercury is only available for less than one month (as hair grows approximately 1 cm per month). Total mercury (all samples) and inorganic mercury (all segments with levels greater than 1.0 ppm (or ug/g) which was 6.5% of the sample) in the hair are analyzed. Segmented hair samples are chemically treated to release ionic mercury species which are further selectively reduced to elemental mercury. The latter is concentrated as its amalgam using gold traps. The mercury is then thermally desorbed from the gold traps into argon gas stream, and concentration of mercury vapours is measured with a UV-detector at 254 nm wavelength using Cold Vapor Atomic Fluorescence Spectrophotometer (CVAFS). Selective reduction of the ionic mercury species allows measurement of total or inorganic mercury. The limit of quantitation is 0.06 ppm (or μg/g) for total and 0.02 ppm (or μg/g) for inorganic mercury in hair. Any unused hair left from the original bundle is reattached to the polyethylene bag and together with unused segments are returned to participants at the end of each study year.

Food Sampling for a TDS Suite of Contaminants

Traditional food samples were collected on the basis of traditional food lists compiled in each community so that collected foods represented at least 80% of the traditional foods consumed that season/year in the region.

The food-sampling strategy was as follows:

- Up to 30 food samples were to be collected from each participating community;
- The community was to identify the most commonly consumed food; the foods that are of the most concern from a nutrition or environmental perspective; and, based on existing knowledge, foods that are known to accumulate higher concentrations of contaminants; and
- Each food sample was a composite of tissues from up to 5 different animals or plants.

The traditional food samples collected were analyzed for the following categories of toxic chemicals, based on the general structure of the Canadian Total Diet Study 1992-1999:

Metals

- Trace elements and heavy metals
- Perfluorinated compounds (PFCs)
- Organochlorine residues, including Polychlorinated biphenyls (PCBs)
- Polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans (PCDD/Fs), also known as dioxins and furans
- Polybrominated fire retardants (PBDEs)

Polycyclic aromatic hydrocarbons (PAHs)

- PAH and alkylated PAH compounds

The complete list can be found in Appendix C.

All food samples were sent for analysis to ALS Global in Burlington, Ontario. The choice of the contract lab was based on a rigorous performance evaluation and a formal bidding process. A comprehensive quality assurance/quality control (QA/QC) program was implemented by the analytical laboratory and the QA/QC results were verified and approved by the PIs of the FNFNES.

Tissue Samples

Prior to digestion, samples were homogenized to provide a homogeneous sample for subsequent digestion. If required, a moisture value was determined gravimetrically after drying a portion of the blended sample at 105°C overnight.

Metals in Tissue Samples

Samples were digested using an open vessel in a combination of nitric acid and hydrogen peroxide using methodology based upon EPA Method # 200.3. Inductively Coupled Argon Plasma Mass Spectroscopy (ICP/MS) was used to perform all analyses for the elements requested. Mercury was determined using Cold Vapour Atomic Fluorescence Spectroscopy. Blanks, duplicates and certified reference materials were digested and analyzed concurrently. All sample results are reported as either micrograms per gram "As Received" or on a "Wet Weight" basis.

Perfluorinated Compounds in Tissue Samples

One gram of homogenized tissue sample undergoes an alkaline digestion using 10 mL of 10mM potassium hydroxide in methanol and shaking for 16 hours. A 5 mL aliquot of the extract is diluted with water and the pH is adjusted to 4-5 with 2% formic acid. The diluted pH adjusted extract is then loaded onto a weak anion exchange (WAX) column and the column washed with 1 mL of 25mM sodium acetate at pH 4.0. The first fraction is eluted with 3 mL of methanol to recover PFOSA. This is directly transferred to a vial for analyzed by LC-MS/MS in negative ion mode. The second fraction is eluted with 3 mL of 0.1% ammonium hydroxide in methanol to recover the remaining PFCs. This fraction is evaporated and reconstituted with 1 mL of 85:15 water: acetonitrile and analyzed by LC-MS/MS in negative ion mode.

PAH in Tissue Samples

Six grams of homogenized tissue is homogenized in dicloromethane (DCM) and filtered through anhydrous sodium sulphate. The extract is evaporated to 6 mL, and 5 mL is injected onto the Gel Permeation Chromatography (GPC) column where a fraction of the eluent is collected, concentrated, and solvent exchanged to hexane. Further clean-up is performed by eluting this extract through 7.3% deactivated silica gel and anhydrous sodium sulphate. The final extract is concentrated and solvent exchanged to isooctane. Analysis is performed using GC-MS in Selective Ion Monitoring (SIM) mode with an EI source.

Pesticides and PCBs (organochlorines) in Tissue Samples

Six grams of tissue is homogenized in dicloromethane (DCM) and filtered through anhydrous sodium sulphate. The extract is evaporated to 6 mL and 5 mL is injected onto the Gel Permeation Chromatography (GPC) column where a fraction of the eluent is collected, concentrated, and solvent exchanged to acetone: hexane (1:1). Further

Photo by Sue Hamilton

clean-up is performed by eluting this extract through PSA columns. The final extract is concentrated and solvent exchanged to isooctane. Analysis is performed for the pesticides (except for toxaphene) and PCBs using GC-MS in Selective Ion Monitoring (SIM) mode with an EI source. Analysis for toxaphene is performed using GC-MS in SIM mode with a CI source.

PCDD/F (Dioxins and Furans) in Tissue Samples

Approximately 10-12 grams of tissue is spiked with 0.5-1 ng each of 15 carbon-13 labeled PCDD/F internal standards and then digested with 80 mL of pre-cleaned concentrated hydrochloric acid. Following overnight digestion of the tissue, the samples are extracted with three 20 mL portions of 9:1 dichloromethane: acetone. The sample is placed in a pre-tared test tube and the remainder of solvent is removed by passing a gentle stream of nitrogen over the surface. The sample is reweighed for lipid concentration. The sample is placed in a vial to which 10 mL of concentrated H2SO4 is added. It is vigorously shaken and left to sit overnight to allow the layers to separate. The extract is then cleaned up on a mixed bed silica gel column (basic, neutral and acidic silica gel). The final cleanup is with basic alumina. The eluate from the alumina column is concentrated by rotary evaporator to 2 mL and final reduction to dryness is by a gentle stream of nitrogen. Recovery standard (1 ng) is added and the final volume made up to 10 μL.

All samples are analyzed on a Thermo Instruments DFS high resolution mass spectrometer coupled with a Thermo Trace gas chromatograph. The column used is a 60 m RTX-DIOXIN2, 0.25 μm, 0.25 mm internal diameter (i.d). An initial six-point calibration (CS-Lo, CS-1 to CS-5) containing all PCDD/F congeners is run covering the range of 0.1 ng/mL to 2000 ng/mL.

PBDE in Tissue Samples

Approximately 10-12 grams of tissue is spiked with 1-10 ng each of carbon-13 labeled PBDE standards and then digested with 80 mL of pre-cleaned conc. HCl. Following overnight digestion of the tissue, the samples are extracted with three 20 mL portions of 9:1 dichloromethane: acetone. The sample extract is concentrated and placed in a vial to which 10 mL of concentrated H2SO4 is added. It is vigorously shaken and left to sit overnight to allow the layers to separate. The extract is then cleaned up on a mixed bed silica gel column (basic, neutral and acidic silica gel). The final cleanup is with basic alumina. The eluate from the alumina column is concentrated by rotary evaporator to 2 mL and final reduction to 50 μL is by a gentle stream of nitrogen. Recovery standard (1-5 ng) is added and the final volume made up to 100 μL.

All samples are analyzed on a Thermo Instruments DFS high resolution mass spectrometer coupled with a Thermo Trace gas chromatograph. The column used is a 15 m DB-5HT, 0.1 μm, 0.25 mm i.d. An initial five-point calibration (CS-1 to CS-5) consisting all PBDEs is run covering the range of 0.25 ng/mL to 1000 ng/mL.

Please refer to Appendix C for detection limits.

Timeline for Data Collection

First, randomly selected communities were contacted by the Assembly of First Nations and invited to send a representative to a two-day Methodology Workshop where the study design was presented in detail. After this workshop, arrangements were made for the principal investigators (PIs) to visit each selected community to discuss the project with the Chief and Council, and, in some cases, with the community at large. The main purpose of these visits was to introduce the project in person to leadership and the larger community and to answer questions and concerns about the nature of the partnership. Following this exchange, a Research Agreement (see sample on www.fnfnes.ca) was signed by the Chief and FNFNES PIs marking the formal beginning of research activities.

Shortly after signing the community research agreement, financial arrangements were agreed upon and community members were hired and trained to be Community Research Assistants (CRAs). After training, which was conducted by Nutrition Research Coordinators (NRCs) [who are a Registered Dietitian and/or have a degree in dietetics], the CRAs carried out data collection activities that continued between the months of September and December. These activities were conducted under the supervision of the NRCs.

Ethical Considerations

This research was conducted following the "Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans" and in particular Chapter 9 research involving the First Nations, Inuit and Métis Peoples of Canada (Canadian Institutes of Health Research, Natural Sciences and Engineering Research Council of Canada 2010), and the document entitled: "Indigenous Peoples & Participatory Health Research: Planning & Management, Preparing Research Agreements" published by the World Health Organization (2010). Its protocol was accepted by the Ethical Review Boards at Health Canada, the University of Northern British Columbia, the University of Ottawa and the Université de Montréal. The FNFNES also follows the First Nations principles of Ownership, Control, Access and Possession (OCAPTM) of data (Schnarch 2004). Individual participation in the project was voluntary and based on informed written consent after an oral and written explanation of each project component.

Project direction followed agreed-upon guiding principles (see www.fnfnes.ca), which were jointly established by the Steering Committee and consultation with Statistics Canada for the sampling methodology and random sample selection. The AFN has played an active role in all aspects of providing initial and ongoing direction to the FNFNES as an equal partner in the research and regularly reports on progress to First Nations. Each First Nation that participates in the FNFNES is considered to be an equal participant and is offered opportunities to contribute to the methodology, refinement of the data collection materials, reports, results communications and any follow-up required in addition to the lead role that the First Nation plays in data collection.

The selected communities were invited to a methodology workshop where information about the project was shared. The research began with the signing of a Community Research Agreement between the researchers and the community leaders outlining the details of the research partnership. Community involvement in the project included: review and input on the methodology and data collection tools; identification, prioritization and collection of traditional food for chemical contaminant testing; identification and prioritization of surface water sampling sites for pharmaceutical testing; coordination of data collection; recruitment of community research assistants to conduct the household survey and collect household tap water samples and hair for mercury analyses; and provide feedback on the community level reports. No surveys were conducted or samples collected without the written informed consent of the participant.

The intent of this regional report is to be descriptive with an aim to generate representative estimates (i.e. min., max., mean, median, 75th percentile, 95th percentile) at the regional level (weighted estimates) and some estimates at the ecozone level for illustration of the potential geographical variability (unweighted estimates). Subsequent analyses examining the relationships between the variables studied will be the objective of separate publications.

For individuals interested in community level estimates, the respective Chief and Council need to be contacted to access the data. A backup copy of all data has been archived at the AFN and to which requests for accessing the community data must be presented. The data will not be released without the respective First Nation's approval in writing.

Data Analyses

All household survey data were entered by the NRCs into a database using Epi-Info version 3.5.4[5], with the exception of the information derived from the 24-hr recalls, which were entered by research nutritionists at the Université de Montréal, using CANDAT[6]. To ensure the accuracy of data entry of the 24-hr recalls, a sub-sample of 10% of the records were cross-checked and discrepancies reconciled. Any systematic discrepancies were also corrected throughout. For food groupings, in addition to assigning each food code to only one food group when feasible, a set of 11 multi-food group classifiers was created for complex recipes (see Appendix D).

Data analysis used SAS/STAT software (version 9.2) with regional estimates generated according to the complex survey design using the bootstrapping SAS subroutines. The SIDE SAS sub-routine[7] was used to assess nutrient adequacy, accounting for intra-individual variation, and therefore approximating usual nutrient intakes. When single bootstrap estimates were greater than the observed mean plus 4 times the standard deviation of the 1st day intake, they were deleted and resampled until they fell within the margin for inclusion in calculations of the standard error of percentiles. The 95th percent confident intervals (CI) for the percent of participants with intakes either below the Estimated Average Requirements (EAR), above the Tolerable Upper Intake Level (UL) or below, above and within the Accepted Macronutrient Distribution Range (AMDR), were obtained in a non-parametric fashion by ordering the 500 bootstraps and using the 2.5th percentile as the lower end and the 97.5th percentile as the upper end.

[5]More information about the software is available online: <http://www.cdc.gov/epiinfo>
[6]More information about the software is available online: <http://www.candat.ca>
[7]More information about the software is available online: http://www.cssm.iastate.edu/software/side/

RESULTS

This report contains information on socio-demographics, health and lifestyle practices, nutrient and food intake with comparisons to Canada's Food Guide – First Nations, Inuit and Métis (Health Canada 2007), traditional food use, income-related household food security, environmental concerns, contaminant exposure, and drinking water and hair analyses.

Sample Characteristics

Ten communities in Alberta participated in this study (Table 1). Eight of the ten communities have year-round road access while the two fly-in communities also have winter roads. Most of the participating communities are remote, located 40 to 240 km away from urban centres in Alberta. Nine communities had more than 100 households on their reserve lands, with three communities having more than 500 homes.

Data collection in Alberta was conducted from September to December 2013 in the following First Nations communities: Dene Tha' First Nation, Little Red River Cree Nation, Horse Lake First Nation, Driftpile First Nation, Mikisew Cree First Nation, Whitefish (Goodfish) Lake First Nation #128, Wesley First Nation, Chiniki First Nation, Louis Bull Tribe, and Ermineskin Cree Nation (Figure 1).

The majority of results presented in this report are based on in-person interviews conducted with a total of 609 First Nations respondents living on-reserve in Alberta. As some questions were not always answered, there are different sample sizes (n) for some of the results. All estimates presented in this report have been adjusted (weighted) whenever possible to be considered representative of all on-reserve First Nations adults in Alberta. However, some estimates are presented unweighted (Table 8, Table 12, Table 13 and Figure 31) and illustrate only geographical variation when applicable.

Table 2 provides details on the sample selected to ensure that the results were representative for First Nations adults living on-reserve in Alberta. Approximately 1279 households were randomly selected with the aim of reaching a targeted survey sample size of 990 adults. Community research assistants visited 894 homes (70% of homes selected). In the households visited, 869 adults were eligible to participate. The overall participation rate was 70% (609/869 eligible households) which is lower than the rate reported for the CCHS 2.2 (2004) at 76.5%. No formal probing was conducted to determine how participants differed from non-participants but there was a higher ratio of female participants (63%) than male participants (37%).

Socio-demographic Characteristics

Photo by Stéphane Decelles

The average age of First Nations participants in Alberta was 39 years for both women and men, and was fairly stable across both ecozones (Table 3). Figures 2a and 2b demonstrate the age group distribution of participants by gender and ecozone. In the Prairies, there were fewer female participants aged 19-30, while there were more female participants in the 71+ age group from the Boreal Plains compared to all First Nations in Alberta (Figure 2a). The percentage of male participants aged 19-30 was highest in the Boreal Plains (Figure 2b).

In participating First Nations households in Alberta, 65% of individuals were between the ages of 15-65 years of age, with children under 15 years of age representing 30%, and elders (over the age of 65), representing 5% (Figure 3). These results match closely to the percentage by age groups reported in the 2012 Registered Indian population for the Alberta region (31% under 15 years, 65% between 15-65, and 4% over the age of 65) (Aboriginal Affairs and Northern Development Canada (AANDC) 2013).

In terms of household size, the median number of people living in a First Nations household in Alberta was 6, with a range of 1 to 19 people (Table 4). One quarter (25%) of households contained 4 or more people (results not shown). Half of the adults reported that they had completed 10 years of education, while 25% had completed 12 or more years.

Figure 4 displays further results on education: about one-fifth of adults (19%) had obtained a high school diploma, 6% had obtained a general equivalency diploma (GED), 36% had obtained a vocational degree, and 9% had obtained a bachelor's degree (Figure 4). First Nations adults in the Prairies ecozone were more likely to report having obtained a vocational training certificate. In the Alberta 2008/2010 RHS, 28% of adults reported having graduated from high school (Pace and Konczi 2013).

Figure 5 shows that the main source of income was wages (49%), followed by social assistance (37%), and pension/senior's benefits (8%). Overall, 69% of households reported that at least one adult had employment (part or full-time) (Figure 6). The percentage of households reporting full-time employment ranged from 41%-62% by ecozone and 39%-68% between communities (results not shown). These findings are similar to the Alberta 2008/2010 RHS survey in which 48% reported that they were working for wages at the time of the survey, with half of the adults reported earning less than $20,000 per year (Pace and Konczi 2013). Figure 7 illustrates that a greater percentage of adults living on reserve in the Prairies indicated that social assistance was their main income.

Health and Lifestyle Practices

Body Mass Index and Obesity

Participants were asked a series of health related questions in order to understand the relationships between diet, lifestyle and health risks. Height and weight measurements were both self-reported and measured for individuals who agreed to have it recorded. In total, 512 individuals provided both measured height and weight, while 48 individuals provided only self-reported height and/or weight. Statistical differences were found between measured and self-reported body weights (underestimated by women) and heights (overestimated by both men and women). Due to this reporting bias, Body Mass Index (BMI) was calculated using both measured heights and weights when the data were available. In cases where only reported or a combination of reported and measured heights and weights were available, the BMI values were adjusted by the addition of the estimated bias value by gender. The estimated bias value is the mean difference found between the BMIs using measured and reported values using a paired t-test.

The BMI is a proxy measure of body fat based on a person's weight and height and is an index used to categorize body weights and risk of disease (See Appendix E for further information). A BMI less than 18.5 categorizes a person as underweight, while a BMI between 18.5 and 24.9 categorizes a person as normal weight. A BMI over 25 categorizes a person as overweight, while a person with a BMI over 30 is obese. People who are overweight or obese are more likely to develop health problems.

Based on their BMIs, 20% of adults had a normal or 'healthy weight', 34% were classified as overweight and 44% of adults were classified as obese (Figure 8a). Eighty-three percent of women aged 19-30, 76% of women aged 31-50 and 84% of women aged 51 and over were overweight or obese (Figure 8b). Fifty-eight percent of men aged 19-30, 77% of men aged 31-50 and 79% of men aged 51 and over were overweight or obese (Figure 8c). The 2008/2010 Alberta RHS reported that most First Nations adults were overweight (33.8%) and obese (36.2%) based on self-reported heights and weights (Pace and Konczi 2013). Nationally, the 2008/2010 RHS reported that 34.2% of First Nations adults living on-reserve were overweight and 40.2% were obese based on self-reported height and weight (First Nations Information Governance Centre (FNIGC) 2012). In the Canadian general population, based on measured weight and height data from the CCHS 2008, approximately 37% of adults aged 18 years and older were overweight and 25% were obese (Public Health Agency of Canada 2011).

Diabetes

Obesity is a major risk factor for diabetes and heart disease. Seventeen percent of First Nations adults in Alberta reported having been told by a health care provider that they had diabetes (Figure 9). Adults aged 40 and over were four times more likely to report having diabetes than younger adults (Figure 10). Type 2 diabetes was the most common form of diabetes reported (Figure 11). In order to compare with previous studies, age-standardized rates were calculated using the 1991 Canadian census data (Statistics Canada's standard for vital statistics due to its relatively current population structure). Age standardization allows for comparison of populations with different age profiles. The age-standardized rate was slightly higher at 18.4% (Table 5); nonetheless, these rates are much higher than the rate of 8.7% found in Canadian adults aged 20 and over (Public Health Agency of Canada 2011). These rates are also higher than those reported in other studies involving First Nations, Inuit and Métis communities including the RHS 2008/2010 (16.2%) (First Nations Information Governance Centre (FNIGC) 2012) and the Alberta region report (13.6%) of the RHS 2008/2010 (Pace and Konczi 2013).

In an effort to lose weight, a small percentage of adults (10%) did report that they were dieting on the day of the 24-hour recall (Figure 12a). Dieting among older women appeared to be more common than among younger women (Figure 12b).

Smoking

Over half (56%) of First Nations adults in Alberta reported that they smoked (Figure 13). Similar rates were found in the Boreal Plains (59%) and the Prairies (53%). These rates are two to three times greater than the national smoking rate of 16.1% for all Canadians aged 15 and older and 15.7% for Albertans (Reid et al. 2014). The smoking rate among First Nations adults in Alberta is similar to the 65% rate reported for Alberta and the 57% rate reported nationally in the 2008/2010 RHS (First Nations Information Governance Centre (FNIGC) 2012; Pace and Konczi 2013). Across Alberta, First Nations adults in this study smoked an average of 9 cigarettes a day (half a pack). This is lower than the Canadian average of 15 cigarettes a day and 14 reported in Alberta (Reid et al. 2014).

The high rates of smoking and diabetes are troubling from a health perspective. Smoking promotes abdominal obesity and increases the risk of diabetes by more than 30% (U.S. Department of Health and Human Services 2014). Both smoking and diabetes cause hardening of the arteries and damage to the blood vessels, thus increasing the risk of heart disease for those who smoke and have diabetes. The risk of having a heart attack is 2-3 times greater for a smoker with diabetes compared to a non-smoker with diabetes, especially in women (Willett et al. 1987). A more recent study showed that middle-aged diabetic men who smoke are at higher risk of death compared to younger, obese female non-smokers (Padwal et al. 2013).

Physical Activity

Just over half of all adults (55%) were classified as being 'sedentary' or 'somewhat active' based on an affirmative response to one of the following statements 'I am usually sitting and do not walk around very much, or, 'I stand or walk around quite a lot, but I do not have to carry or lift things often' (Figures 14a-c). Men more frequently reported that their daily activities including lifting or carrying light or heavy loads. As such men were more likely to have their activity level categorized as 'moderately active' or 'highly active'. In comparison, 42.7% of Albertans were considered 'inactive', in their leisure time in the most recent 2013 CCHS (Statistics Canada 2014b), although the methods differ slightly.

Self-perceived health

In terms of self-perceived health, only 28% of adults said their health was 'very good' or 'excellent' while 39% said their health was 'good' (Figure 15a). Adults in the 19-30 age category (especially men) were more likely to report their health as 'excellent' (Figures 15b and 15c). In the 2008/2010 RHS, 48.5% of adults in Alberta (Pace and Konczi 2013), and 44% of First Nations adults nationally (First Nations Information Governance Centre (FNIGC) 2012) reported that their health was 'excellent' or 'very good'. In stark contrast, 62.5% of Albertans and 61.3% of Canadians said their health was 'very good' or 'excellent' in the CCHS 2013 (Statistics Canada 2014a).

Traditional Food Use and Gardening

IIn Alberta, traditional food harvesting (hunting, fishing, and gathering of wild plants), is an important part of the traditional food systems and food security of First Nations communities. For this survey, community members were asked to describe their pattern of use, over the past year, for 150 traditional foods specific to Alberta. Participants shared information about their personal and family traditional food harvesting and gardening practices, as well as their perceptions about the adequacy of their current traditional food supply. Together, this information demonstrates the value of community food activities to the health of First Nations.

Nine out of 10 adults (94%) reported eating traditional food in the year preceding the interview. Over 100 different traditional foods were harvested during the year, with the types varying across communities. Table 6 shows the percentage of the population surveyed that reported eating each particular traditional food. Most First Nations adults in Alberta ate game (79%) and berries (80%), while many ate wild fish (35%), wild birds (29%), and wild plants (40%). More than half of all adults reported eating moose (67%), saskatoon berries (59%) and raspberries (54%) in the last year.

Geographically, there was great diversity in the reliance on most kinds of traditional food. In the Boreal Plains (northern to mid-Alberta), a greater proportion of adults reported eating wild game (moose, deer, elk), fish (walleye/pickerel, northern pike/jackfish, lake whitefish), birds (mallard, Canada goose, grouse), and wild plants (mint, wihkes/muskrat root), while consumption of these foods was lower in the Prairies (southern Alberta). Saskatoon berries, raspberries, strawberries, and blueberries were the most commonly eaten berries, with little difference in overall consumption by ecozone.

Table 7a summarizes the 10 traditional food species that appeared most frequently in the diet of all First Nations adults in Alberta and for consumers only (those individuals who reported having eaten a particular traditional food in the last year). Consumers reported eating moose three times a month, while mint and wihkes (also known as muskrat root or rat root) were consumed about twice a month and wild berries (saskatoons, blueberries and raspberries, strawberry) and other wild meat (deer, mallard) were eaten about once a month.

Tables 7b-7c illustrates the differences in frequency of use of the top 10 traditional foods by season and ecozone. In all parts of Alberta, moose is the most commonly eaten game meat and is consumed consistently throughout the year, while the peak use of wild berries occurred in the summer months. Fish was not a frequently consumed traditional food item in either ecozone or in all participating First Nations in Alberta.

To estimate the amount of traditional food consumed per day by First Nations adults in Alberta, the traditional food frequency of use data (Table 6) were multiplied by the average portion size reported by consumers of traditional food from the 24hr recalls (Table 8). When portion size values could not be estimated by gender and age group for some food categories due to low sample size, mean portion sizes by each category by total consumers were calculated instead. For organ meats, due to the limited number of people reporting use of organs on the 24-hour recall, an average portion size was calculated from all FNFNES regional (BC, AB, MAN, ONT) data. Since bird eggs, tree foods and mushrooms were not reported to be consumed on the 24hr recalls from Alberta, portion size values from the literature for these foods were used instead.

The average and high (95th percentile) daily intake of traditional foods, by age group and gender, for all participants (consumers and non-consumers) and consumers only, is presented in Table 9a. At the regional level, the average daily intake of traditional food by all participants was 28.9 grams (or about 2 tablespoons), whereas high or heavy consumers (those individuals eating at the upper end or the 95^{th} percentile of intake) had 149.6 grams per day (just over half a cup). Men consumed more traditional food than females.

Average traditional food intakes estimates for consumers are much higher when compared to intakes for all participants. While the average daily intake of fish for all First Nations adults in Alberta (consumers and non-consumers combined) was estimated at 2.9 grams per day, the estimate for consumers only was 8.0 grams (Table 9a). For game organs, the average intake was 1 gram/day among all participants compared to 5.2 grams among consumers. Similarly, usual consumption of birds by all participants was 4.3 grams/day and 14.9 grams for consumers only. Among all participants, the consumption of plant foods (berries, roots, greens) was 5.3 grams/day but only slightly higher at 6.3 grams for consumers only. To note, removal of non-consumers from the analyses had little effect on the average or 95th percentile intake of traditional food.

Table 9b provides a regional breakdown, for consumers only and by gender, of the top three consumed traditional foods within each traditional food category.

Lake whitefish, walleye, and northern pike were the most frequently eaten kinds of fish, with some adult females and males consuming upwards of 23.8 and 52.9 grams, respectively, of walleye daily. Moose, deer and elk were the most heavily consumed game meats while mallard, Canada goose and grouse were the most consumed wild birds. As for plants, saskatoon berry, raspberry and strawberries were the three traditional berries consumed in the greatest amount.

Traditional food intake by ecozones for consumers only is presented in Tables 10a-c. Up to 156 grams/day (or almost 2/3 of a cup) of traditional food are consumed in the Boreal Plains, compared to only 32.8 grams/day (or 2 tablespoons) in the Prairies. Information on the daily intake (mean and 95th percentile intake) of traditional foods by species for all participants only can be found in Appendix G.

Over half (65%) of all households reported participating in traditional harvesting and gathering activities such as hunting, fishing, collecting wild plants, or planting a garden in the year preceding the interview (Figure 16a). When examined by specific activity and by ecozone, a greater percentage of participants (Figure 16b) and households (Figure 16c) reported hunting and fishing in the Boreal Plains while planting a garden and collecting wild plant food was more common in the Prairies ecozone.

Forty-nine percent of all First Nations adults in Alberta reported eating vegetables from a family or community garden (Figure 17). This finding reinforces that for many communities, gardens are a significant contributor to the intake of vegetables and fruits and that sharing of garden produce is an important activity. The different kinds of garden vegetables and fruits reported to be eaten by First Nations in Alberta are listed in Appendix H. Potatoes and carrots were the most commonly consumed garden vegetables.

When asked if their household would like to have more traditional food, over three-quarters of all adults (78%) said that they would (Figure 18). Households reported that the main barriers preventing greater use of traditional food included: a lack of equipment and/or transportation, absence of a hunter in the household, and government regulations, such as firearms certification (Figure 19). Other reported barriers that limit harvesting for traditional food included: oil and gas operations, government restrictions, and forestry operations (Figure 20).

When asked openly to list the most important benefits of traditional food, the top three responses were that they were healthy, natural, and cheaper than store-bought food. As well, traditional foods were perceived to be an important part of the culture and tasty (Figure 21). As for the most important benefits of store-bought food, their availability and convenience, as well as their variety were reported most often. Participants also liked that store-bought food was healthy, was regulated for food safety, had a longer shelf life and had information available on their labels (Figure 22).

Nutrient Intake


Photo by Nancy Turner

IIn order to understand how well First Nations adults in Alberta are eating, each participant was asked to describe the types and amounts of food and beverages that were consumed within a one-day period (24 hours). Data from the 24 hour recalls were used to estimate usual food and nutrient intakes and evaluate the diet quality of First Nations adults in Alberta. The results are compared to "Dietary Reference Intakes" (Institute of Medicine 2000) and *Eating Well with Canada's Food Guide – First Nations, Inuit and Métis* (Health Canada 2007).

Dietary Reference Intakes (DRIs) are recommendations for nutrient intakes (Institute of Medicine 2000). There are four types of reference values: Estimated Average Requirements (EARs); Recommended Dietary Allowance (RDA); Adequate Intake (AI); and Tolerable Upper Intake Levels (UL). The EAR is the median daily intake that is estimated to meet the needs of 50% of the individuals in a group. The EAR is used to assess whether a group of men or women is likely to be getting enough of a certain nutrient for good health. The RDA is the amount of a nutrient that would meet the daily needs of up to 97.5% of healthy individuals in the population. An AI for some nutrients (such as potassium and sodium), is used when there is currently insufficient evidence to establish an EAR and an RDA. The UL is the highest daily nutrient intake that is not likely to pose a risk to health.

Tables 11.1-11.37 compare nutrient intakes from First Nations adults in Alberta to the DRIs. The SIDE SAS sub-routine (see methodology section), nutrient analyses were performed on data from a total of 529 participants (328 women and

201 men) to obtain the distribution (percentiles) of usual intake. While 609 interviews were completed, the nutrient data from eighty individuals were not included. Thirty-six pregnant and lactating women were excluded due to different nutrient requirements for these groups. Participants aged 71 and over were also excluded due to low sample size (n=38), as were six participants with missing age and age group values.

For specific SIDE nutrient analyses, a total of 11 records were excluded (one each for vitamin A and iron, six for vitamin C, and three for percent of energy from fat). This was due to the limited samples sizes and these extreme values made the calculation of all percentiles and standard errors very unreliable (one person ate moose liver, one took a protein supplement, six individuals drank high amounts of vitamin C- fortified fruit flavoured drinks, and three ate very little but high fat foods on the day of the recalls). However, it is to be noted that these extreme values ended up above the upper limits for iron and percent of energy from fat, respectively.

Values that are greater than 50% in the "%<EAR" column indicate a problem of inadequate intake in the population, while the values reported in the "%>UL" column indicate the proportion of the population at risk of excessive intake for a specific nutrient. For some gender and age groups, the estimate of the percentile value, as well as the level of adequacy, could not be estimated precisely enough due to the high level of variability in nutrient intake between and within individuals. Data that have been suppressed due to extreme sampling variability are indicated in the Tables 11.1-11.37 by the symbol (-).

Energy or caloric intakes reported for First Nations adults in Alberta (Table 11.1) are similar to results for the general Alberta adult population from the CCHS Cycle 2.2, Nutrition (2004). Mean energy intakes for First Nation adult males by age group were 2356 kcal/day (aged 19-50 years) and 2134 kcal/day (aged 51-70). Energy intakes for First Nations females were 1965 kcal/day (aged 19-50) and 1554 kcal/day (51-70). In the general Alberta population, energy intakes for males were 2591 kcal/day (age group 19-30), 2464 (31-50), and 2042 (51-70) while energy intakes for females were 1917 kcal/day (19-30), 1769 (31-50), and 1631 (51-70) as reported in CCHS Cycle 2.2 (2004) (Health Canada 2009).

The percentage of energy in the diet from protein, carbohydrates and fat are provided in Tables 11.30 to 11.37 and compared to the recommended levels (acceptable macronutrient distribution ratio or AMDR). The percentage of energy from protein for all adults (range of 17-21%) was within the recommended range of 10-35%. The percentage of energy from fat was above the recommended level (20-35%) for males and females aged 19-50 (Table 11.32). The carbohydrate intake was below the recommended range of 45-65% for 36.7% of males aged 19-50, 46.8% of males aged 51-70 and 37.9% of females aged 51-70. In the general Alberta population, a lower percentage of energy from protein (15.3 -17.5%) and fat (30.1-32.8%) was reported in CCHS Cycle 2.2, Nutrition (2004).

Overall, in comparison to the Dietary Reference Intakes, First Nations adults in Alberta have:

- High intakes of fat among adults aged 19-50;
- High intakes of sodium;
- Low intakes of fibre, vitamin A, vitamin C, vitamin D, calcium and magnesium;
- Low intakes of folate among older women aged 51+;
- Low intakes of vitamin B6 for older adults (aged 51+), and
- Adequate intakes for iron, vitamin B12, riboflavin, niacin, thiamin, zinc and phosphorous.

In the general Alberta adult population, there are also excessive intakes of sodium and low intakes of vitamin D, calcium and fibre (Health Canada 2009). High (excess), as well as low (inadequate), intakes can have serious consequences on health. High intake of fat is linked to obesity and saturated fat is particularly associated with heart disease. High intake of sodium (salt) has been linked to high blood pressure, which can also lead to heart disease. People with diabetes are 2-3 times more likely to develop heart disease than those without. Reducing intake of foods high in fat and sodium are key steps to promoting better health. Increasing the intake of fibre improves the intestinal transit and control of blood sugar.

Eating Well with Canada's Food Guide - First Nations, Inuit and Métis (Health Canada, 2007) describes the amount and types of food needed on a daily basis to supply the nutrients needed for good health and to lower the risk of obesity, type 2 diabetes, heart disease, some cancers, and osteoporosis. There are four food groups in Canada's Food Guide (CFG-FNIM): Vegetables and Fruit, Grain Products, Milk and Alternatives, and Meat and Alternatives. A copy of Canada's Food Guide is in Appendix I and is available online at Health Canada's website (http://www.hc-sc.gc.ca/fn-an/pubs/fnim-pnim/index-eng.php#).

When compared to CFG-FNIM, First Nations adults in Alberta do not appear to be meeting the recommendations for healthy eating (Table 12). First Nations adults in Alberta consumed more than the recommended number of servings from the Meat and Alternatives group and below the recommended intake for the other three food groups (Milk and Alternatives, Vegetables and Fruit, and Grain Products), particularly among women. One in three (35%) adults reported that they avoided specific food or beverages because of intolerance: dairy products, greasy food and spices were the most commonly avoided foods (see Appendix J). The following describes the eating patterns of First Nations adults in Alberta compared to the guidelines in more detail:

Vegetables and Fruit group: CFG-FNIM recommends that adult males have 7-10 Food Guide Servings daily while females have 7-8 Food Guide Servings of vegetables and fruit per day (a Food Guide Serving is equivalent to ½ cup (4 ounces) of a fresh, frozen or canned vegetable, berries, fruit or 100% fruit juice or 1 cup (8 ounces) of raw leafy greens). Adults from First Nations in Alberta consumed about half the minimum recommended amounts (4 servings per day by First Nations men and 3 servings per day by First Nations women). As well, a large portion of the vegetable servings came from potatoes, which are not as rich in vitamins and minerals as leafy green and orange vegetables. Not eating the recommended amount of fruits and vegetables on a regular basis can lead to low intakes of several nutrients, including fibre, vitamin A, vitamin C, magnesium and folate. These nutrients are important for several functions within the body, including: maintaining healthy skin (vitamins A and C); regulating blood pressure and bone mass (magnesium); producing healthy blood (folate and vitamin C); and reducing the risk of infection (vitamins A and C) and some cancers (fibre).

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Grain Products: CFG-FNIM recommends that adult males have 7-8 Food Guide Servings a day, while females are recommended to have 6-7 Food Guide Servings of grain products per day; half of these servings should be whole grain foods. Examples of a Food Guide Serving from the Grain Products include 1 slice of bread, a 2" x 2" x 1" piece of bannock, ½ a bagel or pita, or tortilla, and ½ cup of cooked rice. Whole grain foods, such as brown rice, wild rice, barley and oats, are a good source of fibre and have many health benefits. Foods high in fibre can help us feel full longer, and maintain a healthy body weight, as well as reduce the risk of heart disease, diabetes and cancer. Grain products are also an important source of several nutrients necessary for good health including riboflavin, thiamin, zinc, folate, iron, magnesium and niacin. First Nations men and women in Alberta fell short of the recommended number of servings from this group by 1 Food Guide serving a day.

Milk and Alternatives group: CFG-FNIM recommends that adult males and females aged 19-50 consume 2 servings from this food group per day. Adults aged 51+ are advised to have at least 3 servings a day. Examples of a Food Guide serving from this group include: 1 cup of milk or fortified soy beverage, ¾ cup of yogurt and 1 ½ ounces of cheese. This food group contains the primary sources of calcium and vitamin D which are essential for building and maintaining healthy bones and teeth. In Alberta, both male and female First Nations adults reported having 1 serving per day. This may be explained, in part, by some milk product intolerance, as reported by 14% of the respondents (see Appendix J). This low intake poses a concern for adequacy for calcium and vitamin D.

Meat and Alternatives Group: CFG-FNIM recommends that adult men consume 3 Food Guide Servings of food from the meat and alternates food group every day, while the recommendation for women is 2 servings per day. A Food Guide Serving from the Meat and Alternatives Group is equivalent to 2 eggs or 2 ½ ounces (½ cup) of wild or store bought meat, fish, poultry, shellfish, or ¾ cup of cooked beans (lentils, black beans, split peas), or 2 tablespoons of peanut butter. In this study, men consumed an average of 4 Food Guide Servings from this food group daily and women consumed 3 servings per day. Consuming more than the daily recommended amount of foods from the Meat and Alternatives group can contribute to a high fat intake and replace foods from other food groups which are consumed in low amounts.

Photo by Sue Hamilton

Overall, the food choices of First Nations men and women in Alberta are very similar, except for yogurt (which is consumed more often by women). Within each of the four food groups, there is a limited variety of foods that appear frequently (Table 13). The low consumption of whole grains, fresh berries and fruit, and the low consumption of fresh and frozen vegetables relative to the use of potatoes, are particularly problematic and points towards the need to find ways to increase their consumption to improve the intake of fibre, vitamins and minerals but decrease sodium.

Table 14 lists those foods, ranked in descending order, that are the most important contributors to each nutrient. As mentioned above, salt intakes for all age groups and fat intakes for adults aged 19-50 were above the recommended levels. The main source of fat (both total and saturated) in the diet came from pork, followed by processed meats such as cold cuts and sausages. The main source of salt came from canned soups, followed by cold cuts and sausages. Replacing processed cuts of meat with non-processed leaner meat, pork, chicken and fish, would help in reducing both fat and salt intake. Making homemade soups more often or choosing canned soups marked as 'low sodium' would also reduce salt intake. Increasing consumption of vegetables and fruit would help to increase intakes of vitamin A, vitamin C and fibre. Increasing intake of foods such as fish, milk and milk products (cheese and vitamin D fortified yogurt), calcium and vitamin D fortified beverages (such as fortified soy beverages), bannock (made with baking powder that contains calcium), and dark green vegetables and wild plants (calcium rich sources), would increase intakes of vitamin D and calcium. Finally, eating more whole grain products such as whole grain breads, cereals and pasta would increase intakes of folate and fibre.

Table 14 also demonstrates that traditional foods such as moose and fish were important sources of nutrient intake as they were major contributors to protein, vitamin D, iron and zinc, which are required for strong bones (vitamin D), proper growth, healthy blood and maintenance of muscles. Overall, 16% of the 24 hour recalls included at least one traditional food item. Moose and elk were the most commonly reported traditional foods (Table 15). The important contribution of traditional food to nutrient intake is further illustrated in Table 16. On days that traditional food was eaten, the intake of most nutrients was significantly higher than on days that only included market food. It should also be noted that intake of saturated fat, sugar, and sodium (nutrients linked with a variety of diseases) was significantly higher on days when only market food was consumed.

Table 17 shows the top 10 market foods consumed for Alberta overall and by ecozone. For the longer list of market foods consumed by adults in Alberta, see Appendix K (market foods are organized/coded using the Total Diet Study food codes). There is little variation observed in the types of foods being consumed. Soup was the most popular food consumed by First Nations adults. Water was the most popular beverage, followed by coffee. Carbonated (soft) drinks were the third most consumed beverage, with one cup consumed per person per day. When combined with fruit-flavoured drinks and iced tea, the intake of sugar-sweetened beverages averaged 1 ¾ cups per person per day. It should be noted that sugar-sweetened beverages such as soft drinks, fruit-flavoured drinks, lemonade, sweetened iced tea, sports drinks and energy drinks can increase the risk of becoming overweight, thereby increasing the risk of diabetes and heart disease (Hu and Malik 2010). Drinking water instead of these other above-mentioned beverages would be a healthier alternative.

The use of nutritional supplements increased with age, and was higher in men and women aged 51 and over compared to the younger age groups (Figure 24). Nutrient supplements reported to be taken are listed in Appendix L. Overall, the most commonly reported supplement was vitamin D, followed by multivitamin/mineral supplements and calcium. Nutrient supplements can help individuals meet their nutrient needs when the diet quality is low. Also, the need for vitamin D increases over the age of 50. As such, Heath Canada recommends that men and women over 50 take a vitamin D supplement of 10 μg (400 IU) per day (Health Canada, 2007).

Food Security

In order to gain a better picture of food security (the ability of households to access enough food) among First Nations households, a series of questions were asked about access to both traditional and store-bought food. Some of the findings about traditional food (harvesting, barriers to use) appear in the Traditional Food Use and Gardening section of this report.

As reported in the Traditional Food Use and Gardening section, while the majority of adults would like to have more traditional food in their diet, financial and household constraints (see Figure 19) prevent greater access. Forty-four percent said that they worried that their traditional food supplies would run out before they could get more (Figure 25). Almost half (49%) of the population also worried that they wouldn't be able to replace their traditional foods when they ran out (Figure 26).

Almost all participants (98%) completed the income-related Household Food Security Survey Module (HFSSM). Within the households completing the questionnaire, 68% contained children. In previous FNFNES reports, the percentages of households with children were: 58% (BC), 74% (Manitoba) and 48% (Ontario). Household responses to the 18 item food security section of the questionnaire are presented in Table 18. Examining the responses to the 18 questions in detail, 50% of households worried that their food would run out before they could buy more, 42% said that the food that they bought didn't last and there wasn't any money to get more and 43% couldn't afford to eat balanced meals. Moreover, 46% of households with children relied on less expensive foods to feed their children and 29% said they couldn't afford to feed their children balanced meals.

Based on the three categories of food security, 47% of First Nations households in Alberta were classified as food insecure: 34% of all households were classified as moderately food insecure and 13% were classified as severely food insecure (Table 19 and Figure 27). Households with children experienced greater food insecurity (50%) (Table 19 and Figure 28) than those without children (39%) (Table 19 and Figure 29). Among households with children, 50% experienced food insecurity at the child level. That is, one or more children in each of these households were food insecure in the last year (Table 19). In general, children tend to be protected from food insecurity, and particularly so from its most severe form (15% of adults with severe food insecurity vs 6% of children).

Food insecurity affects more First Nations households' on-reserve in Alberta (47%) than reported by the FNFNES in Ontario (29%), Manitoba (38%) and British Columbia (41%). Moreover, the rate of severe food insecurity in Alberta (13%) was also much higher than the rates found in Ontario (8%), Manitoba (6%) and in British Columbia (7%). Findings from the 2008/2010 Alberta region RHS also indicate a high level of food insecurity on reserve based on the percentage of affirmative responses to each question in the questionnaire. For example, 54.1% of adults reported that they had experienced food shortages, while 47.2% of adults relied on low cost foods and 24.8% cut down on food amounts. The RHS results cannot be directly compared to FNFNES findings. The Alberta RHS provided individual question results (similar to Table 18 in this report) but did not place households into one of the three food security categories based on the number of affirmative responses to each question (for further explanation on categorization, see Table D in Methodology, Food Security Questionnaire section). As well, a shorter version of the HFSSM was used in the RHS (Pace and Konczi 2013). Food insecurity rates among First Nations households on-reserve are much higher than other Canadian households. In 2012, 23.1% of Aboriginal households off reserve were food insecure (Tarasuk, Mitchell and Dachner 2014) while Statistics Canada reported that the percentage of food insecure households for the period of 2011-2012 was 8.1% in Alberta and 8.3% for all Canadian households (on reserve are not included) (Statistics Canada 2013b).

Recently, some food security experts recommended that households be classified as food secure only if all questions are answered "no". Households affirming "yes" to no more than one question on either the adult or child survey should be classified as 'marginally food insecure' (Tarasuk, Mitchell and Dachner 2013). The rate of food insecurity among First Nations in Alberta rose to 60% (Figure 30) when this approach was taken.

At the ecozone level, food insecurity was experienced in more households in southern Alberta communities. In the Prairies ecozone, 56% of households were classified as food insecure (40% moderately and 16% severely insecure), compared to 38% in the Boreal Plains (Figure 31). If re-classified using the 'marginally food insecure' category, 69% of households in the Prairies experienced food insecurity in the last year (results not shown).

Figure 32 shows that when stratified by income level, adults on social assistance reported the highest levels of food insecurity (39% moderately and 24% severely). However, 38% of households with at least one adult earning wages reported some degree of food insecurity.

A likely combination of insufficient wages, lack of employment and the high cost of food are contributing factors to high food insecurity. In each participating community, a Nutrition Research Coordinator (NRC) asked permission of the local grocery store manager to document the cost of common grocery items using Health Canada's 2008 National Nutritious Food Basket tool (Health Canada 2009). The food basket contains 67 basic food items that require preparation (see Appendix M for description and costs). Pre-packaged meals (such as pizza), non-food items (such as household supplies or personal care items) and the cost of transportation are also not included in the food basket pricing. The purchase prices of these 67 food items were obtained from grocery stores in or near each participating Alberta First Nation, as well as in Edmonton for comparison. The total costs of these items were used to calculate the weekly costs of a healthy food basket for a family of four consisting of two adults (one female and one male, aged 31-50 years) and two children (one male teenager aged 14-18 and one female child aged 4-8). The average cost of groceries per week for a family of four in Alberta was \$216. The food basket cost was calculated to be \$174 per week in the Prairies, \$229 in the Boreal Plains, and \$207 in the Taiga Plain, compared to \$204 in Edmonton (Figure 33). Food costs are included for the Taiga Plain as this information, obtained from grocery stores, is not community-level data. Costs ranged between communities from \$168 to \$377 (results not shown).

Concerns about Climate Change

When asked if they had noticed any significant climate change in their traditional territory in the last ten years, over half (61%) of total First Nations in Alberta adults said that they had (Figure 34). Climate change was mainly perceived to decrease the ability to obtain traditional food easily. It has negatively affected the growing and/or hunting season and decreased the availability of traditional food (Figure 35).

Tap Water

Drinking Water Systems

Drinking water systems which provide water to households and buildings for consumption can include Public Water Systems (PWS), Semi-Public Water systems (SPWS) and private wells.

In Alberta, there were 23 water treatment systems (WTS) serving the 10 participating communities: 19 were WTS on-reserve and operated by the First Nation communities while four were Municipal Type Agreements (MTAs). Nine of these systems received water from a groundwater source, nine received water from a surface water source, and one received water from groundwater under the direct influence of surface water (GUDI). In three communities, individual systems (wells) were the main supplier of water. Overall, six percent of households received water through a Municipal Type Agreement (Aboriginal Affairs and Northern Development Canada, Personal Communication 2014). According to AANDC, in terms of water distribution, within participating communities, 68% received water from a public water system (35% of households were connected to a piped system and 33% of households had their water delivered by truck). One third of homes (32%) were on wells (Neegan Burnside, 2011).

In each community, the water treatment operators were asked a series of questions about the water treatment and distribution system. Based on this information, the oldest water treatment plant was built in approximately 1973 and the most recent in 2012. At the time of data collection in the fall of 2013, eight of the ten communities reported that their water treatment plants were staffed by a certified operator. In one of the remaining two communities, the operators were awaiting notification if they had passed their exam. Seven communities reported that the source water was filtered. Where the water was

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not filtered, the communities indicated that the source was groundwater. All communities reported using chlorination for disinfection at the treatment plant. Most communities relied on an automatic chlorine injector system; two used a combination of automatic and manual chlorination. Chemicals used for water treatment included: sodium hypochlorite, sodium bisulphite and antiscalent (genesys LF), aluminum sulfate, chlorine and potassium, soda ash, powdered activated carbon. Five communities reported problems procuring required supplies and/or replacement parts. Six communities reported that their water treatment plant was not up to date: operators in two communities felt that the treatment plant needed to be replaced and operators in two communities indicated that upgrades were planned. In terms of the water distribution system, most communities indicated that the pipes were made of a combination of stainless steel or metal (not always specified) and plastic. Eight of the communities reported water storage tanks or reservoirs at the treatment plant.

With respect to water availability and bacteriological safety, water disruptions and drinking and boil water advisories occurred in five First Nations communities in the last year. Water disruptions were reported to have occurred due to broken watermains, cleaning of the lines, power outages or water delivery truck stoppages. Four communities reported one drinking water advisory while one community issued 14 drinking water advisories. The community which issued 14 drinking water advisories cited the presence of bacteria, coliforms, and sediment in the water as the reason for the advisories. These 14 advisories were all for problems in private well systems. There were no drinking water advisories issued in the Public and Semi-public water systems in this community. An additional "do not consume" advisory was issued in one community by Health Canada due to high chlorine levels resulting from an improperly functioning pump. Many households indicated that alternative sources of water were available. Four communities indicated bottled water was available for sale in the local community store or at the treatment plant.

Table 20 reports the characteristics of all First Nations households and plumbing systems in Alberta. The average age of a house was reported to be 22 years, with the oldest house in the study being built in 1945 and the newest house in 2013. A total of 26% of households had upgraded plumbing, 25% of households treated their water (mainly by using filters or boiling it) and 31% had outside water storage tanks. Over half of the households (58%) had plastic pipes under their kitchen sink.

Figure 36 shows that all participants have tap water, 73% drink it and 92% use it for cooking. Forty-five percent of households reported that the source of their drinking water was the treatment plant or PWS while 17% stated that their water was delivered by truck. Over a third (37%) reported that they obtained their drinking water from wells and 1% stated that they used spring water (Figure 37). The household interview results are similar to what was reported by Neegan Burnside (2011). For participants whose households did not drink it or use it to prepare food, 94% drank bottled water (Figure 38) while 76% used bottled water for cooking purposes (Figure 39). To understand whether chlorine levels in community water systems were a barrier to tap water use FNFNES asked "Does the taste of chlorine prevent you from drinking the tap water?" Over one quarter (26%) of participants answered that 'sometimes' the taste of chlorine prevented them from drinking tap water and 20% said 'yes' (Figure 40).

Tap Water Analysis

Tap water samples were collected from a range of 2 to 20 households in nine of the participating communities (12 was the average). It is the standard protocol to invite up to 20 households in each community to provide tap water samples for analysis. A total of 108 of a planned 200 household sampling plan participated in the tap water sampling component. There were four samples that were collected from alternate drinking water sources.

Metals of Public Health Concern

The FNFNES quantified ten metals that are of concern to human health when the maximum acceptable concentration (MAC) of the Canadian Guidelines of Drinking Water Quality (Health Canada 2014) is exceeded:

- Antimony
- Arsenic
- Barium
- Boron
- Cadmium
- Chromium
- Lead
- Mercury
- Selenium
- Uranium

The results of water sample testing for metals in drinking water of public health concern are listed in Table 21. Of the 108 households, an exceedance was found in the first draw sample in one home for lead and in one home for mercury. In the flushed samples there were no exceedances found for any metals of public health concern.

Lead: In the first round of sample taking (first draw), one household had a lead level above the maximum acceptable guideline of 10 µg/L. This household was in a community located in the Boreal Plains (45 µg/L). Following a five-minute flush of the household piping, all households had lead levels below the maximum acceptable guideline (ranging from below the detection limit to 2.2 µg/L). This indicates that water in this household should be should be run for several minutes before being used for drinking or cooking purposes.

Mercury: In the first round of sample taking (first draw), one household had a mercury level above the maximum acceptable guideline of 1 µg/L. This household was in a community located in the Boreal Plains (1.75 µg/L). All other households tested had mercury levels below the maximum acceptable guideline (ranging from below the detection limit to 0.20 µg/L) in the first draw and the flushed samples. The household with a mercury exceedance only had a first draw sample taken as its cistern had run dry. Follow-up testing by the community's Environmental Health Officer (EHO) found acceptable levels of mercury in this home.

Aesthetic Objective (AO) and Operational Guidance (OG) Metals Sampled

The FNFNES quantified six metals that have operational guidance values (OG) and aesthetic objectives (AO). Six metals had concentrations above the aesthetic guidelines of the Canadian Guidelines of Drinking Water Quality (Health Canada, 2014):

- Aluminum
- Copper
- Iron
- Manganese
- Sodium
- Zinc

The results of water sample testing for metals with OG and AO values in drinking water are listed in Table 22.

Aluminum:

One community had aluminum levels above the guidance value (100 µg/L):

- All 20 households from one community in the Boreal Plains had elevated aluminum levels after the first round of sampling ranging from 150 - 621 µg/L. The large number of high aluminum levels, even after the 5 minute flushed samples were taken (207 – 566 µg/L), indicated that the aluminum was originating from the water treatment plants. This plant has had a history of elevated aluminum levels in the twice yearly monitoring of the drinking water treatment plant. Health Canada has recommended optimization of the coagulation/flocculation process to limit exceedances of aluminum.

While these elevated levels of aluminum pose no health concern, the Chief and Council, the Health Canada Regional Environmental Health Manager, Alberta region and the householders have been made aware of these exceedances.

Iron:

Five communities had elevated levels of iron above the guideline of 300 µg/L:

- Eight households in four communities of the Boreal Plains had an elevated first draw levels of µg/L 345 – 4,480 µg/L. Following a 5-minute flush, six households had levels ranging from 327 – 5,500 µg/L.
- One household in one community of the Prairies had an elevated first draw level of 356 µg/L. Following a 5-minute flush, the level was below the guideline level.

While there are no health concerns, the Chief and Council, the Health Canada EHO for the communities and the householders have been made aware of these exceedances.

Manganese:

Four communities were found to have elevated levels of manganese above the aesthetic objective of 50 µg/L:

- Five households in four communities in the Boreal Plains had first round sampling levels ranging from 50.4 – 86.3 µg/L. Following a 5-minute flush, six households had levels of 78.6 – 87.5 µg/L.
- One household in one community in the Prairies had first round sampling levels of 80.4 µg/L. Following a 5-minute flush, the level was below the guideline level.

While there are no health concerns, the Chief and Council, the Health Canada EHO for the communities and the householders have been made aware of these exceedances.

Sodium:

Three communities had levels of sodium above the 200,000 µg/L limit:

- All 14 households in a Boreal Plains community had levels ranging 293,000 – 485,000 µg/L at the first round of sampling. The 5-minute flush samples ranged from 303,000 to 465,000 µg/L.
- Six households in two Prairies communities had sodium levels from 316,000 – 555,000 µg/L at the first round of sampling. Eleven households had elevated 5-minute flush samples ranging from 213,000 to 544,000 µg/L.

While not a health concern, the Chiefs and Councils, the Health Canada EHOs for these communities and the householders in the Prairies have been made aware of these exceedances.

Zinc:

One community in the Boreal Plains had zinc levels above the 5,000 μg/L guideline:

- One household had a zinc level of 6,890 μg/L after the first round of sampling. Following a 5-minute flush, the level was below the aesthetic guideline.

While there are no health concerns, the Chiefs and Councils, the Health Canada EHOs for these communities and the householders in the Prairies have been made aware of these exceedances.

Water Parameters-chlorine, pH, temperature

Chlorine: Levels of chlorine in household tap water were measured to determine where there was a minimal acceptable level for disinfection (0.2 mg free chlorine per litre of water) present. Free chlorine was not detected in 16 of the tap water samples: these tap water samples were taken in two communities where individual systems (wells), which may not have chlorine added, serve many of the households. In 24 samples free chlorine was present but levels were below the minimal recommended level for disinfection. Therefore, in at least 26% of the tap water samples taken across Alberta, levels of chlorine, where it is actively being used as a disinfectant, are below the minimal level for chlorine disinfection.

pH: The pH in tap water was measured to determine whether the water was at a neutral, acidic or alkaline level. The Canadian Drinking Water Guideline recommends that the pH in drinking water be maintained between 6.5 and 8.5 (Health Canada 2014). Water at a lower pH (below 6.5) is acidic and can leach metal from pipes and pipe fittings, resulting in a higher metal content in drinking water. Lower pH can also reduce disinfection efficiency. Drinking water with a pH above 8.5 indicates a high level alkalinity. A high alkalinity can cause scale build-up in plumbing. Levels of pH outside of the optimal range can have adverse effects on taste, odour and appearance. Low pH can give water a sour or metallic taste and cause blue-green stains in sinks and drains. Exposure to extreme high or low pH values can irritate the skin, and in sensitive individuals, may irritate the stomach. The results of pH testing of tap water in the communities surveyed did not indicate a problem. Four tap water samples in one community exhibited an acidic pH.

Temperature: Health Canada has set 15°C as the maximum temperature for drinking water as an AO. Temperature indirectly affects both aesthetics and health as it can impact disinfection, corrosion and the formation of biofilms (slime layers on pipes that can contain bacteria) in the distribution system (Health Canada 2014). On-site measurements revealed that 66% of tap water samples had temperature levels within the optimal range. Alternate water samples had temperature readings above 15°C. Only one community had tap water readings within the optimal temperature range. There is the possibility that some of the higher temperature readings are due to the drinking water being stored in an indoor or outdoor storage tank for homes which received trucked water delivery, to the hot water mixing with the cold when sampling at the tap.

Surface Water Sampling for Pharmaceuticals

FNFNES quantified the 42 pharmaceuticals listed in Table 23. These pharmaceuticals are widely used in human medicines, veterinary drugs and aquaculture as analgesics, anticonvulsants, antibiotics, antihypertensives, antacids and contraceptives. These pharmaceuticals are of concern to human and/or environmental health and have been frequently reported in other Canadian and American studies (Blair, Crago and Hedman 2013; Geurra, et al. 2014; Glassmeyer, et al. 2005; Kolpin, et al. 2002; Kostich, Batt and Lazorchak 2014; Waiser, et al. 2011; Wu, et al. 2009; Yargeau, Lopata and Metcalfe 2007).

In all, 40 samples were collected at 30 sampling sites (27 surface water sites, 2 wastewater sites in 2 communities and one groundwater site) in 10 First Nations communities in Alberta. Seventy percent of sampling sites (21/30) revealed quantifiable pharmaceuticals in nine of the communities. Seven pharmaceuticals were found in surface water; 14 pharmaceuticals were found in wastewater (Table 23). No pharmaceuticals were found in the groundwater sample.

The maximum concentrations found in the Alberta FNFNES sampling and a comparison to the highest levels reported in other Canadian, U.S. and global studies are reported in Table 24. The FNFNES results are mainly lower to those found in other wastewater and surface waters studies in Canada, the United States, Europe, Asia and Central America.

The results of the pharmaceuticals component of the FNFNES study in Alberta are summarized in Table 25 at the regional level and separately for the Boreal Plains and Prairies. As in the other sections, results for the Taiga Plains are not presented. Overall, there were 16 distinct pharmaceuticals found: seven pharmaceuticals were detected in surface water and fourteen were detected in wastewater (lagoons) sampled in two communities.

Pharmaceuticals Detected by Type and Prevalence in Surface water

The seven pharmaceuticals detected in surface water are presented below in order of the number of sites where they were detected. Reasons as to why they may have been found are provided where possible.

Atenolol was the most prevalent pharmaceutical detected in surface water. It was detected in 5 of the 10 communities sampled and 12 of the 27 surface water sites. Atenolol is a heart medication that is not highly prescribed in First Nations in Alberta (Booker and Gardner, 2014).

Caffeine was the second most prevalent pharmaceutical detected. It was detected in 6 of the 10 communities sampled and 10 of the 27 surface water sites sampled throughout the province. Caffeine is a component of the most highly prescribed pharmaceuticals in First Nations in Alberta (Booker and Gardner, 2014). The top prescribed pharmaceutical is: Acetaminophen/caffeine/codeine (Tylenol No. 1). It is also present in many coffees, teas, soft drinks, energy drinks, and foods containing chocolate.

Cotinine (a metabolite of nicotine) was detected in four communities and seven of the 27 surface water sites sampled in Alberta. An average of 80% of nicotine that is consumed by people is excreted as cotinine. Nicotine is not prescribed (e.g. smoking cessation products, such as patches and gum) in the three of communities where it was detected (Booker and Gardner, 2014) and its presence most probably reflects tobacco use.

Chlortetracycline was detected in two communities at three of the 27 surface water sites. Chlortetracycline is a veterinary pharmaceutical and it is used to treat domestic poultry and cattle. Chlortetracycline enters the environment primarily through the application of manure to fields (United States. Environmental Protection Agency (USEPA) 2009).

Metformin, an antidiabetic medication, was detected in one of the 10 communities and in one of the 27 sites sampled throughout the province. Metformin was one of the top ten prescribed medications in 2011, 2012 and 2013 in the community where it was detected (Booker and Gardner 2014).

Acetaminophen, a pain reliever and a fever reducer, was detected in one community at one site. Acetaminophen is a component of the top prescribed pharmaceutical in Alberta First Nations (Tylenol No. 1) (Booker and Gardner 2014).

Diclofenac is an arthritis medication that was detected in one community and at one site. Diclofenac was one of the 30 most prescribed pharmaceuticals in the community where it was found (Booker and Gardner 2014).

Pharmaceuticals Detected in Wastewater by Type

Two communities requested that their wastewater be tested for the presence of pharmaceuticals. In the wastewater, fourteen pharmaceuticals were detected:

- Antacid: Cimetidine was found in both lagoons.
- Antibiotics: Sulfamethoxazole was found in both lagoons. Clarithromycin and trimethoprim were found in one lagoon.
- Anticonvulsant: Carbamazepine was found in both lagoons.
- Antidiabetic: Metformin was found in both lagoons that were tested.
- Antihypertensives: Atenolol was found in both lagoons that were tested
- Anti-inflammatories: Acetaminophen and naproxen were found in both lagoons. Ibuprofen was found in one lagoon.
- Diuretic: Hydrochlorothiazide was only found in one of the two lagoons tested.
- Analgesic: Codeine was found in both Alberta lagoons sampled.
- Stimulant: Caffeine was found in both lagoons tested.
- Relaxant: Cotinine was found in both Alberta First Nation lagoons tested.

Overview of Pharmaceuticals Detected by Ecozone

The results of the pharmaceuticals found in the Boreal Plains and the Prairies ecozones in Alberta are summarized in Table 25.

Boreal Plains: Seven communities in this ecozone carried out sampling were sampled.

In surface water, six pharmaceuticals were detected:

- Antibiotic: Chlortetracycline
- Antidiabetic: Metformin
- Antihypertensives(Beta-blocker): Atenolol
- Anti-inflammatory: Acetaminophen
- Nicotine metabolite: Cotinine
- Stimulant: Caffeine

Prairies: Two communities were sampled.

In surface water, four pharmaceuticals were detected:

- Antihypertensive (Beta-blocker): Atenolol
- Anti-inflammatory: Diclofenac
- Nicotine metabolite: Cotinine
- Stimulant: Caffeine

In wastewater, 14 pharmaceuticals were detected:

- Analgesic: Codeine
- Antacid: Cimetidine
- Antibiotics: Clarithromycin, Sulfamethoxazole, Trimethoprim
- Antidiabetic: Metformin
- Antihypertensive (Beta-blocker): Atenolol
- Anti-inflammatories: Acetaminophen, Ibuprofen, Naproxen
- Anticonvulsant: Carbamazepine
- Diuretic: Hydrochlorothiazide
- Nicotine metabolite: Cotinine
- Stimulant: Caffeine

FNFNES Alberta Region findings compared to Pharmaceutical Guidelines:

Ambient Guidelines

Currently only one pharmaceutical in Canada has an ambient water guideline level, 17α-Ethinylestradiol at 0.5 ng/L in the province of British Columbia (Nagpal and Meays 2009). This pharmaceutical was not detected in the surface water of First Nations communities in Alberta. The European Commission (EC) has proposed a freshwater Environmental Quality Standard of 0.035 ng/L for Ethinylestradiol. No Alberta site would exceed the EC's proposed guideline (Scientific Committee on Health and Environmental Risks (SCHER) 2011).

The EC has also proposed a freshwater Environmental Quality Standard of 100 ng/L for Diclofenac. No Alberta FNFNES samples exceeded the proposed Diclofenac guideline (Scientific Committee on Health and Environmental Risks (SCHER) 2011).

Drinking Water Guidelines

There are no Canadian Drinking Water Quality Guidelines for pharmaceuticals. Australia has set a drinking water guideline for water recycling that includes six of the pharmaceuticals found in Alberta: acetaminophen, diclofenac, chlortetracycline, cimetidine, metformin and caffeine (Australian guidelines for Water Recycling 2008). In addition, the state of California has developed Monitoring Trigger Levels (MTLs) for potable water reuse for four of the pharmaceuticals found in Alberta: acetaminophen, diclofenac, atenolol and caffeine (Anderson, et al. 2010). The state of New York has established standards for: acetaminophen, caffeine and cotinine (New York City Environment Protection 2011). No Alberta FNFNES samples exceeded these guideline levels. The comparison of the Alberta results to drinking water guidelines in Australia, California and New York is provided in Table 26.

The concentrations of the pharmaceuticals found in the Alberta FNFNES study should not pose a threat to human health. In several communities there are as many as four pharmaceuticals in the surface water. It is unknown at this time the health effects from drinking the water from these surface water sites over a prolonged period.

Mercury in Hair Results


Photo by Kathleen Lindhorst

Of the 609 FNFNES participants in Alberta, 369 agreed to have their hair sampled and tested for mercury. This represents about 61% of the respondents to the household surveys. Therefore, mercury component weights were calculated based on data from 369 actual First Nations participants. The weighted results are presented in Table 27.

Health Canada has a mercury guideline of 2 μg/g in hair (8 ppb mercury in blood) for children, women of childbearing age and 6 μg/g in hair for adult males and older women (20 ppb mercury in blood). There were two exceedances (one male in the 51-70 age category and one female of child bearing age) of the Health Canada mercury biomonitoring guidelines (0.5% of the sample). The arithmetic mean of mercury concentration in hair among the adult Alberta First Nations population living on reserve (sample data weighted) was 0.19 μg/g, while the geometric mean was at 0.08 μg/g. However, as more than 40% of the sample was below the level of detection (LOD), these means are not reliable. The only weighted means with the LOD below 40% were for the age category of 51+ (which is expected to have higher exposure), with an arithmetic mean of 0.38 μg/g (CV=44%, thus estimate considered unreliable) and a geometric mean of 0.14 μg/g (CV=31.6%).

For women of childbearing age (19-50 age category), the means also can't be used, as about 55% of the sample was below the LOD. The distribution of mercury in hair among the 90th and 95th percentile of Alberta First Nations living on reserves, presented in Table 27, indicate that mercury body burden is below the established Health Canada mercury guideline of 6 μg/g in hair (0.77 μg/g +/- 0.46). The data also suggests that the exceedances of the guideline could be present in the 95th percentile of First Nations males in the 51+ age category.

The entirety of the weighted data is characterized by high variability, coupled with a large proportion of the sample in different age categories in both genders that tested below the LOD.

The analysis by ecozone demonstrated a difference in the profiles of mercury exposure among the study participants from one ecozone to the other. Figures 41a and 42a illustrate that more northern ecozone of Alberta (Boreal Plains) is characterized by greater frequency of higher exposures to mercury in comparison with the Prairies. In general, however, these results suggest with some certainty that mercury exposure is not generally a significant issue for First Nations in Alberta.

Table 27 also suggests that for the majority of the First Nations population living on reserves in Alberta there is a clear pattern of increasing mercury exposure with age, a common phenomenon in mercury exposure.

Food Contaminant Results

A total of 467 food samples representing 37 different types of traditional foods were collected for contaminant analysis. To estimate the daily contaminant intake from traditional food, the average amount of traditional food consumed per day by First Nations in Alberta was first calculated by multiplying the average portion size (Table 8) times the frequency of consumption (Table 6). These values were then multiplied by the amount of contaminants measured in the food samples to estimate contaminant exposure level.

Contaminant exposure analyses were completed using the Hazard Quotient (HQ) method. In this approach, the daily contaminant intake is divided by the provisional tolerable daily intake (PTDI) guideline level (HQ=intake/PTD). The PTDI level represents the daily exposure to a contaminant that is unlikely to have an adverse health affect over a lifetime. The risk of harm will be negligible if the HQ is 1 or less. The HQ was calculated for both the average traditional food consumer (average intake/PTDI) and the heavy traditional food consumer (95th percentile intake/PTDI.)

Heavy Metals

Table 28 presents the concentrations of four toxic metals in the Alberta traditional food samples. These metals include arsenic, cadmium, lead, and mercury. Mercury is further analyzed to quantify the more toxic form of methylmercury.

Tables 29a-d shows the top 10 traditional food contributors of arsenic, cadmium, lead and mercury in the diet, for the Alberta region and at the ecozone level.

Arsenic: Since rabbit/hare, walleye and moose meat were eaten most often, they were the main traditional food sources of arsenic (Table 29a). However, the arsenic accumulated in animal tissues is mainly in a non-toxic organic form known as arsenobetaine (AB) and should not be of any safety concern (Agency for Toxic Substances and Disease Registry (ATSDR) n.d.). For both the average and heavy traditional food consumers, the HQ values for arsenic were lower than 1, therefore the risk of harm is negligible based on current consumption (Tables 29a and 30).

Cadmium: Higher levels of cadmium were found in samples of kidney (moose, deer and rabbit) and moose liver. Higher concentrations of cadmium are found in the liver and kidneys of mammals as they tend to accumulate in these organs. Based on their reported use, the main traditional source of cadmium in the diet was moose kidney (Table 29b). For both the average and heavy traditional food consumers, the HQ values for cadmium were lower than 1, therefore the risk of harm is negligible based on current consumption (Tables 29b and 30).

Lead: Among the samples collected, higher levels of lead were found in samples of game meat (bison and rabbit), and wild birds (partridge and grouse). The main traditional sources of lead in the diet were bison and rabbit (Table 29c). This is likely to be from lead residuals in lead shot or lead-containing ammunition. Due to the elevated levels of lead, particularly in the widely consumed traditional foods such as dried bison meat, further investigation is needed to confirm the source.

For both the average and heavy traditional food consumers, the HQ values for lead were lower than 1, therefore the risk of harm is low based on current consumption (Tables 29c and 30). However, these results should be treated cautiously because of the recent findings that there is no threshold for lead toxicity. Therefore, any lead exposure will lead to adverse effects, particularly among children. Because of these findings, Health Canada no longer uses the HQ approach for risk assessment. For consistency with other regions, FNFNES has undertaken risk exposure using the TDI to serve as a preliminary screening. A more comprehensive approach that monitors background exposure including all sources of lead (including market food and drinking water) is needed to characterize the additional risk of lead exposure from traditional food consumption. FNFNES will work with the participating communities to identify the sources of lead in their environment and coordinate a comprehensive risk assessment with the relevant public health authorities.

It has been widely reported that lead concentrations can reach high levels in game animals as a result of contamination from lead bullets and shot (Pain, et al. 2010). Therefore, it is important to raise awareness of the potential risk of eating any waterfowl and game killed by lead shot. Lead ammunition can shatter into fragments too small to detect and remove (Bellinger, et al. 2013). A study in Minnesota found that only 30% of lead fragments were within 2 inches of the exit wound: some lead fragments were found 18 inches away from the exit hole. Rinsing the meat is not effective as it merely spreads the lead fragments (Grund, et al. 2010).

Mercury: There were higher levels of the more toxic form of mercury, known as methyl mercury, in samples of pike and walleye. Walleye and northern pike were the main traditional food sources of mercury in the diet (Table 29d). Higher levels of mercury are commonly seen in Alberta in predatory fish such as walleye, northern pike, and trout due to bioaccumulation and biomagnification along the food chain.

For the adult population, both the average (average/PTDI) and high end (95th percentile/PTDI) HQ values for mercury were lower than 1, therefore the risk of harm is negligible based on current consumption (Table 29d and 30).

Table 31 shows the exposure estimates for mercury for female participants of child bearing age. Due to the susceptibility of the fetus to mercury toxicity, the PTDI for women of child bearing age (as well as teenagers and children) is lower at 0.2 µg/kg/day. The HQs for both the average and the high end consumers (95th percentile intake) using the average and maximum mercury concentrations in food were below 1, which means that the risk of mercury exposure is low.

Exposure estimates for heavy metals were analyzed at the ecozone level for consumers only (Tables 32a-b). Except for cadmium for high consumers in the Boreal Plains (Table 32b), the risk of heavy metal exposure appears to be negligible in all ecozones. Table 33 demonstrates that the risk for mercury exposure for women of child bearing age was also low.

Although the risk of exposure to cadmium was low based on the HQs, some community members did have higher intakes of this metal due to greater consumption of organ meat, such as kidney and liver from moose or deer. As cigarettes are a source of cadmium, smokers who consume large amounts of organ meat are at greater risk of cadmium toxicity. Additionally, the use of steel shot is recommended instead of lead shot, since the consumption of game contaminated by lead containing ammunition may increase the risk of lead exposure.

The relationship between the estimated dietary mercury exposure from traditional food and hair mercury levels was investigated using correlation analyses. Dietary intake of mercury was correlated with hair mercury for all adults (Pearson correlation coefficient=0.31), (Figure 43) and for women of child bearing age (Pearson correlation coefficient=0.33), (Figure 44).

Polycyclic Aromatic Hydrocarbons (PAHs)

Table 34 presents the concentrations of polycyclic aromatic hydrocarbon (PAH) in selected traditional food samples from Alberta. Because of the concern of pollution from the oil and gas industry, additional analysis on PAH metabolites, collectively known as alkylated PAHs are included in the testing of Alberta samples. The list of PAH and alkylated PAH compounds measured can be found in Table C.9 in Appendix C.

Dried elk meat and dried bison meat samples had the highest PAH and alkylated PAH concentrations. Since no fresh samples were collected from the same communities, it is not possible to confirm whether the elevated PAH was a result of the meat smoking process. A controlled study is recommended to study the background level of PAH in fresh elk and bison meat and how smoking/drying methods can affect the PAH concentrations. Elevated PAH and alkylated PAH were found in mallard duck samples. A more detailed geographical analysis relating the harvest location and the PAH profile is needed to investigate the potential sources of PAH in the mallard duck samples. Rat root, an aquatic plant that is commonly used as traditional medicine, was found to accumulate high PAH and alkylated PAH concentrations. This food may be a good bio indicator that can be used to reflect the level of PAH contaminant in the local aquatic environment.

Fish at higher trophic levels like walleye showed higher PAH levels than those at lower trophic level such as Arctic grayling and whitefish. Smoked whitefish also showed higher PAH concentration than raw whitefish, again suggesting the need of studying the effects of food preparation on PAH concentrations. The alkylated PAH concentrations in the northern pike sample was about 10 times higher than the PAH concentrations. This result supports the current belief that alkylated PAH is bioaccumulative and potentially biomagnifiable along the food chain. All species of berries showed low PAH concentrations but the alkylated PAH concentrations were 3-10 times higher. These results suggest that PAH and alkylated PAH may come from different sources, either from the soil or from air pollution. Further studies are needed.

As the main objective of FNFNES is to estimate the risk of contaminant exposure, all the high molecular weight (HMW) PAH concentrations are expressed as toxic equivalencies (TEQs) (Nisbet and LaGoy 1992) to integrate the combined effects of all the HMW PAH congeners; low molecular weight (LMW), PAHs were assessed separately. In general, consumption of traditional foods by First Nations adults at amounts associated with average and heavy consumption is not expected to pose an unacceptable health concern based on the reported HMW PAH TEQs and LMW PAH concentrations. The total daily intake of PAH (TEQ) was estimated to be below the TDI (Table 39) suggesting that the risk of health concern among general consumers is low. However, the mean level of 79.96 ng TEQ/g in dried bison meat and 19.2 ng TEQ/g in mallard duck meat were higher than the screening values for fish proposed by Alberta Health (2-22 ng TEQ/g for fish and 6.73 TEQ/ for subsistence fish consumption). Therefore, some heavy consumers of dried bison meat and mallard duck may be exposed to elevated levels of PAHs; a more comprehensive risk assessment focusing on the consumption of these food items is needed. When HMW PAH TEQs for moose, elk and fish are considered as a whole, exposure to HMW PAHs from the consumption of these foods is not expected to pose a health concern. However, limited samples of moose, elk and fish contained elevated levels of HMW PAH TEQ concentrations relative to other samples within the given food category: if heavy consumers were to regularly consume these traditional foods that had the highest estimated PAH TEQ concentrations, they might be exposed to HMW PAHs levels exceeding the guideline level.

A more comprehensive characterization of potential risks associated with HMW PAH exposure from consumption of these traditional foods that will include detailed analysis on the sample locations of food samples that contain notably elevated PAH concentrations, and identification of local polluted sites, is needed. FNFNES is planning to work with the participating communities, Environment Canada and the government of Alberta to compare data and plan further monitoring studies to identify the sources of PAH pollution.

Persistent Organic Pollutants

Organochlorines: Table 35 shows the concentrations of organochlorines including: hexachlorobenzene, p,p-DDE, total PCBs, trans-Nonachlor and toxaphene in selected traditional food items. All concentrations were very low at the parts per billion level and the variations in concentrations were largely due to the different fat content in different foods.

Polybrominated diphenyl ethers (PBDEs): Concentrations of the fire retardant chemicals, polybrominated diphenyl ethers (PBDEs) are presented in Table 36. The concentrations were all very low at the parts per billion level. The highest concentration was found in the trout samples: however, there is no concern of exposure to PBDEs from eating any of the food sampled.

Perfluorinated compounds (PFCs): Table 37 presents the concentration of perfluorinated compounds (PFCs) in selected traditional foods. The highest concentration was found in the arctic grayling samples. However, there is no concern of exposure to PFCs from eating any of the food sampled.

Dioxins and Furans– [Polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans (PCDD/Fs)]: Table 38 presents the concentrations of dioxins and furans expressed as toxic equivalent quotient (TEQ) in selected traditional foods. Only trace amounts were found in most food. The highest concentration among the samples was found in arctic grayling samples. The reason for this is not known, however, there is no concern of dioxin and furan exposure in any of the food sampled.

Table 39 shows the result of estimated daily intake of organic contaminants including HCBs, DDE, PCB, Chlordane, Toxaphene, PAH, PFOS, PBDE, Dioxin and Furan using the average concentrations respectively. All the HQs were well below 1, indicating that there is negligible risk of exposure to these contaminants through consumption of traditional food. When stratified by ecozones and for consumers only, the risk for PCB exposure from traditional food in all ecozones was also negligible (Table 40).

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Photo by Suzanne Hajto

CONCLUSIONS

This is the first comprehensive study addressing the gaps in knowledge about the diet, traditional food and environmental contaminants to which First Nations in Alberta are exposed. The overall results indicate that traditional food is safe to eat and contributes important nutrients to the diets of First Nations adults in Alberta. However, on average, there are excess intakes of fat and sodium (salt), and inadequate intakes of fibre, vitamin A, vitamin B6, vitamin C, vitamin D, calcium and folate. High rates of obesity, smoking and diabetes are major health issues for First Nations in Alberta. Moreover, food insecurity is a major concern.

These findings highlight the need to continue to build upon current efforts at the community, regional, provincial and national levels to improve food security and nutrition in First Nations communities through a social determinants of health approach. It is recognized that across the AFN regions, there are many community-led initiatives currently addressing these issues, such as community gardens, community sponsored harvests, traditional sharing, inter-generation training. Some programs are partially funded by the Health Canada supported Canada Prenatal Nutrition Program and the Aboriginal Diabetes Initiative. As the results of this report indicate, however, further work is needed.

Additional potential activities that have the potential to improve nutrition and food security in First Nations communities could include: subsidized community agriculture (such as greenhouses and freezers), bulk buying programs (such as the Good Food Box and Buying Club programs), and nutrition education and cooking programs (such as community kitchens). Policies that promote healthy meals at preschool, school and community events would also reinforce the importance of healthy food choices for better health of all community members. *Eating Well with Canada's Food Guide - First Nations, Inuit* and *Métis and Healthy Food Guidelines for First Nations Communities*, by the First Nations Health Council in B.C. (both available online), are two resources designed to assist communities to promote and serve healthier food in schools and at community events. Both can assist communities in developing healthy food policies. The Healthy Food Guidelines provide an expanded list of appropriate foods for all kinds of community settings. Appendix N of this report, adapted from the First Nations Health Council's Healthy Food Guidelines, contains a listing of the types of foods to serve (and not serve) at community events.

While these programs, activities, and policies can have a valuable impact on the nutrition of community members, it is imperative that progress be made to reduce the gaps in income, education and the burden of illness seen in First Nation communities. In addition to food security, issues of food sovereignty have been identified. Many First Nations reported no involvement in the decision on the variety of food products available in stores in the communities. Others have reported various restrictions on traditional food harvest. Self-determination for First Nations and respect for Aboriginal and Treaty rights may lead to greater control of food systems in a way that positively affects food security and the environmental health of First Nations communities.

There is generally no health concern regarding the trace metal levels in the drinking water of the participating households but close monitoring is warranted as water sources and the level of water treatment vary greatly between and even within each community. With respect to bacteriological safety of water, although no tap water samples were tested for the presence of pathogens, water parameters (chlorine and temperature), which can indirectly impact health, were measured. Overall, 44% of samples had temperature levels measured above 15°C (more than 10% of samples had readings over 20°C) and 27% of samples had levels of free chlorine below disinfection levels. These levels indicate that additional monitoring may be warranted.

The levels of pharmaceuticals found in the surface water of Alberta should not pose a threat to human health. Our results also suggest that there is no wide spread problem of sewage contamination of the sources of drinking water supply, important fishing ground and/or recreational waters. However, in several communities there are as many as four pharmaceuticals detected in the surface water. The health effects from drinking the water from these surface water sites over a prolonged period are unknown at this time; it is also unknown whether there are any effects on the fish and wildlife in the river/lakes.

Contaminant levels in most traditional food samples collected were low and should pose no health risk to the average consumer when consumed at the current rate. However, at the Boreal Plains ecozone level, an elevated risk to cadmium was found among high consumers of organ meat. As cigarettes are a source of cadmium, smokers who consume large amounts of organ meat are at greater risk of cadmium toxicity.

Both the hair sampling and diet estimate results showed that there is minimal concern for mercury exposure. However, elevated lead concentrations were commonly found in game meat (such as bison, deer, partridge, caribou and rabbit). A likely source of the lead is the contamination from ammunition. Hunters should be using steel shot rather than lead shot to avoid exposure to lead that could be hazardous, particularly to children. In addition to lead shot, any ammunition can be a source of lead as well. Education efforts are also needed to advise hunters to cut away or avoid the part of the meat surrounding the bullet entry point: rinsing the meat is not effective as it can spread the lead fragments. Elevated levels of PAHs were found in dried meat, mallard duck, rat root and some fish samples. The sources of PAHs need to be identified. The health risk of current exposure among average consumers is low. A more comprehensive risk assessment is needed for heavy consumers.

The data collected in this report will serve as a benchmark for future studies of this type to determine if changes in the environment are resulting in an increase or decrease in concentrations of chemicals of potential concerns, and how diet quality will change over time. Results of the study have also identified the important food species/parts that are commonly consumed and/or showed elevated levels of contamination in each participating community. They can serve as useful biomarker species for future monitoring programs. Some of the participant communities have already expressed an interest in conducting such a follow-up study in five or ten years' time.

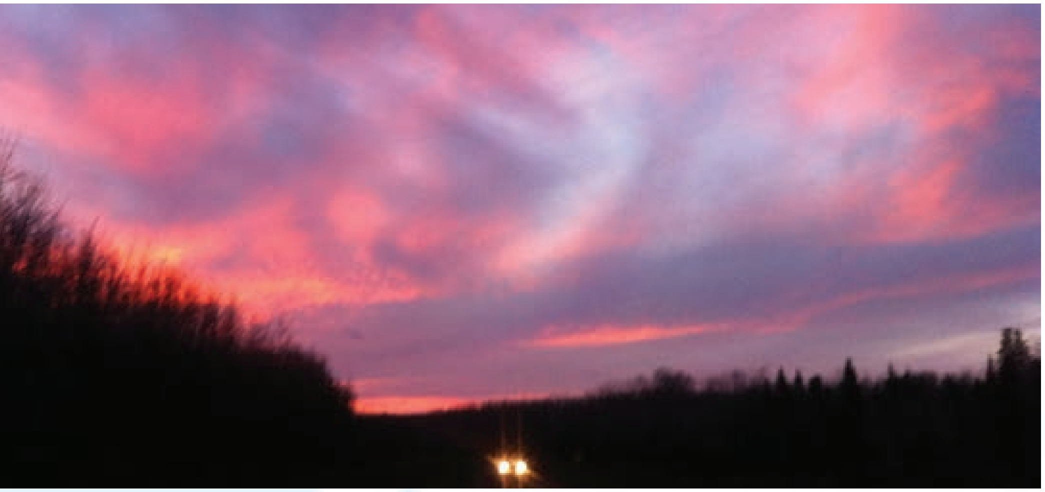


Photo by Stéphane Decelles

Highlights of results:

1. The diet of First Nations adults in Alberta does not meet nutrition recommendations and needs, but the diet is healthier when traditional foods are eaten.
2. Overweight/obesity, smoking, and diabetes are major public health issues.
3. Household food insecurity is a major issue.
4. Water quality, as indicated by the trace metals and pharmaceutical levels, is overall satisfactory, but close monitoring is warranted as water sources and water treatment vary greatly.
5. The overall mercury exposure, as measured in hair samples and calculated through dietary estimates, is low.
6. Levels of chemical contamination of traditional food are generally low and together with the limited consumption, the total dietary contaminant exposure from traditional food is low.
7. Elevated levels of lead and PAH were found in some food items. More detailed studies on sources and exposure to lead and PAH are needed.
8. Future monitoring of trends and changes in the concentrations of environmental pollutants and the consumption of key traditional foods is needed.

A summary of the study results from Alberta can be found in Appendix O.

TABLES AND FIGURES

Sample Characteristics

Table 1. Participating First Nations communities in Alberta

Ecozone	Name of participating community	Number of participants	Location relative to urban centre	Access	Registered population total /on-reserve 2012	Number of homes in communities
Taiga Plains	Dene Tha' First Nation	50	Three community locations situated 1, 80 and 100 km away from High Level	Year-round road	2897/2024	507
Boreal Plains	Little Red River Cree Nation	51	Three settlements; located > 140 km away from High Level	Fly-in; winter road	5130/4493	558
	Horse Lake First Nation	68	Two settlements, located > 40 km away from Grande Prairie	Year-round road	1078/472	116
	Driftpile First Nation	80	One community settlement 48 km from High Prairie	Year-round road	2587/926	254
	Mikisew Cree First Nation	43	Settlements located more than 240 km from Fort McMurray	Fly-in; winter road	2931/779	90
	Whitefish (Goodfish) Lake #128	100	Settlement located 60 km away from St. Paul	Year-round road	*1778	308
	Wesley First Nation	56	Three settlements adjacent to Cochrane	Year-round road	1768/1594	313
	Chiniki First Nation	28	Three settlements adjacent to Cochrane	Year-round road	1709/1561	323
Prairies	Louis Bull Tribe	84	Settlement located 29 km away from Wetaskiwin	Year-round road	2161/1737	284
	Ermineskin Cree Nation	49	Two community locations situated 13 km and 39 km away from Wetaskiwin	Year-round road	4367/3382	503

*Information for Whitefish (Goodfish) Lake #128 obtained from website as AANDC data includes Saddle Lake pop. Population was taken from community website at http://www.wfl128.ca/

Figure 1. Map of participating First Nations communities in Alberta and by ecozones

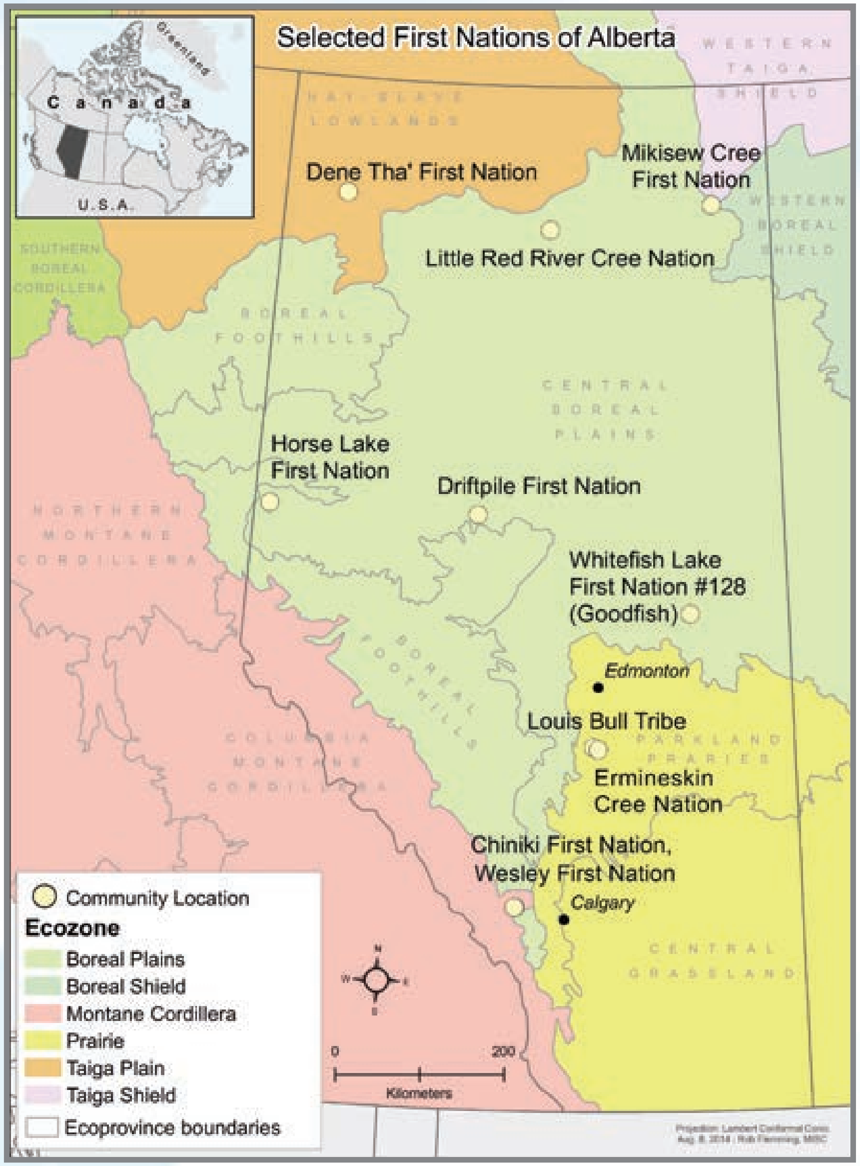


Table 2. Number of First Nations households in Alberta surveyed and participation rate, by ecozone/culture area and total

Sampling characteristics		Boreal Plains	Prairies	All participating First Nations in Alberta
On-reserve and crown land Registered population 2013[1]		11603	5119	18746
On-reserve Registered population 2013, 19 years +[1]		6549	2710	10636
No of occupied households (HHs)		1962	787	3256
No. of HHs selected to participate[2]		928	226	1279
Targeted survey completion		790	200	990
No. of HHs contacted		653	162	894
Not eligible		5	0	6
	Reason for non-eligibility	under 19 years of age, cognitive delays, not living on-reserve	n/a	under 19 years of age, cognitive delays, not living on-reserve
	vacant homes	19	0	19
No. of eligible HHs		629	162	869
HH Non-response	Refused	143	7	160
	Not home during interview period	51	9	68
	No. of incomplete records	9	13	32
No. of HHs (participants) that participated (complete records[3])		426	133	609
No. of participating females		277	83	387
No. of participating males		149	50	222
HH Participation rate (# of participating HHs/ # eligible HHs)		68%	82%	70%

[1] (Aboriginal Affairs and Northern Development (AANDC) 2014). Non-published information as of December 31, 2013 from Indian Registration System (IRS) obtained through information request from FNIHB, [Alexander Bevan]

[2] A random sample of up to 125 HH's per community was done to account for non-response when possible

[3] complete records= completed all parts of questionnaire (traditional food frequency, sociodemographic, food security and 24hr recall)

Socio-demographic Characteristics

Table 3. Average age (SE) of participants

Gender	Boreal Plains	Prairies	First Nations adults in Alberta
Women	41 (1.5)	36 (6)	39 (2.3)
Men	39 (2.1)	39 (11.3)	39 (4.5)

Figure 2a: Percentage of female respondents in each age group in the Alberta region and by ecozone (n=385)

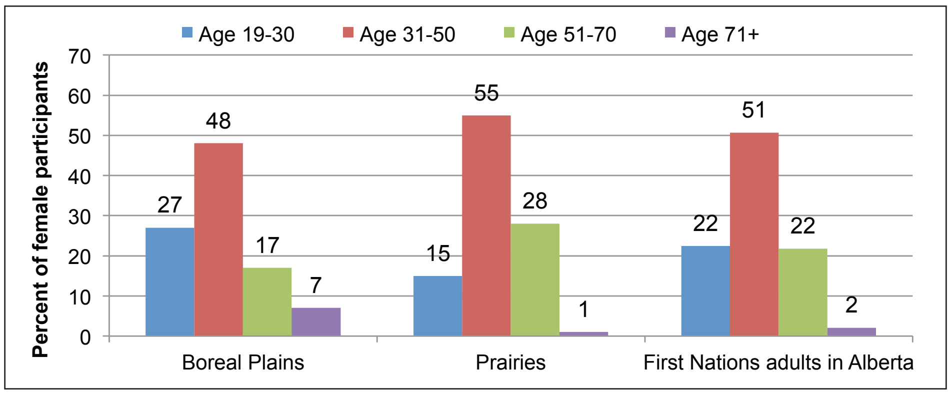


Figure 2b: Percentage of male respondents in each age group, in the Alberta region and by ecozone (n=218)

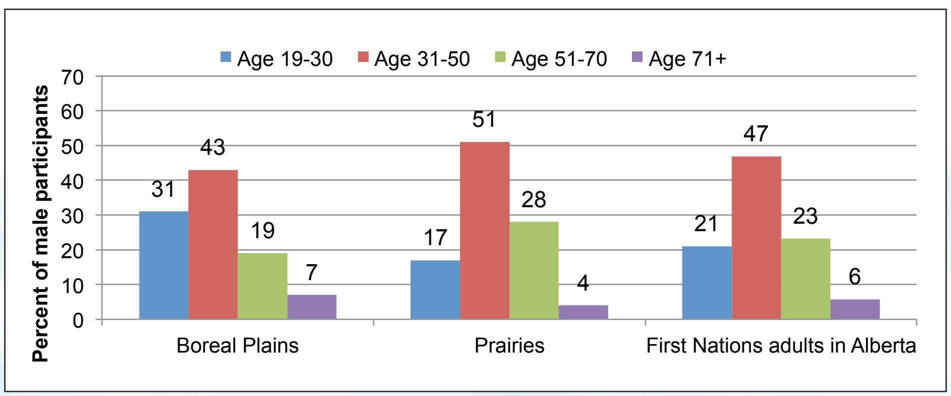


Figure 3. Percentage of household members by age group, First Nations in Alberta (n=609)

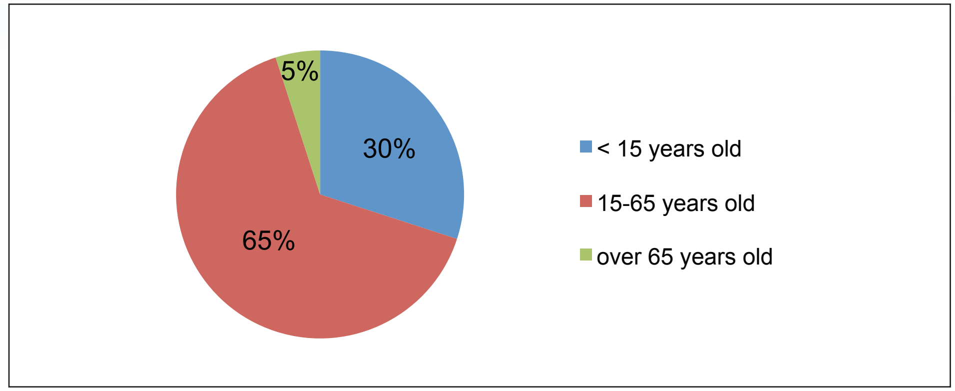


Table 4. Household size and years of education of First Nations adults in Alberta

Household size and Education	Median (range)		
	Boreal Plains (n=426)	Prairies (n=133)	First Nations adults in Alberta (n=609)
Number of people living in the household	6 (1, 15)	6 (1, 19)	6 (1, 19)
Number of years of school completed	10 (0, 19)	10 (4, 20)	10 (0, 20)

Figure 4: Diplomas, certificates and degrees obtained, by ecozone (n=609)

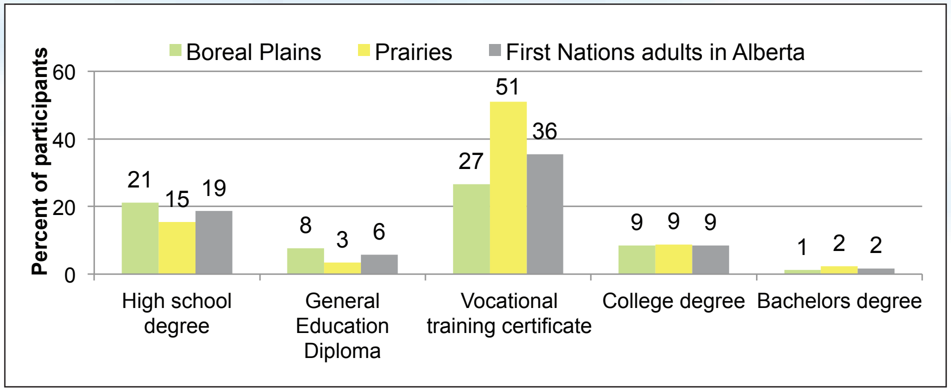


Figure 6. Levels of full-time and part-time employment among First Nations households in Alberta

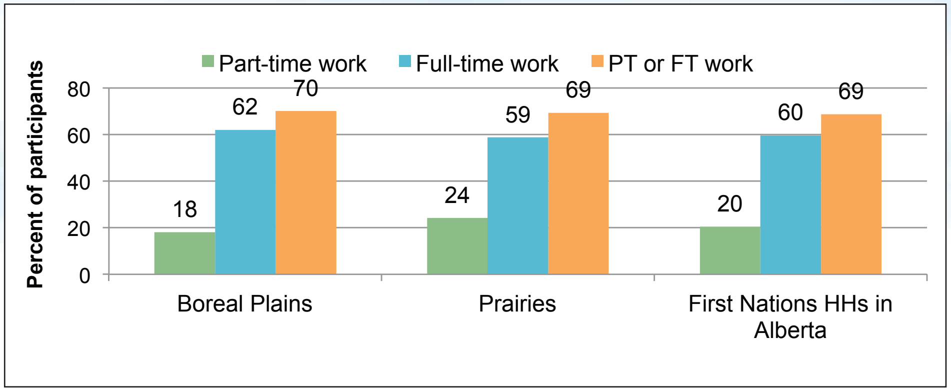
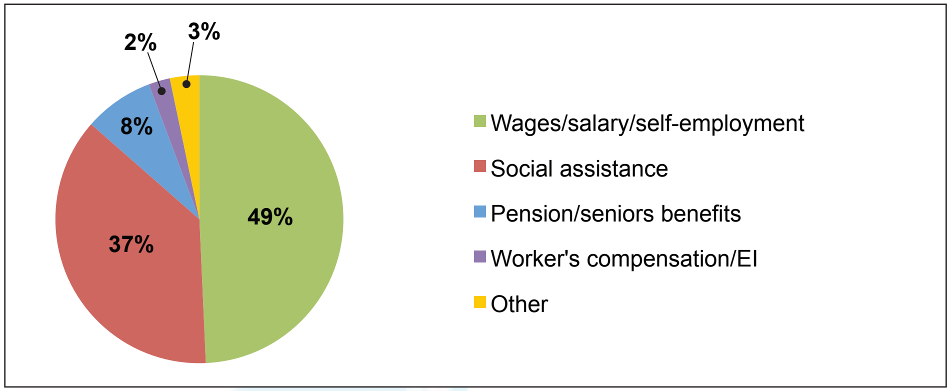


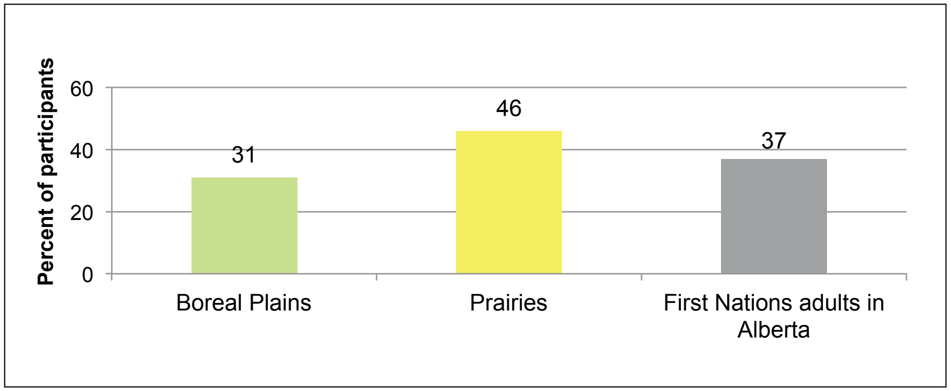
Figure 5. Main source of income for First Nations adults in Alberta (n=609)



EI = Employment insurance

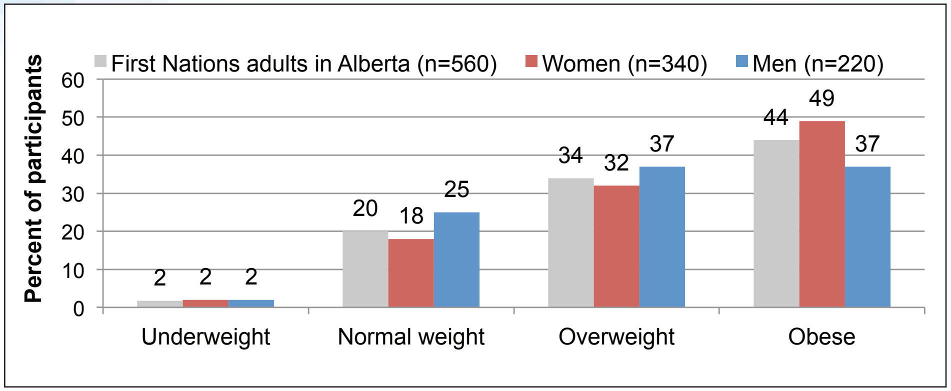
Other includes education allowance, none, spousal support, savings

Figure 7. Percent of First Nations adults in Alberta on social assistance



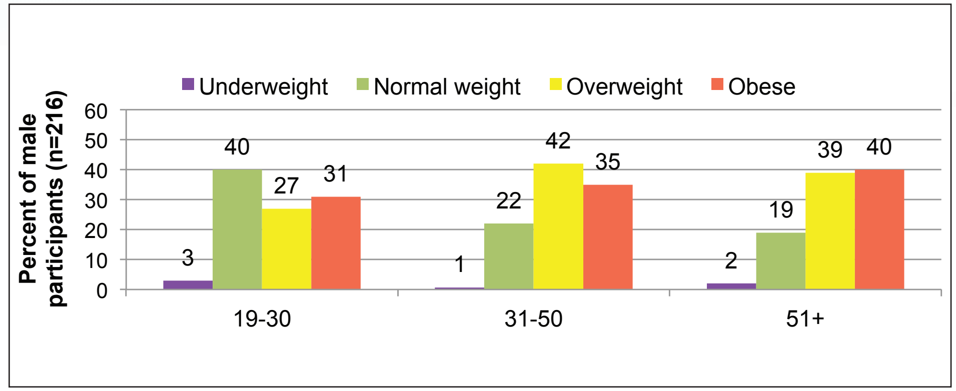
Health and Lifestyle Practices

Figure 8a. Overweight and obesity among First Nations adults in Alberta ++



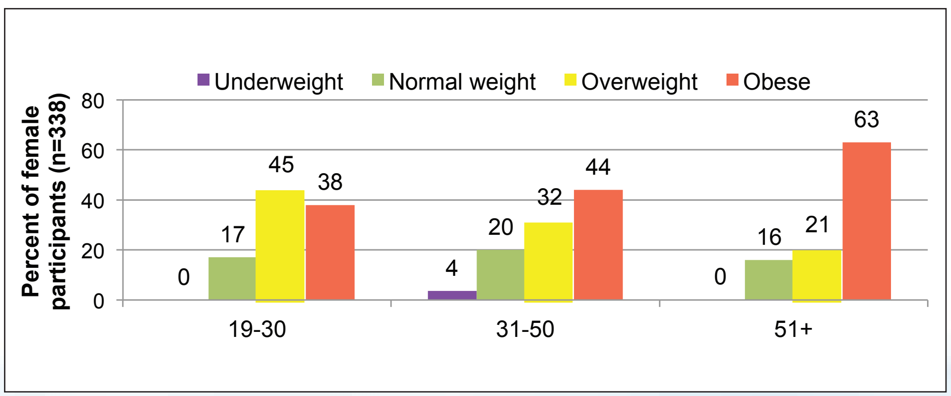
+Due to rounding, the total percentage equals 101% for women and men.

Figure 8c. Overweight and obesity among First Nations men in Alberta, by age group (n=216) ++



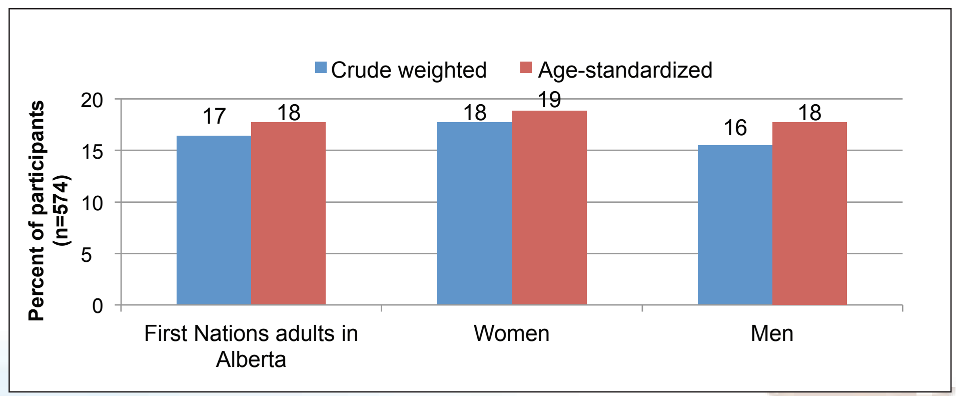
+Due to rounding, the total is 101% for the age group 19-30.

Figure 8b. Overweight and obesity among First Nations women in Alberta, by age group (n=338) *



Figures 8a-c*Classified using Health Canada's BMI categories (Health Canada 2003). Results exclude pregnant and breastfeeding women (n=36). Results include both measured and reported weight and height values; Paired t-tests showed significant differences between reported and measured values (n=258 women and n=180 men), therefore all reported values were adjusted to account for the estimated bias by gender.

Figure 9. Prevalence of self-reported diabetes in First Nations adults in Alberta, total and by gender (weighted and age-standardized rates) ++



++Excludes gestational diabetes; Age-standardized to the 1991 Canadian population.

Figure 10. Prevalence of diabetes in First Nations adults in Alberta by gender and age group

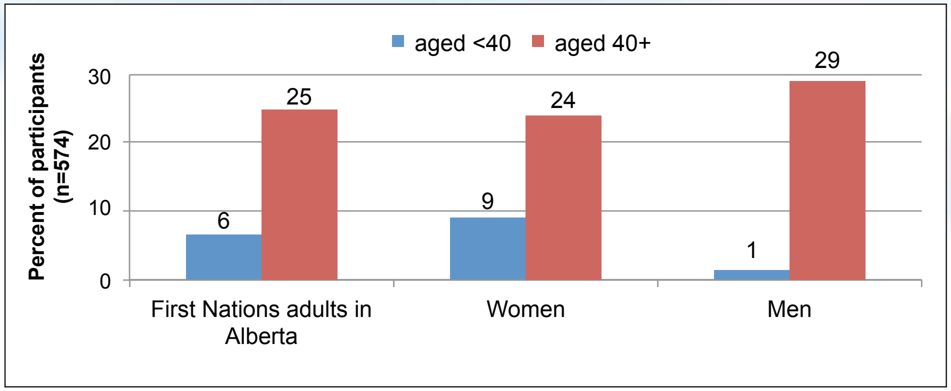


Figure 11. Type of diabetes reported by First Nations adults (n=99)

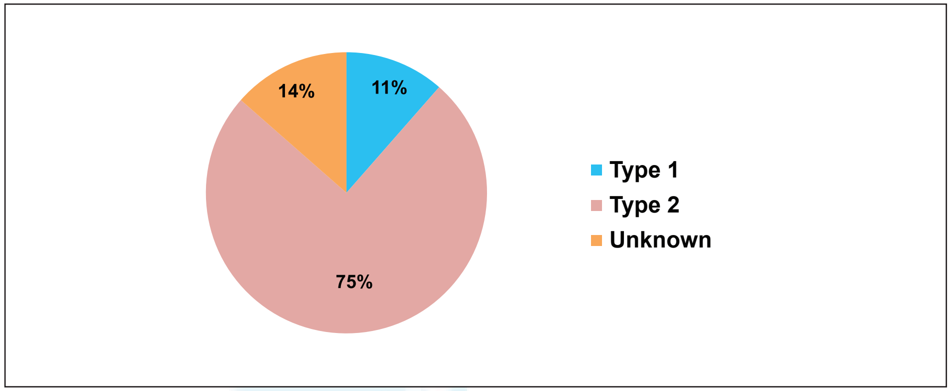


Table 5. Prevalence of self-reported diabetes among First Nations adults in Alberta compared to other Canadian studies

Population	Age	Prevalence Rate %		Reference
		Crude	Age-Standardized‡	
Non-Aboriginal*	12+	6.0	5.0	2009-2010 CCHS
First Nations (on-reserve)	18+	16.2	20.7	2008-2010 RHS
First Nations on-reserve in Alberta	18+	13.6	NA	2008-2010 RHS
First Nations (off-reserve)*	12+	8.7	10.3	2009-2010 CCHS
Inuit*	15+	4.0	NA	2006 APS
Métis*	12+	5.8	7.3	2009-2010 CCHS
First Nations in Manitoba+ (on-reserve)	19+	24.4	20.8	2010 FNFNES
First Nations in Ontario+ (on-reserve)	19+	26.5	24.3	2011-2012 FNFNES
First Nations in Alberta+ (on-reserve)	19+	16.9	18.4	Current study

*(Public Health Agency of Canada 2011) Diabetes in Canada: Facts and figures from a public health perspective. Table 6-1. Prevalence of self-reported diabetes† among First Nations, Inuit, and Métis individuals aged 12 years and older, Canada, 2006, 2008-2010, 2009-2010

+Crude rates for FNFNES are weighted to reflect the regional population size according to sampling plan

‡Age-standardized to the 1991 Canadian population.

CCHS = Canadian Community Health Survey

RHS = First Nations Regional Health Survey (2008/2010) (FNIGC 2012; Pace and Konczi 2013)

APS = Aboriginal Peoples Survey

FNFNES = First Nations Food, Nutrition and Environment Study, Chan et al, 2012 and Chan et al, 2014.

Figure 12a. Percent of First Nations adults in Alberta dieting (to lose weight) on the day before the interview, by gender (n=609)

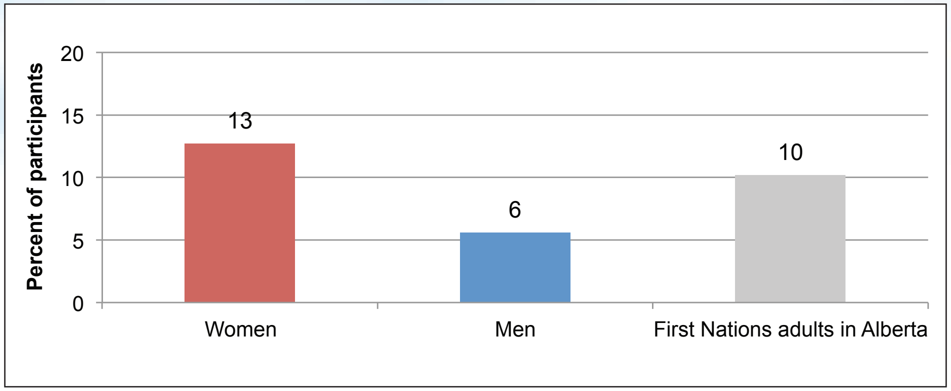


Figure 13. Percent of First Nations adults in Alberta who smoke, by region and ecozone

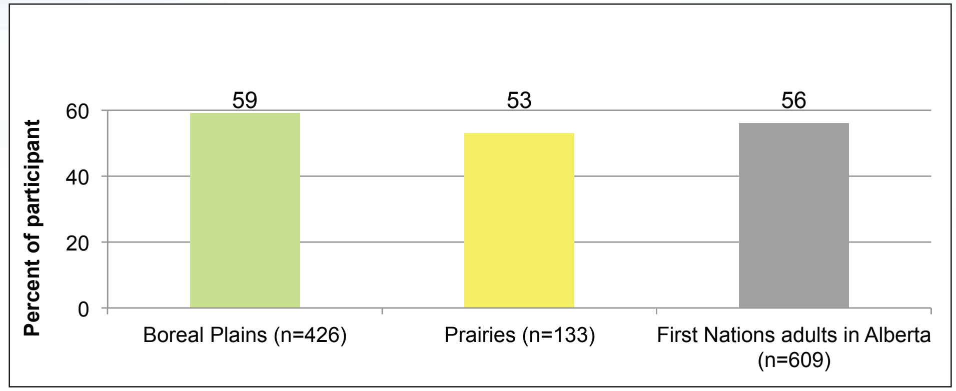


Figure 12b. Percent of First Nations adults in Alberta dieting (to lose weight) on the day before the interview, by gender and age group (n=609)

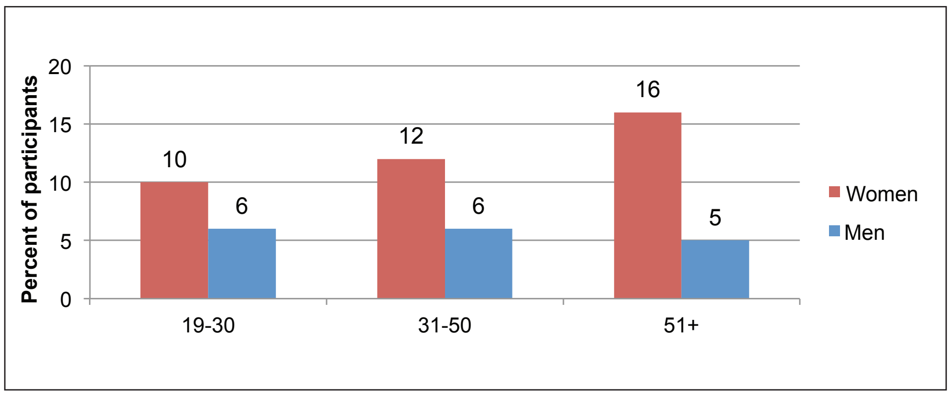


Figure 14a. Self-reported activity level in First Nations adults in Alberta

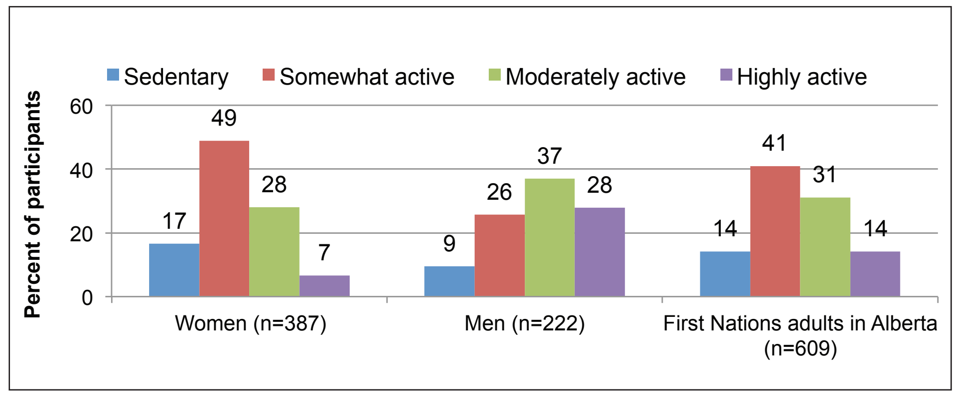


Figure 14b. Self-reported activity level in First Nations women in Alberta, by age group

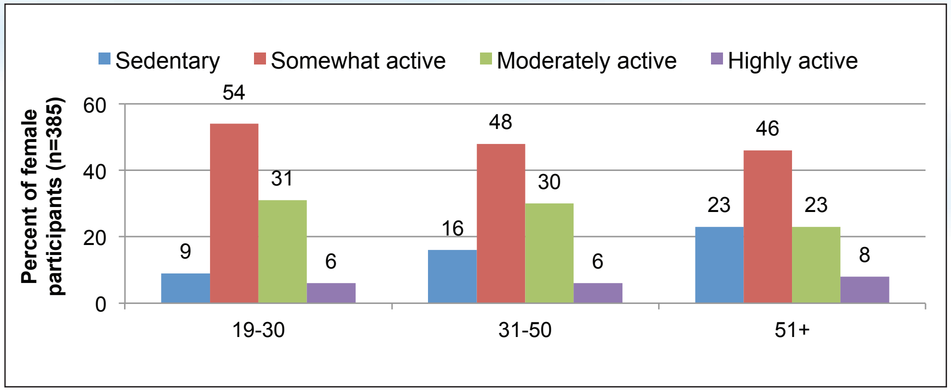


Figure 14c. Self-reported activity level in First Nations men in Alberta, by age group

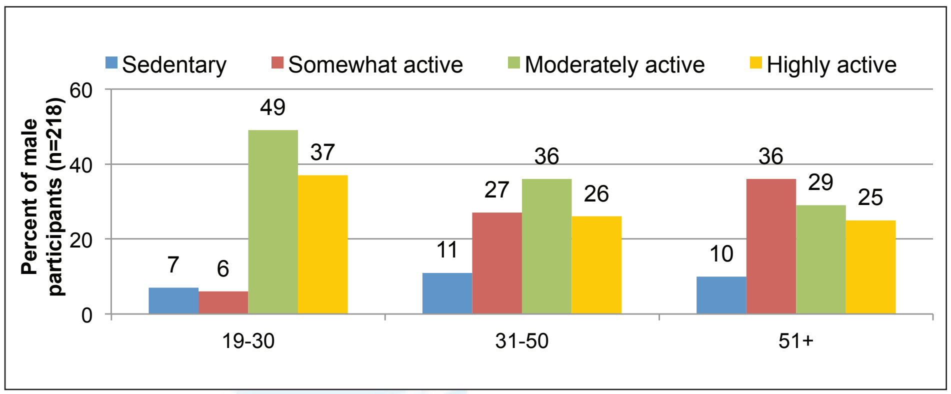


Figure 15a. Self-perceived health in First Nations adults in Alberta

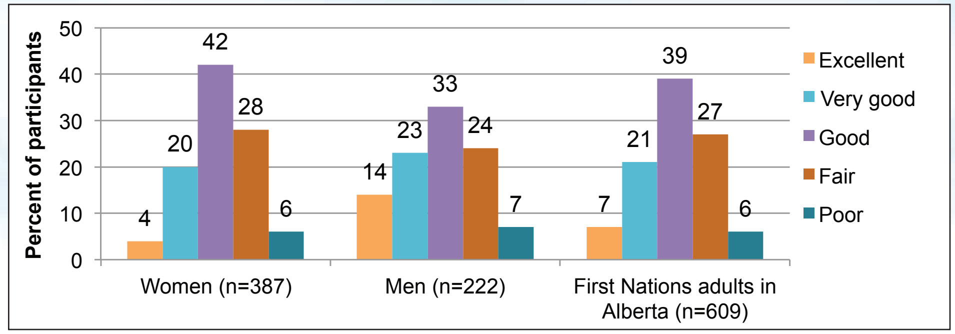


Figure 15b. Self-perceived health in First Nations women in Alberta, by age group

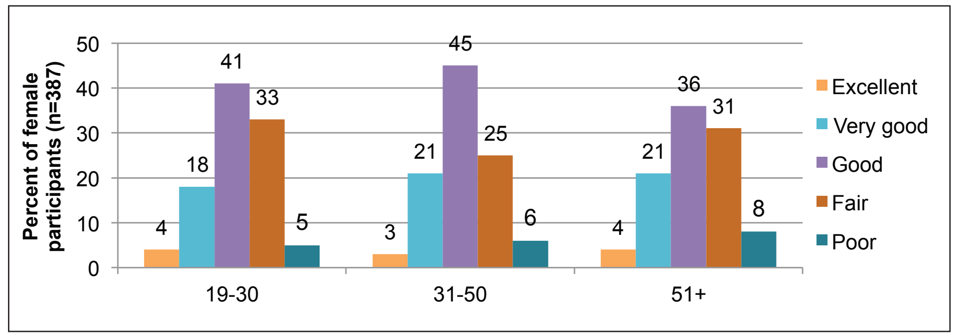
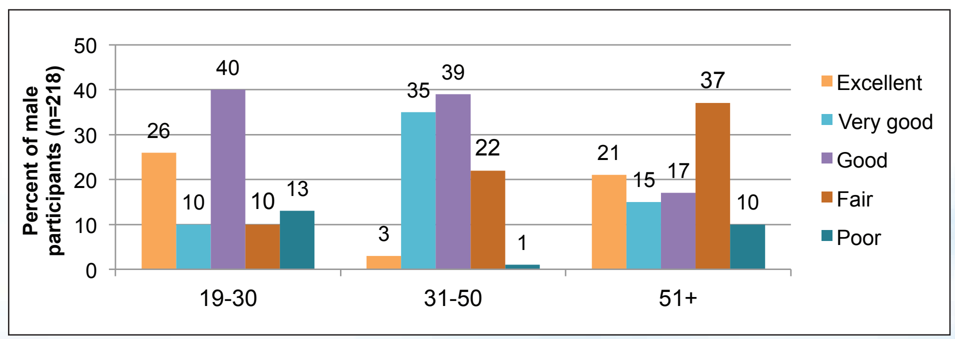


Figure 15c. Self-perceived health in First Nations men in Alberta, by age group



Traditional Food Use and Gardening

Table 6. Percentage of First Nations adults in Alberta consuming traditional foods in the past year, by ecozone area and for all First Nations in Alberta

	Percentage of adults consuming Traditional Food		
Traditional Food Item	Boreal Plains (n=426)	Prairies (n=133)	First Nations adults across Alberta (n=609)
FISH	46	15	35
Lake Whitefish	17	9	14
Walleye (pickerel)	21	2	14
Northern pike (jackfish)	20	2	14
Trout (all combined)	14	6	10
Rainbow trout	9	3	7
Other fish (salmon from BC)	9	2	6
Lake Trout	3	3	3
Goldeye	6	0	3
Brook trout	2	0	1
Brown trout	1	1	1
Arctic grayling	1	0	1
Burbot (Mariah, ling)	2	0	1
Fish eggs (whitefish, northern pike, pickerel, burbot)	2	0	1
Bull trout	0	1	0
Cutthroat trout	0	1	0
Mountain whitefish	1	0	0
Yellow perch	1	0	0
LAND MAMMALS	89	62	79
Moose meat	79	46	67
Deer meat	38	48	41
Elk meat	32	17	25
Rabbit	20	6	15
Moose kidney	22	0	14
Moose liver	20	0	13

	Percentage of adults consuming Traditional Food		
Traditional Food Item	Boreal Plains (n=426)	Prairies (n=133)	First Nations adults across Alberta (n=609)
Bison meat	6	5	6
Deer liver	5	2	4
Beaver meat	5	0	4
Black bear meat	6	0	4
Caribou meat	2	3	3
Black bear fat	4	0	3
Deer kidney	2	2	2
Elk liver	3	0	2
Muskrat meat	2	1	2
Elk kidney	1	0	1
Jackrabbit, white-tailed	0	2	1
Hare, snowshoe	1	0	1
Porcupine	1	0	0
Grizzly bear meat	1	0	0
WILD BIRDS	37	11	29
Ducks (all combined)	26	10	22
Mallard	26	9	21
Goose (Canada, Brant)	15	2	12
Grouse (Prairie chicken/ sharp-tail, blue, ruffed)	9	1	8
Northern Pintail	4	0	4
Teal (blue-winged, green-winged, cinnamon winged)	3	1	3
Wigeon	2	0	2
Northern Shoveler	2	0	2

Traditional Food Item	Percentage of adults consuming Traditional Food		
	Boreal Plains (n=426)	Prairies (n=133)	First Nations adults across Alberta (n=609)
Canvasback	2	0	1
Gadwall	1	0	1
American black	1	0	1
Redhead	1	0	1
Ring necked Duck	1	0	1
Ruddy Duck	1	0	0
Scoter (surf, white winged, black)	1	0	1
Goose, Snow	1	0	1
Goose, White-fronted	0	0	1
Goose fat	1	0	1
Gray Partridge	2	0	1
Ptarmigan (willow, white-tail)	2	0	1
Swan (trumpeter, tundra)	1	0	1
Loon (common, red throated)	1	0	0
Bird eggs (American coot, mallard, duck, Canada goose)	3	0	2
WILD BERRIES OR NUTS	82	78	80
Saskatoon berry	58	60	59
Raspberry (wild, dewberry)	55	53	54
Wild Strawberry	50	18	38
Blueberries	47	27	38
Cherry (pin, chokecherry)	21	48	32
Cranberry (low bush/ bog)	24	10	19
Black huckleberry	19	6	14
Squashberry/mooseberry (Highbush Cranberry)	5	2	4
Gooseberry/currant	5	1	4
Sunflower seeds	1	7	3
Cloudberries (bakeapple)	1	3	2

Traditional Food Item	Percentage of adults consuming Traditional Food		
	Boreal Plains (n=426)	Prairies (n=133)	First Nations adults across Alberta (n=609)
Thimbleberry	1	3	2
Bunchberries	2	0	1
Kinnikinnick (bearberry)	2	1	1
Rose hips (prickly rose)	1	0	1
Hazelnuts/filberts	1	2	1
Crabapple	0	2	1
Pincushion cactus fruit	1	0	0
WILD PLANTS	45	30	40
Mint	31	19	27
Wihkes (muskrat/rat root)	27	21	26
Labrador tea	7	2	5
Sweetgrass (tea)	4	6	5
Wild onion	4	3	3
Bitterroot	2	4	3
Balsamroot	1	0	1
Indian potato (Bear root, Eskimo potato, sweet vetch, licorice root)	1	0	1
Cow parsnip shoots	0	3	1
Dandelions	0	2	1
Plantain	1	1	1
Raspberry leaves	1	3	1
Fiddleheads	1	0	0
Sorrel	1	0	0
Stinging nettle leaves	1	0	0
TREE FOODS	7	4	6
Birch sap	4	3	3
Spruce pitch	2	0	2
Balsam poplar sap	2	0	1
MUSHROOMS puffball, morel)	1	0	0

Table 7a. Yearly and seasonal frequency of use of top ten traditional food items, First Nations adults in Alberta

Traditional Food	Total participants	Percentage of participants*	Days per year and season - Average (95th percentile)				
			Year total	Summer	Spring	Winter	Fall
Moose meat	Total participants	100	28 (144)	7 (36)	6 (36)	7 (36)	7 (36)
	Consumers only	67	41 (168)	11 (54)	9 (48)	10 (48)	11 (54)
Saskatoon berry	Total participants	100	6 (22)	3 (12)	1 (4)	1 (5)	1 (4)
	Consumers only	59	9 (36)	5 (20)	1 (6)	1 (6)	2 (6)
Raspberry	Total participants	100	4 (16)	2 (10)	1 (3)	1 (4)	1 (3)
	Consumers only	54	8 (24)	5 (12)	1 (5)	1 (6)	1 (5)
Deer meat	Total participants	100	3 (12)	1 (4)	0.5 (3)	1 (3)	1 (3)
	Consumers only	41	6 (22)	2 (10)	1 (5)	1 (10)	1 (5)
Blueberries	Total participants	100	4 (16)	2 (8)	1 (2)	1 (4)	1 (3)
	Consumers only	38	10 (48)	4 (12)	2 (12)	2 (12)	2 (12)
Wild strawberry	Total participants	100	3 (12)	2 (10)	1 (2)	1 (2)	1 (2)
	Consumers only	38	9 (48)	5 (12)	1 (12)	1 (12)	1 (6)
Cherry (pin, chokecherry)	Total participants	100	3 (17)	1 (7)	0.5 (2)	1 (4)	1 (4)
	Consumers only	32	10 (48)	4 (12)	1 (6)	2 (9)	2 (12)
Mint	Total participants	100	8 (36)	3 (12)	2 (6)	2 (9)	2 (9)
	Consumers only	27	31 (120)	10 (60)	7 (30)	7 (30)	7 (30)
Wihkes (muskrat/rat root)	Total participants	100	6 (24)	2 (6)	1 (6)	2 (6)	1 (6)
	Consumers only	26	24 (99)	7 (30)	6 (20)	6 (30)	6 (18)
Mallard	Total participants	100	3 (10)	1 (4)	1 (3)	0.2 (0)	1 (3)
	Consumers only	21	11 (45)	4 (12)	3 (12)	1 (6)	3 (12)

Note: for the purpose of this report, the year is divided into 4 seasons of 90 days each.

*The frequency is calculated for the total participants (100% of participants) and for consumers only (percentage of participants who reported eating a food item).

Table 7b. Yearly and seasonal frequency of use of top ten traditional food items, Boreal Plains

Traditional Food	Total participants	Days per year and season - Average (95th percentile)				
		Year total	Summer	Spring	Winter	Fall
Moose meat	Total participants	39 (162)	10 (48)	9 (36)	9 (36)	10 (48)
	Consumers only	49 (240)	13 (60)	11 (60)	12 (60)	13 (72)
Mint	Total participants	10 (48)	3 (12)	2 (7)	3 (12)	2 (10)
	Consumers only	34 (135)	10 (72)	8 (90)	8 (48)	8 (30)
Wihkes (muskrat/rat root)	Total participants	6 (20)	2 (6)	2 (6)	2 (6)	2 (6)
	Consumers only	25 (120)	6 (30)	6 (30)	6 (30)	6 (30)
Raspberry	Total participants	5 (18)	3 (10)	1 (4)	1 (4)	1 (4)
	Consumers only	8 (24)	5 (12)	1 (6)	1 (5)	1 (5)
Saskatoon berry	Total participants	4 (14)	3 (12)	0.4 (3)	0.5 (2)	1 (3)
	Consumers only	8 (24)	5 (16)	1 (3)	1 (3)	1 (3)
Blueberries	Total participants	4 (16)	2 (6)	1 (2)	1 (3)	1 (3)
	Consumers only	8 (26)	3 (12)	1 (6)	1 (6)	2 (5)
Wild strawberries	Total participants	3 (12)	2 (9)	0.4 (2)	0.4 (1)	0.4 (2)
	Consumers only	7 (25)	4 (12)	1 (3)	1 (3)	1 (5)
Grouse	Total participants	3 (12)	1 (4)	1 (3)	0.3 (1)	1 (6)
	Consumers only	13 (120)	5 (40)	4 (40)	1 (7)	4 (40)
Walleye (pickerel)	Total participants	3 (12)	1 (4)	0.5 (2)	1 (5)	1 (2)
	Consumers only	14 (54)	4 (16)	2 (12)	3 (16)	4 (16)
Moose kidney	Total participants	2 (12)	1 (3)	1 (2)	1 (3)	1 (4)
	Consumers only	11 (60)	3 (15)	2 (15)	3 (15)	3 (15)

Table 7c. Yearly and seasonal frequency of use of top ten traditional food items, Prairies

Traditional Food	Total participants	Days per year and season - Average (95th percentile)				
		Year total	Summer	Spring	Winter	Fall
Saskatoon berry	Total participants	7 (26)	3 (12)	1 (7)	1 (6)	1 (6)
	Consumers only	12 (48)	5 (12)	2 (12)	2 (12)	2 (12)
Cherry (pin, chokecherry)	Total participants	6 (22)	2 (12)	1 (6)	1 (5)	1 (5)
	Consumers only	12 (48)	5 (12)	2 (12)	2 (12)	3 (12)
Moose meat	Total participants	5 (16)	1 (5)	1 (7)	1 (6)	1 (4)
	Consumers only	11 (56)	3 (7)	2 (7)	3 (21)	3 (21)
Wihkes (muskrat/rat root)	Total participants	4 (20)	2 (6)	1 (3)	1 (5)	1 (5)
	Consumers only	21 (99)	8 (90)	4 (9)	0.04 (0)	4 (10)
Raspberry (wild, dewberry)	Total participants	4 (13)	2 (8)	1 (2)	1 (5)	1 (3)
	Consumers only	8 (20)	4 (10)	1 (2)	1 (6)	1 (4)
Blueberries	Total participants	4 (15)	1 (9)	1 (2)	1 (6)	1 (4)
	Consumers only	15 (48)	5 (12)	3 (12)	3 (12)	3 (12)
Mint	Total participants	4 (24)	1 (6)	1 (6)	1 (6)	1 (6)
	Consumers only	20 (99)	7 (30)	4 (12)	5 (12)	4 (12)
Wild strawberry	Total participants	3 (10)	1 (10)	1 (2)	1 (2)	1 (2)
	Consumers only	19 (48)	7 (12)	4 (12)	4 (12)	4 (12)
Deer meat	Total participants	3 (12)	1 (4)	0.5 (3)	1 (4)	1 (3)
	Consumers only	6 (21)	2 (6)	1 (4)	2 (10)	1 (5)
Black huckleberry	Total participants	1 (2)	0.4 (2)	0.3 (0)	0.3 (0)	0.3 (0)
	Consumers only	23 (144)	7 (36)	5 (36)	5 (36)	5 (36)

Table 8. Mean portion size of traditional food categories, by gender and age group, as reported from 24hr recalls, First Nations in Alberta, unweighted

Traditional food category	First Nations women			First Nations men		
	Age 19-50	Age 51-70	Age 71+	Age 19-50	Age 51-70	Age 71+
	Mean grams/serving			Mean grams/serving		
Fish[1]	161	161	161	161	161	161
Land mammals, meat	148	90	67	207	145	177
Land mammals, organs[2]	105	105	105	105	105	105
Land mammal fat[1] (moose fat and bone marrow)	31	31	31	31	31	31
Wild birds[1]	161	161	161	161	161	161
Bird egg[3]	144	144	144	144	144	144
Wild berries[1]	91	91	91	91	91	91
Wild plants, roots, or greens[1]	0.9	0.9	0.9	0.9	0.9	0.9
Tree foods[4]	1	1	1	1	1	1
Mushrooms[4]	48	48	48	48	48	48

[1]portion sizes based on mean values by total consumers due to the low number of observations.

[2]portions sizes based on mean values of total consumers from FNFNES data from BC, MB, ON, AB due to low number of observations.

[3]imputed portion size from Canadian nutrient file values for goose egg; Health Canada, 2010.

[4]imputed values from Chan et al, 2011.

Table 9a. Daily intake (average and 95th percentile) of traditional food (grams) by age group and gender for all First Nations adults in Alberta and consumers only
(refer to Appendix F for conversion from grams to usual household measures)

Food category	Level of consumption	Women		Men		First Nations in Alberta (n=603*)
		Age 19-50 (n=283)	Age 51+ (n=102)	Age 19-50 (n=141)	Age 51+ (n=77)	
TOTAL TRADITIONAL FOOD	Total participants (average)	21.9	20.2	38.2	56.9	28.9
	Total participants (95th pctile)	104.4	71.4	221.4	247.7	149.6
	Consumers only (average)	23.5	20.2	41.4	61.2	30.7
	Consumers only (95th pctile)	117.4	71.4	221.4	248.9	155.2
FISH	Total participants (average)	2.0	2.1	3.6	6.9	2.9
	Total participants (95th pctile)	9.7	8.8	18.5	28.2	15.9
	Consumers only (average)	6.5	6.0	8.7	14.4	8.0
	Consumers only (95th pctile)	27.8	19.0	54.3	44.1	39.7
GAME MEAT	Total participants (average)	13.0	7.4	20.6	23.0	14.8
	Total participants (95th pctile)	60.8	35.5	130.7	134.8	71.8
	Consumers only (average)	17.5	9.6	25.1	25.4	18.9
	Consumers only (95th pctile)	78.3	44.9	134.2	134.8	84.0
GAME ORGANS	Total participants (average)	0.4	1.1	1.6	2.4	1.0
	Total participants (95th pctile)	2.0	7.2	2.6	15.5	4.3
	Consumers only (average)	3.3	3.5	7.1	8.3	5.2
	Consumers only (95th pctile)	10.6	13.0	40.3	40.9	34.5
BIRDS	Total participants (average)	2.2	4.2	7.4	7.3	4.3
	Total participants (95th pctile)	5.3	21.2	26.9	68.8	16.3
	Consumers only (average)	8.9	13.0	23.5	20.2	14.9
	Consumers only (95th pctile)	27.4	63.5	69.3	82.2	68.8
BERRIES/PLANTS	Total participants (average)	4.0	5.3	3.8	15.3	5.3
	Total participants (95th pctile)	18.7	17.8	12.0	65.6	19.0
	Consumers only (average)	4.8	5.5	5.1	18.5	6.3
	Consumers only (95th pctile)	19.0	17.8	24.5	65.6	23.2

*missing age values from 6 participants

Table 9b. Daily average and heavy (95th percentile) gram consumption of traditional food by category and top 3 species by category (based on seasonal frequency), consumers only

First Nations in Alberta, consumers only		Gender		Total
		Women	Men	
TOTAL TRADITIONAL FOOD	Average consumer	22.5	46.5	30.5
	Heavy consumer	107.8	221.4	155.2
FISH	Average consumer	6.3	10.4	8.0
	Heavy consumer	27.8	48.1	39.7
Lake whitefish	Average consumer	3.6	2.4	3.1
	Heavy consumer	21.2	8.8	12.8
Walleye (pickerel)	Average consumer	4.0	8.4	6.1
	Heavy consumer	23.8	52.9	28.2
Northern pike (jackfish)	Average consumer	4.8	7.4	6.0
	Heavy consumer	21.2	52.9	23.8
GAME MEAT	Average consumer	15.3	24.9	18.8
	Heavy consumer	60.8	134.2	84.0
Moose meat	Average consumer	15.1	21.1	17.3
	Heavy consumer	58.4	115.2	84.0
Deer meat	Average consumer	2.3	3.2	2.7
	Heavy consumer	10.5	8.4	8.9
Elk meat	Average consumer	2.4	3.5	2.9
	Heavy consumer	9.7	21.6	10.5
GAME ORGANS	Average consumer	3.4	7.5	5.2
	Heavy consumer	13.0	40.6	34.5
Moose kidney	Average consumer	1.9	5.2	3.2
	Heavy consumer	6.9	17.3	17.3
Moose liver	Average consumer	2.3	4.8	3.4
	Heavy consumer	9.5	23.0	23.0
Deer liver	Average consumer	1.4	1.0	1.2
	Heavy consumer	4.0	3.5	4.0

First Nations in Alberta, consumers only		Gender		Total
		Women	Men	
BIRDS	Average consumer	10.2	22.1	14.8
	Heavy consumer	63.5	69.3	68.8
Mallard	Average consumer	4.2	6.5	5.1
	Heavy consumer	17.6	28.7	19.9
Canada goose	Average consumer	3.1	2.3	2.7
	Heavy consumer	14.1	10.6	10.6
Grouse	Average consumer	5.7	5.7	5.7
	Heavy consumer	28.2	31.8	31.8
BERRIES/PLANTS	Average consumer	5.0	9.1	6.3
	Heavy consumer	19.0	59.5	22.5
Saskatoon berry	Average consumer	1.8	2.8	2.1
	Heavy consumer	6.0	12.0	9.0
Raspberry	Average consumer	1.7	2.0	1.8
	Heavy consumer	5.5	6.5	6.0
Wild strawberry	Average consumer	1.3	3.1	1.9
	Heavy consumer	4.5	12.0	12.0

Table 10a. Daily average and heavy (95th percentile) gram consumption of traditional food by category and ecozone by consumers only

Food Category	Level of consumption	All First Nations in Alberta	Boreal Plains	Prairies
TOTAL TRADITIONAL FOOD	Average consumer	30.5	34.2	12.1
	Heavy consumer	155.2	156.0	32.8
FISH	Average consumer	8.0	7.8	2.3
	Heavy consumer	39.7	39.7	19.9
GAME MEAT	Average consumer	18.8	22.3	6.3
	Heavy consumer	84.0	120.8	34.4
GAME ORGANS	Average consumer	5.2	5.3	1.7
	Heavy consumer	34.5	34.5	2.9
BIRDS	Average consumer	14.8	9.1	1.3
	Heavy consumer	68.8	52.0	3.5
BERRIES/PLANTS	Average consumer	6.3	5.1	7.7
	Heavy consumer	22.5	19.5	29.4

Table 10b. Average and heavy (95th percentile) grams of traditional food consumed per day by category and by top 3 species per category, by consumers only, Boreal Plains

Boreal Plains		Gender		Total
		Women	Men	
TOTAL TRADITIONAL FOOD	Average consumer	26.0	52.2	34.2
	Heavy consumer	129.3	221.6	156.0
FISH	Average consumer	6.0	10.6	7.8
	Heavy consumer	27.8	48.1	39.7
Walleye	Average consumer	4.1	8.4	6.0
	Heavy consumer	23.8	48.1	23.8
Northern pike	Average consumer	3.4	6.2	4.6
	Heavy consumer	21.2	15.9	21.2
Lake whitefish	Average consumer	3.7	3.2	3.5
	Heavy consumer	23.8	11.9	21.2
GAME MEAT	Average consumer	18.1	30.9	22.3
	Heavy consumer	77.0	146.0	120.8
Moose meat	Average consumer	17.9	25.5	20.5
	Heavy consumer	58.4	140.1	94.5
Deer meat	Average consumer	2.5	3.3	2.8
	Heavy consumer	17.0	19.2	17.0
Elk meat	Average consumer	2.6	4.6	3.4
	Heavy consumer	9.7	30.4	11.7
GAME ORGANS	Average consumer	3.2	8.1	5.3
	Heavy consumer	13.0	40.6	34.5
Moose kidney	Average consumer	1.9	5.2	3.3
	Heavy consumer	6.9	17.3	17.3
Moose liver	Average consumer	2.0	5.0	3.4
	Heavy consumer	6.9	23.0	23.0
Deer liver	Average consumer	1.4	1.1	1.3
	Heavy consumer	4.0	3.5	4.0

Boreal Plains		Gender		Total
		Women	Men	
BIRDS	Average consumer	6.9	12.4	9.1
	Heavy consumer	33.1	68.8	52.0
Mallard	Average consumer	3.2	3.9	3.5
	Heavy consumer	17.6	10.6	14.1
Grouse	Average consumer	4.5	5.1	4.8
	Heavy consumer	14.1	31.8	31.8
Canada goose	Average consumer	1.3	1.6	1.5
	Heavy consumer	3.5	5.3	4.4
BERRIES/PLANTS	Average consumer	4.6	6.4	5.1
	Heavy consumer	19.0	24.5	19.5
Saskatoon berry	Average consumer	1.5	2.1	1.7
	Heavy consumer	5.0	17.3	6.0
Raspberry	Average consumer	1.8	1.9	1.8
	Heavy consumer	6.0	6.5	6.0
Wild strawberry	Average consumer	1.1	2.0	1.4
	Heavy consumer	4.5	10.0	6.2

Table 10c. Average and heavy (95th percentile) grams of traditional food consumed per day by category and by top 3 species per category, by consumers only, Prairies

Boreal Plains		Gender		Total
		Women	Men	
TOTAL TRADITIONAL FOOD	Average consumer	7.8	19.6	12.1
	Heavy consumer	25.4	93.9	32.8
FISH	Average consumer	0.8	3.5	2.3
	Heavy consumer	2.7	19.9	19.9
Lake whitefish	Average consumer	0.7	1.1	1.0
	Heavy consumer	0.9	2.2	2.2
Rainbow trout	Average consumer	0.4	3.3	1.9
	Heavy consumer	0.4	6.2	6.2
Lake trout	Average consumer	0.4	1.3	0.9
	Heavy consumer	0.4	1.3	1.3
GAME MEAT	Average consumer	4.5	8.6	6.3
	Heavy consumer	15.4	34.4	34.4
Deer meat	Average consumer	2.0	3.0	2.5
	Heavy consumer	4.9	8.4	8.4
Moose meat	Average consumer	3.2	6.5	4.6
	Heavy consumer	19.5	22.4	22.4
Elk meat	Average consumer	1.3	1.8	1.6
	Heavy consumer	4.1	3.6	4.1
GAME ORGANS*	Average consumer	2.3	1.3	1.7
	Heavy consumer	2.9	1.7	2.9
Deer liver	Average consumer	1.4	0.6	1.0
	Heavy consumer	1.4	0.6	1.4
Deer kidney	Average consumer	1.2	0.6	0.9
	Heavy consumer	1.4	0.6	1.4

*only 2 types of organ meats reported to be consumed

Boreal Plains		Gender		Total
		Women	Men	
BIRDS	Average consumer	1.5	0.8	1.3
	Heavy consumer	3.5	3.1	3.5
Mallard	Average consumer	1.0	0.5	0.8
	Heavy consumer	1.8	0.9	1.8
Canada goose	Average consumer	1.8	-	1.8
	Heavy consumer	1.8	-	1.8
Grouse	Average consumer	0.9	0.7	0.8
	Heavy consumer	0.9	0.9	0.9
BERRIES/PLANTS	Average consumer	5.0	13.1	7.7
	Heavy consumer	18.1	59.5	29.4
Saskatoon berry	Average consumer	2.1	3.9	2.6
	Heavy consumer	6.0	12.0	12.0
Raspberry	Average consumer	1.5	2.2	1.7
	Heavy consumer	5.0	16.3	5.0
Cherry	Average consumer	2.0	3.5	2.5
	Heavy consumer	6.0	15.6	12.0

Figure 16a. Percent of First Nations households in Alberta participating in traditional food harvest and gathering practices by region and ecozone (n=609)

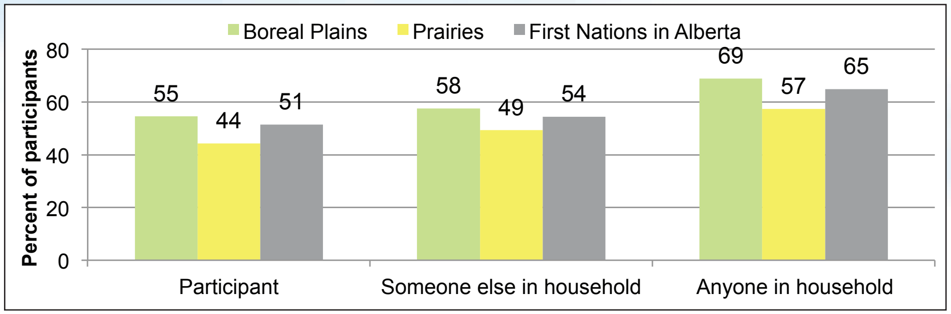


Figure 17. Percent of First Nations adults in Alberta who ate vegetables and/or fruits from their gardens or community gardens, by region and ecozone (n=609)

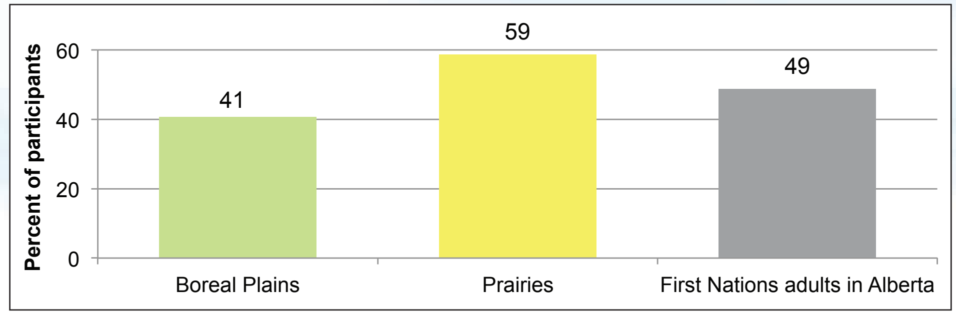


Figure 16b. Traditional food harvest practices by First Nations participants in Alberta by region and ecozone (n=609)

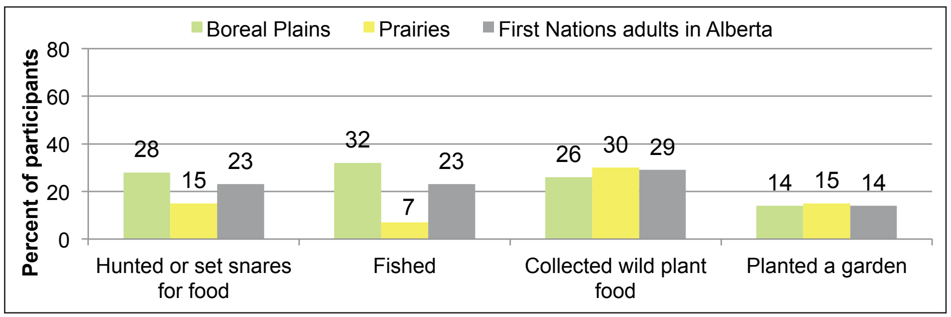


Figure 18. Percent of First Nations adults in Alberta whose households would like more traditional food (n=609)

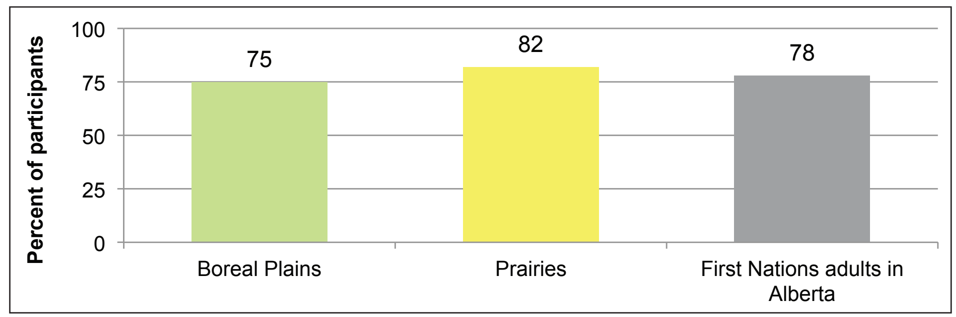


Figure 16c. Traditional food gathering practices by First Nations households in Alberta by region and ecozone (n=609)

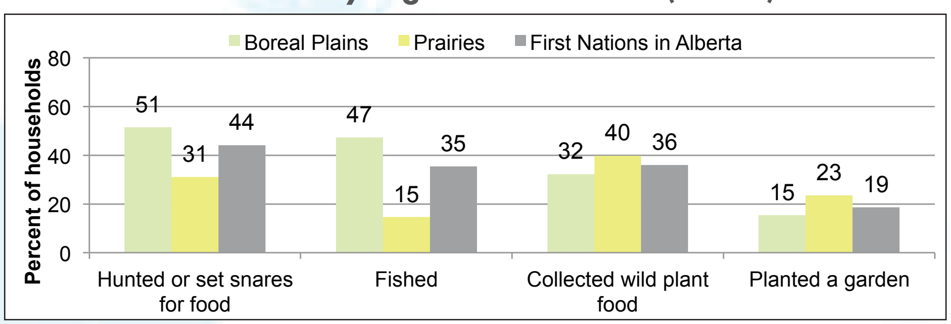
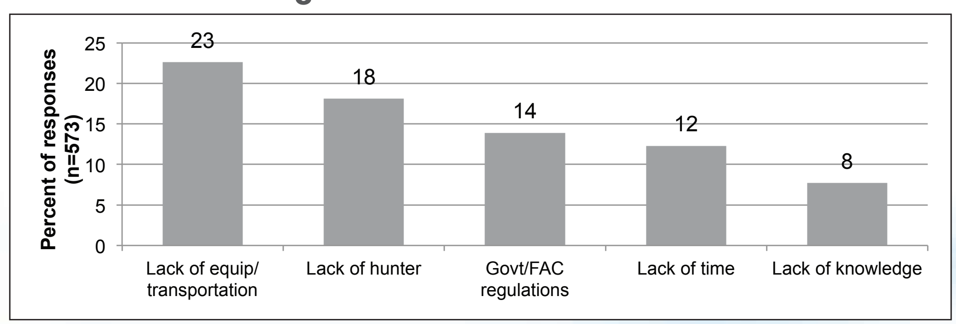


Figure 19. Top 5 barriers preventing First Nations households in Alberta from using more traditional food



Note: verbatim comments to this open-ended question were grouped according to similar categories

Figure 20. Percent of First Nations adults in Alberta who reported that the following affected (or limited) where they could hunt, fish or collect berries (n=609)

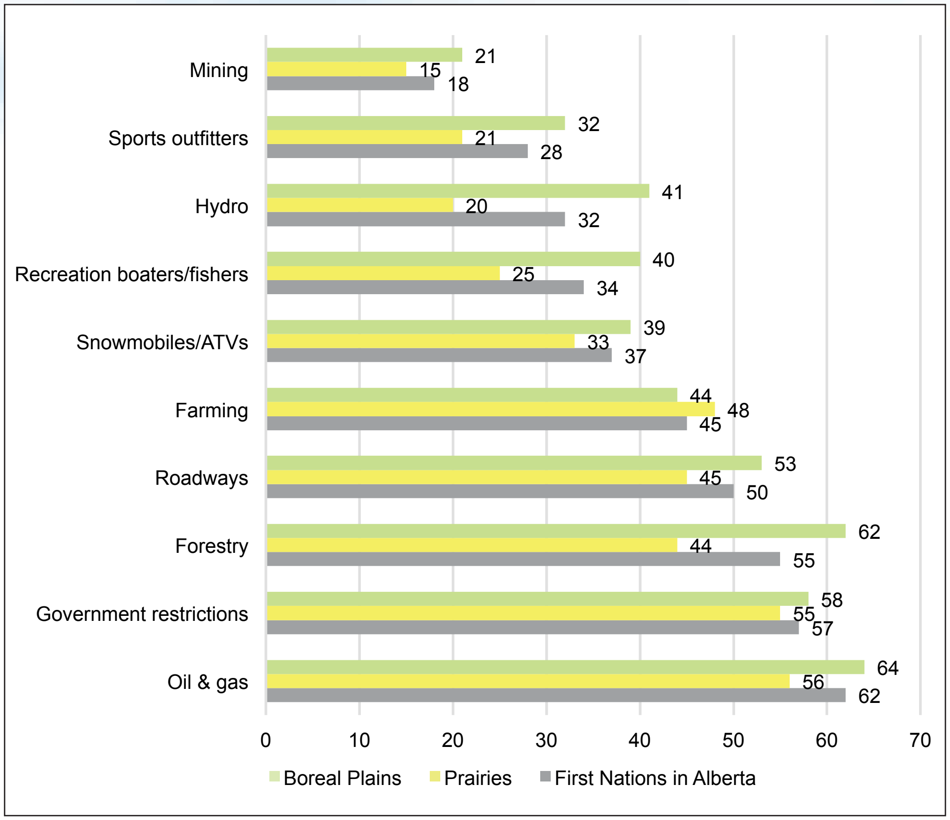
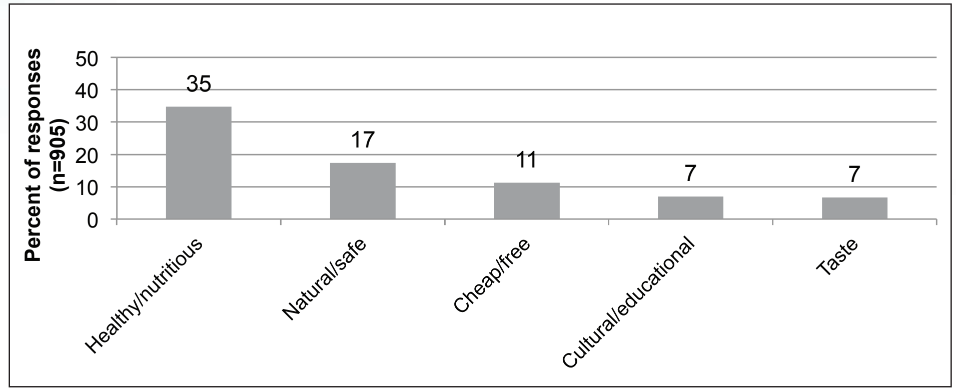
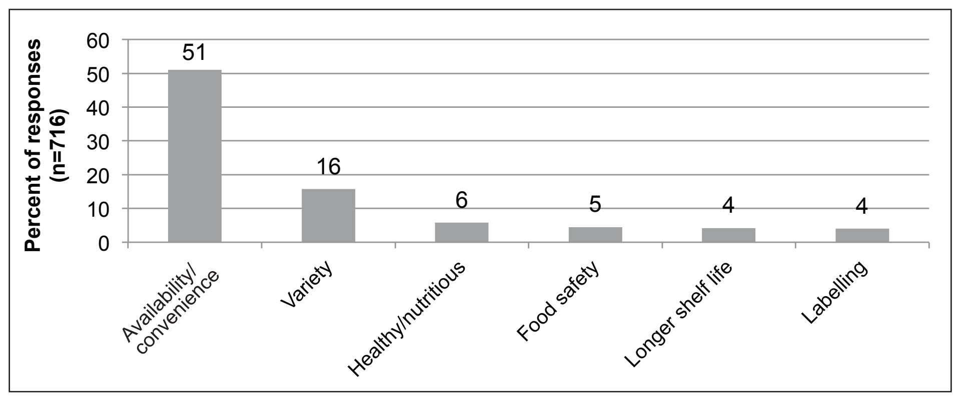


Figure 21. Top 5 benefits of traditional food reported by First Nations adults in Alberta



Note: verbatim comments to this open-ended question were grouped according to similar categories

Figure 22. Top 5* benefits of market food reported by First Nations adults in Alberta



Note: verbatim comments to this open-ended question were grouped according to similar categories
*Top 6 answers displayed due to tied responses.

Table 11.1 Total energy intake (kcal/d): Usual intakes from food, by DRI age-sex group, household population[1]

Sex	Age	n	Mean (SE)	Percentiles (SE) of usual intake						
				5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)
Male	19-50	141	2358 (149)	1289 (183)	1479 (157)	1827 (124)	2261 (140)	2743 (223)	3220 (333)	3524 (410)
	51-70	60	2126 (114)	1308 (199)	1475 (175)	1766 (136)	2112 (121)	2499 (208)	2900 (424)	3171 (658)
Female	19-50	247	1961 (79)	1322 (184)	1435 (157)	1639 (113)	1893 (83)	2185 (129)	2481 (229)	2674 (304)
	51-70	80	1555 (229)	1097 (200)	1166 (212)	1288 (237)	1438 (272)	1610 (315)	1783 (359)	1894 (386)

Table 11.2 Protein (g/d): Usual intakes from food, by DRI age-sex group, household population[1]

Sex	Age	n	Mean (SE)	Percentiles (SE) of usual intake						
				5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)
Male	19-50	141	104 (7)	71 (7)	78 (8)	89 (11)	102 (15)	117 (22)	132 (32)	142 (39)
	51-70	60	115 (10)	77 (19)	84 (18)	96 (14)	111 (12)	128 (17)	144 (27)	154 (37)
Female	19-50	247	83 (6)	58 (11)	63 (10)	72 (8)	83 (7)	95 (9)	108 (15)	116 (19)
	51-70	80	71 (6)	41 (12)	46 (11)	56 (10)	67 (8)	81 (8)	94 (10)	103 (12)

Notes:

In Tables 11.1-11.37 the following symbol, (-) indicates data have a coefficient of variation (CV) >33.3% and as such, are suppressed due to extreme sampling variability

[1]The SIDE SAS sub-routine nutrient analyses were performed on data from a total of 529 participants (328 women and 201 men) to obtain the distribution (percentiles) of usual intake. Nutrient data for 80 individuals were excluded: 36 pregnant and lactating women were excluded due to different nutrient requirements for these groups; participants aged 71 and over were also excluded due to low sample size (n=38), as were six participants with missing age and age group values.

Table 11.3 Total carbohydrates (g/d): Usual intakes from food, by DRI age-sex group, household population[1]

Sex	Age	n	Mean (SE)	Percentiles (SE) of usual intake							EAR	%<EAR (95% CI)
				5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)		
Male	19-50	141	280 (23)	118 (28)	145 (25)	197 (20)	263 (20)	339 (34)	415 (54)	463 (67)	100	(-)
	51-70	60	244 (20)	221 (19)	227 (19)	237 (19)	249 (19)	262 (20)	273 (21)	280 (21)	100	0 (0-0)
Female	19-50	247	231 (9)	129 (25)	146 (22)	178 (16)	218 (10)	266 (17)	315 (33)	348 (45)	100	(-)
	51-70	80	185 (32)	115 (24)	125 (26)	144 (30)	167 (37)	195 (45)	225 (54)	245 (60)	100	(-)

Table 11.4 Total fats (g/d): Usual intakes from food, by DRI age-sex group, household population[1]

Sex	Age	n	Mean (SE)	Percentiles (SE) of usual intake						
				5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)
Male	19-50	141	95 (6)	37 (9)	47 (8)	66 (7)	90 (5)	118 (7)	144 (11)	161 (14)
	51-70	60	78 (6)	45 (8)	51 (8)	62 (8)	75 (10)	90 (20)	(-)	(-)
Female	19-50	247	81 (3)	52 (11)	57 (9)	67 (7)	80 (4)	94 (6)	109 (12)	118 (18)
	51-70	80	61 (9)	41 (8)	43 (8)	48 (9)	54 (11)	62 (13)	69 (15)	74 (16)

Table 11.5 Total saturated fats (g/d): Usual intakes from food, by DRI age-sex group, household population[1]

Sex	Age	n	Mean (SE)	Percentiles (SE) of usual intake						
				5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)
Male	19-50	141	31 (2)	12 (3)	15 (3)	21 (2)	30 (1)	39 (3)	49 (5)	55 (7)
	51-70	60	26 (2)	20 (5)	22 (4)	24 (4)	26 (3)	29 (4)	32 (7)	34 (10)
Female	19-50	247	25 (1)	18 (3)	20 (3)	22 (2)	25 (1)	28 (2)	31 (3)	33 (4)
	51-70	80	18 (2)	13 (3)	14 (3)	15 (3)	17 (3)	18 (3)	20 (4)	21 (4)

Table 11.6 Total monounsaturated fats (g/d): Usual intakes from food, by DRI age-sex group, household population[1]

Sex	Age	n	Mean (SE)	Percentiles (SE) of usual intake						
				5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)
Male	19-50	141	37 (2)	19 (4)	22 (3)	28 (2)	35 (1)	43 (3)	51 (5)	57 (7)
	51-70	60	31 (2)	21 (2)	23 (3)	26 (3)	30 (5)	35 (10)	(-)	(-)
Female	19-50	247	32 (1)	21 (6)	23 (5)	27 (4)	32 (2)	37 (2)	42 (5)	45 (7)
	51-70	80	26 (5)	19 (4)	20 (4)	22 (5)	24 (5)	26 (6)	28 (7)	30 (7)

Table 11.7 Total polyunsaturated fats (g/d): Usual intakes from food, by DRI age-sex group, household population[1]

Sex	Age	n	Mean (SE)	Percentiles (SE) of usual intake						
				5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)
Male	19-50	141	17 (2)	8 (2)	9 (2)	12 (1)	16 (1)	21 (2)	25 (3)	28 (4)
	51-70	60	13 (1)	8 (1)	9 (1)	11 (1)	13 (1)	15 (3)	18 (5)	(-)
Female	19-50	247	17 (1)	9 (2)	10 (2)	13 (2)	16 (1)	21 (19)	26 (2)	29 (3)
	51-70	80	12 (2)	6 (1)	7 (1)	8 (2)	11 (3)	14 (3)	17 (5)	19 (5)

Table 11.8 Linoleic acid (g/d): Usual intakes from food, by DRI age-sex group, household population[1]

Sex	Age	n	Mean (SE)	Percentiles (SE) of usual intake							AI	% > AI (95% CI)
				5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)		
Male	19-50	141	14 (2)	7 (2)	8 (2)	10 (1)	13 (1)	17 (2)	20 (3)	22 (4)	17	(-)
	51-70	60	10 (1)	6 (1)	7 (2)	(-)	10 (2)	12 (4)	(-)	(-)	14	(-)
Female	19-50	247	12 (1)	6 (2)	7 (2)	9 (1)	11 (1)	14 (1)	18 (2)	20 (3)	12	43.9 (20.7-70.5)
	51-70	80	10 (2)	4 (1)	5 (1)	7 (2)	9 (2)	11 (3)	14 (4)	16 (5)	11	(-)

Table 11.9 Linolenic acid (g/d): Usual intakes from food, by DRI age-sex group, household population[1]

Sex	Age	n	Mean (SE)	Percentiles (SE) of usual intake							AI	% > AI (95% CI)
				5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)		
Male	19-50	141	1.6 (0.1)	0.8 (0.2)	0.9 (0.2)	1.1 (0.1)	1.4 (0.1)	1.7 (0.2)	2 (0.4)	2.2 (0.5)	1.6	31.7 (1.6-51.8)
	51-70	60	1.5 (0.1)	0.9 (0.2)	1 (0.2)	1.2 (0.2)	1.4 (0.2)	(-)	(-)	2.3 (0.6)	1.6	(-)
Female	19-50	247	1.6 (0.2)	1.2 (0.3)	1.2 (0.3)	1.4 (0.3)	1.6 (0.3)	1.8 (0.3)	2.1 (0.4)	2.2 (0.5)	1.1	97 (35.8-100)
	51-70	80	1.4 (0.4)	0.8 (0.2)	0.9 (0.2)	1.1 (0.3)	1.3 (0.4)	(-)	(-)	(-)	1.1	(-)

Table 11.10 Cholesterol (mg/d): Usual intakes from food, by DRI age-sex group, household population[1]

Sex	Age	n	Mean (SE)	Percentiles (SE) of usual intake						
				5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)
Male	19-50	141	398 (20)	243 (61)	270 (53)	318 (37)	377 (17)	442 (35)	505 (75)	545 (105)
	51-70	60	373 (46)	262 (53)	281 (60)	315 (82)	(-)	(-)	441 (66)	467 (69)
Female	19-50	247	295 (24)	172 (10)	195 (10)	236 (12)	287 (16)	345 (22)	403 (29)	440 (33)
	51-70	80	268 (36)	170 (43)	186 (40)	215 (36)	251 (43)	291 (65)	329 (95)	353 (118)

Table 11.11 Total sugars (g/d): Usual intakes from food, by DRI age-sex group, household population[1]

Sex	Age	n	Mean (SE)	Percentiles (SE) of usual intake						
				5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)
Male	19-50	141	104 (5)	(-)	52 (14)	72 (11)	99 (7)	130 (14)	161 (37)	180 (58)
	51-70	60	100 (23)	36 (12)	45 (13)	64 (15)	90 (18)	120 (25)	153 (51)	(-)
Female	19-50	247	76 (4)	(-)	32 (10)	47 (8)	68 (5)	93 (6)	121 (13)	139 (18)
	51-70	80	58 (11)	(-)	(-)	30 (9)	44 (11)	65 (17)	93 (28)	(-)

Table 11.12 Total dietary fibre (g/d): Usual intakes from food, by DRI age-sex group, household population[1]

Sex	Age	n	Mean (SE)	Percentiles (SE) of usual intake							AI	% > AI (95% CI)
				5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)		
Male	19-50	141	14 (1)	8 (1)	9 (1)	11 (1)	13 (1)	16 (1)	18 (1)	20 (1)	38	0 (0-0)
	51-70	60	11 (1)	6 (2)	7 (2)	8 (1)	11 (2)	13 (2)	17 (3)	19 (4)	30	(-)
Female	19-50	247	12 (1)	6 (1)	7 (1)	9 (1)	11 (1)	14 (3)	(-)	19 (3)	25	(-)
	51-70	80	10 (1)	7 (1)	8 (1)	9 (1)	10 (1)	11 (2)	12 (2)	12 (2)	21	0 (0-0)

Table 11.13 Vitamin A (RAE/d): Usual intakes from food, by DRI age-sex group, household population[1]

Sex	Age	n	Mean (SE)	Percentiles (SE) of usual intake							EAR	%<EAR (95% CI)
				5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)		
Male	19-50	141	469 (39)	(-)	(-)	264 (49)	390 (34)	566 (38)	790 (86)	967 (136)	625	80.4 (77-99.8)
	51-70	60	467 (129)	(-)	223 (70)	281 (68)	366 (69)	477 (93)	609 (159)	704 (227)	625	91.1 (65.5-100)
Female	19-50	247	440 (47)	279 (78)	308 (72)	361 (59)	428 (44)	503 (52)	579 (92)	628 (128)	500	74.1 (56.5-97.2)
	51-70	79*	330 (46)	226 (56)	244 (58)	276 (63)	315 (68)	358 (76)	400 (89)	426 (101)	500	99.5 (92.3-100)

*One outlier removed due to high intakes (>10 X EAR) of vitamin A.

Table 11.14 Vitamin C (mg/d): Usual intakes from food, by DRI age-sex group, household population[1]

Sex	Age	n	Mean (SE)	Percentiles (SE) of usual intake							EAR	% < EAR (95% CI)	UL	% > UL (95% CI)
				5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)				
Male	19-50	139*	65 (4)	35 (11)	39 (11)	48 (10)	59 (8)	73 (9)	88 (24)	(-)	75	76.7 (60.1-86.7)	2000	0 (0-0)
	51-70	59*	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	75	78.3 (18.7-100)	2000	0 (0-0.1)
Female	19-50	245*	84 (6)	(-)	(-)	47 (10)	73 (7)	110 (10)	153 (21)	183 (30)	60	37.5 (10.6-50.5)	2000	0 (0-0)
	51-70	79*	(-)	14 (4)	18 (5)	25 (8)	(-)	(-)	(-)	(-)	60	79.5 (51.5-99.7)	2000	0 (0-0.2)

*outliers removed due to high intakes (10x>EAR) of vitamin C

Table 11.15 Vitamin C (mg/d): Usual intakes from food (by smoking status)[1]

Sex	Status	n	Mean (SE)	Percentiles (SE) of usual intake							EAR	% < EAR (95% CI)	UL	% > UL (95% CI)
				5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)				
Male	Non-smoker	86	58 (8)	(-)	(-)	(-)	50 (10)	83 (17)	126 (41)	(-)	75	70.5 (44.5-90)	2000	0 (0-0)
	Smoker	112	66 (13)	(-)	(-)	32 (7)	49 (9)	74 (21)	(-)	(-)	110	91.1 (72.5-100)	2000	0 (0-0)
Female	Non-smoker	122	72 (8)	(-)	(-)	36 (11)	57 (10)	(-)	(-)	(-)	60	52.8 (15-66.7)	2000	0 (0-0)
	Smoker	202	77 (4)	(-)	(-)	46 (13)	71 (9)	106 (9)	151 (30)	184 (53)	95	68.6 (58.4-84.3)	2000	0 (0-0)

Table 11.16 Vitamin D (µg/d): Usual intakes from food, by DRI age-sex group, household population[1]

Sex	Age	n	Mean (SE)	Percentiles (SE) of usual intake							EAR	% < EAR (95% CI)	UL	% > UL (95% CI)
				5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)				
Male	19-50	141	3 (0.5)	1.8 (0.4)	2 (0.4)	2.4 (0.5)	2.8 (0.6)	3.4 (0.7)	3.9 (0.9)	4.3 (1)	10	100 (100-100)	100	0 (0-0)
	51-70	60	2.9 (0.2)	(-)	1.5 (0.4)	1.9 (0.4)	2.5 (0.3)	3.3 (0.4)	4.2 (0.9)	4.8 (1.5)	10	100 (96.8-100)	100	0 (0-0)
Female	19-50	247	2.8 (0.4)	(-)	(-)	1.9 (0.5)	2.7 (0.5)	3.6 (0.6)	4.7 (0.9)	5.5 (1.2)	10	99.9 (97.2-100)	100	0 (0-0)
	51-70	80	2 (0.3)	(-)	(-)	1.1 (0.3)	1.6 (0.4)	2.4 (0.6)	3.4 (1)	(-)	10	100 (98.1-100)	100	0 (0-0)

Table 11.17 Folate (DFE/d): Usual intakes from food, by DRI age-sex group, household population[1]

Sex	Age	n	Mean (SE)	Percentiles (SE) of usual intake							EAR	%<EAR (95% CI)
				5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)		
Male	19-50	141	420 (33)	232 (18)	260 (21)	312 (28)	382 (40)	466 (67)	552 (124)	607 (191)	320	27.7 (12.2-45.1)
	51-70	60	403 (15)	189 (44)	224 (37)	292 (27)	383 (28)	492 (47)	606 (76)	682 (98)	320	32.5 (7.5-42.1)
Female	19-50	247	400 (18)	171 (49)	209 (44)	282 (35)	378 (24)	496 (36)	628 (68)	723 (91)	320	34.7 (12.6-49.3)
	51-70	80	289 (48)	174 (46)	191 (46)	222 (46)	261 (52)	304 (66)	347 (85)	375 (101)	320	81.8 (43.6-100)

Table 11.18 Vitamin B6 (mg/d): Usual intakes from food, by DRI age-sex group, household population[1]

Sex	Age	n	Mean (SE)	Percentiles (SE) of usual intake							EAR	% < EAR (95% CI)	UL	% > UL (95% CI)
				5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)				
Male	19-50	141	1.7 (0.1)	1.1 (0.1)	1.2 (0.1)	1.4 (0.2)	1.6 (0.4)	(-)	(-)	(-)	1.1	(-)	100	0 (0-0)
	51-70	60	1.4 (0.3)	(-)	(-)	(-)	1.3 (0.4)	1.5 (0.5)	1.7 (0.5)	1.9 (0.6)	1.4	67 (0.1-99.1)	100	0 (0-0)
Female	19-50	247	1.5 (0.1)	1.1 (0.2)	1.1 (0.2)	1.3 (0.1)	1.5 (0.1)	1.7 (0.2)	1.9 (0.5)	(-)	1.1	(-)	100	0 (0-0)
	51-70	80	1.3 (0.1)	0.6 (0.2)	0.7 (0.2)	0.9 (0.2)	1.1 (0.2)	1.5 (0.2)	1.9 (0.3)	2.1 (0.3)	1.3	62.7 (27.3-90.3)	100	0 (0-0)

Table 11.19 Vitamin B12 (μg/d): Usual intakes from food, by DRI age-sex group, household population[1]

Sex	Age	n	Mean (SE)	Percentiles (SE) of usual intake							EAR	%<EAR (95% CI)
				5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)		
Male	19-50	141	6.9 (0.8)	(-)	2.7 (0.9)	3.8 (0.8)	5.6 (0.7)	8.2 (0.9)	12.2 (1.8)	15.6 (2.9)	2.0	(-)
	51-70	60	5.2 (1.3)	(-)	(-)	(-)	(-)	5.3 (1.7)	7.3 (2.4)	(-)	2.0	(-)
Female	19-50	246	5.2 (0.6)	3.1 (0.4)	3.5 (0.5)	4.1 (0.6)	5 (0.7)	6.1 (0.9)	7.3 (1.1)	8.1 (1.3)	2.0	0 (0-1.3)
	51-70	80	4.3 (0.6)	2.7 (0.9)	3 (0.8)	3.5 (0.8)	4.2 (0.9)	4.9 (1.2)	5.8 (1.7)	(-)	2.0	(-)

Table 11.20 Thiamin (mg/d): Usual intakes from food, by DRI age-sex group, household population[1]

Sex	Age	n	Mean (SE)	Percentiles (SE) of usual intake							EAR	%<EAR (95% CI)
				5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)		
Male	19-50	141	2.1 (0.1)	1.1 (0.1)	1.2 (0.1)	1.5 (0.1)	1.8 (0.1)	2.3 (0.2)	2.9 (0.3)	3.4 (0.5)	1.0	(-)
	51-70	60	1.9 (0.1)	1 (0.3)	1.2 (0.3)	1.5 (0.2)	1.8 (0.2)	2.2 (0.3)	2.7 (0.6)	3 (0.8)	1.0	(-)
Female	19-50	247	1.6 (0.1)	0.8 (0.2)	0.9 (0.2)	1.2 (0.1)	1.5 (0.1)	2 (0.2)	2.6 (0.3)	3 (0.5)	0.9	(-)
	51-70	80	1.5 (0.3)	(-)	(-)	1.1 (0.3)	1.4 (0.4)	1.7 (0.4)	2.1 (0.4)	2.4 (0.5)	0.9	(-)

Table 11.21 Riboflavin (mg/d): Usual intakes from food, by DRI age-sex group, household population[1]

Sex	Age	n	Mean (SE)	Percentiles (SE) of usual intake							EAR	%<EAR (95% CI)
				5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)		
Male	19-50	141	2.3 (0.1)	1.8 (0.3)	1.9 (0.3)	2 (0.2)	2.2 (0.1)	2.4 (0.2)	2.7 (0.4)	2.8 (0.5)	1.1	0 (0-9.9)
	51-70	60	2.4 (0.2)	2 (0.2)	2.1 (0.2)	2.2 (0.3)	2.3 (0.3)	2.5 (0.4)	2.6 (0.6)	2.7 (0.7)	1.1	0 (0-0)
Female	19-50	247	1.8 (0.1)	1.2 (0.3)	1.3 (0.2)	1.5 (0.2)	1.8 (0.2)	2.1 (0.2)	2.3 (0.2)	2.5 (0.3)	0.9	(-)
	51-70	80	1.8 (0.2)	0.9 (0.2)	1.1 (0.2)	1.4 (0.2)	1.7 (0.2)	2.1 (0.3)	2.5 (0.3)	2.7 (0.3)	0.9	(-)

Table 11.22 Niacin (NE/d): Usual intakes from food, by DRI age-sex group, household population[1]

Sex	Age	n	Mean (SE)	Percentiles (SE) of usual intake							EAR	%<EAR (95% CI)
				5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)		
Male	19-50	141	47 (3)	35 (6)	37 (5)	41 (4)	46 (3)	50 (5)	55 (8)	58 (11)	12	0 (0-1.4)
	51-70	60	37 (6)	(-)	23 (7)	27 (7)	34 (8)	41 (10)	50 (12)	57 (14)	12	(-)
Female	19-50	247	38 (2)	30 (1)	32 (2)	34 (2)	38 (2)	41 (2)	45 (2)	47 (3)	11	0 (0-0)
	51-70	80	33 (3)	18 (5)	21 (5)	25 (5)	30 (4)	37 (4)	44 (5)	49 (6)	11	(-)

Table 11.23 Calcium (mg/d): Usual intakes from food, by DRI age-sex group, household population[1]

Sex	Age	n	Mean (SE)	Percentiles (SE) of usual intake							EAR	% < EAR (95% CI)	UL	% > UL (95% CI)
				5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)				
Male	19-50	141	681 (26)	580 (68)	599 (78)	631 (99)	670 (130)	710 (172)	748 (223)	(-)	800	98.1 (28.1-100)	2500	0 (0-0)
	51-70	60	651 (92)	549 (128)	572 (124)	611 (112)	658 (94)	708 (80)	756 (104)	786 (146)	800	96.5 (68.8-99.9)	2000	0 (0-0.7)
Female	19-50	247	588 (49)	513 (53)	531 (54)	561 (56)	595 (59)	632 (62)	666 (65)	687 (68)	800	100 (94.2-100)	2500	0 (0-0)
	51-70	80	444 (67)	369 (71)	379 (73)	396 (77)	416 (81)	437 (87)	455 (93)	467 (97)	1000	100 (100-100)	2000	0 (0-0)

Table 11.24 Iron (mg/d): Usual intakes from food, by DRI age-sex group, household population[1]

Sex	Age	n	Mean (SE)	Percentiles (SE) of usual intake							EAR	% < EAR (95% CI)	UL	% > UL (95% CI)
				5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)				
Male	19-50	140*	17.4 (1.3)	12.8 (3)	(-)	(-)	(-)	(-)	(-)	(-)	6.0	0 (0-0)	45	0 (0-58.4)
	51-70	60	19.3 (2.3)	(-)	10.2 (3.3)	13.6 (3.4)	(-)	23.5 (3.2)	28.3 (7.8)	(-)	6.0	(-)	45	(-))
Female	19-50	247	14.8 (0.9)	10.6 (1.7)	11.4 (1.5)	12.8 (1.1)	14.5 (0.9)	16.5 (1.4)	18.4 (2.6)	19.7 (3.6)	8.1	(-)	45	0 (0-0.5)
	51-70	80	12.3 (1.6)	7.2 (1.3)	7.9 (1.4)	9.4 (1.7)	11.3 (2)	13.8 (2.2)	16.5 (2.4)	18.4 (2.5)	5.0	(-)	45	0 (0-0)

*One outlier removed due to high intakes (>10 X EAR) of iron.

Table 11.25 Potassium (mg/d): Usual intakes from food, by DRI age-sex group, household population[1]

Sex	Age	n	Mean (SE)	Percentiles (SE) of usual intake							AI	% > AI (95% CI)
				5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)		
Male	19-50	141	2691 (133)	2024 (356)	2147 (298)	2366 (190)	2629 (96)	2916 (256)	3195 (556)	3372 (807)	4700	0 (0-9.4)
	51-70	60	2628 (152)	1904 (169)	2041 (171)	2287 (183)	2583 (211)	2906 (257)	3221 (313)	3421 (353)	4700	0 (0-1.2)
Female	19-50	247	2263 (159)	1365 (218)	1514 (190)	1785 (157)	2141 (163)	2579 (246)	3053 (384)	3371 (492)	4700	(-)
	51-70	80	1997 (106)	1714 (278)	1755 (243)	1824 (191)	1904 (150)	1988 (142)	2067 (195)	2115 (268)	4700	0 (0-0.5)

Table 11.26 Sodium (mg/d): Usual intakes from food, by DRI age-sex group, household population[1]

Sex	Age	n	Mean (SE)	Percentiles (SE) of usual intake							AI	% > AI (95% CI)	UL	% > UL (95% CI)
				5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)				
Male	19-50	141	3975 (303)	3132 (351)	3289 (412)	3561 (550)	3877 (782)	4209 (1144)	(-)	(-)	1500	100 (100-100)	2300	100 (99.9-100)
	51-70	60	3235 (293)	(-)	(-)	2251 (416)	2999 (297)	3928 (323)	5113 (589)	6032 (857)	1300	94.3 (84.3-100)	2300	73.5 (54.9-100)
Female	19-50	247	3124 (176)	1686 (380)	1943 (337)	2424 (253)	3037 (150)	3736 (522)	4440 (985)	4897 (1301)	1500	97.3 (89-100)	2300	79.5 (67.1-99.4)
	51-70	80	2192 (463)	(-)	1233 (411)	1509 (446)	1901 (528)	2369 (654)	2833 (807)	3125 (917)	1300	86.9 (21.2-100)	2300	(-)

Table 11.27 Magnesium (mg/d): Usual intakes from food, by DRI age-sex group*, household population[1]

Sex	Age	n	Mean (SE)	Percentiles (SE) of usual intake							EAR	% < EAR (95% CI)
				5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)		
Male	19-30	37	272 (23)	205 (45)	217 (40)	240 (31)	268 (22)	298 (23)	328 (39)	347 (52)	330	90.7 (65.6-100)
	31-70	164	260 (9)	187 (9)	201 (9)	226 (10)	256 (10)	289 (13)	321 (19)	342 (26)	350	96.3 (91.4-99.3)
Female	19-30	59	219 (27)	167 (22)	176 (24)	193 (26)	213 (30)	234 (33)	254 (36)	266 (38)	255	90.6 (29.4-100)
	31-70	269	224 (10)	162 (10)	172 (10)	192 (10)	215 (11)	240 (12)	265 (13)	281 (14)	265	89.9 (77.4-96.8)

*age-groups categorized differently from all other SIDE tables due to different EAR values

Table 11.28 Phosphorus (mg/d): Usual intakes from food, by DRI age-sex group, household population[1]

Sex	Age	n	Mean (SE)	Percentiles (SE) of usual intake							EAR	% < EAR (95% CI)	UL	% > UL (95% CI)
				5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)				
Male	19-50	141	1347 (64)	983 (50)	1051 (52)	1172 (57)	1318 (65)	1479 (77)	1639 (92)	1742 (102)	580	0 (0-0)	4000	0 (0-0)
	51-70	60	1379 (87)	720 (240)	852 (211)	1081 (151)	1348 (78)	1657 (100)	2001 (207)	2247 (290)	580	(-)	4000	0 (0-0.4)
Female	19-50	247	1145 (80)	856 (139)	913 (123)	1010 (99)	1126 (85)	1255 (110)	1387 (175)	1475 (229)	580	0 (0-8.6)	4000	0 (0-0)
	51-70	80	1001 (167)	622 (195)	690 (194)	810 (197)	954 (201)	1109 (205)	1259 (212)	1352 (221)	580	(-)	4000	0 (0-0)

Table 11.29 Zinc (mg/d): Usual intakes from food, by DRI age-sex group, household population[1]

Sex	Age	n	Mean (SE)	Percentiles (SE) of usual intake							EAR	% < EAR (95% CI)	UL	% > UL (95% CI)
				5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)				
Male	19-50	141	15.5 (1.1)	8.5 (1.7)	9.6 (1.5)	11.8 (1.1)	14.6 (0.9)	18.1 (1.6)	22.2 (3.2)	25.1 (4.7)	9.4	(-)	40	(-)
	51-70	60	15.6 (1.3)	10.8 (2.7)	11.7 (2.5)	13.4 (2)	15.5 (2)	17.6 (5.3)	19.7 (5)	(-)	9.4	(-)	40	0 (0-1.6)
Female	19-50	247	11.8 (1)	7.7 (0.7)	8.5 (0.7)	9.9 (0.9)	11.7 (1.1)	13.8 (1.5)	16.1 (1.8)	17.6 (2.1)	6.8	(-)	40	0 (0-0)
	51-70	80	10.8 (0.5)	7.1 (1.9)	7.6 (1.8)	8.7 (1.5)	10 (1.2)	11.7 (1)	13.5 (1.6)	14.7 (2.2)	6.8	(-)	40	0 (0-0)

Table 11.30 Percentage of total energy intake from protein, by DRI age-sex group, household population[1]

Sex	Age	n	Mean (SE)	Percentiles (SE) of usual intake							AMDR	% below AMDR (95% CI)	% within AMDR (95% CI)	% above AMDR (95% CI)
				5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)				
Male	19-50	141	18 (1)	14 (1)	15 (1)	16 (2)	18 (4)	20 (14)	(-)	24 (7)	10-35	0 (0-0.2)	100 (91.4-100)	0 (0-8.6)
	51-70	60	21 (1)	15 (2)	16 (2)	18 (1)	20 (1)	23 (2)	26 (3)	28 (3)	10-35	0 (0-1.9)	99.7 (93.4-100)	(-)
Female	19-50	247	17 (1)	14 (2)	15 (1)	16 (1)	17 (1)	19 (1)	20 (2)	20 (3)	10-35	0 (0-5.6)	100 (94-100)	0 (0-1.3)
	51-70	80	20 (2)	15 (4)	16 (3)	18 (3)	20 (3)	23 (3)	26 (4)	27 (5)	10-35	0 (0-8.5)	99.8 (83.5-100)	(-)

Table 11.31 Percentage of total energy intake from carbohydrates, by DRI age-sex group, household population[1]

Sex	Age	n	Mean (SE)	Percentiles (SE) of usual intake							AMDR	% below AMDR (95% CI)	% within AMDR (95% CI)	% above AMDR (95% CI)
				5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)				
Male	19-50	141	48 (1)	33 (4)	37 (3)	42 (2)	48 (1)	53 (2)	59 (3)	63 (4)	45-65	36.7 (10.5-47.9)	60.1 (49.1-89.5)	(-)
	51-70	60	45 (2)	33 (3)	36 (3)	41 (2)	46 (2)	50 (3)	55 (6)	57 (9)	45-65	46.8 (35-71.3)	52.9 (26.5-63.8)	(-)
Female	19-50	247	48 (1)	41 (3)	42 (2)	45 (1)	47 (1)	50 (2)	52 (3)	54 (4)	45-65	(-)	72.9 (54.6-100)	0 (0-3.6)
	51-70	80	47 (2)	39 (3)	41 (2)	43 (2)	46 (2)	49 (3)	52 (4)	54 (5)	45-65	37.9 (17.8-80.5)	62.1 (19.5-82)	0 (0-4.8)

Table 11.32 Percentage of total energy intake from fats, by DRI age-sex group, household population[1]

Sex	Age	n	Mean (SE)	Percentiles (SE) of usual intake							AMDR	% below AMDR (95% CI)	% within AMDR (95% CI)	% above AMDR (95% CI)
				5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)				
Male	19-50	140*	35 (1)	22 (3)	25 (2)	30 (1)	35 (1)	40 (2)	44 (3)	47 (3)	20-35	3.3 (0-5.7)	45.1 (36.3-65.6)	51.6 (34.2-62)
	51-70	59*	33 (2)	25 (5)	27 (5)	29 (4)	33 (3)	36 (2)	39 (3)	41 (3)	20-35	0 (0-12.6)	68.6 (4.3-87)	31.4 (13-95.7)
Female	19-50	246*	37 (0)	34 (1)	35 (1)	36 (1)	37 (1)	38 (1)	40 (1)	40 (1)	20-35	0 (0-0)	10.5 (3.7-25.5)	89.5 (74.5-96.3)
	51-70	80	34 (1)	31 (4)	32 (5)	33 (8)	34 (11)	35 (6)	36 (8)	37 (9)	20-35	0 (0-0)	69.5 (7.5-98.3)	30.5 (1.7-92.5)

*Outliers removed due to high intakes (>2 X EAR) of percent energy from fat.

Table 11.33 Percentage of total energy intake from saturated fats, by DRI age-sex group, household population[1]

Sex	Age	n	Mean (SE)	Percentiles (SE) of usual intake						
				5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)
Male	19-50	141	11.4 (0.2)	6.3 (0.9)	7.5 (0.7)	9.5 (0.4)	11.7 (0.3)	13.7 (0.4)	15.4 (0.6)	16.4 (0.8)
	51-70	60	12.3 (1.2)	6.8 (1.4)	7.6 (1.3)	9.3 (1.2)	11.5 (0.9)	14.3 (1)	17.3 (1.7)	19.3 (2.4)
Female	19-50	247	11.7 (0.2)	10 (0.2)	10.4 (0.2)	11.1 (0.2)	11.8 (0.2)	12.6 (0.3)	13.3 (0.3)	13.7 (0.3)
	51-70	80	10.4 (0.3)	9 (0.4)	9.3 (0.4)	9.8 (0.4)	10.3 (0.4)	10.9 (0.4)	11.4 (0.5)	11.8 (0.5)

Table 11.34 Percentage of total energy intake from monounsaturated fats, by DRI age-sex group, household population[1]

Sex	Age	n	Mean (SE)	Percentiles (SE) of usual intake						
				5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)
Male	19-50	141	13.9 (0.6)	8.6 (1.2)	9.7 (1)	11.5 (0.7)	13.7 (0.7)	16 (1)	18.1 (1.4)	19.5 (1.8)
	51-70	60	13.4 (0.8)	9.7 (1.1)	10.3 (1.1)	11.5 (1.3)	12.9 (1.3)	14.4 (2.5)	(-)	16.7 (2.7)
Female	19-50	247	14.5 (0.4)	13.1 (1.8)	13.4 (1.5)	14.1 (1)	14.7 (0.5)	15.4 (0.5)	16.1 (1.1)	16.4 (1.4)
	51-70	80	14.5 (0.5)	12.2 (0.6)	12.7 (0.6)	13.6 (0.6)	14.5 (0.6)	15.4 (0.8)	16.3 (0.9)	16.8 (1.1)

Table 11.35 Percentage of total energy intake from polyunsaturated fats, by DRI age-sex group, household population[1]

Sex	Age	n	Mean (SE)	Percentiles (SE) of usual intake						
				5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)
Male	19-50	141	6.5 (0.3)	5.6 (0.3)	5.8 (0.3)	6.1 (0.3)	6.4 (0.3)	6.7 (0.2)	7 (0.2)	7.2 (0.2)
	51-70	60	5.7 (0.4)	3.2 (0.7)	3.5 (0.6)	4.3 (0.6)	5.3 (0.6)	6.5 (0.6)	7.8 (0.7)	8.7 (0.9)
Female	19-50	247	7.4 (0.2)	5.7 (0.9)	6.1 (0.8)	6.8 (0.7)	7.6 (0.2)	8.4 (2.2)	(-)	(-)
	51-70	80	6.7 (0.3)	4.5 (0.8)	5 (0.6)	5.8 (0.5)	6.7 (0.4)	7.6 (0.5)	8.5 (0.8)	9.1 (1)

Table 11.36 Percentage of energy from linoleic acid, by DRI age-sex group, household population[1]

Sex	Age	n	Mean (SE)	Percentiles (SE) of usual intake						
				5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)
Male	19-50	141	5.2 (0.3)	4 (0.3)	4.2 (0.3)	4.6 (0.3)	5.1 (0.3)	5.6 (0.3)	6.1 (0.3)	6.4 (0.3)
	51-70	60	4.1 (0.6)	(-)	(-)	3.1 (0.8)	4 (0.7)	5 (0.7)	6.1 (1)	7 (1.5)
Female	19-50	247	5.4 (0.2)	3.7 (0.6)	4 (0.5)	4.7 (0.4)	5.4 (0.3)	6.3 (0.3)	7.2 (0.6)	7.7 (0.8)
	51-70	80	5.3 (0.3)	4.4 (0.7)	4.6 (0.6)	4.9 (0.6)	5.3 (0.4)	5.8 (0.6)	6.2 (0.8)	6.4 (0.9)

Table 11.37 Percentage of energy from linolenic acid, by DRI age-sex group, household population[1]

Sex	Age	n	Mean (SE)	Percentiles (SE) of usual intake						
				5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)
Male	19-50	141	0.6 (0.1)	0.5 (0.1)	0.5 (0.1)	0.5 (0.1)	0.6 (0.1)	0.6 (0.1)	0.6 (0.1)	0.6 (0.1)
	51-70	60	0.6 (0.1)	(-)	0.3 (0.1)	0.4 (0.1)	0.5 (0.1)	0.7 (0.1)	1 (0.2)	1.3 (0.3)
Female	19-50	247	0.7 (0.1)	0.7 (0.1)	0.7 (0.1)	0.7 (0.1)	0.7 (0.1)	0.8 (0.1)	0.8 (0.1)	0.9 (0.1)
	51-70	80	0.8 (0.1)	0.5 (0.1)	0.5 (0.1)	0.6 (0.1)	0.7 (0.1)	0.9 (0.1)	1 (0.2)	1.1 (0.3)

Table 12. Mean number of Food Guide Servings consumed per day by First Nations men (n=223) and women (n=386) in Alberta compared to Canada's Food Guide (CGF) recommendations (unweighted)

Food Group	Gender	First Nations in Alberta current intake	Canada's Food Guide Recommendations
		Servings per day	
Vegetables and Fruit	men	3.8	7-10
	women	3.4	7-8
Grain Products	men	5.8	7-8
	women	5.2	6-7
Milk and Alternatives	men	1.0	2-3
	women	0.8	2-3
Meat and Alternatives	men	4.0	3
	women	2.9	2

Table 13. Top 5 contributors to Canada's Food Guide (% of total group intake), First Nations women and men in Alberta

Gender	Canada's Food Guide Food Groups							
	Vegetables and Fruit	(%)	Meat and Alternatives	(%)	Grain Products	(%)	Milk and Alternatives	(%)
Women	Potatoes	27.1	Pork	24.9	White bread	22.3	Fluid milk	30.3
	Fresh/frozen vegetables*	24.4	Beef	20.0	Pasta	14.5	Cheddar cheese	28.2
	Fresh/frozen fruits*	12.7	Chicken	15.4	Bannock	13.2	Yoghurt	10.2
	Canned vegetable soups	11.8	Wild meats**	12.5	Rice	9.0	Mac & cheese	9.9
	Fruit juices	8.9	Eggs	9.8	Whole wheat bread	6.0	Mashed Potatoes	8.1
Men	Potatoes	31.3	Pork	18.4	White bread	26.3	Fluid milk	36.2
	Canned vegetable soups	19.1	Wild meats**	16.3	Bannock	13.8	Cheddar cheese	21.4
	Fresh/frozen vegetables	15.7	Beef	15.2	Rice	8.3	Mac & cheese	12.9
	Fruit juices	9.9	Chicken	12.7	Oats	7.7	Pizza	5.7
	Fresh/frozen fruits	8.5	Eggs	10.3	Whole wheat bread	6.2	Cream soups	5.7

* Does not include canned

**Includes moose, caribou, elk, deer

NUTRIENT INTAKE

Table 14. Ten most important contributors to macro and micronutrients for First Nations adults in Alberta

a) Energy		b) Protein		c) Fat		d) Carbohydrates	
FOOD	% of total	FOOD	% of total	FOOD	% of total	FOOD	% of total
Pork[1]	5.5	Pork	11.5	Pork	9.2	Carbonated drinks, regular	10.3
Bread/buns, white	5.3	Beef	10.6	Cold cuts/sausages	8.3	Bread/buns, white	8.3
Carbonated drinks, regular	4.8	Moose	9.8	Beef	6.7	Cereal	5.7
Bannock	4.4	Chicken	7.5	Chicken	5.5	Bannock	5.6
Beef[2]	4.4	Cold cuts/sausages	5.1	Vegetable oil	5.1	Fruit drink	5.6
Pasta/noodles	4.3	Egg, chicken	4.3	Hash browns, french fries, onion rings	5	Pasta/noodles	5.6
Cold cuts/sausages	4.2	Pasta/noodles	4.1	Salty snack food[4]	4.5	Jam/honey/syrup/sugar	5.4
Hash browns, french fries, onion rings	4.1	Bread/buns, white	3.7	Margarine/butter	4.4	Potatoes[5]	4.9
Chicken[3]	3.7	Pizza	3.6	Egg, chicken	4.3	Hash browns, french fries, onion rings	4.8
Pizza	3.7	Elk	2.9	Pizza	4.1	Grains (rice,barley,flour)	3.7

e) Saturated Fat		f) Monounsaturated Fat		g) Polyunsaturated Fat		h) Cholesterol	
FOOD	% of total	FOOD	% of total	FOOD	% of total	FOOD	% of total
Pork	10.4	Pork	10	Salty snack food	9.7	Egg, chicken	36
Cold cuts/sausages	9.7	Cold cuts/sausages	9.7	Vegetable oil	7.5	Pork	9.9
Beef	8.6	Vegetable oil	8.1	Chicken	6.6	Beef	7.9
Hash browns, french fries, onion rings	5.5	Beef	7.9	Vegetables	5.9	Chicken	7.3
Margarine/butter	5.2	Chicken	5.6	Pork	5.7	Moose	5.5
Cheese	5.1	Bannock	5.2	Hash browns, french fries, onion rings	5.3	Cold cuts/sausages	5.1
Pizza	5.1	Hash browns, french fries, onion rings	5	Bannock	5.2	Mixed dish	2.2
Chicken	4.2	Egg, chicken	4.5	Margarine/butter	4.7	Sandwiches	2.2
Egg, chicken	4	Margarine/butter	4.1	Bread/buns, white	4.4	Hamburger/cheeseburger	2.1
Hamburger/cheeseburger	3.4	Salty snack food	3.7	Cold cuts/sausages	4.4	Cheese	2

[1]pork = loin, chops and ribs [2]beef = ground, steak, ribs and brisket [3]chicken = roasted, baked, fried and stewed [4]salty snack food = potato chips, pretzels, popcorn [5]potatoes = boiled, baked, mashed
[6]milk = fluid milk, evaporated, powdered

Table 14. Ten most important contributors to macro and micronutrients for First Nations adults in Alberta

i) Total Sugars		j) Fibre		k) Vitamin A		l) Vitamin C	
FOOD	% of total	FOOD	% of total	FOOD	% of total	FOOD	% of total
Carbonated drinks, regular	27.4	Cereal	10.1	Vegetables	26.3	Fruit drink	49.8
Jam/honey/syrup/sugar	15.1	Vegetables	9.4	Egg, chicken	13.8	Fruit juice	13.8
Fruit drink	5.6	Bread/buns, white	7.8	Milk	9.2	Vegetables	7
Milk[6]	4.2	Hash browns, french fries, onion rings	7.8	Soup	7.8	Fruits	6.8
Fruit juice	4	Potatoes	7	Margarine/butter	7.6	Potatoes	5.4
Fruits	3.9	Salty snack food	6.1	Moose	4.4	Hash browns, french fries, onion rings	3.3
Iced tea	3.9	Bread/buns, whole wheat	5.9	Pizza	4.1	Salty snack food	2.5
Cakes/pies/pastries	3.7	Pasta/noodles	5.5	Cheese	3.5	Soup	2.2
Cereal	3	Fruits	4.7	Cream	2.7	Moose	1.3
Condiments	2.4	Bannock	4.2	Mixed dish	2.2	Flavoured water	0.9

m) Vitamin D		n) Folate		o) Calcium		p) Iron	
FOOD	% of total	FOOD	% of total	FOOD	% of total	FOOD	% of total
Milk	23.6	Bread/Buns, White	15.9	Milk	13.3	Cereal	11.9
Egg, Chicken	16	Pasta/Noodles	13.2	Bannock	10.6	Moose	8.5
Margarine/Butter	12.2	Bannock	12.4	Bread/Buns, White	7.7	Bread/Buns, White	8.4
Pork	9.9	Pizza	6.8	Pizza	7.2	Beef	6.1
Cold Cuts/Sausages	7	Egg, Chicken	4.4	Cheese	6.6	Bannock	5.5
Pasta/Noodles	5.6	Vegetables	4.2	Fruit Drink	4.6	Soup	4.5
Fish	5.1	Cereal	3.5	Pasta/Noodles	3.6	Pasta/Noodles	4.2
Chicken	2.3	Soup	3.5	Vegetables	3.3	Pizza	3.7
Potatoes	1.9	Sandwiches	2.4	Hamburger/Cheeseburger	2.7	Hash Browns, French Fries, Onion Rings	3.1
Bannock	1.8	Fruit Juice	2.3	Soup	2.6	Egg, Chicken	2.8

Table 14. Ten most important contributors to macro and micronutrients for First Nations adults in Alberta

q) Sodium		r) Zinc	
FOOD	% of total	FOOD	% of total
Soup	14.5	Beef	16.7
Cold Cuts/Sausages	9.6	Moose	14.3
Bread/Buns, White	7.4	Pork	9
Pizza	5	Cold Cuts/Sausages	4.4
Bannock	4.5	Cereal	4
Pasta/Noodles	4.3	Pasta/Noodles	3.7
Condiments	4.2	Chicken	3.3
Pork	3.9	Hamburger/Cheeseburger	3.2
Salt	3.1	Pizza	3.1
Sandwiches	3.1	Egg, Chicken	2.9

Figure 23. Percent of 24 hour recalls that included traditional food

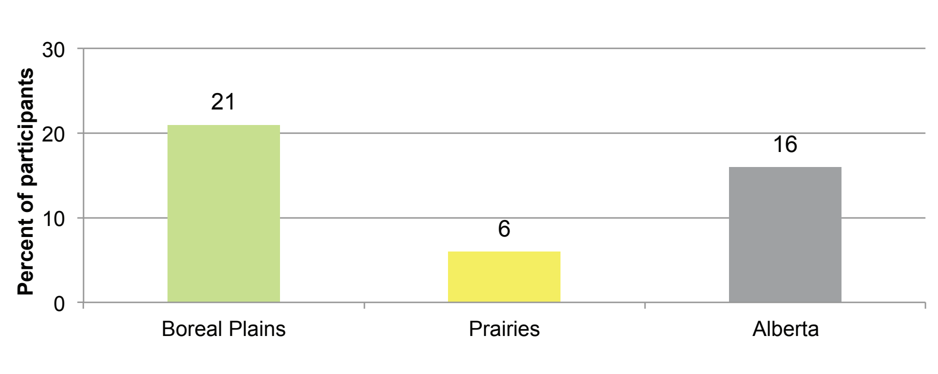


Table 15. Mean grams of traditional food per person per day (from fall 24hr recalls), consumers and non-consumers combined, ranked by overall decreasing amount of consumption, by ecozone/culture area and total*

Traditional Food	Total First Nations in Alberta	Boreal Plains	Prairies
	Mean grams / person/ day		
Moose meat	23.6	36.3	0.5
Elk meat	8.4	1.5	20.0
Caribou meat	1.9	2.9	.
Deer meat	1.4	2.4	.
Northern pike	0.7	0.0	.
Buffalo meat	0.8	1.1	.
Goose meat	0.5	.	1.4
Duck meat	0.4	0.4	.
Whitefish	0.4	.	.
Grouse	0.2	0.4	.
Moose fat	0.2	0.3	.
Chokecherry	0.2	.	0.5
Moose liver	0.2	0.3	.
Walleye	0.1	0.01	.
Moose kidney	0.1	0.1	.

*Results for the Taiga Plain are not displayed separately but are included in the Total. For this reason, there is a higher overall mean intake for foods such as northern pike and walleye which are consumed in smaller amounts in the Boreal Plains and Prairies ecozones

(.) Indicates that the food was not reported on any of the 24hr recalls from that ecozone

Table 16. Comparison of nutrient intake (mean ± SE) on days with and without traditional food (TF), First Nations adults in Alberta

Nutrient	Days with TF (n=122 recalls)	Days without TF (n=487 recalls)
	mean ± SE	
Energy (kcals)	2031.8 ± 94.54	1998.6 ± 47.15
Protein (g)***	139.2 ± 8.64	79.1 ± 2.12
Fat (g)**	70.1 ± 4.04	82.9 ± 2.36
Carbohydrate (g)	219.3 ± 11.5	240.1 ± 6.27
Total sugars (g)**	74.6 ± 6.74	81.9 ± 2.99
Fibre (g)	11.9 ± 0.67	12.3 ± 0.38
Cholesterol (mg)*	376.2 ± 25.34	314.9 ± 11.64
Total Saturated Fat (g)***	19.8 ± 1.18	26.6 ± 0.79
Total Monounsaturated Fat (g)	28.4 ± 1.92	32.6 ± 0.98
Total Polyunsaturated Fat (g)	14.4 ± 1.05	16 ± 0.6
Linoleic acid (g)	11.4 ± 0.84	12 ± 0.44
Linolenic acid (g)*	2 ± 0.23	1.5 ± 0.06
Calcium (mg)*	537.8 ± 32.7	617.8 ± 21.41
Iron (mg)***	23.9 ± 1.42	13.9 ± 0.44
Zinc (mg)***	22.2 ± 1.57	10.9 ± 0.32
Magnesium (mg)**	273.8 ± 12.26	230 ± 6.14
Copper (mg)***	1.6 ± 0.09	1.1 ± 0.03
Potassium (mg)***	3188.4 ± 161.54	2211.1 ± 56.92
Sodium (mg)**	2775.5 ± 141.87	3267.3 ± 98.25
Phosphorus (mg)***	1592.2 ± 80.9	1136 ± 31.6
Vitamin A (µg)	606.5 ± 124.77	429.8 ± 17.3
Vitamin D (µg)	2.9 ± 0.54	2.8 ± 0.13
Vitamin C (mg)	77.9 ± 11.39	87.9 ± 7.38
Folate (µg)	422 ± 24.84	385 ± 12.69
Thiamin (mg)	1.7 ± 0.09	1.8 ± 0.07
Riboflavin (mg)**	2.3 ± 0.11	1.9 ± 0.06
Niacin (mg)**	48.9 ± 3.01	37.5 ± 1.03
Vitamin B6 (mg)*	1.8 ± 0.12	1.5 ± 0.05
Vitamin B12 (µg)***	12.1 ± 1.28	4.3 ± 0.25

*significantly different, unpaired t-test, $p<0.05$; **$p<0.01$; ***$p<0.0001$

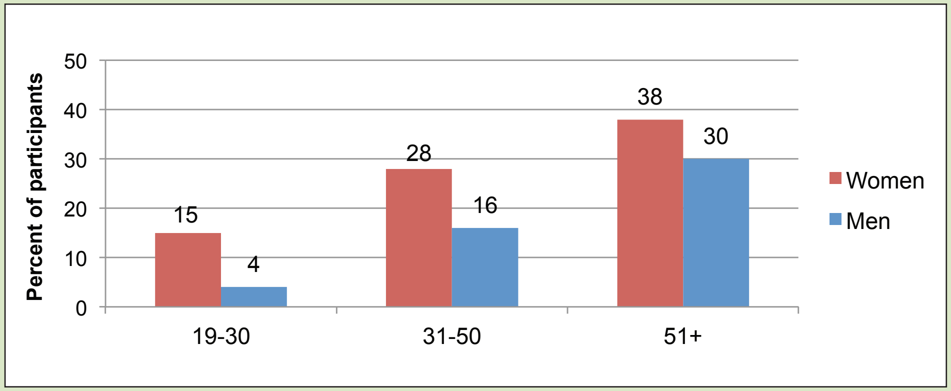
Table 17. Top 10 consumed market foods (grams/person/day), consumers and non-consumers combined, ranked by overall decreasing amount of consumption, by region and ecozones

Alberta		Boreal Plains		Prairies	
Market Food	grams/person /day	Market Food	grams/person /day	Market Food	grams/person /day
BEVERAGES		BEVERAGES		BEVERAGES	
Water, tap	487	Coffee	376	Water, tap	682
Coffee	407	Water, tap	369	Coffee	442
Carbonated drinks, regular	254	Water, bottled	239	Carbonated drinks, regular	282
Tea	161	Carbonated drinks, regular	239	Fruit drink	80
Water, bottled	149	Tea	208	Tea	74
Fruit drink[1]	126	Fruit drink	158	Milk	65
Milk[2]	65	Milk	64	Iced tea	56
Iced tea	42	Flavoured water	33	Fruit juice	50
Fruit juice[3]	34	Iced tea	32	Flavoured water	21
Flavoured water (artificial sweetener)	27	Fruit juice	24	Water, bottled	10
FOOD		FOOD		FOOD	
Soup[4]	105	Soup	103	Soup	107
Potatoes[5]	61	Potatoes	63	Cereal	65
Vegetables[6]	56	Vegetables	62	Potatoes	58
Pasta/noodles	55	Pasta/noodles	62	Bread/buns, white	51
Cereal	48	Pork	42	Vegetables	46
Pork	39	Bannock	40	Pasta/noodles	46
Bread/buns, white	38	Chicken[8]	32	Hash browns, french fries, onion rings	43
Hash browns, french fries, onion rings	36	Hash browns, french fries, onion rings	32	Egg, chicken	40
Bannock	36	Cereal	30	Beef	38
Beef[7]	33	Fruits	30	Grains (rice,barley,flour)	35

*See Appendix K for a more complete list of market foods.

[1] Fruit drinks = fruit flavoured, sweetened drinks, frozen/crystals/canned
[2] Milk = fluid milk, evaporated, powdered
[3] Fruit juice = pure fruit juice, fresh/frozen/canned
[4] Soups =canned soups and ramen noodles
[5] potatoes= boiled, baked, mashed (excludes French fries)
[6] vegetables= fresh, frozen, canned (excludes potatoes)
[7] beef= ground, steak, ribs and brisket
[8] chicken= roasted, baked, fried and stewed

Figure 24. Use of nutritional supplements by First Nations adults in Alberta, by gender and age group (n=609)*



*see Appendix L for a list of the types of supplements reported

Photo by Jack Greenlee
https://commons.wikimedia.org/wiki/File:Acorus_americanus_USFS-1.jpg

Food Security

Figure 25. Percent of households that worried that their traditional food would run out before they could get more, in the previous 12 months (n=609)

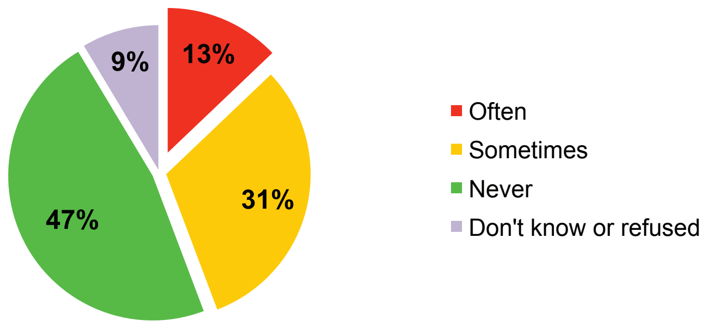


Figure 26. Percent of household that worried that their traditional food would not last and they couldn't get more in the previous 12 months (n=609)

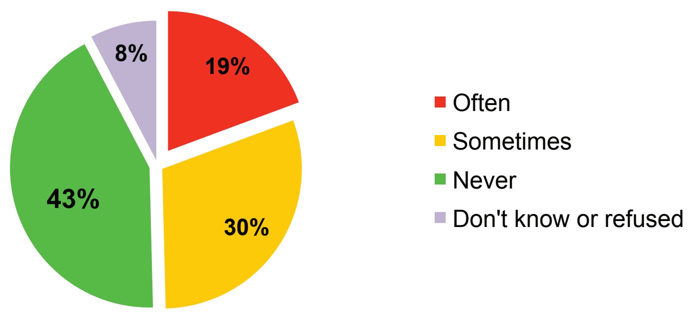


Table 18. Percent of First Nations adults in Alberta who responded affirmatively to food insecurity questions (in the last 12 months)

	Households affirming item		
	All Households (n=594)	Households with Children (n=401)	Households without Children (n=193)
ADULT FOOD SECURITY SCALE			
You and other household members worried food would run out before you got money to buy more	50.0	52.8	40.6
Food you and other household members bought didn't last and there wasn't any money to get more	41.9	44.2	34
You and other household members couldn't afford to eat balanced meals	43.3	46.3	32.9
You or other adults in your household ever cut size of meals or skipped meals	18.4	19.5	14.8
You or other adults in your household ever cut size of meals or skipped meals in 3 or more months	12.1	12.6	10.4
You (personally) ever ate less than you felt you should	19.5	21.1	14
You (personally) were ever hungry but did not eat	10.9	12	6.9
You (personally) lost weight	8.1	8.7	5.9
You or other adults in your household ever did not eat for a whole day	6.8	8.5	0.7
You or other adults in your household ever did not eat for a whole day in 3 or more months	5.4	6.8	0.6
CHILD FOOD SECURITY SCALE			
You or other adults in your household relied on less expensive foods to feed children	35.3	45.6	-
You or other adults in your household couldn't feed children a balanced meal	22.1	28.5	-
Children were not eating enough	14.9	19.2	-
You or other adults in your household ever cut size of any of the children's meals	4.3	5.5	-
Any of the children were ever hungry	5.3	6.9	-
Any of the children ever skipped meals	3.4	4.4	-
Any of the children ever skipped meals in 3 or more months	2.4	3.1	-
Any of the children ever did not eat for a whole day	3.1	4	-

(-) denotes not applicable

Table 19. Income-related household food security status for First Nations in Alberta, by households with and without children, in the previous 12 months

		Income-related food security status											
		Food Secure			Food Insecure								
		All			All			Moderate			Severe		
		n	%	95% CI	n	%	95% CI	n	%	95% CI	n	%	95% CI
All households	Household status	346	53	48-57	248	**47**	43-52	188	**34**	29-38	60	**13**	10-17
	Adult status	348	53	48-58	246	**47**	43-52	187	**34**	30-38	59	**13**	10-16
	Child status	298	70	65-75	103	**31**	25-35	91	**25**	20-29	12	**6**	3-9
Households with children	Household status	221	50	45-56	180	**50**	44-55	138	**35**	30-40	42	**15**	11-19
	Adult status	223	51	45-56	178	**49**	44-55	137	**35**	30-40	41	**14**	10-18
	Child status	298	70	65-75	103	**30**	25-35	91	**24**	20-29	12	**6**	3-9
Households without children	Household status	125	60	53-70	68	**39**	30-47	50	**31**	23-39	18	**8**	3-13

Figure 27. Income-related household food insecurity in First Nations households in Alberta (n=594) *

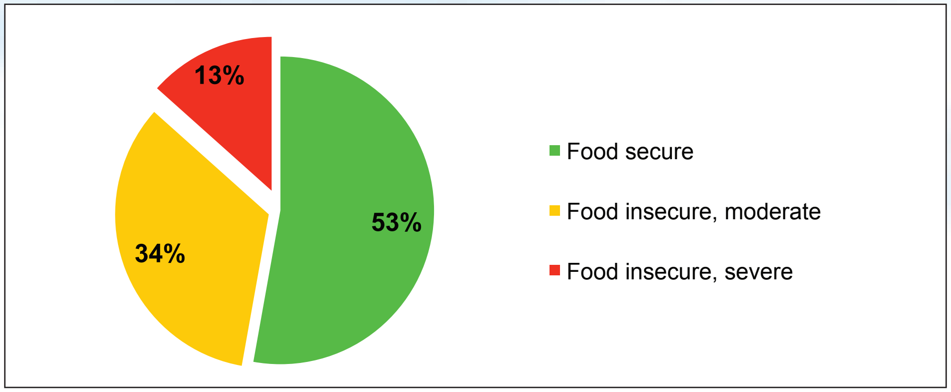


Figure 29. Income-related household food insecurity in First Nations households without children in Alberta (n=193) *

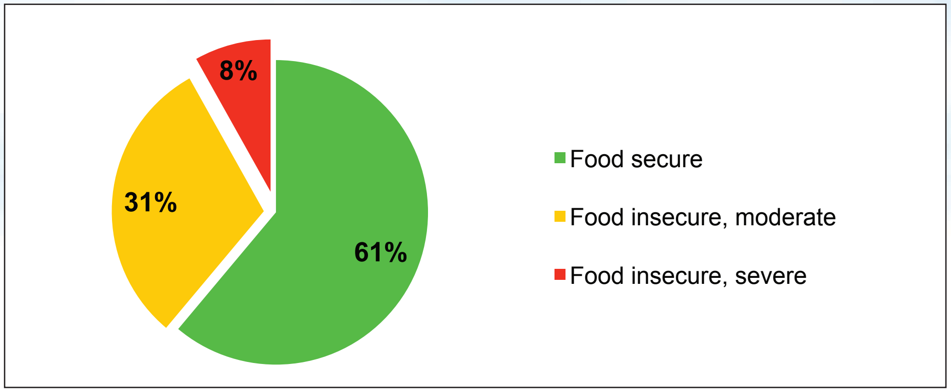


Figure 28. Income-related household food insecurity in First Nations households with children in Alberta (n=401) *

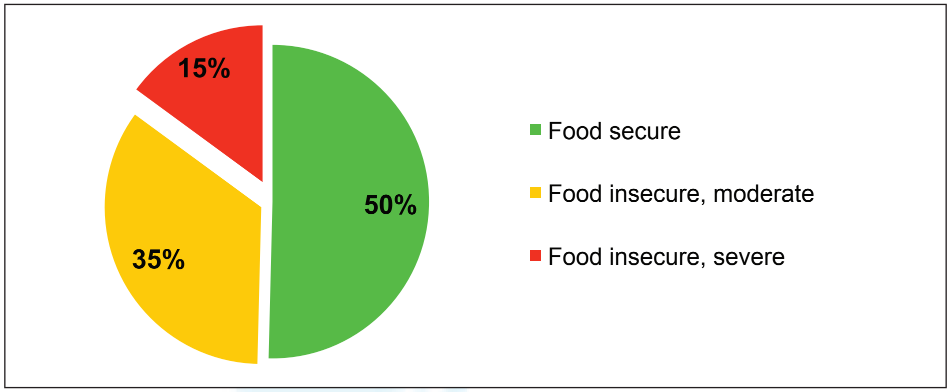
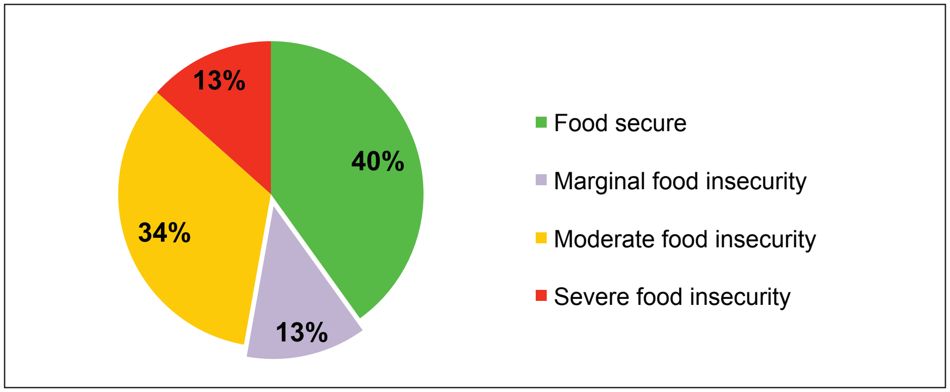


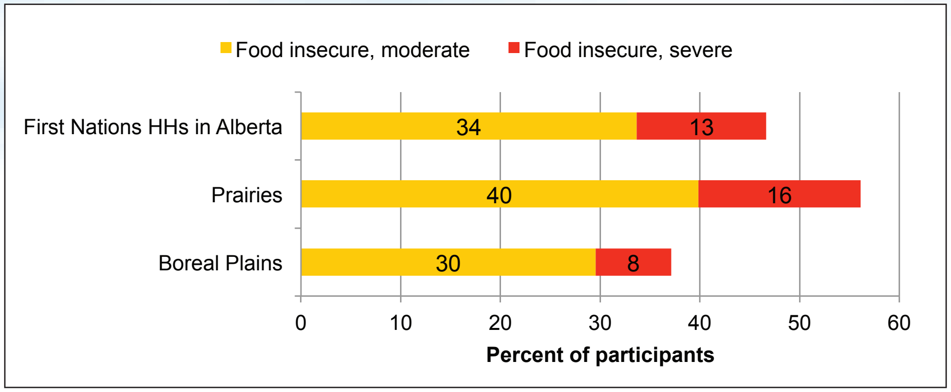
Figure 30. Income-related marginal food insecurity in First Nations households in Alberta (n=594) +



* Classification of food security scale based on CCHS 2.2. Canadian Community Health Survey Cycle 2.2, Nutrition (2004), Income-Related Household Food Security in Canada. Health Canada. 2007, Her Majesty the Queen in Right of Canada: Ottawa.

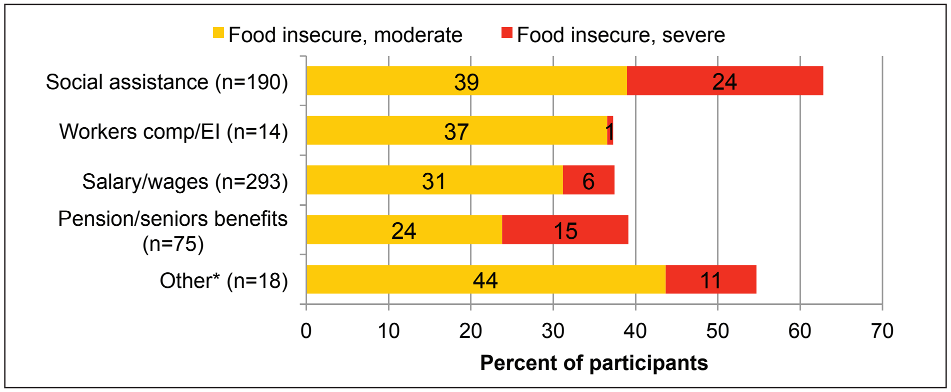
+ Classification as per food security category scale from PROOF (Tarasuk et al)

Figure 31. Income-related household food insecurity in First Nations communities in Alberta, by region and ecozone (n=594)* unweighted



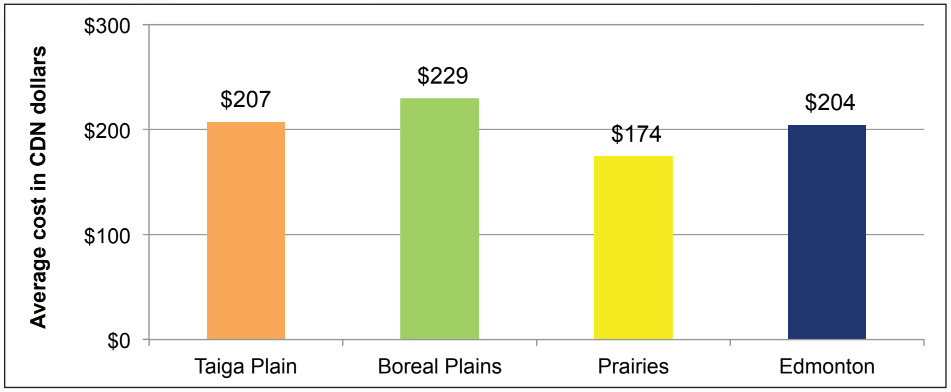
*Results are weighted at the regional level. Ecozone level results are not weighted

Figure 32. Income-related household food insecurity in First Nations communities in Alberta, by income sources



*Other=education allowance, none, spousal support, savings

Figure 33. Comparison of healthy food basket cost for a family of four* (by ecozone) to Edmonton



*family of four consisting of 1 adult male aged 31-50 years old, 1 adult female aged 31-50, 1 male child aged 14-18, and 1 female child aged 4-8.

Concerns about Climate Change

Figure 34. Percent of First Nations adults in Alberta who noticed any significant climate change in their traditional territory in the last 10 years (n=609)

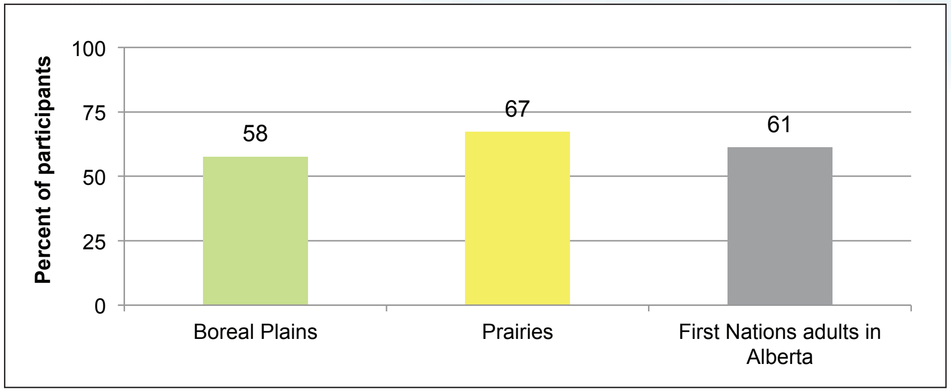
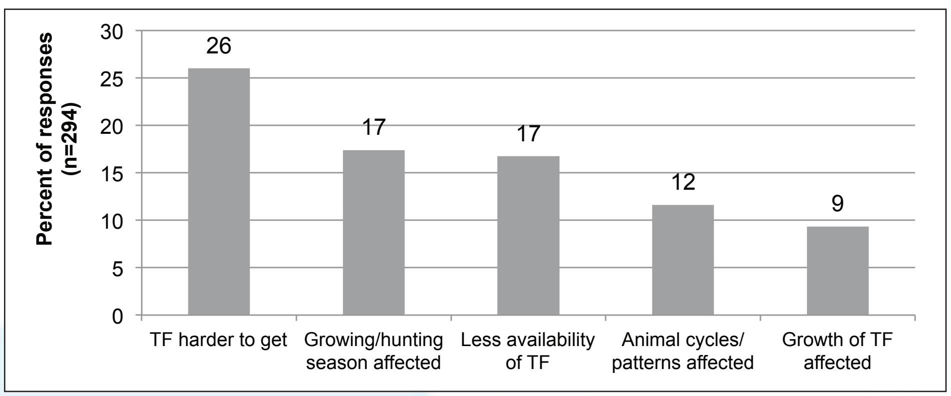


Figure 35. How climate change has affected traditional food availability in First Nations in Alberta



*TF=traditional food

Tap Water Analyses

Table 20. Characteristics of homes and plumbing, First Nations in Alberta

Average year home was built (range) (n=458)	1991 (1945, 2013)
Percent of households (HH) with upgraded plumbing (n=609)	26
Average year plumbing upgraded (range) (n=125)	2008 (1978, 2013)
Percent of HH that treat water (e.g. boiling, with filters, etc.) (n=607)	25
Percent of HH with a water storage system (n=609)	31
Location of water storage system (n=247):	
Inside	22%
Outside	78%
Percent of type of pipes under kitchen sink (n=597)	
Plastic	58%
Plastic with metal fittings	23%
Copper with braided flex line	12%
Braided flex line	4%
Metal	2%
Steel flex line	1%

Figure 36. Household (HH) water source and use, First Nations in Alberta

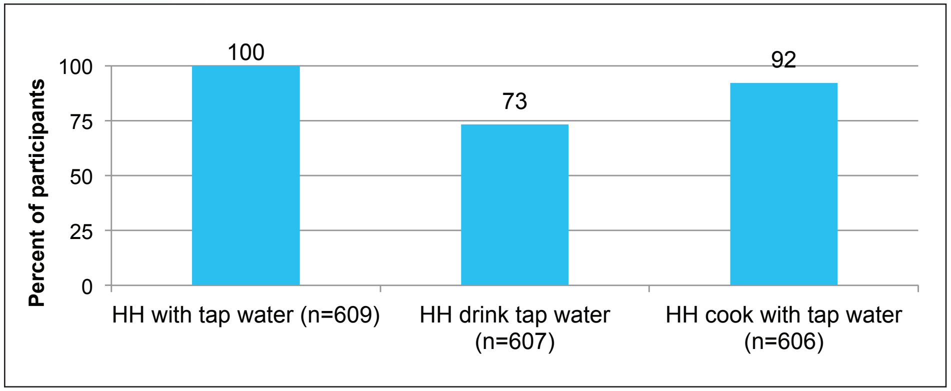


Figure 37. Source of tap water, First Nations in Alberta

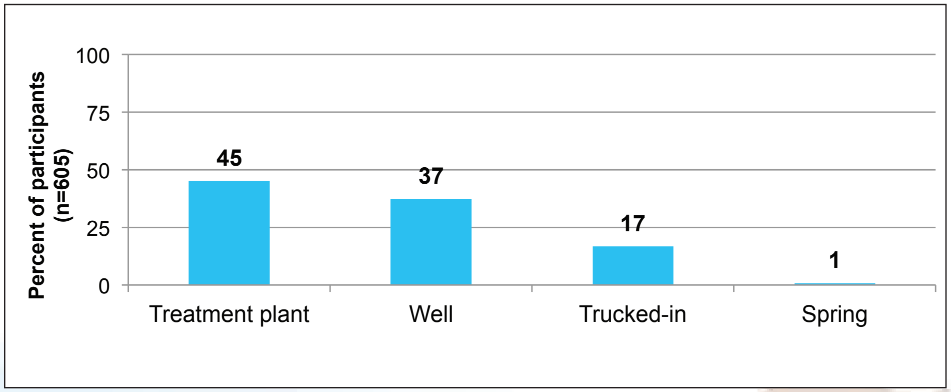
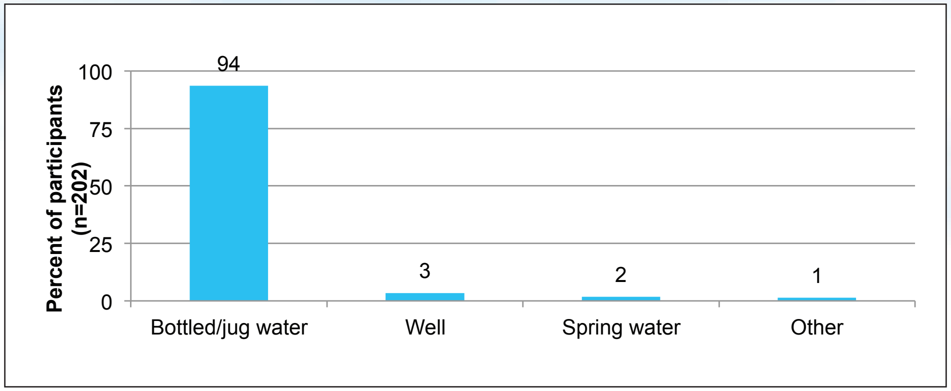
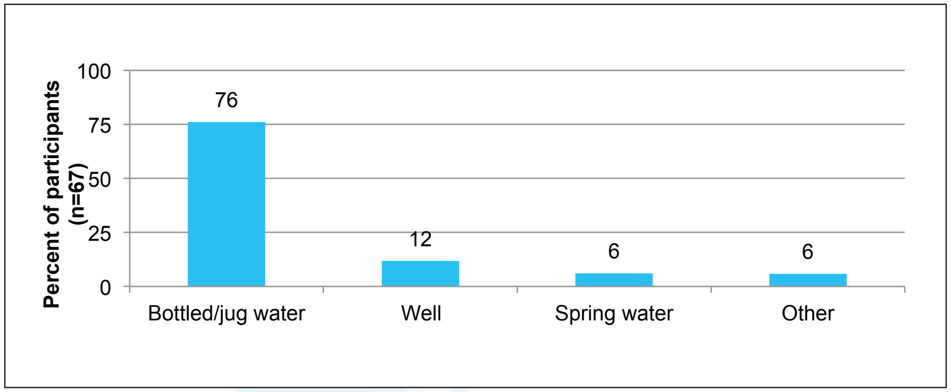


Figure 38. Source of drinking water if no tap water or don't use tap water, First Nations in Alberta



Other = neighbour's, parents', rain/snow water

Figure 39. Source of water for preparation of food/beverages if no tap water or don't use tap water, First Nations in Alberta



Other = neighbor's, parents', snow water

Figure 40. Does the taste of chlorine prevent you from drinking the tap water?

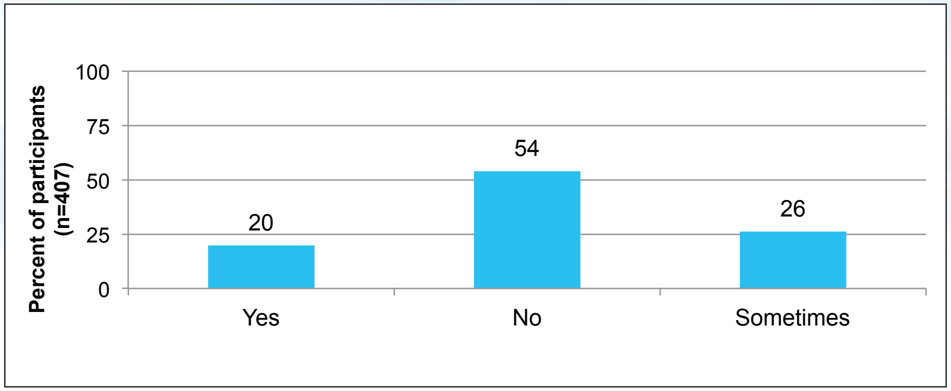


Table 21: Trace metals analysis results for parameters of health concern

Trace Metal Detected	Maximum Detected (µg/L)	Detection Limit (DL) - µg/L	MAC - Maximum Allowable Concentration - GCDWQ, 2008- (µg/L)	Total Number of Samples in Excess			Comments
				First Draw	Flushed (5 Min)	Duplicate	
All Ecozones Combined							
Antimony, Sb	<0.2	0.2	6	0	0	0	Below guideline value.
Arsenic, As	3.3	0.2	10	0	0	0	Below guideline value.
Barium, Ba	472	0.2	1,000	0	0	0	Below guideline value.
Boron, B	491	10	5,000	0	0	0	Below guideline value.
Cadmium, Cd	0.211	0.04	5	0	0	0	Below guideline value.
Chromium, Cr	0.56	0.5	50	0	0	0	Below guideline value.
Lead, Pb	45	0.2	10	1	0	0	Flushed samples below guideline value.
Mercury, Hg	1.75	0.1	1	1	0	0	EHO follow up below guideline level
Selenium, Se	1.23	0.2	10	0	0	0	Flushed samples below guideline value.
Uranium, U	1.5	0.1	20	0	0	0	Below guideline value.
Boreal Plains							
Antimony, Sb	<0.2	0.2	6	0	0	0	Below guideline value.
Arsenic, As	<0.2	0.2	6	0	0	0	Below guideline value.
Barium, Ba	2.3	0.2	10	0	0	0	Below guideline value.
Boron, B	472	0.2	1,000	0	0	0	Below guideline value.
Cadmium, Cd	430	10	5,000	0	0	0	Below guideline value.
Chromium, Cr	0.211	0.04	5	0	0	0	Below guideline value.
Lead, Pb	0.56	0.2	50	0	0	0	Below guideline value.
Mercury, Hg	45	0.2	1	1	0	0	Flushed samples below guideline value.
Selenium, Se	1.75	0.1	10	0	0	0	Flushed samples below guideline value.
Uranium, U	1.23	0.2	10	0	0	0	Below guideline value.

Table 21: Trace metals analysis results for parameters of health concern

Trace Metal Detected	Maximum Detected (µg/L)	Detection Limit (DL) - µg/L	MAC - Maximum Allowable Concentration - GCDWQ, 2008- (µg/L)	Total Number of Samples in Excess			Comments
				First Draw	Flushed (5 Min)	Duplicate	
Prairies							
Antimony, Sb	<0.2	0.2	6	0	0	0	Below guideline value.
Arsenic, As	3.3	0.2	10	0	0	0	Below guideline value.
Barium, Ba	89.9	0.2	1,000	0	0	0	Below guideline value.
Boron, B	491	10	5,000	0	0	0	Below guideline value.
Cadmium, Cd	<0.04	0.04	5	0	0	0	Below guideline value.
Chromium, Cr	0.54	0.5	50	0	0	0	Below guideline value.
Lead, Pb	2.27	0.2	10	0	0	0	Below guideline value.
Mercury, Hg	<1	<0.1	1	0	0	0	Below guideline value.
Selenium, Se	<0.2	0.2	10	0	0	0	Below guideline value.
Uranium, U	<0.1	0.1	20	0	0	0	Below guideline value.

Table 22: Trace metals analysis results for parameters of aesthetic or operational concern

Trace Metal Detected	Maximum Detected (µg/L)	Detection Limit (DL) - µg/L	MAC - Maximum Allowable Concentration - GCDWQ, 2008- (µg/L)	Total Number of Samples in Excess			Comments
				First Draw	Flushed (5 Min)	Duplicate	
All Ecozones Combined							
Aluminum, Al	621	<1	100/200*	20	20	4	Resampled above guideline. Elevated levels pose no health concern.
Copper, Cu	511	<0.2	1,000	0	0	0	Below guideline value.
Iron, Fe	5,810	<10	300	9	6	2	Resampled above guideline. Elevated levels pose no health concern.
Manganese, Mn	87.5	<0.2	50	5	6	3	Resampled above guideline. Elevated levels pose no health concern.
Sodium, Na	550,000	<10	200,000	19	25	3	Resampled above guideline. Elevated levels pose no health concern.
Zinc, Zn	6,890	<1	5,000	1	0	0	Flushed samples below guideline value.
Boreal Plains							
Aluminum, Al	621	<1	100/200*	20	20	4	Resampled above guideline. Elevated levels pose no health concern.
Copper, Cu	511	<0.2	1,000	0	0	0	Below guideline value.
Iron, Fe	5,810	<10	300	8	6	2	Resampled above guideline. Elevated levels pose no health concern.
Manganese, Mn	87.5	<0.2	50	4	6	3	Resampled above guideline. Elevated levels pose no health concern.
Sodium, Na	550,000	<10	200,000	14	14	3	Resampled above guideline. Elevated levels pose no health concern.
Zinc, Zn	6,890	<1	5,000	1	0	0	Flushed samples below guideline value.
Prairies							
Aluminum, Al	20	<1	100/200*	0	0	0	Below guideline value.
Copper, Cu	279	<0.2	1,000	0	0	0	Below guideline value.
Iron, Fe	356	<10	300	1	0	0	Flushed samples below guideline value.
Manganese, Mn	80.4	<0.2	50	1	0	0	Flushed samples below guideline value.
Sodium, Na	370,000	<10	200,000	5	11	0	Above guideline. Elevated levels pose no health concern.
Zinc, Zn	15.3	<1	5,000	0	0	0	Below guideline value.

*This is an operational guidance value, designed to apply only to drinking water treatment plants using aluminum-based coagulants. The operational guidance values of 0.1mg/L applies to conventional treatment plants, and 0.2 mg/ L applies to other types of treatment systems.

Pharmaceutical Analyses in Surface Water

Table 23. Pharmaceuticals tested for and quantified in First Nations communities in the Boreal Plains and Prairies ecozones in Alberta

Pharmaceutical	Human	Veterinary	Aquaculture	Detected Surface Water (SW) and Wastewater (WW)
Analgesic/Anti-Inflammatory				
Acetaminophen	X			SW & WW
Diclofenac	X			SW
Ibuprofen	X			WW
Indomethacin	X			No
Ketoprofen	X	X		No
Naproxen	X			WW
Antibiotic				
Chlortetracycline		X		SW
Ciprofloxacin	X			No
Clarithromycin	X			WW
Erythromycin	X	X		No
Isochlortetracycline		X		No
Lincomycin		X		No
Monensin		X		No
Oxytetracycline		X	X	No
Roxithromycin	X			No
Sulfamethazine		X		No
Sulfamethoxazole	X			WW

Table 23. Pharmaceuticals tested for and quantified in First Nations communities in the Boreal Plains and Prairies ecozones in Alberta

Pharmaceutical	Human	Veterinary	Aquaculture	Detected Surface Water (SW) and Wastewater (WW)
Tetracycline	X	X		No
Trimethoprim	X	X	X	WW
Antacid				
Cimetidine	X			WW
Ranitidine	X			No
Antidiabetics				
Metformin	SW & WW			SW and WW
Pentoxifylline	X	X		No
Antihypertensives (Beta-blocker)				
Metoprolol	X			No
Atenolol	X			SW & WW
Antihypertensives				
Diltiazem	X			No
Antianginal metabolite				
Dehydronifedipine	X			No
Anticoagulant				
Warfarin	X	X		No
Anticonvulsant				
Carbamazepine	X			WW
Antihistamine				
Diphenhydramine	X			No
Diuretics				
Furosemide	X			No
Hydrochlorthiazide	X			WW

Table 23. Pharmaceuticals tested for and quantified in First Nations communities in the Boreal Plains and Prairies ecozones in Alberta

Pharmaceutical	Human	Veterinary	Aquaculture	Detected Surface Water (SW) and Wastewater (WW)
Antidepressant				
Fluoxetine	X	X		No
Analgesic				
Codeine	X			WW
Lipid Regulators				
Atorvastatin	X			No
Bezafibrate	X			No
Clofibric Acid	X	X		No
Gemfibrozil	X			No
Stimulant				
Caffeine	X			SW & WW
Metabolite of nicotine (smoking cessation)				
Cotinine	X			SW & WW
Steroid				
α -Trenbolone		X		No
α -Trenbolone		X		No
Oral Contraceptive				
17 α - Ethinyl estradiol	X			No

Table 24. Comparison of pharmaceutical levels detected in First Nations communities in Alberta to findings from Canadian, U.S. and Global studies

	Pharmaceutical	n*	Sites	**FNFNES Max Concentration (ng/l)		Canadian & US Studies (ng/l)		Global Studies (ng/l)		Reference
				Waste-water	Surface water	Wastewater	Surface water	Wastewater	Surface water	
Analgesic/Anti-Inflammatory										
1	Acetaminophen	3	3	24	17	500,000 [a]	10,000[b]	482,687 [ap] (Wales)	17,699.4 [d] (Spain)	(a) (Geurra, et al. 2014); (b) (Kolpin, et al. 2002) ; (c) (Lin and Tsai 2009) ; (d) (Pascual-Aguilar, Andreu and Pico 2013)
2	Diclofenac	1	1	-	35	28,400 [e]	500 [f]	228,500 [c] (Taiwan)	18,740 [g] (Spain)	e) (Metcalfe, Miao, et al. 2004) ; (f) (Chiu and Westerhoff 2010); (g) (Osorio, et al. 2013)
3	Ibuprofen	1	1	53.0	-	75,800 [h]	6,400 [i]	1,500,000 [c] (Taiwan)	36,790 [j] (Costa Rica)	(h) (Metcalfe, Koenig, et al. 2003) ; (i) (Sadezky, et al. 2010); (c) (Lin and Tsai 2009) ; (j) (Spongberg, et al. 2011)
4	Naproxen	2	2	40.6	-	611,000 [h]	4500 [k]	611,000 [l] (France)	12,300 [m] (Turkey)	(h) (Metcalfe, Koenig, et al. 2003); (k) (Brun, et al. 2006) ; (l) (Miege, et al. 2009); m) (Aydin and Talini 2013)
Antibiotic										
5	Chlortetracycline	2	3	-	12	1,000,000 [r]	1,500 [r]	171,000 [i] (Korea)	2,420 [s] (China)	(r) (Campagnolo, et al. 2002); (i) (Sadezky, et al. 2010) ; (s) (Wei, et al. 2011)
6	Clarithromycin	1	1	7.5	-	8,000 [a]	79 [e]	14,000 [o] (Italy)	1727 [am] (Spain)	a) (Geurra, et al. 2014) (e) (Metcalfe, Miao, et al. 2004) (o) (Verlicchi and Zambello 2012); (am) (Valcarcel, Gonzalez, et al., Analysis of the presence of cardiovascular and analgesic// anti-inflammatory/antipyretic pharmaceuticals in river- and drinking water of the Madrid Region in Spain. 2011a)
7	Sulfamethoxazole	2	2	213.0	-	6,000 [v]	1,900 [b]	1,340,000 [w] (Taiwan)	11,920[g]	(v) (Batt, Bruce and Aga 2006); (b) (Kolpin, et al. 2002); (c) (Lin and Tsai 2009); (g) (Ginebreda, et al. 2010)
8	Trimethoprim	1	1	14.5	-	7900 i	800 i	162,000 [x] (Korea)	28,000 [y] (Pakistan)	(i) (Sadezky, et al. 2010); (x) (Sim, et al. 2011); (y) (Khan, et al. 2013)

Table 24. Comparison of pharmaceutical levels detected in First Nations communities in Alberta to findings from Canadian, U.S. and Global studies

Pharmaceutical		n*	Sites	**FNFNES Max Concentration (ng/l)		Canadian & US Studies (ng/l)		Global Studies (ng/l)		Reference
				Waste-water	Surface water	Wastewater	Surface water	Wastewater	Surface water	
Antacid										
9	Cimetidine	3	4	2.5	3.3	462 [z]	580 [b]	61,200 [q] (Taiwan)	1,338 [aa] (Korea)	(z) (Glassmeyer, et al. 2005) (b) (Kolpin, et al. 2002) (q) (Wang and Lin 2014) (aa) (Choi, et al. 2008)
Antidiabetics										
10	Metformin	3	3	1,690	31	26000 [ab]	2,355 [ac]	129,000 [ad] (Germany)	3,100 [n] (Germany)	z) (Glassmeyer, et al. 2005) (b) (Kolpin, et al. 2002) (q) (Wang and Lin 2014) (aa) (Choi, et al. 2008)
Antihypertensives (Beta-blocker)										
11	Atenolol	5	14	10.4	22	3,140 [ah]	432 [i]	122,000 [ai] (Spain)	30,900 [ap] (South Africa)	ah) (Vidal-Dorsch, et al. 2012) ; (i) (Sadezky, et al. 2010); (ai) (Gomez, et al. 2006); (ap) (Agunbiade and Moodley 2014)
Anticonvulsant										
12	Carbamazepine	2	2	83.2	-	3,287 [ag]	749 [ai]	840,000 [an] (Israel)	67,715 [ao] (Spain)	(ag) (Sosiak and Hebben 2005); (ai) (Kley-wegt, et al. 2011); (an) (Lester, et al. 2013); (ao) (Valcarcel, Gonzalez, et al. 2011b)
Diuretics										
13	Hydrochlorthiazide	1	1	6.9	-	2950 [ae]	75 [ae]	5,500 [o] (Italy)	17,589 [aj] (Spain)	(ae) (Batt, Kostich and Lazorchak 2008); (o) (Verlicchi and Zambello 2012); (aj) (Valcarcel, Gonzalez, et al., Analysis of the presence of cardiovascular and analgesic//an-ti-inflammatory/antipyretic pharmaceuticals in river- and drinking water of the Madrid Region in Spain. 2011a)
Analgesic										
14	Codeine	2	2	61.2	-	5,700 [a]	1,000 [b]	32,300 [am] (Wales)	815 [al] (Wales)	(a) (Geurra, et al. 2014); (b) (Kolpin, et al. 2002); (o) (Verlicchi and Zambello 2012) (am) (Kasprzyk-Hordern, Dinsdale and Guwy 2008); (al) (Kasprzyk-Hordern and Guwy 2009)

Table 24. Comparison of pharmaceutical levels detected in First Nations communities in Alberta to findings from Canadian, U.S. and Global studies

Pharmaceutical		n*	Sites	**FNFNES Max Concentration (ng/l)		Canadian & US Studies (ng/l)		Global Studies (ng/l)		Reference
				Waste-water	Surface water	Wastewater	Surface water	Wastewater	Surface water	
Stimulant										
15	Caffeine	6	12	776	275	120,000 [u]	6,000 [b]	3,549,000 [ak] (Singapore)	1,121,400,000 [j] (Costa Rica)	(u) Yang, et al. 2011); (b) (Kolpin, et al. 2002);; (ak) (Tran, et al. 2014); (j) (Spongberg, et al. 2011)
Metabolite of nicotine (smoking cessation)										
16	Cotinine	4	9	56.7	59.6	7,800 [ab]	1,400 [f]	42,300 [t] (Spain)	6,582 [aj] (Spain)	(ab) (Benotti and Brownawell 2007); (f) (Chiu and Westerhoff 2010); (t) (Huerta-Fontela, et al. 2008); (aj) (Valcarcel, Gonzalez, et al., Analysis of the presence of cardiovascular and analgesic//anti-inflammatory/antipyretic pharmaceuticals in river- and drinking water of the Madrid Region in Spain. 2011a)

n*=number of communities **FNFNES maximum values from FNFNES BC 2008/2009, FNFNES MB 2010, FNFNES ON 2011/2012

Table 25: Level of pharmaceuticals in surface water and wastewater in First Nation communities in Alberta and by ecozone

Pharmaceutical	Detection limit (ng/l)	FNFNES Max Concentration (ng/l)					
		Wastewater*	Number of Samples Collected	Number of samples detected	Surface water	Number of Samples Collected	Number of samples detected
Alberta: Pharmaceuticals Detected							
Analgesic/Anti-Inflammatory							
Acetaminophen	10	24	4	4	17	35	2
Diclofenac	15	<15	4	0	35	35	1
Ibuprofen	20	53	4	1	<20	35	0
Naproxen	5	40.6	4	4	<5	35	0
Antibiotic							
Chlortetracycline	10	<10	4	0	12	35	2
Clarithromycin	2	7.5	4	2	<2	35	0
Sulfamethoxazole	2	213	4	4	<2	35	0
Trimethoprim	2	14.5	4	2	<2	35	0
Antacid							
Cimetidine	2	2.5	4	3	<2	35	0
Antidiabetics							
Metformin	10	1,690	4	4	31	35	2
Antihypertensives (Beta-blocker)							
Atenolol	5	10.4	4	4	22.3	35	14
Anticonvulsant							
Carbamazepine	0.5	83.2	4	4	<0.5	35	0
Diuretics							
Hydrochlorthiazide	5	6.9	4	1	<5	35	0
Analgesic							
Codeine	5	61.2	4	4	<5	35	0
Stimulant							
Caffeine	5	776	4	4	275	35	14
Metabolite of nicotine (smoking cessation)							
Cotinine	5	56.7	4	4	59.6	35	14

*Wastewater tested in 2 communities.

Table 25: Level of pharmaceuticals in surface water and wastewater in First Nation communities in Alberta and by ecozone

Pharmaceutical	Detection limit (ng/l)	FNFNES Max Concentration (ng/l)					
		Wastewater*	Number of Samples Collected	Number of samples detected	Surface water	Number of Samples Collected	Number of samples detected
Boreal Plains							
Analgesic/Anti-Inflammatory							
Acetaminophen	10	<10	0	0	17	28	2
Diclofenac	15	<15	0	0	<15	28	0
Ibuprofen	20	<20	0	0	<20	28	0
Naproxen	5	<5	0	0	<5	28	0
Antacid							
Cimetidine	2	<2	0	0	<2	28	0
Antidiabetics							
Metformin	10	<10	0	0	31	28	2
Antihypertensives (Beta-blocker)							
Atenolol	5	<5	0	0	22.3	28	14
Anticonvulsant							
Carbamazepine	0.5	<0/5	0	0	<0.5	28	0
Diuretics							
Hydrochlorthiazide	5	<5	0	0	<5	28	0
Analgesic							
Codeine	5	<5	0	0	<5	28	0
Stimulant							
Caffeine	5	<5	0	0	275	28	14
Metabolite of nicotine (smoking cessation)							
Cotinine	5	<5	0	0	59.6	28	14

Table 25: Level of pharmaceuticals in surface water and wastewater in First Nation communities in Alberta and by ecozone

Pharmaceutical	Detection limit (ng/l)	FNFNES Max Concentration (ng/l)					
		Wastewater*	Number of Samples Collected	Number of samples detected	Surface water	Number of Samples Collected	Number of samples detected
Prairies							
Analgesic/Anti-Inflammatory							
Acetaminophen	10	24	4	4	<10	3	0
Diclofenac	15	<15	4	0	35	3	1
Ibuprofen	20	53	4	1	<20	3	0
Naproxen	5	40.6	4	4	<5	3	0
Antibiotic							
Chlortetracycline	10	<10	4	0	<10	3	0
Clarithromycin	2	7.5	4	2	<2	3	0
Sulfamethoxazole	2	213	4	4	<2	3	0
Trimethoprim	2	14.5	4	2	<2	3	0
Antacid							
Cimetidine	2	2.5	4	3	<2	3	0
Antidiabetics							
Metformin	10	1,690	4	4	<10	3	0
Antihypertensives (Beta-blocker)							
Atenolol	5	10.4	4	4	17.9	3	4
Anticonvulsant							
Carbamazepine	0.5	83.2	4	4	<0.5	3	0
Diuretics							
Hydrochlorthiazide	5	6.9	4	1	<5	4	0
Analgesic							
Codeine	5	61.2	4	4	<5	3	0
Stimulant							
Caffeine	5	776	4	4	29.5	3	4
Metabolite of nicotine (smoking cessation)							
Cotinine	5	56.7	4	4	59.6	3	3

Table 26. Comparison of FNFNES Alberta results to drinking water guidelines in Australia, California and New York

Pharmaceutical	FNFNES Max Concentration (ng/l)	Australian Guideline (ng/l)	California Monitoring Trigger Level (ng/L)	New York State Standard (ng/L)
	Surface water			
All Ecozones combined: Pharmaceuticals Detected				
Analgesic/Anti-Inflammatory				
Acetaminophen	17	175,000	350,000	5,000
Diclofenac	35	1,800	1,800	NA
Antibiotic				
Chlortetracycline	12	105,000	NA	NA
Antacid				
Cimetidine	3.3	200,000	NA	NA
Antidiabetics				
Metformin	31	250,000	NA	NA
Antihypertensives (Beta-blocker)				
Atenolol	22.3	NA	70,000	NA
Stimulant				
Caffeine	275	350	350	50,000
Metabolite of nicotine (smoking cessation)				
Cotinine	59.6	10,000	NA	50,000

Table 27. Arithmetic (A.M.) and geometric (G.M.) means of total mercury in hair concentration (µg/g or ppm) for First Nations in Alberta

First Nations living in Alberta on-Reserve			Unweighted			Weighted								Weighted Percentiles					
Gender	Age group	Sample size	%<LOD	A.M	G.M	A.M	Lower 95% CI	Upper 95% CI	C.V. %	G.M.	Lower 95% CI	Upper 95% CI	C.V. %	90th	Lower 95% CI	Upper 95%CI	95th	Lower 95% CI	Upper 95%CI
Total	19-30	68	73.53	0.10	<LOD	0.07	<LOD	0.11	28.18	<LOD	<LOD	0.07	18.38	0.16	<LOD	0.31	0.27	0.12	0.43
Total	31-50	176	40.34	0.20	0.11	0.19	0.14	0.25	14.56	0.11	0.09	0.13	9.35	0.36	<LOD	0.73	0.77	0.27	1.26
Total	51+	125	23.20	0.47	0.21	0.38	<LOD	0.70	44.01	0.14	0.07	0.25	31.60	1.00	0.21	1.78	1.49	<LOD	3.77
Total	**Total**	**369**	**40.65**	**0.27**	**0.12**	**0.19**	**0.10**	**0.28**	**23.95**	**0.08**	**<LOD**	**0.11**	**11.00**	**0.34**	**<LOD**	**0.64**	**0.77**	**0.31**	**1.22**
Males	19-30	16	56.25	0.13	0.08	<LOD	<LOD	0.12	40.24	<LOD	<LOD	0.08	26.97	0.15	<LOD	0.28	0.16	<LOD	0.43
Males	31-50	52	28.85	0.22	0.13	0.21	0.12	0.30	21.40	0.13	0.10	0.18	15.80	0.39	<LOD	0.98	1.04	0.28	1.81
Males	51+	53	16.98	0.65	0.29	0.60	<LOD	1.26	56.10	0.22	<LOD	0.68	58.67	1.49	<LOD	3.91	2.21	<LOD	6.69
Males	**Total**	**121**	**27.27**	**0.40**	**0.17**	**0.24**	**0.07**	**0.40**	**35.53**	**0.10**	**<LOD**	**0.15**	**21.47**	**0.50**	**<LOD**	**1.06**	**1.04**	**0.37**	**1.72**
Females	19-30	52	78.85	0.09	<LOD	0.08	<LOD	0.11	26.66	<LOD	<LOD	<LOD	16.44	0.27	<LOD	0.48	0.27	0.11	0.43
Females	31-50	124	45.16	0.19	0.10	0.18	0.11	0.25	19.67	0.10	0.08	0.12	11.07	0.34	<LOD	0.62	0.77	<LOD	1.57
Females	51+	72	27.78	0.33	0.17	0.17	0.10	0.24	20.59	0.09	<LOD	0.13	19.90	0.48	0.21	0.74	0.66	0.33	1.00
Females	**Total**	**248**	**47.18**	**0.21**	**0.10**	**0.14**	**0.10**	**0.17**	**13.70**	**0.07**	**<LOD**	**0.09**	**8.20**	**0.30**	**0.20**	**0.40**	**0.48**	**0.23**	**0.73**
Females of child bearing age	**19-50**	**176**	**55.11**	**0.16**	**0.08**	**0.13**	**0.09**	**0.17**	**15.75**	**<LOD**	**<LOD**	**0.08**	**9.05**	**0.28**	**0.20**	**0.36**	**0.40**	**0.12**	**0.67**

Notes:

- Use with caution, CV between 15% and 35%
- CV greater than 35% or the estimate is thought to be unstable
- if >40% of sample were below the LOD (level of detection), means are thought to be meaningless and should not be used

All shaded figures would not normally be released due to high CVs or the high percentage of respondents below the limit of detection.

Estimates have been adjusted for non-response and are post-stratified to population counts within age/sex group. Even with post-stratification, estimates for males aged 19-30 are likely to be instable due to the sample size. Variance estimation for non-linear statistics such as percentiles is itself subject to variability, particularly with small sample sizes. Confidence intervals that are inconsistent for percentages typically imply all such percentages should only be used with extreme caution.

Estimates should be used with caution due to high CVs. Note that CV does not reflect bias, only sampling error:
Good (CV is up to 15%), Use with caution (CV is between 15% and 35 %), Unreliable (over 35%).

Figure 41a. Mercury concentration in hair of participants living in the Boreal Plains ecozone

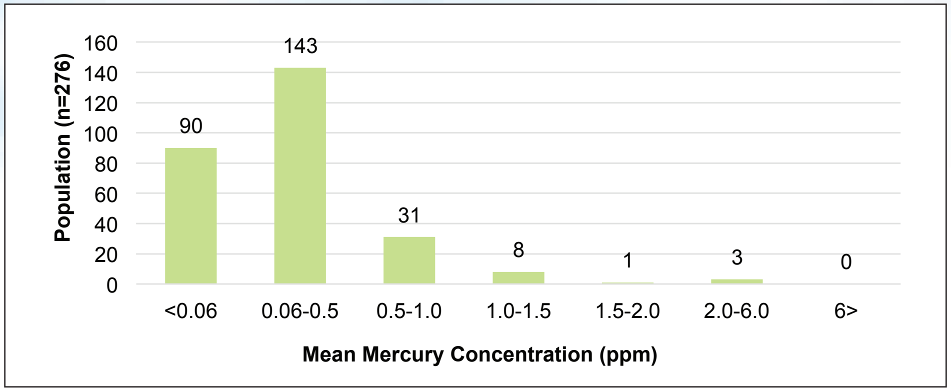


Figure 42a. Mercury concentration in hair of women of childbearing age (WCBA) living in the Boreal Plains ecozone

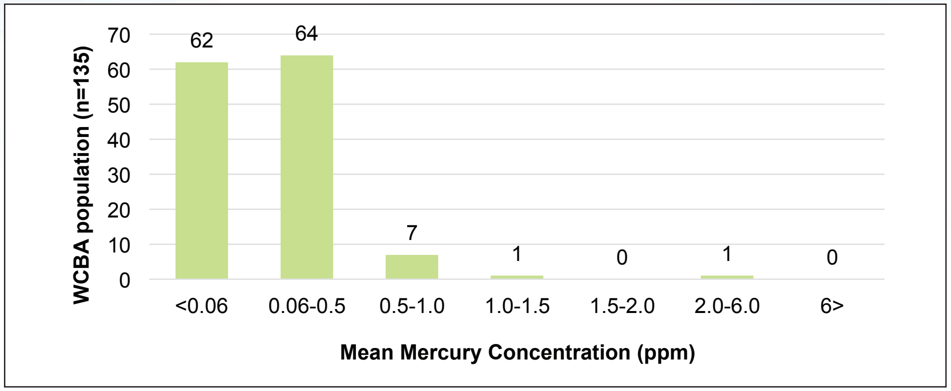


Figure 41b. Mercury concentration in hair of participants living in the Prairies ecozone

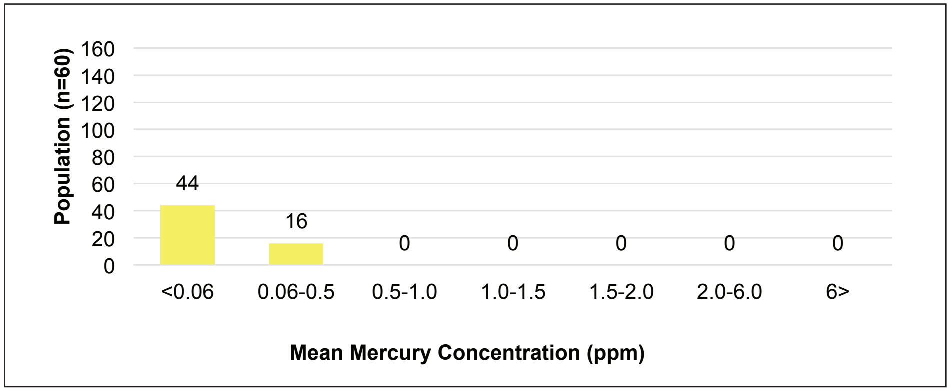


Figure 42b. Mercury concentration in hair for women of childbearing age (WCBA) living in the Prairies ecozone

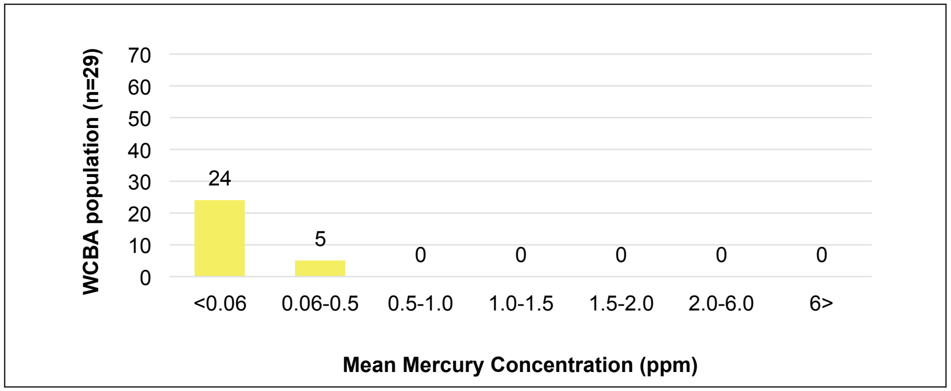


Table 28. Mean and maximum levels of toxic trace metals in traditional food samples from Alberta (µg/g fresh weight)

Traditional food sample	n*	Arsenic (ug/g)		Cadmium (ug/g)		Lead (ug/g)		Mercury (ug/g)		Methyl Mercury (ug/g)	
		Mean	Max	Mean	Max	Mean	Max	Mean	Max	Mean	Max
FISH											
Arctic grayling	1	0.020	0.020	0.008	0.008	ND	ND	0.167	0.167	0.035	0.035
Goldeye	1	0.017	0.017	0.006	0.006	0.020	0.020	0.202	0.202	NM	NM
Mariah (ling/Burbot)	1	0.044	0.044	ND	ND	ND	ND	0.221	0.221	NM	NM
Northern pike	4	0.051	0.075	0.001	0.002	0.003	0.005	0.561	0.964	0.268	0.581
Sucker	1	0.030	0.030	ND	ND	ND	ND	0.133	0.133	0.081	0.081
Trout	3	0.080	0.122	0.001	0.002	0.004	0.009	0.134	0.241	0.025	0.037
Trout, rainbow	1	0.012	0.012	ND	ND	ND	ND	0.078	0.078	0.016	0.016
Walleye (pickerel)	4	0.054	0.076	0.001	0.003	0.003	0.008	0.550	1.020	0.149	0.372
Whitefish	4	0.062	0.109	ND	ND	0.002	0.004	0.243	0.567	0.038	0.054
GAME											
Beaver meat	1	0.169	0.169	0.013	0.013	0.019	0.019	0.019	0.019	NM	NM
Bison meat	2	0.017	0.033	0.016	0.030	32.752	65.503	0.001	0.002	NM	NM
Bison kidney	1	0.013	0.013	1.210	1.210	0.013	0.013	0.024	0.024	NM	Nm
Bison liver	1	0.006	0.006	0.391	0.391	0.009	0.009	0.030	0.030	NM	NM
Black bear meat	1	0.007	0.007	0.014	0.014	0.013	0.013	ND	ND	NM	NM
Deer fat	2	ND	ND	ND	ND	0.004	0.007	0.001	0.002	NM	NM
Deer kidney	1	ND	ND	6.120	6.120	0.019	0.019	0.019	0.019	NM	NM
Deer liver	1	ND	ND	0.233	0.233	0.013	0.013	0.002	0.002	NM	NM
Deer meat	7	0.001	0.005	0.004	0.007	0.099	0.570	0.001	0.004	NM	NM
Elk meat	5	0.012	0.049	0.011	0.022	0.078	0.367	0.0004	0.002	NM	NM
Moose heart	6	0.004	0.017	0.497	2.880	0.015	0.070	0.002	0.008	NM	NM
Moose kidney	8	0.006	0.020	13.170	31.100	0.042	0.176	0.015	0.027	NM	NM
Moose liver	7	0.004	0.010	1.610	3.780	0.014	0.037	0.005	0.013	NM	NM

Table 28. Mean and maximum levels of toxic trace metals in traditional food samples from Alberta (µg/g fresh weight)

Traditional food sample	n*	Arsenic (ug/g)		Cadmium (ug/g)		Lead (ug/g)		Mercury (ug/g)		Methyl Mercury (ug/g)	
		Mean	Max	Mean	Max	Mean	Max	Mean	Max	Mean	Max
Moose intestines	5	0.002	0.012	0.018	0.035	0.098	0.459	0.0004	0.002	NM	NM
Moose stomach lining	1	0.008	0.008	0.014	0.014	0.043	0.043	0.001	0.001	NM	NM
Moose tongue	2	ND	ND	0.043	0.070	0.004	0.008	0.001	0.001	NM	NM
Moose meat	9	0.004	0.009	0.009	0.016	0.069	0.529	0.001	0.003	NM	NM
Porcupine meat	1	0.013	0.013	0.014	0.014	0.115	0.115	ND	ND	Nm	Nm
Rabbit liver	1	ND	ND	3.750	3.750	0.008	0.008	0.013	0.013	NM	NM
Rabbit meat	7	0.031	0.218	0.044	0.168	4.200	27.300	0.001	0.004	NM	NM
BIRDS											
Coot	1	4.220	4.22	ND	ND	0.486	0.486	0.021	0.021	NM	NM
Goldeneye meat	1	0.015	0.015	0.003	0.003	0.004	0.004	0.057	0.057	NM	NM
Goose gizzard	1	0.004	0.004	0.003	0.003	ND	ND	ND	ND	NM	NM
Goose meat	6	0.019	0.073	0.010	0.022	0.029	0.146	0.001	0.002	NM	NM
Mallard duck gizzard	1	0.013	0.013	0.002	0.002	ND	ND	0.028	0.028	NM	NM
Mallard meat	6	0.009	0.013	0.004	0.015	0.351	1.370	0.059	0.225	NM	NM
Northern pintail meat	1	0.043	0.043	ND	ND	0.005	0.005	0.010	0.010	NM	NM
Partridge meat	3	0.008	0.015	0.004	0.005	1.198	2.790	ND	ND	NM	NM
Grouse meat	10	0.003	0.013	0.013	0.051	0.963	8.660	0.0003	0.002	NM	NM
Scaup meat	1	0.015	0.015	0.001	0.001	0.031	0.031	0.063	0.063	NM	NM
Wigeon meat	1	0.031	0.031	0.002	0.002	0.361	0.361	0.003	0.003	NM	NM
PLANTS											
Blueberries	6	0.002	0.005	0.001	0.004	0.008	0.027	ND	ND	NM	NM
Blueberry leaves	1	0.424	0.424	0.079	0.079	0.386	0.386	0.010	0.010	NM	NM
Highbush cranberry	2	ND	ND	0.001	0.002	ND	ND	ND	ND	NM	NM
Lowbush cranberries	7	0.003	0.009	0.004	0.012	0.018	0.111	ND	ND	NM	NM
Muskeg/labrador tea	1	0.002	0.002	ND	ND	0.0001	0.0001	ND	ND	NM	NM
Peppermint leaves	1	0.005	0.005	ND	ND	ND	ND	ND	ND	NM	NM
Peppermint tea	4	0.0004	0.001	ND	ND	0.000	0.001	ND	ND	NM	NM

Table 28. Mean and maximum levels of toxic trace metals in traditional food samples from Alberta (µg/g fresh weight)

Traditional food sample	n*	Arsenic (ug/g)		Cadmium (ug/g)		Lead (ug/g)		Mercury (ug/g)		Methyl Mercury (ug/g)	
		Mean	Max	Mean	Max	Mean	Max	Mean	Max	Mean	Max
Pincherry	6	0.002	0.006	0.001	0.003	0.003	0.006	ND	ND	NM	NM
Raspberries	4	0.015	0.059	0.004	0.007	0.002	0.007	ND	ND	NM	NM
Raspberry root	1	ND	ND	ND	ND	ND	ND	ND	ND	NM	NM
Rat root (wihkes) tea	4	0.104	0.281	0.012	0.022	0.045	0.159	0.002	0.004	NM	NM
Sage root tea	1	0.002	0.002	ND	ND	0.002	0.002	ND	ND	NM	NM
Saskatoon berry	7	0.005	0.022	0.011	0.024	0.002	0.007	ND	ND	NM	NM
Saskatoon root	1	ND	ND	0.004	0.004	ND	ND	ND	ND	NM	NM
Spinach leaves	1	0.005	0.005	0.003	0.003	0.008	0.008	ND	ND	NM	NM
Wild strawberry	3	0.006	0.009	0.008	0.018	0.004	0.013	ND	ND	NM	NM

n*=number of communities; ND= not detected; NM= not measured

Table 29a. Top 10 traditional food sources of arsenic intake among First Nations adults, in the Alberta region and at the ecozone level

Boreal Plains		Prairies		Alberta	
Traditional Food	%	Traditional Food	%	Traditional Food	%
Rabbit/hare	20.8	Moose meat	24.7	Rabbit/hare	16.3
Moose meat	18.8	Whitefish	24.1	Walleye	16.0
Walleye	17.7	Strawberries	13.7	Moose meat	15.7
Northern pike	12.8	Bison meat	13.0	Northern pike	13.9
Whitefish	6.0	Wihkes	7.2	Whitefish	6.5
Elk meat	4.8	Walleye	5.5	Beaver meat	4.7
Beaver meat	2.7	Lake trout	4.2	Northern pintail	4.3
Raspberries	2.4	Rainbow trout	2.1	Elk meat	3.8
Mallard	1.7	Mallard	2.0	Mallard	3.0
Northern pintail	1.5	Northern pike	1.4	Raspberries	2.0

Table 29b. Top 10 traditional food sources of cadmium among First Nations adults, in the Alberta region and at the ecozone level

Boreal Plains		Prairies		Alberta	
Traditional Food	%	Traditional Food	%	Traditional Food	%
Moose kidney	76.2	Deer kidney	59.7	Moose kidney	75.5
Moose liver	14.5	Saskatoon berries	18.8	Moose liver	14.5
Deer kidney	7.1	Moose kidney	5.4	Deer kidney	7.4
Moose meat	1.0	Moose meat	4.5	Moose meat	1.0
Deer liver	0.3	Strawberries	3.3	Deer liver	0.3
Grouse meat	0.2	Deer liver	2.2	Grouse meat	0.2
Rabbit/hare	0.2	Bison meat	2.0	Saskatoon berries	0.2
Elk meat	0.1	Deer meat	1.6	Rabbit/hare	0.2
Saskatoon berries	0.1	Blueberries	1.0	Elk meat	0.1
Raspberries	0.0	Raspberries	0.7	Strawberries	0.1

Table 29c. Top 10 traditional food sources of lead among First Nations adults, in the Alberta region and at the ecozone level

Boreal Plains		Prairies		Alberta	
Traditional Food	%	Traditional Food	%	Traditional Food	%
Rabbit/hare	49.0	Bison meat	94.5	Bison meat	51.7
Bison meat	40.8	Deer meat	3.9	Rabbit/hare	38.9
Moose meat	4.3	Rabbit/hare	0.6	Moose meat	3.5
Mallard	2.5	Moose meat	0.3	Mallard	2.0
Grouse	1.6	Mallard	0.3	Grouse	1.3
Partridge	0.8	Blueberries	0.3	Deer	0.8
Moose kidney	0.4	Goose	0.1	Partridge meat	0.6
Elk meat	0.2	Cherries (pin/ chokecherries)	0.04	Wigeon	0.4
Wigeon	0.1	Strawberries	0.04	Moose kidney	0.3
Low bush cranberries	0.0	Low bush cranberries	0.02	Elk meat	0.2

Table 29d. Top 10 traditional food sources of mercury among First Nations adults, in the Alberta region and at the ecozone level

Boreal Plains		Prairies		Alberta	
Traditional Food	%	Traditional Food	%	Traditional Food	%
Northern pike	45.5	Walleye	32.9	Northern pike	44.4
Walleye	34.0	Whitefish	30.9	Walleye	35.3
Mallard	6.5	Northern pike	9.1	Whitefish	7.0
Whitefish	6.4	Rainbow trout	7.9	Mallard	6.0
Goldeye	1.9	Mallard	7.3	Goldeye	1.6
Moose kidney	1.4	Moose meat	6.1	Moose kidney	1.2
Mariah (Burbot)	1.1	Lake trout	4.6	Mariah (burbot)	0.9
Moose liver	0.9	Deer kidney	0.6	Moose liver	0.8
Trout	0.4	Bison meat	0.4	Rainbow trout	0.5
Moose meat	0.4	Goose	0.1	Moose meat	0.5

Table 30. Exposure estimates (μg/kg body weight/day) for metals from traditional food for First Nations adults in Alberta, using mean and maximum concentrations (n=609)

Contaminant	PTDI (μg/kg/day)	Level of concentration	n> PTDI	Mean	Median	95th percentile	HQ Mean/PTDI	HQ 95th/PTDI
Arsenic	1	mean	0	0.004	0.0004	0.02	0.004	0.02
		maximum	0	0.01	0.001	0.02	0.01	0.02
Cadmium	1	mean	15	0.11	0.001	0.22	0.11	0.22
		maximum	15	0.11	0.001	0.26	0.11	0.26
Lead	3.6	mean	8	0.22	0.002	0.88	0.06	0.25
		maximum	18	0.40	0.003	1.54	0.11	0.43
Mercury	0.5	mean	2	0.01	0.0001	0.06	0.03	0.12
		maximum	6	0.02	0.0001	0.07	0.03	0.14

Table 31. Exposure estimates (µg/kg body weight/day) for mercury from traditional food (using mean and maximum concentrations) among First Nations women of child bearing age (WCBA) in Alberta (n=282)

Level of mercury concentration	PTDI (µg/kg/day)	n> PTDI	Mean	Median	95th percentile	HQ Mean/PTDI	HQ 95th/PTDI
Mean	0.2	3	0.01	0.00004	0.03	0.04	0.16
Maximum	0.2	4	0.01	0.0001	0.04	0.04	0.19

Table 32a. Toxic metal exposure estimates (µg/kg body weight/day) from traditional food for First Nations adults in Alberta, using mean and maximum concentrations, Boreal Plains ecozone, consumers only (n=418)

Contaminant	PTDI (µg/kg/day)	Level of concentration	n> PTDI	Mean	95th percentile	HQ Mean/PTDI	HQ 95th/PTDI
Arsenic	1	mean	0	0.005	0.02	0.005	0.02
		maximum	0	0.01	0.07	0.01	0.07
Cadmium	1	mean	17	0.36	0.76	0.36	0.76
		maximum	32	0.76	1.64	0.76	1.64
Lead	3.6	mean	4	0.21	0.85	0.06	0.24
		maximum	21	0.84	3.01	0.23	0.84
Mercury	0.5	mean	2	0.02	0.09	0.04	0.17
		maximum	8	0.03	0.16	0.07	0.31

Table 32b. Toxic metal exposure estimates (µg/kg body weight/day) from traditional food for First Nations adults in Alberta, using mean and maximum concentrations, Prairies ecozone, consumers only (n=113)

Contaminant	PTDI (µg/kg/day)	Level of concentration	n> PTDI	Mean	95th percentile	HQ Mean/PTDI	HQ 95th/PTDI
Arsenic	1	mean	0	0.0003	0.001	0.0003	0.001
		maximum	0	0.0003	0.0014	0.0003	0.001
Cadmium	1	mean	0	0.0008	0.003	0.0008	0.003
		maximum	0	0.0009	0.003	0.0009	0.003
Lead	3.6	mean	0	0.0072	0.035	0.002	0.01
		maximum	0	0.0110	0.0499	0.0031	0.01
Mercury	0.5	mean	0	0.0003	0.003	0.0006	0.005
		maximum	0	0.0003	0.0025	0.0006	0.005

Table 33. Mercury exposure estimates (µg/kg body weight/day) from traditional food (using mean and maximum concentrations) among First Nations women of child bearing age in Alberta, by ecozone

Ecozone (n)	PTDI (µg/kg/day)	Level of mercury concentration	n>PTDI	Mean	95th percentile	HQ Mean/PTDI	HQ 95th/PTDI
Boreal Plains (n=198)	0.2	mean	3	0.01	0.07	0.07	0.35
		maximum	6	0.02	0.07	0.10	0.35
Prairies (n=53)	0.2	mean	0	0.0002	0.002	0.001	0.01
		maximum	0	0.0002	0.002	0.001	0.01

Figure 43. Correlation between mercury exposure from traditional food and hair mercury levels, total population (n=370)

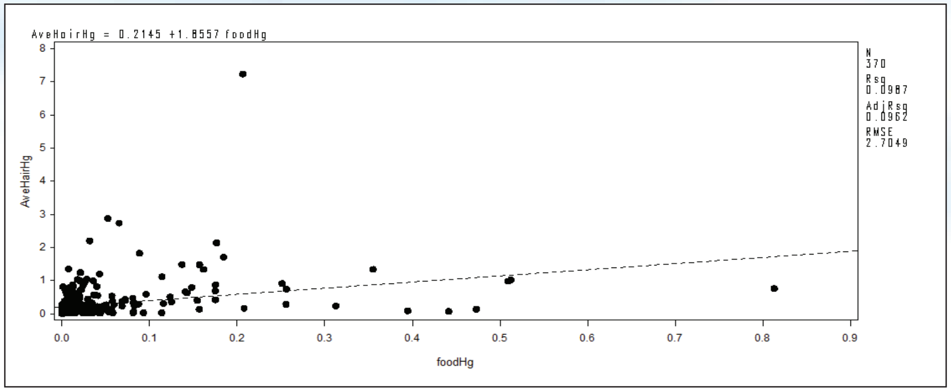


Figure 44. Correlation between mercury exposure from traditional food and hair mercury levels, women of child bearing age (n=176)

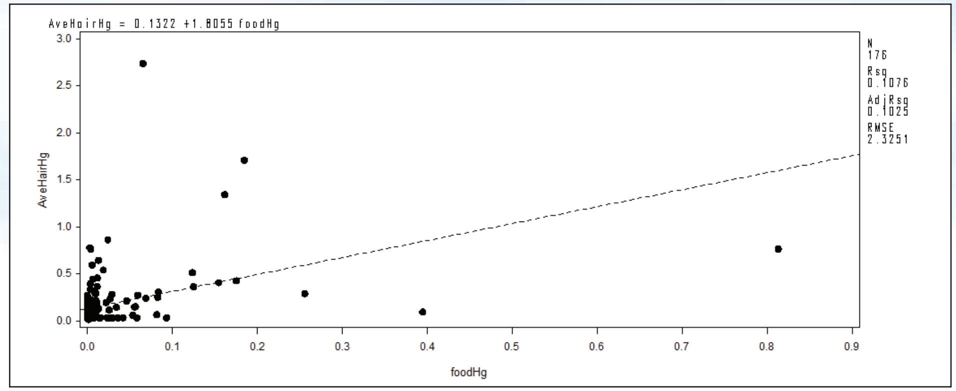


Table 34. Mean and maximum levels of Polycyclic Aromatic Hydrocarbons (PAHs) in Alberta traditional food samples (ng TEQ/g fresh weight)

Traditional food species	n*	Total PAHs ng TEQ/g		Total PAHs ng/g		n*	Alkylated PAH (ng/g)	
		Mean	Max	Mean	Max		Mean	Max
FISH								
Arctic grayling	1	0.0003	0.0003	3.68	3.68	1	NM	NM
Goldeye	1	0.0001	0.0001	10.08	10.08	1	16.32	16.32
Northern pike	4	0.0002	0.0004	9.35	13.78	1	138.38	138.38
Sucker	1	0.0002	0.0002	5.41	5.41	0	NM	NM
Trout	3	0.0003	0.0004	13.17	17.4	0	NM	NM
Walleye	4	0.2	0.79	37.97	143.7	0	NM	NM
Whitefish	3	0.0002	0.0004	8.10	12.11	0	NM	NM
Whitefish, smoked	2	0.24	0.48	45.21	85.17	0	NM	NM

n*=number of communities. For some samples, the amount available prevented complete analysis.

Table 34. Mean and maximum levels of Polycyclic Aromatic Hydrocarbons (PAHs) in Alberta traditional food samples (ng TEQ/g fresh weight)

Traditional food species	n*	Total PAHs ng TEQ/g		Total PAHs ng/g		n*	Alkylated PAH (ng/g)	
		Mean	Max	Mean	Max		Mean	Max
GAME								
Beaver	1	0.18	0.18	106.03	106.03	0	NM	NM
Bison liver	1	ND	ND	17.18		1	13.52	13.52
Bison meat, dried	1	79.95	79.95	8376.63		1	21912.67	21912.67
Black bear meat	1	0.64	0.64	184.25	184.25	1	213.26	213.26
Deer liver	1	ND	ND	7.28	7.28	1	16.73	16.73
Deer meat	7	0.02	0.13	14.99	35.14	7	43.10	225.71
Deer meat, smoked	1	0.16	0.16	98.56	98.56	1	135.43	135.43
Elk meat	3	0.00017	0.00028	10.34	19.67	3	22.15	29.43
Elk meat, dried	3	4.03	8.80	879.86	1771.47	3	1529.14	3462.72
Marten	1	ND	ND	39.53	39.53	1	42.16	42.16
Moose liver	7	0.002	0.01	10.22	24.97	**6**	43.04	136.77
Moose meat	8	0.14	1.08	42.83	184.49	8	52.17	188.82
Muskrat	1	ND	ND	69.3	69.3	0	NM	NM
Rabbit meat	7	0.0001	0.0004	14.64	38.65	7	28.75	55.65
BIRDS								
Goldeneye	1	ND	ND	11.02	11.02	1	30.19	30.19
Mallard	6	19.2	105.58	500.24	2528.62	6	399.37	1710.19
Partridge	1	ND	ND	54.36	54.36	1	22.01	22.01
PLANTS								
Highbush cranberry	2	0.0001	0.0003	5.64	6.2	2	22.14	35.76
Raspberries	2	0.0001	0.0003	6.68	8.37	2	37.06	67.54
Raspberry root	1	0.0004	0.0004	11.16	11.16	1	59.82	59.82
Rat root (wihkes)	2	0.05286	0.105	640.88	1277.63	1	283.57	283.57
Rat root tea form	1	0	0	4.12	4.12	1	9.92	9.92
Saskatoon berry	7	0.04	0.24	6.26	9.73	7	64.28	369.29
Wild strawberry	2	0.0001	0.0002	7.5	9.92	2	26.87	34.26

n*=number of communities. For some samples, the amount available prevented complete analysis.

Table 35. Mean and maximum levels of organochlorines in Alberta traditional food samples (ng/g fresh weight)

Traditional Food Sample	n*	Hexachlorobenzene		p,p-DDE		total PCBs		trans-Nonachlor		Toxaphene	
		Mean	Max	Mean	Max	Mean	Max	Mean	Max	Mean	Max
FISH											
Arctic grayling	1	0.11	0.11	0.07	0.07	ND	ND	ND	ND	0.04	0.04
Northern pike	4	0.33	0.86	0.92	2.8	0.22	0.69	0.15	0.39	0.17	0.33
Sucker	1	0.31	0.31	0.43	0.43	ND	ND	ND	ND	0.08	0.08
Trout	3	0.37	0.59	2.46	4.63	2.71	4.29	0.51	1.40	0.51	1.06
Walleye	4	0.14	0.22	0.18	0.24	0.69	1.92	0.04	0.16	0.06	0.19
Whitefish	4	0.50	0.98	1.91	5.68	1.29	4.71	0.03	0.13	0.07	0.15

n*= number of communities

Table 36. Mean and maximum levels of Polybrominated Diphenyl Ethers (PBDEs) in Alberta traditional food samples (ng/g fresh weight)

Traditional Food Sample	n*	Mean total PBDEs	Max total PBDEs
FISH			
Arctic grayling	1	0.09	0.09
Northern pike	4	0.80	1.81
Trout	3	5.27	13.87
Walleye	4	0.48	0.65
Whitefish	4	0.44	0.93

n*= number of communities

Table 37. Mean and Max total levels of Perfluorinated Compounds (PFCs) in Alberta traditional food samples (ng/g fresh weight)

Traditional Food Sample	n*	Mean total PFCs	Max total PFCs
FISH			
Arctic grayling	1	4.26	4.26
Northern pike	4	0.16	0.40
Sucker	1	0.23	0.23
Trout	3	0.56	1.04
Walleye	4	0.25	0.32
Whitefish	4	0.22	0.22
GAME			
Bison/buffalo	2	0.31	0.61
Deer	7	0.39	0.98
Elk	5	0.55	1.05
Moose liver	7	1.58	4.31
Moose meat	9	0.15	0.39

n*= number of communities

Table 38. Levels of Dioxins and Furans in Alberta traditional food samples (ng TEQ/kg fresh weight)

Traditional Food Sample	n*	Mean Dioxins and Furans	Max Dioxins and Furans
FISH			
Arctic grayling	1	0.16	0.16
Northern pike	4	0.001	0.003
Sucker	1	0.01	0.01
Trout	3	0.03	0.07
Walleye	4	0.02	0.03

n*= number of communities

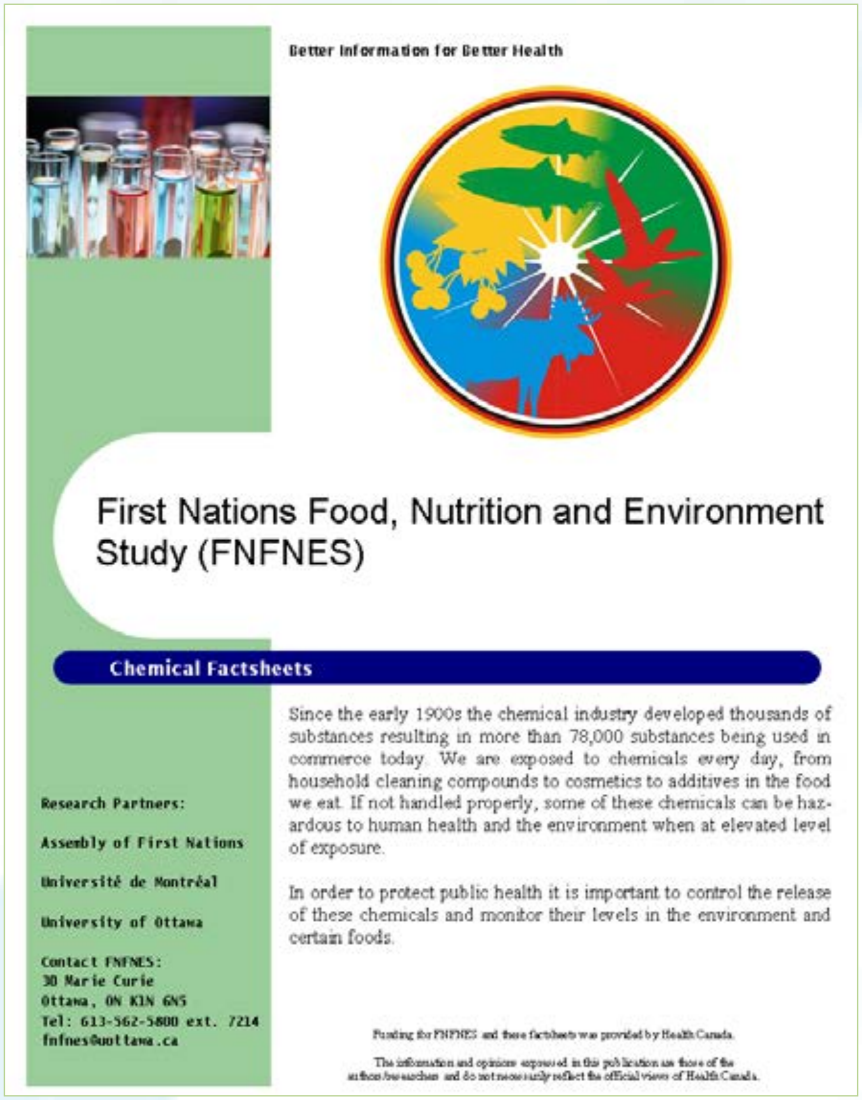
Table 39. Exposure estimates (µg/kg body weight/day) for organics from traditional food for Alberta First Nations using mean concentrations (n=609)

Organics	PTDI (µg/kg/day)	n>PTDI	Mean	Median	95th percentile	Mean/PTDI	95th/PTDI
HCBs	0.27	0	0.00001	0	0.00004	0.00003	0.00014
DDE	20	0	0.00002	0	0.00009	0	0
PCB	1	0	0.00001	0	0.00006	0.00001	0.00006
Chlordane	0.05	0	0	0	0.00001	0.00007	0.00023
Toxaphene	0.2	0	0	0	0.00001	0.00001	0.00005
PAH	40	0	0.0003	0.00001	0.00137	0.00001	0.00003
PFOS	0.08	0	0.00006	0.00001	0.00027	0.00072	0.00333
PBDE	0.1	0	0.00002	0	0.00009	0.00018	0.00087
Dioxin and Furan	2.3 pg/kg/day	0	0	0	0	0	0

Table 40. Exposure estimates (µg/kg body weight/day) for PCBs from traditional food for Alberta First Nations, using mean and maximum concentrations, by ecozone, consumers only

Ecozone	Level of concentration	n>PTDI	Mean	95th percentile	HQ Mean/PTDI	HQ 95th/PTDI
Boreal Plains	mean	0	0.00002	0.00007	0.00002	0.00007
	maximum	0	0.00004	0.0002	0.00004	0.0002
Prairies	mean	0	0.00001	0.00005	0.00001	0.00005
	maximum	0	0.00001	0.00005	0.00001	0.00005
Total First Nations in Alberta	mean	0	0.00002	0.00008	0.00002	0.00008
	maximum	0	0.00006	0.0003	0.00006	0.0003

Appendix A. Chemical fact sheets


Better Information for Better Health

First Nations Food, Nutrition and Environment Study (FNFNES)

Chemical Factsheets

Since the early 1900s the chemical industry developed thousands of substances resulting in more than 78,000 substances being used in commerce today. We are exposed to chemicals every day, from household cleaning compounds to cosmetics to additives in the food we eat. If not handled properly, some of these chemicals can be hazardous to human health and the environment when at elevated level of exposure.

In order to protect public health it is important to control the release of these chemicals and monitor their levels in the environment and certain foods.

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UNDERSTANDING CHEMICAL POLLUTANTS

What chemicals in the environment are we worried about?

We often hear that we are unknowingly being exposed to chemicals in the air we breathe, food we eat and water we drink. What are they and what do they do? The following is a list of chemicals that are commonly found in the Canadian environment. The First Nations Food, Nutrition and Environment Study (FNFNES) collected traditional food and drinking water samples from First Nations communities and measured the concentrations of these chemicals to assess the risk of exposure. The results of testing are presented in the Regional Reports. These factsheets are included to provide background information to the general reader on these chemicals. As the focus of FNFNES is on long-term low-level exposure from food and water, the acute effects of high doses such as those from occupational exposure are not presented.

Based on the evidence gathered from animal experiments and human populations accidentally exposed to these chemicals, threshold levels of many of these chemicals have been established. For public health protection, national and international guidelines have been established. When the daily intake is below these threshold values, no adverse health effects are expected among the studied population.

Included are Chemical Factsheets on the following substances:

Benefit of Traditional Foods vs Risk: Traditional foods offer many nutritional and cultural benefits. These must be weighed against the market-food alternatives and levels of contamination.

Persistent Organic Pollutants: Toxic organic chemical substances that do not break down or dissipate in the environment. They can stay in your body for a very long time.

Pesticides and Herbicides: These kill insects, weeds and fungus which harm agricultural crops. They can affect the nervous system and immune functions.

Polychlorinated biphenyls (PCBs): These industrial chemicals, while banned have been used in transformers, capacitors and as coolants and persist in the environment. They can affect the development of children.

Polybrominated Diphenyl Ethers (PBDEs): These compounds are used as flame retardants and are often found in building materials and consumer goods such as electronics and furniture. They can affect immune functions.

Dioxins and Furans: There are 210 different types of dioxins and furans, all of which are persistent organic pollutants and some of which can cause cancer.

Polycyclic Aromatic Hydrocarbons (PAHs): These are produced through burning and some PAHs can cause cancer.

Perfluorinated Compounds (PFCs): Toxic and carcinogenic in animals, PFCs lasts indefinitely in the environment. It is used in the manufacture of non-stick surfaces such as on cookware. They can affect thyroid functions.

Cadmium: A metallic chemical element used to make alloys and batteries that can damage the kidney.

Lead: A heavy blue-grey metal which affects the brain development of children.

Mercury: A silver metal that is liquid at room temperature, mercury can take a variety of forms, some of which are more easily absorbed by the human body and can affect child development.

Arsenic: A silvery-white poisonous metal that is used to make insecticides and poisons for rodents. It is toxic to animals and humans and can cause cancer.

More factsheets are available at the First Nations Environmental Health Innovation Network (FNEHIN) website: www.fnehin.ca

Benefit of Traditional Foods vs Risk

Traditional foods should not be avoided because of suspected contamination as they are an excellent source of nutrients. The test results of contaminants found in traditional foods collected in your area are reported in the regional reports and any that are high in contaminants have been highlighted. This will provide you with local information that can be used to choose the best food to maximize the nutrient intake and lower your exposure to environmental contaminants.

Wild game has been found, on average, to be higher in protein and lower in both fat and cholesterol than domesticated meats.[1] First Nations have long relied upon traditional foods for a healthy, balanced and nutritious diet. Traditional foods are an optimal food choice that can be found locally and acquired with traditional knowledge. Studies, such as this one, show that those who consume traditional foods have a more nutritious and healthier diet than those that don't and that traditional foods can make important contributions to the intake of several important nutrients.

Persistent Organic Pollutants (POPs)

Persistent organic pollutants are organic compounds that are resistant to environmental degradation through chemical, biological, and photolytic (broken down by sunlight) processes. As they are not easily broken down, they can persist in the environment, sometimes for decades. They can be transported far from their sources by air and ocean current (e.g. from the industrialized south to the Canadian Arctic). They can bioaccumulate in plants, animals and humans (absorbed into the body at a rate greater than is removed), and biomagnified (increase in concentrations) along the food chain. At high enough concentrations POPs can have harmful effects on human health and the environment.

POPs include some of the most well-known and toxic environmental contaminants, such as polychlorinated biphenyls (PCBs), dioxins and furans. POPs commonly found in traditional foods and discussed in the FNFNES reports include hexachlorobenzene (HCB), 1,1,1-trichloro-2,2-bis(4-chlorophenyl)ethane (DDT) and its metabolite, 1,1-dichloro-2,2-bis(4-chlorophenyl)ethylene (DDE), PCBs, dioxins and furans. Although the levels of many of these contaminants have declined since most developed countries have restricted their use decades ago, they are persistent and remain in the environment and our bodies for long periods of time.[ii]

POPs can affect neural development and the immune system and can also disrupt hormonal balance and regulation. The developing fetus and infants are at higher risk of POPs exposure as POPs can pass through the placenta to the fetus, or be ingested by babies through breast milk. It is important to note that the benefits of breast feeding have always out-weighed the risk of contaminants in breast milk in all cases studied worldwide.

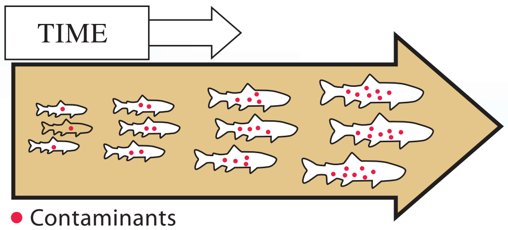

Illustration of how POPs accumulate in animals and people faster than the body can excrete the substance[iii]

Pesticides and Herbicides:

What are they? Pesticides are chemicals used to eliminate or control a variety of domestic or agricultural pests that can damage crops and livestock and reduce farm productivity. The most commonly applied pesticides are insecticides (to kill insects), herbicides (to kill weeds), rodenticides (to kill rodents), and fungicides (to control fungi, mold, and mildew). Of these pesticide classes, herbicides (weed killers) are the most widely used.

Where are they found? Pesticide residues are common food contaminants. Older pesticides such as organochlorines (like DDT) can be found in fatty tissues such as meat, fish and milk products while modern pesticides such as organophosphates are mainly found on the surface of fruits and vegetables. Since organophosphates are water soluble, they can be easily washed away. Therefore, always wash fruits and vegetables thoroughly with water before eating. Due to surface runoff, pesticides and herbicides can also be found in surface water, if there has been heavy use in the area. This may be a concern as it could contaminate drinking water from surface supplies.

What are the major health effects? Some pesticides are toxic to the nervous and immune system, and some are endocrine (hormone) disruptors. Endocrine disruptors are substances that can interfere with the endocrine system of animals, including humans by mimicking certain hormones. Endocrine disruption is important because hormones play a critical role in controlling how the body develops. A number of environmental contaminants (as well as other substances, such as some pharmaceuticals) are endocrine disruptors. Some pesticides, such as pentachlorophenol are contaminated with dioxins, which may play a role in their toxicity[iv]. For example, daily ingestion of low doses of diquat, an extensively used herbicide, induces intestinal inflammation in rats. It has been suggested that repeated ingestion of small amounts of pesticides, as could be found in food, may have consequences for human health and may be involved in the development of gastrointestinal disorders[v]. Exposure to pesticides during the fetal stage and in childhood can cause long-term damage.

What are the guideline levels in water and food and daily intake?

The tolerable daily intake (TDI) established by Health Canada for DDT, a classic organochlorine pesticides and for chlorpyrifos, a common organophosphate pesticide, is 0.01 mg/Kg BW/day.

There is no drinking water guideline for DDT as it does not dissolve in water easily. The drinking water guideline for chlorpyrifos is 0.09 mg/L.[vi]

Polychlorinated biphenyls (PCBs)

What are they? PCBs are a class of compounds that are mixtures of up to 209 different chlorinated hydrocarbons, or congeners. Different congeners sometimes act differently from one another, and some are more resistant to break down than others in the environment. Some congeners can act like dioxins ("dioxin-like congeners") and others act in other ways ("non dioxin-like congeners"). PCBs were used in paints, lubricants and electrical equipment.

Where are they found? PCBs are generally found in higher concentrations in fatty foods of animal origin, such as some fish, meats and dairy products. Everyone living in developed countries have PCBs in their bodies and long-range transport of PCBs by global air currents have caused PCBs to be distributed globally.[vii] Most PCBs enter the environment from landfill sites and leaks from old equipment. Food is the largest source of exposure but air, water and soil can play a part as well.[viii]

What are the major health effects? Since people are never exposed to only one of these groups, people exposed to PCBs are at risk of the same health effects caused by dioxins, as well as those caused by non-dioxin-like PCB congeners. People eating large amounts of certain sports fish, wild game and marine mammals are at increased risk for higher exposures and possible adverse health effects. Long-term, high level exposure may also cause liver and kidney cancer.[ix] Fetal exposure to PCBs can cause developmental deficits such as lowering IQ among children.

What are the guideline levels in water and food and daily intake?

The tolerable daily intake (TDI) established by Health Canada is 0.0001 3mg/kg bw/day.[x]

Flame Retardants - Polybrominated Diphenyl Ethers (PBDEs)

What are they? Flame retardants are chemicals that prevent the spread of fire and are persistent organic pollutants. PBDE flame retardants are added to some plastics, electrical and electronic equipment, upholstered furniture, non-clothing textiles and foam products. Because PBDEs are added to the products rather than chemically bound into them, they can be slowly and continuously released from the products during their manufacture, while in use, or after their disposal. As of 2008 the EU has banned several types of brominated flame retardants following evidence beginning in 1998 that the chemicals were accumulating in human breast milk.

Where are they found? PBDEs have been found both in the environment and in humans, including in human breast milk in Canada, the United States and Europe. PBDEs are generally found in higher concentrations in fatty foods of animal origin, such as some fish, meats and dairy products. Exposure to PBDEs is nearly impossible to avoid due to their presence in the air, indoor dust, water, food, animal fats, and breast milk. Nearly all Americans tested have trace amounts of flame retardants in their body. While the levels in humans are very low, they have been increasing with time, and are higher in North Americans than in Europeans.

What are the major health effects? Many are considered harmful, as they are linked to adverse health effects in laboratory animal research. Concerns are being raised because of their persistence, bioaccumulation, and potential for toxicity, both in animals and in humans. Research in laboratory animals has linked PBDE exposure to an array of adverse health effects including thyroid hormone disruption, neurobehavioural effects and possibly, cancer.[xi]

What are the guideline levels in water and food and daily intake?

There is no guideline level for PBDE from Health Canada.

Dioxins and Furans

What are they? There are over 200 types of polychlorinated dibenzodioxins (PCDDs), or dioxins. Polychlorinated dibenzofurans (PCDFs) are related chemicals. Some other persistent organic pollutants can act like dioxins, and are called "dioxin-like compounds."

Where are they found? The largest source of dioxins and furans entering the environment is through large-scale waste incinerators. Emissions are also made from small-scale burning of plastics, diesel, treated wood and cigarette smoke. The primary source of exposure to dioxins and dioxin-like compounds in developed countries is via food, especially meat, milk, dairy, eggs, and fish, which together make up 93% of total exposure. Inhalation, consumption of water, vegetable oils, grains, fruits and vegetables only constitute a small percentage of overall exposure.[xii]

What are the major health effects? Dioxins are known to suppress the immune system of animals and humans,[xiii] and are likely to cause cancer.[xiv] Changes to animals' hormone and reproduction systems and development have also been observed due to high exposure to dioxins and furans. [xv]. The question of whether dioxins can influence the body's immune system to attack its own cells causing disease, like type 1 diabetes, is still being investigated.

What are the guideline levels in water and food and daily intake?

Health Canada has set a tolerable daily intake (TDI) for PCDDs and PCDFs at 2.3 pg/Kg BW/day (Health Canada, 2005 and WHO 2010).

Polycyclic Aromatic Hydrocarbons (PAHs)

What are they? PAHs are a group encompassing over 100 different chemicals and are usually found as two or more of these compounds in a mixture. They are created through incomplete burning of many substances.

Where are they found? Exposure can be through inhalation, drinking contaminated water, or eating contaminated foods including grilled or charred meats. Air can become contaminated with PAHs by wild fires, vehicle exhaust, trash incinerators, cigarette smoke or coal tar, and water and foods can be contaminated from the soil and ground water.[xvi] Waste sites where construction materials or ash are buried can also contaminate ground water. Breathing smoke which contains PAHs is the most common way people are exposed to PAHs. Eating food grown in contaminated soil can expose people to PAHs. Charring or grilling food can increase the amount of PAHs that the food contains.

What are the major health effects? Some PAHs are expected to be carcinogens and have caused cancer and reproductive problems in laboratory animals, but there is a lack of data on the effect of PAHs on humans. PAHs can damage lungs, liver, kidneys and skin. According to the US Environmental Protection Agency, PAHs also can damage red blood cells and weaken the immune system. PAHs are a large class of chemicals which range from nontoxic to extremely toxic. Their toxicity, and therefore the amount of the PAH needed to cause a health effect, is dependent upon the type of PAH. Seven types of PAHs have been deemed probable human carcinogens by the U.S. Environmental Protection Agency.

What are the guideline levels in water and food and daily intake?

Health Canada recommended a maximum acceptable concentration of 0.01 µg/L Benzo[α]pyrene (a PAH) in drinking water. Health Canada has no guideline level for non-carcinogenic endpoints of PAHs. The oral slope factor for Benzo[α]pyrene is 2.3 mg/Kg BW/day.

Perfluorinated Compounds (PFCs)

What are they? Perfluorinated compounds (PFCs) are a family of fluorine-containing chemicals with unique properties to make materials stain and stick resistant. PFCs are incredibly resistant to breakdown and are turning up in unexpected places around the world. Although these chemicals have been used since the 1950s in countless familiar products, they've been subjected to little government testing. There are many forms of PFCs, but the two getting attention recently are: PFOA or perfluorooctanoic acid, used to make Teflon products and PFOS or perfluorooctane sulfonate, a breakdown product of chemicals formerly used to make Scotch Gard products.

Where are they found? PFCs are used in a wide array of consumer products and food packaging. Grease-resistant food packaging and paper products, such as microwave popcorn bags and pizza boxes, contain PFCs. PFOS was used until 2002 in the manufacture of 3M's Scotch Gard treatment and used on carpet, furniture, and clothing. PFOA is used to make DuPont's Teflon product, famous for its use in non-stick cookware. If Teflon-coated pans are overheated, PFOA is released. PFCs are in cleaning and personal-care products like shampoo, dental floss, and denture cleaners. Even Gore-Tex clothing, beloved in the Northwest for its ability to shed water, contains PFCs.

What are the major health effects? In recent studies there have been indications that PFOAs interfere with normal reproduction by adversely affecting fertility, and has caused developmental toxicity in offspring resulting in birth defects.[xix]

What are the guideline levels in water and food and daily intake?

There is no guideline level for PFCs from Health Canada.

Metals:

Metals include elements like arsenic, mercury, lead and cadmium, all of which are toxic. Metals occur naturally in the environment with large variations in concentration. In modern times, economic activity has resulted in several sources of metals that are introduced to the environment via pollution. Waste-derived fuels and coal are especially prone to containing metals, so they should be a central concern in a consideration of their use. Living organisms require trace amounts of some metals, such as iron, cobalt, copper, manganese, molybdenum, and zinc which are beneficial. However, excessive levels can be detrimental to health. Other metals such as cadmium, lead, mercury, and arsenic are considered to be toxic and have no known vital or beneficial effects and over time their accumulation in the bodies of animals can cause serious illness.

Cadmium

What is it? Cadmium is a natural element that is found in all soils and rocks. It is a metal that resists corrosion and is used in many applications such as batteries, some plastics such as PVC, and metal coatings.

Where is it found? It can enter the environment from mining, industry, coal and household waste burning and hazardous waste sites and can travel great distances before entering the local environment through ground or water. Cadmium does not break down, can travel great distances in the environment and can change in form. Cigarette smoke is a major source of exposure to cadmium and can effectively double the average daily intake. Other sources of exposure include from foods (cadmium is often found to be highest in shellfish and the liver and kidneys of large mammals like moose and deer) drinking water, and breathing air near a waste incinerator.
What are the major health effects? Long-term exposure to lower levels can cause kidney and lung damage, fragile bones and an increase in cancers.

What are the guideline levels in water and food and daily intake?

The drinking water guideline for Cd is 0.005 mg/L. The tolerable daily intake (TDI) established by Health Canada is 0.008 mg/Kg BW/day.

Lead:

What is it? Lead is found naturally in the environment and has many industrial uses.

Where is it found? Lead was once commonly used in gasoline, paint, pipes, although its use has now been restricted in these areas. It can currently be found in lead-acid car batteries, toys, solder, stained glass, crystal vessels, lead ammunition, jewelry and PVC plastic. Some of the most common ways to be exposed to lead include improper disposal of old lead-based paint, leaded gasoline, some ceramics or other lead containing products. Lead from these sources can find its way into drinking water in homes with old pipes containing lead solder, inhaling paint dust or ingesting broken or peeling lead paint, and through animals that have been killed with lead shot. Fragments can be too small to detect and washing can merely spread them. Detectable fragments contain even more lead and should be avoided when eating for everyone. Canada continues to permit the use of lead in hunting, except for hunting migratory birds and in wetlands[xx]).

What are the major health effects? Lead is well known to be a serious toxin for humans and has contributed to nervous system, kidney and reproductive system problems. Long term exposure can also cause anemia. Recent studies in children in other parts of the world are beginning to suggest that amounts of lead much lower than previously thought can contribute to impaired intelligence. This is especially true for very young children.

What are the guideline levels in water and food and daily intake?

The drinking water guideline for lead is 0.01 mg/L. There is no known level of lead exposure that is considered safe and no established tolerable daily intake (TDI).

Mercury:

What is it? Mercury is the only metal that is liquid at normal air temperature and pressure. Mercury occurs in deposits throughout the world mostly as cinnabar (mercuric sulfide). Mercury can exist in different forms in the environment. It can be found in either elemental form such as liquid or vapour, dissolved inorganic form or organic form. Mercury can change forms through natural processes.
Where is it found? Mercury can be released naturally from rocks, soil and volcanoes. It is found in certain dental fillings (dental amalgam), thermometers, and compact fluorescent lights (CFLs) and its use in other applications is being phased out.

Mercury is released from waste incineration, coal and fossil fuel burning, cement production, mining and smelting. Much of the airborne mercury that settles in Canada actually originates from outside Canada. Mercury can also be released into the environment through flooding. For example, a new reservoir is created, the mercury naturally present in soils and vegetation is converted in water by bacterial action to methylmercury, a more toxic form of mercury where it enters the food chain and bioaccumulates in fish. Mercury accumulates within living organisms so that when one animal eats other animals, much of that mercury stays within the animal which has eaten the other. This process of bioaccumulation applies to humans who eat animals which contain mercury so that those higher in the food chain (predatory fish and carnivorous mammals) often have higher mercury levels. Methylmercury is most often found in large predatory and bottom feeding fish (such as mackerel, orange roughy, walleye, trout) and shellfish.

What are the major health effects? Long-term exposure to mercury can affect brain functions, weaken the immune system, and cause neurological disorders and damage. High-level exposure can also permanently damage the brain, kidneys, and developing fetus and produce tremors, changes in vision or hearing and memory problems. Children are more sensitive to mercury than adults and mercury can be passed from a mother's body to the fetus.

What are the guideline levels in water and food and daily intake?

The drinking water guideline for mercury is 0.001 mg/L.[xxi] The provisional tolerable weekly intake (pTWI) for methylmercury established by the WHO is 1.6 ug/Kg BW and 4 ug/Kg BW for inorganic mercury. Health Canada has set guideline levels for methylmercury at 0.47 ug/Kg BW/day for adults and 0.2 ug/Kg BW/day for women of child bearing age, pregnant women and children.[xxii]

Arsenic

What is it? Arsenic is a natural element found widely throughout the earth. It can be found in some drinking water, such as from deep wells, and is produced as a by-product from certain mining operations. The main use of metallic arsenic is for strengthening copper and lead alloys (for example, in automotive batteries). Arsenic is commonly found in semiconductor electronic devices. Arsenic and its compounds, especially the trioxide, are used in the production of pesticides, herbicides, insecticides and treated wood products.

Where is it found? Arsenic is found everywhere in low levels; including in air, food and water. It can even result in arsenic poisoning in certain areas of the world when ingested in drinking water. It can take on various different forms, some of which are more toxic than others, and is most often used as a preservative in pressure treated wood, and as an active ingredient in some pesticides (such as those used in orchards). Sources of contamination include cigarette smoke and coal burning facilities. Arsenic can travel great distances when in the air and water. Exposure to arsenic is most often from arsenic treated wood, small amounts from food, water and air and living within an area with high natural levels of arsenic in rock.

What are the major health effects? Arsenic can irritate the throat and lungs, cause numbness in hands and feet, nausea and vomiting, decreased production of blood cells, skin irritation on contact, loss of movement and in very high levels can cause death. Studies have shown that ingesting certain types of arsenic can increase the risk of skin, liver, bladder and lung cancer.[xxiii] Long-term exposure of children may also affect development. Arsenic is considered to cause cancer.

What are the guideline levels in water and food and daily intake?

Health Canada recommended a maximum acceptable concentration of 0.01 mg/L arsenic in drinking water. Health Canada has no guideline level for non-carcinogenic endpoints. The oral slope factor for arsenic is 1.5 mg/Kg BW/day.

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Appendix B. Statistical tools used to obtain weighted estimates at the regional level

1: Non-Response adjustment factor:

For each stratum h=1,…,H, and each community i=1,…,n_h, if r_h communities participated in the study out of the n_h selected, then the non-response adjustment factor is given by:

$$WADJ1_{hi} = \begin{cases} \frac{n_h}{r_h}, & \text{for participating communities} \\ 0, & \text{for non-participating communities} \end{cases}$$

2. Bootstrap method for Standard Error

i) Draw a simple random sample of m_h=n_h-1 communities with replacement from the n_h sampled communities, independently for each stratum h=1,…H.

ii) Let m^*_{hi} be the number of times the (hi)-th sample community is selected ($\bullet_i\, m^*_{hi} = m_h$).

iii) Define the bootstrap weights as

$$w^*_{hijk} = \frac{n_h}{n_h \quad 1} \quad m^*_{hi} \quad WFINAL3_{hijk}$$

If the (hi)-th community is not selected in the bootstrap sample, $m^*_{hi} = 0$ and then $w^*_{hijk} = 0$.

iv) Do steps i) to iii) B=500 times.

For estimating the sampling error, let be the population parameter of interest. Let $\hat{\ }$ be the full-sample estimate for obtained by using the final weight and let $\hat{\ }^*_b$, b = 1, ..., 500, be the Bootstrap replicate estimates of the same parameter of interest obtained by using the Bootstrap weights. Then, setting B = 500, the Bootstrap estimate of the sampling error of $\hat{\ }$ is given by:

$$se_{BOOT}(\hat{\ }) = \sqrt{\hat{V}_{BOOT}(\hat{\ })},$$

where $\hat{V}_{BOOT}(\hat{\ }) = \frac{1}{B}\bullet_{b=1}^{B}(\hat{\ }^*_b \quad \hat{\ })^2 = 0.002\bullet_{b=1}^{500}(\hat{\ }^*_b \quad \hat{\ })^2.$

with a CV: $cv(\hat{\ }) = \frac{se_{BOOT}(\hat{\ })}{\hat{\ }} \quad 100\%$

Appendix C. Detection limit tables

Table C.1 Organochlorine Pesticides

PARAMETER	DL (ug/g)	PARAMETER	DLs (ug/g)
Chlordane, α-	0.001	Chlordane, g-	0.001
Chlorpyrifos	0.001	DDE, p,p'-	0.0005
DDT, o,p'-	0.005	DDT, p,p'-	0.005
Dicofol	0.010	Dieldrin	0.005
Endosulfan I	0.010	Endosulfan II	0.030
Endosulfan sulfate	0.010	Endrin	0.010
HCB	0.0003	HCH, α-	0.002
HCH, β-	0.010	HCH, g-	0.001
Heptachlor	0.001	Heptachlor epoxide (exo)	0.001
Heptachlor epoxide (endo)	0.010	Methoxychlor	0.020
Oxychlordane	0.005	Nonachlor, trans-	0.001
TDE, p,p'-	0.0005	TDE, o,p'-	0.0005
Mirex	0.002	Aldrin	0.001
Toxaphene parlar 50	0.0003	Toxaphene parlar 26	0.0005
Heptachlor epoxide (exo)	0.001	DDE, p,p'-	0.001

Table C.2 Organophosphate Pesticides

PARAMETER	DL (ug/g)	PARAMETER	DLs (ug/g)
Azinphos-methyl	0.020	Chlorfenvinphos 1	0.01
Coumaphos	0.010	Diazinon	0.005
Dimethoate	0.010	Disulfoton	0.005
Ethion	0.010	Fensulfothion	0.030
Fenthion	0.010	Fonofos	0.005
Malathion	0.010	Methidathion	0.030
Methyl parathion	0.020	Parathion	0.020
Phorate	0.010	Phorate sulfone	0.010
Phosalone	0.010	Phosmet	0.010
Terbuphos	0.010	Tetrachlorvinphos	0.005
Chlorfenvinphos 2	0.003		

Table C.3 PCB Congeners

Congener	DLs	Congener	DLs	Congener	DLs	Congener	DLs	Congener	DLs
28	0.001	60	0.001	118	0.0005	153	0.0003	189	0.001
33	0.001	66	0.001	128	0.0005	156	0.0005	191	0.0005
37	0.001	74	0.001	129	0.0005	157	0.0005	193	0.0005
40	0.001	87	0.001	136	0.0005	170	0.001	194	0.001
41	0.001	90	0.001	137	0.0005	180	0.0005	201	0.0005
44	0.001	99	0.001	138	0.0005	183	0.0005	203	0.0005
49	0.001	105	0.0005	141	0.0005	185	0.0005	206	0.001
								209	0.0003

Table C.4a Methylmercury in Food

ELEMENT	SYMBOL	RLs (ng/g)
Methylmercury	Me-Hg	4.0

Table C.4b Metals in Food

ELEMENT	SYMBOL	DLs (ppm) Based on Dry Weight	DLs (ppm) Based on Wet Weight
Aluminum	Al	0.5	0.1
Arsenic	As	0.1	0.02
Barium	Ba	0.1	0.02
Beryllium	Be	0.1	0.02
Bismuth	Bi	0.1	0.02
Cadmium	Cd	0.02	0.004
Calcium	Ca	5	1
Chromium	Cr	0.1	0.02
Cobalt	Co	0.1	0.02
Copper	Cu	0.1	0.02
Iron	Fe	5	1
Lead	Pb	0.1	0.02
Lanthanum	La	0.5	0.1
Magnesium	Mg	5	1
Manganese	Mn	0.1	0.02
Mercury	Hg	0.01	0.002
Molybdenum	Mo	0.1	0.02
Nickel	Ni	0.1	0.02
Phosphorous	P	15	3
Potassium	K	10	2
Selenium	Se	0.1	0.02
Silver	Ag	0.025	0.005
Sodium	Na	5	1
Strontium	Sr	0.1	0.02
Thallium	Tl	0.01	0.002
Tin	Sn	0.1	0.02
Vanadium	V	0.1	0.02
Zinc	Zn	0.5	0.1

Table C.5 Metals in Tap Water

ELEMENT	SYMBOL	DLs (ppm)
Aluminum	Al	0.001
Antimony	Sb	0.0002
Arsenic	As	0.0002
Barium	Ba	0.0002
Beryllium	Be	0.0002
Bismuth	Bi	0.0002
Boron	B	0.01
Cadmium	Cd	0.00004
Calcium	Ca	0.01
Chromium	Cr	0.0002
Cobalt	Co	0.0002
Copper	Cu	0.0002
Iron	Fe	0.01
Lead	Pb	0.0002
Lithium	Li	0.0002
Magnesium	Mg	0.01
Manganese	Mn	0.0002
Mercury (by CVASF)	Hg	0.00002
Molybdenum	Mo	0.0001
Nickel	Ni	0.0002
Phosphorous	P	0.03
Potassium	K	0.02
Selenium	Se	0.0002
Silicon	Si	0.05
Silver	Ag	0.00005
Sodium	Na	0.01
Strontium	Sr	0.0002
Tellurium	Te	0.0002
Thallium	Tl	0.00002
Thorium	Th	0.0005
Tin	Sn	0.0002
Titanium	Ti	0.0002
Uranium	U	0.0001
Vanadium	V	0.0002
Zinc	Zn	0.001
Zirconium	Zr	0.002

Table C.6 PCDDs and PCDFs subcontracted to Pacific Rim Laboratories

PCDDs	DLs (ng/kg)	PCDDs	DLs (ng/kg)
1,2,3,7,8-PentaCDD	0.05	1,2,3,4,7,8-HexaCDD	0.1
1,2,3,6,7,8-HexaCDD	0.1	1,2,3,7,8,9-HexaCDD	0.1
1,2,3,4,6,7,8-HeptaCDD	0.1	OctaCDD	0.3
TCDD	0.03		

PCDFs	DLs (ng/kg)	PCDFs	DLs (ng/kg)
2,3,7,8-TetraCDF	0.03	1,2,3,7,8-PentaCDF	0.05
2,3,4,7,8-PentaCDF	0.05	1,2,3,4,7,8-HexaCDF	0.08
1,2,3,6,7,8-HexaCDF	0.08	1,2,3,7,8,9-HexaCDF	0.08
2,3,4,6,7,8-HexaCDF	0.08	1,2,3,4,6,7, 8-HeptaCDF	0.10
1,2,3,4,7,8,9-HeptaCDF	0.10	OctaCDF	0.20

Table C.7 PBDEs subcontracted to Pacific Rim Laboratories

BDE congener	X No of Br.	Structure	DL(ng/kg)
47	4	2,2',4,4'	5
85	5	2,2',3,4,4'	2
99	5	2,2',4,4',5	5
100	5	2,2',4,4',6	5
153	6	2,2',4,4',5,5'	2
154	6	2,2',4,4',5,6'	2
183	7	2,2',3,4,4',5',6	2
209	10	2,2',3,3',4,4',5,5',6,6'	25

Table C.8 PFCs

PFC	Common Name	DLs (ug/g)
PFC	Common Name	DLs (ug/g)
PFPeA	perfluoropentanoic acid	0.001
PFHxA	perfluorohexanoic acid	0.0005
PFHpA	perfluoroheptanoic acid	0.0005
PFOA	perfluorooctanoic acid	0.0005
PFNA	perfluorononanoic acid	0.0005
PFDA	perfluorodecanoic acid	0.0005
PFUnA	perfluoroundecanoic acid	0.0005
PFDoA	perfluorododecanoic acid	0.0005
PFTA	perfluorotridecanoic acid	0.0005
PFBS	perfluorobutane sulfonate	0.0005
PFHxS	perfluorohexane sulfonate	0.0005
PFOS	perfluorooctane sulfonate	0.0005
PFOSA	perfluorooctane sulfonamide	0.001

Table C.9 PAHs

Polycyclic Aromatic Hydrocarbons	DLs (ug/g)	Polycyclic Aromatic Hydrocarbons	DLs (ug/g)
Naphthalene	0.001	Acenaphthylene	0.001
Acenaphthene	0.001	Fluorene	0.001
Phenanthrene	0.001	Anthracene	0.001
Flouranthene	0.001	Pyrene	0.001
Benz[α]anthracene	0.001	Chrysene	0.001
Benzo[β]fluoranthene	0.001	Benzo[k]fluoranthene	0.001
Benzo[α]pyrene	0.001	Benzo[ghi]perylene	0.001
Dibenz[α,h]anthracene	0.001	Indeno[1,2,3-cd]pyrene	0.001

Table C.9 PAHs

Parameter	DLs (ng/litre)	Parameter	DLs (ng/litre)
Acetaminophen	10	Atenolol	5
Atorvastatin	5	Bezafibrate	0.5
Caffeine	5	Carbamazepine	0.5
Chlortetracycline	10	Cimetidine	2
Ciprofloxacin	20	Clarithromycin	2
Codeine	5	Cotinine	5
Clofibric acid	1	Dehydonifedipine	2
Diclofenac	15	Diltiazem	5
Diphenhydramine	10	17 αEthinylestradiol	0.2
Erythromycin	10	Fluoxetine	5
Furosemide	5	Gemfibrozil	1
Hydrochlorothiazide	5	Ibuprofen	20
Iso-Chlortetracycline	10	Indomethacin	15
Ketoprofen	2	Lincomycin	10
Metformin	10	Metoprolol	5
Monensin	10	Naproxen	5
Oxytetracycline	10	Pentoxyfylline	2
Ranitidine	10	Roxithromycin	5
Sulfamethazine	5	Sulfamethoxazole	2
Tetracycline	10	Alpha-Trenbolone	2
Beta-Trenbolone	2	Trimethoprim	2
Warfarin	0.5		

Appendix D. Framework for mixed dishes categorization into food groupings

Table C.7 PBDEs subcontracted to Pacific Rim Laboratories

Mixed Foods	Grain Products	Vegetables & Fruits	Milk Products	Meat & Alternatives	Serving Size	Examples of mixed foods
1. Grains and Meat	1			1	100g	Rice fried with meat, bannock with eggs, plain hamburger
2. Grains and Milk Products	1		0.5		150g	Cheese pizza, macaroni and cheese, yogurt coated granola bar
3. Grains and Vegetables	2	1			150g	Raisin bread, pasta salad with vegetables, granola bar with blueberries
4. Grains, Vegetables and Meat	1	1		0.5	150g	Egg roll with meat, cabbage rolls, chicken with rice and carrots
5. Grains, Vegetables and Milk Products	1	1	0.5		200g	Meatless lasagna, cheese pizza with vegetables, cannelloni with cheese and spinach
6. Grains, Meat and Milk Products	1		0.5	0.5	200g	French toast, pepperoni pizza, croissant with egg, cheese, and sausage
7. Vegetables and Meat		1		1	150g	Baked beans with pork, chili con carne, meat and vegetable stew
8. Vegetables and Milk Products		1	1		150g	Tzatziki, poutine, mashed potatoes with milk
9. Grains, Vegetables, Meat and Milk Products	1	0.25	0.5	0.5	200g	Spinach quiche, all dressed pizza, lasagna with meat
10. Meat and Milk products			1	1	150g	Eggnog, cheese sausage, cream of chicken soup
11. Vegetables, Meat and Milk Products		0.5	1	0.5	200	Clam chowder, chicken stuffed with vegetables and cheese, salad with egg and cheese

Appendix E. Body Mass Index (BMI)

The Body Mass Index (BMI) uses a person's weight (in kilograms) and height (in metres) to calculate his or her risk of developing health problems.

$$\text{BMI} = \frac{\text{weight (kg)}}{\text{height (m)} \times \text{height (m)}}$$

Categories of BMI and Health Risk

BMI	Classification	Risk of developing health problems
< 18.5	Underweight	Increased
18.5 - 24.9	Normal Weight	Least
25.0 - 29.9	Overweight	Increased
30.0 - 34.9	Obese class I	High
35.0 - 39.9	Obese class II	Very high
>= 40.0	Obese class III	Extremely high

Notes: The BMI is not used for pregnant or lactating women. These BMI categories are not used for children less than 18 years of age. For people aged 65 and over, the "normal weight" classification may range from a BMI of 18.5 to 29.9. Other factors such as lifestyle habits, fitness level and the presence or absence of other health risk conditions need to be taken into consideration to determine an individual's risk.

Source: Health Canada. Canadian Guidelines for Body Weight Classification in Adults.

Ottawa: Minister of Public Works and Government Services Canada; 2003.

Available from : http://www.hc-sc.gc.ca/fn-an/nutrition/weights-poids/guide-ld-adult/bmi_chart_java-graph_imc_java-eng.php

How to calculate your BMI:

Step 1: Determine your weight in kilograms.

To convert weight from pounds to kilograms, divide by **2.2**:

$$\frac{\textbf{weight (pounds)}}{\textbf{height (m) x height (m)}} = \textbf{weight (kg)}$$

Step 2: Determine your height in metres.

To convert height from feet and inches to metres:

a) Multiply height in feet times **12** to get height in **inches**

b) Add any **additional height** in inches to the value obtained in a)

c) Multiply value in b) times **0.0254** to get height in **metres**

Step 3: Take your weight in kilograms (value from Step 1) and divide by your height in metres (value from Step 2) squared.

$$\frac{\textbf{weight (kg)}}{\textbf{height (m) x height (m)}} = \textbf{BMI}$$

Step 4: Compare your BMI to the classification chart to determine your health risk.

Example: *Let's calculate the BMI of someone who weighs 160 pounds and is 5'8" tall:*

Step 1:

To convert from pounds to kilograms, divide by 2.2:

$$\frac{160 \text{ pounds}}{2.2} = 72.7 \text{ kg}$$

Step 2:

To convert height from 5'8" to metres:

a) multiply 5 feet x 12 inches per foot= 60 inches

b) 60 + 8 inches= 68 inches

c) 68 x 0.0254= 1.73 metres

So 5 feet 8 inches = 1.73 metres

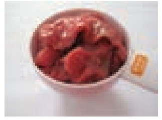
Step 3:

$$\frac{72.7 \text{ kg}}{(1.73\text{m} \times 1.73\text{m})} = 24.3$$

Step 4:

According to the chart, a BMI of 24.3 falls within 18.5 - 24.9, the normal weight range that has the least risk to developing health problems.

Appendix F. Conversion of Grams to Usual Household Measures

Grams	Usual Household Measures	
5 grams	1 teaspoon	
10 grams	2 teaspoons	 
15 grams	1 tablespoon	
30 grams	2 tablespoons	 
60 grams	¼ cup	
75 grams	⅓ cup	
125 grams	½ cup	
180 grams	¾ cup	
250 grams	1 cup	
375 grams	1 ½ cup	 
500 grams	2 cups	 

Appendix G. Traditional Food Intake by species in grams per day

a) Estimated average (mean) intake of traditional foods (g/person/day), consumers and non-consumers, based on traditional food frequency results

Food	Mean grams/ person/ day				
	Women		Men		First Nations in Alberta (n=603)*
	Age 19-50 (n=283)	Age 51+ (n=102)	Age 19-50 (n=141)	Age 51+ (n=77)	
All traditional food	21.87	20.24	38.23	56.92	28.92
Moose meat	11.03	5.49	15.05	17.93	11.68
Saskatoon berry	1.08	1.34	0.96	2.59	1.25
Deer meat	0.94	0.34	1.63	2.08	1.11
Mallard	0.66	1.28	1.57	1.63	1.08
Grouse (sharp-tailed, blue, ruffed)	0.43	1.85	1.55	1.5	1.05
Raspberry	0.91	1.05	0.71	1.62	0.96
Walleye/pickerel	0.4	0.61	1.68	1.74	0.87
Northern pike/jackfish	0.58	0.62	0.76	2.85	0.85
Blueberries	0.51	0.76	0.38	3.08	0.78
Elk meat	0.58	0.22	1.28	1.01	0.73
Wild strawberry	0.47	0.52	0.62	2.47	0.71
Cherry	0.44	0.73	0.49	2.14	0.67
Rabbit	0.17	0.43	0.86	1.37	0.5
Moose liver	0.14	0.55	0.72	1.08	0.45
Moose kidney	0.18	0.37	0.7	1.18	0.44
Lake whitefish	0.44	0.43	0.18	1.02	0.43
Northern pintail	0.26	0.05	0.73	0.49	0.36
Northern shoveler	0.22	0.05	0.85	0.26	0.35
Canada goose	0.25	0.46	0.26	0.68	0.33
Black huckleberry	0.19	0.16	0.1	1.65	0.31
Black bear meat	0.03	0.04	0.99	0.08	0.26
Bison meat	0.06	0.02	0.35	0.95	0.21
Wigeon	0.05	0	0.56	0.51	0.21

Food	Mean grams/ person/ day				
	Women		Men		First Nations in Alberta (n=603)*
	Age 19-50 (n=283)	Age 51+ (n=102)	Age 19-50 (n=141)	Age 51+ (n=77)	
Lowbush cranberries	0.16	0.27	0.14	0.45	0.2
Gadwall	0.05	0.02	0.6	0	0.17
Teal	0.12	0.05	0.11	0.62	0.16
Canvasback	0	0.01	0.56	0.28	0.16
Cloudberry	0.02	0.04	0	0.96	0.11
Beaver meat	0.06	0.05	0.12	0.34	0.1
Goldeye	0.03	0.17	0.1	0.22	0.09
Rainbow trout	0.03	0.04	0.09	0.25	0.07
Gray partridge	0.01	0.02	0.23	0.05	0.07
Highbush cranberries	0.04	0.14	0.06	0.09	0.07
Gooseberry/currant	0.01	0.1	0.19	0.03	0.07
Snowshoe hare	0.06	0.01	0.11	0.04	0.06
Ptarmigan	0.02	0.23	0	0.1	0.06
Bird eggs	0.03	0.11	0.05	0.09	0.06
Burbot	0.04	0.01	0.06	0.08	0.05
Fish eggs	0.06	0.06	0.02	0.05	0.05
Deer liver	0.04	0.07	0.07	0.04	0.05
White fronted goose	0.01	0	0.12	0.17	0.05
Sunflower seeds	0.07	0	0.05	0.05	0.05
Lake trout	0.01	0.01	0.09	0.09	0.04
Caribou meat	0.02	0.02	0.06	0.08	0.04
Brown trout	0.01	0	0.01	0.21	0.03
Sauger	0.06	0.03	0	0.01	0.03
Deer kidney	0.01	0.05	0.05	0.05	0.03

a) Estimated average (mean) intake of traditional foods (g/person/day), consumers and non-consumers, based on traditional food frequency results

Food	Mean grams/ person/ day				
	Women		Men		First Nations in Alberta (n=603)*
	Age 19-50 (n=283)	Age 51+ (n=102)	Age 19-50 (n=141)	Age 51+ (n=77)	
Black bear fat	0.02	0.01	0.06	0.01	0.03
Grizzly bear meat	0	0	0	0.34	0.03
Redhead	0	0	0.04	0.15	0.03
Snow goose	0.03	0.01	0.01	0.16	0.03
Thimbleberry	0.02	0.04	0.01	0.08	0.03
Brook trout	0	0	0.1	0	0.02
Elk liver	0	0.06	0.01	0.02	0.02
Long-tail duck	0	0	0.04	0.06	0.02
Ring necked duck	0	0	0.03	0.15	0.02
Scoter	0.02	0.03	0.01	0	0.02
Swan	0	0	0	0.15	0.02
Bunchberries	0.03	0.05	0.01	0	0.02
Wihkes	0.02	0.02	0.01	0.03	0.02
Mint	0.02	0.04	0.01	0.03	0.02
Bull trout	0	0	0.03	0.07	0.01
Arctic grayling	0	0.01	0.02	0.04	0.01
Mountain whitefish	0	0	0	0.06	0.01
Yellow perch	0	0	0.01	0.02	0.01
Longnose sucker	0	0.04	0.01	0.02	0.01
Elk kidney	0	0.01	0.01	0.05	0.01
White-tailed jackrabbit	0	0	0.01	0.03	0.01
Muskrat meat	0	0.01	0.03	0.02	0.01
Ruddy duck	0	0	0.02	0	0.01
American black duck	0	0	0.03	0.03	0.01

Food	Mean grams/ person/ day				
	Women		Men		First Nations in Alberta (n=603)*
	Age 19-50 (n=283)	Age 51+ (n=102)	Age 19-50 (n=141)	Age 51+ (n=77)	
Scaup	0	0	0	0.15	0.01
Other wild bird (American coot)	0	0.03	0	0.01	0.01
Buffaloberry/soapberry	0.01	0.02	0.01	0	0.01
Kinnikinnick/bearberry	0	0.02	0.02	0	0.01
Rosehips	0.01	0	0.01	0.04	0.01
Hazelnuts/filberts	0.02	0	0.02	0	0.01
Cutthroat trout	0	0	0	0.03	0
Goldeneye	0	0.01	0	0.01	0
White sucker	0.01	0	0	0	0
Redhorse sucker	0	0	0	0.01	0
Fisher	0	0	0.01	0	0
Porcupine	0	0	0.01	0	0
Harlequin duck	0	0	0	0.01	0
Loon	0	0	0.01	0	0
Goose fat	0	0	0.01	0	0
Wild turkey	0	0	0	0.01	0
Other berries/seeds (crabapple)	0	0.01	0	0	0
Cow parsnip shoots	0	0	0	0.01	0
Morel mushrooms	0	0	0	0.01	0

*n=603 as missing age data for 6 participants

b) Estimated high consumption (95th percentile rate) of traditional foods (g/person/day), consumers and non-consumers, based on traditional food frequency results

Food	95th percentile grams/ person/ day				
	Women		Men		First Nations in Alberta (n=603)*
	Age 19-50 (n=283)	Age 51+ (n=102)	Age 19-50 (n=141)	Age 51+ (n=77)	
Total traditional food	104.44	71.41	221.4	247.67	149.55
Moose meat	58.39	29.59	94.54	139.66	58.39
Saskatoon berry	5.48	4.99	3.49	17.33	5.48
Deer meat	4.05	1.73	5.84	8.4	4.87
Mallard	1.76	8.82	3.53	9.7	4.41
Cherry	3.99	4.24	1.99	11.97	4.24
Raspberry	4.49	4.49	2.49	16.26	3.99
Blueberries	3.49	3.24	1.99	17.72	3.99
Grouse (prairie chicken/ sharp-tailed, blue, ruffed)	1.76	2.65	10.59	6.18	3.53
Elk meat	1.62	0.99	5.25	3.6	3.24
Wild strawberry	2.49	2.49	2.99	13.67	2.99
Walleye/pickerel	1.76	3.97	4.41	12.35	2.65
Northern pike/jackfish	1.76	2.65	2.65	15.88	2.65
Moose kidney	0.86	2.88	1.44	10.36	2.01
Lake whitefish	1.32	1.32	0.44	5.29	1.76
Canada goose	0.88	1.32	1.76	4.41	1.76
Rabbit	0.41	1.23	4.67	9.21	1.75
Moose liver	0.29	4.32	1.15	3.16	1.44
Black huckleberry	1.25	0.5	0.5	11.97	1
Lowbush cranberries	0.25	1	1	1.75	1
Rainbow trout	0	0.44	0.88	1.32	0.44
Other fish (salmon from BC)	0.88	0	0.44	0	0.44
Bison meat	0	0	2.33	11.64	0.41
Mint	0.07	0.24	0.02	0.12	0.09

Food	95th percentile grams/ person/ day				
	Women		Men		First Nations in Alberta (n=603)*
	Age 19-50 (n=283)	Age 51+ (n=102)	Age 19-50 (n=141)	Age 51+ (n=77)	
Wihkes	0.04	0.05	0.06	0.12	0.06
Deer liver	0	0.29	0.29	0.29	0
Beaver meat	0	0.25	0.58	2.4	0
Black bear meat	0	0.25	0.58	0.8	0
Gooseberry/currant	0	0.25	0.25	0	0
Northern pintail	0	0	0.88	2.65	0
Sweetgrass tea	0	0.01	0	0.03	0
Cloudberry	0	0	0	9.47	0
Teal	0	0	0	5.29	0
Canvasback	0	0	0	2.65	0
Wigeon	0	0	0	2.65	0
Northern shoveler	0	0	0	2.65	0
Goldeye	0	0	0	1.76	0
Lake trout	0	0	0	1.32	0
Brook trout	0	0	0.88	0	0
Caribou meat	0	0	0	0.8	0
Thimbleberry	0	0	0	0.75	0
Deer kidney	0	0	0	0.58	0
Sunflower seeds	0	0	0	0.5	0
White-tailed jackrabbit	0	0	0	0.4	0
Highbush cranberries	0	0.25	0	0	0
Cow parsnip shoots	0	0	0	0.09	0
Black bear fat	0	0	0.08	0	0
Labrador tea	0	0	0.01	0	0

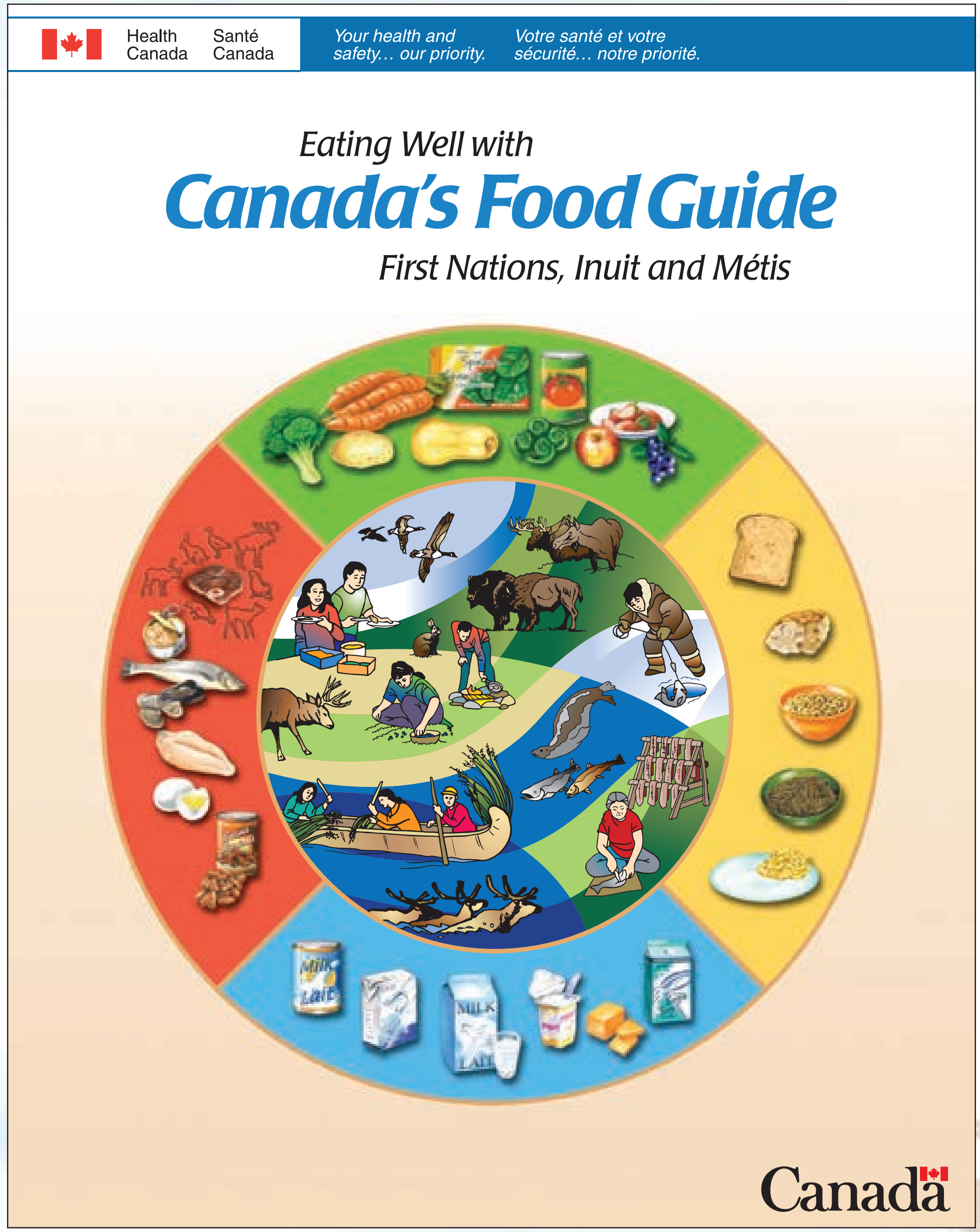
Appendix H. Types of fruits and vegetables consumed from personal or community gardens in First Nations communities in Alberta

Types of fruits and vegetables eaten from gardens	Percent of all fruits and vegetables reported (n=1113)
Potatoes (white, russet, purple, yams)	25.8
Carrots	20.3
Onions (white, green, shallots)	13.0
Turnips	4.6
Peas (green, snow peas)	4.4
Lettuce	3.9
Tomatoes	3.5
Cucumbers	2.8
Beans (yellow, green)	2.2
Berries (blackberries, strawberries, raspberries, thimbleberries, Saskatoon berries, cloudberries)	2.2
Radishes	2
Corn	1.95
Beets	1.7
Squash (pumpkin, acorn, spaghetti)	1.9
Rhubarb	1.4
Celery	1.2
Peppers (red, green, jalapeno)	1.2
Zucchinis	1

Types of fruits and vegetables eaten from gardens	Percent of all fruits and vegetables reported (n=1113)
Apples	0.9
Cabbage (bok choy, brussel sprouts)	0.6
Greens (spinach, swiss chard)	0.6
Barley	0.6
Grapes	0.6
Lentils	0.6
Sunflower Seeds	0.5
Broccoli	0.5
Cantaloupe	0.3
Apricots	0.2
Sweet grass	0.1
Cherries	0.02
Peaches	0.02
Pears	0.02
Garlic	0.01
Parsley	0.01
Parsnips	0.01
Plums	0.01

Appendix I.

Eating Well with Canada's Food Guide First Nations, Inuit and Métis



VEGETABLES AND FRUIT

GRAIN PRODUCTS

MILK AND ALTERNATIVES

MEAT AND ALTERNATIVES

How to use Canada's Food Guide

The Food Guide shows how many servings to choose from each food group every day and how much food makes a serving.

1. Find your age and sex group in the chart below.
2. Follow down the column to the number of servings you need for each of the four food groups every day.
3. Look at the examples of the amount of food that counts as one serving. For instance, 125 mL (1/2 cup) of carrots is one serving in the Vegetables and Fruit food group.

What is one Food Guide Serving?

Look at the examples below.

Eating Well Every Day

Canada's Food Guide describes healthy eating for Canadians two years of age or older.

Choosing the amount and type of food recommended in Canada's Food Guide will help:

- children and teens grow and thrive
- meet your needs for vitamins, minerals and other nutrients
- lower your risk of obesity, type 2 diabetes, heart disease, certain types of cancer and osteoporosis (weak and brittle bones).

Recommended Number of Food Guide Servings per day

	Children 2–3 years old	Children 4–13 years old	Teens and Adults (Females)	Teens and Adults (Males)
Vegetables and Fruit Fresh, frozen and canned.	4	5-6	7-8	7-10
Grain Products	3	4-6	6-7	7-8
Milk and Alternatives	2	2-4	Teens 3-4; Adults (19-50 years) 2; Adults (51+ years) 3	Teens 3-4; Adults (19-50 years) 2; Adults (51+ years) 3
Meat and Alternatives	1	1-2	2	3

Vegetables and Fruit: Eat at least one dark green and one orange vegetable each day. Choose vegetables and fruit prepared with little or no added fat, sugar or salt. Have vegetables and fruit more often than juice.

- Dark green and orange vegetables 125 mL (1/2 cup)
- Other vegetables 125 mL (1/2 cup)
- Leafy vegetables and wild plants cooked 125 mL (1/2 cup) raw 250 mL (1 cup)
- Berries 125 mL (1/2 cup)
- Fruit 1 fruit or 125 mL (1/2 cup)
- 100% Juice 125 mL (1/2 cup)

Grain Products: Make at least half of your grain products whole grain each day. Choose grain products that are lower in fat, sugar or salt.

- Bread 1 slice (35 g)
- Bannock 35 g (2" x 2" x 1")
- Cold cereal 30 g (see food package)
- Hot cereal 175 mL (3/4 cup)
- Cooked pasta 125 mL (1/2 cup)
- Cooked rice White, brown, wild 125 mL (1/2 cup)

Milk and Alternatives: Drink 500 mL (2 cups) of skim, 1% or 2% milk each day. Select lower fat milk alternatives. Drink fortified soy beverages if you do not drink milk.

- Milk Powdered milk, mixed 250 mL (1 cup)
- Fortified soy beverage 250 mL (1 cup)
- Canned milk (evaporated) 125 mL (1/2 cup)
- Yogurt 175 g (3/4 cup)
- Cheese 50 g (1 1/2 oz.)

Meat and Alternatives: Have meat alternatives such as beans, lentils and tofu often. Eat at least two Food Guide Servings of fish each week.* Select lean meat and alternatives prepared with little or no added fat or salt.

- Traditional meats and wild game 75 g cooked (2 1/2 oz)/125 mL (1/2 cup)
- Fish and shellfish 75 g cooked (2 1/2 oz)/125 mL (1/2 cup)
- Lean meat and poultry 75 g cooked (2 1/2 oz)/125 mL (1/2 cup)
- Eggs 2 eggs
- Beans – cooked 175 mL (3/4 cup)
- Peanut butter 30 mL (2 Tbsp)

When cooking or adding fat to food:

- Most of the time, use vegetable oils with unsaturated fats. These include canola, olive and soybean oils.
- Aim for a small amount (2 to 3 tablespoons or about 30-45 mL) each day. This amount includes oil used for cooking, salad dressings, margarine and mayonnaise.
- Traditional fats that are liquid at room temperature, such as seal and whale oil, or ooligan grease, also contain unsaturated fats. They can be used as all or part of the 2-3 tablespoons of unsaturated fats recommended per day.
- Choose soft margarines that are low in saturated and trans fats.
- Limit butter, hard margarine, lard, shortening and bacon fat.

*Health Canada provides advice for limiting exposure to mercury from certain types of fish. Refer to www.healthcanada.gc.ca for the latest information. Consult local, provincial or territorial governments for information about eating locally caught fish.

Respect your body... Your choices matter

Following Canada's Food Guide and limiting foods and drinks which contain a lot of calories, fat, sugar or salt are important ways to respect your body. Examples of foods and drinks to limit are:

- pop
- fruit flavoured drinks
- sweet drinks made from crystals
- sports and energy drinks
- candy and chocolate
- cakes, pastries, doughnuts and muffins
- granola bars and cookies
- ice cream and frozen desserts
- potato chips
- nachos and other salty snacks
- french fries
- alcohol

People who do not eat or drink milk products must plan carefully to make sure they get enough nutrients.

The traditional foods pictured here are examples of how people got, and continue to get, nutrients found in milk products. Since traditional foods are not eaten as much as in the past, people may not get these nutrients in the amounts needed for health.

People who do not eat or drink milk products need more individual advice from a health care provider.

Wild plants, seaweed

Bannock (made with baking powder)

Fish with bones, shellfish, nuts, beans

Women of childbearing age

All women who could become pregnant, and pregnant and breastfeeding women, need a multivitamin with **folic acid** every day. Pregnant women should make sure that their multivitamin also contains **iron**. A health care provider can help you find the multivitamin that is right for you.

When pregnant and breastfeeding, women need to eat a little more. They should include an extra 2 to 3 Food Guide Servings from any of the food groups each day.

For example:

- have dry meat or fish and a small piece of bannock for a snack, or
- have an extra slice of toast at breakfast and an extra piece of cheese at lunch.

Women and men over the age of 50

The need for **vitamin D** increases after the age of 50.

In addition to following Canada's Food Guide, men and women over the age of 50 should take a daily vitamin D supplement of 10 µg (400 IU).

For strong body, mind and spirit, be active every day.

This guide is based on *Eating Well with Canada's Food Guide.*

For more information, interactive tools or additional copies visit Canada's Food Guide at: **www.healthcanada.gc.ca/foodguide**

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Également disponible en français sous le titre : Bien manger avec le Guide alimentaire canadien – Premières Nations, Inuit et Métis

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Appendix J. List of common foods and beverages avoided because of intolerance

Types of food avoided because of intolerance	% (out of 304 responses)
Milk and dairy products (includes milk, chocolate milk, yogurt, cheese, ice cream, cream)	40.3
Greasy food	7.6
Spices and spicy foods	6.2
Carbonated drinks (includes soda and energy drinks)	4.5
Fruits (includes oranges, strawberries, cranberries, wild berries, bananas, blueberries, pineapple, pears, grapefruit)	4.3
Meat (includes beef, moose, elk, deer, pork, chicken)	4.1
Fast food (includes Chinese food, McDonalds, KFC)	3.1
Pasta	2.8
Fish/Seafood	2.6
Caffeine (Coffee/Tea)	2.6
Sugar and sugary foods	2.6
Bread/Wheat	2.1
Salt/Salty Foods	1.7
Vegetables (includes corn, cauliflower, carrots, cabbage, green peppers, lettuce)	1.7
Eggs	1.5
Processed meat (includes sausages, hot dogs, ground beef, bacon, deli meat)	1.3

Types of food avoided because of intolerance	% (out of 304 responses)
Donuts	1.3
Gravy	1.2
Tap water	1.1
Soups/Canned Food	1.0
Nuts/Peanuts/Seeds	0.9
Fruit juice	0.9
Tomatoes (includes spaghetti sauce)	0.8
Pizza	0.7
Processed food	0.5
Chocolate	0.5
Fibre foods	0.4
Onions/Garlic	0.4
Pickles	0.4
Liver	0.2
Duck	0.1
Bannock	0.1
Potatoes	0.1
Beans/Lentils	0.17
Smoked foods	0.05

Appendix K. Market food intake (g/person/day)

Total Diet Study food code*	Food Description	First Nations in Alberta (n=609) Grams/person/day
PP08	Tap Water, Kitchen	487.48
K03	Coffee	407.30
K04	Soft drinks (regular and diet)	265.66
FNFNES9*	Other beverages	202.44
K05	Tea	161.20
PP10	Water, Natural Spring (bottled)	149.02
G19	Potatoes, boiled without skins	55.84
A02	Milk 2%	46.86
F19	Rice	41.03
F20	Buns & Rolls	40.12
F15	Pasta, mixed dishes	34.30
B04	Pork, fresh	34.22
N02	French fries	33.93
C01	Eggs	32.56
F07	Cereals, oatmeal	32.13
E03	Soups, Broth Canned	31.87
E01	Soups, Meats Canned	31.62
C02	Poultry Chicken & Turkey	29.16
F01	Bread White	28.84
N01	Pizza	27.91
FNFNES2*	Mixed dishes	25.30
FNFNES6*	Other fruits	23.19
E04	Soups, Dehydrated	22.24
F16	Pasta Plain	19.13
E02	Soups, Creamed Canned	18.99
B03	Beef, Ground	18.48
FNFNES4*	Other vegetables	16.52
H08	Citrus Juice Frozen	16.21
B11	Wiener Sausage	15.91
N03	Hamburger	15.74
B02	Beef Roast	14.61
A03	Milk 1%	14.18
FNFNES10*	Other fast foods	11.96
J08	Sugar, white	10.05
F02	Bread Whole Wheat	9.16
F05	Cereal Cooked Wheat	9.13
FNFNES8*	Other miscellaneous	8.81
H07	Citrus Fruits	8.35
A06	Cream	8.21
G24	Tomato Sauce	8.15
A08	Yogurt	7.90
B08	Cold cuts and luncheon meats	7.77
G20	Potatoes, chips (plain, salted)	7.44
PP01	Condiments	7.21
H03	Apple Raw	6.95
G06	Carrots	6.77
H04	Bananas	6.68
G17	Potatoes, baked with skin	6.67
I01	Cooking fats and salad oils	6.59
G09	Corn	6.07
N05	Chicken burger	6.01
H01	Apple Juice Canned	5.80

Total Diet Study food code*	Food Description	First Nations in Alberta (n=609) Grams/person/day
B05	Pork Cured	5.05
F04	Cake	4.80
A11	Cheese Processed	4.78
B01	Beef Steak	4.61
PP11	Water, Natural Mineral	3.89
F06	Cereal Corn	3.86
FF21	Bread Other	3.84
M05	Frozen Entrees (oven/mw)- microwave	3.77
G13	Onions	3.73
F14	Pancake Waffle	3.54
FNFNES3*	Other cereal products	3.39
F13	Muffins	3.31
G10	Cucumbers and dill pickles	3.29
FNFNES5*	Other salty snacks	3.26
B09	Lunch Meat Canned	3.20
F09	Cookies (chocolate chip)	3.08
F08	Cereals, wheat and bran	2.92
G11	Lettuce	2.91
G23	Tomatoes (raw and broiled)	2.84
M01	Popcorn	2.69
F11	Danish and donuts	2.66
J09	Syrup	2.64
I02	Margarine	2.58
J02	Chocolate Bar	2.54
M06	Frozen dinner, beef + vegetables with or without dessert	2.24
D03	Fish, Canned	2.18
N08	Egg breakfast on a bun or bagel or muffin or croissant	2.13
A01	Milk Whole	2.12
J03	Gelatin Dessert	2.08
M02	Frozen Entrees	1.98
A09	Cheese	1.97
N07	Chicken (breaded, fried, nuggets or pieces)	1.91
A12	Butter	1.88
A07	Ice Cream	1.84
D01	Fish, Marine	1.79
A04	Milk Skim	1.69
G08	Celery	1.63
F10	Crackers	1.52
B07	Lamb	1.39
F03	Bread Rye	1.38
J06	Peanut butter and peanuts	1.35
G01	Baked Beans, Canned	1.34
J01	Chocolate Bar	1.31
G04	Broccoli	1.30
H09	Citrus juice, canned	1.27
G15	Peppers	1.19
J05	Jams	1.18
FNFNES1*	Other dairy products	1.14
J07	Puddings	1.12
G21	Rutabagas or turnip	1.06
H11	Grapes	1.06

Total Diet Study food code*	Food Description	First Nations in Alberta (n=609) Grams/person/day
JJ12	Nuts	1.00
G12	Mushrooms	1.00
FF17	Pie, Apple	0.97
H12	Melons	0.97
H19	Strawberries	0.90
G14	Peas	0.86
H02	Apple Sauce	0.84
F18	Pie Other	0.75
PP07	Soya Sauce	0.68
G18	Potatoes, boiled with skins	0.66
G02	Beans, String	0.65
II04	Mayonnaise	0.61
N06	Hot dog	0.55
G05	Cabbage	0.55
A05	Evaporated Milk	0.54
H17	Raisins	0.49
D04	Shellfish	0.46
H18	Raspberries	0.40
F12	Flour, White	0.31
PP02	Salt	0.25
J10	Seeds, shelled (sunflower)	0.24
H05	Blueberries	0.24
H14	Pears	0.24
F17	Pie, apple (fresh or frozen)	0.18
G22	Tomato juice, canned	0.14
H13	Peaches	0.10
G07	Cauliflower	0.09
HH20	Kiwi Fruit	0.09
GG22	Spinach	0.08
PP06	Herbs and Spices	0.07
H16	Plums and Prunes	0.05
J04	Honey Bottle	0.05
B10	Organ Meats	0.04
H15	Pineapple Canned	0.03
CC03	Poultry Liver Pate	0.01
JJ13	Chewing Gum	0.003
FNFNES7*	Other meat products	0.003

*n=165 foods that did not fall into the Total Diet Study codes (Dabeka and Cao 2013); these foods were assigned FNFNES codes in order to group them for the purpose of these analyses.
FNFNES1 includes almond and soy milks, sour cream dips
FNFNES2 includes chili, shepherd's pie, sandwiches, stir fries
FNFNES3 includes granola bars, tacos, tortillas
FNFNES4 includes eggplant, salads, kale, mixed frozen vegetables, garlic
FNFNES5 includes corn/tortilla chips, pretzels
FNFNES6 includes blackberry, cranberry, fruit salad, pineapple, pomegranate, non-citrus fruit juice
FNFNES7 includes head cheese and pork skins
FNFNES8 includes coffee whitener, artificial sweeteners, gravy, brown sugar, vinegar
FNFNES9 includes fruit-flavoured drinks, energy drinks, iced tea and protein drinks
Note: alcohol was excluded from these analyses

Appendix L. List of nutritional supplements taken by First Nations in Alberta

Types of supplements reported to be taken	% of all supplements reported (n=222)
Vitamin D	21.98
Multivitamin/Mineral Supplement	19.37
Calcium	11.37
Vitamin B (6, 12, Complex)	8.8
Iron Supplement	7.98
Vitamin C	5.95
Prenatal Supplement	5.27
Herbal Supplement	4.72
Omega/Fish Oil	4.6
Pure North	1.68
Vitamin A	1.16
Garlic	1
Swiss Natural Sources Cranberry Extract	0.98
Folic Acid	0.96
Usana Antioxidant	0.93

Types of supplements reported to be taken	% of all supplements reported (n=222)
Potassium	0.78
Protein Supplement	0.72
Kidney Supplement	0.55
Licorice Root	0.37
Progressive Veg Greens	0.31
Magnesium	0.12
Melatonin	0.1
Metamucil	0.05
Vitamin E	0.05
Liquid Chlorophyll	0.05
Oxy-Powder	0.05
Supple Peach Mango Joint Supplement With Glucosamine & Chondroiten	0.05
Synergy	0.05

Appendix M. Comparison of nutritious food basket item costs in First Nations in Alberta to Edmonton

FOOD ITEM	PURCHASE UNIT	Average Cost First Nations in Alberta (n=10 stores)	Taiga Plain (n=2 stores)*	Boreal Plains (n=8 stores)	Prairies (n=2 stores)	Edmonton
			Price per purchase unit in CDN dollars			
MILK & MILK ALTERNATIVES						
Milk, partly skimmed, 2% M.F.	4 L	5.74	5.34	6.13	4.56	5.09
Cheese, processed food, cheddar, slices	500 GM	4.92	5.19	5.13	3.63	4.99
Cheese, mozzarella, partially skim (16.5% M.F.)	200 GM	4.35	4.74	4.54	3.39	3.99
Cheese, cheddar	200 GM	4.40	4.74	4.57	3.53	3.99
Yogourt, fruit bottom, 1% to 2% M.F.	750 GM	4.17	3.68	4.52	2.97	3.99
EGGS						
Grade A large eggs	dozen	3.01	2.79	3.10	2.82	2.75
MEAT, POULTRY AND LEGUMES						
Chicken, legs	1 KG	7.19	4.27	8.03	5.63	8.80
Ham, sliced, regular (approximately 11% fat)	175 GM	3.11	3.09	3.24	2.04	2.49
Beef, hip, inside (top) round roast	1 KG	12.70	11.22	13.78	11.43	15.25
Beef, hip, inside (top) round steak	1 KG	13.89	14.55	14.66	11.43	15.25
Beef, ground, lean	1 KG	9.37	9.29	9.80	7.59	10.18
Beans, baked, canned in tomato sauce	398 ML	1.17	1.39	1.16	0.87	1.00
Peanuts, dry roasted	700 GM	5.28	6.29	4.93	4.78	6.99
Lentils, dry	454 GM	2.02	2.46	2.06	1.25	2.01
Peanut butter, smooth type, fat, sugar and salt added	500 GM	4.31	4.49	4.45	3.47	2.99
Pork, loin, centre chop, bone-in	1 KG	11.35	10.77	11.48	10.19	6.85

FOOD ITEM	PURCHASE UNIT	Average Cost First Nations in Alberta (n=10 stores)	Taiga Plain (n=2 stores)*	Boreal Plains (n=8 stores)	Prairies (n=2 stores)	Edmonton
			Price per purchase unit in CDN dollars			
FISH						
Tuna, light, canned in water	170 GM	1.67	1.79	1.81	1.12	2.79
Fish (sole, haddock, pollock, halibut), frozen	400 GM	5.31	4.89	5.26	5.72	5.99
Salmon, chum (keta), canned	213 GM	3.05	2.69	3.29	2.38	2.19
ORANGE VEGETABLES & FRUIT						
Peach, canned halves or slices, juice pack	398 ML	2.03	1.82	2.12	1.56	2.99
Melon, cantaloupe, raw	1 KG	3.11	2.92	2.42	4.84	2.75
Sweet potato, raw	1 KG	2.95	2.94	3.56	0.99	2.84
Carrot, raw	1 KG	2.26	2.75	2.48	1.63	1.32
DARK GREEN VEGETABLES						
Beans, snap (Italian, green or yellow), frozen	1 KG	4.63	8.37	5.18	2.14	2.79
Lettuce, cos or romaine	1 KG	4.77	5.48	5.05	2.12	2.87
Vegetables, mixed, frozen	1 KG	3.78	3.77	4.02	2.54	2.5
Broccoli, raw	1 KG	4.59	4.85	4.70	3.77	1.28
Peas, green, frozen	1 KG	4.04	4.91	4.45	2.36	4.65
Pepper, sweet, green, raw	1 KG	4.49	3.80	4.73	3.07	6.59
OTHER VEGETABLES & FRUIT						
Apple, raw	1 KG	2.78	2.55	2.95	1.94	3.28
Banana, raw	1 KG	2.17	1.94	2.34	1.70	1.08
Grape, red or green, raw	1 KG	4.64	7.67	5.24	2.83	8.8
Oranges, all commercial varieties, raw	1 KG	3.46	3.50	3.62	2.80	2.84
Orange juice, frozen concentrate	355 ML	2.02	1.83	2.29	1.19	1.00
Pear, raw	1 KG	3.01	3.49	2.99	2.91	2.84

FOOD ITEM	PURCHASE UNIT	Average Cost First Nations in Alberta (n=10 stores)	Taiga Plain (n=2 stores)*	Boreal Plains (n=8 stores)	Prairies (n=2 stores)	Edmonton
			Price per purchase unit in CDN dollars			
Raisin, seedless (sultana)	750 GM	6.20	6.19	6.71	4.50	7.38
Strawberry, frozen, unsweetened	600 GM	5.19	5.99	5.20	4.77	4.99
Apple juice, canned or bottled, added vitamin C	1.36 L	3.39	2.92	3.82	2.29	3.19
Potato, white, raw	4.54 KG	7.42	5.24	9.14	3.23	5.99
Corn, canned vacuum packed	341 ML	1.15	1.30	1.21	0.75	1.00
Rutabaga (turnip), raw	1 KG	1.53	1.50	1.50	1.59	2.80
Cabbage, raw	1 KG	1.87	2.16	2.10	1.16	2.18
Cucumber, raw	1 KG	3.89	2.85	4.16	3.77	1.50
Celery, raw	1 KG	2.21	2.95	2.19	2.29	3.02
Lettuce, iceberg	1 KG	3.04	2.98	3.04	2.97	2.76
Mushroom, raw	1 KG	8.52	6.58	8.72	7.66	6.59
Onion, raw	1 KG	2.26	1.38	2.45	1.79	2.08
Tomato, red, raw	1 KG	4.40	4.93	4.48	3.24	2.84
Tomato, canned, whole	796 ML	1.62	2.14	1.67	0.95	1.25
Vegetable juice cocktail	1.89 L	3.65	3.99	3.73	2.83	3.69
WHOLE GRAIN PRODUCTS						
Cereal, bran flakes with raisins	775 GM	6.15	7.20	6.12	4.99	3.74
Cereal, oats, quick cooking	1 KG	3.47	3.03	3.59	3.02	3.69
Cereal, toasted oat Os	525 GM	5.20	4.72	5.79	2.71	3.79
Bread, pita, whole-wheat	284 GM	2.59	1.69	2.76	2.10	3.31
Bread, whole wheat	675 GM	2.98	2.92	2.88	2.87	3.89
Grains, wheat flour, whole-grain	2.5 KG	6.12	5.29	6.58	4.66	6.99

FOOD ITEM	PURCHASE UNIT	Average Cost First Nations in Alberta (n=10 stores)	Taiga Plain (n=2 stores)*	Boreal Plains (n=8 stores)	Prairies (n=2 stores)	Edmonton
			Price per purchase unit in CDN dollars			
NON WHOLE GRAIN PRODUCTS						
Cookie, plain (arrowroot, social tea)	350 GM	3.65	3.89	3.75	2.49	3.29
Roll, hamburger	350 GM	2.49	1.71	2.13	3.58	2.44
Cracker, saltine, unsalted top	450 GM	2.81	2.72	3.11	1.54	1.79
Bread, white	675 GM	2.86	2.39	2.87	2.87	3.49
Pasta, spaghetti, enriched	900 GM	2.56	2.54	2.72	1.77	2.49
Grains, wheat flour, white, enriched, all purpose	2.5 KG	5.51	4.95	5.71	4.66	6.99
Rice, white, long-grain, parboiled	900 GM	2.91	3.29	3.06	1.66	4.69
FATS AND OILS						
Vegetable oil, canola	1.89 L	8.23	8.47	8.86	6.48	8.95
Salad dressing, mayonnaise type	475 ML	3.18	2.44	3.64	1.94	3.69
Salad dressing, Italian, regular	950 ML	4.67	3.88	5.16	2.99	3.49
Margarine, tub, non-hydrogenated	907 GM	4.43	4.49	4.42	3.96	3.49

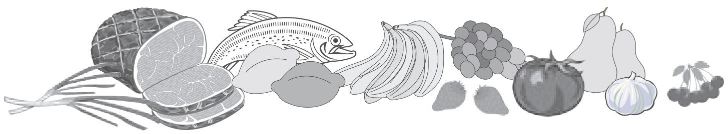
*Average of 2 stores located geographically in Boreal Plains to which community members drive.

Appendix N. Healthy Food Guidelines for First Nations Communities[13]

Food is part of celebration, ceremony, social functions, learning functions and is one of our best ways to bring people together. With many occasions to offer and share food, we have plenty of opportunity to promote healthy choices by ensuring that healthy foods are available almost all of the time.

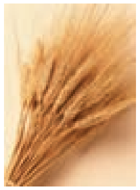
Serving healthy foods in communities means having healthy food selections at all community activities that include food such as: community programs, gatherings, meetings and special events as well as at daycares and schools and even as part of fundraising events. Serving healthy foods starts with the types of food offered as well as the amount of food offered.

The following table of foods was based on the Guidelines for Food and Beverage Sales in British Columbia Schools and further adapted from a document created by the First Nations Health Council in BC. It has been modified for this report to assist communities in the promotion of healthy food choices at community events. The table is broken into Food Categories based on nutrition criteria that assess the calories and amount of sugar, fat and salt (sodium) in these foods. The first category, "Leave off the Table", contains foods that are generally high in fat and sugar and/or salt. The second category, "Better on the Table", includes foods that may be low in fat or salt (sodium) but do not meet all of the criteria of foods that fit within the third category, "Great on the Table Anytime".



In order to promote healthy eating, we encourage communities to make and serve the types of foods listed under **"Better on the Table"** and **"Great on the Table Anytime"** as often as possible. Foods listed under **"Leave off the Table"** should be offered as little as possible or only at special occasions.

[13]Adapted with permission from First Nations Health Council. 2009. Healthy Food Guidelines for First Nations Communities(BC). The complete guidelines are available through the First Nations Health Authority www.fnha.ca

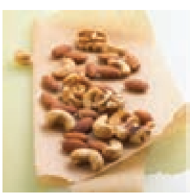
Food Category	Leave off the Table	Better on the Table	Great on the Table Anytime
Grains			
Grains must be the first or second ingredient (not counting water) Grain ingredients may include: - Flours made from wheat, rye, rice, potato, soy, millet, etc. - Rice, pasta, corn, amaranth, quinoa, etc 	• Flavoured or Instant rice • Fried Bannock, White bread, White buns • Baked goods and pastries (ex. Commercial muffins with a diameter more than 2 inches, cakes, cookies, danishes, croissant, cinnamon buns) • High fat crackers • Commercial or home-made pasta salads made with lots of dressing • Instant noodles (packages, cup) with seasoning mix • Microwave popcorn and fried snack foods eg. Potato, tortilla chips	• White rice • Baked bannock, enriched breads, buns, bagels, tortillas, English muffins, pancakes, etc • Lower fat baked goods that are small in size (2 inch muffins, mini loaves • Low-fat crackers (no trans-fat) • Pasta salads made with very little dressing • Other rice noodles • Trans-fat free, low-fat baked grain and corn snacks (baked tortilla chips, popcorn)	• Brown, wild or mix of brown & white rice • Whole grain baked bannock, breads, buns, bagels, tortillas, English muffins, pancakes, etc • Some small baked lower fat items with whole grains, fibre, fruit or nuts, such as loaves, muffins • Low-fat whole grain crackers • Most whole grain pastas • Whole grain and corn snacks (cereal mix, tortilla chips, hot air popcorn with no butter)
Note: Foods high in starches and sugars (natural or added) can remain stuck on teeth and put dental health at risk. Grain food choices of concern are sugary cereals, granola and granola bars, crackers, cookies and chips (corn, wheat, rice, etc). The Canadian Dental Association suggests eating these foods only at mealtimes and not as a snack.			

APPENDICES

Food Category	Leave off the Table	Better on the Table	Great on the Table Anytime
Vegetables & Fruit			
A vegetable or fruit or fruit puree must be the first or second ingredient, not counting water 	• Raw, canned or cooked fresh/frozen fruits and vegetables served with condiments or add-ins that don't meet Better on the Community Table/Great on the Table Anytime criteria (ex. Fruit in heavy syrup, most canned vegetables) • Fruit with a sugar based coating (e.g., yogurt- or chocolate- covered raisins) • Dried fruit (e.g., fruit roll-ups/leathers/ chips) or fruit juice snacks (e.g., gummies) • Regular potato/vegetable chips • Coated/breaded and deep fried vegetables (e.g., French-fried potatoes, onion rings) • High Salt (sodium) pickles (see Condiments)	• Raw, canned or cooked fresh/frozen fruits and vegetables (including wild greens and berries) that are cooked or prepared with low salt, low-fat sauces (e.g., low-fat milk-based) or meet Better on the Table Criteria (ex. Fruit in light syrup, low sodium canned vegetables) • Some sweetened baked fruit slices • Low-salt, baked potato/vegetable chips • Low salt (sodium) pickles	• Raw, canned or cooked fresh/frozen berries, fruit and vegetables (including wild greens and berries) that are served plain or with the minimum amount of dressing/serving recommended in the Condiment Section • Homemade salsa with fresh tomatoes or canned diced tomatoes and minimal salt
Note: Foods high in sugars and starches (natural or added) can leave particles clinging to teeth and put dental health at risk. Vegetable/fruit choices of concern include fruit leathers, dried fruit, and chips (potato or other).			

Food Category	Leave off the Table	Better on the Table	Great on the Table Anytime
Vegetable & Fruit Juices			
A vegetable or fruit juice or puree must be the first ingredient (not counting water): - may be diluted with water or carbonated water - may have added food ingredients, e.g. Fruit pulp, fruit puree - may not be fortified with vitamins other than Vitamin C, or with minerals other than calcium. 	• Most “drinks”, “blends”, “cocktails”, “splashes” and “beverages” (if sweetened with added sugars) • Most regular tomato and vegetable juices • Fruit smoothies made with leave off the community table ingredients • Slushy drinks and frozen treats (e.g., frozen fruit juice bars) with added sugars (note that concentrated fruit juice is considered an added sugar when it is not preceded by water in the ingredient list) • Juice drinks with added caffeine, guarana or yerba	• 100% fruit juice • 100% fruit + vegetable juices • Some lower-sodium tomato and vegetable juices • Fruit smoothies made with better and great on the table ingredients • Slushy drinks and frozen treats (e.g., frozen fruit juice bars) with no added sugars • Diluted or sparkly juice drinks, no added sugars	• Natural berry juices with water but no added sugar
Note: 100% juice and other fruit drinks contain sugars and acids (natural or added) that dissolve tooth enamel when sipped frequently. To avoid prolonged exposure to these sugars and acids, choose plain water over fruit juice.			

Food Category	Leave off the Table	Better on the Table	Great on the Table Anytime
Milk-based and Calcium Containing Foods			
For milk-based foods, milk must be the first ingredient; cream is NOT considered a milk ingredient 	• Candy flavoured ice creams, sundaes and many frozen yogurts • Frozen 'yogurt' not based on milk ingredients (see "Candies, Chocolates, etc" food grouping) • Most ice milks, ice creams, and frozen novelties • Some puddings/custards • Some higher fat cheeses • Most cream cheese and light cream cheeses and spreads (see condiment section) • Most processed cheese slices and spreads made without milk • Whole fat cottage cheese	• Small portions of some ice milks and frozen yogurts – simply flavoured • Small portions of sherbet • Puddings/custards made with low fat milk and limited added sugar • Pudding/custards/ice milk bars with artificial sweeteners (not for young kids) • Most flavoured yogurts • Yogurt with artificial sweeteners • Processed cheese slices made with milk • 1-2% milk fat cottage cheese	• Some flavoured yogurts (lower fat and sugar) • Plain yogurt (low-fat) • Most regular and reduced fat or light cheeses, cheese strings (unprocessed) • Low-sodium cottage cheese (1% milk fat.) • Canned salmon with bones
Note: Individuals who do not eat or drink milk products should seek advice from a health care provider.			
Milk & Calcium Containing Beverages			
Milk must be the first ingredient; cream is NOT considered a milk ingredient. Fortified soy drinks contain protein and calcium and are included in this food grouping.	• Most candy flavoured milks • Most eggnogs • Most hot chocolate mixes made with water (see also "Other Beverages") • Smoothies made with Leave off the Community Table ingredients • Some blended sweetened regular and decaf coffee drinks	• Most basic flavoured milks and fortified soy drinks • Yogurt drinks • Some eggnogs if lower in sugar • Most hot chocolates made with milk • Smoothies made with Better on the Community Table ingredients	• Plain, unflavoured fortified soy and rice drinks • Skim, 1% and 2% milk • Some hot chocolates made with milk and very little added sugar • Smoothies made with ingredients from the "Great on the Table Anytime" list • Decaffeinated, unsweetened tea/coffee latté
Note: Whole milk (3.25%) is recommended for children less than 2 years of age. Lower fat milks are suitable for children older than 2 years of age. Individuals who do not eat or drink milk products should seek advice from a health care provider.			

Food Category	Leave off the Table	Better on the Table	Great on the Table Anytime
Meat & Alternatives			
A meat or meat alternative must be the first or second ingredient (excluding nuts and seeds*). Meat and meat alternatives include: beef, pork, poultry, fish, game meats, eggs, soybeans, legumes, and tofu. *See the "Nuts & Seed Mixes or Bars" category for guidelines on these items 	• Many products deep fried in hydrogenated or partially hydrogenated oils or in vegetable shortening • Marbled or fatty meats • Many cold cuts and deli meats (deli chicken, deli beef, pepperoni, bologna, salami, etc) if high in salt or contain nitrates • Canned meats (Kam, Klik, corned beef, ham, etc) • Some seasoned chicken or tuna salads • Most regular wieners, sausages, smokies, bratwurst • Most pepperoni/chicken sticks • Some jerky • Bacon	• Some breaded and baked chicken/fish/meat • Some marinated poultry • Some fish canned in oil • Some deli meats if not too salty • Some chicken or tuna salads, lightly seasoned • Some lean wieners, sausages • Lean pepperoni/chicken sticks • Some jerky, lightly seasoned • Some egg salads, lightly seasoned • Legume salads, lightly seasoned • Some refried beans	• Chicken, turkey • Fish, seafood, fresh or canned in water/broth • Lean meat (beef, bison, pork, lamb) • Game meats and birds (moose, caribou, duck, etc) • Eggs • Tofu • Some chicken salads if lower salt • Some lean wieners if lower salt • Jerky (plain) • Beans, peas, lentils • Most legume salads if lower salt • Refried beans (lower fat)
Note: Many processed meats are high in saturated fat, salt and nitrates. Choose non-processed, lean meat, poultry or fish instead. Wild game meats and fish are lower in saturated fat and contain no added salt or nitrates.			
Nuts & Seeds (Mixes or Bars)			
Peanuts, nuts or seeds must be the first or second ingredient. 	• Nuts with a sugar based coating (eg. Chocolate, yogurt covered nuts) • Salty or sugary nut/seed bars and mixes (e.g. sesame snap bars) • Nuts/seeds that are highly salted or flavoured and roasted in additional oil	• Nuts/seed bars and mixes with nuts/seeds or fruit as the first ingredient and no sugar based coatings	• Nut/seed bars and mixes with nuts/seeds or fruit as first ingredient • Nuts/seeds, natural or dry roasted

Food Category	Leave off the Table	Better on the Table	Great on the Table Anytime
Mixed Entrée Foods			
Note: Some trans fats occur naturally in meats like beef, lamb, goat, deer, moose, elk, and buffalo. Naturally occurring trans fats are considered healthy. 	• Sandwiches with deli or processed meats • Subway style sandwiches greater than 6 inches • Some pizzas (4 cheese/double cheese, meat lover) • Pizza pockets • Meat pot pies • Sausage/vegetable rolls • Pasta with a cream based sauce	• Most sandwiches • Short (e.g. 6 inch) submarine sandwiches, and burgers made with lean roasted meats (turkey, chicken, beef), but few vegetables • Some cheese or meat pizzas with vegetables • Baked pizza pockets, pizza pretzels, pizza bagels • Some curries, moderately salted • Stir fries • Sushi • Pilaf (rice and meat) • Pasta with milk or vegetable based sauce • Hard tacos with meat or bean filling	• Sandwiches, short (6 inch) submarine sandwiches, and burgers made with whole grain breads and lean meats (turkey, chicken, beef) and plenty of vegetables and whole grain bread/buns • Some pizzas with vegetables • Stews, chilies, curries (lower sodium) • Stir fries on rice, if sauce is low in sodium • Pilaf (with vegetables) • Pasta with vegetable and meat based sauce • Burritos (bean or meat) • Soft tacos filled with “Great on the Table” ingredients • Some low sodium frozen entrees
Candies, Chocolates			
	• Most regular packages • Most very small packages of candies/ chocolates • Very small portions of dessert gelatins	• Sugar-free gum or mints or cough drops • Diabetic candies (adults only)	None

Food Category	Leave off the Table	Better on the Table	Great on the Table Anytime
Soups			
Includes dry, canned and fresh 	• Some instant soups, plain or seasoned • Regular canned soups, broth or milk based • Many canned soups, broth or milk based • Ramen noodles	• Home-made soups made with soup bouillon/stock and other ingredients from the "Great on the Table Anytime" list • Hamburger soup made with regular fat meat • Some low-sodium canned or instant soups	• Home-made soups made without soup bouillon/stock • Hamburger soup made with lean meat (lean ground beef, moose or deer meat) • Some soups made with meat or beans/ lentils • Some low-sodium canned or instant soups made with meat or beans/lentils
Other Beverages* (Non-Juice/Non-Milk based)			
	• Most drinks with sugars as the first ingredient (not counting water) – e.g. iced teas, fruit 'aides', pops • Most sport drinks* • Most hot chocolate mixes made with water	• Water (flavoured or not) minimally sweetened • Soda water ** • Diet decaffeinated soft drinks and diet non-carbonated drinks (Secondary schools only) • Decaffeinated tea • Decaffeinated coffee	• Water, plain • Lemon/lime water • Soda water ** • Sparkling/carbonated water or water with added flavours (no added sugar and/or no artificial sweeteners) • Traditional teas • Fruit/mint flavoured unsweetened teas

* Sport/electrolyte drinks containing added sugars are not recommended. These beverages may be useful during sports events lasting more than 1 hour on hot days. Plain water is the best beverage when exercising.

* Other Beverages may provide excess calories, caffeine, artificial sweeteners, or acids and often displace healthier food/beverage choices. These beverages often contain acids (natural or added) that may dissolve tooth enamel when sipped frequently. To reduce risk of damage to tooth enamel, choose water most often as a beverage. Limit portion sizes of "Other Beverages" (except plain water) to: 250 mL or less per serving for children (aged 5-12) and 360 mL or less for children aged 12 and older.

** If serving soda water, check the sodium content as some brands may have higher levels.

Food Category	Use in Moderation	Generally No Limits
Condiments & Add-Ins		
	• Soy sauce: 2 - 3 mL • Hot sauce: 5 - 10 mL • Table salt: ¼ - ½ mL • Soft margarine, butter: 5 - 10 mL • Cream: 5 - 15 mL Whipped Cream (from cream): 15 - 30 mL • Regular/light cream cheese or processed cheese spread: 5 - 15 mL • Regular sour cream: 15 - 30 mL • Low-fat sour cream: 15 – 45 mL • Fat-free sour cream: 15 – 60 mL • Low-fat/fat-free dips, dressings, spreads (e.g., mayonnaise, miracle whip, sandwich spread): 5 - 15 mL • Regular dips, dressings, spreads: 5 - 10 mL • Oil for sautéing or dressing (e.g., homemade vinegar and oil): 5 - 10 mL • Ketchup, mustard, relishes: 10 - 15 mL • Pickles (regular): 10-15 ml (Low sodium pickles: no limit) • Horseradish: 10 - 45 mL • Jarred salsa, sauerkraut: 10 - 30 mL (fresh salsa can fit into the Vegetables and Fruit food grouping) • Salad toppers (e.g. Bacon bits): 5 - 10 mL Croutons: 25 - 50 mL • Sugars, honey, jams/jellies, molasses, syrups (e.g., pancake): 15 mL • Flavoured syrups (e.g. for lattes): 1 pump (10 mL)	• Herbs and salt-free seasonings, garlic, pepper, lemon juice, Mrs. Dash
Condiments and add-ins can be used to enhance the flavour of Better on the Table and Great on the Table Anytime items. Condiments and add-ins should be served on the side whenever possible.		

Appendix O. Summary of Results for Alberta

First Nations Food, Nutrition and Environment Study

University of Ottawa
Université de Montréal
Assembly of First Nations

Summary of Results: Alberta

Alberta 2013

Who participated?

609 — 6 = median household size, with a range of **1-19**

386 223

60% of households said that at least 1 adult worked full-time.

What is the FNFNES about?

The FNFNES took place in **10 First Nations** communities in 2013 to answer these questions:

- What kinds of traditional and store bought foods are people eating?
- What is the diet like?
- Is the water safe to drink?
- Are the levels of pharmaceuticals in the water safe?
- Are people being exposed to harmful levels of mercury?
- Is traditional food safe to eat?

Which communities participated?

Dene Tha' First Nation
Little Red River Cree Nation
Horse Lake First Nation
Driftpile First Nation
Mikisew First Nation
Whitefish (Goodfish) Lake First Nation #128
Wesley First Nation
Chiniki First Nation
Louis Bull Tribe
Ermineskin Cree Nation

What were the findings on health?

67% of adults said their health was good or better

45% of adults are physically active

20% of adults are at a healthy weight

17% of adults have diabetes

56% of adults are smokers

Thank you to everyone who participated!

How many households are harvesting traditional food?

65% of households harvested traditional food
35% **fished**
44% **hunted**
36% **harvested wild plants**

4 out of 5 would like more traditional food

Top barriers to greater use are: lack of equipment/transportation, lack of a hunter, regulations, time and a lack of knowledge

What and how much traditional food are people eating?

3 traditional foods commonly eaten: **moose**, **saskatoon berries** and **raspberries**

29 grams of traditional food or 2 tablespoons daily

How well are First Nations adults in Alberta eating?

Adults **eat fewer than** the recommended servings of:

Grain Products
Vegetables and Fruit
Milk and Alternatives

Inadequate amounts can lead to **nutrient deficiencies** and **poor health**.

Adults **eat more than** the recommended servings of:

Meat and Alternatives

Excess intake can contribute to a **high fat** and **high saturated fat** intake. A **high fat** diet is linked to heart disease and diabetes.

Can households afford sufficient, safe and nutritious food?

Household food security is defined as "when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life."

47% of households are **food insecure**
34% are moderately food insecure, relying on lower quality/priced foods
13% experience food shortages

Weekly cost of groceries for a family of four*:

$216

Costs ranged from **$168** (southern Alberta) to **$377**(northern Alberta). Costing was done in a grocery store near each community. Costs are calculated using the National Nutritious Food Basket (NNFB), which contains a list of 67 food items. Foods that require little or no preparation, spices, condiments, household supplies or personal care items are not included. Transportation costs are **not included**.

Nutrition Recommendations:

- Choose more vegetables and fruit, including wild plants and berries.
- Choose whole wheat grains more often. Make baked bannock with whole wheat flour.
- Choose milk and milk products (such as cheese or yogurt) or beverages fortified with calcium and vitamin D (such as soy beverages) more often.
- Choose leaner meats, plus game and fish.

APPENDICES

Is the water safe to drink?

73% of households **drink** the tap water.
46% said that a chlorine taste limited its use for drinking
92% of households **cook** with the tap water.

Testing of tap water in 108 homes indicates that the **water is safe to drink**.
Levels of **10** metals that can affect **human health** were **low and within guidelines.**
Levels of **6** metals that can affect **colour, taste or smell** were within **guidelines.**

Are the levels of pharmaceuticals in the water safe?

7 pharmaceuticals were found in **surface water**.

Acetaminophen (anti-inflammatory), **Atenolol** (heart medication), **Caffeine** (pain relief and coffee/tea), **Cotinine** (metabolite of nicotine), **Chlortetracycline** (veterinary antibiotic), **Diclofenac** (anti-inflammatory), and **Metformin** (antidiabetic).

The low levels should not be a concern for human health.

Are people being exposed to harmful levels of mercury?

Hair samples were collected from **369** adults.
Levels of mercury were within Health Canada's guideline **normal acceptable** range for **367** adults. Letters were sent to **2** people with suggestions on how to reduce their exposure to mercury.

Is traditional food safe to eat?

467 food samples from **37** species were collected.

Fish: goldeye, mariah, northern pike, sucker, trout, walleye, whitefish, grayling
Game: bear, bison, deer, elk, moose, beaver, marten, porcupine, rabbit
Birds: coot, goldeneye, goose, mallard, northern pintail, partridge, grouse, scaup, wigeon
Plants: blueberries, high bush cranberries, low bush cranberries, cherries, raspberries, saskatoons, wild spinach, strawberries, peppermint tea, labrador tea, and wihkes (muskrat root)

Traditional food is safe and healthy to eat.

Recommendations

- To limit **cadmium exposure,** individuals may want to have less than 1 1/2 cups (375 grams) of moose kidney per month, especially among smokers who are at greater risk of cadmium exposure.
- **Use steel shot** instead of l**ead shot. ** Ammunition can shatter and fragments can be **too small to detect** by sight or feel. Fragments can travel more than **12 inches** away from the wound area. Some meat samples had higher levels of **lead**. Eating food contaminated by lead shot can be harmful to health, especially to a child's brain development.

Alberta 2013

Key Results For All Participating First Nations in Alberta:

1. The diet of First Nations adults in Alberta does not meet nutrition needs nor recommendations, but the diet is healthier when traditional foods are eaten.
2. Overweight/obesity, smoking, and diabetes are major public health issues.
3. Household food insecurity is a major issue.
4. Water quality, as indicated by the trace metals and pharmaceutical levels, is overall satisfactory, but close monitoring is warranted as water sources and water treatment vary greatly.
5. The overall mercury exposure, as measured in hair samples and calculated through dietary estimates, is low.
6. Levels of chemical contamination of traditional food are generally low and together with the limited consumption, the total dietary contaminant exposure from traditional food is low.
7. Elevated levels of lead and PAH were found in some food items. More detailed studies on sources and exposure to lead and PAH are needed.
8. Future monitoring of trends and changes in the concentrations of environmental pollutants and the consumption of key traditional foods is needed.

More information can be found on the FNFNES website: www.fnfnes.ca

If you have any questions about these results or the project itself, please contact:
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