FIRST NATIONS FOOD, NUTRITION & ENVIRONMENT STUDY

Results from Ontario 2011|2012

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"Healthy Environment and
Healthy Foods for
Healthy First Nations"

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TABLE OF CONTENTS

Nutrient Intake 91

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
FN: First Nation
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
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
TWS: Trucked Water System
TPWS: Trucked Public Water System
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.

Biometric mean: See mean.

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 (when between 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.

Community Water System: A piped water distribution system with five or more connections that can include any combination of housing units and public access buildings.

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/culture area: 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.

Individual Water System: 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 (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: 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 system with less than five connections, but has one or more buildings open to the public.

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

Surface water: 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 or Provisional Tolerable Daily Intake: 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: An estimate of the highest average daily nutrient intake level that is likely to pose no adverse health effects.

Trucked Public Water System: A system that has one or more buildings open to the public and that receives trucked water delivery.

Trucked Water System: A group of individual homes or multi-family buildings with less than five housing units that receives trucked water delivery and do not include public access buildings.

Water treatment plant: The facility that treats water so that it is clean and safe to drink.

Water treatment system: 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 liter; 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: Picograms (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 are being collected, especially where fish are being harvested or where water is being taken for drinking purposes.

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 9 First Nations communities in Manitoba in 2010. Reports of both studies are available on the FNFNES website (www.fnfnes.ca). Data collection was conducted in 18 First Nations communities in Ontario during the fall of 2011 and 2012. This report presents the aggregated results from these 18 First Nations communities in Ontario.

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.

Results

Data were collected in 18 First Nations communities in Ontario. In each community, households were randomly selected; one participant per household, nineteen years and older, living on-reserve and who self-identified as a First Nation person was invited to participate. There were a total of 1,429 participants (896 women and 533 men). The overall participation rate was 79% for questionnaires and 52% for sampling of mercury in hair. The average age of the participants was 38 years for both women and men. The median number of people reported to usually live in First Nations households in Ontario was four: 71% were between the ages of 15 and 65, 19% were children less than 15 years of age and 10% were elders (over 65 years of age).

Based on measured and/or self-reported height and weight data, 35% of adults were overweight (30% of women and 44% of men) and 50% were obese (54% of women and 45% of men). Twenty-six percent of adults reported that they had diabetes and almost half of all adults (49%) were smokers.

Traditional food appeared in the diet of almost all First Nations adults (93%). Over 100 different traditional foods were harvested during the year, with the types varying across communities. Most adults reported eating fish (73% of participants), game (68%), and wild berries or nuts (60%). One out of three people reported eating wild birds (39%) and wild plants (32%) while one in five First Nation adults (21%) reported using foods from trees (such as cedar tea and maple syrup). Only one percent of adults reported eating wild mushrooms. The most frequently eaten traditional foods were walleye, moose and blueberries. At the regional level, First Nations adults in Ontario consume on average 43 grams of traditional food a day while heavy consumers have up to 205 grams/day. On a daily basis, traditional food was consumed in greater amounts by adults in northern communities. Almost 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: time for harvesting; a hunter; and equipment or transportation. External factors that inhibited access to traditional food included forestry operations and government restrictions.

Climate change was also perceived by 79% of participants to affect the availability of traditional food.

In terms of overall diet quality, First Nations adults in Ontario do not meet the amounts and types of food recommended in Canada's Food Guide. The number of food guide servings for 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. Many nutrients that are needed for good health and prevention of disease, including fibre, vitamin A, vitamin D, vitamin C, calcium, folate and magnesium, 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, vitamin D, 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 than when traditional food was included in the diet.

Twenty-nine percent of households reported experiencing food insecurity; 21% of the households are moderately food insecure and 8% are severely food insecure. Household food insecurity varied by ecozone, ranging from 18% in the southern communities of ecozone 2 (Boreal Shield/Northeast) to 52% in northern communities within ecozone 1 (Boreal Shield/Subarctic). The high price of food is a contributing factor to high food insecurity and the subsequent inability to eat a 'balanced meal'. The cost of groceries per week for a family of four ranged from $175 in southern First Nations communities to $344 in northern First Nations communities, compared to $205 in Ottawa. When asked about traditional food security, 32% 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, thirteen of the eighteen communities had their own water treatment plant. Four communities received treated water from neighbouring municipalities and one community received treated water from a nearby First Nation. All communities reported that they had a piped water distribution system that supplied the majority of homes. In five communities, there were also households that received trucked in water. Seven communities also reported that private wells supplied drinking water for some homes. In the twelve months preceding this study, seven of the communities had issued boil-water advisories; four communities issued more than one advisory within the year. The reasons for the boil-water advisories included exceedance of bacteria counts and reduced quality as a result of construction and maintenance of the existing water treatment system.

Almost all participants (99%) reported that their households have tap water; 16% of households reported having water storage tanks. Sixty-five percent of participants reported that they use the tap water for drinking while 87% use it for cooking. One quarter of participants said that the smell of chlorine sometimes prevented them from drinking tap water. In the 334 homes that had their tap water tested for metals, there were exceedances for lead in one (0.3%) house and uranium in eighteen houses (5%). Uranium is naturally occurring in the bedrock of the Canadian Shield and, as a result, some wells in nearby non-First Nation communities in Ontario also have elevated uranium levels. The FNFNES uranium findings have resulted in increased monitoring of the affected wells by Health Canada.

Testing for the presence of pharmaceuticals in surface water was undertaken in seventeen communities: quantifiable pharmaceuticals were found in fourteen communities. Thirty-one pharmaceuticals were found in one or more communities. The FNFNES results are generally lower than those found in other wastewater and surface waters reported in Canada, the United States, Europe, Asia and Central America. However, the health effects of the mixtures of multiple pharmaceuticals in the surface water are unknown at this time.

Slightly over half of all participants (53%) provided hair samples for mercury testing. The average mercury concentration among adults was 0.64 µg/g (geometric mean was at 0.27 µg/g). Only 8 adult males (1%) and 9 women of child-bearing age (3%) had mercury concentrations exceeding the Health Canada guidelines. The overall results indicate that the body burden of mercury is generally low and the perceived risk of mercury exposure from fish consumption is not warranted. However, almost 30% of First Nations women of childbearing age living in the Boreal Shield/Subarctic area (ecozone 1) exceeded the Health Canada hair mercury guideline. Risk communication is needed to advise women of child bearing age in the region to choose fish that are at a lower position (trophic level) on the food chain and are likely to contain lower levels of contaminants (e.g. whitefish) more often and eat less predatory fish (such as walleye) to lower their mercury intake.

A total of 1241 food samples representing 115 different types of traditional foods were collected for contaminant analysis. Most of the contaminant concentrations found in the traditional foods are within the normal ranges that are typically found in Canada with no health concern associated with consumption. However, higher concentrations of mercury (> 0.5 µg/g) were found in predatory fish (fish of higher trophic level) such as walleye, pike, and trout. Therefore, women of childbearing age as well as teenagers and children may want to limit consumption of predatory fish to no more than 1 cup per week in order to limit mercury exposure. Some game samples such as deer had higher concentrations of lead likely as a result of contamination from lead containing ammunition. It is recommended to use steel shot instead of lead shot when hunting and to cut away the portion of meat surrounding the bullet entry area to decrease the risk of lead exposure.

Thus far, this study has been a valuable tool in addressing the gaps in knowledge about the total diet, traditional food and levels of environmental contaminants to which First Nations in Ontario 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) and higher rates of chronic and infectious diseases, and mental health issues (Public Health Agency of Canada 2012), (Public Health Agency of Canada 2011) (Public Health Agency of Canada 2010). 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, environmental health, genetics, the state of the environment and the social determinants of health (income, education, employment, early childhood development, social networks, food security, gender, ethnicity, disability), (Frohlich, Ross and Richmond 2006) (Mikkonen and Raphael 2010). For First Nation peoples, the history of colonization and the loss of jurisdiction over territories is an additional dimension of the determinants of health (Egeland and Harrison 2013) (Reading and Wien 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, environmental 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 is 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).

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 is 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 has been shown to be significant risk factors for 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. 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 bioaccumulative factors found 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 contaminants 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 (Kuhnlein, Receveur and Chan 2001), (Laird, et al. 2013) (Donaldson, et al. 2010).

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 objective. 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 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. The FNFNES is being implemented region by region over a 10 year period and will be representative of all First Nations for regions south of the 60th parallel. The study was first implemented in 21 First Nations communities in British Columbia in 2008 and 2009 (L. Chan, O. Receveur, et al. 2011). In 2010, data collection was undertaken in nine Manitoba First Nations communities (L. Chan, O. Receveur, et al. 2012). In 2011 and 2012, the study took place in 18 First Nations communities in Ontario. Ontario has both the largest on-reserve population (91,754) and First Nations population (195,139) in Canada (Aboriginal Affairs and Northern Development Canada (AANDC) 2012). Five of the 20 largest First Nations communities are in Ontario and 47% of Registered First Nations live on-reserve. Seventy two percent of the population is 19 years or older. 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 597 First Nations communities. The FNFNES is inviting approximately 100 communities to participate in this study.

Sampling

For the purposes of this study, communities were sampled using a combined ecozone/culture area framework to ensure that the diversity in ecozones and cultural areas were represented in the sampling strategy. Only First Nations communities which have a population on reserve larger than zero were included (583 communities).

Terrestrial Ecozones are very large scale divisions of the earth's surface based on 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 15 terrestrial ecozones and five aquatic ecozones. The province of Ontario contains three ecozones (Boreal Shield, Hudson Plains, and Mixedwood Plains). 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 Ontario AFN region.

Culture Areas is an older concept developed by anthropologists in the nineteenth century to identify geographic areas within which Indigenous communities shared a greater number of traits/cultural affinities than from those outside the area. In Ontario, there are two identified culture areas (Northeast and Subarctic).

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

Ecozone Name	General Description
Boreal Shield	The Boreal Shield is the largest ecozone in Canada, stretching from northeastern Alberta to Newfoundland. It is an immense flat plain of bedrock covered in boreal forest, millions of lakes, ponds and wetlands.
Hudson Plains	The Hudson Plains extends from Northeastern Manitoba across Ontario and into western Quebec. Situated along the edge of Hudson Bay, this large low flatland contains much of Canada's and the world's wetlands.
Mixedwood Plains	The Mixedwood Plains ecozone is comprised of gentle rolling hills and lowlands. Located primarily in southern Ontario, it is bounded by 3 of the Great Lakes (Huron, Erie and Ontario) and extends eastward along the St. Lawrence river to Quebec City.

Using the ecozone/culture area framework, First Nations communities in Ontario were stratified by ecozone and culture area into four strata; Boreal Shield/Subarctic (Ecozone 1), Boreal Shield/Northeast (Ecozone 2), Hudson Plains/Subarctic (Ecozone 3) and Mixedwood Plains/Northeast (Ecozone 4). The number of communities allocated to the Ontario region (18 communities) was distributed among the four strata, allowing for a minimum of four communities per stratum and a maximum of six for the ecozone with the greatest population. The selection of communities was done independently for each stratum.

Communities were selected 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). In addition to the randomly selected communities, two communities (Asubpeeschoseewagong Netum Anishinabek and Aamjiwnaang First Nation) were added because of their history of environmental contaminant concerns.

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.

Table B presents a summary of the collection effort in each stratum.

Table B. Summary of collection effort for each stratum in Ontario

Stratum Number	Ecozone / culture area	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	Boreal Shield/ Subarctic	29088	55	6	6	4026
2	Boreal Shield/ Northeast	15379	39	4	4	3945
3	Hudson Plains/ Subarctic	7788	6	4	4	7006
4	Mixedwood Plains/ Northeast	39495	26	4	4	22571
Total		91754	126	18	18	37548

+Total population at time of calculation was based on 2012 statistics

Sampling in Ontario 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. Two large communities (Six Nations and Akwesasne) were allowed an increased target sample size of 200 households to generate more meaningful results at the community level.

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 Ontario; 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).

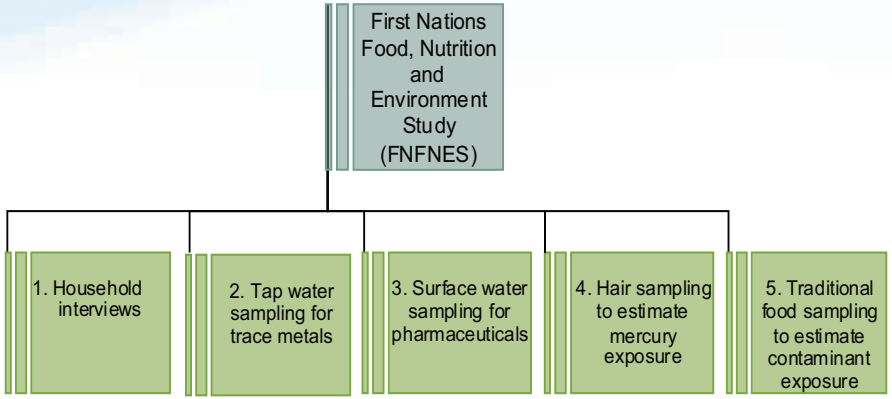
Sometimes, the sampling error might be difficult to interpret because the measure of precision is influenced by what is being estimated. For example, a sampling error of 100 would be considered large for measuring the average weight of people but would be considered small for estimating average annual 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 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 to answer a series of questionnaires 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 contaminant2 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.

Household Interviews

The household interview component of the FNFNES was a survey that 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 were developed that 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 Ontario and after eliciting input of representatives of each participant community. Table C demonstrates the categorization of frequency of consumption that was 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.[1],

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.

A subsample of 20% of the respondents were invited to fill 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.

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

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). 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.

The questionnaire used in this project is the income-related Household Food Security Survey Module (HFSSM) adapted from food security module developed in the U.S. (Bickel, et al. 2000). This module was also used in the CCHS 2.2 questionnaire and further adapted for Aboriginal households (Lawn and Harvey 2004). 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 for households with children). 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.

The tap water analysis consisted of both sample collection 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.

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 2011, water samples were sent for analysis to Maxxam in Burnaby, British Columbia. In 2012, water samples were sent to ALS Global, in Burnaby, British Columbia. 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.

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 FNIHB, Ontario 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), First Nations and Inuit Health Branch (FNIHB) (Booker and Gardner 2013). 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).

In 2011, the pharmaceuticals in surface water samples were sent for analysis to Maxxam Analytics in Burnaby, British Columbia. In 2012, the pharmaceuticals in surface and wastewater samples were sent 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·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

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

The FNFNES includes a non-invasive bio-monitoring component, relying on sampling of human hair for analysis for mercury (Hg). This sampling was 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 CALA accredited FNIHB Laboratory in Ottawa, Ontario. 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.

In 2012, to increase the number of men participating in the hair sampling for mercury, a short hair sampling procedure was introduced. For participants with short hair, approximately 10 milligrams of hair was trimmed from the base of the neck onto a piece of paper. The paper was folded and stapled, placed in a polyethylene bag and sent to the laboratory for analysis. In 2011, hair samples were analyzed in the CALA accredited Health Canada FNIHB Laboratory in Ottawa, Ontario. In 2012, hair samples were analyzed in the SCC accredited Health Canada Regions and Programs Bureau Québec Region Laboratory in Longueuil, Québec using the same equipment and procedures as the Ottawa laboratory.

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. Total mercury (all samples) and inorganic mercury (20% of samples) 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

Persistent Organic Pollutants

- Perfluorinated compounds (PFCs)
- Polycyclic aromatic hydrocarbons (PAHs)
- Organochlorine residues
- Polychlorinated biphenyls (PCBs)
- Polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans (PCDD/Fs), also known as dioxins and furans
- Polybrominated fire retardants (PBDEs)

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 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 conc. HCl). 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), the CRAs carried out data collection activities that continued between the months of October 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), 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 randomly 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.

Data Analyses

All household survey data were entered by the NRCs into a database using Epi-Info version 3.5.3, 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. 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. 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 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 confidence intervals (CI) were obtained by ordering the 500 bootstraps and using the 2.5th percentile as a lower level and 97.5th for percent below Estimated Average Requirements (EAR), percent greater than the Tolerable Upper Intake Level (UL), percent below the Accepted Macronutrient Distribution Range (AMDR), percent above the AMDR and percent within the AMDR.

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/culture area 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.

Results of this study were first presented to each community and their suggestions and concerns are summarized at the end of this report.

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, drinking water and hair analyses.

Sample Characteristics

Eighteen communities in Ontario participated in this study (Table 1). Sixteen communities were randomly selected and 2 communities were added: Asubpeeschoseewagong Netum Anishinabek and Aamjiwnaang First Nation were invited to participate because of the history of environmental contaminant concerns and a recommendation from the Chiefs of Ontario. Eleven of the eighteen communities have year round road access. Of the seven fly-in communities, six have winter roads. Most of the participating communities are remote, located 80 to 600 km away from urban centres in Ontario. Sixteen communities had more than 100 households on their reserve lands, with two communities having more than 1000 homes.

Data collection in Ontario was conducted over two years, from September to December in 2011 and 2012 due to the large number of communities involved. In the fall of 2011, seven communities collected data: Asubpeeschoseewagong Netum Anishinabek, Wauzhushk Onigum Nation, Webequie First Nation, Fort William First Nation, Sagamok Anishnawbek First Nation, Atikameksheng Anishnawbek and Marten Falls First Nation. In the fall of 2012, 11 communities collected data: Kitchenuhmaykoosib Inninuwug, Kingfisher Lake First Nation, Batchewana First Nation of Ojibways, Garden River First Nation, Fort Albany First Nation, Attawapiskat First Nation, Moose Cree First Nation, Aamjiwnaang First Nation, Munsee-Delaware Nation, Six Nations of the Grand River, and Akwesasne (Figure 1).

The majority of results presented in this report are based on in-person interviews conducted with a total of 1,429 First Nations respondents living on-reserve in Ontario. 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 in Ontario. However, some estimates are presented unweighted (Table 8, Table 12, 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 Ontario. Approximately 2800 households were randomly selected with the aim of reaching a targeted survey sample size of 1918 adults. Community research assistants visited 1919 homes (72% of homes selected). In the households visited, 1809 adults were eligible to participate. The overall participation rate was 79% (1429/1809 eligible households) which is slightly higher 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%). The Ontario Region Report of the 2008/2010 Regional Health Survey (RHS) also had a higher percentage of female participants (Chiefs of Ontario 2012).

Socio-demographic Characteristics

The average age of First Nations participants in Ontario was 38 years for both women and men and was fairly stable across all four ecozone/culture areas (Table 3). Figures 2a and 2b demonstrate the age group distribution of participants by gender and ecozone. In Ecozones 2 and 3, there was a higher percentage of female participants aged 31-50, while there were more female participants in the 19-30 age group from Ecozones 1 and 3 compared to all First Nations in Ontario (Figure 2a). The number of male participants aged 31-50 appeared highest in ecozone 1, while the number of elder male participants aged 71+ appeared lowest in ecozone 2 (Figure 2b).

In participating First Nations households in Ontario, 71% of individuals were between the ages of 15-65 years of age, with children less than 15 years of age representing 19% and elders (over the age of 65), 10% (Figure 3). According to the 2012 population file obtained from AANDC's Indian Registration system (Aboriginal Affairs and Northern Development Canada (AANDC) 2012), 60% of individuals residing on-reserve and crown land are between the ages of 15-65 years of age, while 24% are under the age of 15 and 7% are older than 65 years.

In terms of household size, the median number of people living in a First Nations household in Ontario was 4, with a range of 1 to 16 people (Table 4). One quarter (25%) of households contained 5 or more people (results not shown). Half of the adults reported that they had completed 12 years of education, while 25% had completed 14 or more years of school. Southern communities (Ecozones 2 and 4) appeared to have fewer people living in households and higher number of years of education.

Figure 4 displays further results on education; almost half of the adults (48%) had obtained a high school diploma, 25% had obtained a vocational degree, 8% had obtained a general equivalency diploma (GED), and 7% had obtained a bachelor's degree (Figure 4). First Nations adults in southern communities (Ecozones 2 and 4) were more likely to report having obtained a high school diploma or post-secondary education. In the Ontario 2008/2010 RHS, 49% of adults reported having graduated from high school (Chiefs of Ontario 2012).

Figure 5 shows that the main source of income was wages (56%), followed by pension/senior's benefits (17%), social assistance (15%) and worker's compensation/employment insurance (8%). Overall, 75% 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 63%-69% by ecozone and 37%-75% between communities (results not shown). These findings are similar to the Ontario 2008/2010 RHS survey in which 56% reported that they were working for wages at the time of the survey and 60% of adults reported that their main income was from wages: half of the adults reported earning less than $20,000 per year (Chiefs of Ontario 2012). Figure 7 shows that the percent of adults on social assistance ranged from 8% to 29% among ecozones, with an overall average of 15%.

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. Statistical differences were found between self-reported and measured body weights and heights therefore, when available, measured values were used to calculate Body Mass Index (BMI). On average, the difference between self-reported and measured weights was 0.8kg for women and 1.1kg for men. In cases where only reported heights and weights were available, these values were adjusted to correct for bias before calculating the BMI. 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, 14% of adults had a normal or 'healthy weight', 35% were classified as overweight and 50% of adults were classified as obese (Figure 8a). Sixty-six percent of women aged 19-30, 87% of women aged 31-50 and 87% of women aged 51 and over were overweight or obese (Figure 8b). Seventy-nine percent of men aged 19-30, 89% of men aged 31-50 and 92% of men aged 51 and over were overweight or obese (Figure 8c). These findings are similar to the 2008/2010 results for the Ontario RHS: 31.6% of adults were overweight and 47.8% were obese based on self-reported heights and weights (Chiefs of Ontario 2012). Nationally, the 2008/2010 RHS reported that 34.2% of First Nations adults on-reserve are overweight and 40.2% are 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 are overweight and 25% are obese (Public Health Agency of Canada 2011).

Diabetes

Obesity is a major risk factor for diabetes and heart disease. One in four First Nations adults in Ontario (26%) reported having been told by a health care provider that they had diabetes (Figure 9). Adults aged 40 and over were three 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. Age standardization allows for comparison of populations with different age profiles. The age-standardized rate was slightly lower at 24.3% (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 Ontario region report of the RHS 2008/2010.

In an effort to lose weight, a small percentage of adults (12%) did report that they were dieting on the day of the 24-hour recall (Figure 12a). Older men reported dieting more often than younger men (Figure 12b).

Smoking

Almost half (49%) of First Nations adults in Ontario reported that they smoked (Figure 13). There was a geographical trend with fewer adult smokers (33%) in southern communities (Ecozone 4), compared to a rate of 55-60% among adults in the other ecozones. 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 Ontarians (Reid, et al. 2014). The smoking rate among First Nations adults in Ontario is similar to the 57% rate reported nationally in the 2008/2010 RHS (First Nations Information Governance Centre (FNIGC) 2012) and the 49.5% rate reported in the 2008/2010 RHS Ontario region (Chiefs of Ontario 2012). 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. In fact, 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

Most adults (43%) reported their activity level as being 'somewhat active' (Figures 14a-c). Men reported a higher level of activity than women. In the Ontario region report of the RHS 2008/2010, 45.2% of adults were considered moderately active or active (Chiefs of Ontario 2012) while 53.8% of Ontarians were considered moderately active or active in the most recent 2011/2012 CCHS (Statistics Canada 2013).

Self-perceived health

In terms of self-perceived health, only 24% of adults said their health was 'very good' or 'excellent' while most (44%) 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, 39.6% of adults in Ontario (Chiefs of Ontario 2012), 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, 60.4% of Ontarians and 59.9% of Canadians said their health was very good or excellent in the CCHS 2011/2012 (Statistics Canada 2013).

Traditional Food Use and Gardening

In Ontario, both traditional food harvesting (hunting, fishing, and gathering of wild plants) and cultivation of plants, especially in southern Ontario, are important parts of the traditional food systems and food security of First Nations communities. For this survey, community members described their pattern of use of 150 traditional foods harvested in Ontario over the last year. 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 (93%) 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 Ontario ate wild fish (73%), game (68%) and berries (60%), while many ate wild birds (39%), wild plant roots and greens (32%) and tree foods (21%). More than half of all adults reported eating walleye (58%) and moose meat (53%) in the last year. Only 1% of adults reported harvesting mushrooms. In 2012, a set of questions about the use of cultivated traditional food (corn, beans, and squash) was added; a 57% rate of consumption was reported.

Geographically, there was great diversity in the reliance on the kinds of traditional food. In northern Ontario (Ecozones 1 and 3) a greater proportion of adults reported eating wild game, fish and birds while cultivated traditional food (corns, beans, and squash) were predominantly reported in southern communities (Ecozones 2 and 4). The percentage of adults that consumed wild birds (mainly Canada goose) was highest in the Hudson Plains/Subarctic (Ecozone 3, 92%), followed by the Boreal Shield/Subarctic (Ecozone 1, 54%). A smaller percentage of adults (34%) reported harvesting wild birds (mainly grey partridge, wild turkey and grouse) in the Boreal Shield/Northeast area (Ecozone 2) and the Mixedwood Plains/Northeast area (Ecozone 4, 15%). Blueberries, strawberries, and raspberries were the most commonly eaten berries and wild rice, wihkes (muskrat/rat root) and Labrador tea were the wild plant greens and roots reported most often. As for tree foods, maple syrup was consumed by 17% of adults, mainly in southern communities.

Table 7a summarizes the traditional food species that appear most frequently in the diet of all adults in Ontario. Consumers are defined as those having eaten a particular traditional food in the last year. On average, consumers had meals that included walleye, moose, Canada goose, and lake whitefish almost twice per month. Tables' 7b-7e illustrates the differences in frequency of use of the top 10 traditional foods by season and ecozone. In all parts of Ontario, wild game seemed to be eaten more frequently in the fall months. In Ecozones 1, 2 and 4, the peak use of wild berries occurred in the summer months (in Ecozone 3, no berries were included in the list of top 10 foods). In Ecozones 1 and 3, fish was more frequently consumed in the summer months and goose was predominantly eaten during the spring.

To estimate the amount of traditional food consumed per day by First Nations adults in Ontario, the traditional food frequency of use data (Table 6) were multiplied by the average portion size (Table 8). The average and high (95th percentile) daily intake of traditional foods, by age group, 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 was 43 grams (or about 3 tablespoons), while older females (71+) and males (51+) had an average daily intake of 58 and 133 grams, respectively. Heavy traditional food consumers (those individuals eating at the upper end or the 95 percentile of intake) had a daily intake of 205 grams per day (range of 134 to 499 grams). There was very little difference in the overall intake of traditional food when non-consumers were excluded.

When examined by traditional food category, fish and berries appear to be more accessible than game or birds for First Nations in Ontario. There is also a stark contrast in the consumption of wild fish, organ meat and birds by heavy consumers compared to all participants. As well, differences are seen in traditional food consumption between men and women and age groups: older adults ate more traditional food and men consumed more traditional food than females. While the average First Nation adult in Ontario ate less than 20 grams of wild fish per day, some individuals consumed 180 grams daily. The average intake of game organs for most First Nations adults was just over 1 gram/day while heavy consumers reported an intake over 60 grams/day. Similarly, most First Nation adults ate less than 5 grams/day of birds while heavy consumers ate 44 grams/day. Among all participants and consumers only, the consumption of plant foods (berries, roots, greens) was similar.

Table 9b provides a regional breakdown, for consumers only and by gender, of the top three consumed traditional foods within each traditional food category. Walleye, lake whitefish, and trout were the most frequently eaten kinds of fish, with some adult females and males consuming upwards of 26 and 116 grams, respectively, of walleye daily. Moose, deer and rabbit were the most heavily consumed game meats while Canada goose, ducks (all combined) and partridge were eaten in the largest amounts. As for plants, blueberries, corn and strawberries were the three traditional foods consumed in the greatest amount. Traditional food intake by ecozones for consumers only is presented in Tables 10a-e. Fish makes up a greater part of the diet of First Nations adults in Ecozone 1 (up to 180 grams/day) while game meat is eaten in similar amounts in Ecozones 1 to 3 and plants are eaten in greater amounts in Ecozone 2 and 4. Information on the daily intake of traditional foods by species for all participants and for consumers only can be found in Appendix F.

Almost three-quarters (70%) 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, 38% of all households reported fishing and 19% reported hunting and/or setting snares: in Ecozone 1, almost half of households (48%) reported fishing while 36% of households in Ecozone 3 hunted (Figure 16b). Harvesting wild plant foods and gardening were popular activities in Ecozones 2 and 4 (Figure 16c).
Fifty-three percent of adults living in Ecozone 2 and 78% of adults living in Ecozone 4 reported eating vegetables from a family or community garden (Figure 17). This finding reinforces that for many southern 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 Ontario are listed in Appendix G. Tomatoes, cucumbers, and potatoes were the most commonly consumed garden vegetables.

When asked if their household would like to have more traditional food, the majority of adults (73%) said that they would (Figure 18). The main barriers preventing greater use of traditional food by First Nations households in Ontario are time constraints, absence of a hunter in the household, and lack of equipment and/or transportation (Figure 19). Other reported barriers that limit harvesting for traditional food included: forestry operations, government restrictions, and roadways (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 tasty and an important part of the culture (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, was fresh, and could be cheaper than traditional food due to the cost of equipment and transportation (Figure 22).

Nutrient Intake

In order to understand how well First Nations adults in Ontario are eating, each participant was asked to describe the types and amounts of food and beverages they consumed within a one day period (24 hours). Data from the 24-hour recalls allows evaluation of the diet quality of First Nations adults in Ontario. 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. 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 Recommended Dietary Allowance 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) exists as 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 Ontario to "Dietary Reference Intakes" (Institute of Medicine 2000). The SIDE SAS sub-routine nutrient analyses were performed on data from a total of 1388 participants (855 women and 533 men). Pregnant and lactating women were excluded due to different nutrient requirements for these groups.

Energy intakes reported for First Nation adults in Ontario (Table 11.1) are similar to results for the general Ontario adult population from the CCHS 2004. Mean energy intakes for First Nation adult males by age group was 2331 kcal/day (aged 19-50 years), 2104 kcal/day (aged 51-70) and 2023 kcal/day (71+). Energy intakes for Ontario males were 2594 kcal/day (age group 19-30), 2324 (31-50), 2132 (51-70) and 1774 (71+ years) (Health Canada 2009). Energy intakes for First Nations females were 1876 (aged 19-50), 1706 (51-70) and 1709 (71+). In the general Ontario population, energy intakes for females were 1760 kcal/day (19-30), 1759 (31-50), 1647 (51-70) and 1521 (71+ years) as reported in CCHS Cycle 2.2, Nutrition (2004) (Health Canada 2009).

The percentage of the total energy intake that comes from fat (Table 11.32) in the diet of First Nations adults in Ontario ranged from 34-37% while a range of 29.7 to 32% was reported for the general Ontario population in the CCHS Cycle 2.2, Nutrition (2004).

Overall, in terms of nutrient intake for First Nations in Ontario, there are:

- High intakes of fat and sodium;
- Low intakes of fibre, vitamin A, vitamin C, vitamin D and calcium;
- Low intakes of folate and magnesium for all women; and
- Adequate intakes for iron, vitamin B12, riboflavin, niacin, thiamine, zinc and phosphorous.

In the general Ontario adult population, there are also excessive intakes of sodium and low intakes of vitamin D, calcium and vitamin C (among smokers) (Health Canada 2009). High (excess), as well as low (inadequate) nutrient 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.

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 H 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 Ontario do not appear to be meeting the recommendations for healthy eating (Table 12). First Nations adults in Ontario 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. The following describes the eating patterns of First Nations adults in Ontario 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 Ontario 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).

Grain Products: CFG-FNIM recommends that adult males, have 7-8 Food Guide Servings a day, while females 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, 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 from Ontario 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 Ontario, both male and female First Nation adults reported having 1 serving per day. This may be explained, in part, by some milk product intolerance, as reported by 21% of the respondents for which the question was asked in the second year of data collection in Ontario. 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.

Overall, the food choices of First Nations men and women in Ontario are very similar, except for yogurt (which is consumed more often by women). Within each of the four food groups, a limited number of foods 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, is particularly problematic and points towards the need to find ways to increase consumption to improve intake of fibre, vitamins and minerals but decrease sodium.

Table 14 shows the foods that are the most important contributors to nutrients. As mentioned above, fat and salt intakes were above the recommended levels. The main source of fat (both total and saturated) in the diet came from beef, 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. Eating beef less often and replacing processed cuts of meat with non-processed leaner meat, pork, chicken and fish would help in reducing both fat and salt intake. Choosing canned soups with lower sodium content 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 milk and milk products (such as milk, yogurt and cheese) 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, 14% of the 24 hour recalls included at least one traditional food item, ranging from 8% in Ecozone 2 to 24% in Ecozone 3 (Figure 23). Moose and walleye 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 Ontario overall and by ecozone. There is little variation observed in the types of foods being consumed. Soup was the most popular food consumed by First Nations adults. Coffee was the most popular beverage, followed by water and tea. Soft drinks were also popular and 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 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 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 I. Overall, the most commonly reported supplement was vitamin D, followed by multivitamin/mineral supplements and vitamin B. Nutrient supplements can help individuals meet their nutrient needs when the diet quality is low. For example, 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 prevent greater access. Over one-quarter of the population (27%) said that they worried that their traditional food supplies would run out before they could get more (Figure 25). Almost one third (30%) 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 (96%) completed the income-related Household Food Security Survey Module (HFSSM). Within the households completing the questionnaire, 48% contained children. In the FNFNES for Manitoba and BC, 74% and 58% of households contained children, respectively. 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, 30% of households worried that their food would run out before they could buy more, 25% said that the food that they bought didn't last and there wasn't any money to get more and 28% couldn't afford to eat balanced meals. Moreover, 18% of households with children relied on less expensive foods to feed their children and 12.5% said they couldn't afford to feed their children balanced meals.

Based on the three categories of food security, 29% of First Nations households in Ontario were classified as food insecure: 21% of all households were classified as moderately food insecure and 8% were classified as severely food insecure (Table 19 and Figure 27). Households with children experienced greater food insecurity (37%) (Table 19 and Figure 28) than those without children (21%) (Table 19 and Figure 29). Among households with children, 24% experienced food insecurity at the child level. That is, one or more children in each of these households was 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 (9% of parents with severe food insecurity vs 2% of children).

Food insecurity affects fewer First Nations households on-reserve in Ontario than reported by the FNFNES in Manitoba (38%) and British Columbia (41%), however rates of severe food insecurity were similar at 6% in Manitoba and 7% in British Columbia. Food insecurity rates among First Nations households on-reserve are much higher than other Canadian households. In 2011/2012, 23.1% of Aboriginal households off reserve (23.1%) (Tarasuk, Mitchell and Dachner 2014), 8.2% of Ontario households and 8.3% of all Canadian households were food insecure (Statistics Canada 2013). The 2008/2010 RHS reported that 47.6% of First Nations adults in Ontario (Chiefs of Ontario 2012) and 54.2% of First Nations adults nationally live in food insecure households (First Nations Information Governance Centre (FNIGC) 2012). The 2008/2010 RHS findings cannot be compared directly to the FNFNES results due to methodological differences (the RHS used a modified shortened version of the HFSSM and classified an individual as food insecure if they answered affirmative on one question) and weighting of results (percentage of adults vs. households that are food insecure).

Recently, food security experts recommended to classifying only households that answer "no" to all food security questions as food secure. Instead, 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 Ontario rose to 39% when the 'marginally food insecure' category was added (Figure 30).

When examined at an ecozone/cultural area level, food insecurity was experienced in more households in northern Ontario communities. In Ecozone 1, 52% of households were classified as food insecure (34% moderately and 18% severely insecure) and Ecozone 3 where 45% of households were food insecure (36% moderately and 9% severely) (Figure 31). If re-classified using the 'marginally food insecure' category, 60% and 57% of households in Ecozone 1 and 3, respectively, experienced food insecurity in the last year.

Figure 32 shows that when stratified by income level, adults on social assistance reported the highest levels of food insecurity (40% moderately and 19% severely). However, 24% 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 is a contributing factor 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 J). Pre-packaged meals (such as pizza), spices and condiments are not included. Non-food items such as household supplies or personal care items are not included. The purchase prices of these 67 food items were obtained from grocery stores in or near each participating Ontario First Nation, as well as in Thunder Bay and Ottawa for comparison. This tool was used to calculate the weekly price of a healthy food basket for a family of four. 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 (aged 31-50 years) and two children (one male teenager aged 14-18 and one female child aged 4-8). Food costs ranged from $175 per week (Ecozone 2) to $344 (Ecozone 3) to feed healthy meals to a family of four for a week (Figure 33).

Concerns about Climate Change

When asked if they had noticed any significant climate change in their traditional territory in the last ten years, over three-quarters of total First Nations in Ontario adults (79%) said that they had (Figure 34). The range of positive response ranged from 74% to 88% among the 4 ecozones. Climate change was mainly perceived to decrease the availability of traditional food, affect the growth of traditional food, and affect the animals' usual cycles or patterns (Figure 35).

Tap Water

Community Water Systems

In Ontario, thirteen of the eighteen communities participating in the study had their own water treatment system. Four communities received treated water from nearby municipalities and one First Nation received water from a nearby First Nation. Seven communities also reported that private wells supplied drinking water for some homes.

Drinking water systems which provide water to households and buildings for consumption can include Community Water Systems (CWS), Individual Water Systems (IWS), Public Water Systems (PWS), Trucked Water Systems (TWS) and Trucked Public Water Systems (TPWS). One First Nation had two water treatment plants, thus a total of fourteen water treatment systems were surveyed. The oldest water treatment plant was built in approximately 1980 and the newest in 2009. At the time of the survey, all but two of the community water treatment plants were staffed by a certified operator. In one of these two communities, the operator had been certified in the past but the certification had since expired.

In the participating communities and not including municipal sources, source water for drinking purposes was obtained mostly from surface supplies: 7 were from lakes, 5 from rivers and 3 from groundwater.

Two of the thirteen communities did not specify the type of water filtration used while the remaining communities used a wide range of methods including but not limited to rapid sand, sand and anthracite, coagulation and sedimentation. All but one community reported using chlorination for disinfection at the treatment plant with twelve having automatic chlorine injectors while two relied on manual chlorination. The community that did not report chlorinating or disinfecting the water was the one that received water from a neighouring First Nation and used individual wells and therefore had no treatment plant. A wide range of methods were used for treating the water: sodium hypochlorite, chlorine gas, polyaluminum chloride, polymer, soda ash, potassium permanage, stonetone, and chlorine. Six of the First Nations communities reported problems procuring required supplies and/or replacement parts. One of the communities also cited replacement parts being unavailable for months due to the closure of the winter roads.

Five of the thirteen communities with treatment plants thought that their treatment plant was not up to date. This included one community which noted that treatment processes prior to filtration were needed but not currently in place. A sixth community reported that their new treatment plant, which opened in 2012, had already required many repairs. Three of the thirteen communities indicated that greater capacity was needed to support their growing communities.

All communities had a piped water distribution system that supplied the majority of homes. Five communities also had household level water storage tanks for trucked water delivery to some homes. Eight First Nations communities reported the pipes of the water distribution system were made out of plastic (PVC) while ten reported the pipes were PVC in conjunction with one or more of the following: ductile iron, high-pressed concrete, asbestos concrete, cast iron. Twelve of the communities had no water storage facilities. Those that did had tanks of various sizes between 4,500 and 500,000 litres.
Many of the communities made use of alternative drinking water sources. The FNFNES collected drinking water samples from lakes or rivers in four different communities where the household indicated that it was a source of drinking water. In seven communities, some households relied on private wells. High uranium levels in the groundwater made bottled water mandatory for some households in one community. One community had access to a filter located in the community store, while the majority of community members in another community used reverse osmosis water from depots located in the community due to high levels of trihalomethane in the drinking water.

As for water availability and bacteriological safety, seven First Nations communities had declared one or more boil-water advisories in the year prior to data collection. One community had issued four boil-water advisories, one issued three, three issued two and two issued a single advisory. The majority of the reasons provided for the advisories related to regular maintenance or construction which required a temporary suspension of treatment plant operations. The community which issued four boil-water advisories cited bacteria in well water as the reason for the advisories.

Table 20 reports the characteristics of all First Nations households and plumbing systems in Ontario. The average participant's house was built in 1991, with the oldest house in the study being built in 1893 and the newest house in 2012. A total of 20% of households had upgraded plumbing, 32% of households treated their water (mainly by using filters or boiling it) and 16% had outside water storage tanks. Almost half of the households (48%) had plastic pipes under their kitchen sink.

Figure 36 shows that 99% of participants have tap water, 66% drink it and 87% use it for cooking. Almost three-quarters (73%) of households in the participating communities obtain their water from water treatment plants (Figure 37). For participants whose households did not have tap water or who did not drink it or use it to prepare food, 85% drank bottled water (Figure 38) while 77% 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?" One out of four participants answered that 'sometimes' the taste of chlorine prevented them from drinking tap water and 18% said 'yes' (Figure 40).

Tap Water Analysis

Tap water samples were collected from a range of five to 43 households in each of the participating communities (18.8 was the average). It is the standard protocol to invite up to 20 households in each community to provide a tap water sample for analysis, however in two very large communities (population > 5,000), more tap water samples were collected. Taking into account duplicate samples for quality control and assurance purposes, 339 of a planned 400 households participated in the tap water sampling component. There were 22 samples that were collected from alternative drinking water sources.

Metals of Public Health Concern

The FNFNES quantified nine metals that are of concern to human health when the maximum acceptable concentration (MAC) of the Canadian Guidelines of Drinking Water Quality (Health Canada, 2012) is exceeded:

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

The results of water sample testing for metals in drinking water of public health concern are listed in Table 21. A total of 334 households agreed to have their tap water sampled. In 25/334 homes (7%), there were elevated levels of lead in the first draw samples but in the flushed samples there was an exceedance for lead only in 1/334 homes (0.3%) and in 18 households (5%) there was an exceedance for uranium.

Lead: In the first round of sample taking (first draw), 25 out of 334 (7%) households had lead levels above the maximum acceptable guideline of 10 µg/L. These households were in communities located in the Boreal Shield/Subarctic (11.6 - 120 µg/L), the Boreal Shield/Northeast (12.5 - 25 µg/L), the Hudson Plains/Subarctic (10.3 - 88.9 µg/L), and in the Mixedwood Plains/Northeast (12.7 -19.5 µg/L). Following a five-minute flush of the household piping, 24 of these 25 households had lead levels below the maximum acceptable guideline (ranging from below the detection limit to 8.5 µg/L). This indicates that the water in these households should be run several minutes before being used for drinking or cooking purposes.

One household (located in the Mixedwood Plains/Northeast area) required further investigation after the initial tap water sample collection and analysis in the fall of 2012. The Environmental Health Officer for this community attempted to resample the tap water at this household, but the offer was declined.

Uranium: Eighteen households (5% of all households tested) had uranium concentrations above the maximum acceptable guideline of 20 ug/L. All these exceedances were found in two communities in the Boreal Shield/Northeast. Uranium levels are higher in these areas since it occurs naturally in southern Ontario. Wells in neighboring non-First Nation communities have also been found to have elevated levels of uranium. In one household, the first draw sample was 57.5 ug/L. The five-minute flush sample was 37.1 ug/L. The water in this household is not used for drinking and cooking. In the other seventeen households, the first draw samples ranged from 20.4 to 23.3 ug/L. The flushed samples in these households ranged from 20.0 to 22.7 ug/L. The community's Environmental Health Officer subsequent sampling of the community's water distribution system found acceptable levels of uranium in the drinking water (18.5 ug/L). The FNFNES findings have led to increased sampling frequency to determine if the fluctuation is seasonal.

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, 2012):

- 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: Eight communities had aluminum samples above the guidance value (100 µg/L):

- Five households from two communities in the Boreal Shield/Subarctic had elevated aluminum levels after the first round of sampling ranging from 179 - 443 µg/L.
- Two households from a community in the Boreal Shield/Northeast had first round sampling levels ranging from 112 - 127 µg/L.
- Twenty-one households from two communities in the Hudson Plains/ Subarctic had first round sampling levels ranging from 127 - 1,920 µg/L.
- Eleven households from two communities in the Mixedwood Plains/ Northeast had first round sampling ranging from 105 – 213 µg/L.

In three of these communities, the large number of high aluminum levels, even after the 5 minute flushed samples were taken, indicated that the aluminum was originating from the water treatment plants. These plants were thus resampled two months later.

- The aluminum levels from two plants, one located in the Boreal Shield/ Subarctic (50 µg/L) and the other located in the Mixedwood Plains/ Northeast (50-90 µg/L), were below the operational guidance value.
- The aluminum levels remained higher than the operational guidance value in one of the plants sampled located in the Hudson Plains/Subarctic (1,170 µg/L).

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

Copper: Eight communities had elevated levels of copper above the guideline of 1,000 µg/L:

- Seven households in the Boreal Shield/Subarctic had first draw levels ranging from 1,030 - 1,680 µg/L. After a 5 minute flush, the level was below the guideline.
- Seven households in three communities in the Hudson Plains/Subarctic had first draw levels ranging from 1,030 - 2,460 µg/L. After a 5 minute flush, the levels in each household were below the guideline.
- Four households from three communities in the Mixedwood Plains/ Northeast had first round sampling levels ranging from 1,080 - 5,850 µg/L. After a 5 minute flush, three households had copper levels above the aesthetic objective.

While not a health concern, the Chief and Council, the Health Canada Regional Environmental Health Manager and the householders have been made aware of these exceedances.

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

- One household in the Boreal Shield/Subarctic had an elevated first draw level of 643 µg/L. Following a 5 minute flush, the level was below the aesthetic guideline.
- Two households in one community in the Boreal Shield/Northeast had elevated first round samples ranging from 592 - 1,830 µg/L. Following a 5 minute flush, one household was below the aesthetic guideline and the other was 680 µg/L.
- Four households in three communities in the Mixedwood Plains/Northeast had had elevated first round samples ranging from 309 - 990 ug/L. Following a 5 minute flush, the levels ranged from 657 - 925 ug/L.

While there are no health concerns, the Chief and Council, the Health Canada Regional Environmental Health Manager 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:

- One household in the Boreal Shield/Northeast had a flushed sample level of 78.8 µg/L. A further sample taken several minutes later from this tap had an acceptable level of 3.4 ug/L.
- Four households in a community in the Hudson Plains/Subarctic had acceptable first round levels of 48.7 - 49.3 µg/L. The flush samples ranged from 52.6 - 61.1 ug/L.
- Four households in two communities in the Mixedwood Plains/Northeast had first round sampling levels ranging from 51.5 - 115 µg/L. There were exceedances in five of the five minute flush samples ranged from 52.9 - 96 ug/L.

While not a health concern, the Chief and Council, the Health Canada Regional Environmental Health Manager and the householders have been made aware of these exceedances.

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

- Three households in two Mixedwood Plains/Northeast communities had levels ranging from 390,000 - 756,000 µg/L, at the first round of sampling. The five minute flush samples ranged from 383,000 - 840,000 ug/L.

While not a health concern, the Chief and Council, the Health Canada Regional Environmental Health Manager and the householders have been made aware of these exceedances.

Water Parameters-chlorine, pH, temperature

Chlorine: One of the tests conducted was to determine the presence of a chlorine residual necessary for adequate disinfection (free chlorine) in tap water at the household level. On-site testing revealed that free chlorine was not detected in 47 of the tap water samples, the majority of which were drawn from individual well water or were alternate samples where chlorine would not be expected to be detected. There were also 43 samples where free chlorine was detected but was below the acceptable range. However, some of these samples were also from individual wells or alternate drinking water sources. Where free chlorine was detected, the range was from 0.01 mg/L to a high of 6.0 mg/L.

pH: Another test conducted was for pH in tap water which is of major importance in determining corrosiveness. The Canadian Drinking Water Guideline AO for pH is between 6.5 and 8.5 (Health Canada 2012). Water of low pH (lower than 6.5) may corrode metal from pipes and pipe fittings and result in higher metal content in drinking water as well as reduce disinfection efficiency. Failure to control pH not only can result in contamination of drinking water by metals, but can also have adverse effects on taste, odour and appearance. Exposure to extreme high or low pH values results in irritation to the eyes, skin and mucous membranes. In sensitive individuals, gastrointestinal irritation may also occur. The results of pH testing of tap water in the communities surveyed did not indicate a problem. However, 28 of the tap water samples exhibited an acidic pH of 6.2 and one at 6.3 and ranged across eight of the communities. All other tap water samples were within the optimal pH range of 6.5-8.5.

Temperature: Corrosion can be accelerated by high water temperature. At the time of sampling the temperature of the tap water was measured and ranged from 1.9°C to 26.9°C. Health Canada has set 15°C as the maximum temperature for drinking water as an AO. On-site measurements revealed that 82 tap water samples from eleven communities and including alternate drinking water samples showed results above 15°C. 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 receive trucked water delivery, to the hot water mixing with the cold when sampling at the tap, or in the case of alternate water sources, the storage container may not be refrigerated.

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. In addition, 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, Kim, et al., Occurrence and fate of antibiotic, analgesic/anti-inflammatory and antifungal compounds in five wastewater treatment processes. 2014) (Glassmeyer, et al. 2005) (Kolpin, Furlong, et al. 2002) (Kostich, Batt and Lazorchak 2014) (Waiser, et al. 2011) (Wu, et al. 2009) (Yargeau, Lopata and Metcalfe 2007). In all, 95 samples were collected at 51 sampling sites in 17 First Nations communities in Ontario. Of the 51 sampling sites, 40 (78%) revealed quantifiable pharmaceuticals in 14 of the communities.

Thirty-one pharmaceuticals were found in one or more communities; they are listed in Table 24 along with the maximum concentration found in the Ontario FNFNES sampling. Also included in this table are the highest levels of pharmaceuticals reported in other Canadian, U.S. and global studies. Most of the FNFNES results are lower than those found in other wastewater and surface waters studies in Canada, the United States, Europe, Asia and Central America. The FNFNES values for ranitidine, metformin and hydrochlorothiazide were the highest in North America. However, one would have to drink hundreds of glasses of water per day from these surface water sites for a prolonged period to experience health effects.

Overview of Pharmaceuticals Detected by Type

The results of the pharmaceuticals component of the FNFNES study in Ontario are summarized in Table 25. The following describes the results aggregated by ecozone, providing information on what was detected in each of the four ecozones and why it might have been detected in those locations. The pharmaceuticals listed and described below are presented in descending order of prevalence.

Atenolol was the most prevalent pharmaceutical detected. It was detected in 14 of the 17 communities sampled and 40 of the 51 sites. Atenolol is an antihypertensive medication that is one of the most highly prescribed in First Nations in Ontario.

Caffeine was the second most prevalent pharmaceutical detected. It was detected in 12 of the 17 communities sampled and 25 of the 51 sites sampled throughout the province. Caffeine is a component of the most highly prescribed pharmaceuticals (acetaminophen – caffeine-codeine (e.g. Tylenol)) in First Nations in Ontario. It is also present in many coffees, teas, soft drinks, energy drinks, and foods containing chocolate.

Sulfamethoxazole was detected in seven communities. It was detected in 18 of the 51 sites sampled throughout the province. It was sparingly prescribed in the communities where it was found (ranking in the top 100 pharmaceuticals prescribed in these communities) (Booker and Gardner 2013). It has been detected at a rate of 100% of surface water samples in a previous Canadian study (Metcalfe, Miao, et al. 2004). It is an antibiotic and a potential endocrine disrupting chemical.

Metformin, an anti-diabetic medication, was detected in seven of the 17 communities and 17 of the 51 sites sampled throughout the province. Metformin was one of the top five prescribed medications in 2011 and 2012 in the communities where it was detected (Booker and Gardner 2013). Trimethoprim, an antibiotic, was detected in seven communities. It was detected in 11 of the 51 sites sampled throughout the province. It was sparingly prescribed in the communities where it was found (ranking in the top 100

pharmaceuticals prescribed in these communities) (Booker and Gardner 2013). Cotinine (a metabolite of nicotine) was detected in seven communities. 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 communities where it was detected (Booker and Gardner 2013) and its presence most probably reflects tobacco use.

Carbamazepine was detected in six communities at 12 of the 51 sites sampled throughout the province. It is a medication prescribed as an anticonvulsant and mood stabilizer. It is also a potential endocrine disrupting chemical. Carbamazepine is not on the list of medications prescribed in three of the communities where it was found and was one of the 100 most prescribed medications in one of the communities (Booker and Gardner 2013) .

Naproxen is an anti-inflammatory that was detected in six communities and eight of the 51 sites sampled throughout the province. Naproxen was one of the 60 most prescribed pharmaceuticals in the communities where it was found (Booker and Gardner 2013).

Hydrochlorothiazide is a blood pressure medication that was detected in five communities and nine of the 51 sites sampled throughout the province. It was one of the top ten medications prescribed in two communities and in the top 25 in the other communities found (Booker and Gardner 2013).

Codeine is a pain and cough relief medication that was detected in five communities and nine of the 51 sites sampled throughout the province. It was one of the top twenty medications prescribed in the communities where it was found (Booker and Gardner 2013).

Ibuprofen is a pain medication that was detected in five communities and nine of the 51 sites sampled throughout the province. It was one of the top thirty medications prescribed in the communities where it was found (Booker and Gardner 2013).

Bezafibrate is a cholesterol medication that was detected in four communities and eight of the 51 sites samples throughout the province. Bezafibrate is not on the list of medications prescribed in three of the communities where it was found (Booker and Gardner 2013).

Diclofenac is an arthritis medication that was detected in four communities and eight of the 51 sites samples throughout the province. Diclofenac was one of the 65 most prescribed pharmaceuticals in the communities where it was found (Booker and Gardner 2013).

*Metoprolo*l is a blood pressure medication that was detected in four communities and eight of the 51 sites samples throughout the province. Metoprolol was one of the top ten most prescribed pharmaceuticals in two of the communities where it was found (Booker and Gardner 2013).

Ranitidine is an antacid used to treat ulcers that was detected in four communities and eight of the 51 sites samples throughout the province. Ranitidine was one of the 35 most prescribed pharmaceuticals in one of the communities where it was found (Booker and Gardner 2013). It was not prescribed in the other communities in the year of the sampling.

Sulfamethazine is an antibiotic that is used to treat animals that was detected in four communities and eight of the 51 sites samples throughout the province. Sulfamethazine is not prescribed for human use, but was reportedly used to treat dogs in several of the communities where it was found (Booker and Gardner 2013).

Cimetidine is an ulcer medication that was detected in four communities and seven of the 51 sites samples throughout the province. Cimetidine is not on the list of medications prescribed in the communities where it was found (Booker and Gardner 2013).

Gemfibrozil is a cholesterol medication that was detected in four communities and six of the 51 sites samples throughout the province. Gemfibrozil was not prescribed in the communities where it was found (Booker and Gardner 2013) .

Ciprofloxacin is an antibiotic used to treat skin, bladder and kidney infections. It was detected in three communities and seven of the 51 sites samples throughout the province. Ciprofloxacin is one of the 100 most prescribed medications in one of the communities where it was found (Booker and Gardner 2013).

Clarithromycin is an antibiotic used to treat pneumonia, skin and ear infections that was detected in three communities and seven of the 51 sites samples throughout the province. Clarithromycin is one of the 70 most prescribed medications in one of the communities where it was found (Booker and Gardner 2013).

Warfarin is an anticoagulant blood thinner that was detected in three communities and seven of the 51 sites samples throughout the province. Warfarin was one of the 40 most prescribed medications in one of the communities but much less prescribed in the other two communities where it was found (Booker and Gardner 2013).

Ethinylestradiol was detected in two communities and three of the 51 sites samples throughout the province. It is an oral contraceptive, and an endocrine disrupting chemical. Interestingly, ethinylestradiol is not on the 2013 list of medications prescribed in one of the communities where it was detected and was one of the 70 most prescribed medications in the other community (Booker and Gardner 2013).

Diltiazem is a blood pressure medication that was detected in two communities and two of the 51 sites samples throughout the province. Diltiazem was not prescribed in one community and was one of the 45 most prescribed medications in the other community (Booker and Gardner 2013)

Diphenhydramine is an antihistamine used to treat sneezing, runny nose, itching, hives and other symptoms of allergies and the common cold that was detected in two communities and two of the 51 sites samples throughout the province. Diphenhydramine is not on the list of medications prescribed in the communities where it was found (Booker and Gardner 2013).

Furosemide is a blood pressure and fluid buildup medication that was found in one community and two of the 51 sites samples throughout the province. No information is available on Furosemide prescriptions for the community where it was found (Booker and Gardner 2013).

Atorvastatin is a cholesterol medication that was found in one community and one of the 51 sites samples throughout the province. Atorvastatin was one of the 10 most prescribed medications the community where it was found (Booker and Gardner 2013).

Dehydronifedipine is a metabolite of nifedipine a blood pressure medication that is used to control chest pain (angina). Dehydronifedipine was found in one community and one of the 51 sites samples throughout the province. Dehydronifedipine was not prescribed in the community where it was found (Booker and Gardner 2013).

Erythromycin, an antibiotic, was found in one community and one of the 51 sites samples throughout the province. Erythromycin was not prescribed in the community where it was found (Booker and Gardner 2013).

Ketoprofen is an anti-inflammatory that was detected in one community and one of the 51 sites samples throughout the province. Ketoprofen was not prescribed in the community where it was found (Booker and Gardner 2013).
Pentoxifylline is a diabetes medication that was detected in one community and one of the 51 sites samples throughout the province. Pentoxifylline was not prescribed in the community where it was found (Booker and Gardner 2013).

Overview of Pharmaceuticals Detected by Ecozone

Boreal Shield/Subarctic: Six communities were sampled within the Boreal Shield/Subarctic ecozone. Ten pharmaceuticals were detected:

- Anti-inflammatories: Acetaminophen, Ketoprofen
- Antibiotics: Sulfamethoxazole, Trimethoprim
- Antacids: Cimetidine
- Anti-diabetics: Metformin
- Antihypertensives (Beta-blocker): Atenolol
- Anticoagulants: Warfarin
- Stimulant: Caffeine
- Nicotine metabolite: Cotinine

Boreal Shield/Northeast: Four communities were sampled within the Boreal Shield/Northeast ecozone. Twenty-two pharmaceuticals were detected:

- Anti-inflammatories: Diclofenac, Ibuprofen, Naproxen
- Antibiotics: Clarithromycin, Erythromycin, Sulfamethoxazole, Trimethoprim
- Antacids: Cimetidine
- Anti-diabetics: Metformin, Pentoxifylline
- Antihypertensives (Beta-blocker): Atenolol, Metoprolol
- Antihypertensives: Diltiazem
- Antianginal metabolite: Dehydronifedipine
- Anticonvulsant: Carbamazepine
- Antihistamine: Diphenhydramine
- Diuretics: Hydrochlorothiazide
- Analgesics: Codeine
- Lipid Regulators: Bezafibrate, Gemfibrozil
- Stimulants: Caffeine
- Nicotine metabolite: Cotinine

Hudson Plains/Subarctic: Four communities were sampled within the Hudson Plains/Subarctic ecozone. Twenty pharmaceuticals were detected:

- Anti-inflammatories: Acetaminophen, Ibuprofen, Naproxen
- Antibiotics: Ciprofloxacin, Sulfamethazine, Sulfamethoxazole, Trimethoprim
- Antacids: Cimetidine, Ranitidine
- Anti-diabetics: Metformin
- Antihypertensives (Beta-blocker): Atenolol, Metoprolol
- Anticonvulsant: Carbamazepine
- Diuretics: Hydrochlorothiazide
- Analgesics: Codeine
- Lipid Regulators: Atorvastatin, Gemfibrozil
- Stimulants: Caffeine
- Nicotine metabolite: Cotinine
- Oral Contraceptive: Ethinylestradiol

Mixedwood Plains/Northeast: Four communities were sampled within the Mixedwood Plains/Northeast ecozone. Twenty-six pharmaceuticals were detected:

- Anti-inflammatories: Acetaminophen, Diclofenac, Ibuprofen, Naproxen
- Antibiotics: Ciprofloxacin, Clarithromycin, Sulfamethazine, Sulfamethoxazole, Trimethoprim
- Antacids: Cimetidine, Ranitidine
- Anti-diabetics: Metformin
- Antihypertensives (Beta-blocker): Atenolol, Metoprolol
- Antihypertensives: Diltiazem
- Anticoagulant: Warfarin
- Anticonvulsant: Carbamazepine
- Antihistamine: Diphenhydramine
- Diuretics: Furosemide, Hydrochlorothiazide
- Analgesics: Codeine
- Lipid Regulators: Bezafibrate, Gemfibrozil
- Stimulants: Caffeine
- Nicotine metabolite: Cotinine
- Oral Contraceptive: Ethinylestradiol

Pharmaceutical Guidelines:

Ambient Guidelines

Currently only one pharmaceutical in Canada has an ambient water guideline level, 17 α-ethinylestradiol at 0.5 ng/L in the province of British Columbia (Nagpal and Meays 2009). This pharmaceutical was detected at 0.74, 0.55 and 0.40 ng/L in three locations in two First Nations communities in Ontario. The maximum values in these communities were above the 30 day average concentration of the province of British Columbia guideline to protect aquatic life but below the maximum allowable guideline of 0.75 ng/L. Levels found at these sites could affect the fertility of some fish. The European Commission (EC) has proposed a freshwater Environmental Quality Standard of 0.035 ng/L for ethinylestradiol. Both Ontario sites would exceed the EC's proposed guideline (Scientific Committee on Health and Environmental Risks (SCHER) 2011). The EC has proposed a freshwater Environmental Quality Standard of 100 ng/L for Diclofenac. No Ontario 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 of 1.5 ng/L (Australian Guidelines for Water Recycling 2008). No Ontario FNFNES samples exceeded this guideline. The highest ethinylestradiol value found in Ontario was 50% of the Australian guideline. From the Acceptable Daily Intakes (ADIs) of pharmaceutical compounds, the number of glasses of water one would have to drink to exceed the safe level can be calculated. It is estimated that drinking more than 7-10 glasses of water from the two sites where ethinylestradiol was found over a prolonged period could result in headaches, nausea, dizziness and increased blood pressure. It could also increase the risk of cardiovascular disease and gallbladder disease. The concentrations of the other pharmaceuticals in the FNFNES study would not pose a threat to human health. In several communities there are as many as 19 - 21 pharmaceuticals in the surface water. The health effects from drinking the water from these sites over a prolonged period are unknown at this time. However, follow-up testing of wells in the vicinity of these surface water sites demonstrated that the communities' drinking water was safe to drink.

Mercury in Hair Results

Of the 1429 FNFNES participants in Ontario, 765 individuals consented to hair sampling for mercury. After the exclusion of data from 21 individuals (who either did not provide their age, complete the household survey or provide sufficient amount of hair for analysis) the weighting of mercury analysis sample was based on data from 744 respondents (52% of the nutritional component respondents). All mercury figures and the data table in this report represent results from 744 First Nations participants in Ontario.

The arithmetic mean (average) of mercury concentration in hair among the adult First Nations population living on-reserve in Ontario was 0.64µg/g, while the geometric mean was at 0.27 µg/g (sample data unweighted). For women of childbearing age (19-50 age category), the arithmetic mean of mercury was 0.40 µg/g and geometric mean 0.21µg/g (unweighted). The distribution of mercury in hair among the 90th and 95th percentile of First Nations living on-reserves in Ontario, presented in Table 26, indicate that mercury body burden is below the established Health Canada mercury guideline of 6 µg/g in hair for the general population (the 95th percentile (with 95% confidence) for Ontario First Nations living on-reserves is 1.35 µg/g +/- 0.86) (sample data weighted).

In total, 8 participants (three women over 50 years of age and five men over 19 years of age) had hair mercury values above 6µg/g (including 2 exceedances in at least one hair segment sampled) which represented 1.1% of the total First Nations population in Ontario. Among women of childbearing age, there were 10 exceedances of Health Canada mercury biomonitoring guidelines (2µg/g) including 6 exceedances in at least one hair segment sampled which represented 3.3% of the total sample of women of childbearing age in Ontario.

The entirety of the weighted data is characterized by very high variability and would be generally considered as unreliable in representing the entire population. This level of variability suggests the existence of sub-groups within the First Nations population that are exposed to higher levels of mercury than Table 26 suggests. Further analysis by ecozone (Figures 41a-41d and 42a-42d) provided a vivid illustration of this point through a notable difference in the profiles of mercury exposure among the study participants from Ecozone 1-Boreal Shield/Subarctic, as compared to all other ecozones. In particular, the majority of exceedances for women of childbearing age were observed in Ecozone 1- Boreal Shield/Subarctic with 7% of First Nation women of childbearing age exceeding the 2 µg/g (based on the mean of three samples). However, when exceedances in at least one hair segment sampled were considered, 12.3% women of childbearing age exceeded Health Canada mercury guideline. These findings suggest that First Nations residing in Ecozone 1 - Boreal Shield/Subarctic should be the primary focus of the future health promotion and risk communication efforts by public health professionals in order to decrease the levels of mercury exposure among women of childbearing age.

While the overall results indicate that the body burden of mercury is generally low, they also suggest that risk communication efforts should focus on women of childbearing age and articulate the importance of consuming a variety of traditional foods, particularly species of fish with low levels of mercury. In general, from examining mercury body burdens in Figures 41a-41d, it appears that First Nations residing in subarctic areas have a greater tendency to accumulate higher levels of mercury. These distributions, including Figures 42a-42d for women of child bearing age provide some suggestions as to relative priority of risk communication measures.

Table 26 also suggests that for the majority of the First Nations population living on-reserve there is a clear pattern of increasing mercury exposure with age before the age of 70.

In general, the results suggest that the background, population-based body burden of mercury does not present a health concern. However, the high level of variability requires increased focus on the investigation of sub-groups with higher levels of exposure in the northern First Nations communities.

Food Contaminant Results

A total of 1,241 food samples representing 115 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 Ontario 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 27 presents the concentrations of four toxic metals in the Ontario traditional food samples, including arsenic, cadmium, lead, and mercury, which is further analyzed to quantify the more toxic form of methylmercury. Tables 28a-d shows the top 10 traditional food contributors of arsenic, cadmium, lead and mercury in the diet, by total and by ecozone.

Arsenic: Higher levels of arsenic were found in samples of fish (northern pike, brook trout, brown trout, lake trout, smelts, sturgeon, walleye, and whitefish) beaver meat and a few plant foods (tobacco, puffball mushrooms and onions). As walleye and whitefish were eaten most often, they were the main traditional food sources of arsenic (Table 28a). 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 29 and 30).

Cadmium: Higher levels of cadmium were found in samples of kidney (deer and moose), moose liver and some samples of beaver meat. Based on their reported use, the main traditional sources of cadmium in the diet were moose kidney and liver (Table 28b). Higher concentrations of cadmium are found in the liver and kidneys of mammals as they tend to accumulate in these organs. 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 29 and 30).

Lead: Among the samples collected, higher levels of lead were found in samples of game meat (beaver, moose, deer, squirrel), and wild birds (ducks and goose). Some plant samples (ginger, sunflower seeds, onions, carrots, and tobacco) along with puffball mushrooms had higher levels of lead as well. The main traditional sources of lead in the diet were beaver, moose, deer and goose (Table 28c). This is likely to be a result of lead residuals from lead shot or lead-containing ammunition. 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). Higher levels of lead found in plant samples are likely an indication of elevated levels of lead in the local soil and/or from air pollution. Elevated soil lead levels were known to some communities. For both the average and heavy traditional food consumers, the HQ values for lead were lower than 1, therefore the risk of harm is negligible based on current consumption (Tables 29 and 30).

Mercury: There were higher levels of the more toxic form of mercury, known as methyl mercury, in samples of pike, walleye, pink salmon, splake and lake trout. The highest levels of methyl mercury were measured in walleye, pike and sturgeon. Walleye and pike were eaten most often (average frequency of 12 times/year), so they are the main traditional food sources of mercury in the diet (Table 28d). Higher levels of mercury are commonly seen in Ontario in predatory fish such as walleye, pike, and trout due to bioaccumulation and biomagnification along the food chain.

Adult males and older females (aged 50+) have a higher PTDI for mercury than females of child-bearing years. For males and females over age 50, 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 (Tables 29 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 regionally, the risk of mercury exposure is low.

Exposure estimates for heavy metals were analyzed by ecozones and for consumers only (Tables 32a-d). The risk of heavy metal exposure appears to be low for Ecozone 2 (Table 32b) and Ecozone 3 (Table 32c). However, using the maximum concentrations of lead found in the food samples, heavy consumers appeare to be at risk of lead exposure in Ecozone 1 (Table 32a) and Ecozone 4 (Table 32d). The risk of mercury exposure appears to be high in Ecozone 1 for heavy consumers as the HQs using average and maximum mercury concentrations were greater than 1 (Table 32a). Moreover, the HQs for mercury for women of child bearing age from Ecozone 1 calculated at the 95th percentile of intake were 1.55 (average concentrations) and 3.48 (maximum concentrations) (Table 33).

These results indicate that the consumption of game contaminated by lead containing ammunition may increase the risk of lead exposure. It is recommended to use steel shot instead of lead shot. Although regional and ecozone results showed that the risk of exposure to cadmium was low based on the HQs, some community members did have higher intakes of this metal due to higher intakes of organ meat such as liver and kidney from moose, deer, or caribou. As well, it should be mentioned that smoking also contributes to cadmium exposure, therefore the risk of cadmium toxicity is higher for smokers who consume large amounts of organ meat.

These results also indicate that community members living in Ecozone 1, including women of child bearing age who eat high amounts (more than 1 cup per week) of predatory fish, such as walleye, pike and lake trout, are at risk of mercury exposure. These results support the findings from the mercury in hair results which showed that nearly 30% of First Nations women of childbearing age from this ecozone exceeded the guidelines for mercury in hair.

The statistical relationship between 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=0.22) and for women of child bearing age (Pearson correlation coefficient=0.53). Regression analyses showed that the linear relationship was estimated with less error for the women due to the fact that there were a few extreme values for the total population (i.e. some people with low mercury exposure from food but high mercury in hair values and some people with high exposure but low hair values) (Figures 43 and 44).

These results warrant recommending women of child bearing age to consume smaller sized fish of those types known to accumulate higher levels of mercury or to choose fish lower in mercury such as whitefish. The Ontario Ministry of the Environment (Sport Fish Contaminant Monitoring Program) has up-to-date information on fish consumption advisories for specific lakes and rivers in Ontario. This information is available by calling 1-800-820-2716 or online at www.ontario.ca/fishguide.

Persistent Organic Pollutants

Polycyclic Aromatic Hydrocarbons (PAHs): Table 34 presents the concentrations of polycyclic aromatic hydrocarbon (PAH) in selected traditional food samples from Ontario. All the concentrations were very low. The highest amounts were found in sucker meat samples. This can be partly explained by the fact that bottom-feeding fish accumulate PAH from the sediment, however some contamination from oil and gas production facilities could also be a factor. However, these concentrations are still very low and should have no adverse effects on the health of the animals.

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. Selected fish had PCB at 100s of parts per billion level suggesting that the historical contamination of PCB in selected water bodies remains to be a source of PCB in the fish.

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 brown 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 sucker samples. However, there is no concern of exposure to PFCs from eating any of the food sampled.

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 teal meat 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 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).

COMMUNITY INPUT

This report and all the results contained herein would not have been possible without the active participation, hard work and leadership of the 18 participating First Nations in Ontario including the community research assistants, community members who participated and all those who helped coordinate data collection. The FNFNES has taken an active approach to ensuring that participating First Nations have an opportunity to lead, influence and improve the FNFNES, from the beginning of the study to results communication and follow-up. Each First Nation has been the first to receive their own results through a presentation to the community and through a draft community report and draft summary of results. Furthermore, the FNFNES has looked to a suitable venue to release this Regional Report so that First Nations in Ontario will be the first to receive the results. The results below are compiled from the feedback received at community presentations, from comments on the community reports and from a short questionnaire which was asked of a key community contact after the community had some time to consider their results.

Community Presentations: The FNFNES Regional Coordinator worked with each First Nation to organize a community presentation to discuss the results. In some cases the presentation was with Chief and Council, with the community at large or in a few cases, multiple presentations were requested to different groups/audiences within the community. Translation to a First Nations language was needed at some of the community presentations and was provided with the help of community members. At each presentation, the FNFNES ensured that there would be members of the team available to present and answer questions on all aspects of the study. Following the initial presentation, the community was provided with some time to review and provide input on their community reports and results. Below is a summary of the feedback that was received.

General Comments: Similarly to previous regions which have participated in the FNFNES, a number of First Nations were interested in knowing how their results compared to First Nations as a whole in their region as well as to nearby communities. The community level reports offer comparisons where available, not only to the regional level results, but also to past studies if the First Nation had these available. One community raised the concern that letters (in the case of a hair mercury exceedence), and other communications materials directed to community members should be translated to the First Nation's first language, Oji-Cree. In response, the FNFNES translated all hair mercury exceedence letters for the community and re-sent them. A number of First Nations stated that they appreciated the comparisons offered between their community's results and the results for First Nations as a whole in Ontario. However, one First Nation requested that values for all of Ontario or Canada also be included in the figures and graphs so that the results on topics such as obesity, smoking and diabetes could be visualized.

Nutrition: Some First Nations expressed concern that community members would have different understandings of the term "traditional food", specifically that they might take it to include dishes made with flour, sugar and other ingredients that would not have been part of the traditional diet. Interestingly, one community felt that their diabetes rate might have been under-reported due to some people in their community not wanting to admit that they had diabetes. Suggestions from First Nations on how to improve nutrition included programs that promoted and transferred traditional knowledge on harvesting, preparing and preserving traditional foods. Additional suggestions included renewal/increased funding for food banks, Health Canada's Aboriginal Diabetes Initiative and other programs to promote food security.

Food Security: Multiple northern and remote First Nations expressed frustration with the high costs of store food and the equipment and fuel needed to harvest traditional foods in their communities as impacting the ability to afford a nutritious and adequate diet. In particular, one community explicitly noted that they did not qualify for the Government of Canada Nutrition North Canada program despite the high costs of store bought food and remote location. Another community thought that the rates of food insecurity were higher in their community than what was reported given the limited employment opportunities, high numbers of adults accessing social security and the high store food costs. Other First Nations that were accessible by road still felt that the distance

required to reach a store, combined with the necessity of owning a vehicle and paying for gas, dramatically increased the cost of accessing market foods and therefore contributed to food insecurity. Some of the non-remote First Nations were surprised at the high rates of food insecurity in their communities.

Chemical Contaminants in Traditional Food: A couple of First Nations expressed an interest in receiving detailed information on what the safe levels of contaminants were, and exactly how much and how often which foods could be eaten. Overall these communities were looking for more practical information on safe levels of consumption of traditional foods and how to reduce exposure to contaminants. A couple of communities also raised concerns regarding the mixtures of different contaminants in the environment and of cumulative effects. A number of First Nations had specific questions on where the samples of traditional foods were collected from. While the FNFNES collects limited information on this matter, the FNFNES is attempting to look at the contaminant levels of the traditional foods that communities are consuming as opposed to identifying and quantifying point sources of exposure or local variations.

One community felt that collecting traditional food samples only during the fall resulted in not enough samples of the traditional foods which are harvested in the other seasons and which might not have been available for sampling during the time of the FNFNES data collection. The community attributed low numbers of certain types of traditional foods collected to the timelines that data collection was active.

In a number of First Nations, it was suggested that the FNFNES reports needed to be clearer in that biological parameters were not tested for, particularly when stating traditional foods and water are safe for consumption. One community highlighted the challenge in offering culturally appropriate consumption advice and the differences between traditional knowledge and western knowledge when confronted with a recommendation for high consumers of a particular organ meat to limit consumption. Hunters in the audience noted that this organ was eaten right away after the animal is killed as a cultural practice. This example is indicative of the challenge in providing culturally appropriate consumption advisories to First Nations. One First Nation noted that the FNFNES recommendation to promote the consumption of traditional foods might have to change if the community did indeed increase its consumption as this would impact the risk analysis which has been based upon current consumption levels. The First Nation requested clarification on how much additional traditional food would be safe to consume above the currently consumed levels from a contaminants perspective.

Pharmaceuticals in Surface Water and Metals in Tap Water: During the community presentations of the draft FNFNES results there were often concerns raised about the pharmaceuticals in the surface water analysis component. Perhaps as these are emerging contaminants and therefore few people have heard of finding pharmaceuticals in surface water, there was often some concern during the discussion of this component. Community members were quite interested to hear how the pharmaceuticals came to be in their rivers, streams and lakes, what could be done about it and what effect this would have on aquatic and human life. A few individuals wondered whether concentrations of pharmaceuticals would also show up in their drinking water if it was found in the surface waters. A couple of First Nations noted that it would be useful to see guidelines on the safe amounts for pharmaceuticals in water. However, as noted in the Pharmaceutical Guidelines section of this report, very few jurisdictions in the world have established guideline levels. With respect to the tap water analysis component, one First Nation requested that the recommendation to flush tap water before consumption be more prominent in their report.

Next Steps: In a number of communities it was clear that there was interest in follow-up studies being conducted to further assess the exposure to particular contaminants within the community and for particular traditional foods. A couple of First Nations said that they were already using the results in program planning for food security and health promotion. One First Nation mentioned that they were going to use the traditional food and water sampling information to develop an environmental health research plan and another that these results would be incorporated into their current community-based land use plan. A couple of First Nations wanted to find out more information on proposals to access funding for various topics covered in their results.

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 Ontario 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 Ontario. However, on average, there are excess intakes of fat and sodium (salt), and inadequate intakes of fibre, vitamin A, vitamin C, vitamin D, folate, calcium and magnesium. High rates of obesity, smoking and diabetes are major health issues for First Nations in Ontario. Moreover, food insecurity is a major concern in most communities.

These findings highlight the need to continue to build upon current efforts at the community, regional, provincial and national level to improve food security and nutrition in First Nations communities through a social determinants of health approach. It is recognized that there are many community-led initiatives currently addressing these issues, such as community gardens, the Health Canada supported Canada Prenatal Nutrition Program and the Aboriginal Diabetes Initiative. However, as the results of this report indicate, further work is needed. Additional potential activities that have the potential to improve nutrition and food security in First Nations communities include: subsidized traditional food harvesting and 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 for 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 K 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. 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 concern regarding the trace metal levels in the drinking water but close monitoring is warranted as water sources and water treatment vary greatly. Increased water sampling frequency, especially in the winter months, is recommended in communities that appear to have fluctuating levels of trace metals in their drinking water. It is recommended that the tap water be flushed once in the morning before consumption. In addition, flushing the toilet or using the shower before drinking tap water, will also reduce levels of exposure to metals from indoor plumbing.

The levels of pharmaceuticals found in the surface water of most communities pose no risk to human health. The long-term health effects of the mixture of multiple pharmaceuticals found in several communities are unknown at this time. However, several of these pharmaceuticals bioaccumulate and can cause fertility problems in fish at the levels found in this study. Further investigations are warranted in communities where the communities' drinking water could be contaminated by many pharmaceutical compounds.

Contaminant levels in all traditional food samples collected were generally low and should pose no health risk to the consumer. There may be occasional contamination of lead by gun shot in game meat (such as deer, partridge, caribou and rabbit) therefore consumers should be aware of the potential risk of eating game killed by lead shot. Hunters should be using steel shot, rather than lead shot to avoid exposure to lead that could be hazardous to both children and adults. Both the hair sampling and diet estimate results showed that there is minimal concern of mercury exposure. However, women of child bearing age, teenagers, and children should limit consumption of predatory fish such as walleye and pike to avoid high intakes of mercury. The Ministry of the Environment (Sport Fish Contaminant Monitoring Program) has information on fish consumption advisories for specific lakes and rivers in Ontario. Contact the Sport Fish Contaminant Monitoring Program (1-800-820-2716) or find up-to-date information online at www.ontario.ca/fishguide.

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 concerns, and how diet quality will change over time. Some of the participant communities have already expressed

an interest in conducting such a follow-up study in five or ten years' time.

Highlights of results:

1. The diet of First Nations adults in Ontario does not meet nutrition needs, but the diet is healthier when traditional foods are eaten.
2. Overweight/obesity, smoking, and diabetes are major 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. Chemical contamination of traditional food is not worrisome, but it is important to have the data from this study for future monitoring of trends and changes.

A summary of the study results from Ontario can be found in Appendix L.

Sample Characteristics

Table 1. Participating First Nations communities in Ontario

Ecozone/ culture area number	Ecozone/ culture area	Name of participating community	Year of data collection	Number of participants	Location relative to urban centre	Access	Registered Population Total /on-reserve 2012	Number of Homes in Communities
1	Boreal Shield/ Subarctic	Asubpeeschoseewagong Netum Anishinabek	2011	70	80 km north of Kenora	Year-round road	1,473 / 940	219
		Wauzhushk Onigum Nation	2011	37	3 km southeast of Kenora	Year-round road	724 / 351	120
		Kitchenuhmaykoosib Inninuwug First Nation	2012	50	600 km north of Thunder Bay	Fly-in ; winter road	1537 / 1000	288
		Kingfisher Lake First Nation	2012	55	504 km north of Thunder Bay	Fly-in; winter road	536 / 474	107
		Webequie First Nation	2011	98	540 km north of Thunder Bay	Fly-in; winter road	841 / 283	146
		Fort William First Nation	2011	49	Adjacent to Thunder Bay	Year-round road	2,099 / 953	325
2	Boreal Shield/ Northeast	Batchewana First Nation of Ojibways*	2012	63	0-85 km from Sault Ste. Marie*	Year-round road	2,649 / 745	272
		Sagamok Anishnawbek First Nation	2011	87	96 km southwest of Sudbury	Year-round road	2,745 / 1562	389
		Atikameksheng Anishnawbek	2011	100	19 km west of Sudbury	Year-round road	1,097 / 399	130
		Garden River First Nation	2012	94	15 km east of Sault Ste. Marie	Year-round road	2,666/ 1,239	459

Ecozone/ culture area number	Ecozone/ culture area	Name of participating community	Year of data collection	Number of participants	Location relative to urban centre	Access	Registered Population Total /on-reserve 2012	Number of Homes in Communities
3	Hudson Plains/ Subarctic	Marten Falls First Nation	2011	51	402 km northeast of Thunder Bay	Fly-in	701 / 361	59
		Fort Albany First Nation	2012	94	460 km north of Timmins	Fly-in; winter road	4,602 / 2,964	171
		Attawapiskat First Nation	2012	38	492 km north of Timmins	Fly-in; winter road	3,431 / 1,946	280
		Moose Cree First Nation	2012	83	315 km north of Timmins	Fly-in; winter road	4,194/ 1,735	470
4	Mixedwood Plains/ Northeast	Aamjiwnaang First Nation	2012	100	0-10 km from Sarnia	Year-round road	2,248 / 948	244
		Munsee-Delaware Nation	2012	30	25 km southwest of London	Year-round road	601/ 175	59
		Six Nations of the Grand River	2012	142	25 km southwest of Hamilton	Year-round road	25,231 / 12,146	3500
		Akwesasne	2012	188	30 km northeast of Cornwall	Year-round road	11,679 / 9,302	1440

*Batchewana First Nation comprises 3 inhabited reserves: Rankin is adjacent to Sault Ste. Marie, Goulais Bay Reserve is 56km away and Obadjiwan Reserve is 85km away.
Other references: www.ruralroutes.com, www aboriginalcanada.gc.ca, www.wikipedia.org

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

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

Ecozone/ Culture Area						
		1 Boreal Shield/ Subarctic	2 Boreal Shield/ Northeast	3 Hudson Plains/ Subarctic	4 Mixedwood Plains/ Northeast	All First Nations in Ontario
On-reserve Registered population 2012[1]		4026	3945	7006	22571	37548
On-reserve Registered population 2012, 19 years +1		2851	2721	4314	16427	26313
No of occupied households (HHs)		1205	1250	979	5243	8677
No. of HHs selected to participate[2]		730	650	465	1047	2892
Targeted survey completion		600	400	359	559	1912
No. of HHs contacted		446	417	355	701	1919
Not eligible		2	8	16	5	31
Reason for non-eligibility		not First Nations	not First Nations, unable to give informed consent	not First Nations, not on-reserve, under-age, illness	not First Nations, illness, deaf	not First Nations, not on-reserve, under-age, unable to give informed consent, illness, deaf
	vacant homes	15	11	5	48	79
No. of eligible HHs		429	398	334	648	1809
HH Non-response	Refused	22	53	60	155	290
	Not home during interview period	30	1	0	24	55
	No. of incomplete records	18	0	8	9	37
No. of HHs (participants) that participated (complete records[3])		359	344	266	460	1429
No. of participating females		196	223	174	303	896
No. of participating males		163	121	92	157	533
HH Participation rate (# of participating HH s/ # eligible HHs)		84%	86%	80%	71%	79%

[1]Aboriginal Affairs and Northern Development Canada, 2012 [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 of participants

	Mean age in years (SE)				
	Ecozone/ Culture Area				
Gender	1	2	3	4	All First Nations in Ontario
Women	37 (4.0)	40 (6.0)	32 (2.2)	39 (3.3)	38 (2.3)
Men	37 (4.8)	42 (8.8)	37 (4.1)	39 (3.7)	38 (3)

Figure 2a: Percentage of female respondents in each age group, by ecozone and the Ontario region (n=896)

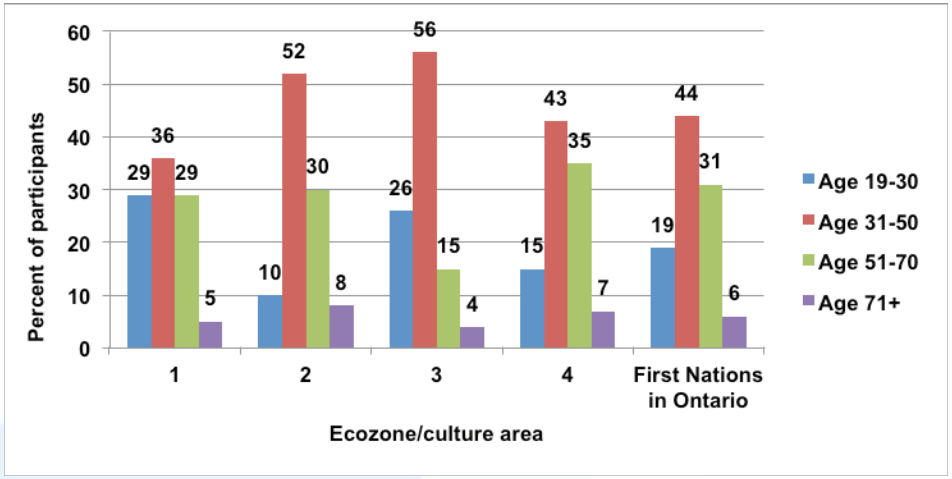
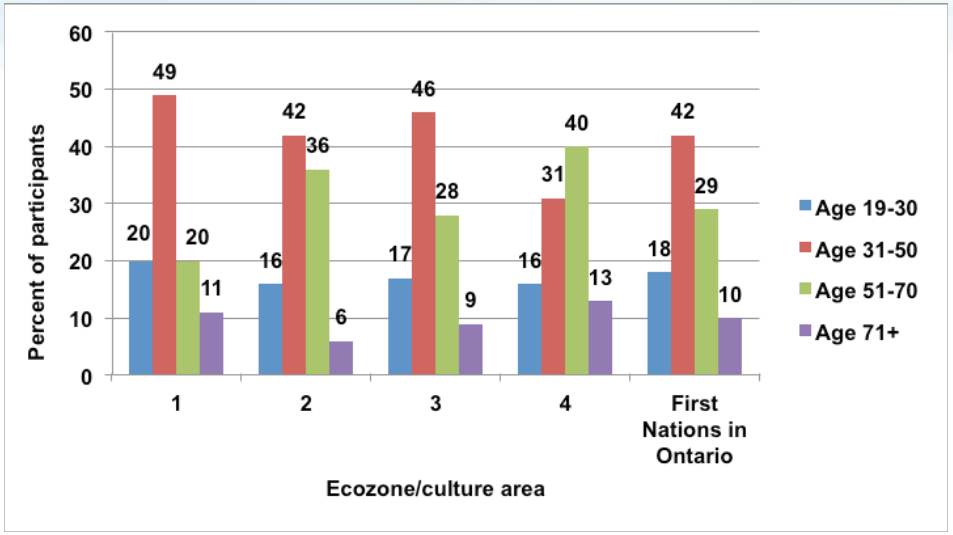


Figure 2b: Percentage of male respondents in each age group, by ecozone and the Ontario region (n=533)



Legend for ecozone/culture areas:
1= Boreal Shield/Subarctic (northwestern ON)
2= Boreal Shield/Northeast (southwestern ON)
3= Hudson Plains/Subarctic (northeastern ON)
4= Mixedwood Plains/Northeast (southeastern ON)

Figure 3. Percentage of household members by age group, First Nations in Ontario (n=1429)

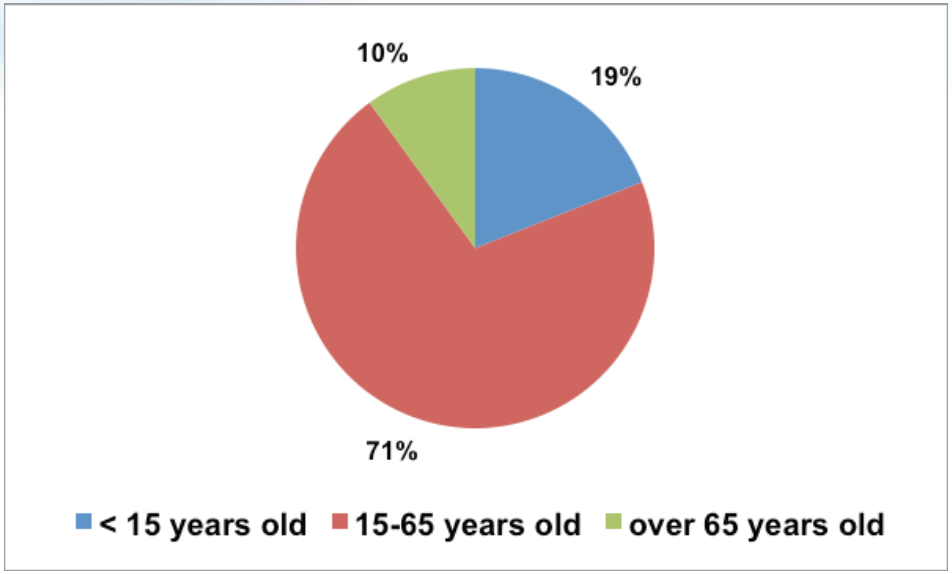
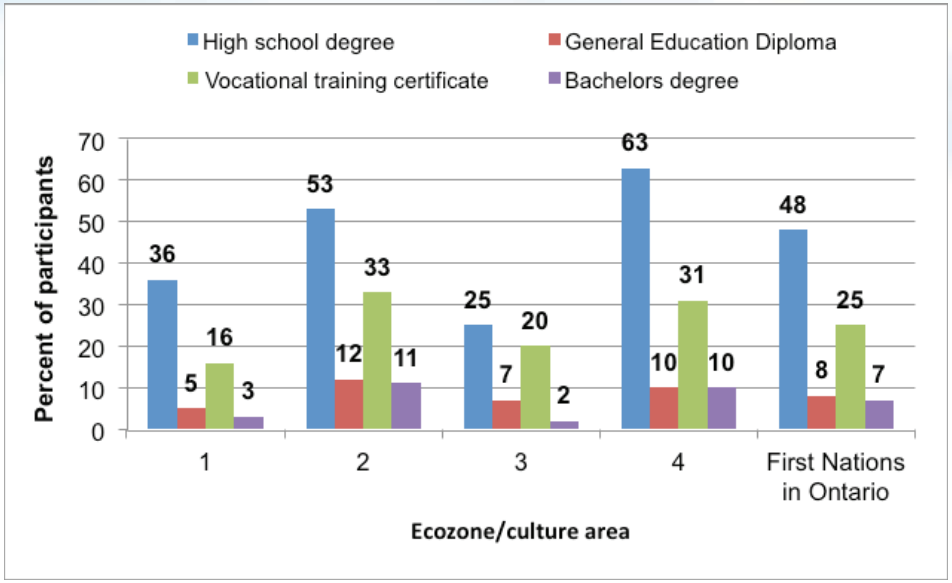


Table 4. Household size and years of education of First Nations adults in Ontario

Household size, Education and Employment	Ecozone 1 (n=359)	Ecozone 2 (n=344)	Ecozone 3 (n=266)	Ecozone 4 (n=460)	First Nations in Ontario (n=1429)
	Median (range)				
Number of people living in the household	4 (1-12)	3 (1-16)	5 (1-14)	3 (1-12)	4 (1-16)
Number of years of school completed	11 (0-20)	12 (1-30)	9 (0-20)	12 (0-22)	12 (0-30)

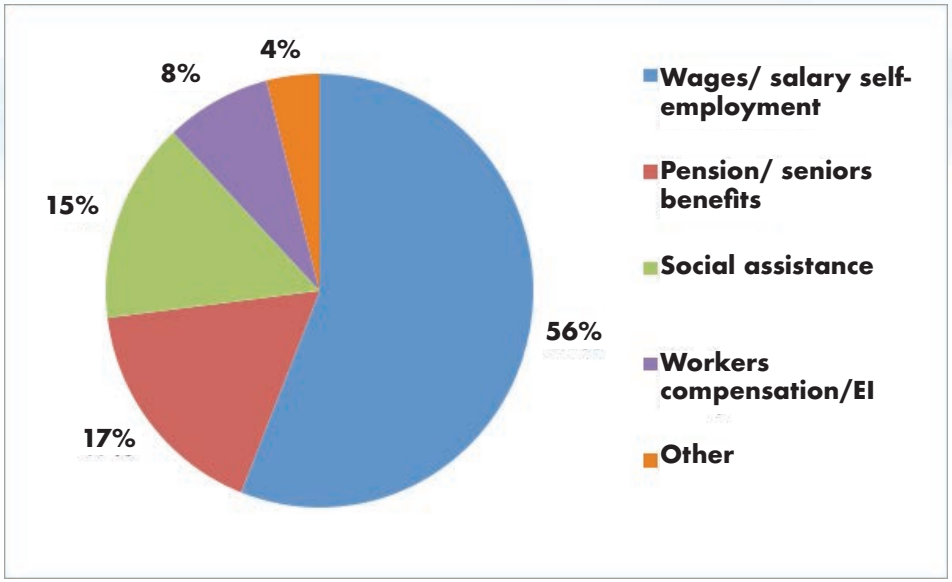
Legend for ecozone/culture areas:
1= Boreal Shield/Subarctic (northwestern ON)
2= Boreal Shield/Northeast (southwestern ON)
3= Hudson Plains/Subarctic (northeastern ON)
4= Mixedwood Plains/Northeast (southeastern ON)

Figure 4: Diplomas, certificates and degrees obtained, by ecozone/culture area (n=1429)



Legend for ecozone/culture areas:
1= Boreal Shield/Subarctic (northwestern ON)
2= Boreal Shield/Northeast (southwestern ON)
3= Hudson Plains/Subarctic (northeastern ON)
4= Mixedwood Plains/Northeast (southeastern ON)

Figure 5. Main source of income for First Nations adults in Ontario (n=1429)



EI= Employment insurance
Other includes training/school allowance, parental or spousal support, savings, no income, and no answer

Figure 6. Levels of full-time and part-time employment of First Nations adults in Ontario, by ecozone/culture area

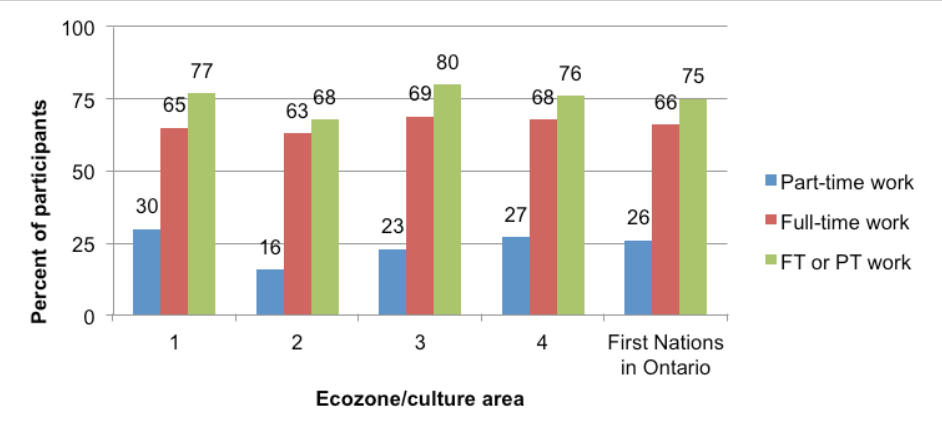
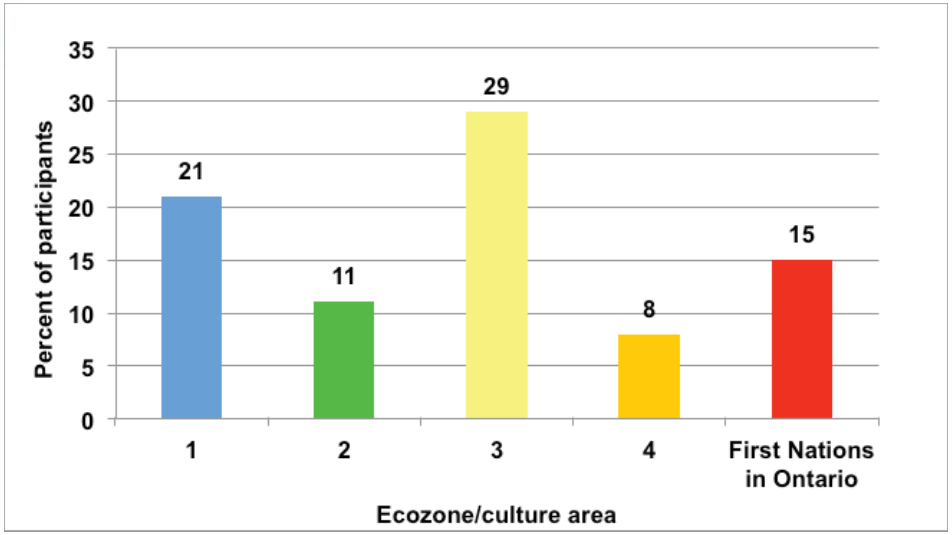


Figure 7. Percent of First Nations adults in Ontario on social assistance by ecozone/culture area and total (n=1424)



Legend for ecozone/culture areas:
1= Boreal Shield/Subarctic (northwestern ON)
2= Boreal Shield/Northeast (southwestern ON)
3= Hudson Plains/Subarctic (northeastern ON)
4= Mixedwood Plains/Northeast (southeastern ON)

Health and Lifestyle Practices

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

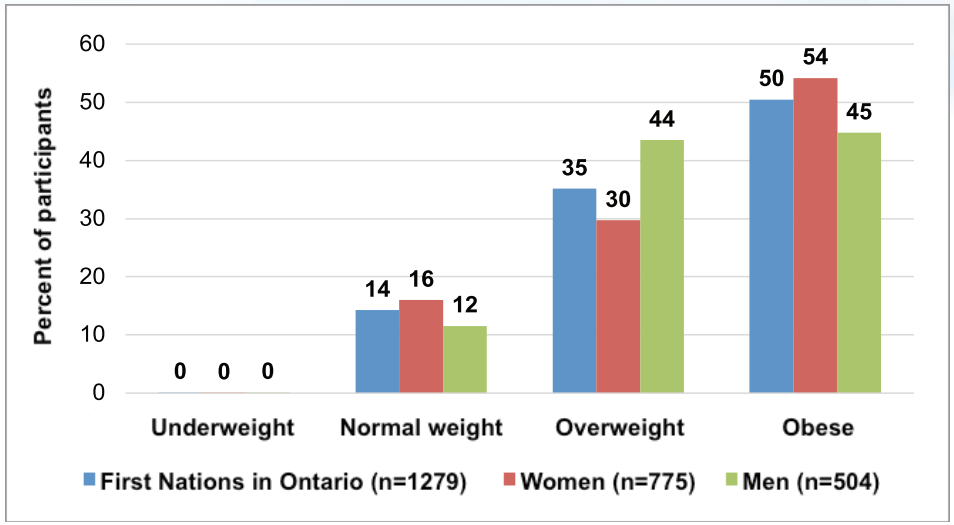
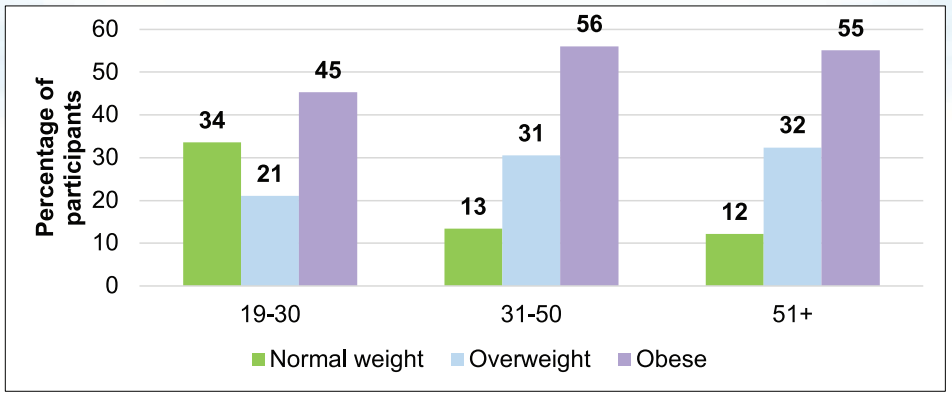


Figure 8b. Overweight and obesity among First Nations women in Ontario (n=774)[1]



[1] Classified using Health Canada's BMI categories (Health Canada 2003)
Results exclude pregnant and breastfeeding women (n=40). Results include both measured and reported weight and height values; significant differences were found between measured (n=414) and reported (n=869) values, therefore reported values were adjusted to account for the estimated bias by gender.

Figure 8c. Overweight and obesity among First Nations men in Ontario (n=504)

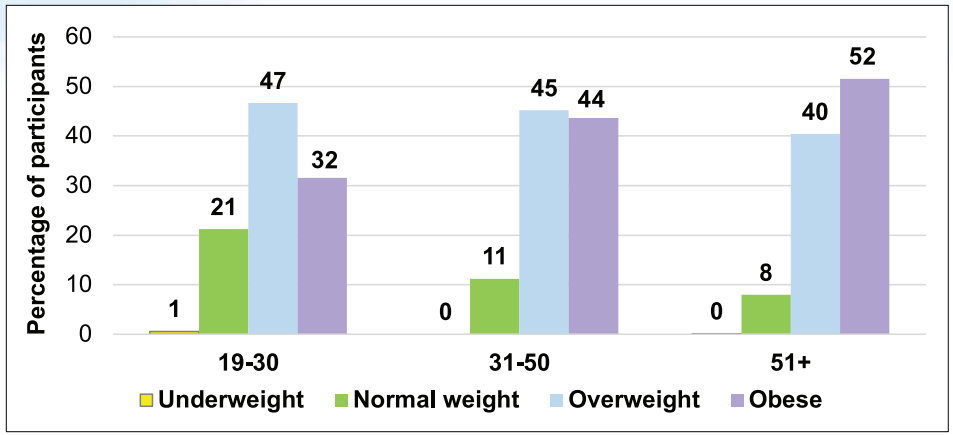
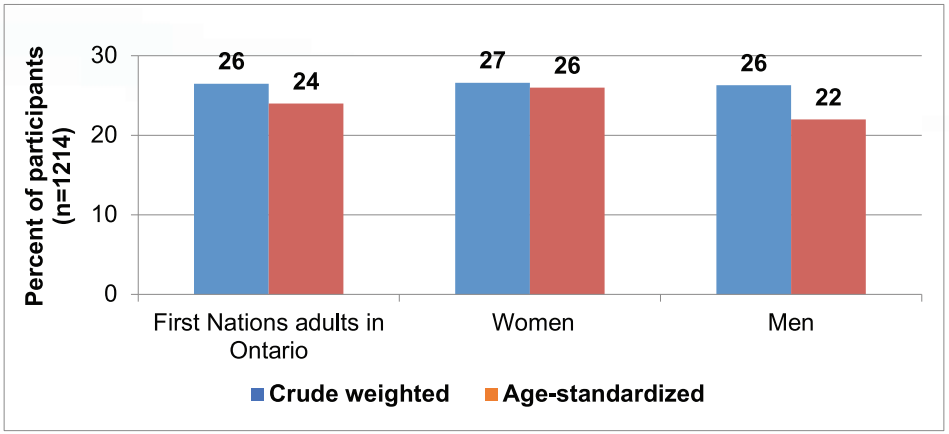


Figure 9. Prevalence of self-reported diabetes1 in First Nations adults in Ontario, total and by gender (weighted and age-standardized rates[2])



[1]Excludes gestational diabetes
[2]Age-standardized to the 1991 Canadian population

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

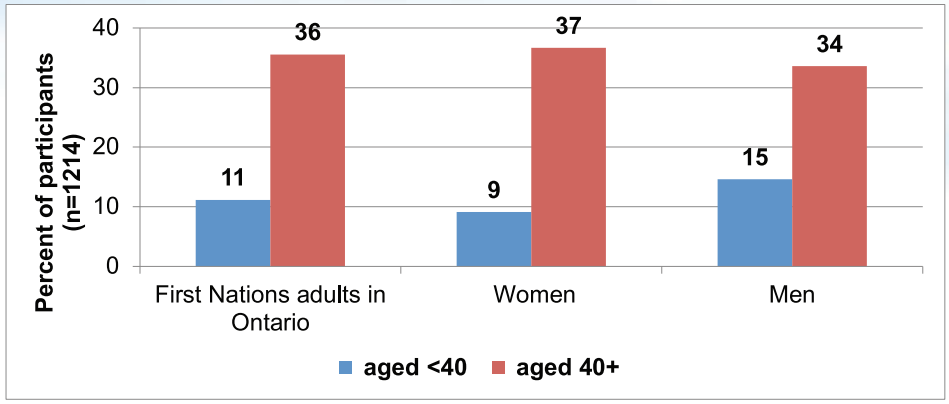


Figure 11. Type of diabetes reported by First Nations adults in Ontario diabetic participants (n=324)

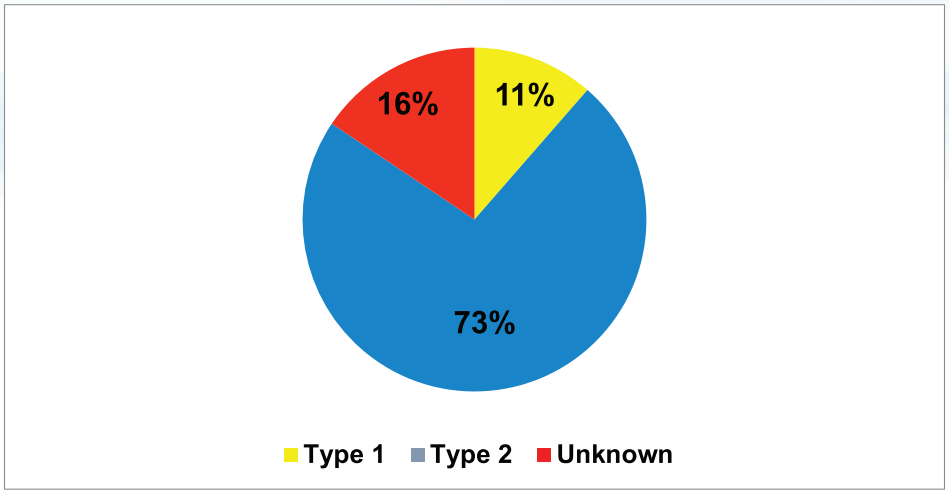


Table 5. Prevalence of self-reported diabetes among First Nations adults in Ontario compared to other Canadian studies

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 Ontario	18+	21.6	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
Manitoba First Nations (on-reserve)	19+	24.4	20.8	2010 FNFNES
First Nations in Ontario (on-reserve)	19+	26.5	24.3	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

‡Age-standardized to the 1991 Canadian population.

CCHS= Canadian Community Health Survey

RHS= First Nations Regional Longitudinal Health Survey (Phase 2)

APS= Aboriginal Peoples Survey

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

Figure 12a. Percent of First Nations adults in Ontario dieting (to lose weight) on the day before the interview, by gender (n=1429)

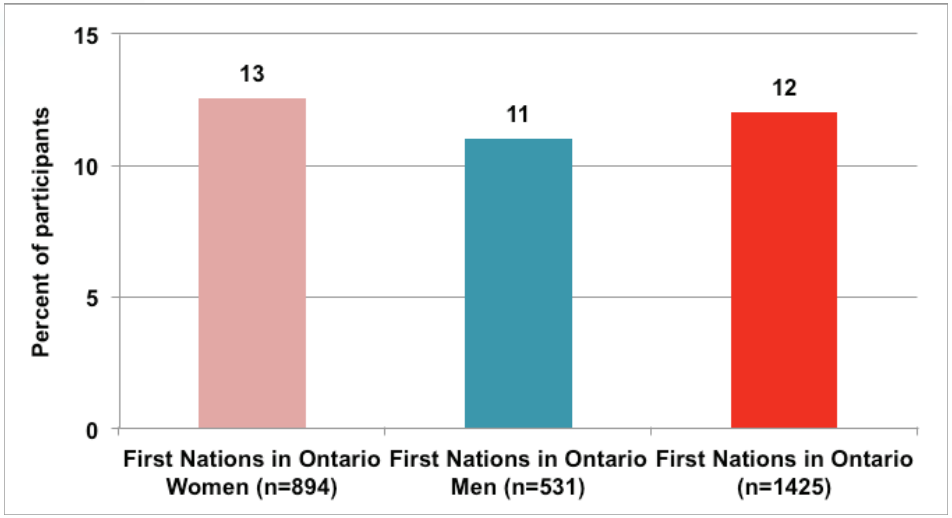


Figure 12b. Percent of First Nations adults in Ontario dieting (to lose weight) on the day before the interview, by gender and age group (n=1429)

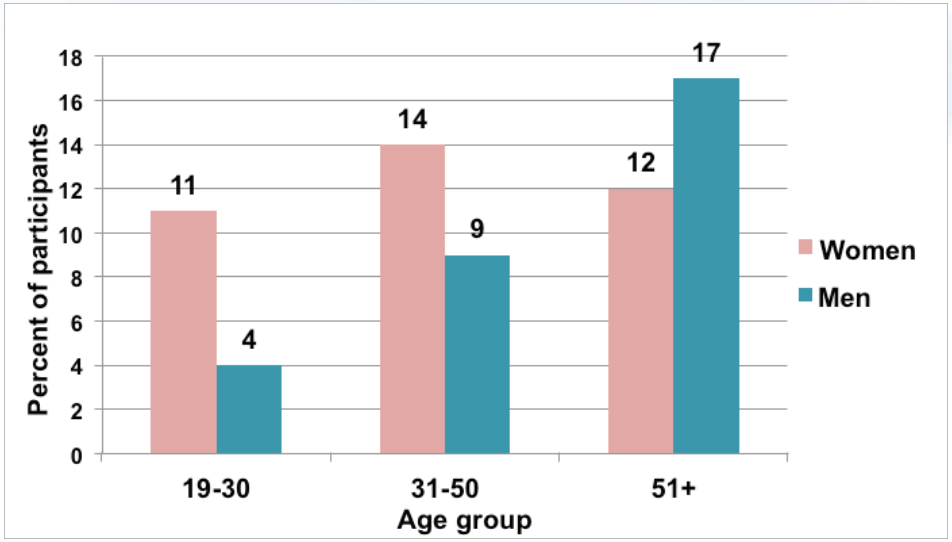
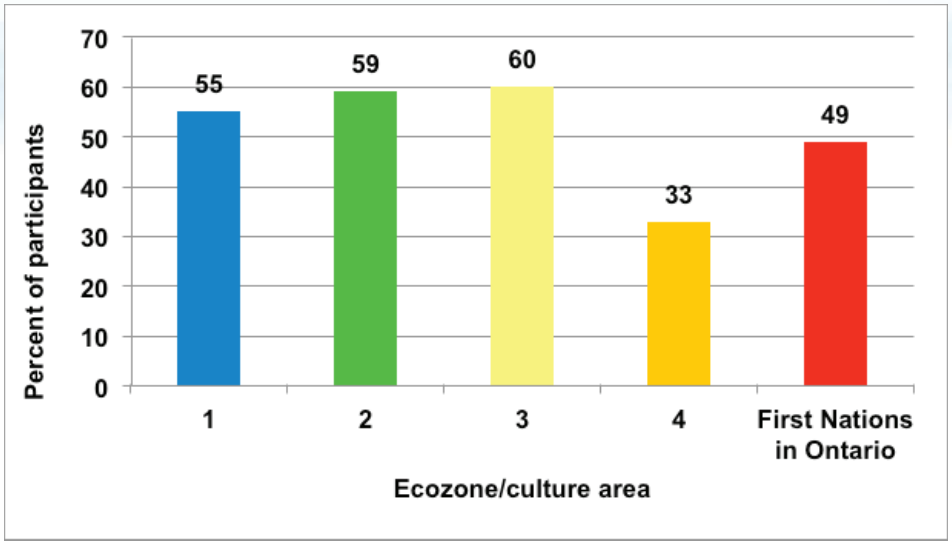


Figure 13. Percent of First Nations adults in Ontario who smoke, by ecozone/culture area and total (n=1428)



Legend for ecozone/culture areas:
1= Boreal Shield/Subarctic (northwestern ON)
2= Boreal Shield/Northeast (southwestern ON)
3= Hudson Plains/Subarctic (northeastern ON)
4= Mixedwood Plains/Northeast (southeastern ON)

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

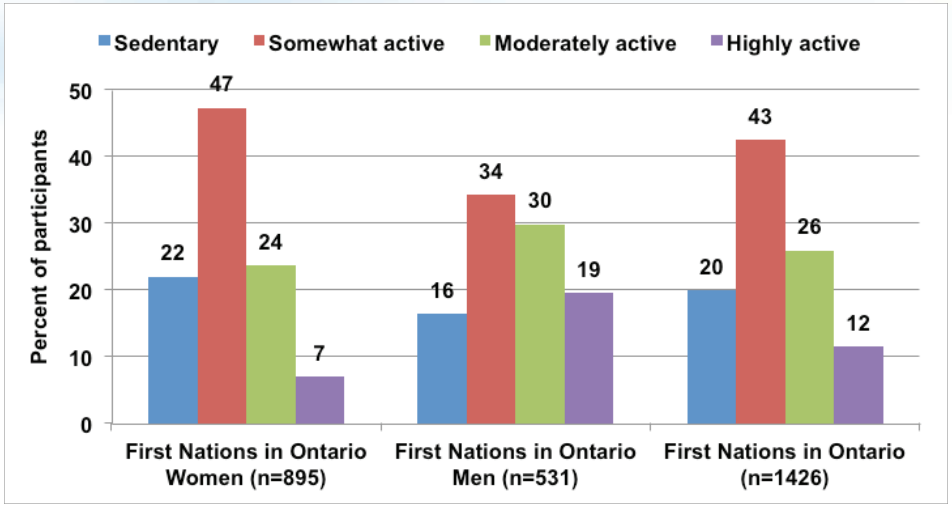


Figure 14b. Self-reported activity level in First Nations women in Ontario, by age group (n=895)

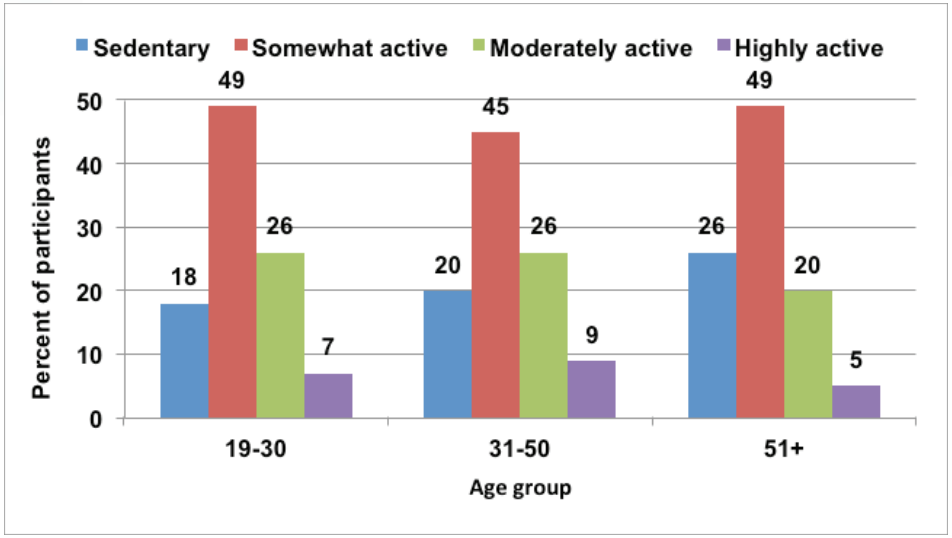


Figure 14c. Self-reported activity level in First Nations men in Ontario, by age group (n=531)

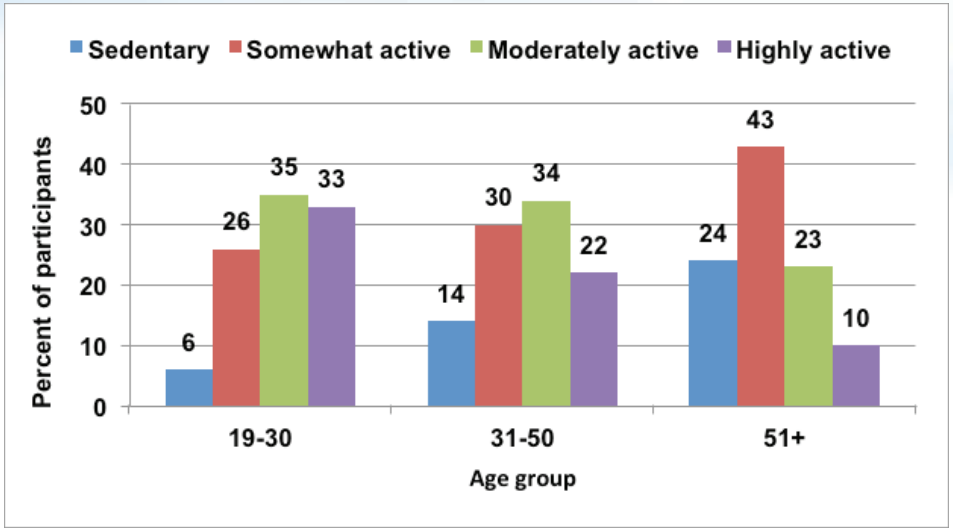


Figure 15a. Self-perceived health in First Nations adults in Ontario

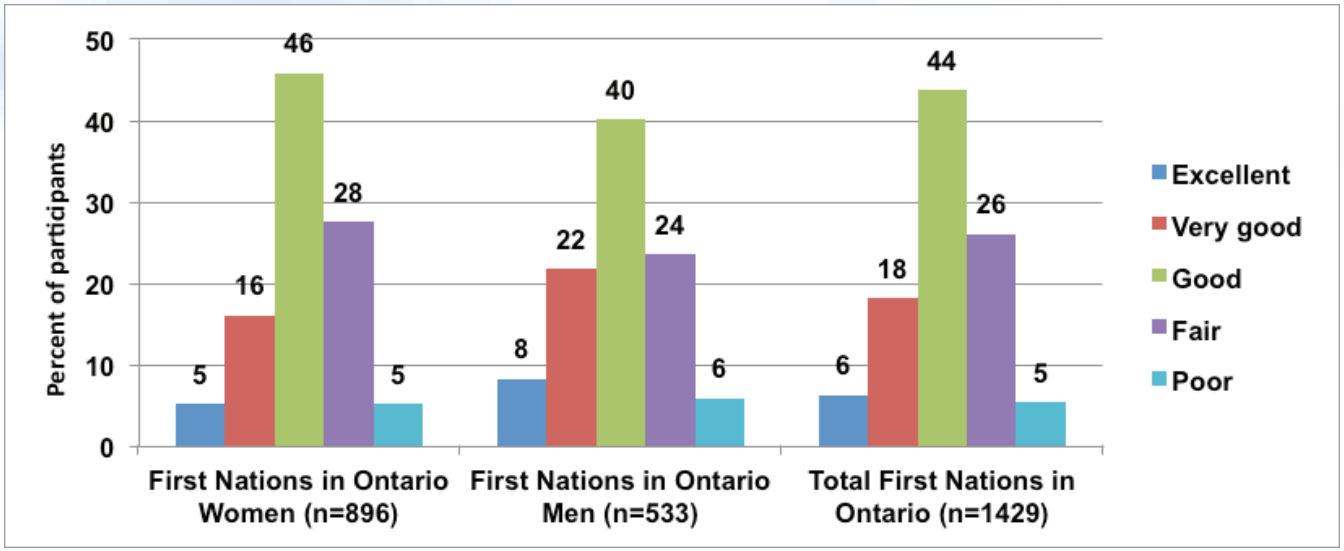


Figure 15b. Self-perceived health in First Nations women in Ontario, by age group (n=896)

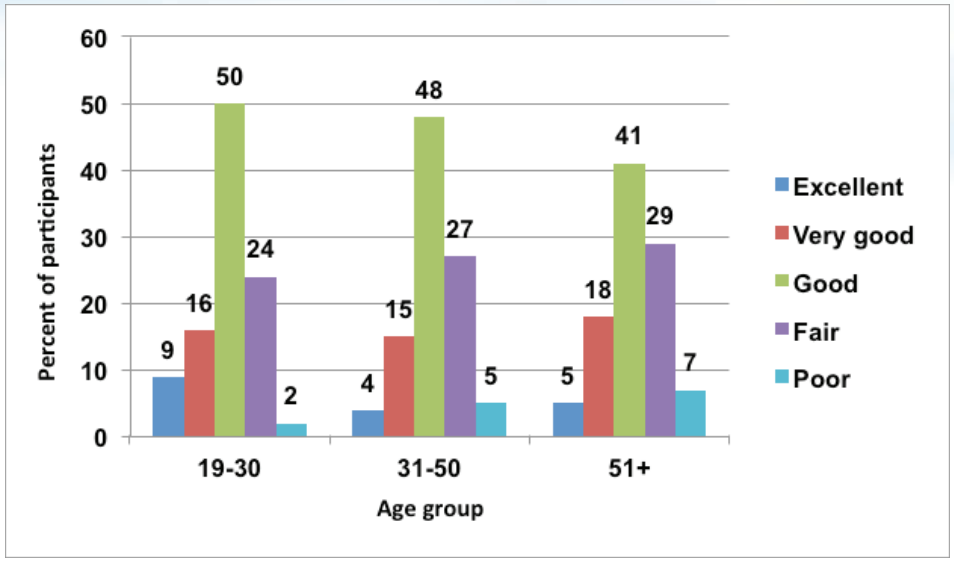
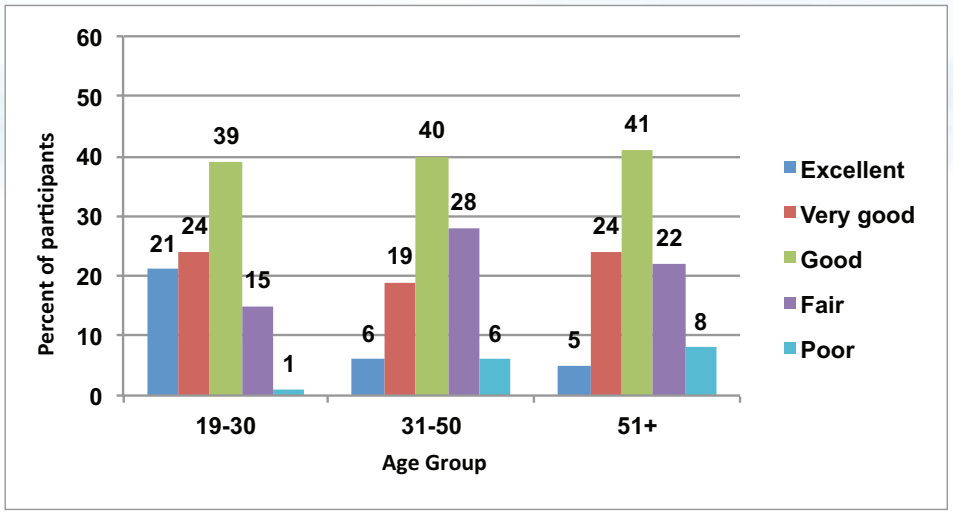


Figure 15c. Self-perceived health in First Nations men in Ontario, by age group (n=533)



Traditional Food Use and Gardening

Table 6. Percent of First Nations adults in Ontario consuming traditional foods in the past year, by ecozone/culture area and all First Nations in Ontario

	Percent Consumption				
Traditional Food Item	Ecozone 1 n=359	Ecozone 2 n=344	Ecozone 3 n=266	Ecozone 4 n=460	First Nations in Ontario n=1429
FISH	84	79	81	55	73
Walleye/yellow pickerel	80	56	49	35	58
Lake whitefish	38	46	15	3	26
Trout (all combined)	23	41	32	5	21
Northern pike	25	28	41	3	19
Lake trout	17	32	9	2	14
Sturgeon	25	6	28	5	14
Yellow Perch	3	16	1	23	12
Smelt	0	28	1	2	7
Chinook (King) salmon	1	13	0	9	6
Smallmouth Bass	0	14	0	10	6
Speckle (brook) trout	3	11	17	1	5
Rainbow trout	2	13	4	3	5
White perch/White Bass	3	5	0	9	5
White Sucker	11	1	0	0	5
Largemouth Bass	0	10	0	5	4
Ling (Burbot or Maria)	6	2	0	0	3
Round whitefish	0	2	20	0	2
Sauger	5	0	0	0	2
Red (longnose) Sucker	5	0	0	0	2

Table 6. Percent of First Nations adults in Ontario consuming traditional foods in the past year, by ecozone/culture area and all First Nations in Ontario

	Percent Consumption				
Traditional Food Item	Ecozone 1 n=359	Ecozone 2 n=344	Ecozone 3 n=266	Ecozone 4 n=460	First Nations in Ontario n=1429
Splake trout	0	3	2	0	1
Lake herring (Cisco)	0	3	1	0	1
Bluegill sunfish	0	0	0	2	1
Brown bullhead catfish	0	1	0	3	1
Channel Catfish	0	0	0	1	1
Eel	2	0	1	0	1
Brown trout	0	1	0	0	0
Rock Bass	0	1	0	1	0
Muskie	0	0	0	1	0
WILD GAME	78	63	97	55	68
Moose meat	67	57	96	26	53
Deer meat	24	40	1	48	34
Rabbit meat	17	15	33	5	14
Moose liver	20	5	15	1	10
Caribou meat	12	1	34	2	8
Beaver meat	15	2	17	1	8
Moose kidney	12	2	16	0	6
Elk meat	2	4	0	4	3
Deer liver	0	2	0	1	1
Caribou liver	3	0	2	0	1
Caribou kidney	3	0	4	0	1
Black bear meat	0	1	0	1	1
Muskrat meat	1	0	1	2	1
Squirrel meat (red, grey, black)	0	2	0	1	1
Ground squirrel meat	0	0	0	2	1

Table 6. Percent of First Nations adults in Ontario consuming traditional foods in the past year, by ecozone/culture area and all First Nations in Ontario

	Percent Consumption				
Traditional Food Item	Ecozone 1 n=359	Ecozone 2 n=344	Ecozone 3 n=266	Ecozone 4 n=460	First Nations in Ontario n=1429
River otter meat	0	0	2	0	0
Deer kidney	0	1	0	0	0
Black bear fat	0	0	1	0	0
Other land mammals (moose tongue, heart, and nose, squirrel, porcupine, deer heart)	0	1	2	0	1
WILD BIRDS	54	34	92	15	39
Canada goose	41	4	91	2	23
Ducks (all combined)	27	4	47	5	16
Mallard	26	3	44	3	14
Grey partridge	17	23	22	1	13
Grouse (Blue, Ruffed, Sharp-tailed)	17	7	9	0	9
Snow goose	12	0	43	1	7
Wild turkey	0	3	2	11	4
Scoter (surf, white winged, black)	2	0	1	0	1
Wood duck	1	1	0	1	1
Ring necked duck	3	0	0	0	1
Northern pintail	1	0	8	1	1
American black	1	1	1	0	1
Teal	1	0	7	0	1
Golden eye	3	0	1	0	1
Bufflehead	2	0	0	0	1
Loon	2	0	3	0	1
Merganser	1	0	2	0	1
Ring-necked pheasant	0	0	1	1	1

Table 6. Percent of First Nations adults in Ontario consuming traditional foods in the past year, by ecozone/culture area and all First Nations in Ontario

	Percent Consumption				
Traditional Food Item	Ecozone 1 n=359	Ecozone 2 n=344	Ecozone 3 n=266	Ecozone 4 n=460	First Nations in Ontario n=1429
Bird eggs (goose, northern shoveler, seagull)	1	0	7	0	1
Canvasback	1	0	0	0	0
American wigeon	0	0	0	1	0
Northern shoveler	0	0	2	0	0
Other wild bird (snowy owl, swan, yellow legs)	0	0	3	0	0
WILD BERRIES OR NUTS	63	69	55	53	60
Blueberries	60	61	20	14	42
Wild Strawberry	22	41	6	39	31
Raspberry (wild)	25	37	17	23	26
Blackberry	1	21	0	9	8
Hickory nuts	0	0	0	22	7
Black raspberry	1	10	2	10	6
Cranberry (low-bush/lingonberry)	1	11	24	1	5
Cherry (pin, chokecherry, sand)	3	9	1	4	4
Gooseberry/currant	6	3	3	0	3
Serviceberry (juneberry)	6	1	6	0	3
Crabapple	2	10	0	1	3
Highbush Cranberry (Squashberry, Mooseberry)	1	4	10	1	2
Hazelnut	0	6	0	2	2
Walnuts	0	1	0	6	2
Thimbleberries (salmonberry)	0	1	0	2	1
Rose hips (prickly rose)	0	1	0	1	1
Juniper	1	2	0	1	1
Crowberry	1	0	0	0	0

Table 6. Percent of First Nations adults in Ontario consuming traditional foods in the past year, by ecozone/culture area and all First Nations in Ontario

	Percent Consumption				
Traditional Food Item	Ecozone 1 n=359	Ecozone 2 n=344	Ecozone 3 n=266	Ecozone 4 n=460	First Nations in Ontario n=1429
Teaberry (wintergreen)	0	1	0	0	0
Buffaloberry	0	0	2	0	0
Bearberry	0	0	3	0	0
Hawthorn	0	1	0	0	0
Sumac	0	2	0	0	0
Other berries or nuts (elderberry, beech nuts, chestnuts)	0	0	0	2	1
WILD PLANTS	34	22	28	37	32
Wild rice	23	3	0	6	12
Wihkes (muskrat/ rat root)	9	3	0	7	7
Labrador tea leaves	7	4	27	2	6
Mint leaves	0	5	0	5	3
Wild onion	2	4	0	3	3
Wild leek	0	2	0	5	2
Fiddleheads (Ostrich fern)	1	4	0	3	2
Dandelions	1	3	0	3	2
Wild ginger	0	1	0	1	1
Raspberry leaves	0	2	0	3	1
Wintergreen (teaberry) leaves	0	3	0	0	1
Stinging nettle leaves	0	0	0	2	1
Jerusalem artichoke	0	0	0	1	0
Thimbleberry, salmonberry shoots	1	0	0	0	0
Cow parsnip	0	0	0	1	0
Wild basil	0	0	0	1	0

Table 6. Percent of First Nations adults in Ontario consuming traditional foods in the past year, by ecozone/culture area and all First Nations in Ontario

	Percent Consumption				
Traditional Food Item	Ecozone 1 n=359	Ecozone 2 n=344	Ecozone 3 n=266	Ecozone 4 n=460	First Nations in Ontario n=1429
Other wild plants (goldthread root tea, pepper roots, wild garlic, honey suckle, St. John's wort, wild bergamot, wild chives)	0	2	0	9	4
TREE FOODS	13	32	2	28	21
Maple syrup	5	29	0	26	17
Pine needle tea (Jack and white)	3	0	0	1	2
White Pine seeds/nut	0	0	0	2	1
Poplar (cottonwood) inner bark	1	0	0	0	0
Spruce (black or white) inner bark	1	0	0	0	0
Other tree foods (cedar tea, mullein, juniper tea, slippery elm, willow bark)	6	7	2	8	7
MUSHROOMS	0	2	0	3	1
Morels and puff balls	0	2	0	3	1
CULTIVATED TRADITIONAL FOOD*	3	41	4	88	57
Corn/hominy	0	18	0	84	33
Beans	0	13	0	49	19
Squash	0	10	0	51	19

*This category was only included on the questionnaire in the second year of data collection.

Table 7a. Seasonal frequency of use of top ten traditional food items, based on average days per year, for First Nations in Ontario

Traditional Food	Total participants	Average days per year food consumed (95th pctile)	Percent of consumers	Average days per season (95th pctile) for all participants (n=1429)			
				Average days per season (95th pctile) Consumers only			
	Consumers only	Average days/ year (95th pctile)		Summer	Spring	Winter	Fall
Walleye/yellow pickerel	Total participants	11 (50)	58	4 (25)	3 (12)	2 (12)	2 (12)
	Consumers only	20 (100)	100	7 (30)	5 (30)	4 (20)	4 (30)
Moose meat	Total participants	10 (48)	53	2 (12)	2 (12)	2 (12)	4 (18)
	Consumers only	19 (80)	100	5 (21)	4 (12)	4 (20)	7 (30)
Blueberries	Total participants	6 (30)	42	3 (12)	1 (2)	1 (2)	1 (3)
	Consumers only	14 (54)	100	8 (30)	2 (12)	2 (12)	2 (12)
Canada goose	Total participants	5 (28)	23	1 (5)	3 (12)	1 (3)	1 (5)
	Consumers only	23 (90)	100	5 (20)	11 (60)	3 (10)	4 (12)
Lake whitefish	Total participants	5 (24)	26	2 (10)	1 (6)	1 (5)	1 (6)
	Consumers only	19 (84)	100	6 (30)	4 (24)	3 (12)	5 (24)
Strawberries	Total participants	4 (16)	31	2 (12)	1 (1)	0 (0)	0 (0)
	Consumers only	13 (54)	100	8 (30)	2 (12)	1 (6)	2 (10)
Deer meat	Total participants	3 (16)	34	1 (3)	0 (3)	1 (6)	1 (8)
	Consumers only	10 (38)	100	2 (7)	1 (6)	3 (12)	4 (12)
Raspberries	Total participants	3 (12)	26	2 (7)	0 (0)	0 (0)	0 (0)
	Consumers only	11 (48)	100	6 (30)	2 (12)	1 (2)	2 (2)
Northern pike	Total participants	2 (12)	19	1 (4)	1 (3)	1 (3)	1 (2)
	Consumers only	12 (48)	100	4 (12)	3 (12)	3 (12)	3 (12)
Maple syrup	Total participants	2 (12)	17	1 (3)	1 (3)	1 (2)	0 (2)
		14 (48)	100	3 (12)	5 (12)	3 (20)	3 (12)

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

Table 7b. Seasonal frequency of use of top ten traditional food items, based on average days per year, Ecozone 1

Traditional Food	Total participants	Average days per year food consumed (95th pctile)	Percent of consumers	Average days per season (95th pctile) for Ecozone 1 participants (n=359)			
				Average days per season (95th pctile) Consumers only			
	Consumers only	Average days/ year (95th pctile)		Summer	Spring	Winter	Fall
Walleye/yellow pickerel	Total participants	23 (120)	80	8 (30)	6 (30)	4 (30)	5 (30)
	Consumers only	29 (120)	100	11 (30)	7 (40)	5 (30)	6 (30)
Moose meat	Total participants	14 (48)	67	4 (12)	3 (12)	3 (12)	5 (30)
	Consumers only	21 (78)	100	5 (30)	4 (12)	4 (12)	7 (30)
Lake whitefish	Total participants	8 (40)	38	3 (12)	2 (12)	1 (8)	2 (12)
	Consumers only	22 (102)	100	8 (36)	5 (30)	4 (20)	6 (30)
Canada goose	Total participants	8 (42)	41	2 (8)	4 (30)	1 (5)	2 (6)
	Consumers only	20 (64)	100	4 (12)	10 (30)	2 (6)	4 (12)
Blueberries	Total participants	5 (30)	60	4 (12)	0 (0)	0 (1)	1 (3)
	Consumers only	9 (36)	100	6 (25)	1 (1)	1 (2)	1 (6)
Northern pike	Total participants	5 (24)	25	1 (6)	1 (6)	1 (12)	1 (6)
	Consumers only	18 (80)	100	5 (30)	4 (20)	5 (20)	4 (20)
Lake trout	Total participants	3 (12)	17	2 (6)	1 (2)	0 (1)	0 (3)
	Consumers only	16 (78)	100	9 (36)	3 (12)	2 (6)	3 (12)
White sucker	Total participants	2 (8)	11	1 (2)	1 (4)	0 (0)	1 (2)
	Consumers only	21 (120)	100	6 (30)	6 (30)	4 (30)	5 (30)
Moose liver	Total participants	2 (8)	20	1 (2)	0 (2)	1 (2)	1 (3)
	Consumers only	12 (48)	100	3 (12)	2 (12)	3 (12)	3 (12)
Ducks	Total participants	2 (6)	27	0 (2)	1 (4)	0 (0)	0 (2)
	Consumers only	8 (24)	100	1 (6)	5 (12)	0 (2)	2 (6)

Table 7c. Seasonal frequency of top ten consumed traditional food items, based on average days per year, Ecozone 2

Traditional Food	Total participants	Average days per year food consumed (95th pctile)	Percent of consumers	Average days per season (95th pctile) for Ecozone 2 participants (n=344)			
				Average days per season (95th pctile) Consumers only			
	Consumers only	Average days/ year (95th pctile)		Summer	Spring	Winter	Fall
Moose meat	Total participants	12 (55)	57	3 (12)	2 (12)	4 (21)	4 (26)
	Consumers only	22 (108)	100	5 (24)	4 (21)	6 (30)	7 (30)
Blueberries	Total participants	12 (54)	61	6 (30)	2 (12)	2 (12)	2 (13)
	Consumers only	20 (96)	100	10 (48)	3 (24)	3 (24)	4 (30)
Strawberries	Total participants	9 (48)	41	4 (30)	2 (7)	1 (4)	1 (4)
	Consumers only	21 (75)	100	10 (54)	5 (30)	3 (15)	3 (15)
Lake whitefish	Total participants	7 (42)	46	2 (12)	2 (12)	1 (6)	2 (12)
	Consumers only	15 (48)	100	4 (12)	4 (12)	3 (12)	4 (12)
Raspberries	Total participants	6 (12)	37	2 (12)	1 (0)	1 (0)	1 (1)
	Consumers only	16 (60)	100	6 (30)	3 (30)	2 (12)	4 (30)
Walleye/yellow pickerel	Total participants	5 (21)	56	2 (7)	2 (6)	1 (4)	1 (4)
	Consumers only	10 (32)	100	3 (12)	3 (12)	1 (6)	2 (12)
Lake trout	Total participants	5 (20)	32	1 (6)	2 (6)	1 (5)	1 (6)
	Consumers only	15 (96)	100	4 (24)	5 (30)	3 (12)	3 (12)
Deer meat	Total participants	4 (24)	40	1 (4)	1 (3)	1 (6)	2 (12)
	Consumers only	11 (48)	100	2 (8)	2 (8)	3 (12)	4 (14)
Maple syrup	Total participants	3 (16)	29	1 (4)	2 (7)	1 (4)	0 (4)
	Consumers only	11 (48)	100	2 (10)	5 (12)	2 (9)	1 (9)
Cranberry (low-bush)	Total participants	3 (2)	11	1 (0)	1 (0)	1 (0)	1 (1)
	Consumers only	25 (90)	100	6 (12)	5 (12)	5 (12)	8 (90)

Table 7d. Seasonal frequency of top ten consumed traditional food items, based on average days per year, Ecozone 3

Traditional Food	Total participants	Average days per year food consumed (95th pctile)	Percent of consumers	Average days per season (95th pctile) for Ecozone 3 participants (n=266)			
				Average days per season (95th pctile) Consumers only			
	Consumers only	Average days/ year (95th pctile)		Summer	Spring	Winter	Fall
Canada goose	Total participants	36 (152)	91	8 (40)	16 (72)	6 (30)	6 (30)
	Consumers only	39 (152)	100	8 (40)	18 (72)	6 (30)	7 (60)
Moose meat	Total participants	25 (80)	96	6 (30)	5 (30)	4 (20)	10 (30)
	Consumers only	26 (84)	100	6 (30)	5 (30)	5 (20)	10 (30)
Snow goose	Total participants	14 (80)	43	3 (10)	4 (30)	3 (10)	4 (10)
	Consumers only	32 (152)	100	6 (17)	10 (72)	7 (60)	9 (60)
Caribou meat	Total participants	6 (40)	34	1 (10)	2 (12)	2 (10)	1 (12)
	Consumers only	18 (48)	100	4 (12)	5 (12)	4 (15)	4 (15)
Labrador tea	Total participants	6 (24)	27	2 (6)	1 (6)	1 (6)	1 (6)
	Consumers only	21 (80)	100	6 (20)	5 (30)	5 (20)	5 (20)
Walleye/yellow pickerel	Total participants	6 (30)	49	3 (20)	1 (5)	0 (2)	2 (10)
	Consumers only	11 (51)	100	6 (30)	1 (6)	0 (2)	3 (20)
Ducks	Total participants	5 (40)	47	2 (13)	2 (10)	0 (1)	1 (9)
	Consumers only	11 (50)	100	5 (30)	4 (14)	0 (1)	3 (2)
Northern pike	Total participants	5 (20)	41	2 (6)	1 (4)	1 (2)	1 (6)
	Consumers only	11 (48)	100	6 (15)	2 (6)	2 (6)	2 (10)
Rabbit meat	Total participants	3 (12)	33	0 (2)	0 (3)	1 (4)	1 (3)
	Consumers only	8 (33)	100	1 (4)	2 (6)	3 (10)	2 (10)
Round whitefish	Total participants	2 (7)	20	2 (6)	0 (0)	0 (1)	0 (2)
	Consumers only	10 (63)	100	8 (60)	0 (3)	0 (3)	1 (6)

Table 7e. Seasonal frequency of top ten consumed traditional food items, based on average days per year, Ecozone 4

Traditional Food	Total participants	Average days per year food consumed (95th pctile)	Percent of consumers	Average days per season (95th pctile) for Ecozone 4 participants (n=460)			
				Average days per season (95th pctile) Consumers only			
	Consumers only	Average days/ year (95th pctile)		Summer	Spring	Winter	Fall
Corn/hominy	Total participants	15 (48)	84	5 (15)	3 (12)	3 (12)	4 (13)
	Consumers only	18 (52)	100	6 (20)	4 (12)	4 (12)	5 (14)
Beans	Total participants	10 (48)	49	4 (13)	2 (12)	2 (12)	2 (12)
	Consumers only	21 (63)	100	9 (30)	4 (12)	4 (12)	4 (12)
Squash	Total participants	6 (28)	51	2 (12)	1 (6)	1 (8)	2 (12)
	Consumers only	12 (48)	100	4 (13)	2 (12)	3 (12)	4 (12)
Deer meat	Total participants	6 (36)	48	1 (4)	1 (6)	2 (12)	2 (10)
	Consumers only	12 (39)	100	2 (12)	2 (9)	4 (26)	4 (12)
Strawberries	Total participants	4 (20)	39	3 (12)	1 (4)	0 (0)	1 (1)
	Consumers only	12 (40)	100	7 (28)	2 (12)	1 (6)	1 (6)
Maple syrup	Total participants	4 (21)	26	1 (5)	1 (6)	1 (5)	1 (5)
	Consumers only	17 (66)	100	4 (20)	5 (20)	4 (20)	4 (20)
Raspberries	Total participants	3 (12)	23	2 (12)	1 (0)	0 (0)	0 (0)
	Consumers only	14 (48)	100	7 (30)	2 (12)	2 (12)	2 (12)
Blueberries	Total participants	3 (12)	13	1 (6)	1 (3)	1 (0)	1 (2)
	Consumers only	23 (108)	100	10 (54)	5 (12)	4 (12)	5 (12)
Walleye/yellow pickerel	Total participants	3 (17)	35	1 (5)	1 (5)	1 (2)	0 (3)
	Consumers only	8 (32)	100	3 (12)	2 (8)	1 (6)	1 (5)
Yellow perch	Total participants	3 (10)	23	1 (5)	1 (3)	1 (2)	0 (2)
	Consumers only	11 (60)	100	4 (20)	3 (15)	2 (15)	2 (15)

Table 8. Mean portion size of traditional food categories, by gender and age group, as reported from 24hr recalls, First Nations in Ontario, 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	190	172	185	203	306	293
Land mammals	204	141	200	234	229	260
Land mammal fat (moose)*	43	43	43	43	43	43
Wild birds	183	183	183	183	183	183
Bird egg**	144	144	144	144	144	144
Wild berries	159	159	159	140	140	140
Wild rice*	95	95	95	95	95	95
Wild plants, roots, shoots or greens	1	1	1	0.4	0.4	0.4
Maple syrup	54	54	54	54	54	54
Tree foods***	1	1	1	1	1	1
Mushrooms***	48	48	48	48	48	48

Notes: portion sizes for wild birds, wild berries, wild plants, and maple syrup were based on mean values by total or gender due to the low number of observations
*imputed portion size from 1 participant
**imputed portion size from Canadian nutrient file values for goose egg; Health Canada, 2010.
***imputed values from Chan et al, 2011.

Table 9a. Daily (average and heavy (95th percentile)) intake of Traditional Food in grams by age group for all First Nations adults in Ontario and consumers* only

Food category	Level of consumption	Women			Men			First Nations in Ontario (n=1429)
		Age 19-50	Age 51-70	Age 71+	Age 19-50	Age 51-70	Age 71+	
Total traditional food	Total participants (average)	32.07	36.59	57.75	40.04	59.98	133.46	42.65
	Total participants (95th pctile)	133.62	154.13	325.47	176.20	239.41	499.15	204.90
	Consumers only (average)	34.64	38.55	61.44	44.13	61.20	136.74	45.64
	Consumers only (95th pctile)	133.81	160.43	325.47	177.40	239.41	499.15	209.62
Fish	Total participants (average)	9.18	12.32	16.80	16.94	30.15	86.02	17.03
	Total participants (95th pctile)	41.64	58.90	134.82	73.97	130.78	179.81	78.70
	Consumers only (average)	14.43	16.25	24.72	21.15	40.47	94.53	23.64
	Consumers only (95th pctile)	66.63	72.10	134.82	77.86	178.57	179.81	117.12
Game meat	Total participants (average)	8.62	5.02	7.80	12.05	9.67	20.54	9.23
	Total participants (95th pctile)	40.24	22.41	46.03	42.31	36.39	79.07	38.01
	Average consumers only	12.99	8.77	13.60	15.71	13.46	23.34	13.58
	Consumers only (average)	61.48	33.99	63.01	47.44	75.29	79.07	55.63
Game organs	Consumers only (95th pctile)	0.76	1.61	3.16	1.92	0.82	3.86	1.40
	Total participants (95th pctile)	0.56	0.77	21.92	7.69	2.51	28.49	2.56
	Consumers only (average)	12.42	17.75	14.98	11.72	5.47	24.28	12.89
	Consumers only (95th pctile)	107.31	200.88	52.60	46.16	20.08	68.38	61.55

Table 9a. Daily (average and heavy (95th percentile)) intake of Traditional Food in grams by age group for all First Nations adults in Ontario and consumers* only

Food category	Level of consumption	Women			Men			First Nations in Ontario (n=1429)
		Age 19-50	Age 51-70	Age 71+	Age 19-50	Age 51-70	Age 71+	
Birds	Total participants (average)	4.58	1.91	4.22	4.87	7.71	12.34	4.75
	Total participants (95th pctile)	21.06	12.53	32.09	25.25	42.62	42.62	22.56
	Consumers only (average)	12.28	5.86	12.98	11.55	20.20	18.72	12.34
	Consumers only (95th pctile)	61.17	27.07	74.20	36.10	85.73	49.64	43.62
Berries, plants	Total participants (average)	8.93	15.71	25.57	4.25	11.62	10.58	10.21
	Total participants (95th pctile)	54.20	53.04	110.65	19.95	46.93	28.20	46.93
	Consumers only (average)	12.01	17.84	31.17	6.26	13.17	11.79	13.10
	Consumers only (95th pctile)	65.12	67.62	110.65	27.62	46.93	28.20	52.16

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

First Nations in Ontario, consumers only		Gender		Total
		Women	Men	
Total Traditional Food	Average consumer	37.62	59.44	45.66
	Heavy consumer	154.13	218.22	209.62
Fish	Average consumer	15.74	35.18	23.64
	Heavy consumer	69.75	179.81	117.12
Walleye/pickerel	Average consumer	7.16	19.15	12.44
	Heavy consumer	26.03	116.40	52.82
Lake whitefish	Average consumer	8.20	15.07	10.86
	Heavy consumer	33.93	80.09	50.30
Trout	Average consumer	2.61	3.83	3.05
	Heavy consumer	8.11	10.06	10.06
Game meat	Average consumer	11.85	16.02	13.58
	Heavy consumer	50.30	61.55	55.63
Moose	Average consumer	10.13	12.02	10.92
	Heavy consumer	46.95	46.16	46.16
Deer	Average consumer	5.16	6.23	5.67
	Heavy consumer	21.24	25.00	25.00
Rabbit	Average consumer	2.69	3.71	3.17
	Heavy consumer	9.27	11.92	11.54
Game organs	Average consumer	14.70	11.33	12.89
	Heavy consumer	107.31	51.29	61.55
Moose liver	Average consumer	6.18	5.92	6.04
	Heavy consumer	26.83	30.77	26.83

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

First Nations in Ontario, consumers only		Gender		Total
		Women	Men	
Moose kidney	Average consumer	8.52	5.72	7.10
	Heavy consumer	26.83	17.10	26.83
Deer liver	Average consumer	0.45	7.75	6.19
	Heavy consumer	0.56	30.77	30.77
Birds	Average consumer	10.52	14.89	12.34
	Heavy consumer	45.12	43.62	43.62
Canada goose	Average consumer	11.15	11.88	11.47
	Heavy consumer	48.13	42.12	45.12
Ducks	Average consumer	4.14	4.82	4.47
	Heavy consumer	12.03	12.03	12.03
Partridge	Average consumer	1.79	3.25	2.36
	Heavy consumer	9.02	12.03	12.03
Plants	Average consumer	15.32	9.26	13.14
	Heavy consumer	65.41	38.82	52.16
Blueberries	Average consumer	8.10	2.62	5.83
	Heavy consumer	42.25	11.51	23.52
Corn	Average consumer	3.11	4.47	3.56
	Heavy consumer	11.05	20.52	14.50
Strawberries	Average consumer	7.41	2.27	5.40
	Heavy consumer	31.36	4.60	23.52

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

Food Category	Level of consumption	All First Nations in Ontario	Ecozone 1	Ecozone 2	Ecozone 3	Ecozone 4
Total Traditional Food	Average consumer	45.66	59.08	45.92	64.43	26.76
	Heavy consumer	209.62	220.31	203.34	242.51	123.25
Fish	Average consumer	23.64	34.86	18.81	13.38	10.35
	Heavy consumer	117.12	179.81	73.97	65.39	59.40
Game meat	Average consumer	13.58	14.76	15.46	20.61	8.21
	Heavy consumer	55.63	63.01	67.07	78.25	33.99
Game organs	Average consumer	12.89	14.24	14.24	5.53	4.88
	Heavy consumer	61.55	68.38	68.38	15.67	8.98
Birds	Average consumer	12.34	13.40	2.27	31.22	2.28
	Heavy consumer	43.62	42.62	8.02	153.28	6.52
Plants	Average consumer	13.14	6.39	20.43	4.63	16.09
	Heavy consumer	52.16	27.62	70.57	20.91	63.45

Table 10b. Average and 95th percentile grams of traditional food consumed per day by category (and by top 3 species per category by frequency), for average and heavy consumers only, Ecozone 1

Ecozone 1		Gender		Total
		Women	Men	
Total Traditional Food	Average consumer	42.57	79.42	59.08
	Heavy consumer	153.62	335.64	220.31
Fish	Average consumer	22.59	48.07	34.86
	Heavy consumer	86.71	179.81	179.81
Walleye	Average consumer	10.32	26.53	18.15
	Heavy consumer	37.48	116.40	100.60
Lake whitefish	Average consumer	9.84	17.27	13.18
	Heavy consumer	37.70	85.51	62.47
Northern pike	Average consumer	10.15	12.21	11.43
	Heavy consumer	37.70	40.24	40.24
Game meat	Average consumer	11.48	18.32	14.76
	Heavy consumer	35.54	75.29	63.01
Moose	Average consumer	9.70	14.76	12.09
	Heavy consumer	30.13	57.70	46.16
Deer	Average consumer	1.88	4.73	3.58
	Heavy consumer	6.58	11.40	11.40
Rabbit	Average consumer	2.95	3.93	3.48
	Heavy consumer	13.41	11.54	13.41
Game organs	Average consumer	17.37	11.68	14.24
	Heavy consumer	107.31	46.16	68.38
Moose liver	Average consumer	6.45	6.02	6.22
	Heavy consumer	26.83	25.64	26.83
Moose kidney	Average consumer	8.96	6.48	7.66
	Heavy consumer	61.81	17.10	26.83
Caribou liver	Average consumer	19.74	8.45	12.96
	Heavy consumer	30.90	30.77	30.90

Table 10b. Average and 95th percentile grams of traditional food consumed per day by category (and by top 3 species per category by frequency), for average and heavy consumers only, Ecozone 1

Ecozone 1		Gender		Total
		Women	Men	
Birds	Average consumer	11.70	15.31	13.40
	Heavy consumer	38.61	42.62	42.62
Canada goose	Average consumer	9.19	10.69	9.89
	Heavy consumer	36.10	27.58	32.09
Partridge	Average consumer	1.64	3.40	2.49
	Heavy consumer	6.02	15.04	12.03
Ducks	Average consumer	4.76	4.77	4.77
	Heavy consumer	11.03	12.03	12.03
Plants	Average consumer	6.75	5.95	6.39
	Heavy consumer	26.25	27.62	27.62
Blueberries	Average consumer	4.72	2.37	3.61
	Heavy consumer	20.91	11.51	13.81
Raspberries	Average consumer	1.90	3.13	2.37
	Heavy consumer	5.23	13.81	13.81
Wild rice	Average consumer	1.07	3.75	2.09
	Heavy consumer	3.64	7.81	6.25

Table 10c. Average and 95th percentile grams of traditional food consumed per day by category (and by top 3 species per category by frequency), for average and heavy consumers only, Ecozone 2

Ecozone 2		Gender		Total
		Women	Men	
Total Traditional Food	Average consumer	44.65	48.76	45.92
	Heavy consumer	173.93	218.22	203.34
Fish	Average consumer	14.39	28.14	18.81
	Heavy consumer	45.24	155.93	73.97
Walleye/pickerel	Average consumer	3.75	9.34	5.74
	Heavy consumer	11.31	38.53	19.79
Lake whitefish	Average consumer	6.84	11.96	8.46
	Heavy consumer	22.62	80.09	40.24
Trout	Average consumer	2.75	2.26	2.61
	Heavy consumer	9.37	5.87	9.37
Game meat	Average consumer	15.02	16.24	15.46
	Heavy consumer	67.07	69.24	67.07
Moose	Average consumer	13.18	10.42	12.18
	Heavy consumer	67.07	30.77	60.36
Deer	Average consumer	5.17	7.04	5.99
	Heavy consumer	21.24	30.77	26.83
Rabbit	Average consumer	1.39	4.23	2.43
	Heavy consumer	3.86	23.08	10.04
Game organs	Average consumer	13.50	13.83	13.65
	Heavy consumer	52.60	61.55	61.55
Moose liver	Average consumer	7.77	8.05	7.89
	Heavy consumer	26.30	30.77	30.77
Moose kidney	Average consumer	18.55	0.64	11.29
	Heavy consumer	26.30	0.64	26.30
Deer liver	Average consumer	0.47	11.91	8.89

Table 10c. Average and 95th percentile grams of traditional food consumed per day by category (and by top 3 species per category by frequency), for average and heavy consumers only, Ecozone 2

Ecozone 2		Gender		Total
		Women	Men	
	Heavy consumer	0.56	30.77	30.77
Birds	Average consumer	1.37	3.96	2.27
	Heavy consumer	3.51	12.53	8.02
Partridge	Average consumer	1.30	3.10	1.81
	Heavy consumer	2.51	12.03	12.03
Grouse	Average consumer	1.24	2.85	2.32
	Heavy consumer	3.01	7.02	7.02
Canada goose	Average consumer	0.79	2.46	1.35
	Heavy consumer	2.01	12.03	3.01
Plants	Average consumer	25.76	8.81	20.43
	Heavy consumer	110.65	35.50	70.57
Blueberries	Average consumer	11.65	2.76	8.59
	Heavy consumer	52.27	7.67	41.82
Strawberries	Average consumer	12.29	2.13	9.07
	Heavy consumer	52.27	4.60	32.67
Raspberries	Average consumer	9.12	2.11	6.80
	Heavy consumer	26.14	4.60	26.14

Table 10d. Average and 95th percentile grams of traditional food consumed per day by category (and by top 3 species per category by frequency), for average and heavy consumers only, Ecozone 3

Ecozone 3		Gender		Total
		Women	Men	
Total Traditional Food	Average consumer	51.53	94.08	64.43
	Heavy consumer	242.51	506.95	242.51
Fish	Average consumer	9.38	21.45	13.38
	Heavy consumer	62.99	82.68	65.39
Walleye/pickerel	Average consumer	5.01	8.82	6.49
	Heavy consumer	24.03	30.59	26.83
Northern pike	Average consumer	3.71	12.75	7.18
	Heavy consumer	24.99	74.65	26.83
Trout	Average consumer	4.35	5.25	4.84
	Heavy consumer	8.11	11.74	11.74
Game meat	Average consumer	18.05	26.49	20.61
	Heavy consumer	83.28	75.29	78.25
Moose	Average consumer	13.94	15.79	14.50
	Heavy consumer	46.95	56.47	51.29
Caribou	Average consumer	8.55	13.92	10.61
	Heavy consumer	26.83	28.49	26.83
Rabbit	Average consumer	4.14	5.21	4.49
	Heavy consumer	18.63	12.55	18.08
Game organs	Average consumer	3.04	8.67	5.53
	Heavy consumer	14.68	15.67	15.67
Moose kidney	Average consumer	2.07	3.10	2.55
	Heavy consumer	11.18	13.46	11.18
Moose liver	Average consumer	2.06	3.80	2.87
	Heavy consumer	11.18	19.23	11.18
Caribou kidney	Average consumer	0.81	12.17	8.59
	Heavy consumer	1.10	25.10	14.96

Table 10d. Average and 95th percentile grams of traditional food consumed per day by category (and by top 3 species per category by frequency), for average and heavy consumers only, Ecozone 3

Ecozone 3		Gender		Total
		Women	Men	
Birds	Average consumer	25.02	45.44	31.22
	Heavy consumer	97.77	318.13	153.28
Canada goose	Average consumer	18.14	22.87	19.59
	Heavy consumer	65.18	144.39	76.21
Ducks	Average consumer	5.28	8.26	6.31
	Heavy consumer	20.05	46.13	25.07
Snow goose	Average consumer	8.83	30.24	15.99
	Heavy consumer	40.11	144.39	76.21
Plants	Average consumer	4.08	5.92	4.63
	Heavy consumer	20.91	19.95	20.91
Labrador tea	Average consumer	0.06	0.02	0.05
	Heavy consumer	0.33	0.09	0.22
Cranberries	Average consumer	1.57	1.45	1.54
	Heavy consumer	4.36	3.84	4.36
Blueberries	Average consumer	2.92	3.50	3.13
	Heavy consumer	13.07	6.90	10.74

Table 10e. Average and 95th percentile grams of traditional food consumed per day by category (and by top 3 species per category by frequency), for average and heavy consumers only, Ecozone 4

Ecozone 4		Gender		Total
		Women	Men	
Total Traditional Food	Average consumer	26.02	28.30	26.76
	Heavy consumer	123.25	93.19	123.25
Fish	Average consumer	8.56	13.43	10.35
	Heavy consumer	41.64	60.21	59.40
Walleye/pickerel	Average consumer	3.74	6.52	4.92
	Heavy consumer	16.66	20.12	19.27
Yellow perch	Average consumer	6.64	6.74	6.69
	Heavy consumer	31.23	43.59	31.23
Smallmouth bass	Average consumer	1.80	4.82	2.99
	Heavy consumer	4.16	17.61	7.22
Game meat	Average consumer	7.87	8.73	8.21
	Heavy consumer	38.01	26.93	33.99
Deer	Average consumer	6.48	7.03	6.71
	Heavy consumer	34.65	25.64	25.64
Moose	Average consumer	3.75	3.19	3.51
	Heavy consumer	13.41	9.97	9.97
Rabbit	Average consumer	2.79	1.30	2.03
	Heavy consumer	7.82	4.39	7.82
Game organs	Average consumer	0.39	5.77	4.88
	Heavy consumer	0.39	8.98	8.98
Moose liver*	Average consumer	.	3.69	3.69
	Heavy consumer	.	4.49	4.49
Deer liver*	Average consumer	0.39	3.52	2.90
	Heavy consumer	0.39	4.49	4.49

*only 2 types of organ meats reported to be consumed

Table 10e. Average and 95th percentile grams of traditional food consumed per day by category (and by top 3 species per category by frequency), for average and heavy consumers only, Ecozone 4

Ecozone 4		Gender		Total
		Women	Men	
Birds	Average consumer	2.52	1.91	2.28
	Heavy consumer	21.06	5.52	6.52
Wild turkey	Average consumer	0.82	1.17	0.97
	Heavy consumer	2.01	3.01	2.01
Ducks	Average consumer	1.19	0.83	1.00
	Heavy consumer	2.01	3.01	2.01
Canada goose	Average consumer	0.50	1.60	1.27
	Heavy consumer	0.50	2.51	2.51
Plants	Average consumer	17.08	13.94	16.09
	Heavy consumer	70.26	46.93	63.45
Corn	Average consumer	3.32	4.78	3.79
	Heavy consumer	13.38	20.52	14.60
Squash	Average consumer	2.06	2.79	2.30
	Heavy consumer	9.73	10.26	9.73
Beans	Average consumer	3.42	5.94	4.28
	Heavy consumer	10.87	20.52	17.10

Figure 16a. Percent of First Nations households in Ontario participating in traditional food harvest and gathering practices* by ecozone/culture area compared to all Ontario communities (n=1429)

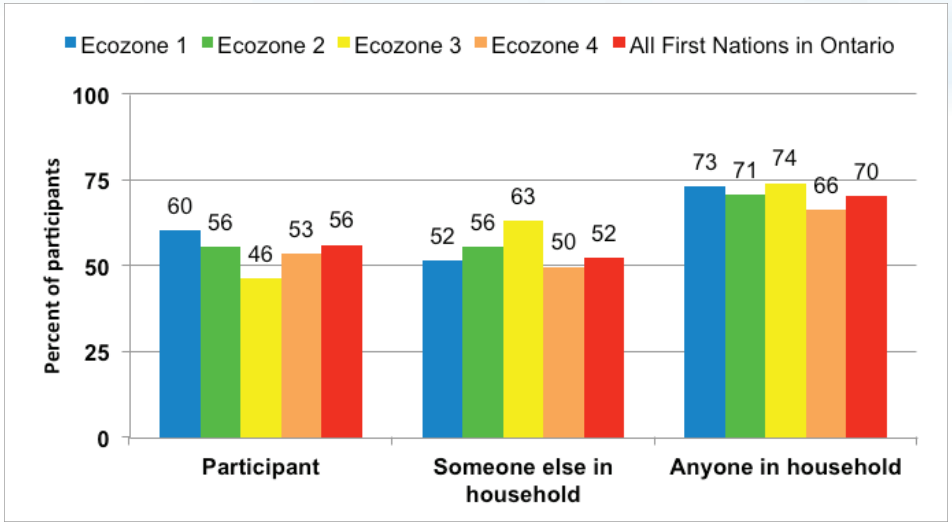
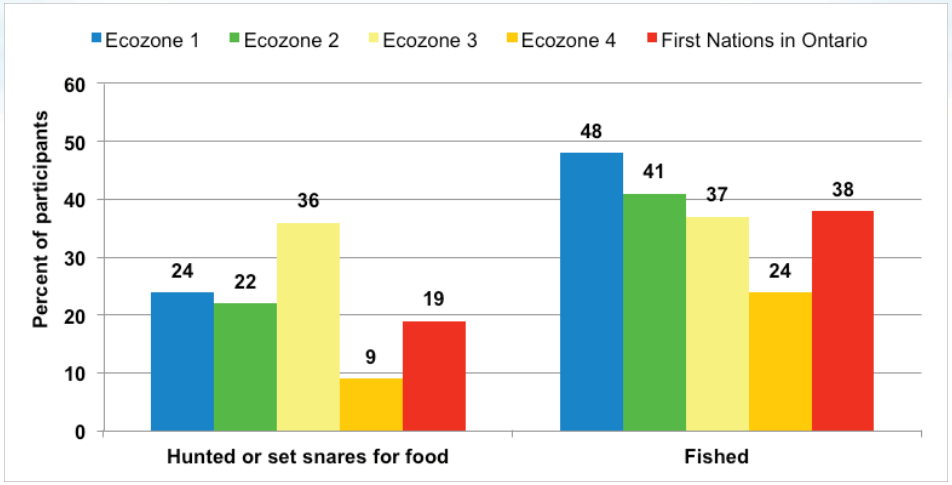


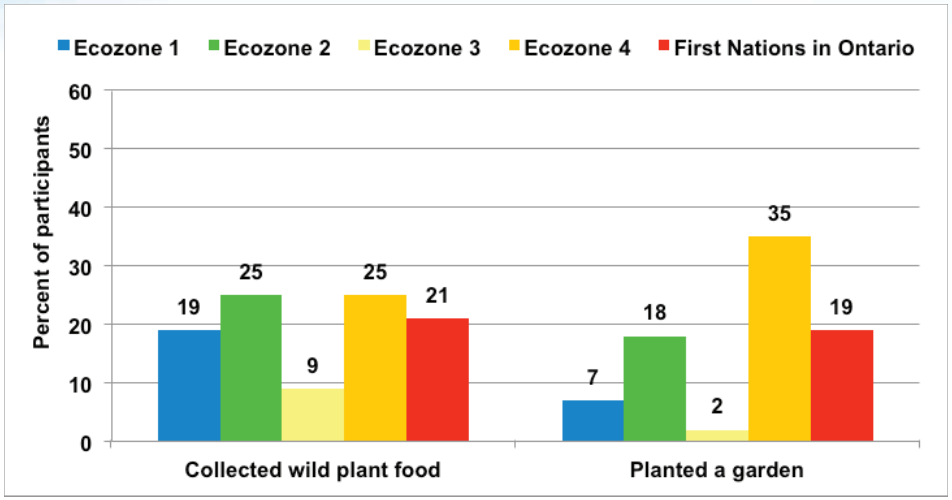
Figure 16b. Traditional food harvest practices by First Nations adults in Ontario by ecozone/culture area compared to all Ontario communities (n=1429)



*includes hunting, fishing, collecting wild plants, or planting a garden

Legend for ecozone/culture areas:
1= Boreal Shield/Subarctic (northwestern ON)
2= Boreal Shield/Northeast (southwestern ON)
3= Hudson Plains/Subarctic (northeastern ON)
4= Mixedwood Plains/Northeast (southeastern ON)

Figure 16c. Traditional food gathering practices by First Nations adults in Ontario by ecozone/culture area compared to all Ontario communities (n=1429)



Legend for ecozone/culture areas:
1= Boreal Shield/Subarctic (northwestern ON)
2= Boreal Shield/Northeast (southwestern ON)
3= Hudson Plains/Subarctic (northeastern ON)
4= Mixedwood Plains/Northeast (southeastern ON)

Figure 17. Percent of First Nations adults in Ontario who ate vegetables and/or fruits from their gardens or community gardens, by ecozone/culture area and total (n=1429)

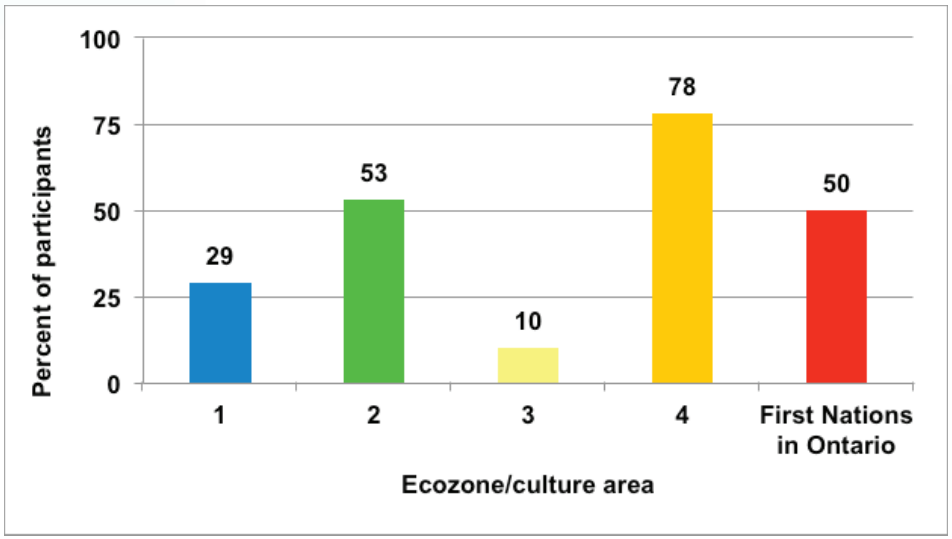
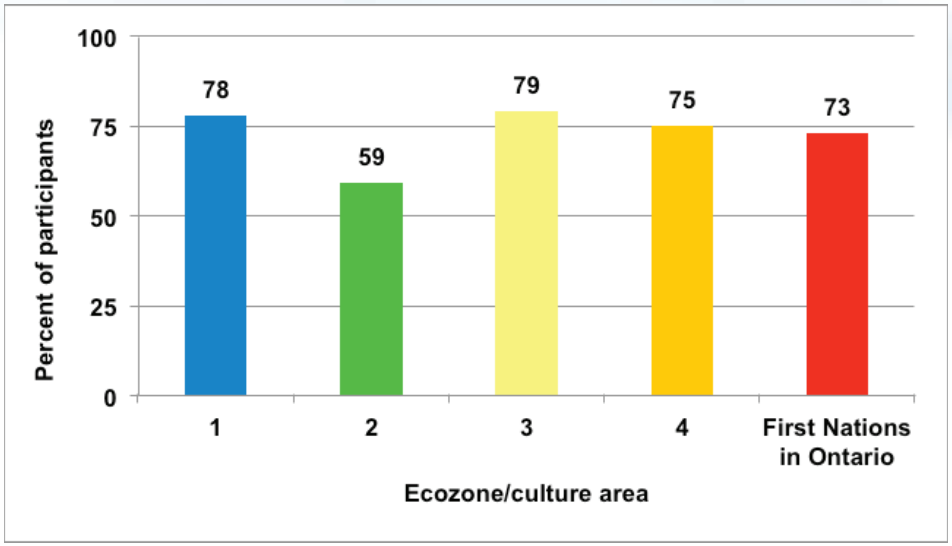
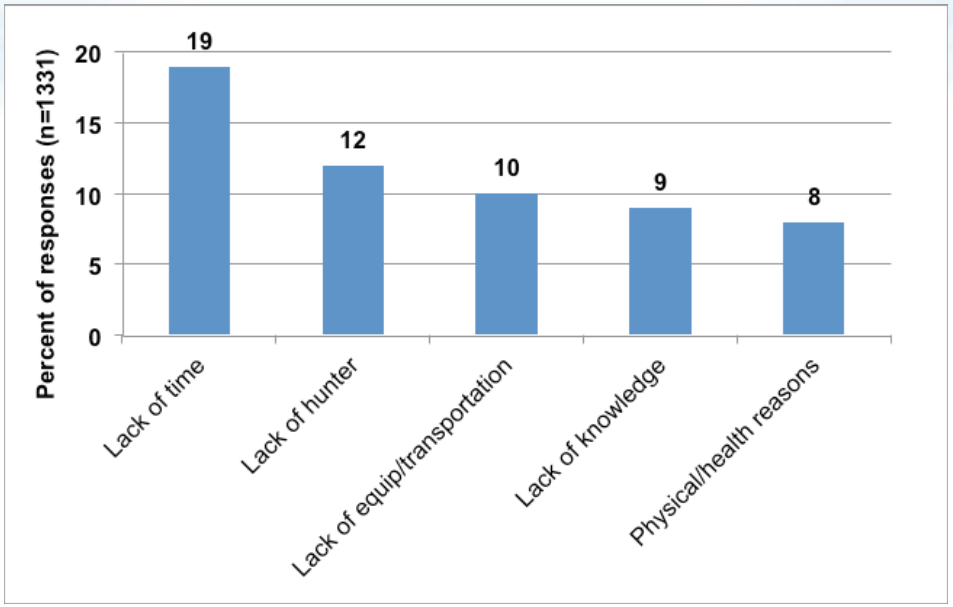


Figure 18. Percent of First Nations adults in Ontario whose households would like more traditional food (n=1421)



Legend for ecozone/culture areas:
1= Boreal Shield/Subarctic (northwestern ON)
2= Boreal Shield/Northeast (southwestern ON)
3= Hudson Plains/Subarctic (northeastern ON)
4= Mixedwood Plains/Northeast (southeastern ON)

Figure 19. Top 5 barriers preventing First Nations households in Ontario 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 Ontario who reported that the following affected (or limited) where they could hunt, fish or collect berries (n=1429)

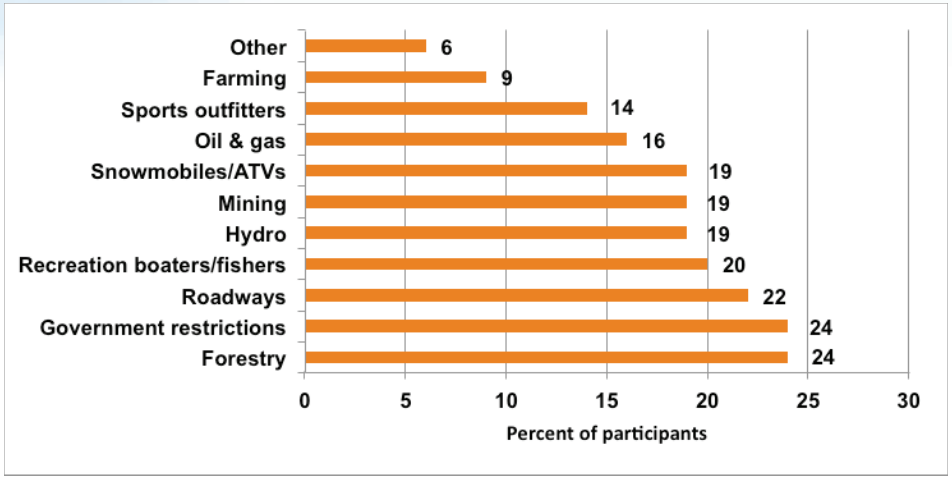
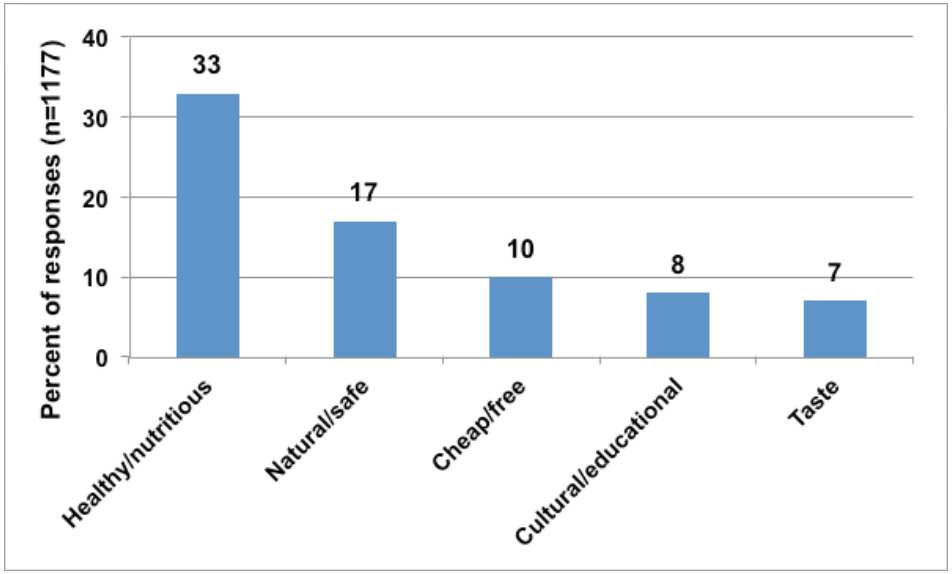
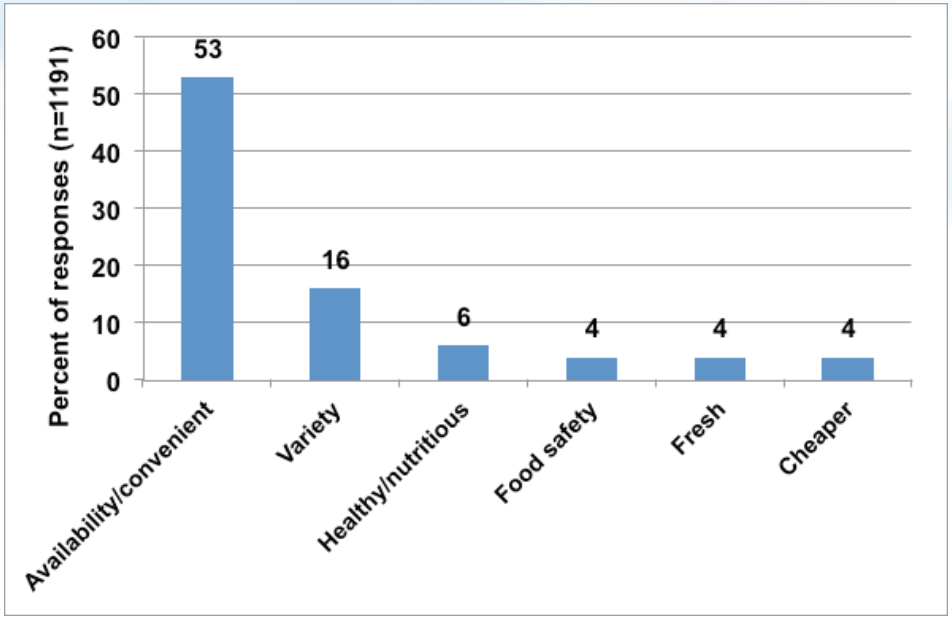


Figure 21. Top 5 benefits of traditional food reported by First Nations adults in Ontario



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 Ontario



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

Nutrient Intake

(Note that in Tables 11.1-11.37 (-) data with a coefficient of variation (CV) >33.3%, suppressed due to extreme sampling variability)

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

[1]pregnant and/or breastfeeding participants not included in analyses due to different nutrient requirements

				Percentiles (SE) of usual intake						
Sex	Age	n	Mean (SE)	5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)
Male	19-50	315	2331 (96)	1409 (170)	1571 (151)	1874 (118)	2255 (94)	2679 (123)	3109 (200)	3396 (262)
	51-70	174	2104 (100)	1369 (160)	1501 (139)	1751 (111)	2087 (114)	2479 (173)	2869 (259)	3121 (323)
	71+	44	2023 (227)	1542 (253)	1645 (242)	1827 (246)	2036 (274)	2246 (298)	2429 (329)	2536 (373)
Female	19-50	521	1876 (65)	1661 (163)	1705 (140)	1781 (102)	1869 (75)	1961 (94)	2047 (146)	2100 (185)
	51-70	262	1706 (62)	1371 (163)	1441 (141)	1565 (99)	1713 (68)	1872 (146)	2028 (241)	2128 (293)
	71+	72	1709 (85)	1532 (98)	1572 (99)	1640 (100)	1715 (101)	1790 (101)	1858 (101)	1898 (101)

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

				Percentiles (SE) of usual intake						
Sex	Age	n	Mean (SE)	5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)
Male	19-50	315	100 (4)	78 (11)	82 (10)	90 (7)	98 (4)	108 (6)	116 (11)	122 (15)
	51-70	174	99 (7)	62 (9)	69 (8)	82 (8)	98 (7)	118 (9)	141 (13)	157 (16)
	71+	44	114 (18)	62 (16)	70 (16)	88 (18)	113 (22)	139 (25)	160 (28)	173 (31)
Female	19-50	521	77 (3)	71 (8)	72 (7)	74 (5)	77 (3)	79 (4)	82 (8)	83 (10)
	51-70	262	76 (5)	59 (9)	62 (8)	69 (6)	77 (5)	85 (7)	93 (10)	98 (12)
	71+	72	84 (8)	49 (12)	55 (11)	66 (10)	82 (10)	102 (12)	125 (20)	141 (27)

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

				Percentiles (SE) of usual intake							EAR	%<EAR (95% CI)
Sex	Age	n	Mean (SE)	5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)		
Male	19-50	315	275 (13)	146 (26)	168 (24)	210 (17)	264 (13)	326 (20)	393 (38)	437 (55)	100	0.5 (-)
	51-70	174	240 (15)	165 (24)	179 (22)	204 (17)	236 (16)	272 (22)	309 (34)	334 (45)	100	0 (-)
	71+	44	205 (16)	123 (17)	139 (20)	169 (23)	203 (24)	234 (25)	257 (35)	271 (52)	100	1.4 (-)
Female	19-50	521	227 (11)	178 (19)	188 (17)	206 (14)	226 (12)	248 (14)	270 (21)	283 (26)	100	0 (-)
	51-70	262	197 (6)	180 (16)	184 (14)	190 (10)	198 (7)	205 (10)	212 (15)	216 (19)	100	0 (-)
	71+	72	200 (15)	168 (17)	174 (19)	184 (22)	196 (28)	207 (38)	218 (55)	225 (69)	100	0 (0-0)

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

				Percentiles (SE) of usual intake						
Sex	Age	n	Mean (SE)	5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)
Male	19-50	315	94 (4)	51 (8)	59 (7)	72 (6)	90 (5)	110 (6)	131 (9)	146 (12)
	51-70	174	85 (6)	43 (7)	51 (7)	65 (5)	83 (6)	106 (9)	129 (14)	145 (18)
	71+	44	84 (10)	50 (14)	57 (13)	71 (12)	87 (12)	102 (13)	115 (17)	124 (23)
Female	19-50	521	76 (3)	64 (8)	67 (7)	71 (5)	76 (4)	81 (5)	86 (8)	89 (10)
	51-70	262	70 (4)	61 (8)	63 (7)	67 (5)	71 (4)	75 (6)	79 (11)	82 (15)
	71+	72	65 (4)	52 (9)	55 (8)	60 (6)	67 (5)	73 (6)	80 (9)	83 (11)

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

				Percentiles (SE) of usual intake						
Sex	Age	n	Mean (SE)	5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)
Male	19-50	315	31 (1)	17 (3)	19 (2)	24 (2)	30 (2)	36 (2)	43 (3)	48 (4)
	51-70	174	26 (2)	11 (2)	14 (2)	19 (2)	25 (2)	33 (3)	42 (4)	48 (5)
	71+	44	24 (3)	16 (4)	17 (3)	20 (3)	24 (3)	27 (3)	31 (5)	33 (6)
Female	19-50	521	25 (1)	18 (3)	20 (3)	22 (2)	25 (1)	28 (2)	31 (3)	33 (3)
	51-70	262	23 (2)	16 (3)	17 (3)	20 (2)	23 (2)	26 (2)	30 (4)	32 (6)
	71+	72	19 (2)	15 (1)	16 (2)	17 (2)	19 (2)	21 (2)	23 (2)	24 (2)

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

				Percentiles (SE) of usual intake						
Sex	Age	n	Mean (SE)	5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)
Male	19-50	315	37 (2)	19 (3)	22 (3)	28 (2)	35 (2)	44 (3)	53 (4)	59 (5)
	51-70	174	33 (2)	17 (4)	20 (3)	26 (3)	33 (3)	41 (4)	49 (6)	54 (8)
	71+	44	33 (4)	19 (6)	22 (6)	27 (5)	34 (5)	40 (6)	46 (11)	51 (15)
Female	19-50	521	29 (1)	21 (3)	23 (3)	26 (2)	29 (2)	32 (2)	36 (3)	38 (4)
	51-70	262	27 (2)	18 (3)	20 (3)	23 (3)	27 (2)	32 (5)	36 (7)	40 (9)
	71+	72	26 (2)	22 (4)	23 (4)	25 (3)	26 (2)	28 (3)	30 (4)	31 (6)

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

				Percentiles (SE) of usual intake						
Sex	Age	n	Mean (SE)	5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)
Male	19-50	315	18 (1)	10 (2)	11 (1)	14 (1)	17 (1)	21 (1)	26 (2)	29 (3)
	51-70	174	18 (2)	9 (2)	10 (2)	13 (2)	18 (2)	22 (2)	28 (4)	31 (5)
	71+	44	19 (3)	8 (3)	10 (3)	15 (4)	20 (4)	25 (4)	30 (5)	33 (7)
Female	19-50	521	15 (1)	10 (2)	11 (2)	13 (1)	15 (1)	17 (1)	19 (2)	20 (3)
	51-70	262	14 (1)	8 (2)	9 (2)	11 (1)	13 (1)	16 (1)	19 (2)	21 (3)
	71+	72	14 (2)	11 (1)	11 (2)	13 (2)	14 (2)	16 (3)	17 (5)	18 (8)

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

				Percentiles (SE) of usual intake								
Sex	Age	n	Mean (SE)	5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)	AI	% > AI (95% CI)
Male	19-50	315	15 (1)	8 (2)	9 (1)	11 (1)	14 (1)	17 (1)	21 (2)	23 (3)	17	27.1 (2-43.1)
	51-70	174	14 (1)	7 (2)	8 (2)	10 (1)	13 (1)	17 (2)	21 (3)	23 (4)	14	45.5 (14.7-65.2)
	71+	44	15 (3)	5 (3)	6 (3)	10 (3)	16 (4)	20 (4)	25 (4)	28 (5)	14	57.6 (9.5-94)
Female	19-50	521	12 (1)	8 (1)	9 (1)	10 (1)	12 (1)	14 (1)	16 (2)	17 (2)	12	45 (18.1-74)
	51-70	262	11 (1)	6 (1)	7 (1)	8 (1)	10 (1)	13 (1)	16 (2)	18 (2)	11	42.2 (25.8-54.7)
	71+	72	11 (1)	8 (2)	8 (2)	10 (2)	11 (2)	13 (2)	15 (3)	16 (4)	11	55.3 (-)

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

				Percentiles (SE) of usual intake								
Sex	Age	n	Mean (SE)	5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)	AI	% > AI (95% CI)
Male	19-50	315	1.7 (0.13)	0.5 (0.14)	0.7 (0.14)	1 (0.15)	1.4 (0.17)	2.1 (0.21)	2.9 (0.29)	3.5 (0.41)	1.6	42.6 (29.1-60.1)
	51-70	174	1.9 (0.17)	0.8 (0.25)	1 (0.24)	1.3 (0.22)	1.8 (0.19)	2.3 (0.31)	2.8 (0.45)	3.2 (0.6)	1.6	59.7 (39.9-92.1)
	71+	44	2.1 (0.27)	0.8 (-)	0.9 (0.28)	1.4 (0.33)	2 (-)	2.7 (-)	3.5 (-)	4.3 (-)	1.6	66.3 (31.5-93.2)
Female	19-50	521	1.4 (0.1)	0.9 (0.18)	1 (0.16)	1.1 (0.13)	1.3 (0.1)	1.5 (0.14)	1.8 (0.23)	1.9 (0.31)	1.1	77.2 (50.9-100)
	51-70	262	1.6 (0.15)	0.9 (0.26)	1 (0.25)	1.3 (0.21)	1.6 (0.15)	2 (0.3)	2.5 (0.56)	2.8 (0.74)	1.1	85.2 (60.1-100)
	71+	72	1.4 (0.23)	0.8 (0.23)	0.9 (0.23)	1.1 (0.23)	1.3 (0.26)	1.6 (0.41)	1.9 (-)	2.1 (-)	1.1	70.2 (17.9-99)

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

				Percentiles (SE) of usual intake						
Sex	Age	n	Mean (SE)	5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)
Male	19-50	315	384 (17)	216 (14)	247 (14)	304 (15)	376 (17)	452 (20)	527 (26)	574 (31)
	51-70	174	375 (26)	182 (56)	212 (52)	274 (42)	362 (37)	463 (53)	556 (83)	610 (104)
	71	44	366 (60)	120 (-)	150 (-)	226 (74)	363 (86)	480 (81)	619 (98)	728 (141)
Female	19-50	521	300 (23)	201 (40)	220 (36)	254 (29)	297 (27)	347 (37)	397 (56)	429 (70)
	51-70	262	277 (25)	152 (38)	174 (36)	215 (32)	269 (29)	333 (35)	401 (50)	446 (65)
	71+	72	320 (35)	166 (-)	195 (60)	250 (53)	326 (47)	418 (58)	516 (95)	582 (133)

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

				Percentiles (SE) of usual intake						
Sex	Age	n	Mean (SE)	5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)
Male	19-50	315	95 (5)	36 (9)	45 (8)	62 (7)	86 (5)	117 (7)	152 (14)	176 (20)
	51-70	174	77 (10)	28 (8)	35 (8)	48 (8)	68 (8)	94 (11)	124 (19)	148 (26)
	71+	44	49 (4)	25 (8)	29 (8)	36 (9)	45 (9)	54 (11)	63 (15)	70 (20)
Female	19-50	521	83 (9)	48 (11)	54 (10)	65 (9)	81 (9)	99 (11)	119 (17)	132 (21)
	51-70	262	64 (5)	32 (9)	38 (9)	48 (7)	62 (6)	79 (7)	96 (11)	107 (15)
	71+	72	53 (6)	26 (8)	30 (8)	38 (7)	49 (7)	61 (8)	74 (12)	82 (16)

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

				Percentiles (SE) of usual intake								
Sex	Age	n	Mean (SE)	5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)	AI	% > AI (95% CI)
Male	19-50	315	16 (1)	10 (2)	11 (2)	13 (1)	15 (1)	18 (1)	21 (2)	24 (3)	38	0 (-)
	51-70	174	18 (2)	8 (2)	10 (2)	13 (2)	17 (2)	23 (2)	28 (3)	32 (4)	30	7.1 (-)
	71+	44	19 (2)	9 (3)	11 (3)	14 (3)	19 (2)	23 (3)	28 (4)	31 (5)	30	6.2 (-)
Female	19-50	521	14 (1)	8 (1)	9 (1)	10 (1)	13 (1)	16 (1)	19 (2)	20 (2)	25	0.8 (-)
	51-70	262	14 (1)	10 (1)	11 (1)	12 (1)	14 (1)	16 (1)	18 (1)	19 (1)	21	1.7 (-)
	71+	72	15 (1)	12 (2)	13 (3)	14 (-)	15 (-)	17 (-)	18 (-)	19 (-)	21	1.1 (-)

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

				Percentiles (SE) of usual intake								
Sex	Age	n	Mean (SE)	5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)	EAR	%<EAR (95% CI)
Male	19-50	315	426 (38)	166 (62)	203 (59)	275 (51)	376 (43)	505 (47)	656 (80)	768 (117)	625	87.9 (78.5-99.2)
	51-70	174	555 (47)	287 (83)	334 (76)	423 (61)	541 (49)	677 (66)	819 (110)	912 (146)	625	66.6 (49.5-96.5)
	71+	44	609 (132)	223 (119)	298 (127)	447 (146)	613 (160)	754 (156)	894 (160)	1005 (181)	625	52.1 (12.8-98.1)
Female	19-50	521	424 (44)	268 (56)	288 (50)	330 (40)	391 (33)	468 (53)	551 (102)	606 (148)	500	82.1 (58.7-100)
	51-70	262	591 (115)	331 (80)	366 (79)	437 (78)	535 (86)	661 (134)	805 (251)	907 (-)	500	41.1 (-)
	71+	72	979 (-)	179 (-)	235 (-)	372 (-)	641 (-)	1169 (-)	2103 (-)	3039 (-)	500	38.2 (-)

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

				Percentiles (SE) of usual intake										
Sex	Age	n	Mean (SE)	5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)	EAR	% < EAR (95% CI)	UL	% > UL (95% CI)
Male	19-50	315	89 (16)	13 (8)	20 (8)	36 (9)	60 (11)	101 (17)	159 (31)	202 (43)	75	61.2 (43-78.8)	2000	0 (0-0)
	51-70	174	74 (13)	18 (14)	24 (14)	38 (15)	61 (16)	101 (22)	159 (41)	208 (56)	75	60.8 (15.5-82.3)	2000	0 (0-0)
	71+	44	45 (11)	15 (3)	19 (4)	27 (5)	39 (9)	55 (17)	77 (-)	96 (-)	75	89.1 (63.5-100)	2000	0 (0-0)
Female	19-50	521	68 (7)	37 (12)	42 (11)	53 (10)	68 (9)	86 (11)	107 (18)	121 (25)	60	36.5 (-)	2000	0 (0-0)
	51-70	262	54 (5)	12 (7)	17 (7)	27 (6)	43 (5)	67 (9)	97 (22)	121 (34)	60	69.5 (58-85.9)	2000	0 (0-0)
	71+	72	76 (-)	10 (-)	15 (-)	25 (-)	46 (-)	94 (-)	189 (-)	295 (-)	60	60.4 (30.5-98.7)	2000	0 (-)

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

				Percentiles (SE) of usual intake										
Sex	Status	n	Mean (SE)	5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)	EAR	% < EAR (95% CI)	UL	% > UL (95% CI)
Males 19+	Non-smoker	257	84 (12)	14 (10)	20 (10)	35 (11)	63 (13)	111 (18)	177 (31)	229 (45)	75	58 (35.3-77.7)	2000	0 (0-0)
	Smoker	276	76 (19)	14 (8)	19 (9)	32 (10)	52 (12)	82 (21)	122 (35)	154 (47)	110	86.9 (65.2-99.5)	2000	0 (0-0)
Females 19+	Non-smoker	426	68 (7)	23 (10)	29 (10)	42 (9)	62 (7)	89 (11)	123 (23)	148 (33)	60	48.2 (14.2-66.2)	2000	0 (0-0)
	Smoker	430	60 (6)	27 (10)	31 (10)	41 (9)	55 (8)	74 (10)	97 (17)	112 (23)	95	89.3 (75.3-100)	2000	0 (0-0)

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

				Percentiles (SE) of usual intake										
Sex	Age	n	Mean (SE)	5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)	EAR	% < EAR (95% CI)	UL	% > UL (95% CI)
Male	19-50	315	4.2 (0.45)	1.3 (0.38)	1.6 (0.4)	2.4 (0.44)	3.5 (0.5)	5.2 (0.62)	7.2 (0.86)	8.7 (1.13)	10	97.1 (93.6-99.8)	100	0 (0-0)
	51-70	174	5.9 (0.62)	2.1 (-)	2.6 (0.79)	3.7 (0.71)	5.4 (0.65)	7.9 (0.89)	11 (1.81)	13.6 (2.86)	10	86.6 (78.2-99.6)	100	0 (0-0)
	71+	44	8.7 (1.27)	2.5 (-)	3.2 (1.02)	5.1 (1.33)	8.4 (1.64)	12.8 (2.49)	18.8 (4.71)	24.4 (7.15)	15	82.2 (68.9-99.7)	100	0 (-)
Female	19-50	521	3.4 (0.23)	2.8 (0.23)	2.9 (0.24)	3.1 (0.26)	3.4 (0.28)	3.6 (0.31)	3.9 (0.34)	4.1 (0.36)	10	100 (100-100)	100	0 (0-0)
	51-70	262	4.1 (0.38)	3.4 (0.34)	3.6 (0.36)	3.8 (0.41)	4.1 (0.47)	4.5 (0.54)	4.8 (0.61)	5 (0.66)	10	100 (100-100)	100	0 (0-0)
	71+	72	7.4 (1.99)	4.8 (-)	5.3 (-)	6.2 (-)	7.3 (-)	8.7 (-)	10.2 (-)	11.2 (-)	15	99.7 (58.6-100)	100	0 (-)

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

				Percentiles (SE) of usual intake								
Sex	Age	n	Mean (SE)	5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)	EAR	% < EAR (95% CI)
Male	19-50	315	405 (32)	245 (51)	273 (47)	324 (40)	388 (33)	463 (37)	541 (58)	594 (78)	320	23.7 (-)
	51-70	174	393 (26)	225 (37)	255 (33)	311 (28)	386 (29)	476 (42)	568 (61)	626 (75)	320	27.8 (-)
	71+	44	364 (31)	210 (36)	239 (40)	291 (45)	353 (63)	413 (228)	467 (92)	501 (139)	320	36 (-)
Female	19-50	521	332 (16)	192 (33)	217 (30)	264 (25)	324 (19)	390 (19)	457 (27)	501 (36)	320	48.5 (24-61.8)
	51-70	262	315 (18)	233 (40)	250 (37)	278 (29)	313 (23)	351 (29)	388 (42)	412 (52)	320	55 (-)
	71+	72	330 (17)	215 (43)	232 (41)	266 (37)	311 (33)	367 (39)	428 (61)	470 (80)	320	54.7 (-)

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

				Percentiles (SE) of usual intake										
Sex	Age	n	Mean (SE)	5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)	EAR	% < EAR (95% CI)	UL	% > UL (95% CI)
Male	19-50	315	1.7 (0.1)	1 (0.17)	1.1 (0.16)	1.3 (0.12)	1.6 (0.1)	1.9 (0.14)	2.3 (0.26)	2.6 (0.35)	1.1	8.4 (-)	100	0 (0-0)
	51-70	174	1.7 (0.09)	0.8 (0.12)	1 (0.11)	1.2 (0.1)	1.6 (0.11)	2 (0.17)	2.6 (0.29)	3 (0.39)	1.4	35.8 (16.5-48.6)	100	0 (0-0)
	71+	44	2.1 (0.41)	1.6 (0.39)	1.7 (0.38)	1.9 (0.39)	2.1 (0.43)	2.3 (0.48)	2.5 (0.51)	2.6 (0.53)	1.4	0.6 (-)	100	0 (0-0)
Female	19-50	521	1.5 (0.05)	1 (0.16)	1.1 (0.14)	1.2 (0.1)	1.4 (0.07)	1.7 (0.1)	2 (0.19)	2.2 (0.26)	1.1	13.3 (-)	100	0 (0-0)
	51-70	262	1.3 (0.07)	0.9 (0.17)	1 (0.15)	1.1 (0.11)	1.3 (0.09)	1.5 (0.11)	1.7 (0.18)	1.8 (0.24)	1.3	46.6 (18.7-69.7)	100	0 (0-0)
	71+	72	1.4 (0.11)	0.8 (0.17)	0.9 (0.17)	1.1 (0.15)	1.4 (0.14)	1.8 (0.17)	2.2 (0.26)	2.5 (0.37)	1.3	43.8 (11.9-72.6)	100	0 (0-0)

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

				Percentiles (SE) of usual intake								
Sex	Age	n	Mean (SE)	5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)	EAR	% < EAR (95% CI)
Male	19-50	315	8.8 (-)	6.3 (1.39)	6.4 (1.38)	6.7 (1.38)	6.9 (1.5)	7.2 (2.21)	7.5 (-)	7.6 (-)	2.0	0 (-)
	51-70	174	6.9 (1.13)	1.9 (0.57)	2.4 (0.56)	3.5 (0.57)	5.8 (0.79)	9 (1.59)	13.7 (3.5)	18 (5.06)	2.0	5.8 (-)
	71+	44	5.9 (1.14)	2.9 (0.99)	3.5 (0.94)	4.5 (0.91)	5.7 (1.15)	7.3 (1.88)	9.6 (3.13)	11.8 (-)	2.0	1.1 (-)
Female	19-50	521	4.6 (0.56)	2.5 (0.22)	2.8 (0.27)	3.4 (0.38)	4.3 (0.54)	5.4 (0.75)	6.6 (1.02)	7.5 (1.24)	2.0	0.9 (-)
	51-70	262	5.1 (0.72)	2.8 (0.34)	3.1 (0.39)	3.8 (0.5)	4.8 (0.69)	6 (1)	7.3 (1.45)	8.2 (1.82)	2.0	0.4 (-)
	71+	72	5.6 (0.85)	3.2 (0.94)	3.5 (0.95)	4.3 (0.98)	5.2 (1.08)	6.4 (1.39)	7.8 (2.16)	8.7 (-)	2.0	0.1 (-)

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

				Percentiles (SE) of usual intake								
Sex	Age	n	Mean SE)	5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)	EAR	% < EAR (95% CI)
Male	19-50	315	1.9 (0.12)	1.2 (0.22)	1.3 (0.2)	1.5 (0.16)	1.9 (0.13)	2.2 (0.16)	2.6 (0.25)	2.8 (0.33)	1.0	0.8 (-)
	51-70	174	2.1 (0.16)	1.1 (0.17)	1.3 (0.16)	1.6 (0.15)	2.1 (0.17)	2.6 (0.24)	3.3 (0.35)	3.7 (0.43)	1.0	1.4 (-)
	71+	44	1.9 (0.14)	1.3 (0.27)	1.4 (0.24)	1.7 (0.22)	1.9 (0.3)	2.2 (0.55)	2.4 (-)	2.5 (0.45)	1.0	0.1 (-)
Female	19-50	521	1.6 (0.07)	1.4 (0.16)	1.4 (0.14)	1.5 (0.11)	1.6 (0.08)	1.6 (0.1)	1.7 (0.15)	1.8 (0.2)	0.9	0 (-)
	51-70	262	1.5 (0.06)	1.2 (0.15)	1.2 (0.13)	1.4 (0.09)	1.5 (0.06)	1.7 (0.1)	1.9 (0.2)	2 (0.27)	0.9	0.1 (-)
	71+	72	1.7 (0.13)	1.1 (0.19)	1.2 (0.18)	1.4 (0.16)	1.6 (0.15)	1.9 (0.2)	2.2 (0.29)	2.4 (0.36)	0.9	0.4 (-)

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

				Percentiles (SE) of usual intake								
Sex	Age	n	Mean (SE)	5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)	EAR	% < EAR (95% CI)
Male	19-50	315	2.2 (0.16)	1.3 (0.21)	1.5 (0.19)	1.8 (0.16)	2.1 (0.16)	2.6 (0.22)	3 (0.34)	3.3 (0.43)	1.1	1.4 (-)
	51-70	174	2.3 (0.12)	1.5 (0.18)	1.6 (0.16)	1.9 (0.14)	2.3 (0.14)	2.8 (0.19)	3.2 (0.29)	3.5 (0.36)	1.1	0.6 (-)
	71+	44	2.2 (0.18)	1.4 (0.27)	1.6 (0.26)	1.9 (0.25)	2.3 (0.23)	2.6 (0.26)	3 (0.38)	3.2 (0.49)	1.1	0.9 (-)
Female	19-50	521	1.9 (0.06)	1.3 (0.16)	1.4 (0.14)	1.6 (0.11)	1.9 (0.08)	2.2 (0.09)	2.5 (0.14)	2.7 (0.18)	0.9	0.1 (-)
	50-70	262	1.8 (0.05)	1.2 (0.09)	1.3 (0.08)	1.5 (0.07)	1.8 (0.06)	2.1 (0.08)	2.4 (0.13)	2.6 (0.17)	0.9	0.3 (-)
	71+	72	1.9 (0.09)	1.3 (0.21)	1.4 (0.19)	1.6 (0.15)	1.8 (0.12)	2.1 (0.14)	2.3 (0.21)	2.5 (0.27)	0.9	0.1 (-)

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

				Percentiles (SE) of usual intake								
Sex	Age	n	Mean (SE)	5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)	EAR	% < EAR (95% CI)
Male	19-50	315	47 (2)	30 (5)	33 (5)	39 (3)	46 (2)	54 (3)	61 (5)	66 (7)	12	0 (-)
	51-70	174	43 (3)	28 (3)	30 (3)	36 (3)	43 (3)	51 (5)	62 (7)	69 (9)	12	0 (0-0)
	71+	44	54 (11)	32 (9)	36 (9)	44 (11)	53 (13)	64 (15)	73 (16)	78 (17)	12	0 (-)
Female	19-50	521	37 (1)	30 (1)	32 (1)	34 (1)	36 (2)	39 (2)	42 (2)	44 (2)	11	0 (0-0)
	51-70	262	34 (2)	24 (4)	26 (3)	30 (2)	34 (2)	39 (3)	44 (5)	47 (6)	11	0 (-)
	71+	72	36 (2)	21 (4)	23 (4)	28 (3)	35 (3)	43 (4)	53 (8)	60 (11)	11	0 (-)

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

				Percentiles (SE) of usual intake										
Sex	Age	n	Mean (SE)	5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)	EAR	% < EAR (SE)	UL	% > UL (95% CI)
Male	19-50	315	753 (59)	570 (112)	604 (102)	665 (81)	737 (61)	815 (72)	890 (123)	938 (168)	800	70.9 (39.3-95.7)	2500	0 (-)
	51-70	174	830 (64)	376 (84)	454 (86)	614 (84)	828 (80)	1069 (114)	1305 (139)	1454 (168)	800	46.7 (24.1-69.8)	2000	0.2 (-)
	71+	44	738 (132)	331 (117)	407 (123)	554 (141)	736 (158)	908 (160)	1073 (184)	1201 (222)	800	59.7 (20-99.7)	2000	0.2 (-)
Female	19-50	521	651 (28)	554 (28)	573 (29)	607 (30)	647 (32)	689 (34)	728 (35)	753 (36)	800	99 (90.9-100)	2500	0 (0-0)
	51-70	262	625 (27)	429 (71)	465 (63)	531 (48)	613 (35)	706 (42)	801 (68)	862 (89)	1000	99.1 (95.6-100)	2000	0 (0-0)
	71+	72	585 (42)	367 (82)	405 (78)	478 (72)	572 (69)	683 (79)	798 (114)	875 (153)	1000	98.5 (87.8-100)	2000	0 (-)

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

				Percentiles (SE) of usual intake										
Sex	Age	n	Mean (SE)	5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)	EAR	%< EAR (SE)	UL	% > UL (95% CI)
Male	19-50	315	16.7 (1.55)	8.7 (1.73)	9.9 (1.61)	12.2 (1.43)	15.5 (1.37)	19.5 (1.81)	23.9 (2.82)	27 (3.77)	6.0	0.4 (-)	45	0.1 (0-1.2)
	51-70	174	16.6 (1.07)	10.6 (1.76)	11.8 (1.63)	13.9 (1.4)	16.7 (1.27)	20.1 (1.61)	23.7 (2.3)	26.2 (2.86)	6.0	0 (-)	45	0 (-)
	71+	44	15.9 (1.55)	8.9 (1.96)	10.2 (1.81)	12.6 (1.61)	15.6 (1.67)	18.7 (2.28)	21.8 (3.43)	24.2 (4.42)	6.0	0.3 (-)	45	0 (-)
Female	19-50	521	13 (0.51)	9 (0.44)	9.7 (0.47)	11 (0.53)	12.5 (0.62)	14.3 (0.73)	16.1 (0.86)	17.3 (0.95)	7.7	0.8 (-)	45	0 (0-0)
	51-70	262	12.8 (0.47)	7.9 (1.04)	8.8 (0.95)	10.3 (0.79)	12.4 (0.64)	15 (0.84)	17.9 (1.53)	19.8 (2.18)	5.0	0.1 (-)	45	0 (-)
	71+	72	14.5 (1.5)	11.2 (-)	11.8 (2.94)	13 (-)	14.5 (3.94)	16.1 (-)	17.6 (-)	18.6 (-)	5.0	0 (0-0)	45	0 (-)

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

				Percentiles (SE) of usual intake								
Sex	Age	n	Mean (SE)	5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)	AI	% > AI (95% CI)
Male	19-50	315	2823 (149)	2087 (317)	2226 (271)	2471 (200)	2763 (154)	3079 (209)	3385 (337)	3579 (436)	4700	0 (-)
	51-70	174	2743 (139)	1560 (168)	1780 (151)	2181 (124)	2660 (133)	3260 (220)	4014 (370)	4565 (491)	4700	4.2 (-)
	71+	44	2760 (204)	1968 (222)	2157 (246)	2476 (278)	2820 (291)	3123 (279)	3363 (260)	3502 (251)	4700	0 (-)
Female	19-50	521	2278 (73)	1948 (72)	2021 (76)	2147 (83)	2294 (92)	2448 (103)	2595 (114)	2686 (121)	4700	0 (0-0)
	51-70	262	2247 (77)	1509 (221)	1645 (195)	1892 (144)	2199 (92)	2541 (111)	2883 (196)	3103 (264)	4700	0 (-)
	71+	72	2355 (183)	1163 (218)	1357 (212)	1737 (207)	2249 (212)	2869 (242)	3532 (305)	3982 (381)	4700	1.5 (-)

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

			Percentiles (SE) of usual intake											
Sex	Age	n	Mean (SE)	5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)	AI	% > AI (95% CI)	UL	% > UL (95% CI)
Male	19-50	315	3497 (185)	1766 (299)	2053 (281)	2586 (244)	3273 (211)	4087 (233)	4961 (345)	5561 (467)	1500	97.8 (93.3-100)	2300	83.9 (72.8-98.4)
	51-70	174	3175 (178)	1846 (292)	2098 (259)	2554 (212)	3116 (199)	3752 (268)	4408 (406)	4846 (523)	1300	99.4 (97.6-100)	2300	84.3 (71.9-99.9)
	71+	44	3064 (330)	1712 (475)	1998 (446)	2516 (400)	3112 (377)	3718 (454)	4315 (647)	4723 (811)	1200	99.2 (87.6-100)	2300	82.2 (45.4-99.7)
Female	19-50	521	2937 (120)	2045 (305)	2219 (263)	2532 (190)	2915 (142)	3338 (212)	3757 (352)	4028 (457)	1500	99.8 (95.6-100)	2300	86.9 (69.2-100)
	51-70	262	2729 (113)	1874 (251)	2030 (216)	2308 (154)	2660 (120)	3063 (203)	3468 (363)	3734 (467)	1300	99.9 (95.8-100)	2300	75.5 (59.1-95.5)
	71+	72	2600 (254)	1672 (363)	1824 (341)	2099 (316)	2435 (327)	2806 (397)	3170 (511)	3403 (595)	1200	99.8 (91.2-100)	2300	60.4 (-)

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

				Percentiles (SE) of usual intake						
Sex	Age	n	Mean (SE)	5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)
Male	19-50	315	287 (18)	179 (34)	199 (31)	235 (25)	279 (20)	330 (23)	380 (35)	413 (45)
	51-70	174	298 (17)	164 (19)	188 (18)	234 (17)	294 (20)	364 (27)	436 (37)	484 (45)
	71+	44	313 (32)	203 (44)	228 (39)	271 (40)	323 (44)	366 (49)	396 (55)	412 (61)
Female	19-50	521	244 (8)	192 (7)	203 (8)	221 (8)	243 (9)	266 (10)	289 (11)	303 (12)
	51-70	262	242 (9)	168 (24)	182 (21)	208 (16)	239 (11)	274 (14)	307 (24)	329 (31)
	71+	72	255 (17)	162 (26)	179 (25)	211 (23)	253 (20)	306 (24)	363 (35)	403 (46)

* %<EAR not calculated due to different EAR by age-groups

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

				Percentiles (SE) of usual intake										
Sex	Age	n	Mean (SE)	5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)	EAR	% < EAR (95% CI)	UL	% > UL (95% CI)
Male	19-50	315	1360 (70)	1294 (142)	1306 (122)	1325 (87)	1347 (64)	1369 (92)	1389 (151)	1401 (195)	580	0 (-)	4000	0 (0-0)
	51-70	174	1344 (72)	802 (80)	908 (70)	1110 (58)	1363 (71)	1632 (125)	1948 (209)	2192 (273)	580	0.7 (-)	4000	0 (-)
	71+	44	1502 (224)	1034 (245)	1124 (236)	1289 (249)	1484 (289)	1682 (310)	1845 (328)	1937 (358)	580	0 (-)	4000	0 (-)
Female	19-50	521	1089 (32)	814 (32)	870 (34)	969 (36)	1087 (39)	1213 (43)	1333 (47)	1408 (50)	580	0 (-)	4000	0 (0-0)
	51-70	262	1052 (34)	802 (109)	853 (94)	943 (67)	1050 (44)	1164 (58)	1273 (100)	1340 (131)	580	0 (-)	4000	0 (0-0)
	71+	72	1170 (91)	654 (151)	741 (141)	910 (124)	1136 (112)	1410 (135)	1706 (206)	1909 (267)	580	2.3 (-)	4000	0 (-)

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

				Percentiles (SE) of usual intake										
Sex	Age	n	Mean (SE)	5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)	EAR	% < EAR (95% CI)	UL	% > UL (95% CI)
Male	19-50	315	13.7 (0.8)	9.7 (1.5)	10.4 (1.3)	11.7 (1)	13.2 (0.8)	15 (1.1)	16.7 (2)	17.9 (2.6)	9.4	3.5 (-)	40	0 (-)
	51-70	174	13.5 (0.9)	7.6 (1.4)	8.5 (1.3)	10.5 (1.1)	13 (0.9)	16 (1.3)	19.6 (2.3)	22.5 (3.4)	9.4	16.1 -)	40	0.1 (-)
	71+	44	12.7 (1)	8.5 (1.6)	9.4 (1.4)	10.9 (1.1)	12.6 (0.9)	14.5 (1.3)	16.5 (2.3)	18.1 (3.2)	9.4	10.1 (-)	40	0 (-)
Female	19-50	521	10.7 (0.5)	7.4 (0.4)	8 (0.4)	9 (0.4)	10.3 (0.5)	11.8 (0.7)	13.4 (0.8)	14.5 (0.9)	6.8	1.8 (-)	40	0 (0-0)
	51-70	262	10.6 (1.2)	7.4 (1.7)	8 (1.6)	9.1 (1.3)	10.5 (1.2)	12.1 (1.6)	13.6 (2.6)	14.7 (3.4)	6.8	2.3 (-)	40	0 (0-0)
	71+	72	10.8 (0.9)	5.7 (1.4)	6.6 (1.3)	8.4 (1.1)	10.8 (1)	13.7 (1.3)	16.6 (1.9)	18.6 (2.5)	6.8	11.2 (-)	40	0 (-)

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

				Percentiles (SE) of usual intake										
	Age	n	Mean (SE)	5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)	AMDR	% below AMDR (95% CI)	% within AMDR (95% CI)	% above AMDR (95% CI
Male	19-50	315	17 (0)	15 (0)	15 (0)	16 (0)	17 (0)	18 (0)	19 (1)	20 (1)	10-35	0 (0-0)	100 (100-100)	0 (0-0)
	51-70	174	19 (1)	16 (2)	16 (2)	18 (2)	19 (1)	21 (2)	24 (2)	25 (3)	10-35	0 (-)	100 (97.2-100)	0 (-)
	71+	44	23 (1)	21 (10)	21 (8)	22 (12)	23 (10)	24 (10)	25 (5)	26 (6)	10-35	0 (0-0)	100 (99.4-100)	0 (-)
Female	19-50	521	17 (1)	13 (1)	14 (1)	15 (1)	17 (1)	18 (1)	20 (1)	21 (2)	10-35	0 (-)	100 (99-100)	0 (-)
	51-70	262	18 (1)	13 (1)	14 (1)	16 (1)	18 (1)	20 (1)	23 (2)	24 (2)	10-35	0.3 (-)	99.7 (96.7-100)	0 (-)
	71+	72	20 (2)	14 (2)	15 (2)	17 (2)	19 (2)	23 (2)	26 (3)	28 (4)	10-35	0 (-)	99.3 (94.6-100)	0.7 (-)

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

				Percentiles (SE) of usual intake										
Sex	Age	n	Mean (SE)	5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)	AMDR	% below AMDR (95% CI)	% within AMDR (95% CI)	% above AMDR (95% CI)
Male	19-50	315	48 (1)	44 (3)	44 (2)	46 (1)	48 (1)	49 (1)	51 (2)	52 (3)	45-65	14.4(-)	85.6 (58.4-99.8)	0 (-)
	51-70	174	46 (1)	35 (3)	37 (2)	41 (2)	45 (1)	50 (2)	54 (3)	56 (3)	45-65	48.5 (27.7-69)	51.3 (30.9-71)	0.2 (-)
	71+	44	41 (2)	30 (4)	33 (3)	36 (2)	39 (2)	43 (3)	46 (3)	47 (4)	45-65	87.8 (50.4-100)	12.2 (-)	0 (-)
Female	19-50	521	49 (1)	44 (2)	45 (2)	47 (1)	49 (1)	51 (1)	53 (2)	54 (2)	45-65	11 (-)	89 (67.6-100)	0 (-)
	51-70	262	48 (1)	42 (2)	43 (2)	45 (2)	48 (2)	50 (2)	52 (1)	53 (1)	45-65	20.7 (-)	79.3 (37.1-96.3)	0 (0-0)
	71+	72	47 (2)	39 (4)	41 (3)	43 (2)	46 (2)	49 (3)	51 (4)	53 (4)	45-65	38.2 (-)	61.8 (14.1-96.9)	0 (-)

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

					Percentiles (SE) of usual intake									
Sex	Age	n	Mean (SE)	5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)	AMDR	% below AMDR (95% CI)	% within AMDR (95% CI)	% above AMDR (95% CI)
Male	19-50	315	36 (1)	30 (3)	31 (2)	33 (1)	36 (1)	38 (1)	41 (2)	42 (3)	20-35	0 (-)	40.2 (5.3-56.4)	59.8 (43.6-94.7)
	51-70	174	35 (1)	26 (3)	28 (2)	32 (2)	36 (1)	40 (2)	44 (3)	46 (4)	20-35	0.5 (-)	43.1 (25.2-56.1)	56.4 (42.9-73.8)
	71+	44	37 (1)	32 (3)	33 (3)	36 (2)	38 (2)	41 (2)	44 (3)	46 (4)	20-35	0 (-)	19.9 (-)	80.1 (54.9-100)
Female	19-50	521	36 (1)	29 (2)	30 (1)	33 (1)	36 (1)	39 (1)	41 (1)	43 (2)	20-35	0 (-)	44.1 (27.6-57.6)	55.9 (42.4-72.4)
	51-70	262	35 (1)	30 (1)	31 (1)	33 (1)	35 (1)	38 (1)	40 (1)	41 (1)	20-35	0 (0-0)	47.4 (29.6-64.9)	52.6 (35.1-70.4)
	71+	72	34 (2)	30 (3)	31 (3)	33 (2)	35 (2)	37 (2)	39 (3)	40 (4)	20-35	0 (-)	49.6 (11.7-82.3)	50.4 (17.7-88.3)

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

				Percentiles (SE) of usual intake						
Sex	Age	n	Mean (SE)	5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)
Male	19-50	315	11.9 (0.3)	8.4 (0.8)	9.2 (0.6)	10.4 (0.4)	11.8 (0.4)	13.3 (0.5)	14.8 (0.7)	15.6 (0.9)
	51-70	174	11 (0.6)	6.7 (0.8)	7.6 (0.7)	9.2 (0.5)	11 (0.5)	12.9 (0.7)	14.7 (1.1)	16 (1.4)
	71+	44	10.9 (0.7)	9.1 (1.2)	9.4 (1.1)	10.1 (0.9)	10.9 (0.9)	11.9 (1)	13 (1.4)	13.7 (1.8)
Female	19-50	521	11.6 (0.3)	9.1 (0.8)	9.7 (0.7)	10.7 (0.4)	11.8 (0.3)	13 (0.5)	14.1 (0.8)	14.8 (1)
	51-70	262	11.4 (0.4)	8.9 (1)	9.4 (0.9)	10.3 (0.6)	11.3 (0.4)	12.4 (0.6)	13.4 (0.9)	14 (1.1)
	71+	72	10.1 (0.6)	7.5 (1.4)	8.1 (1.2)	9.2 (0.9)	10.3 (0.7)	11.4 (0.8)	12.5 (1.1)	13.1 (1.4)

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

				Percentiles (SE) of usual intake						
Sex	Age	n	Mean (SE)	5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)
Male	19-50	315	14.2 (0.4)	10.3 (1.2)	11.2 (0.9)	12.6 (0.6)	14.1 (0.5)	15.7 (0.8)	17.2 (1.1)	18.2 (1.4)
	51-70	174	13.7 (0.4)	11.4 (0.5)	11.9 (0.5)	12.8 (0.5)	13.8 (0.5)	14.8 (0.5)	15.7 (0.5)	16.3 (0.5)
	71+	44	14.5 (0.7)	11.2 (1.5)	12 (1.3)	13.4 (1)	14.8 (1)	16.4 (1.2)	18.4 (1.9)	19.7 (2.5)
Female	19-50	521	13.5 (0.4)	10.6 (0.9)	11.2 (0.7)	12.3 (0.6)	13.5 (0.5)	14.8 (0.6)	16.1 (0.9)	16.8 (1.1)
	51-70	262	13.5 (0.4)	10.8 (0.4)	11.3 (0.4)	12.3 (0.4)	13.4 (0.5)	14.5 (0.5)	15.5 (0.6)	16.2 (0.6)
	71+	72	13.2 (0.7)	10.6 (1.6)	11.3 (1.3)	12.4 (1)	13.6 (0.9)	15 (1.2)	16.2 (1.7)	17 (2.1)

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

				Percentiles (SE) of usual intake						
Sex	Age	n	Mean (SE)	5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)
Male	19-30	315	6.9 (0.2)	6.4 (0.6)	6.5 (0.5)	6.7 (0.3)	6.9 (0.2)	7.1 (0.3)	7.3 (0.6)	7.4 (0.7)
	51-70	174	7.4 (0.4)	4.8 (0.8)	5.3 (0.7)	6.2 (0.6)	7.3 (0.5)	8.6 (1.5)	9.8 (3.5)	10.7 (1.2)
	71+	44	7.8 (0.6)	4.4 (0.9)	5.1 (0.9)	6.6 (1)	8.4 (1.1)	9.7 (1.2)	11.3 (1.7)	12.6 (2.2)
Female	19-50	521	7.1 (0.3)	5.1 (0.6)	5.5 (0.5)	6.1 (0.4)	6.9 (0.3)	7.7 (0.3)	8.5 (0.5)	9.1 (0.6)
	51-70	262	7.1 (0.3)	4.9 (0.7)	5.3 (0.6)	6 (0.5)	6.9 (0.3)	7.9 (0.6)	8.9 (1)	9.5 (1.3)
	71+	72	7.1 (0.6)	5.9 (0.7)	6.2 (0.7)	6.7 (0.8)	7.3 (0.8)	7.9 (0.9)	8.5 (0.9)	8.8 (0.9)

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

				Percentiles (SE) of usual intake						
Sex	Age	n	Mean (SE)	5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)
Male	19-50	315	5.6 (0.2)	3.8 (0.1)	4.2 (0.1)	4.8 (0.2)	5.5 (0.2)	6.2 (0.2)	6.9 (0.3)	7.3 (0.3)
	51-70	174	5.7 (0.4)	3.6 (0.7)	4 (0.6)	4.8 (0.5)	5.6 (0.4)	6.6 (0.6)	7.5 (0.9)	8.1 (1.1)
	71+	44	6.2 (0.7)	4 (0.9)	4.6 (0.9)	5.6 (0.9)	6.6 (0.9)	7.5 (0.9)	8.3 (1.2)	8.9 (1.6)
Female	19-50	521	5.6 (0.2)	4 (0.5)	4.3 (0.4)	4.8 (0.3)	5.5 (0.2)	6.2 (0.3)	6.8 (0.5)	7.2 (0.6)
	51-70	262	5.5 (0.2)	3.4 (0.5)	3.8 (0.4)	4.5 (0.3)	5.3 (0.3)	6.4 (0.3)	7.5 (0.5)	8.2 (0.7)
	71+	72	5.7 (0.6)	5.2 (0.9)	5.3 (0.8)	5.6 (0.7)	5.9 (0.7)	6.1 (0.9)	6.4 (1.1)	6.5 (1.5)

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

				Percentiles (SE) of usual intake						
Sex	Age	n	Mean (SE)	5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)
Male	19-50	315	0.6 (0.05)	0.3 (0.07)	0.4 (0.07)	0.5 (0.06)	0.6 (0.06)	0.8 (0.07)	0.9 (0.12)	1 (0.16)
	51-70	174	0.8 (0.04)	0.4 (0.09)	0.5 (0.09)	0.6 (0.07)	0.7 (0.06)	0.9 (0.07)	1.1 (0.12)	1.2 (0.16)
	71+	44	0.9 (0.1)	0.4 (0.1)	0.5 (0.1)	0.7 (0.13)	0.9 (0.47)	1.1 (0.2)	1.4 (0.57)	1.6 (0.36)
Female	19-50	521	0.7 (0.04)	0.4 (0.07)	0.4 (0.06)	0.5 (0.05)	0.6 (0.04)	0.7 (0.05)	0.9 (0.09)	1 (0.12)
	51-70	262	0.8 (0.07)	0.5 (0.11)	0.5 (0.1)	0.6 (0.08)	0.8 (0.07)	1 (0.1)	1.2 (0.18)	1.3 (0.25)
	71+	72	0.7 (0.11)	0.5 (0.11)	0.5 (0.11)	0.6 (0.11)	0.7 (0.13)	0.8 (0.18)	0.9 (0.27)	0.9 (0.36)

Table 12. Mean number of food guide servings consumed per day by First Nations men (n=533) and women (n=896) in Ontario compared to Canada's Food Guide (CGF) recommendations (unweighted)

Food Group	Gender	Ontario First Nations current intake	Canada's Food Guide Recommendations
		Servings per day	
Vegetables & Fruits	men	4	7-10
	women	3	7-8
Grain Products	men	6	7-8
	women	5	6-7
Milk & Alternatives	men	1	2-3
	women	1	2-3
Meat & Alternatives	men	4	3
	women	3	2

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

Gender	Canada's Food Guide Food Groups			
	Fruit/ Vegetable (%)	Meat & alternates (%)	Grain products (%)	Milk & alternates (%)
Women	Potatoes 20.0	Beef 14.7	White bread 14.7	Fresh milk 21.9
	Fresh/frozen Vegetable* 17.1	Ham/sausages 12.6	Whole wheat/ Rye bread 11.4	Cheddar cheese 13.2
	Fresh fruits 12.8	Eggs 11.5	Pasta/ macaroni 10.4	Yogurt 7.8
	Fruit juices 9.9	Chicken 11.2	Hot cereal 7.7	Mashed potatoes 6.8
	Vegetable soups 8.3	Moose/ Caribou meat 5.5	Rice 5.0	Macaroni & cheese 6.2
Men	Potatoes 26.3	Beef meat 19.1	White bread 21.8	Fresh milk 27.3
	Fresh/frozen Vegetable 13.9	Eggs 12.0	Pasta/ macaroni 19.6	Cheddar cheese 14.1
	Vegetable soups 11.6	Ham/sausages 10.3	Whole wheat/ Rye bread 14.1	Mashed potatoes 12.0
	Fresh fruits 9.5	Chicken meat 10.0	Hot cereal 7.6	Macaroni & cheese 9.1
	Fruit juices 9.2	Moose/ Caribou meat 9.0	Rice 6.9	Pizza/ Lasagna 6.0

* This category does not include canned vegetables.

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

a) Energy		b) Protein		c) Fat		d) Carbohydrates	
FOOD	% of total	FOOD	% of total	FOOD	% of total	FOOD	% of total
Bread, white	6.3	Chicken	13.4	Beef	8.3	Bread, white	9.8
Chicken[1]	6.0	Beef	12.8	Cold cuts/sausages	8.1	Pasta/noodles	8.1
Pasta/noodles	5.8	Pasta/noodles	5.6	Chicken	8.0	Carbonated drinks (pop)	7.3
Beef[2]	5.5	Pork	4.8	Margarine	5.6	Cereal	7.0
Cereal	4.3	Cold cuts/sausages	4.7	Eggs	4.5	Jam/honey/syrup/sugar	5.6
Cold cuts/sausages	4.1	Bread/buns, white	4.5	Pork	4.3	Bread, whole wheat	5.0
Pizza	3.5	Eggs	4.3	Salty snack food	4.3	Potatoes[4]	3.9
Bread, whole wheat	3.4	Moose meat	4.1	Pizza	4.2	Hash browns, French fries, onion rings	3.8
Carbonated drinks, regular	3.4	Bread, whole wheat	3.9	Hash browns, French fries, onion rings	3.2	Fruit-flavoured drinks	3.7
Salty snack food[3]	3.0	Fish	3.9	Vegetable oil	3.0	Cakes/pies/pastries	3.4

e) Saturated Fat		f) Monounsaturated Fat		g) Polyunsaturated Fat		h) Cholesterol	
FOOD	% of total	FOOD	% of total	FOOD	% of total	FOOD	% of total
Beef	10.4	Beef	9.9	Chicken	9.7	Eggs	34.6
Cold cuts/sausages	9.2	Cold cuts/sausages	97	Margarine	9.0	Chicken	11.7
Chicken	6.1	Chicken	8.6	Salty snack food	9.0	Beef	10.1
Cheese	5.8	Margarine	6.6	Salad dressing	5.5	Cold cuts/sausages	5.5
Butter	5.2	Vegetable oil	5.0	Hash browns, French fries, onion rings	5.2	Pork	4.0
Pizza	4.8	Eggs	4.9	Bread/buns, white	5.1	Sandwiches	3.5
Pork[5]	4.7	Pork	4.9	Vegetable oil	4.2	Fish	3.0
Cream	4.3	Pizza	4.4	Cold cuts/sausages	4.1	Moose meat	2.4
Eggs	4.1	Salty snack food	4.2	Cakes/pies/pastries	3.7	Cheese	2.3
Hash browns, French fries, onion rings	3.2	Cakes/pies/pastries	3.2	Eggs	3.7	Milk	2.1

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

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	19.4	Cereal	13.5	Vegetables	19.7	Fruit-flavoured drinks	27.1
Jam/honey/syrup/ sugar	15.5	Bread, whole wheat	12.7	Eggs	13.1	Fruit juice	17.4
Fruits	6.6	Vegetables	8.1	Milk	10.7	Vegetables	14.7
Milk	6.1	Bread, white	7.3	Margarine	9.3	Fruits	11.9
Fruit juice	4.3	Pasta/noodles	6.4	Moose liver	6.0	Potatoes	5.3
Fruit-flavoured drinks	4.2	Fruits	6.1	Cold cuts/sausages	5.0	Hash browns, French fries, onion rings	3.4
Cakes/pies/pastries	4.0	Hash browns, French fries, onion rings	5.0	Soup	3.9	Soup	2.2
Cereal	3.4	Potatoes	4.6	Cheese	3.6	Salty snack food	2.1
Iced tea	3.4	Salty snack food	4.6	Butter	3.5	Pasta/noodles	2.0
Bread/buns, white	2.5	Pizza	3.4	Cream	3.2	Spaghetti/tomato sauce	1.2

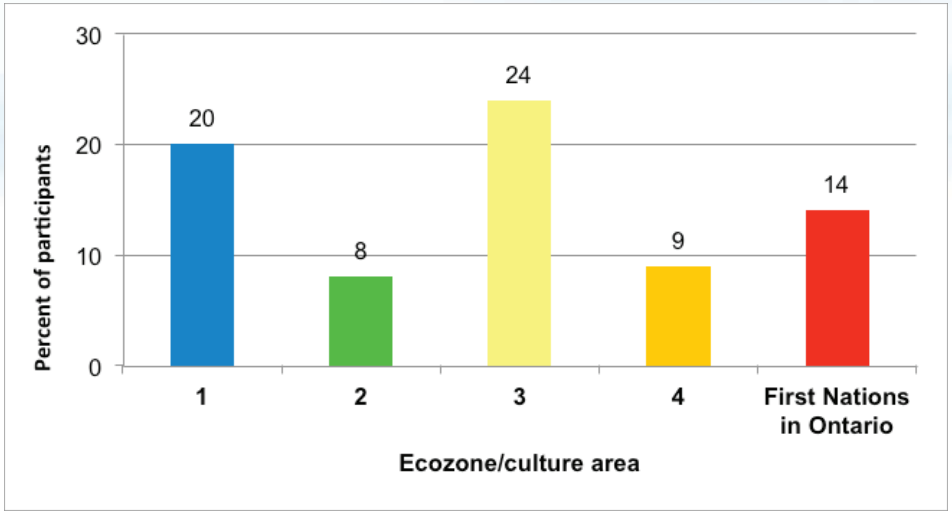
m) Vitamin D		n) Folate		o) Calcium		p) Iron	
FOOD	% of total	FOOD	% of total	FOOD	% of total	FOOD	% of total
Fish	20.5	Pasta/noodles	17.7	Milk	15.5	Cereal	13.0
Milk	20.3	Bread, white	16.8	Bread, whole wheat	11.5	Bread, white	10.4
Margarine	16.9	Pizza	6.1	Bread, white	7.5	Beef	7.8
Eggs	11.7	Vegetables	5.5	Cheese	7.4	Pasta/noodles	6.1
Pasta/noodles	5.1	Bread, whole wheat	5.0	Pizza	5.6	Bread, whole wheat	4.8
Cold cuts/sausages	4.2	Cereal	5.0	Pasta/noodles	4.9	Chicken	4.2
Pork	2.9	Eggs	5.0	Cereal	2.8	Moose meat	3.5
Chicken	2.6	Sandwiches	3.0	Vegetables	2.6	Pizza	3.5
Milk, evaporated	1.7	Tea	3.0	Sandwiches	2.5	Soup	3.4
Beef	1.6	Soup	2.4	Fruit-flavoured drinks	2.4	Vegetables	2.8

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

q) Sodium		r) Zinc	
FOOD	% of total	FOOD	% of total
Soup	10.4	Beef	21.0
Cold cuts/sausages	9.7	Moose meat	6.4
Bread, white	9.2	Cereal	6
Pizza	4.8	Chicken	6
Bread, whole wheat	4.5	Pasta/noodles	4.6
Chicken	4.5	Cold cuts/sausages	4.3
Pasta/noodles	4.2	Bread, whole wheat	3.9
Sandwiches	3.8	Pork	3.7
Pork	2.8	Milk	3.5
Cheese	2.7	Pizza	3.2

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

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



Legend for ecozone/culture areas:
1= Boreal Shield/Subarctic (northwestern ON)
2= Boreal Shield/Northeast (southwestern ON)
3= Hudson Plains/Subarctic (northeastern ON)
4= Mixedwood Plains/Northeast (southeastern ON)

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

	Total First Nations in Ontario	Ecozone 1	Ecozone 2	Ecozone 3	Ecozone 4
Traditional Food	**Mean grams/ person/ day**				
Moose meat	10.05	15.82	3.83	49.30	0.68
Walleye-pickerel	3.23	6.70	2.22	0.45	0.32
Whitefish	2.64	5.52	1.52	2.75	.
Trout	2.27	5.06	1.40	.	.
Tomatoes	1.02	.	.	.	3.01
Deer meat	0.87	0.19	0.43	.	2.09
Caribou meat	0.84	.	.	14.68	.
Partridge	0.68	0.88	.	3.44	0.41
Cornmeal, lime-treated	0.58	.	.	.	1.72
Perch	0.56	.	0.30	.	1.45
Rabbit meat	0.46	.	2.08	0.36	.
Goose meat	0.39	.	.	6.77	.
Sturgeon	0.30	0.76	.	.	.
Maple syrup	0.29	.	0.04	.	0.82
Kidney beans	0.25	.	.	.	0.75
Moose liver	0.25	0.39	0.48	.	.
Squash	0.24	.	.	.	0.71
Raspberries	0.19	.	0.90	.	.
Potatoes	0.18	.	.	0.81	0.39
Wild rice	0.16	.	.	.	0.46
Strawberries	0.10	.	.	.	0.29
Snap beans	0.07	.	.	.	0.21
Peppers	0.06	.	.	.	0.18
Mullet (sucker)	0.06	0.14	.	.	.

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

	Total First Nations in Ontario	Ecozone 1	Ecozone 2	Ecozone 3	Ecozone 4
Traditional Food	**Mean grams/ person/ day**				
Pike eggs	0.05	0.14	.	.	.
Onions	0.05	.	.	.	0.15
Bergamot, herb	0.05	.	.	.	0.15
Carrots	0.05	.	.	.	0.14
Garlic	0.03	.	.	.	0.08
Moose tongue	0.02	.	0.09	.	.
Pike	0.01	.	0.06	.	.
Moose fat	0.01	0.03	.	.	.
Cabbage	0.01	.	.	.	0.03
Basil	0.01	.	.	.	0.03
Labrador tea	0.001	.	.	0.01	.
Wild ginger and sweet flag tea	0.001	.	.	.	0.002
Juniper tea	0	.	0.0002	.	.

(.) indicates that the food was not reported on any of the 24hr recalls from that ecozone
Note: For the purposes of this report, traditional food in Ontario includes both wild and cultivated foods.

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

Nutrient	Days with TF (n=202 recalls)	Days without TF (n=1227 recalls)
	mean ± SE	
Energy (kcals)	2019 ± 69	1972 ± 28
Protein (g)***	121 ± 5	82 ± 1
Fat (g)	77 ± 4	81 ± 1
Carbohydrate (g)	219 ± 8	235 ± 4
Total sugars (g)**	66 ± 4	81 ± 2
Fibre (g)	15 ± 0.7	15 ± 0.3
Cholesterol (mg)**	380 ± 23	318 ± 7
Total Saturated Fat (g)***	21 ± 1	26 ± 0.5
Total Monounsaturated Fat (g)	31 ± 2	31 ± 1
Total Polyunsaturated Fat (g)	17 ± 1	16 ± 0.3
Linoleic acid (g)	13 ± 1	13 ± 0.3
Linolenic acid (g)***	2 ± 0.18	1.5 ± 0.04
Calcium (mg)	673 ± 36	694 ± 13
Iron (mg)***	20 ± 1	14 ± 0.3
Zinc (mg)***	17 ± 1	11 ± 0.2

Nutrient	Days with TF (n=202 recalls)	Days without TF (n=1227 recalls)
	mean ± SE	
Magnesium (mg)***	307 ± 11	258 ± 4
Copper (mg)***	1.6 ± 0.07	1.2 ± 0.03
Potassium (mg)***	2988 ± 107	2407 ± 36
Sodium (mg)*	2707 ± 142	3088 ± 51
Phosphorus (mg)***	1533 ± 58	1151 ± 16
Vitamin A (µg)	727 ± 150	477 ± 20
Vitamin D (µg)***	9.5 ± 1.1	4 ± 0.11
Vitamin C (mg)*	58 ± 5	72 ± 3
Folate (µg)	387 ± 19	351 ± 6
Thiamin (mg)*	1.9 ± 0.09	1.7 ± 0.03
Riboflavin (mg)***	2.4 ± 0.09	2.0 ± 0.03
Niacin (mg)***	49 ± 2	39 ± 0.6
Vitamin B6 (mg)**	1.8 ± 0.09	1.5 ± 0.03
Vitamin B12 (µg)***	12 ± 0.84	5 ± 0.52

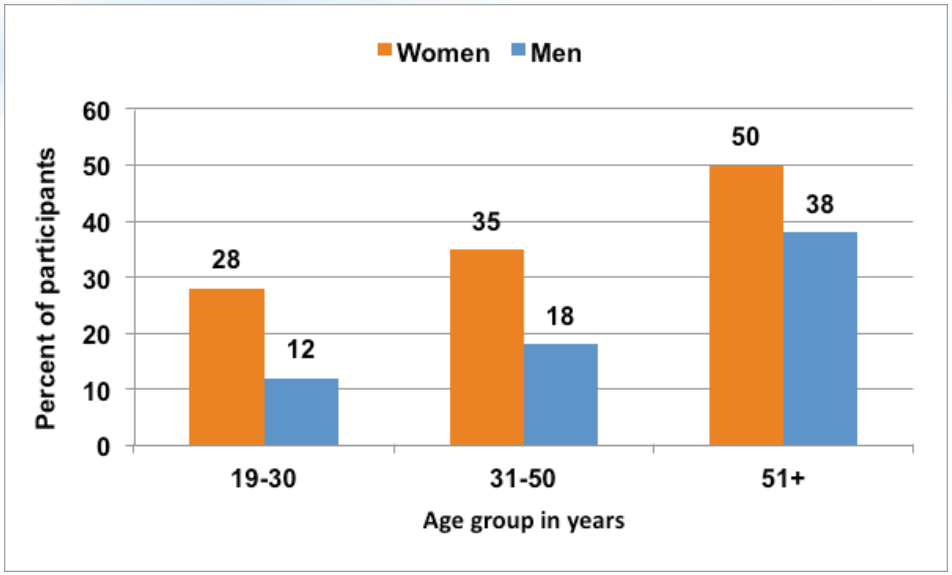
*significantly different, unpaired t-test, p<0.05; **p<0.01; ***p<0.000

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

Total Ontario participants		Ecozone 1		Ecozone 2		Ecozone 3		Ecozone 4	
Market Food	**grams/person/day**	**Market Food**	**grams/person/day**	**Market Food**	**grams/person/day**	**Market Food**	**grams/person/day**	**Market Food**	**grams/person/day**
BEVERAGES		**BEVERAGES**		**BEVERAGES**		**BEVERAGES**		**BEVERAGES**	
Coffee	395	Water, tap	374	Coffee	491	Tea	451	Coffee	441
Water, tap	373	Coffee	317	Water, tap	425	Coffee	294	Water, tap	375
Tea	205	Tea	282	Carbonated drinks, regular	162	Water, tap	166	Water, bottled	324
Carbonated drinks, regular	177	Carbonated drinks, regular	204	Water, bottled	132	Carbonated drinks, regular	161	Carbonated drinks, regular	157
Water, bottled	170	Fruit drink	103	Tea	95	Fruit drink	153	Tea	143
Milk	89	Milk	96	Milk	94	Carbonated drinks, diet	74	Carbonated drinks, diet	98
Fruit drinks[1]	81	Water, bottled	72	Carbonated drinks, diet	64	Water, bottled	69	Milk	84
Carbonated drinks, diet	67	Carbonated drinks, diet	40	Fruit drinks	56	Milk	50	Fruit drinks	59
Fruit juice[2]	36	Fruit juice	34	Iced tea	40	Fruit juice	21	Fruit juice	43
Iced tea	30	Iced tea	28	Fruit juice	33	Milk, evaporated	12	Iced tea	30
FOOD		**FOOD**		**FOOD**		**FOOD**		**FOOD**	
Soups[3]	88	Soups	95	Soups	87	Soups	96	Soups	81
Pasta	74	Cereal	83	Vegetables	83	Pasta	76	Vegetables	71
Vegetables[4]	64	Pasta/noodles	82	Pasta	67	Potatoes	74	Pasta	69
Cereal	64	Chicken	65	Fruits	63	Cereal	64	Fruits	65
Chicken[5]	**54**	Vegetables	**49**	Cereal	**58**	Eggs	**61**	Chicken	**53**
Fruits	**48**	Potatoes	**45**	Bread, white	**53**	Beef	**55**	Bread, white	**45**
Potatoes[6]	**47**	Beef	**43**	Potatoes	**48**	Bread, white	**52**	Cereal	**45**
Bread, white	**45**	Bread, white	**38**	Beef	**47**	Vegetables	**50**	Potatoes	**43**
Beef[7]	**42**	Cold cuts/sausages	**36**	Chicken	**40**	Chicken	**40**	Beef	**35**
Eggs	**32**	Eggs	**34**	Eggs	**30**	Cold cuts/sausages	**37**	Sandwiches	**33**

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

Figure 24. Use of nutritional supplements by First Nations adults in Ontario (n=1429)*



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

Food Security

Figure 25. Percent of households that worried that their traditional food would run out before they could get more, in the past 12 months (n=1429)

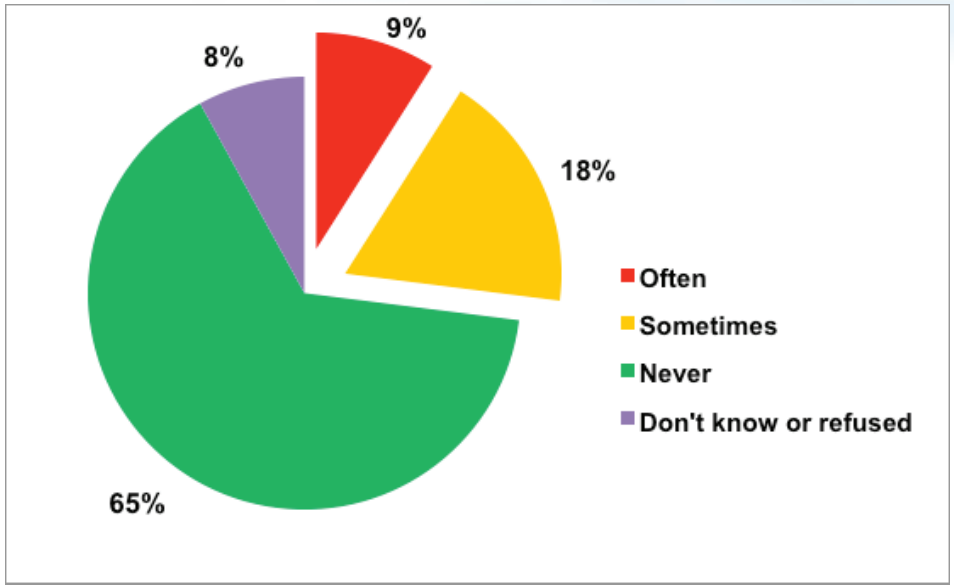


Figure 26. Percent of household that worried that their traditional food just didn't last and they couldn't get more in the past 12 months (n=1429)

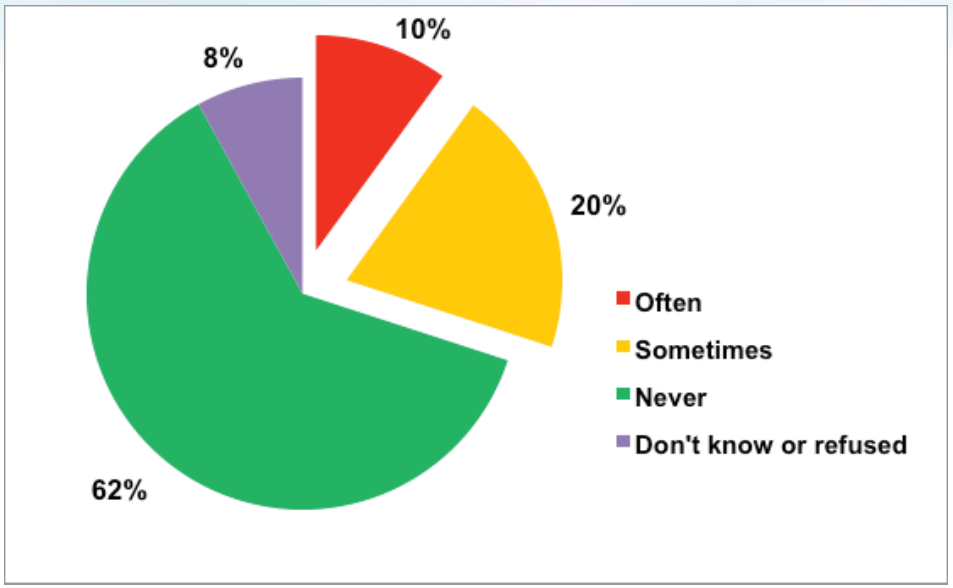


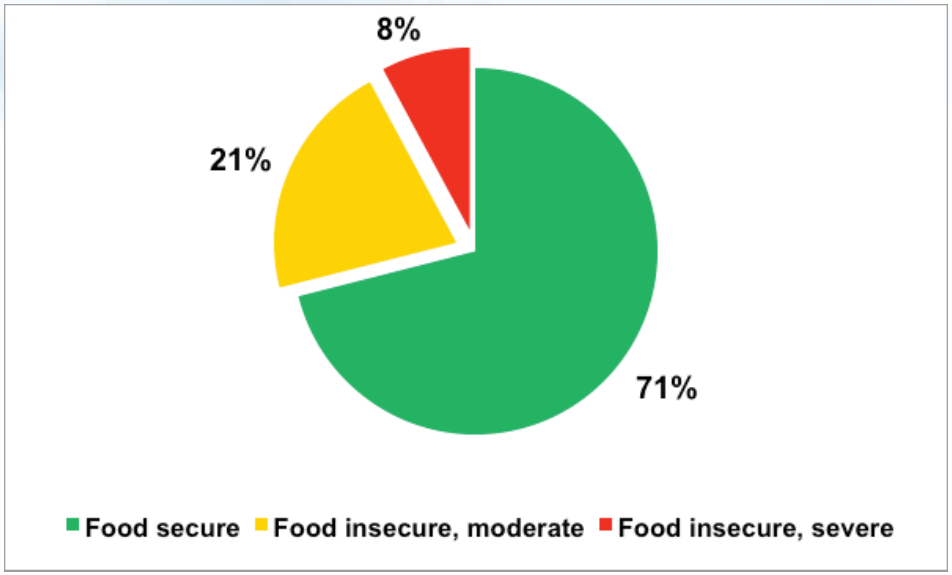
Table 18. Percent of First Nations adults in Ontario who responded affirmatively to food security questions (in the last 12 months)

	Households affirming item		
	All Households (n=1376)	Households with Children (n=667)	Households without Children (n=709)
Adult Food Security Scale			
You and other household members worried food would run out before you got money to buy more	29.9	38.3	20.4
Food you and other household members bought didn't last and there wasn't any money to get more	24.6	30.9	17.3
You and other household members couldn't afford to eat balanced meals	27.9	32.7	22.6
You or other adults in your household ever cut size of meals or skipped meals	9.6	11.6	7.3
You or other adults in your household ever cut size of meals or skipped meals in 3 or more months	7.5	8.4	6.4
You (personally) ever ate less than you felt you should	11.5	13.9	8.8
You (personally) were ever hungry but did not eat	7.6	9.4	5.6
You (personally) lost weight	3.9	4.6	3.2
You or other adults in your household ever did not eat for a whole day	2.9	2.8	3.1
You or other adults in your household ever did not eat for a whole day in 3 or more months	2.4	2.4	2.5
Child Food Security Scale			
You or other adults in your household relied on less expensive foods to feed children	18.0	33.9	-
You or other adults in your household couldn't feed children a balanced meal	12.5	23.5	-
Children were not eating enough	6.6	12.5	-
You or other adults in your household ever cut size of any of the children's meals	1.8	3.4	-
Any of the children were ever hungry	1.8	3.4	-
Any of the children ever skipped meals	1.5	2.8	-
Any of the children ever skipped meals in 3 or more months	0.6	1.2	-
Any of the children ever did not eat for a whole day	0.4	0.8	-

Table 19. Income-related household food security status for First Nations in Ontario, by households with and without children

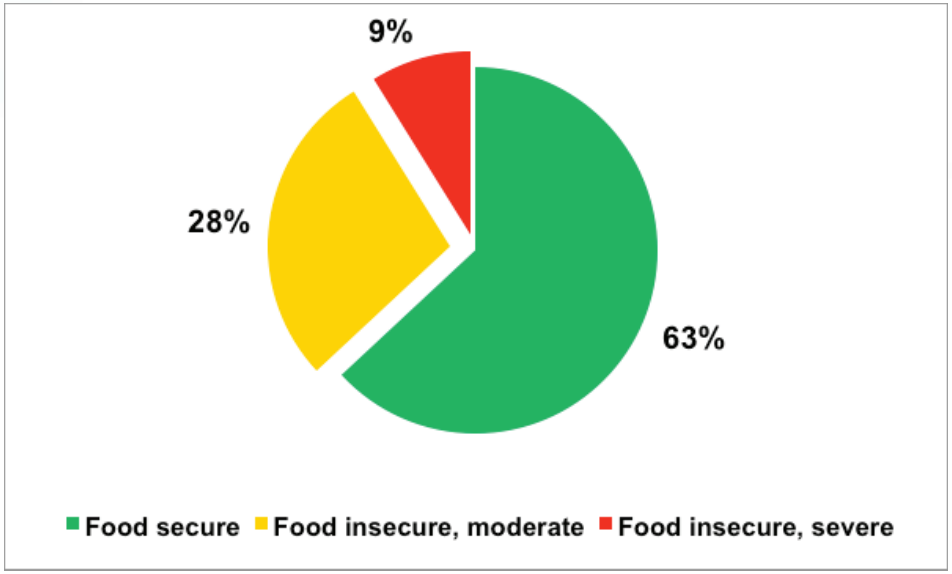
		Income-related food security status											
		Food Secure			Food Insecure								
		All			All			Moderate			Severe		
		n	%	95% CI	n	%	95% CI	n	%	95% CI	n	%	95% CI
All households	Household status	928	71	68-74	448	29	26-32	322	21	19-24	126	8	6-9
	Adult status	942	72	69-74	434	28	25-31	309	21	18-23	125	8	6-9
	Child status	481	76	73-80	186	24	20-27	164	22	18-25	22	2	1-3
Households with children	Household status	391	63	59-68	276	37	32-41	207	28	24-32	69	9	6-11
	Adult status	405	65	61-69	262	35	31-39	194	26	22-30	68	9	6-11
	Child status	481	76	73-80	186	24	20-27	164	22	18-25	22	2	1-3
Households without children	Household status	537	79	76-83	172	21	17-24	115	14	11-17	57	7	5-9

Figure 27. Income-related household food insecurity in First Nations households in Ontario[2] (n=1376)



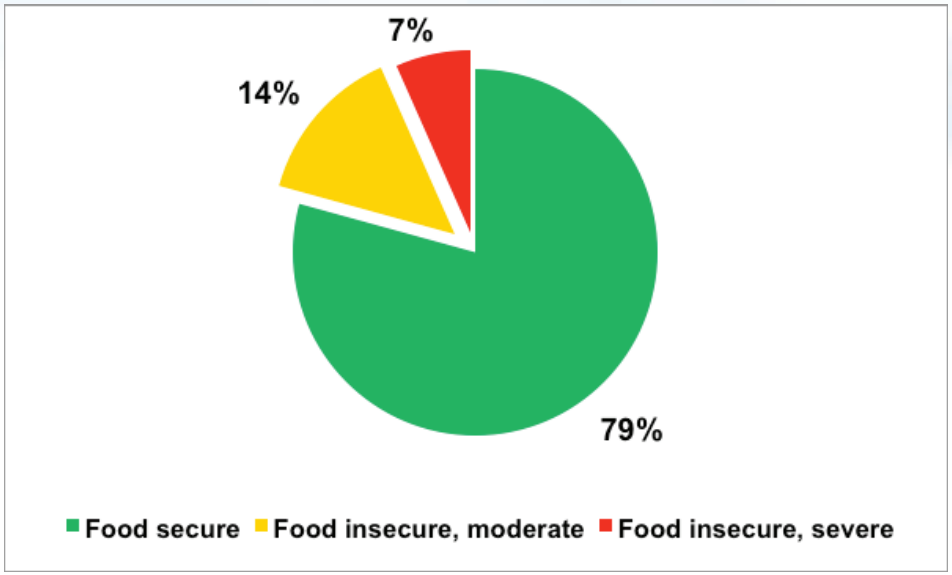
[2] Classification of food security scale based on CCHS 2.2. Ibid.

Figure 28. Income-related household food insecurity in First Nations households with children in Ontario[3](n=667)



[3] Classification of food security scale based on CCHS 2.2. Ibid.

Figure 29. Income-related household food insecurity in First Nations households without children in Ontario[4](n=709)



[4] Classification of food security scale based on CCHS 2.2. Ibid.

Figure 30. Marginal food insecurity in First Nations households in Ontario (n=1376)

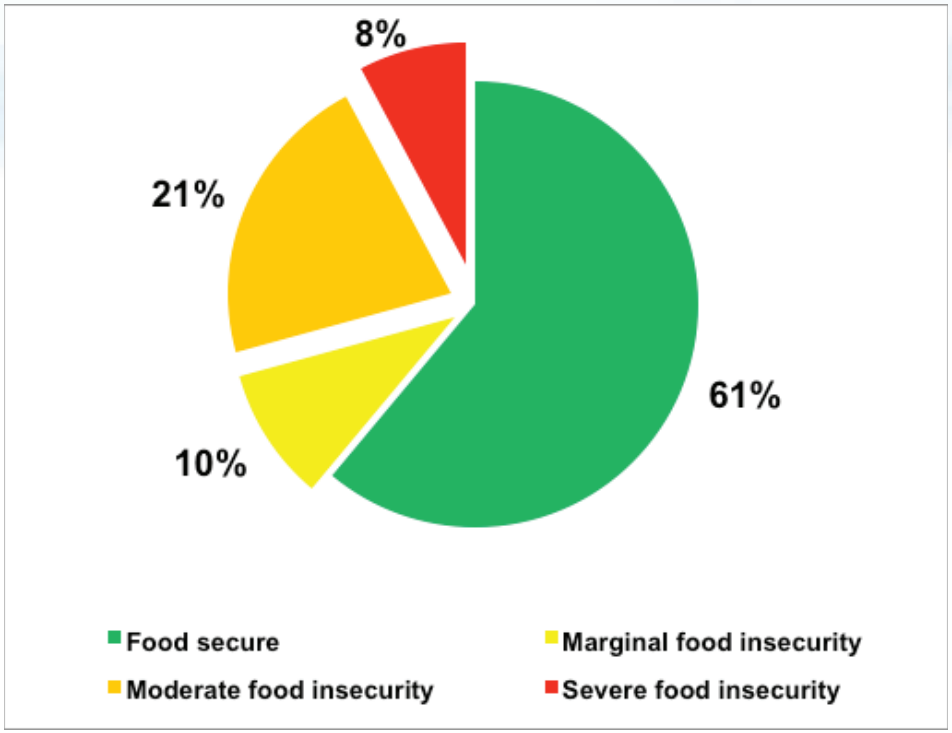
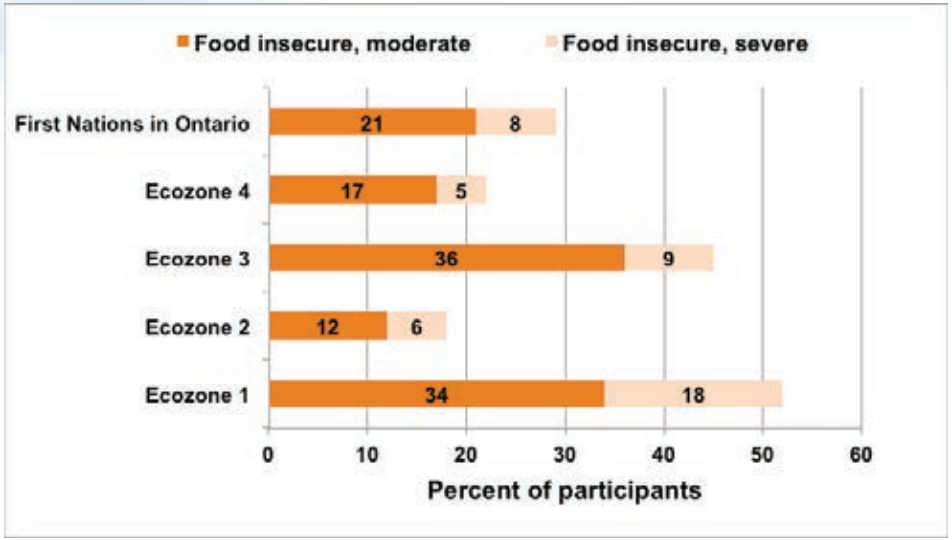
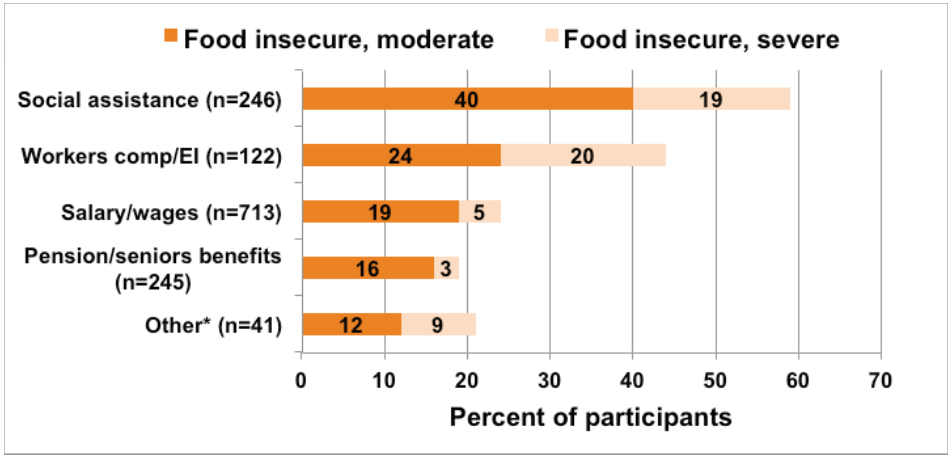


Figure 31. Income-related household food security in First Nations communities in Ontario, by ecozone/ culture area (n=1376), unweighted



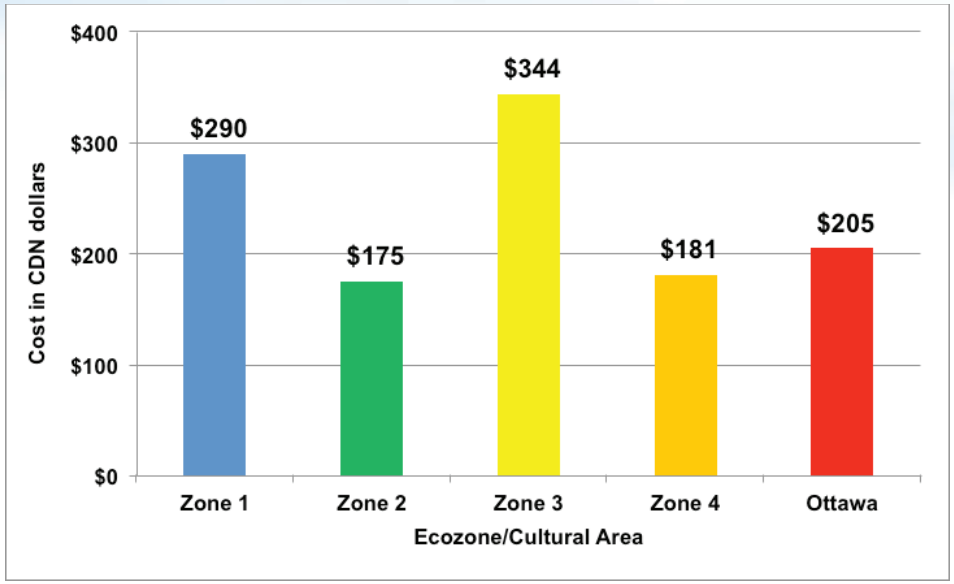
Legend for ecozone/culture areas:
1= Boreal Shield/Subarctic (northwestern ON)
2= Boreal Shield/Northeast (southwestern ON)
3= Hudson Plains/Subarctic (northeastern ON)
4= Mixedwood Plains/Northeast (southeastern ON)

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



*other sources of income include training/school allowance, spousal/parental support, savings, none

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



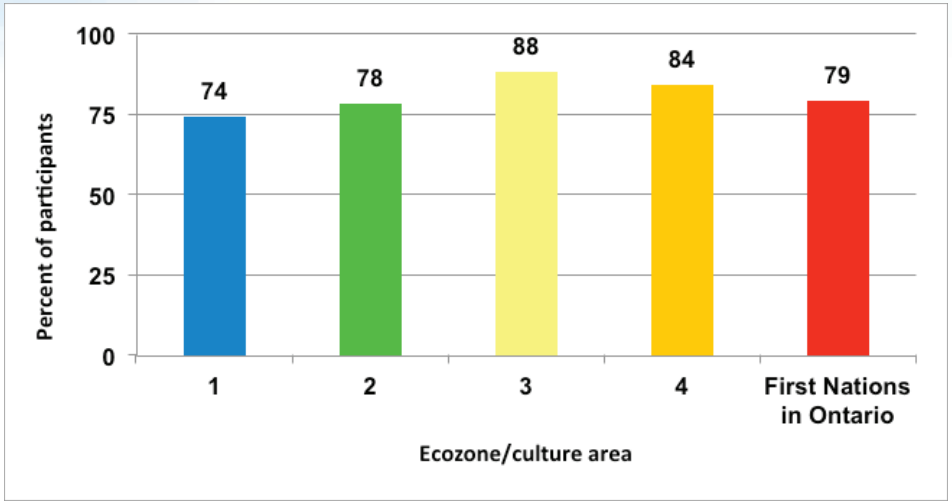
Legend for ecozone/culture areas:
1= Boreal Shield/Subarctic (northwestern ON)
2= Boreal Shield/Northeast (southwestern ON)
3= Hudson Plains/Subarctic (northeastern ON)
4= Mixedwood Plains/Northeast (southeastern ON)

*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

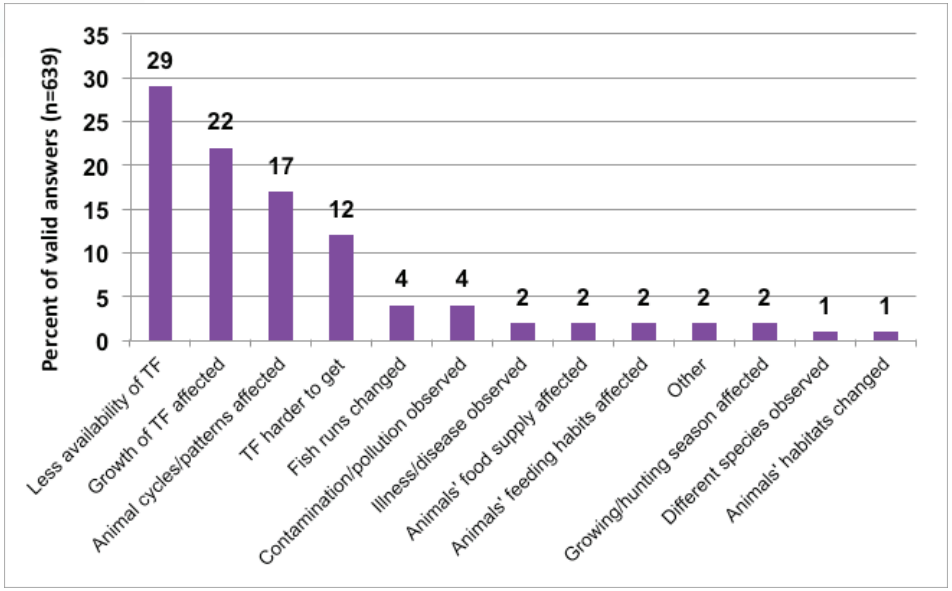
Figure 34. Percent of First Nations adults in Ontario who noticed any significant climate change in their traditional territory in the last 10 years (n=1429)

Legend for ecozone/culture areas:



1= Boreal Shield/Subarctic (northwestern ON)
2= Boreal Shield/Northeast (southwestern ON)
3= Hudson Plains/Subarctic (northeastern ON)
4= Mixedwood Plains/Northeast (southeastern ON)

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



Tap Water Analyses

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

Characteristic	Answer
Average year home was built (range) (n=1017)	1991 (1893, 2012)
Percent of households (HH) with upgraded plumbing (n=1429)	20%
Average year plumbing upgraded (range) (n=213)	2005 (1965, 2012)
Percent of HH that treat water (e.g. with filters, boiling, etc.) (n=1428)	32%
Percent of HH with a water storage system (n=1427)	16%
Location of water storage system (n=213):	
Inside	55%
Outside	45%
Type of water storage system (n=213):	
Able to be carried (bucket)	35%
Fixed in place	65%
Percent of type of pipes under kitchen sink (n=1382)	
Metal	18%
Plastic	48%
Plastic with metal fittings	10%
Copper with braided flex line	21%

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

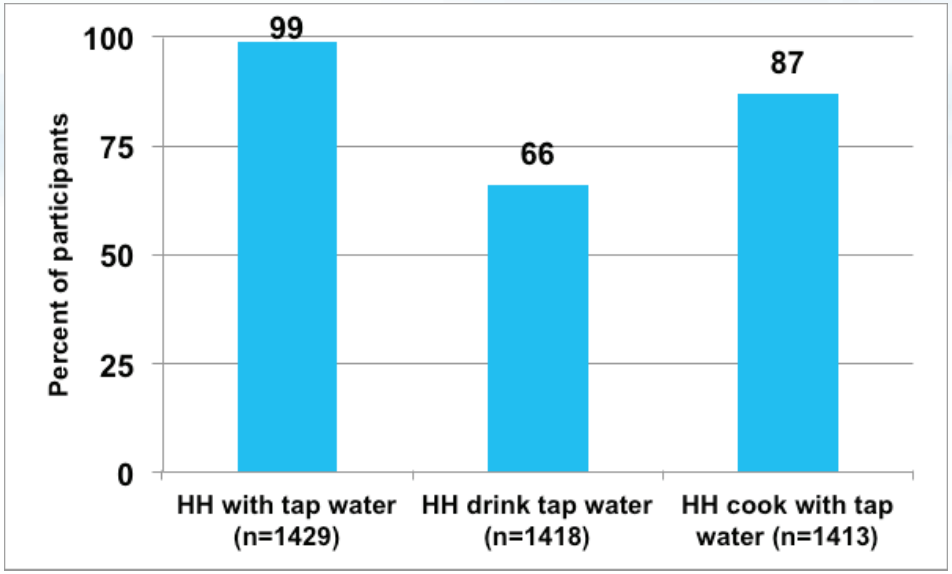
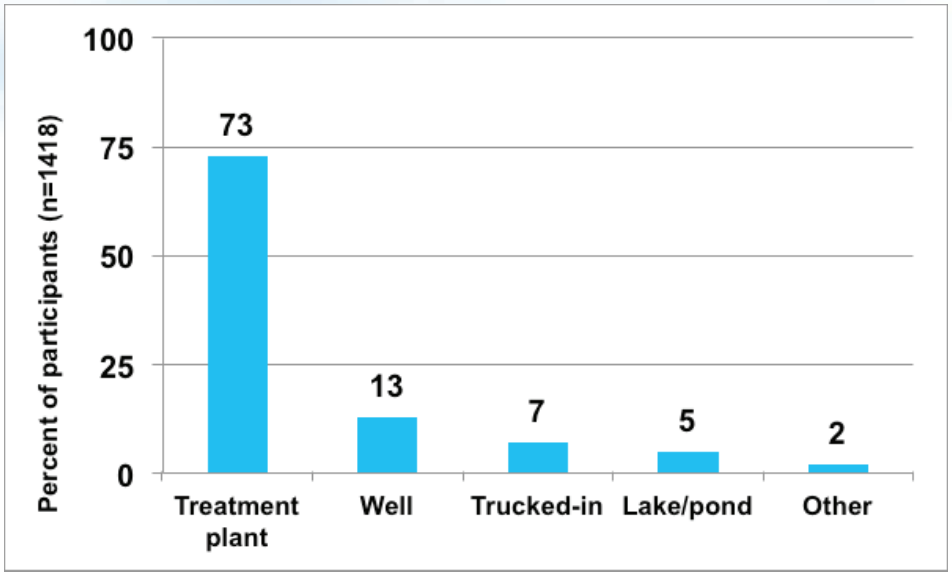
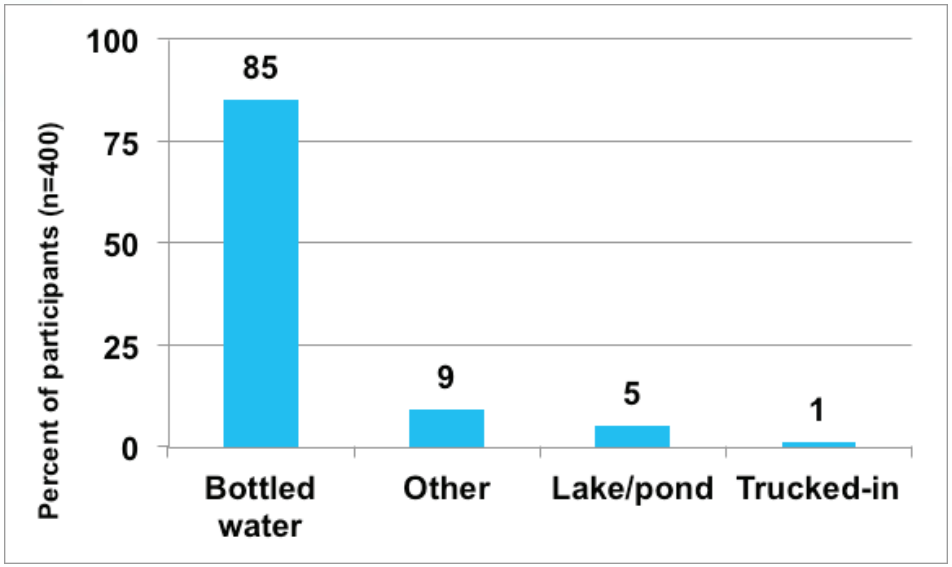


Figure 37. Source of tap water, First Nations in Ontario



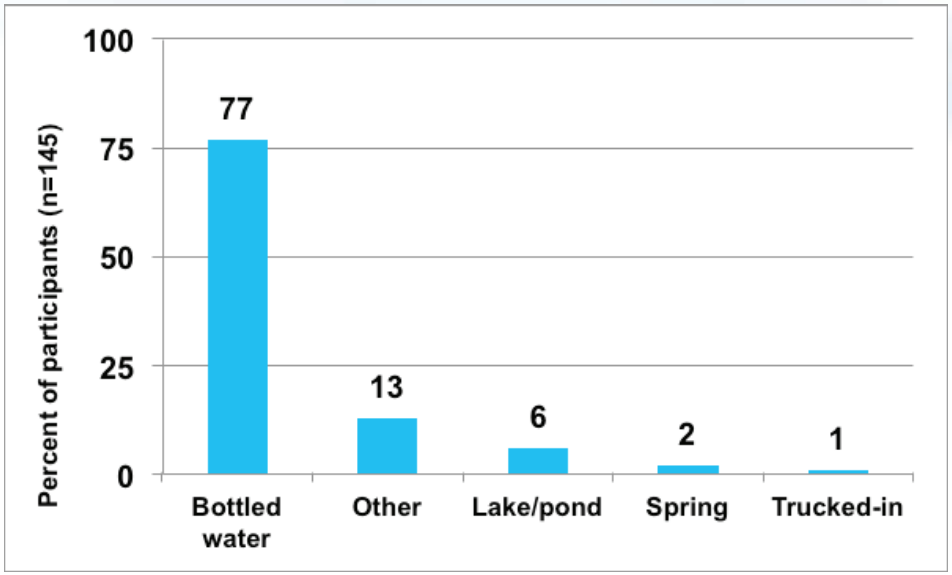
Other = cistern, water line, spring, stream, river

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



other = water treatment plant, reverse osmosis water system, spring, stream/river

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



other = water treatment plant, reverse osmosis water system

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

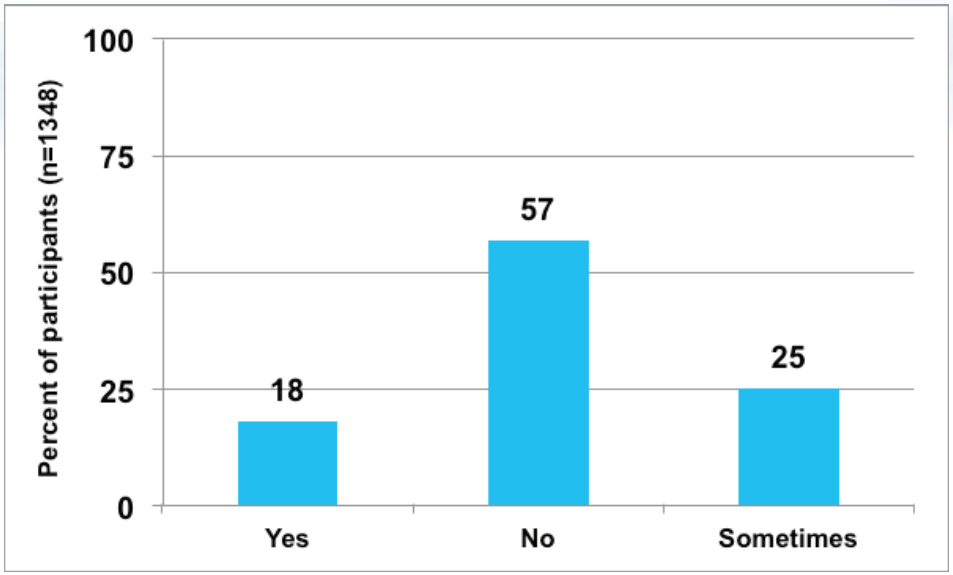


Table 21: Trace metals analysis results for parameters of health concern

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	0.69	0.2	6	0	0	0	Below guideline value.
Arsenic, As	5.75	0.2	10	0	0	0	Below guideline value.
Barium, Ba	878	0.2	1000	0	0	0	Below guideline value.
Boron, B	1590	10	5000	0	0	0	Below guideline value.
Cadmium, Cd	1.91	0.04	5	0	0	0	Below guideline value.
Chromium, Cr	2.6	0.2	50	0	0	0	Below guideline value.
Lead, Pb	120	0.2	10	25	1	1	1 sample was above the guideline. Resampling was refused by the householder.
Selenium, Se	0.64	0.2	10	0	0	0	Below guideline value.
Uranium, U	57.5	0.1	20	18	18	3	1 community had 17 exceedances. This is an ongoing issue that Health Canada is aware of. In the other community, the household in question does not use the water for drinking or cooking.
Boreal Shield /Subarctic							
Antimony, Sb	0.08	0.2	6	0	0	0	Below guideline value.
Arsenic, As	0.77	0.2	10	0	0	0	Below guideline value.
Barium, Ba	12.4	0.2	1000	0	0	0	Below guideline value.
Boron, B	<10	10	5000	0	0	0	Below guideline value.
Cadmium, Cd	0.277	0.04	5	0	0	0	Below guideline value.
Chromium, Cr	0.4	0.2	50	0	0	0	Below guideline value.
Lead, Pb	120	0.2	10	9	0	0	Flushed samples below guideline value.
Selenium, Se	0.11	0.2	10	0	0	0	Below guideline value.
Uranium, U	0.114	0.1	20	0	0	0	Below guideline value.

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	
Boreal Shield /Northeast							
Antimony, Sb	0.29	0.2	6	0	0	0	Below guideline value.
Arsenic, As	5.75	0.2	10	0	0	0	Below guideline value.
Barium, Ba	243	0.2	1000	0	0	0	Below guideline value.
Boron, B	420	10	5000	0	0	0	Below guideline value.
Cadmium, Cd	0.075	0.04	5	0	0	0	Below guideline value.
Chromium, Cr	2.6	0.2	50	0	0	0	Below guideline value.
Lead, Pb	25	0.2	10	2	0	0	Flushed samples below guideline value.
Selenium, Se	0.64	0.2	10	0	0	0	Below guideline value.
Uranium, U	57.5	0.1	20	18	18	3	One community with 17 exceedances. This is an ongoing issue that Health Canada is aware of. In the other community, the household in question does not use the water for drinking or cooking.
Hudson Plains /Subarctic							
Antimony, Sb	0.05	0.2	6	0	0	0	Below guideline value.
Arsenic, As	0.53	0.2	10	0	0	0	Below guideline value.
Barium, Ba	20.6	0.2	1000	0	0	0	Below guideline value.
Boron, B	<10	10	5000	0	0	0	Below guideline value.
Cadmium, Cd	1.91	0.04	5	0	0	0	Below guideline value.
Chromium, Cr	0.4	0.2	50	0	0	0	Below guideline value.
Lead, Pb	88.9	0.2	10	9	0	0	Flushed samples below guideline value.
Selenium, Se	0.08	0.2	10	0	0	0	Below guideline value.
Uranium, U	0.08	0.1	20	0	0	0	Below guideline value.

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	
Mixedwood Plains /Northeast							
Antimony, Sb	0.69	0.2	6	0	0	0	Below guideline value.
Arsenic, As	1.99	0.2	10	0	0	0	Below guideline value.
Barium, Ba	878	0.2	1000	0	0	0	Below guideline value.
Boron, B	1590	10	5000	0	0	0	Below guideline value.
Cadmium, Cd	0.49	0.04	5	0	0	0	Below guideline value.
Chromium, Cr	<0.2	0.2	50	0	0	0	Below guideline value.
Lead, Pb	34.4	0.2	10	5	1	1	1 sample was above the guideline. Resampling was refused by the householder
Selenium, Se	<0.2	0.2	10	0	0	0	Below guideline value.
Uranium, U	4.03	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	1920	<1	100/200*	39	49	7	Above guideline. Elevated levels pose no health concern.
Copper, Cu	5850	<0.2	1,000	17	3	1	Above guideline. Elevated levels pose no health concern.
Iron, Fe	1830	<10	300	7	4	0	Above guideline. Elevated levels pose no health concern.
Manganese, Mn	116	<0.2	50	4	10	1	Above guideline. Elevated levels pose no health concern.
Sodium, Na	840,000	<10	200,000	3	3	2	Above guideline. Elevated levels pose no health concern.
Zinc, Zn	3930	<1	5,000	0	0	0	Below guideline value.
Boreal Shield /Subarctic							
Aluminum, Al	512	<1	100/200*	5	12	0	Above guideline. Elevated levels pose no health concern.
Copper, Cu	1680	<0.2	1,000	7	0	0	Flushed samples below guideline value.
Iron, Fe	643	<10	300	1	0	0	Flushed samples below guideline value.
Manganese, Mn	16.4	<0.2	50	0	0	0	Below guideline value.
Sodium, Na	16,800	<10	200,000	0	0	0	Below guideline value.
Zinc, Zn	646	<1	5,000	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	
Boreal Shield /Northeast							
Aluminum, Al	127	<1	100/200*	2	5	1	Above guideline. Elevated levels pose no health concern.
Copper, Cu	553	<0.2	1,000	0	0	0	Below guideline value.
Iron, Fe	1830	<10	300	2	1	0	Above guideline. Elevated levels pose no health concern.
Manganese, Mn	78.8	<0.2	50	0	1	0	Above guideline. Elevated levels pose no health concern.
Sodium, Na	125,000	<10	200,000	0	0	0	Below guideline value.
Zinc, Zn	1360	<1	5,000	0	0	0	Below guideline value.
Hudson Plains /Subarctic							
Aluminum, Al	1920	<1	100/200*	21	21	5	Above guideline. Elevated levels pose no health concern.
Copper, Cu	3460	<0.2	1,000	7	0	0	Flushed samples below guideline value.
Iron, Fe	1540	<10	300	0	0	0	Below guideline value.
Manganese, Mn	62.5	<0.2	50	0	4	0	Above guideline. Elevated levels pose no health concern.
Sodium, Na	24,200	<10	200,000	0	0	0	Below guideline value.
Zinc, Zn	3930	<1	5,000	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	
Mixedwood Plains /Northeast							
Aluminum, Al	596	<1	100/200*	11	11	1	Above guideline. Elevated levels pose no health concern.
Copper, Cu	5850	<0.2	1,000	4	3	1	Above guideline. Elevated levels pose no health concern.
Iron, Fe	990	<10	300	4	3	0	Above guideline. Elevated levels pose no health concern.
Manganese, Mn	116	<0.2	50	4	5	1	Above guideline. Elevated levels pose no health concern.
Sodium, Na	840,000	<10	200,000	3	3	2	Above guideline. Elevated levels pose no health concern.
Zinc, Zn	2480	<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 Ontario

Pharmaceutical	Human	Veterinary	Aquaculture	Detected
Analgesic/Anti-Inflammatory				
Acetaminophen	X			Yes
Codeine	X			Yes
Diclofenac	X			Yes
Ibuprofen	X			Yes
Indomethacin	X			No
Ketoprofen	X	X		Yes
Naproxen	X			Yes
Antibiotic				
Chlortetracycline		X		No
Ciprofloxacin	X			Yes
Clarithromycin	X			Yes
Erythromycin	X	X		Yes
Lincomycin		X		No
Monensin		X		No
Oxytetracycline		X	X	No
Roxithromycin	X			No
Sulfamethazine		X		Yes
Sulfamethoxazole	X			Yes
Tetracycline	X	X		No
Trimethoprim	X	X	X	Yes

Table 23. Pharmaceuticals tested for and quantified in First Nations communities in Ontario

Pharmaceutical	Human	Veterinary	Aquaculture	Detected
Antacid				
Cimetidine	X			Yes
Ranitidine	X			Yes
Anti-diabetics				
Metformin	X			Yes
Pentoxifylline	X	X		Yes
Antihypertensives (Beta-blocker)				
Metoprolol	X			Yes
Atenolol	X			Yes
Antihypertensives				
Diltiazem	X			Yes
Antianginal metabolite				
Dehydronifedipine	X			Yes
Anticoagulant				
Warfarin	X	X		Yes
Anticonvulsant				
Carbamazepine	X			Yes
Antihistamine				
Diphenhydramine	X			Yes
Diuretics				
Furosemide	X			Yes
Hydrochlorthiazide	X			Yes
Antidepressant				
Fluoxetine	X	X		No

Table 23. Pharmaceuticals tested for and quantified in First Nations communities in Ontario

Pharmaceutical	Human	Veterinary	Aquaculture	Detected
Lipid Regulators				
Atorvastatin	X			Yes
Bezafibrate	X			Yes
Clofibric Acid	X	X		No
Gemfibrozil	X			Yes
Stimulant				
Caffeine	X			Yes
Metabolite of nicotine (smoking cessation)				
Cotinine	X			Yes
Steroid				
α-Trenbolone		X		No
β-Trenbolone		X		No
Oral Contraceptive				
17α-Ethinyl estradiol	X			Yes

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

	Pharmaceutical	# of Communities	# of Sites	# of Samples	FNFNES Max Concentrations (ng/L)		Canadian & US Studies (ng/L)		Global studies (ng/L)		Reference
					Wastewater	Surface water	Wastewater	Surface Water	Wastewater	Surface Water	
Analgesic/Anti-Inflammatory											
1	Acetaminophen	3	4	4	6,280	34	500,000 a	10,000b	417,500 c (Taiwan)	17,699.4 d (Spain)	a) (Geurra, Kim, et al. 2014) (b) (Kolpin, Furlong, et al. 2002) (c) (Lin and Tsai 2009) (d) (Pascual-Aguilar, Andreu and Pico 2013)
2	Diclofenac	4	8	15	-	38	28,400 e	500 f	228,500 c (Taiwan)	18,740 g (Spain)	(e) (Metcalfe, Miao, et al. 2004) (f) (Chiu and Westerhoff 2010) (c) (Lin and Tsai 2009) (g) (Osorio, et al. 2013)
3	Ibuprofen	4	9	12	192	367	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	Ketoprofen	1	1	1	-	304	5,700 h	79 k	233,630 l (Poland)	9810 j (Costa Rica)	(h) (Metcalfe, Koenig, et al. 2003) (k) (Brun, et al. 2006) (l) (Kotowska, Kapelewska and Sturgulewska 2014) (j) (Spongberg, et al. 2011)
5	Naproxen	6	8	13	25.6	120	611,000 i	4500 k	551,950 l (Poland)	12,300 m (Turkey)	(i) (Sadezky, et al. 2010) (k) (Brun, et al. 2006) (l) (Kotowska, Kapelewska and Sturgulewska 2014) (m) (Aydin and Talini 2013)

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

	Pharmaceutical	# of Communities	# of Sites	# of Samples	FNFNES Max Concentrations (ng/L)		Canadian & US Studies (ng/L)		Global studies (ng/L)		Reference
					Wastewater	Surface water	Wastewater	Surface Water	Wastewater	Surface Water	
Antibiotic											
6	Ciprofloxacin	3	7	13	58	37.7	5,600 i	360 i	31,000,000 aj (India)	13,570 m (Turkey)	(i) (Sadezky, et al. 2010) (aj) (Larsson, Pedro and Paxeus 2007); (m) (Aydin and Talini 2013)
7	Clarithromycin	3	7	18	-	69.6	8,000 a	79 e	14,000 o (Italy)	950 i (Germany)	(a) (Geurra, Kim, et al. 2014) (e) (Metcalfe, Miao, et al. 2004) (o) (Verlicchi and Zambello 2012) (i) (Sadezky, et al. 2010)
8	Erythromycin	1	1	1	-	23	4,670 p	120,900 i	55,300 q (Taiwan)	2,246 y (Vietnam)	(p) (Bartelt-Hunt, et al. 2011) (i (Sadezky, et al. 2010) (q) (Wang and Lin 2014) (y) (Hoa, et al. 2011)
9	Sulfamethazine	4	8	18	15.6	19.1	400,000 r	408 s	400,000 t (Croatia)	6,192 u (Spain)	(r) (Campagnolo, et al. 2002) (s) (Lissemore, et al. 2006) (t) (Babic, et al. 2007) (u) (Diaz-Cruz, Garcia-Galan and Barcelo 2008)
10	Sulfamethoxazole	7	18	31	34.7	87.0	6,000 v	1,900 b	1,340,000 w (Taiwan)	11,920g (Spain)	(v) (Batt, Bruce and Aga 2006) (b) (Kolpin, Furlong, et al. 2002) (w) (Lopez-Serna, Petrovic and Barcelo 2012) (g) (Osorio, et al. 2013)
11	Trimethoprim	6	11	21	18.8	32	7900 i	800 i	2,880 x (Singapore)	1,808 y (Vietnam)	(i) (Sadezky, et al. 2010) (x) (Tran, et al. 2014) (y) (Hoa, et al. 2011)
Antacid											
12	Cimetidine	4	7	18	4.8	3.8	462 z	580 b	61,200 q (Taiwan)	1,338 aa (Korea)	(z) (Glassmeyer, et al. 2005) (b) (Kolpin, Furlong, et al. 2002) (q) (Wang and Lin 2014) (aa) (Choi, et al. 2008)
13	Ranitidine	3	8	17	22.0	33.0	1,400 ab	27 ac	160,000 aj (India)	136 w (Spain)	(ab) (Kostich, Batt and Lazorchak 2014) (ac) (Kolpin, Skopec, et al. 2004) (aj) (Larsson, Pedro and Paxeus 2007) (w) (Lopez-Serna, Petrovic and Barcelo 2012)

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

	Pharmaceutical	# of Communities	# of Sites	# of Samples	FNFNES Max Concentrations (ng/L)		Canadian & US Studies (ng/L)		Global studies (ng/L)		Reference
					Wastewater	Surface water	Wastewater	Surface Water	Wastewater	Surface Water	
Anti-diabetics											
14	Metformin	7	11	38	8,430	5,640	26000 ad	2,355 ae	129,000 af (Germany)	3,100 n (Germany)	(ad) (Benotti and Brownawell 2007) (ae) (MacGillivray 2013) (af) (Scheurer, Sacher and Brauch 2009) (n) (Scheurer, Michel, et al. 2012)
15	Pentoxifylline	1	1	2	-	12.7	600 h	92 f	9770 ag (Taiwan)	570 ah (Germany)	(h) (Metcalfe, Koenig, et al. 2003) (f) (Chiu and Westerhoff 2010); (ag) (Lin, Yu and Lin 2008); (ah) (Sacher, et al. 2008)
Antihypertensives (Beta-blockers)											
16	Metoprolol	4	8	15	7.5	77.0	2,270 ai	571 ai	950,000 aj (India)	3,960 g (Spain)	(ai) (Fono, Kolodziej and Sedlak 2006) (aj) (Larsson, Pedro and Paxeus 2007) (g) (Osorio, et al. 2013)
17	Atenolol	14	40	75	20.2	245	3,060 ak	432 i	122,000 bm (Spain)	6,167 am (Spain)	(ak) (Vanderford and Snyder 2006) (i) (Sadezky, et al. 2010) (bm) (Gomez, et al. 2006) (am) (Valcarcel, et al. 2011)
Antihypertensives											
18	Diltiazem	2	2	3	-	73.1	146 z	130 an	5,258 bo (Wales)	65 bn (Wales)	(z) (Glassmeyer, et al. 2005) (an) (Wu, et al. 2009) (bo) (Kasprzyk-Hordern and Guwy 2009) (bn) (Kasprzyk-Hordern, Dinsdale and Guwy 2008) (o) (Verlicchi and Zambello 2012) (ao) (Bayen, et al. 2013)
Antianginal metabolite											
19	Dehydronifedipine	1	1	1	-	2.4	1,560 ap	30 b	89 aq (Germany)	-	(ap) (Lietz and Meyer 2006) (b) (Kolpin, Furlong, et al. 2002) (aq) (Ternes, Bonerz and Schmidt 2001)
Anticoagulant											
20	Warfarin	3	7	8	-	3.87	120 ap	30 ar	104 as (Norway)	-	(ap) (Lietz and Meyer 2006) (ar) (Loper, et al. 2007) (as) (Lindsey, Meyer and Thurman 2001)
Anticonvulsant											
21	Carbamazepine	6	12	26	0.53	39.6	3,287 at	3,480 ar	840,000 d (Israel)	7100 av (Germany)	(at) (Sosiak and Hebben 2005) (ar) (Roden 2013) (d) (Pascual-Aguilar, Andreu and Pico 2013) (av) (Weigel, et al. 2004)

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

	Pharmaceutical	# of Communities	# of Sites	# of Samples	FNFNES Max Concentrations (ng/L)		Canadian & US Studies (ng/L)		Global studies (ng/L)		Reference
					Wastewater	Surface water	Wastewater	Surface Water	Wastewater	Surface Water	
Antihistamine											
22	Diphenhydramine	2	2	6	-	56.0	1600 au	273 z	1,700 o (Italy)	4.6 ao (Singapore)	(au) (Saleveson et al. 2013 in Alidina, et al. 2014); (o) (Verlicchi and Zambello 2012) (ao) (Bayen, et al. 2013)
Diuretics											
23	Furosemide	1	2	3	-	8.5	930 aw	-	32,558 al (Portugal)	630 bo (Wales)	(aw) (Batt, Kostich and Lazorchak 2008) (al) (Santos, et al. 2013) (bo) (Kasprzyk-Hordern and Guwy 2009)
24	Hydrochlorthiazide	5	9	23	39.2	85.9	2950 aw	75 aw	5,500 ax (Italy)	17,589 am (Spain)	(aw) (Batt, Kostich and Lazorchak 2008) (ax) (Khan and Lee 2012) (am) (Valcarcel, et al. 2011)
Analgesic											
25	Codeine	5	9	23	48.6	101	5,700 ay	1,000 b	32,300 bo (Wales)	815 bn (Wales)	(ay) (Karthikeyan and Meyer 2006) (b) (Kolpin, Furlong, et al. 2002) (bo) (Kasprzyk-Hordern and Guwy 2009) (bn) (Kasprzyk-Hordern, Dinsdale and Guwy 2008)
Lipid regulators											
26	Atorvastatin	1	1	1	5.6	-	263 az	101 ba	1,000 aj (India)	52.3 bb (Spain)	(aj) (Larsson, Pedro and Paxeus 2007) (az) (Lee, Peart, et al. 2009) (ba) (Conley, et al. 2008) (bb) (Da Silva, et al. 2011)
27	Bezafibrate	4	8	19	-	11.2	4,700 k	470 k	7,600 bc (Austria)	15,060 bd (Spain)	(k) (Brun, et al. 2006) (bc) (Clara, et al. 2005) (bd) (Ginebreda, et al. 2010)
28	Gemfibrozil	3	6	7	-	16.8	36,530 be	4,200bf	28,571 bg (Spain)	17,036 j (Costa Rica)	(be) (Lee, Peart and Svoboda 2005) (bf) (Waiser, et al. 2011) (bg) (Bueno, et al. 2007) (j) (Spongberg, et al. 2011)
Stimulant											
29	Caffeine	12	25	45	2,750	4,018	120,000 bh	6,000 b	549,000 x (Korea)	1,121,400 j (Costa Rica)	(bh) (Yang, et al. 2011) (b) (Kolpin, Furlong, et al. 2002) (x) (Tran, et al. 2014) (j) (Spongberg, et al. 2011)

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

	Pharmaceutical	# of Communities	# of Sites	# of Samples	FNFNES Max Concentrations (ng/L)		Canadian & US Studies (ng/L)		Global studies (ng/L)		Reference
					Wastewater	Surface water	Wastewater	Surface Water	Wastewater	Surface Water	
Metabolite of nicotine (smoking cessation)											
30	Cotinine	7	11	25	33.8	46.2	7,800ad	1,400f	2880bj (Switzerland)	153.3bp (Switzerland)	(ad) (Benotti and Brownawell 2007) (f) (Chiu and Westerhoff 2010) (bj) (Buerge, et al. 2008) (bp) (Robles-Molina, et al. 2014)
Oral contraceptive											
31	17α-Ethinyl estradiol	2	3	5	-	0.74	242 bh	273 b	4,437 bk (China)	101.9 bl (Portugal)	(bh) (Yang, et al. 2011) (b) (Kolpin, Furlong, et al. 2002) (bk) (He, et al. 2013) (bl) (Ribeiro, et al. 2009)

*FNFNES maximum values from FNFNES BC 2008/2009, FNFNES MB 2010, FNFNES ON 2011/2012

Table 25: Level of pharmaceuticals in surface water, by total and by ecozone/culture area

Pharmaceutical	FNFNES Max Concentration (ng/l)		Detection limit (ng/l)	Number of Samples Collected	Number of samples detected
	Wastewater*	Surface water			
All Ecozones combined: Pharmaceuticals Detected					
Analgesic/Anti-Inflammatory					
Acetaminophen	6,280	34.0	10	95	
Diclofenac	<15	38.0	15	95	15
Ibuprofen	192	367	20	95	12
Ketoprofen	<2	2.4	2	95	1
Naproxen	25.6	120	5	95	13
Antibiotic					
Ciprofloxacin	58	36.0	20	95	13
Clarithromycin	<2	69.6	2	95	18
Erythromycin	<10	23	10	95	1
Sulfamethazine	15.6	19.1	5	95	18
Sulfamethoxazole	34.7	87.0	2	95	31
Trimethoprim	18.8	32.0	2	95	23
Antacid					
Cimetidine	4.8	3.8	2	95	18
Ranitidine	22.0	33.0	10	95	18
Anti-diabetics					
Metformin	8,430	5,640	10	95	38
Pentoxifylline	<2	12.7	2	95	2
Antihypertensives (Beta-blocker)					
Metoprolol	7.5	77.0	5	95	15
Atenolol	20.2	245	5	95	75

Table 25: Level of pharmaceuticals in surface water, by total and by ecozone/culture area

Pharmaceutical	FNFNES Max Concentration (ng/l)		Detection limit (ng/l)	Number of Samples Collected	Number of samples detected
	Wastewater*	Surface water			
Antihypertensives					
Diltiazem	<5	73.1	5	95	3
Antianginal metabolite					
Dehydronifedipine	<2	2.4	2	95	1
Anticoagulant					
Warfarin	<0.5	2.92	0.5	95	8
Anticonvulsant					
Carbamazepine	0.53	39.6	0.5	95	26
Antihistamine					
Diphenhydramine	<10	56.0	10	95	6
Diuretics					
Furosemide	<5	8.5	5	95	3
Hydrochlorthiazide	39.2	85.9	5	95	23
Analgesic					
Codeine	48.6	101	5	95	23
Lipid Regulators					
Atorvastatin	5.6	<5	5	95	1
Bezafibrate	<1	11.2	1	95	19
Gemfibrozil	<1	16.8	1	95	7
Stimulant					
Caffeine	2,750	4018	5	95	45
Metabolite of nicotine (smoking cessation)					
Cotinine	33.8	46.2	5	95	25
Oral Contraceptive					
17α-Ethinyl estradiol	<0.2	0.74	0.2	95	5

Table 25: Level of pharmaceuticals in surface water, by total and by ecozone/culture area

Pharmaceutical	FNFNES Max Concentration (ng/l)		Detection limit (ng/l)	Number of Samples Collected	Number of samples detected
	Wastewater*	Surface water			
Ecozone 1-Boreal Shield/Subarctic: Pharmaceuticals Detected					
Analgesic/Anti-Inflammatory					
Acetaminophen	<10	34.0	10	24	2
Diclofenac	<15	<15	15	24	0
Ibuprofen	<20	<20	20	24	0
Ketoprofen	<2	2.4	2	24	1
Naproxen	<5	<5	5	24	0
Antibiotic					
Ciprofloxacin	<20	<20	20	24	0
Clarithromycin	<2	<2	2	24	0
Erythromycin	<10	<10	10	24	0
Sulfamethazine	<5	<5	5	24	0
Sulfamethoxazole	<2	52.0	2	24	1
Trimethoprim	<2	18.4	2	24	1
Antacid					
Cimetidine	<2	2.7	2	24	3
Ranitidine	<10	<10	10	24	0
Anti-diabetics					
Metformin	<10	243	10	24	1
Pentoxifylline	<2	<2	2	24	0
Antihypertensives (Beta-blocker)					
Metoprolol	<5	<5	5	24	0
Atenolol	<5	23.2	5	24	12
Antihypertensives					
Diltiazem	<5	<5	5	24	0
Antianginal metabolite					
Dehydronifedipine	<2	<2	2	24	0

Table 25: Level of pharmaceuticals in surface water, by total and by ecozone/culture area

Pharmaceutical	FNFNES Max Concentration (ng/l)		Detection limit (ng/l)	Number of Samples Collected	Number of samples detected
	Wastewater*	Surface water			
Anticoagulant					
Warfarin	<0.5	2.92	0.5	24	7
Anticonvulsant					
Carbamazepine	<0.5	<0.5	0.5	24	0
Antihistamine					
Diphenhydramine	<10	<10	10	24	0
Diuretics					
Furosemide	<5	<5	5	24	0
Hydrochlorthiazide	<5	<5	5	24	0
Analgesic					
Codeine	<5	<5	5	24	0
Lipid Regulators					
Atorvastatin	<5	<5	5	24	0
Bezafibrate	<1	<1	1	24	0
Gemfibrozil	<1	<1	1	24	0
Stimulant					
Caffeine	315.9	44	5	24	5
Metabolite of nicotine (smoking cessation)					
Cotinine	<5	5.8	5	24	1
Oral Contraceptive					
17α-Ethinyl estradiol	<0.2	<0.2	0.2	24	0

Table 25: Level of pharmaceuticals in surface water, by total and by ecozone/culture area

Pharmaceutical	FNFNES Max Concentration (ng/l)		Detection limit (ng/l)	Number of Samples Collected	Number of samples detected
	Wastewater*	Surface water			
Ecozone 2-Boreal Shield/Northeast: Pharmaceuticals Detected					
Analgesic/Anti-Inflammatory					
Acetaminophen	<10	<10	10	16	0
Diclofenac	<15	15	15	16	1
Ibuprofen	<20	53.0	20	16	3
Ketoprofen	<2	<2	2	16	0
Naproxen	<5	75.0	5	16	2
Antibiotic					
Ciprofloxacin	<20	<20	20	16	0
Clarithromycin	<2	69.6	2	16	2
Erythromycin	<10	23	10	16	1
Sulfamethazine	<5	<5	5	16	0
Sulfamethoxazole	<2	87.0	2	16	2
Trimethoprim	<2	32	2	16	2
Antacid					
Cimetidine	<2	2.4	2	16	2
Ranitidine	<10	<10	10	16	0
Anti-diabetics					
Metformin	<10	5,640	10	16	2
Pentoxifylline	<2	12.7	2	16	2
Antihypertensives (Beta-blocker)					
Metoprolol	<5	77.0	5	16	2
Atenolol	<5	245	5	16	13
Antihypertensives					
Diltiazem	<5	73.1	5	16	2
Antianginal metabolite					
Dehydronifedipine	<2	2.4	2	16	1

Table 25: Level of pharmaceuticals in surface water, by total and by ecozone/culture area

Pharmaceutical	FNFNES Max Concentration (ng/l)		Detection limit (ng/l)	Number of Samples Collected	Number of samples detected
	Wastewater*	Surface water			
Anticoagulant					
Warfarin	<0.5	<0.5	0.5	16	0
Anticonvulsant					
Carbamazepine	<0.5	39.6	0.5	16	2
Antihistamine					
Diphenhydramine	<10	56.0	10	16	2
Diuretics					
Furosemide	<5	<5	5	16	0
Hydrochlorthiazide	<5	5.6	5	16	2
Analgesic					
Codeine	<5	101	5	16	2
Lipid Regulators					
Atorvastatin	<5	<5	5	16	0
Bezafibrate	<1	11.2	1	16	3
Gemfibrozil	<1	16.8	1	16	2
Stimulant					
Caffeine	<5	355.0	5	16	11
Metabolite of nicotine (smoking cessation)					
Cotinine	<5	46.2	5	16	2
Oral Contraceptive					
17α-Ethinyl estradiol	<0.2	<0.2	0.2	16	0

Table 25: Level of pharmaceuticals in surface water, by total and by ecozone/culture area

Pharmaceutical	FNFNES Max Concentration (ng/l)		Detection limit (ng/l)	Number of Samples Collected	Number of samples detected
	Wastewater*	Surface water			
Ecozone 3-Hudson Plains/Subarctic: Pharmaceuticals Detected					
Analgesic/Anti-Inflammatory					
Acetaminophen	6,280	<10	10	28	1
Diclofenac	<15	<15	15	28	0
Ibuprofen	192	367	20	28	5
Ketoprofen	<2	<2	2	28	0
Naproxen	25.6	67.6	5	28	5
Antibiotic					
Ciprofloxacin	58.0	<20	20	28	1
Clarithromycin	<2	<2	2	28	0
Erythromycin	<10	<10	10	28	0
Sulfamethazine	15.6	<5	5	28	1
Sulfamethoxazole	34.7	9.3	2	28	5
Trimethoprim	18.8	3.9	2	28	3
Antacid					
Cimetidine	4.8	<2	2	28	1
Ranitidine	22.0	15.0	10	28	2
Anti-diabetics					
Metformin	8,430	6210	10	28	13
Pentoxifylline	<2	<2	2	28	0
Antihypertensives (Beta-blocker)					
Metoprolol	7.5	<5	5	28	1
Atenolol	20.2	105	5	28	23
Antihypertensives					
Diltiazem	<5	<5	5	28	0
Antianginal metabolite					
Dehydronifedipine	<2	<2	2	28	0
Anticoagulant					

Table 25: Level of pharmaceuticals in surface water, by total and by ecozone/culture area

Pharmaceutical	FNFNES Max Concentration (ng/l)		Detection limit (ng/l)	Number of Samples Collected	Number of samples detected
	Wastewater*	Surface water			
Warfarin	<0.5	<0.5	0.5	28	0
Anticonvulsant					
Carbamazepine	0.53	8.08	0.5	28	5
Antihistamine					
Diphenhydramine	<10	<10	10	28	0
Diuretics					
Furosemide	<5	<5	5	28	0
Hydrochlorthiazide	39.2	37.9	5	28	5
Analgesic					
Codeine	48.6	62.5	5	28	5
Lipid Regulators					
Atorvastatin	5.6	<5	5	28	1
Bezafibrate	<1	<1	1	28	0
Gemfibrozil	<1	7.1	1	28	1
Stimulant					
Caffeine	2,750	4,018	5	28	5
Metabolite of nicotine (smoking cessation)					
Cotinine	33.8	43.8	5	28	5
Oral Contraceptive					
17α-Ethinyl estradiol	<0.2	0.55	0.2	28	1

Table 25: Level of pharmaceuticals in surface water, by total and by ecozone/culture area

Pharmaceutical	FNFNES Max Concentration (ng/l)		Detection limit (ng/l)	Number of Samples Collected	Number of samples detected
	Wastewater*	Surface water			
Ecozone 4-Mixedwood Plains/Northeast: Pharmaceuticals Detected					
Analgesic/Anti-Inflammatory					
Acetaminophen	<10	12.0	10	27	1
Diclofenac	<15	38.0	15	27	14
Ibuprofen	<20	85.0	20	27	4
Ketoprofen	<2	<2	2	27	0
Naproxen	<5	120	5	27	6
Antibiotic					
Ciprofloxacin	<20	36.0	20	27	12
Clarithromycin	<2	35.3	2	27	16
Erythromycin	<10	<10	10	27	0
Sulfamethazine	<5	19.1	5	27	17
Sulfamethoxazole	<2	45.7	2	27	23
Trimethoprim	<2	10.2	2	27	17
Antacid					
Cimetidine	<2	3.8	2	27	12
Ranitidine	<10	33.0	10	27	16
Anti-diabetics					
Metformin	<10	1,550	10	27	22
Pentoxifylline	<2	<2	2	27	0
Antihypertensives (Beta-blocker)					
Metoprolol	<5	25.6	5	27	12
Atenolol	<5	42.0	5	27	27
Antihypertensives					
Diltiazem	<5	5.2	5	27	1

Table 25: Level of pharmaceuticals in surface water, by total and by ecozone/culture area

Pharmaceutical	FNFNES Max Concentration (ng/l)		Detection limit (ng/l)	Number of Samples Collected	Number of samples detected
	Wastewater*	Surface water			
Antianginal metabolite					
Dehydronifedipine	<2	<2	2	27	0
Anticoagulant					
Warfarin	<0.5	0.51	0.5	27	1
Anticonvulsant					
Carbamazepine	<0.5	32.9	0.5	27	19
Carbamazepine	<0.5	32.9	0.5	27	19
Antihistamine					
Diphenhydramine	<10	14	10	27	4
Diuretics					
Furosemide	<5	8.5	5	27	3
Hydrochlorthiazide	<5	85.9	5	27	16
Analgesic					
Codeine	<5	101	5	27	16
Lipid Regulators					
Atorvastatin	<5	<5	5	27	0
Bezafibrate	<1	7.8	1	27	16
Gemfibrozil	<1	5.6	1	27	5
Stimulant					
Caffeine	<5	502	5	27	24
Metabolite of nicotine (smoking cessation)					
Cotinine	<5	16.6	5	27	17
Oral Contraceptive					
17α-Ethinyl estradiol	<0.2	0.74	0.2	27	4

Mercury in Hair Analyses

Table 26. Arithmetic (A.M.) and geometric (G.M.) means of total mercury in hair concentration (µg/g or ppm) in First Nations in Ontario.

First Nations living in Ontario on-Reserve			Unweighted		Weighted													
Gender	Age group	Sample size	A.M	G.M	A.M.	Lower 95% CI	Upper 95%CI	C.V. %	G. M.	Lower 95% CI	Upper 95%CI	C.V. %	0.90	Lower 95% CI	Upper 95%CI	0.95	Lower 95% CI	Upper 95%CI
Total	19-30	127	0.49	0.20	0.31	0.10	0.52	34.30	0.14	0.10	0.21	19.59	0.80	0.33	1.27	1.16	0.33	2.00
Total	31-50	303	0.51	0.24	0.42	0.21	0.62	25.24	0.19	0.15	0.24	11.23	0.86	0.19	1.52	1.42	0.10	2.75
Total	51-70	249	0.74	0.33	0.47	0.30	0.64	18.59	0.23	0.18	0.30	13.62	0.99	0.23	1.74	1.74	0.52	2.95
Total	> 71	65	1.20	0.41	0.57	0.33	0.82	22.15	0.31	0.23	0.42	15.66	0.83	0.05	1.61	1.23	-1.23	3.68
Total	Total	744	0.64	0.27	0.41	0.26	0.55	18.62	0.19	0.16	0.23	9.23	0.85	0.43	1.27	1.35	0.49	2.20
M	19-30	38	0.69	0.22	0.34	-0.05	0.74	58.44	0.14	0.07	0.28	33.51	0.85	-0.24	1.95	1.29	-1.18	3.76
M	31-50	90	0.76	0.32	0.51	0.16	0.87	34.80	0.23	0.16	0.33	17.47	1.15	-0.21	2.50	2.15	-0.17	4.47
M	51-70	87	0.95	0.39	0.55	0.30	0.80	22.92	0.26	0.16	0.42	25.16	1.17	0.15	2.18	1.93	0.54	3.32
M	> 71	21	0.81	0.44	0.58	0.36	0.79	18.74	0.45	0.36	0.57	11.69	0.63	-0.57	1.82	1.23	-1.18	3.63
M	Total	236	0.82	0.33	0.47	0.24	0.71	25.12	0.21	0.15	0.29	16.49	1.00	0.31	1.69	1.74	0.48	3.00
F	19-30	89	0.41	0.19	0.27	0.17	0.37	18.36	0.14	0.10	0.21	19.65	0.80	0.47	1.14	0.97	0.59	1.34
F	31-50	213	0.40	0.21	0.31	0.24	0.39	12.23	0.16	0.13	0.19	10.69	0.68	0.48	0.89	1.18	0.84	1.51
F	51-70	162	0.62	0.31	0.39	0.25	0.52	18.02	0.21	0.16	0.26	11.88	0.77	0.11	1.43	1.54	0.43	2.65
F	> 71	44	1.38	0.40	0.57	0.22	0.92	31.08	0.23	0.14	0.38	25.34	0.83	-0.27	1.93	1.09	-2.56	4.74
F	Total	508	0.56	0.25	0.34	0.25	0.42	12.92	0.17	0.14	0.20	8.08	0.80	0.60	1.01	1.15	0.81	1.49
F	19-50	302	0.40	0.21	0.29	0.23	0.36	11.94	0.15	0.12	0.18	10.41	0.78	0.58	0.99	1.14	0.88	1.41

Notes:

Use with caution, CV between 15% and 35%

CV greater than 35% or the estimate is thought to be unstable

Note 1: Estimates have been adjusted for non-response and are post-stratified to population counts within age/sex group.
Note 2: Even with post-stratification, estimates for males aged 19-50 are likely to be biased due to collection issues.This bias is likely to affect the applicable totals. Use only with extreme caution.
Note 3: 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%).
Note 4: All shaded figures would not normally be released due to high CVs.
Note 5: 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.

Figure 41a. Mercury concentration in hair for all participants living in Ecozone 1- Boreal Shield/Subarctic

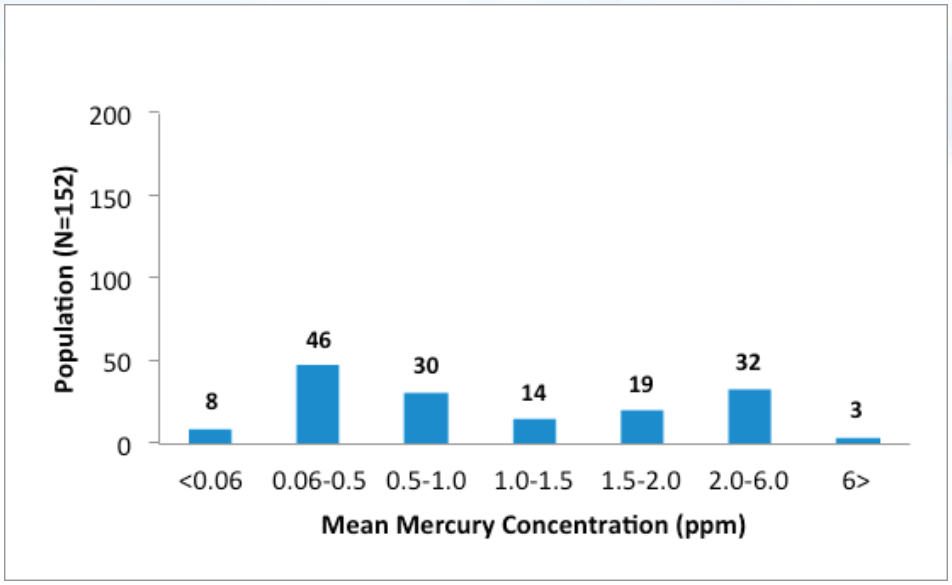


Figure 41b. Mercury concentration in hair for all participants living in Ecozone 2-Boreal Shield/Northeast

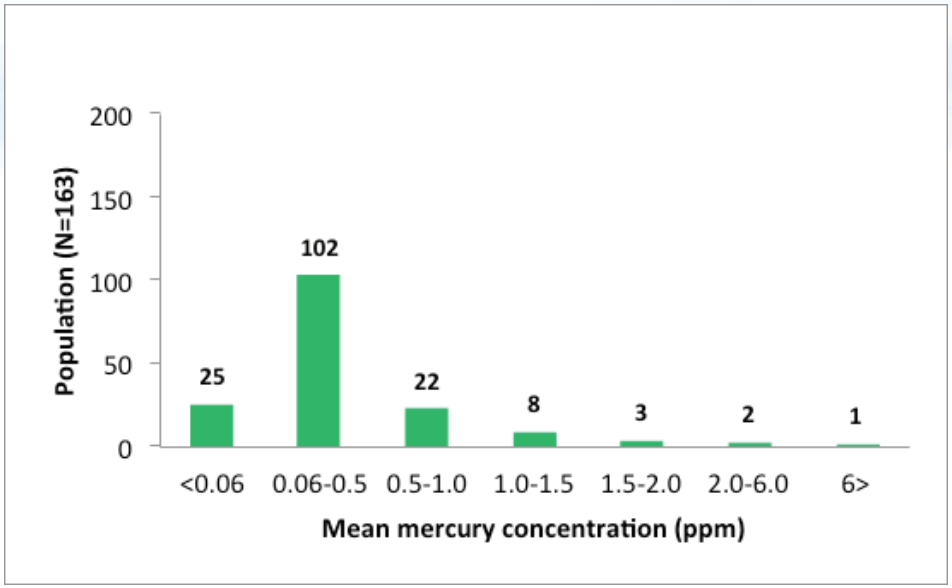


Figure 41c. Mercury concentration in hair for all participants living in Ecozone 3-Hudson Plains/Subarctic

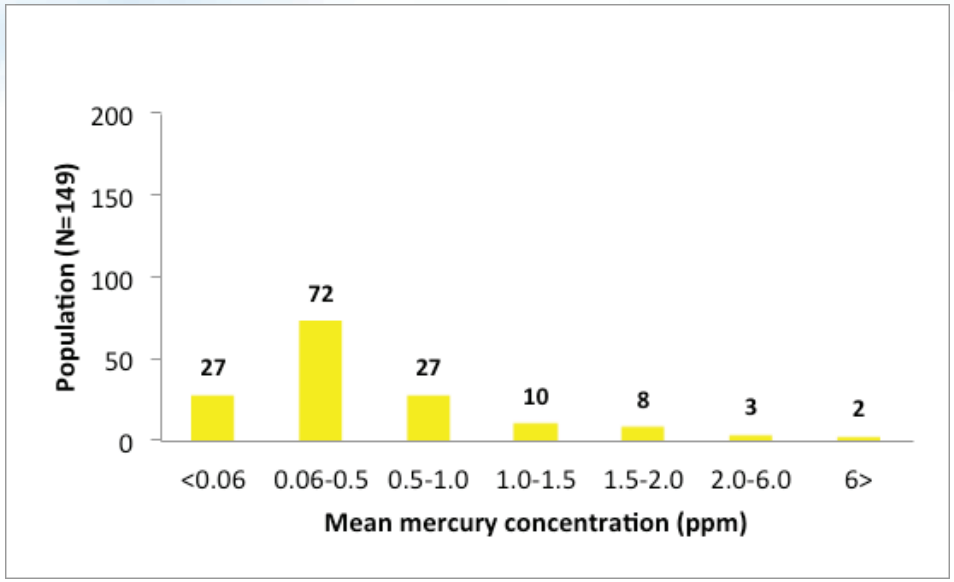


Figure 41d. Mercury concentration in hair for all participants living in Ecozone 4-Mixedwood Plains/ Northeast

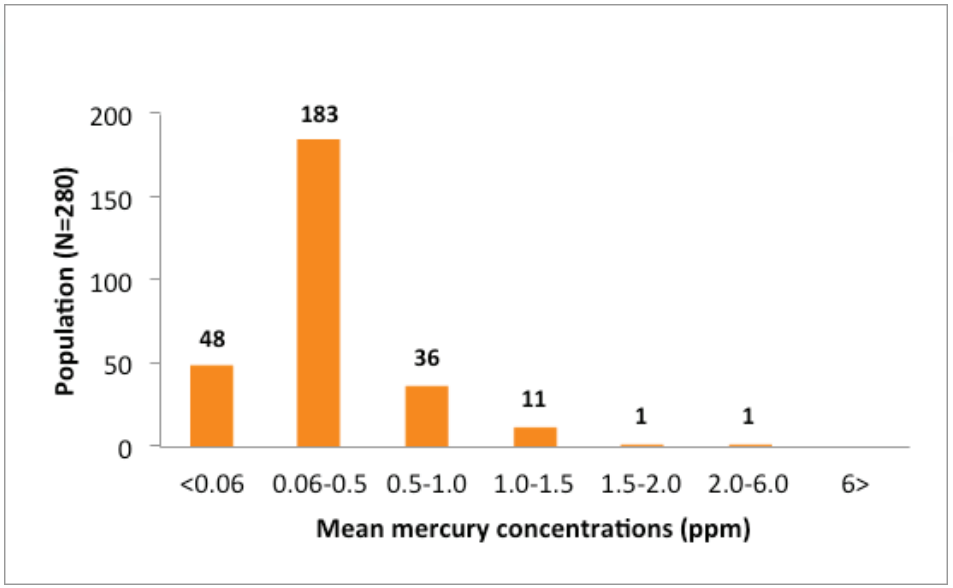


Figure 42a. Mercury concentration in hair for women of childbearing age (WCBA) living in Ecozone 1-Boreal Shield/Subarctic

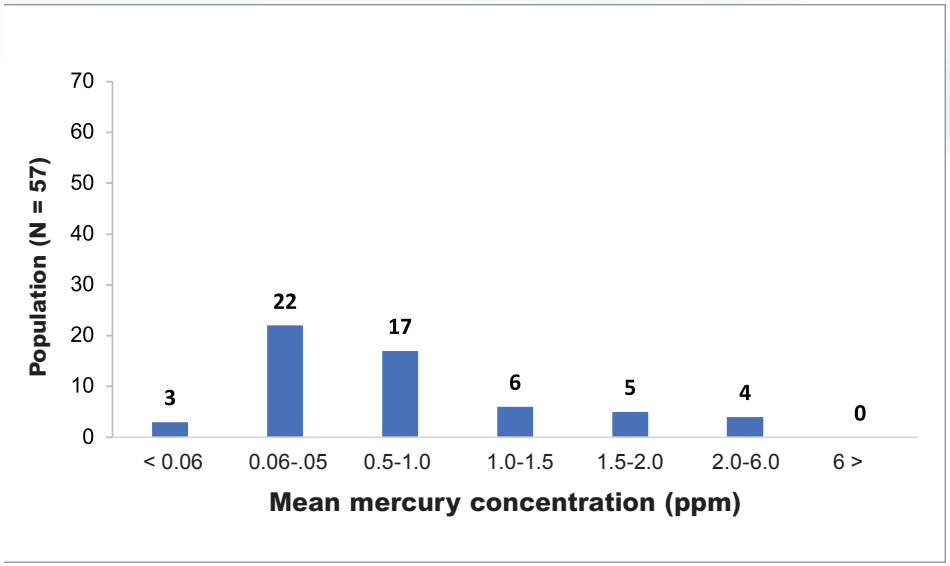


Figure 42b. Mercury concentration in hair for women of childbearing age (WCBA) living in Ecozone 2-Boreal Shield/Northeast

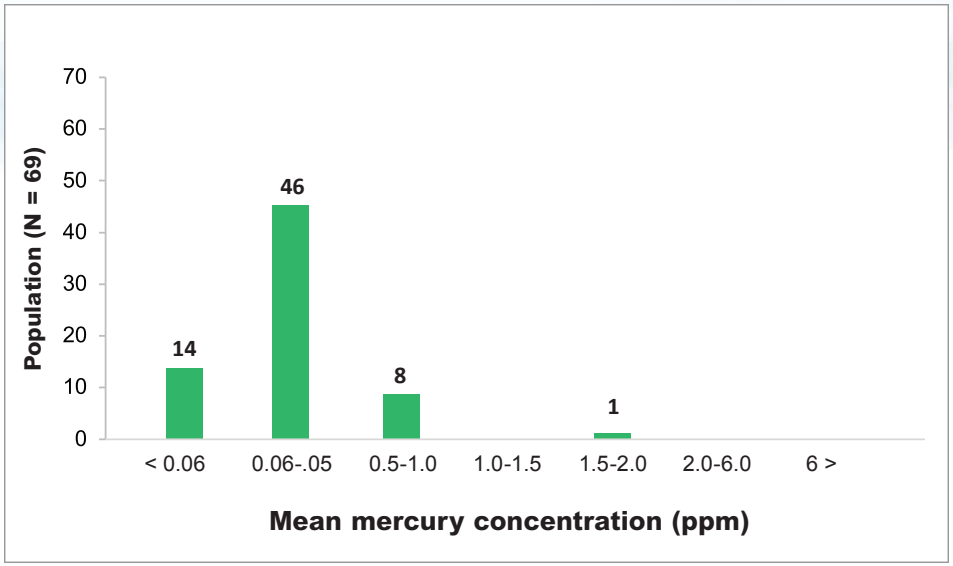


Figure 42c. Mercury concentration in hair for women of childbearing age (WCBA) living in Ecozone 3-Hudson Plains/Subarctic

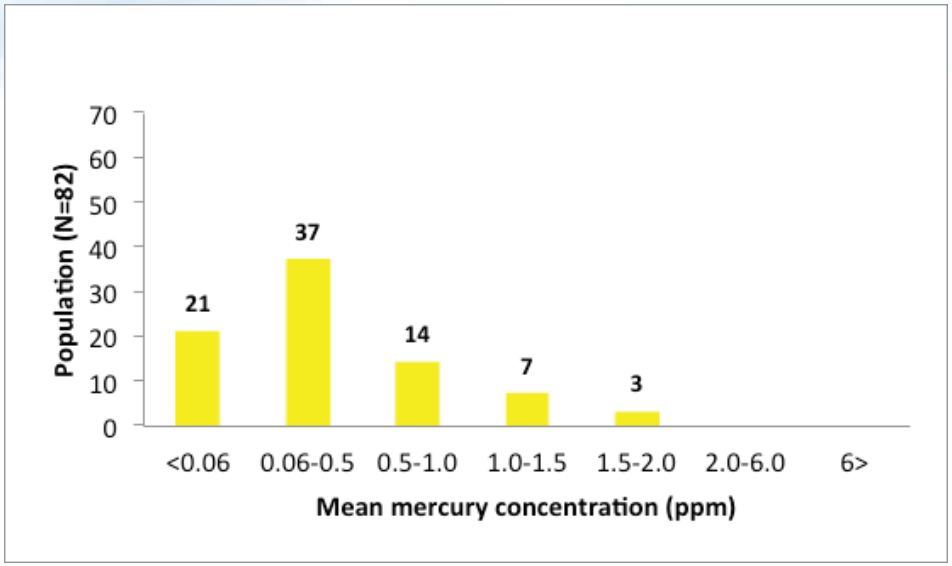
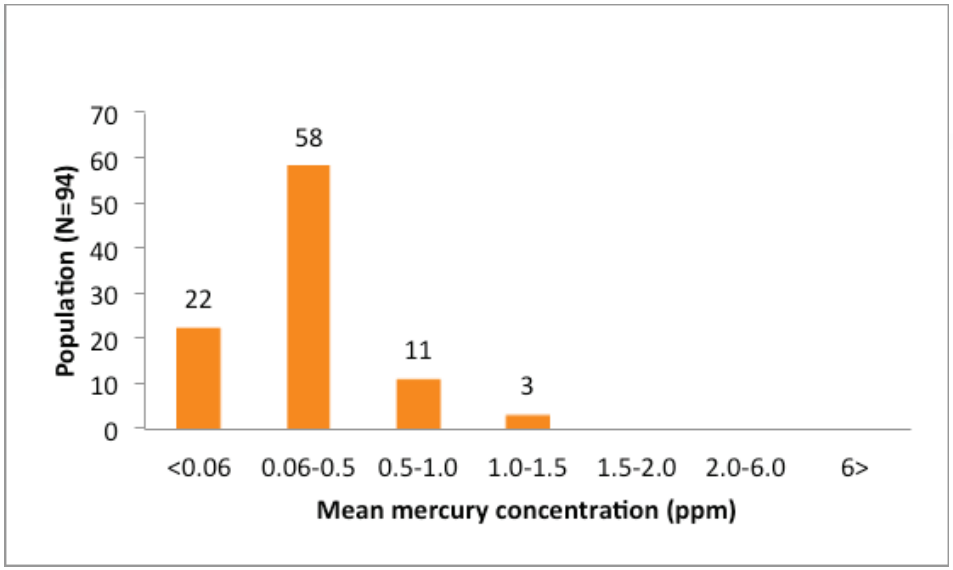


Figure 42d. Mercury concentration in hair for women of childbearing age (WCBA) living in Ecozone 4-Mixedwood Plains/Northeast



Food Contaminant Analyses

Table 27. Average and maximum levels of toxic trace metals in Ontario traditional food samples (µg/g fresh weight)

Traditional food sample	n*	Arsenic		Cadmium		Lead		Mercury		Methyl Mercury	
		Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max
FISH											
Brook trout	1	0.537	0.537	ND	ND	ND	ND	0.112	0.112	0.065	0.065
Brown trout	1	0.277	0.277	ND	ND	0.006	0.006	0.158	0.158	0.072	0.072
Lake trout	6	0.151	0.411	0.002	0.008	0.005	0.022	0.301	0.533	0.172	0.293
Rainbow trout	2	0.234	0.256	ND	ND	ND	ND	0.105	0.188	0.070	0.070
Trout (species unknown)	3	0.142	0.207	0.001	0.002	0.011	0.023	0.352	0.895	0.245	0.427
Carp	1	0.088	0.088	ND	ND	0.007	0.007	0.368	0.368	0.138	0.138
Catfish	1	0.086	0.086	ND	ND	ND	ND	0.066	0.066	0.064	0.064
Herring	3	0.082	0.137	0.013	0.025	ND	ND	0.076	0.087	0.013	0.013
King/chinook salmon	5	0.140	0.333	0.003	0.013	0.004	0.008	0.119	0.353	0.119	0.384
Largemouth bass	1	0.018	0.018	ND	ND	ND	ND	0.271	0.271	0.080	0.080
Pike Meat	9	0.120	0.633	0.002	0.004	0.020	0.086	0.633	2.750	0.298	0.693
Pink salmon	2	0.241	0.377	0.002	0.003	0.007	0.008	0.166	0.257	0.281	0.281
Salmon roe eggs	1	0.058	0.058	ND	ND	0.004	0.004	0.023	0.023	0.003	0.003
Sauger	1	0.044	0.044	ND	ND	0.005	0.005	0.174	0.174	NM	NM
Smelts	5	0.319	0.504	0.087	0.176	0.014	0.049	0.042	0.082	0.010	0.016
Sockeye	1	0.038	0.038	0.007	0.007	0.013	0.013	0.071	0.071	NM	NM
Splake	4	0.078	0.136	ND	ND	ND	ND	0.451	0.667	0.287	0.311
Sturgeon	9	0.371	1.020	0.008	0.044	0.030	0.254	0.259	0.632	0.154	0.543
Sucker Eggs	1	0.022	0.022	ND	ND	ND	ND	0.007	0.007	NM	NM
Sucker	3	0.113	0.201	0.022	0.064	0.029	0.067	0.082	0.185	0.077	0.077
Walleye eggs	1	0.042	0.042	ND	ND	ND	ND	0.007	0.007	0.003	0.003
Walleye pemmican	1	0.163	0.163	0.004	0.004	0.134	0.134	0.212	0.212	0.074	0.074
Walleye-pickerel	18	0.144	0.743	0.002	0.021	0.004	0.013	0.319	0.823	0.227	1.330
Round Whitefish Meat	1	0.030	0.030	0.010	0.010	ND	ND	0.025	0.025	NM	NM

Table 27. Average and maximum levels of toxic trace metals in Ontario traditional food samples (µg/g fresh weight)

Traditional food sample	n*	Arsenic		Cadmium		Lead		Mercury		Methyl Mercury	
		Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max
Whitefish eggs	1	0.521	0.521	0.002	0.002	0.008	0.008	0.022	0.022	0.007	0.007
Whitefish	11	0.662	2.770	0.004	0.016	0.004	0.017	0.084	0.154	0.039	0.075
Yellow Perch	6	0.042	0.130	0.004	0.018	0.009	0.036	0.208	0.297	0.087	0.147
GAME											
Beaver liver	1	ND	ND	0.330	0.330	0.044	0.044	0.002	0.002	NM	NM
Beaver meat	10	0.034	0.287	0.258	2.430	5.412	49.486	0.002	0.011	0.001	0.001
Beef	1	ND	ND	ND	ND	0.004	0.004	ND	ND	NM	NM
Caribou bone	1	ND	ND	ND	ND	0.007	0.007	0.007	0.007	NM	NM
Caribou meat	6	0.023	0.057	0.004	0.013	0.015	0.040	0.011	0.020	NM	NM
Cow Moose Stomach	1	0.248	0.248	0.006	0.006	ND	ND	0.003	0.003	NM	NM
Deer Heart	1	0.006	0.006	0.007	0.007	ND	ND	0.002	0.002	NM	NM
Deer kidney	3	0.012	0.032	3.030	8.830	0.016	0.034	0.054	0.149	ND	ND
Deer liver	4	0.013	0.029	0.473	0.862	1.342	5.350	0.010	0.017	ND	ND
Deer meat	9	0.007	0.026	0.003	0.010	4.905	42.400	0.001	0.006	ND	ND
Deer Tongue	2	0.028	0.052	0.014	0.016	0.109	0.203	0.002	0.003	NM	NM
Elk meat	1	ND	ND	0.005	0.005	0.011	0.011	ND	ND	NM	NM
Moose bone marrow	2	ND	ND	0.001	0.002	ND	ND	ND	ND	NM	NM
Moose fat	2	0.003	0.006	0.003	0.004	0.008	0.016	ND	ND	NM	NM
Moose heart	5	0.003	0.011	0.011	0.034	0.010	0.035	0.0004	0.0019	NM	NM
Moose intestines	4	0.007	0.028	0.018	0.052	0.005	0.012	0.0003	0.0012	NM	NM
Moose kidney	8	0.008	0.028	13.926	24.900	0.020	0.092	0.0180	0.0480	ND	ND
Moose liver	12	0.016	0.085	1.469	2.730	0.031	0.136	0.0068	0.0242	0.0003	0.0014
Moose meat	15	0.004	0.014	0.026	0.279	0.985	12.900	0.0023	0.0137	ND	ND
Moose nose	2	0.010	0.017	0.004	0.004	0.009	0.013	0.0008	0.0016	NM	NM
Moose tongue	5	0.033	0.151	0.032	0.085	0.453	2.190	0.0008	0.0015	NM	NM
Muskrat meat	3	0.020	0.050	0.004	0.006	0.011	0.023	0.0039	0.0083	0.0025	0.0025
Rabbit heart	1	0.004	0.004	0.014	0.014	0.006	0.006	ND	ND	NM	NM

Table 27. Average and maximum levels of toxic trace metals in Ontario traditional food samples (µg/g fresh weight)

Traditional food sample	n*	Arsenic		Cadmium		Lead		Mercury		Methyl Mercury	
		Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max
Rabbit liver	1	ND	ND	0.655	0.655	0.058	0.058	0.018	0.018	NM	NM
Rabbit meat	11	0.005	0.0346	0.035	0.245	0.040	0.241	0.002	0.011	ND	ND
Red squirrel meat	1	0.006	0.0063	0.081	0.081	0.591	0.591	0.004	0.004	NM	NM
Squirrel meat	1	0.007	0.0071	0.064	0.064	1.470	1.470	0.009	0.009	NM	NM
BIRDS											
Black duck meat	1	0.013	0.0129	ND	ND	0.179	0.179	0.073	0.073	NM	NM
Black Partridge	1	0.011	0.0107	0.017	0.017	0.015	0.015	ND	ND	NM	NM
Bufflehead duck meat	2	0.114	0.16	0.002	0.005	0.044	0.048	0.038	0.053	NM	NM
Duck meat	1	0.008	0.0075	ND	ND	0.020	0.020	0.035	0.035	NM	NM
Goldeneye duck	2	0.017	0.0284	0.083	0.165	0.003	0.005	0.060	0.090	0.034	0.034
Mallard duck	8	0.053	0.223	0.005	0.008	1.562	8.530	0.024	0.054	0.010	0.012
Pintail duck	4	0.022	0.0366	0.002	0.005	0.057	0.114	0.034	0.050	NM	NM
Teal duck	5	0.064	0.21	0.006	0.015	1.543	7.550	0.073	0.146	0.071	0.079
Brown Partridge Meat	1	0.012	0.0117	0.008	0.008	0.005	0.005	ND	ND	NM	NM
Canadian Goose Kidney	1	0.046	0.0463	0.016	0.016	0.028	0.028	0.001	0.001	ND	ND
Godwit meat	1	0.022	0.0216	0.016	0.016	1.310	1.310	0.046	0.046	NM	NM
Goose Fat	1	0.011	0.0113	0.039	0.039	0.009	0.009	ND	ND	NM	NM
Goose meat	8	0.010	0.0311	0.001	0.003	0.392	1.190	0.002	0.006	0.001	0.003
Partridge meat	13	0.011	0.0241	0.018	0.070	1.204	8.780	0.000	0.003	ND	ND
Ptarmigan meat	3	0.029	0.0616	0.044	0.131	0.006	0.018	0.044	0.130	NM	NM
Snow goose meat	3	0.032	0.0595	0.004	0.005	0.240	0.482	0.002	0.003	0.001	0.001
Turkey meat	3	0.015	0.0233	0.004	0.008	0.008	0.015	0.002	0.003	NM	NM
PLANTS											
Acorn nuts	4	0.007	0.0133	0.002	0.007	0.012	0.030	ND	ND	NM	NM
Apish	1	ND	ND	ND	ND	ND	ND	NM	NM	NM	NM
Apples	1	ND	ND	ND	ND	0.008	0.008	ND	ND	NM	NM
Beans, snap	2	ND	ND	ND	ND	0.004	0.008	ND	ND	NM	NM

Table 27. Average and maximum levels of toxic trace metals in Ontario traditional food samples (µg/g fresh weight)

Traditional food sample	n*	Arsenic		Cadmium		Lead		Mercury		Methyl Mercury	
		Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max
Beets	2	0.003	0.0066	0.015	0.024	0.020	0.028	ND	ND	NM	NM
Blackberries	2	ND	ND	ND	ND	0.012	0.025	ND	ND	NM	NM
Blue corn	1	ND	ND	0.007	0.007	ND	ND	ND	ND	NM	NM
Blueberries	10	0.004	0.0117	0.002	0.012	0.006	0.024	ND	ND	NM	NM
Brussel sprouts	1	0.016	0.0156	0.015	0.015	0.075	0.075	0.002	0.002	NM	NM
Cabbage	2	ND	ND	0.003	0.007	0.006	0.013	ND	ND	NM	NM
Carrots	1	0.015	0.0148	0.010	0.010	0.263	0.263	0.008	0.008	NM	NM
Cedar leaves	3	0.001	0.0023	ND	ND	0.0008	0.0015	ND	ND	NM	NM
Cedar tea	5	0.001	0.0031	0.0000	0.0001	0.0003	0.0004	NM	NM	NM	NM
Chokecherries	1	ND	ND	0.0024	0.0024	0.0093	0.0093	ND	ND	NM	NM
Hominy corn	3	0.022	0.0668	0.0002	0.0005	0.0018	0.0055	ND	ND	NM	NM
Sweet yellow corn	2	ND	ND	0.0054	0.0065	0.0105	0.0209	ND	ND	NM	NM
White corn	1	ND	ND	0.0031	0.0031	0.0400	0.0400	ND	ND	NM	NM
Corn soup	1	ND	ND	ND	ND	0.0112	0.0112	ND	ND	NM	NM
Crabapples	2	ND	ND	ND	ND	0.0072	0.0144	ND	ND	NM	NM
Cranberries	3	0.002	0.0056	0.0075	0.0136	0.0115	0.0152	ND	ND	NM	NM
Cucumber	1	0.007	0.0071	ND	ND	0.0122	0.0122	ND	ND	NM	NM
Dandelion greens	1	ND	ND	0.0001	0.0001	0.0003	0.0003	NM	NM	NM	NM
Elderberries	1	ND	ND	ND	ND	0.0042	0.0042	ND	ND	NM	NM
Gooseberries	1	0.006	0.0064	0.0379	0.0379	ND	ND	ND	ND	NM	NM
Grapes	1	ND	ND	ND	ND	0.010	0.010	ND	ND	NM	NM
Hawthorn berries	2	0.002	0.005	0.004	0.005	0.028	0.047	ND	ND	NM	NM
Hazelnuts	1	0.016	0.016	0.013	0.013	0.028	0.028	ND	ND	NM	NM
Hickory nuts	3	0.005	0.010	0.003	0.008	0.024	0.071	0.0004	0.0012	NM	NM
Highbush cranberries	3	ND	ND	0.004	0.006	0.036	0.105	0.0003	0.0010	NM	NM
Honey mushroom	1	0.025	0.0252	0.158	0.158	0.089	0.089	0.0215	0.0215	NM	NM
Horsetail shoots	1	0.086	0.0863	ND	ND	0.058	0.058	0.0026	0.0026	NM	NM

Table 27. Average and maximum levels of toxic trace metals in Ontario traditional food samples (µg/g fresh weight)

Traditional food sample	n*	Arsenic		Cadmium		Lead		Mercury		Methyl Mercury	
		Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max
Ironwood tea	1	0.002	0.0017	ND	ND	ND	ND	NM	NM	NM	NM
Labrador tea	6	0.001	0.002	0.00002	0.00005	0.00037	0.00080	ND	ND	NM	NM
Labrador tea leaves	3	0.001	0.00171	0.00001	0.00003	0.00072	0.00186	ND	ND	NM	NM
Leeks	1	ND	ND	0.0051	0.0051	ND	ND	ND	ND	NM	NM
Lowbush cranberries	1	ND	ND	ND	ND	ND	ND	ND	ND	NM	NM
Maple Syrup	6	0.006	0.01110	0.01050	0.02880	0.03717	0.11400	ND	ND	NM	NM
Mint tea	1	0.002	0.00217	0.00001	0.00001	0.00014	0.00014	NM	NM	NM	NM
Mint tea leaves	2	0.000	0.00058	ND	ND	0.00012	0.00024	NM	NM	NM	NM
Mushrooms	1	0.118	0.118	0.089	0.089	0.110	0.110	0.012	0.012	NM	NM
Mycena mushroom	1	0.026	0.026	0.095	0.095	1.040	1.040	0.500	0.500	NM	NM
Onions	1	0.128	0.128	0.016	0.016	1.070	1.070	0.002	0.002	NM	NM
Potatoes	2	0.003	0.005	0.018	0.030	0.015	0.019	ND	ND	NM	NM
Puffball mushrooms	1	0.543	0.543	0.131	0.131	1.190	1.190	1.720	1.720	NM	NM
Radish	1	0.048	0.048	0.020	0.020	0.127	0.127	0.001	0.001	NM	NM
Raspberries	2	0.003	0.007	0.007	0.010	0.004	0.008	ND	ND	NM	NM
Red kidney beans	1	ND	ND	ND	ND	0.005	0.005	ND	ND	NM	NM
Rosehips	1	ND	ND	ND	ND	0.023	0.023	ND	ND	NM	NM
Sage leaves	1	0.000	0.00005	0.00004	0.00004	0.00029	0.00029	NM	NM	NM	NM
Sage tea	2	0.001	0.00233	0.00003	0.00005	0.00048	0.00078	NM	NM	NM	NM
Saskatoon berries	2	0.002	0.00450	0.00145	0.00290	0.00325	0.00650	0.001	0.001	NM	NM
Stinging nettles	1	0.000	0.0001	ND	ND	0.0001	0.0001	NM	NM	NM	NM
Strawberry	4	0.001	0.0056	0.0190	0.0421	0.0528	0.1930	ND	ND	NM	NM
Sumac	1	ND	ND	ND	ND	ND	ND	ND	ND	NM	NM
Summer squash	1	ND	ND	ND	ND	0.067	0.067	ND	ND	NM	NM
Sunflower seeds	1	0.016	0.016	0.029	0.029	0.429	0.429	ND	ND	NM	NM
Sweet green pepper	1	ND	ND	0.012	0.012	0.005	0.005	ND	ND	NM	NM
Sweetflag root	2	0.017	0.035	ND	ND	0.041	0.083	ND	ND	NM	NM

Table 27. Average and maximum levels of toxic trace metals in Ontario traditional food samples (µg/g fresh weight)

Traditional food sample	n*	Arsenic		Cadmium		Lead		Mercury		Methyl Mercury	
		Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max
Sweetflag tea	1	0.001	0.001	ND	ND	ND	ND	NM	NM	NM	NM
Tobacco	1	0.196	0.196	0.388	0.388	1.100	1.100	0.036	0.036	NM	NM
Tomatoes	1	ND	ND	0.012	0.012	0.007	0.007	ND	ND	NM	NM
Turnip	1	ND	ND	0.012	0.012	0.004	0.004	ND	ND	NM	NM
Turtle socks leaves	1	ND	ND	0.00001	0.00001	ND	ND	NM	NM	NM	NM
Walnuts	1	0.015	0.015	ND	ND	0.0177	0.0177	ND	ND	NM	NM
Weekay Wild Ginger	1	0.003	0.003	ND	ND	0.0013	0.0013	ND	ND	NM	NM
Western dock leaves	1	0.001	0.001	0.0000	0.0000	0.0003	0.0003	NM	NM	NM	NM
Wild ginger	1	0.097	0.097	0.0568	0.0568	0.5050	0.5050	0.006	0.006	NM	NM
Wild Rice	1	0.015	0.015	ND	ND	ND	ND	0.002	0.002	NM	NM
Winter squash	4	ND	ND	0.005	0.018	0.006	0.014	ND	ND	NM	NM
Wintergreen	1	0.007	0.007	ND	ND	0.167	0.167	0.004	0.004	NM	NM

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

Table 28a. Top 10 contributors to arsenic intake, by ecozone/culture area and total

Ecozone 1		Ecozone 2		Ecozone 3		Ecozone 4		Total First Nations in Ontario	
Traditional Food	%	Traditional Food	%	Traditional Food	%	Traditional Food	%	Traditional Food	%
Walleye/ Pickerel	33.3	Whitefish Meat	33.6	Whitefish	41.4	Walleye/ Pickerel	29.0	Walleye/ Pickerel	28.5
Whitefish Meat	14.6	Walleye/ Pickerel	22.8	Walleye/ Pickerel	21.1	Yellow perch	15.1	Whitefish Meat	22.6
White sucker	10.2	Brook trout	12.0	Pike	10.3	Rainbow trout	14.0	Lake trout	6.7
Sturgeon Meat	8.5	Lake trout	11.2	Sturgeon	6.2	Hominy corn	13.9	Sturgeon Meat	6.2
Lake trout	6.7	Rainbow trout	7.5	Goose meat	5.6	Sturgeon	9.8	Brook trout	5.9
Beaver meat	6.5	Smelts	5.2	Brook trout	5.6	Lake whitefish	5.1	White sucker	5.3
Goose meat	3.7	Trout, any	1.7	Snow goose meat	2.9	Channel catfish	2.5	Rainbow trout	3.4
Brook trout	3.6	Yellow perch	1.4	Caribou meat	1.4	Lake trout	2.4	Pike Meat	3.3
Pike Meat	3.0	Pike	1.1	Moose meat	1.0	Hickory nuts	1.6	Beaver meat	3.3
Caribou meat	2.7	Sturgeon Meat	0.8	Round whitefish	0.9	Smelts	1.5	Goose meat	2.7

Table 28b. Top 10 contributors to cadmium intake, by ecozone/culture area and total

Ecozone 1		Ecozone 2		Ecozone 3		Ecozone 4		Total First Nations in Ontario	
Traditional Food	%	Traditional Food	%	Traditional Food	%	Traditional Food	%	Traditional Food	%
Moose kidney	85.3	Moose kidney	90.9	Moose kidney	48.0	Moose liver	32.7	Moose kidney	84.0
Moose liver	11.6	Deer liver	3.5	Beaver meat	20.8	Wild strawberry	24.2	Moose liver	9.8
Rabbit meat	0.9	Moose meat	1.2	Moose meat	18.1	Moose meat	7.1	Moose meat	1.5
Walleye/ Pickerel	0.8	Moose liver	0.9	Moose liver	10.3	Raspberries	5.5	Beaver meat	1.0
Moose meat	0.5	Smelts	0.8	Goose meat	0.8	Hickory nuts	5.3	Walleye/ Pickerel	0.7
Wild strawberry	0.2	Wild strawberry	0.5	Rabbit meat	0.7	Maple syrup	3.9	Rabbit meat	0.7
Caribou meat	0.1	Raspberries	0.5	Snow goose meat	0.4	Yellow perch	2.9	Deer liver	0.6
Whitefish Meat	0.1	Whitefish Meat	0.4	Round whitefish	0.3	Blueberries	2.7	Wild strawberry	0.4
Blueberries	0.1	Deer meat	0.2	Partridge Meat	0.1	Deer liver	2.6	Smelts	0.1
White sucker	0.1	Partridge meat	0.2	Grouse meat	0.1	Ground squirrel meat	2.1	Whitefish Meat	0.1

Table 28c. Top 10 contributors to lead intake, by ecozone/culture area and total

Ecozone 1		Ecozone 2		Ecozone 3		Ecozone 4		Total First Nations in Ontario	
Traditional Food	%	Traditional Food	%	Traditional Food	%	Traditional Food	%	Traditional Food	%
Beaver meat	46.9	Moose meat	58.6	Goose meat	37.2	Deer meat	72.9	Beaver meat	43.5
Moose meat	44.0	Partridge meat	17.4	Snow goose meat	36.9	Moose meat	15.0	Moose meat	42.3
Goose meat	7.4	Deer meat	5.2	Moose meat	17.8	Wild strawberry	5.3	Goose meat	7.5
Partridge meat	1.0	Wild strawberry	4.4	Partridge Meat	2.8	Ground squirrel meat	1.5	Deer meat	3.4
Snow goose meat	0.2	Blueberries	2.7	Deer meat	1.6	Hickory nuts	1.4	Partridge meat	1.3
White sucker	0.1	Raspberries	1.6	Caribou meat	1.0	Partridge meat	1.3	Snow goose meat	0.8
Walleye/ Pickerel	0.1	Pike	1.5	Ducks	0.7	Maple syrup	0.4	Wild strawberry	0.3
Caribou meat	0.1	Maple syrup	1.3	Sturgeon	0.6	Blueberries	0.3	Walleye/ Pickerel	0.1
Whitefish Meat	0.1	Red squirrel meat	1.0	Rabbit meat	0.5	Yellow perch	0.3	White sucker	0.1
Lake trout	0.05	Yellow perch	0.9	Pike	0.4	Hominy corn	0.2	Caribou meat	0.1

Table 28d. Top 10 contributors to mercury intake, by ecozone/culture area and total

Ecozone 1		Ecozone 2		Ecozone 3		Ecozone 4		Total First Nations in Ontario	
Traditional Food	%	Traditional Food	%	Traditional Food	%	Traditional Food	%	Traditional Food	%
Walleye/ Pickerel	60.5	Walleye/ Pickerel	41.6	Pike	38.2	Walleye/ Pickerel	56.7	Walleye/ Pickerel	54.9
Pike Meat	18.9	Lake trout	28.7	Walleye/ Pickerel	31.3	Yellow perch	24.8	Pike Meat	16.6
Whitefish Meat	7.0	Pike	8.4	Sturgeon	7.2	Rainbow trout	6.0	Lake trout	8.9
Lake trout	5.4	Whitefish Meat	7.9	Splake trout	6.4	Sturgeon	5.8	Whitefish Meat	6.3
Sturgeon Meat	2.5	Trout, any	3.9	Whitefish	3.3	Northern pike	2.4	Yellow perch	4.1
Trout, any	1.6	Yellow perch	3.6	Ducks	2.6	Lake trout	2.3	Sturgeon Meat	2.7
Yellow perch	1.6	Brook trout	2.3	Goose meat	2.4	Channel catfish	0.9	Trout, any	1.8
Ducks	0.7	Splake trout	1.2	Moose meat	2.0	Lake whitefish	0.3	Rainbow trout	0.8
Brook trout	0.4	Smelts	0.7	Lake trout	1.6	Ducks	0.2	Brook trout	0.8
White sucker	0.3	Rainbow trout	0.6	Brook trout	1.5	Moose meat	0.1	Ducks	0.7

Table 29. Exposure estimates (µg/kg body weight/day) for metals from traditional food for First Nations adults in Ontario, using average concentrations (n=1429)

Metal	PTDI (µg/kg/day)	n>PTDI	Mean	Median	95th percentile	HQ Mean/PTDI	HQ 95th/PTDI
Arsenic	1	3	0.02	0.006	0.10	0.02	0.10
Cadmium	1	23	0.08	0.0007	0.17	0.08	0.17
Lead	3.6	29	0.32	0.01	1.47	0.09	0.41
Mercury	0.5	11	0.04	0.01	0.22	0.08	0.45

Table 30. Exposure estimates (µg/kg body weight/day) for metals from traditional food for First Nations adults in Ontario using maximum concentrations (n=1429)

Metal	PTDI (µg/kg/day)	n>PTDI	Mean	Median	95th percentile	HQ Mean/PTDI	HQ 95th/PTDI
Arsenic	1	4	0.03	0.01	0.11	0.03	0.11
Cadmium	1	23	0.08	0.00	0.17	0.08	0.17
Lead	3.6	30	0.35	0.01	1.73	0.10	0.48
Mercury	0.5	13	0.04	0.01	0.24	0.09	0.49

Table 31. Exposure estimates (µg/kg body weight/day) for mercury from traditional food (using average and maximum concentrations) among First Nations women of child bearing age in Ontario (n=561)

Level of mercury concentration	PTDI (µg/kg/day)	n>PTDI	Mean	Median	95th percentile	HQ Mean/PTDI	HQ 95th/PTDI
Average	0.2	13	0.02	.006	0.10	0.12	0.50
Maximum	0.2	14	0.03	.004	0.14	0.13	0.69

Table 32a. Exposure estimates (µg/kg body weight/day) for metals from traditional food for First Nations adults in Ontario, using average and maximum concentrations, Ecozone 1, consumers only (n=340)

Contaminant	PTDI (µg/kg/day)	Level of concentration	n> PTDI	Mean	95th percentile	HQ Mean/PTDI	HQ 95th/PTDI
Arsenic	1	average	0	0.04	0.14	0.04	0.14
		maximum	1	0.07	0.27	0.07	0.27
Cadmium	1	average	20	0.19	0.74	0.19	0.74
		maximum	24	0.24	0.93	0.24	0.93
Lead	3.6	average	23	0.71	3.50	0.20	0.97
		maximum	62	1.80	7.64	0.50	2.12
Mercury	0.5	average	18	0.13	0.57	0.25	1.14
		maximum	57	0.28	1.26	0.55	2.52

Table 32b. Exposure estimates (µg/kg body weight/day) for metals from traditional food for First Nations adults in Ontario, using average and maximum concentrations, Ecozone 2, consumers only (n=314)

Contaminant	PTDI (µg/kg/day)	Level of concentration	n> PTDI	Mean	95th percentile	HQ Mean/PTDI	HQ 95th/PTDI
Arsenic	1	average	0	0.03	0.14	0.03	0.14
		maximum	0	0.05	0.22	0.05	0.22
Cadmium	1	average	1	0.07	0.02	0.07	0.02
		maximum	2	0.08	0.03	0.08	0.03
Lead	3.6	average	0	0.01	0.06	0.00	0.02
		maximum	0	0.03	0.17	0.01	0.05
Mercury	0.5	average	0	0.03	0.12	0.06	0.24
		maximum	2	0.05	0.19	0.09	0.38

Table 32c. Exposure estimates (µg/kg body weight/day) for metals from traditional food for First Nations adults in Ontario, using average and maximum concentrations, Ecozone 3, consumers only (n=264)

Contaminant	PTDI (µg/kg/day)	Level of concentration	n> PTDI	Mean	95th percentile	HQ Mean/PTDI	HQ 95th/PTDI
Arsenic	1	average	3	0.07	0.26	0.07	0.26
		maximum	4	0.12	0.41	0.12	0.41
Cadmium	1	average	6	0.09	0.35	0.09	0.35
		maximum	13	0.20	0.73	0.20	0.73
Lead	3.6	average	0	0.11	0.44	0.03	0.12
		maximum	0	0.28	1.28	0.08	0.36
Mercury	0.5	average	2	0.04	0.19	0.08	0.38
		maximum	4	0.06	0.26	0.11	0.53

Table 32d. Exposure estimates (µg/kg body weight/day) for metals from traditional food for First Nations adults in Ontario, using average and maximum concentrations, Ecozone 4, consumers only (n=417)

Contaminant	PTDI (µg/kg/day)	Level of concentration	n> PTDI	Mean	95th percentile	HQ Mean/PTDI	HQ 95th/PTDI
Arsenic	1	average	0	0.005	0.018	0.005	0.018
		maximum	0	0.01	0.03	0.01	0.03
Cadmium	1	average	0	0.001	0.004	0.001	0.004
		maximum	0	0.001	0.01	0.001	0.01
Lead	3.6	average	6	0.443	2.681	0.123	0.745
		maximum	33	1.69	10.32	0.47	2.87
Mercury	0.5	average	0	0.012	0.049	0.023	0.098
		maximum	0	0.01	0.07	0.03	0.13

Table 33. Exposure estimates (µg/kg body weight/day) for mercury from traditional food (using average and maximum concentrations) among First Nations women of child bearing age in Ontario, by ecozone

Ecozone (n)	PTDI (µg/kg/day)	Level of mercury concentration	n>PTDI	Mean	95th percentile	HQ Mean/PTDI	HQ 95th/PTDI
1 (n=131)	0.2	average	14	0.08	0.31	0.39	1.55
		maximum	32	0.15	0.70	0.75	3.48
2 (n=118)	0.2	average	1	0.02	0.06	0.08	0.28
		maximum	3	0.03	0.12	0.14	0.63
3 (n=134)	0.2	average	2	0.02	0.08	0.09	0.42
		maximum	3	0.03	0.16	0.14	0.82
4 (n=142)	0.2	average	1	0.01	0.0454	0.054	0.23
		maximum	2	0.01	0.0625	0.063	0.31

Figure 43. Correlation between mercury exposure from traditional food and hair mercury levels, total population

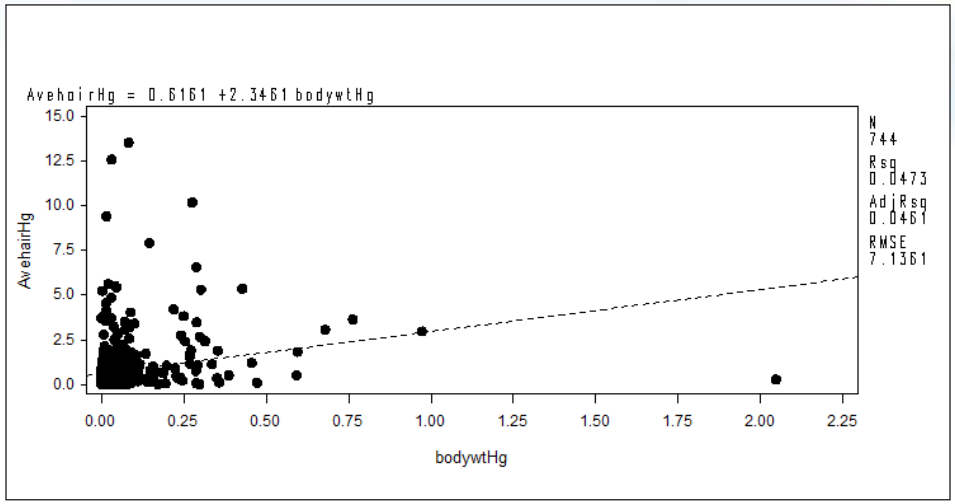


Figure 44. Correlation between mercury exposure from traditional food and hair mercury levels, women of child bearing age

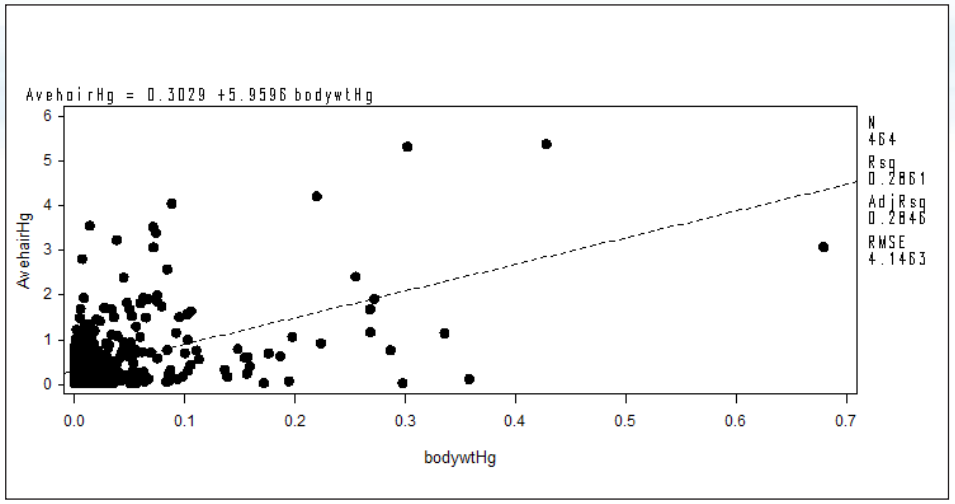


Table 34. Average and maximum levels of Polycyclic Aromatic Hydrocarbons (PAHs) in Ontario traditional food samples (ng TEQ/g fresh weight)

Traditional food sample	n*	Total PAHs ng TEQ/g	
		Ave	Max
FISH			
Brook trout	1	ND	ND
Brown trout	1	0.056	0.056
Lake trout	6	4.66	15.47
Rainbow trout	2	12.98	25.92
Trout Meat	2	4.86	9.26
Catfish	1	0.00	0.00
Herring Meat	2	6.36	12.71
King/chinook salmon	5	2.34	10.24
Largemouth bass	1	ND	ND
Smallmouth bass	2	0.001	0.001
Pike Meat	8	3.86	12.61
Pink salmon	2	7.91	15.81
Salmon roe eggs	1	ND	ND
Smelts	2	0.22	0.45
Sturgeon Meat	9	3.50	15.59
Sucker Meat	2	515.12	1018.07
Walleye eggs	1	0.001	0.001
Walleye pemmican	1	32.048	32.048
Walleye-pickerel	18	5.54	27.90
Whitefish eggs	1	ND	ND
Whitefish Meat	11	77.61	766.90
Yellow Perch Meat	6	3.55	14.13

Traditional food sample	n*	Total PAHs ng TEQ/g	
		Ave	Max
GAME			
Deer Meat	2	12.70	18.66
Moose Liver	1	5.41	5.41
Moose Meat	4	6.38	7.33
Muskrat meat	1	9.40	9.40
BIRDS			
Goose meat	2	75.04	149.35
Mallard Meat	2	426.97	841.01
Partridge Meat	1	6.28	6.28
Snow goose meat	1	0.001	0.001
Teal Meat	1	25.38	25.38

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

Traditional food sample	n*	Hexachlorobenzene		p,p-DDE		total PCBs		trans-Nonachlor		Toxaphene	
		Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max
FISH											
Brook trout	1	1.17	1.17	0.56	0.56	3.34	3.34	1.11	1.11	0.44	0.44
Brown trout	1	3.28	3.28	102.00	102.00	282.01	282.01	11.00	11.00	0.66	0.66
Carp Meat	1	1.57	1.57	6.40	6.40	126.52	126.52	1.49	1.49	3.03	3.03
Catfish	1	3.13	3.13	16.30	16.30	231.17	231.17	4.55	4.55	ND	ND
Herring Meat	3	0.63	0.67	4.47	7.18	9.46	11.96	1.40	1.80	4.06	6.06
King/chinook salmon	5	1.14	2.43	26.27	61.10	72.72	161.20	6.57	20.40	8.77	41.30
Lake trout	6	1.69	3.46	26.65	64.95	63.69	222.85	7.37	24.20	20.78	64.69
Largemouth bass	1	0.04	0.04	ND	ND	0.96	0.96	ND	ND	ND	ND
Pike Meat	9	0.15	0.31	1.85	6.52	8.98	30.08	0.32	2.24	0.34	2.93
Pink salmon	2	1.44	1.95	20.29	34.70	60.81	100.55	8.95	15.60	32.66	57.72
Rainbow trout	2	1.71	2.51	57.04	109.00	153.64	298.51	6.89	12.20	1.60	1.69
Round Whitefish Meat	1	0.70	0.70	9.40	9.40	36.91	36.91	1.63	1.63	5.89	5.89
Salmon roe eggs	1	3.55	3.55	64.30	64.30	111.34	111.34	9.90	9.90	10.46	10.46
Smelts	5	0.91	1.20	11.59	28.35	20.64	64.47	1.90	3.05	1.87	4.80
Splake Meat	4	0.24	0.39	2.23	3.91	15.57	30.70	ND	ND	0.14	0.28
Sturgeon Meat	9	0.71	1.43	5.51	26.20	43.41	351.95	0.98	5.93	0.14	0.91
Sucker Eggs	1	0.41	0.41	5.05	5.05	8.14	8.14	0.35	0.35	ND	ND
Sucker meat	3	0.45	0.64	2.50	3.36	7.67	16.49	0.28	0.33	0.02	0.06
Trout Meat	3	0.35	0.50	0.30	0.60	0.46	0.70	ND	ND	ND	ND
Walleye eggs	1	1.30	1.30	2.50	2.50	2.34	2.34	ND	ND	ND	ND
Walleye pemmican	1	1.13	1.13	3.21	3.21	4.43	4.43	ND	ND	0.18	0.18
Walleye-pickerel	18	0.23	1.14	2.69	12.50	14.75	64.13	0.52	3.85	1.31	16.75
Whitefish eggs	1	2.68	2.68	2.13	2.13	4.29	4.29	1.51	1.51	1.51	1.51
Whitefish Meat	11	0.91	2.59	5.89	24.53	14.56	83.34	1.80	11.80	3.15	20.18
Yellow Perch Meat	6	0.15	0.44	3.11	10.60	33.18	149.38	0.54	2.59	ND	ND

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

Traditional food sample	n*	Hexachlorobenzene		p,p-DDE		total PCBs		trans-Nonachlor		Toxaphene	
		Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max
GAME											
Beaver meat	10	0.22	0.35	0.02	0.03	9.91	9.91	ND	ND	ND	ND
Caribou meat	6	0.32	0.32	ND	ND	ND	ND	ND	ND	ND	ND
Deer meat	9	0.24	0.37	0.04	0.08	6.50	13.00	ND	ND	ND	ND
Moose fat	2	2.19	2.19	ND	ND	NM	NM	ND	ND	ND	ND
Moose intestines	4	1.26	1.26	ND	ND	NM	NM	ND	ND	ND	ND
Moose meat	15	0.09	0.12	ND	ND	0.03	0.11	ND	ND	ND	ND
Muskrat meat	3	0.11	0.11	0.03	0.03	10.40	10.40	ND	ND	ND	ND
BIRDS											
Canadian Goose Kidney	1	0.25	0.25	2.54	2.54	0.12	0.12	0.31	0.31	0.04	0.04
Goldeneye duck	2	3.16	3.16	6.39	6.39	13.78	13.78	ND	ND	ND	ND
Goose Fat	1	0.97	0.97	ND	ND	NM	NM	ND	ND	ND	ND
Goose meat	8	0.26	0.54	4.85	18.80	0.47	1.04	0.30	1.49	0.46	2.28
Mallard duck	8	0.48	1.16	3.38	8.49	7.45	11.68	0.53	1.47	ND	ND
Partridge meat	13	0.15	0.15	ND	ND	NM	NM	ND	ND	ND	ND
Ptarmigan meat	3	0.17	0.17	2.20	2.20	14.75	14.75	0.20	0.20	ND	ND
Snow goose meat	3	0.55	0.68	17.75	42.90	0.17	0.25	ND	ND	0.39	1.16

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

Traditional Food Sample	n*	Average total PBDEs	Max total PBDEs
FISH			
Brook trout	1	0.91	0.91
Brown trout	1	47.49	47.49
Lake trout	6	22.18	75.21
Rainbow trout	2	23.11	43.33
Trout Meat	3	2.41	5.66
Catfish	1	8.00	8.00
Herring Meat	2	3.49	4.18
King/chinook salmon	5	12.31	27.17
Largemouth bass	1	0.54	0.54
Pike Meat	9	2.40	9.08
Pink salmon	2	11.39	12.88
Salmon roe eggs	1	38.03	38.03
Smallmouth bass	2	2.15	3.97
Smelts	2	6.11	8.37
Sturgeon Meat	9	3.85	25.58
Sucker meat	3	1.36	2.17
Walleye eggs	1	0.26	0.26
Walleye pemmican	1	1.89	1.89
Walleye-pickerel	18	2.61	17.83
Whitefish eggs	1	0.65	0.65
Whitefish Meat	11	5.87	41.34
Yellow Perch Meat	6	2.02	4.63

Traditional Food Sample	n*	Average total PBDEs	Max total PBDEs
GAME			
Beaver Meat	1	0.42	0.42
Deer Meat	2	0.39	0.60
Moose Liver	1	0.08	0.08
Moose Meat	4	1.61	3.58
Muskrat meat	1	0.08	0.08
BIRDS			
Goose meat	2	0.48	0.52
Mallard Meat	3	0.86	2.39
Partridge Meat	1	0.06	0.06
Ptarmigan Meat	1	0.46	0.46
Snow goose meat	2	4.50	5.83
Teal Meat	1	0.73	0.73

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

Traditional Food Sample	n*	Average total PFCs	Max total PFCs
FISH			
Brook trout	1	0.32	0.32
Lake trout	4	5.86	16.11
Rainbow Trout Meat	1	15.26	15.26
Trout Meat	2	7.74	12.51
Catfish	1	1.91	1.91
Herring	1	0.38	0.38
King/chinook salmon	4	6.06	10.71
Largemouth bass	1	2.27	2.27
Smallmouth bass	2	2.61	2.69
Perch	1	2.95	2.95
Pike	5	8.27	13.25
Pink salmon	1	2.23	2.23
Smelts	1	21.26	21.26
Sturgeon	4	1.14	2.98
Sucker Meat	1	43.01	43.01
Walleye-pickerel	14	8.08	12.83
Whitefish eggs	1	ND	ND
Whitefish Meat	6	6.75	13.57

Traditional Food Sample	n*	Average total PFCs	Max total PFCs
GAME			
Caribou meat	1	ND	ND
Deer Kidney	2	15.64	19.82
Deer Liver	2	17.89	17.89
Deer meat	2	8.09	16.01
Elk meat	1	ND	ND
Moose Kidney	4	13.71	18.35
Moose liver	6	15.77	26.49
Moose meat	12	7.81	15.37
BIRDS			
Canadian Goose Kidney	1	16.76	16.76

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

Traditional Food Sample	n*	Average Dioxan and Furans	Max Dioxan and Furans
FISH			
Brook trout	1	0.17	0.17
Brown trout	1	1.47	1.47
Catfish	1	1.53	1.53
Herring Meat	1	3.44	3.44
King/chinook salmon	4	1.46	2.99
Lake trout	6	3.62	15.62
Pike Meat	8	0.56	1.44
Pink salmon	2	1.35	1.38
Rainbow trout	2	2.06	2.56
Salmon roe eggs	1	5.93	5.93
Smallmouth bass	2	0.01	0.02
Smelts	1	2.00	2.00
Sturgeon Meat	9	4.25	33.81
Sucker Meat	2	2.00	3.80
Trout Meat	3	0.91	2.50
Walleye eggs	1	0.34	0.34
Walleye pemmican	1	0.29	0.29
Walleye-pickerel	18	0.83	3.63
Whitefish eggs	1	0.49	0.49
Whitefish Meat	10	2.57	9.01
Yellow Perch Meat	6	0.71	2.34

Traditional Food Sample	n*	Average Dioxan and Furans	Max Dioxan and Furans
GAME			
Deer Meat	2	0.40	0.81
Moose Liver	1	1.34	1.34
Moose Meat	3	0.78	1.28
Muskrat meat	1	0.88	0.88
BIRDS			
Barrow's Golden Eye Duck Meat	1	ND	ND
Goose meat	3	0.14	0.30
Mallard Meat	2	5.31	9.63
Partridge Meat	1	0.78	0.78
Snow goose meat	3	0.18	0.27
Teal Meat	1	8.92	8.92

n*=number of communities

Table 39. Exposure estimates (µg/kg body weight/day) for organics from traditional food for Ontario First Nations using average concentrations (n=1429)

Organics	PTDI (µg/kg/day)	n>PTDI	Mean	Median	95th percentile	Mean/ PTDI	95th/ PTDI
HCBs	0.27	0	0.00012	0.00002	0.00063	0.00045	0.00235
DDE	20	0	0.00089	0.00012	0.00382	0.00004	0.00019
PCB	1	0	0.00261	0.00035	0.01273	0.00261	0.01273
Chlordane	0.05	0	0.00016	0	0.00067	0.00318	0.01338
Toxaphene	0.2	0	0.00044	0	0.00180	0.00222	0.00900
PAH	40	0	0.02222	0.00051	0.05119	0.00056	0.00128
PFOS	0.08	3	0.00250	0.00035	0.01172	0.03120	0.14652
PBDE	0.1	0	0.00078	0.00013	0.00329	0.00780	0.03289
Dioxin and Furan	2.3 pg/kg/day	0	0.00023	0.00003	0.00125	0.00010	0.00054

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

Ecozone	Level of concentration	n> PTDI	Mean	95th percentile	HQ Mean/PTDI	HQ 95th/PTDI
1	average	0	0.01	0.03	0.01	0.03
	maximum	0	0.02	0.08	0.02	0.08
2	average	0	0.004	0.026	0.004	0.03
	maximum	0	0.01	0.04	0.01	0.04
3	average	0	0.0003	0.001	0.0003	0.001
	maximum	0	0.001	0.002	0.0006	0.002
4	average	0	0.003	0.014	0.0029	0.014
	maximum	0	0.004	0.020	0.0036	0.02
Total First Nations in Ontario	average	0	0.005	0.022	0.005	0.022
	maximum	0	0.018	0.095	0.018	0.095

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 Nation 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. Because 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 byphenyls (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.

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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.

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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. Because 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 be bioaccumulated 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), p,p' dichlorodiphenyltrichloroethane (DDT) and its metabolite p,p-dichloro-2,2bis (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.[2]

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.

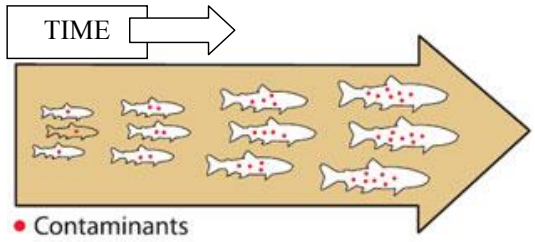

Illustration of how POPs accumulate in animals and people faster than the body can excrete the substance[3]

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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[4]. 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[5] . 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 pesticide 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.[6]

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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 ("nondioxin-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.[7] 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.[8]

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.[9] 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 0.001 mg/Kg BW/day.[10]

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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 liver, thyroid, reproductive/developmental and neurological effects. Concerns are being raised because of their persistence, bioaccumulation, and potential for toxicity, both in animals and in humans. A growing body of research in laboratory animals has linked PBDE exposure to an array of adverse health effects including thyroid hormone disruption, permanent learning and memory impairment, behavioural changes, hearing problems, delayed puberty onset, decreased sperm count, birth defects and possibly, cancer.[11]

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

There is no guideline level for PBDE from Health Canada.

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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.[12]

What are the major health effects? Dioxins are known to suppress the immune system of animals and humans,[13] and are likely to cause cancer.[14] Changes to animals' hormone and reproduction systems and development have also been observed due to high exposure to dioxins and furans.[15] 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).

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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.[16] 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.[17] Although, exposure to PAHs can damage lungs, liver, kidneys and skin of humans.[18] 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 ug/L Benzo[a]pyrene) (a PAH) in drinking water. Health Canada has no guideline level for non-carcinogenic endpoints of PAHs. The oral slope factor for Benzo[a]pyrene is 2.3 mg/Kg BW/day.

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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 Scotchgard 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 Scotchgard 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.[19]

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

There is no guideline level for PFCs from Health Canada.

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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.

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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 and lead shot ammunition, although its use has now been restricted in these areas. It can currently be found in some types of batteries (car batteries), toys, solder, 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 eating birds or other animals that have been killed with lead shot. If the bird survives, these fragments then stay in the bird and are absorbed by the bird, to be eaten by the next hunter who successfully hunts the bird. These fragments are usually too small to be detected by the person eating the bird. Detectable fragments contain even more lead and should be avoided when eating for everyone. Canada has banned the use of lead shot for hunting, but lead ammunition is still readily available.

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. The tolerable daily intake (TDI) established by Health Canada is 0.0036 mg/Kg BW/day.

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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 either elemental form 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. 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.[20] 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.[21]

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 alloys of copper and especially lead (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.[22] 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

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 ($\sum_i m^*_{hi} = m_h$).

iii) Define the bootstrap weights as

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

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 θ be the population parameter of interest. Let $\hat{\theta}$ be the full-sample estimate for θ obtained by using the final weight and let $\hat{\theta}^*_b$, 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 $\hat{\theta}$ is given by:

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

where $\hat{V}_{BOOT}(\hat{\theta}) = \frac{1}{B}\sum_{b=1}^{B}\left(\hat{\theta}^*_b - \hat{\theta}\right)^2 = 0.002\sum_{b=1}^{500}\left(\hat{\theta}^*_b - \hat{\theta}\right)^2$.

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

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 (exo) epoxide	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	Nonachlor, trans-	0.001

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	1 0.01
Arsenic	As	0.1 0.02	0.005
Barium	Ba	0.1 0.02	0.005
Beryllium	Be	0.1 0.02	0.030
Bismuth	Bi	0.1 0.02	0.005
Cadmium	Cd	0.02 0.004	0.030
Calcium	Ca	5 1	0.020
Chromium	Cr	0.1 0.02	0.010
Cobalt	Co	0.1 0.02	0.010
Copper	Cu	0.1 0.02	0.005
Iron	Fe	5 1	0.001
Lead	Pb	0.1	0.02
Lanthanum	La	0.5	0.1
Magnesium	Mg	5	1

ELEMENT	SYMBOL	DLs (ppm) Based on Dry Weight	DLs (ppm) Based on Wet Weight
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

ELEMENT	SYMBOL	DLs (ppm)
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)
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.10 PHARMACEUTICALS IN WATER

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 α-Ethinylestradiol	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

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, hamburger sandwich
2. Grains and Milk Products	1		0.5		150g	Cheese pizza, cheese tortellini, macaroni and cheese
3. Grains and Vegetables	2	1			150g	Bread raisin, potato gnocchi, granola bar with blueberries
4. Grains, Vegetables and Meat	1	1		0.5	150g	Egg roll with meat, cabbage rolls, Chimichanga without cheese
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, Quiche Lorraine, croissant with egg, cheese and sausage (fast food)
7. Vegetables and Meat		1		1	150g	Succotash, Chili con carne, meat and vegetable stew
8. Vegetables and Milk Products		1	1		150g	Tzatziki, poutine, scalloped potatoes au gratin
9. Grains, Vegetables, Meat and Milk Products	1	0.25	0.5	0.5	200g	Spinach quiche, all dressed pizza, lasagna with meat, Burrito
10. Meat and milk products			1	1	150g	Eggnog, Sausage cheesefurter, chicken parmesan
11. Vegetables, meat and milk products		0.5	1	0.5	200g	Clam chowder, Mixed dishes (chicken, broccoli, cheese), Salad with egg, cheese, vegetables

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.

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

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:**

$$\frac{\textbf{weight (pounds)}}{\textbf{2.2}} = \textbf{weight (kg)}$$

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.

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

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: Traditional Food Intake by species in grams per day

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

Traditional Food	Mean grams/ person/ day						
	Women			Men			First Nations in Ontario (n=1429)
	Age 19-50 (n=561)	Age 51-70 (n=262)	Age 71+ (n=72)	Age 19-50 (n=315)	Age 51-70 (n=174)	Age 71+ (n=44)	
Total traditional food	**32.08**	**36.61**	**57.77**	**40.17**	**59.98**	**133.46**	**42.68**
Walleye/Pickerel	3.24	4.34	4.07	8.18	12.75	43.02	7.14
Moose meat	5.62	3.27	5.12	7.24	5.93	10.85	5.74
Lake whitefish	1.74	2.59	3.27	3.08	5.7	6.23	2.86
Canada Geese	2.84	1.1	2.66	2.72	3.43	5.63	2.64
Blueberries	2.41	4.05	6.51	1.14	1.33	1.62	2.46
Deer meat	1.88	0.78	0.8	2.74	1.59	5.74	1.93
Wild strawberry	1.58	2.74	5.95	0.41	1.51	0.57	1.67
Northern pike	0.77	1	1.33	0.99	3.62	8.92	1.51
Raspberries	0.97	2.15	5.32	0.6	0.59	0.82	1.24
Lake trout	1.14	0.82	3.51	1.05	1.55	1.56	1.21
Corn/hominy	0.92	1.4	0.37	0.34	3.18	1.77	1.13
Beans, kidney	0.46	1.04	0.22	0.28	2.42	1.17	0.76
Yellow perch	0.54	0.34	0.49	0.39	1.14	5.09	0.71
Caribou meat	0.63	0.28	0.49	1.15	0.66	1.55	0.71
Snow geese	0.54	0.11	0.35	0.54	1.11	3.97	0.64
Ducks, all	0.62	0.21	0.32	0.5	1.7	0.77	0.62
Moose liver	0.26	0.65	1.37	0.95	0.39	1.48	0.59
White sucker	0.14	0.81	0.51	0.39	0.71	3.88	0.54

Traditional Food	Mean grams/ person/ day						
	Women			Men			First Nations in Ontario (n=1429)
	Age 19-50 (n=561)	Age 51-70 (n=262)	Age 71+ (n=72)	Age 19-50 (n=315)	Age 51-70 (n=174)	Age 71+ (n=44)	
Sauger	0	0.17	0	0.28	0	11.27	0.53
Moose kidney	0.22	0.53	1.66	0.44	0.29	1.26	0.44
Rabbit meat	0.26	0.26	1.06	0.58	0.7	0.79	0.43
Winter squash	0.29	0.66	0.18	0.12	0.81	1.35	0.42
Lake sturgeon	0.16	0.32	0.71	0.64	0.67	0.98	0.41
Grouse	0.23	0.2	0.22	0.52	0.5	1.1	0.35
Maple syrup	0.29	0.77	0.08	0.13	0.37	0.38	0.35
Grey partridge	0.24	0.16	0.38	0.42	0.61	0.31	0.32
Chinook salmon	0.31	0.3	0	0.07	0.3	1.98	0.31
Blackberries	0.34	0.55	0.39	0.09	0.17	0.05	0.3
Beaver meat	0.1	0.24	0.28	0.28	0.71	1.33	0.29
Rainbow trout	0.14	0.3	0.06	0.25	0.58	1.26	0.28
Low bush cranberries	0.09	0.1	5.02	0.09	0.06	0.03	0.28
Hickory nuts	0.4	0.16	0.1	0.1	0.12	0.52	0.25
Burbot	0.1	0.31	1.01	0.23	0.32	0.05	0.23
Wild rice	0.13	0.16	0.04	0.22	0.49	1.11	0.23
Brook trout	0.07	0.14	0.14	0.61	0.15	0.25	0.22
Black raspberries	0.14	0.48	0.04	0.19	0.06	0.01	0.2
White perch/bass	0.2	0.23	0.13	0.11	0.13	0.47	0.19
Smallmouth bass	0.13	0.13	0.09	0.14	0.52	0.29	0.18
Trout, all	0.09	0.21	0.2	0.16	0.3	0.08	0.16
Caribou liver	0.14	0.2	0.06	0.18	0.06	0.47	0.16
Caribou kidney	0.14	0.21	0.07	0.11	0.06	0.64	0.16
Cherries, pin/choke	0.04	0.47	0.04	0.07	0.09	0.44	0.15
Walnuts	0.17	0.31	0.07	0.02	0.08	0.02	0.15
Smelt	0.04	0.09	1.09	0.11	0.16	0.05	0.12

Traditional Food	Mean grams/ person/ day						
	Women			Men			First Nations in Ontario (n=1429)
	Age 19-50 (n=561)	Age 51-70 (n=262)	Age 71+ (n=72)	Age 19-50 (n=315)	Age 51-70 (n=174)	Age 71+ (n=44)	
Juniper berries	0.17	0.22	0	0.04	0	0.01	0.12
Round whitefish	0.08	0.01	0.01	0.05	0.6	0.01	0.11
Largemouth bass	0.08	0.07	0.06	0.08	0.25	0.4	0.11
Red longnose sucker	0.03	0.08	0.06	0.14	0.36	0.12	0.1
Gooseberries	0.02	0.16	0.04	0.11	0.04	0.22	0.08
Crabapples	0.04	0.02	0.85	0.08	0.1	0.01	0.08
Elk meat	0.09	0.14	0.01	0.02	0.01	0.04	0.07
Deer liver	0	0	0	0.23	0.02	0.01	0.06
Hazelnut	0.08	0.1	0	0.04	0.02	0	0.06
Thimbleberries	0.11	0	0.01	0	0	0.07	0.05
Other berries	0.13	0	0	0	0	0	0.05
Splake trout	0.08	0	0.02	0.04	0	0.02	0.04
Wild turkey	0.03	0.03	0.04	0.03	0.07	0.16	0.04
Highbush cranberries	0.03	0.02	0.06	0.08	0.03	0.07	0.04
Brown bullhead catfish	0.03	0	0.01	0.01	0.11	0.09	0.03
Muskrat meat	0.01	0.06	0.03	0.03	0.02	0.08	0.03
Goldeneye	0	0	0	0.05	0.18	0	0.03
Pheasant	0.07	0.01	0.08	0.01	0	0	0.03
Buffaloberries	0.06	0	0	0	0	0	0.03
Saskatoon berries	0.01	0.05	0.04	0.03	0.04	0.12	0.03
Cisco	0.02	0.01	0.03	0	0.1	0	0.02
Channel catfish	0.03	0	0	0	0.06	0	0.02
Other land mammals	0	0.02	0.17	0	0.01	0.12	0.02
Bufflehead	0	0.02	0	0.04	0.06	0.03	0.02
Loon	0	0.07	0.03	0.01	0.02	0.05	0.02

Traditional Food	Mean grams/ person/ day						
	Women			Men			First Nations in Ontario (n=1429)
	Age 19-50 (n=561)	Age 51-70 (n=262)	Age 71+ (n=72)	Age 19-50 (n=315)	Age 51-70 (n=174)	Age 71+ (n=44)	
Bluegill sunfish	0	0.01	0	0.02	0	0	0.01
Pumpkinseed sunfish	0	0	0	0.02	0	0	0.01
Rock bass	0	0	0	0.02	0	0	0.01
Muskie	0.02	0	0	0.01	0.01	0	0.01
Eel	0	0.02	0.01	0	0.04	0	0.01
Red squirrel meat	0	0	0	0.01	0.02	0	0.01
Ground squirrel meat	0.02	0	0	0	0	0.04	0.01
Merganser	0	0	0.13	0.01	0.03	0.09	0.01
Canada goose egg	0	0	0	0.02	0	0.22	0.01
Crowberries	0.01	0	0	0	0.07	0	0.01
Teaberries	0.02	0	0	0	0	0.02	0.01
Bearberries	0.01	0.01	0	0	0	0.17	0.01
Cloudberries	0	0	0.24	0	0	0	0.01
Blue huckleberries	0.01	0	0	0.01	0.02	0	0.01
Rose hips	0	0.04	0	0	0.01	0	0.01
Acorns	0	0	0	0.03	0	0	0.01
Brown trout	0.01	0	0.02	0	0	0	0
Black bear meat	0	0	0.01	0	0.01	0	0
Black bear fat	0	0	0.03	0	0	0	0
River otter meat	0	0	0	0	0	0.11	0
Bunchberries	0	0.01	0	0	0	0	0
Hawthorn	0	0	0	0	0	0.01	0
Sumac	0	0	0	0.01	0	0.01	0
Wihkes/rat root	0	0.01	0	0	0	0	0
Labrador tea leaves	0	0.01	0.01	0	0	0	0
Mullein	0	0.01	0	0	0	0.01	0

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

Traditional Food	95th percentile grams/person/day (consumers and non-consumers)						
	Women			Men			First Nations in Ontario (n=1429)
	Age 19-50 (n=561)	Age 51-70 (n=262)	Age 71+ (n=72)	Age 19-50 (n=315)	Age 51-70 (n=174)	Age 71+ (n=44)	
Total traditional food	**133.62**	**154.13**	**325.47**	**176.2**	**239.41**	**499.15**	**204.90**
Walleye/Pickerel	16.66	22.62	24.33	30.59	100.6	116.4	30.03
Moose meat	26.83	15.45	26.3	30.77	25.1	68.38	26.83
Lake whitefish	7.81	19.79	18.25	20.02	40.24	32.11	15.1
Canada Geese	10.53	7.52	24.07	18.05	24.07	23.06	14.04
Blueberries	20.91	17.42	20.91	4.6	4.6	6.9	13.07
Deer meat	10.06	4.64	6.58	17.95	8.16	25.64	11.4
Northern pike	2.6	5.18	6.08	6.12	20.12	38.53	9.63
Wild strawberry	8.71	13.07	20.91	2.3	4.6	1.53	6.97
Corn/hominy	4.87	6.14	1.91	2.3	20.52	7.13	6.12
Lake trout	2.08	5.65	48.66	6.67	10.06	4.01	5.65
Beans, kidney	2.43	5.52	1.27	1.53	20.52	7.13	4.6
Raspberries	3.48	5.23	20.91	3.84	3.45	4.6	4.6
Yellow perch	1.04	2.83	3.04	2.22	4.19	9.63	3.77
Squash, winter	1.62	3.68	0.95	0.58	5.13	11.72	2.55
Lake sturgeon	1.04	1.41	3.04	3.34	3.35	4.82	2.22
Ducks, all	1	1	1.5	3.01	7.52	3.51	2.01
Maple syrup	1.18	5.03	0.44	1.18	2.96	3.7	1.78
Moose liver	0.56	0.39	8.77	3.85	2.51	11.4	1.68
Rabbit meat	1.12	0.77	6.58	1.92	7.53	4.27	1.68
Grouse	0	1	0	3.01	4.01	12.03	1.5

Traditional Food	95th percentile grams/person/day (consumers and non-consumers)						
	Women			Men			First Nations in Ontario (n=1429)
	Age 19-50 (n=561)	Age 51-70 (n=262)	Age 71+ (n=72)	Age 19-50 (n=315)	Age 51-70 (n=174)	Age 71+ (n=44)	
Grey partridge	1	1	1	4.01	3.01	1	1.5
Wild rice	1.04	1.04	0.52	1.3	2.86	3.38	1.3
Caribou meat	0.56	0.39	1.64	1.92	3.76	8.55	1.28
Beaver meat	0	1.16	1.1	1.28	3.76	8.55	1.1
Snow geese	0.5	1	1	1	3.01	3.01	1
Smallmouth bass	0.52	0.94	0.51	1.11	0.84	4.82	0.94
Hickory nuts	1.31	0.87	1.31	0	0.77	5.75	0.87
Blackberries, large	1.31	0.87	5.23	0.38	0.77	0	0.87
Chinook salmon	1.04	0	0	0	0.84	12.84	0.84
Black raspberries	0.87	0.87	0	1.15	0	0	0.77
Moose kidney	0	0.39	19.73	1.92	1.25	11.4	0.63
White perch/bass	0	0.47	0.51	0.56	0	1.61	0.52
Smelt	0.52	0.47	0	0.56	0.84	0	0.52
Trout, all	0	0.94	0.51	0	0.84	0	0.47
Mullein	0	0.02	0	0.01	0.01	0.02	0.01
Sauger	0	0	0	0	0	38.53	0
Rainbow trout	0	0.47	0	0	0	20.87	0
White sucker	0	0	0	0	1.68	16.05	0
Caribou kidney	0	0	0	0	0	5.7	0
Largemouth bass	0	0.47	0	0	0	4.82	0
Caribou liver	0	0	0	0	0	2.85	0
Gooseberries	0	0	0	0.38	0	2.68	0
Brown bullhead catfish	0	0	0	0	0	1.61	0
Wild turkey	0	0	0	0.5	0	1	0
Brook trout	0	0	0	2.22	0	0.8	0

Traditional Food	95th percentile grams/person/day (consumers and non-consumers)						
	Women			Men			First Nations in Ontario (n=1429)
	Age 19-50 (n=561)	Age 51-70 (n=262)	Age 71+ (n=72)	Age 19-50 (n=315)	Age 51-70 (n=174)	Age 71+ (n=44)	
Thimbleberries	0	0	0	0	0	0.77	0
Saskatoon berries	0	0.44	0	0	0	0.77	0
Elk meat	0	0	0	0	0	0.71	0
Muskrat meat	0	0	0	0	0	0.71	0
Ground squirrel meat	0	0	0	0	0	0.71	0
Cherries, pin/choke	0	0.44	0	0	0.77	0.38	0
Walnuts	0	0	0	0	0	0.38	0
Labrador tea leaves	0	0.01	0.01	0	0	0.01	0
Gold thread root tea	0	0	0	0	0	0.01	0
Burbot	0	0	0.51	0	0	0	0
Red longnose sucker	0	0	0.51	0	0	0	0
Low bush cranberries	0	0	20.91	0	0	0	0
Highbush cranberries	0	0	0.87	0	0	0	0
Crabapples	0	0	0.87	0.38	0	0	0
Wihkes	0	0.01	0	0	0	0	0

c) Estimated average intake of top 10 traditional foods (g/person/day), consumers only, based on traditional food frequency results

Traditional Food	Mean grams/ person/ day (consumers only)						
	Women			Men			First Nations in Ontario
	Age 19-50	Age 51-70	Age 71+	Age 19-50	Age 51-70	Age 71+	
Walleye/Pickerel	6.56	9.55	13.25	11.09	18.71	31.50	11.17
Moose meat	12.51	8.95	11.97	13.17	10.36	20.74	12.09
Lake whitefish	6.77	8.40	9.64	11.36	12.97	22.58	9.77
Canada Geese	12.21	6.83	24.20	10.31	14.35	13.54	11.75
Blueberries	4.64	8.42	8.88	3.61	2.42	2.95	4.74
Deer meat	7.50	3.01	1.96	9.01	4.86	7.58	6.51
Wild strawberry	6.53	8.22	7.46	1.85	3.03	1.71	5.66
Northern pike	4.37	9.29	3.51	5.37	25.32	21.37	9.87
Raspberries	2.68	5.98	12.06	2.06	1.88	3.60	3.83
Lake trout	4.34	3.84	25.50	5.91	6.39	7.08	6.42

d) Estimated high consumption (95th percentile rate) of traditional foods (g/person/day), consumers only, based on traditional food frequency results

Traditional Food	95th percentile grams/person/day (consumers only)						
	Women			Men			First Nations in Ontario
	Age 19-50	Age 51-70	Age 71+	Age 19-50	Age 51-70	Age 71+	
Walleye/Pickerel	24.99	42.41	28.89	36.71	100.60	116.40	38.17
Moose meat	36.33	26.27	59.18	46.16	25.10	85.48	46.16
Lake whitefish	20.82	33.93	24.33	36.71	55.33	96.33	37.70
Canada Geese	60.16	20.05	60.16	40.11	40.11	40.11	45.12
Blueberries	20.91	42.25	20.91	13.81	10.74	6.90	17.42
Deer meat	26.83	9.27	6.58	30.77	22.59	28.49	26.83
Wild strawberry	23.52	47.05	35.28	4.60	7.67	4.60	31.36
Northern pike	15.62	37.70	12.16	13.35	140.84	115.59	40.24
Raspberries	5.23	26.14	20.91	4.60	4.99	18.41	13.07
Lake trout	11.97	16.96	48.66	26.70	13.41	77.06	33.37

Appendix G: Types of fruits and vegetables consumed from personal or community gardens in First Nations communities in Ontario

Types of fruits and vegetable eaten from gardens	Percent of all fruits and vegetables reported (n=2745)
Tomatoes	17.3
Cucumbers	13.5
Potatoes	10.1
String Beans (green and yellow)	8.2
Onions (onions, shallots, chives, and scallions)	7.0
Peppers	5.9
Carrots	5.6
Corn	5.1
Squash	4.3
Zucchinis	2.7
Lettuce	2.6
Berries (strawberries, raspberries, blueberries, blackberries, thimbleberries, and elderberries)	2.5
Radishes	1.6
Beets	1.5
Pumpkins	1.4
Melons (cantaloupe and watermelon)	1.3
Cabbage	1.0
Peas	1.0
Apples	0.9
Rhubarb	0.8
Turnips	0.7
Celery	0.6

Types of fruits and vegetable eaten from gardens	Percent of all fruits and vegetables reported (n=2745)
Broccoli	0.5
Herbs (cilantro, basil, mint, dill, oregano, sage, thyme, rosemary, and parsley)	0.5
Spinach	0.5
Garlic	0.4
Legumes (kidney, potato, cranberry, navy, and black beans)	0.3
Grapes	0.3
Eggplants	0.3
Swiss Chard	0.3
Kale	0.2
Cauliflower	0.2
Leeks	0.2
Cherries	0.1
Plums	0.1
Brussel Sprouts	0.1
Asparagus	0.1
Sunflowers	0.1
Mushrooms	0.1
Rutabaga	0.04
Greens	0.03

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

Health Canada Santé Canada

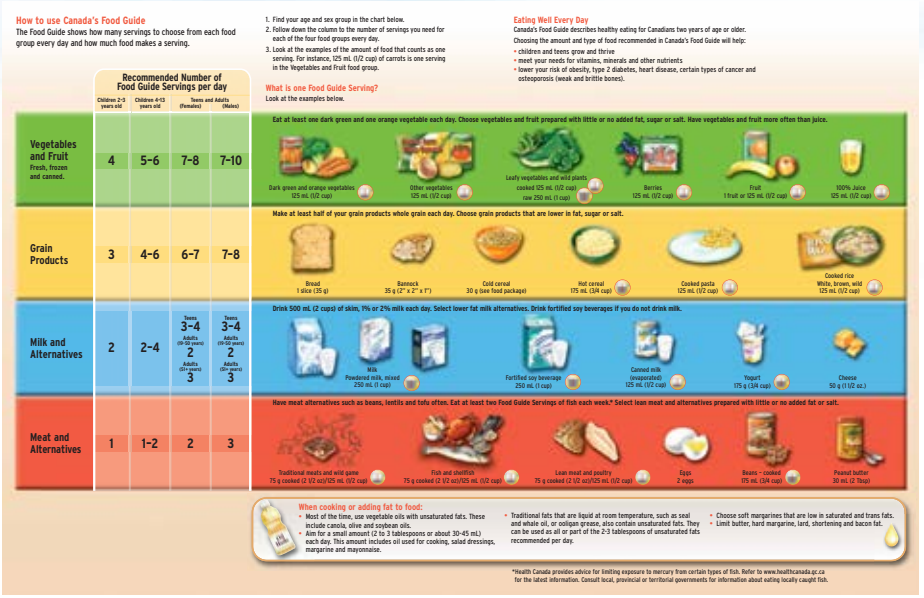
Your health and safety… our priority. *Votre santé et votre sécurité… notre priorité.*

Eating Well with

Canada's Food Guide

First Nations, Inuit and Métis

Canada



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

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)

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)

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.)

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.

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
This publication can be made available on request on diskette, large print, audio-cassette and braille.

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Appendix I: List of nutritional supplements taken by First Nations in Ontario

Types of supplements reported to be taken	% of all supplements reported (n=849)
Vitamin D	17.95
Multivitamin/Mineral Supplement	14.78
Vitamin B (B1, B3, B6, B12, Complex)	10.67
Omega Fatty Acids	9.27
Calcium	8.22
Vitamin C	7.28
Iron	4.55
Prenatal Vitamin	2.71
Herbal Supplements	2.62
Magnesium	1.75
Traditional Medicine	1.65
Co-Enzyme Q	1.25
Glucosamine	1.25
Weight Loss Supplement	1.18
Protein Supplement	0.95
Vitamin E	0.92
Ginger	0.75
Flax Seed Oil	0.72
Probiotics	0.70
Potassium	0.58
Garlic	0.53
Alpha Lipoid Acid	0.52
Selenium	0.52
Ca & Mg	0.51

Types of supplements reported to be taken	% of all supplements reported (n=849)
Cyanocobalamin	0.46
Zinc	0.46
Acai Smoothie	0.44
Folic Acid	0.43
Vitamin K	0.40
Ca-Vit D	0.38
Chromium	0.35
Biotin 1000mg	0.33
Cranberry Extract	0.32
5 HTP	0.27
Gingko Biloba	0.27
Greens Organic Powder	0.26
Reds Organic Powder	0.26
Ca, Vit D& Mg	0.18
Chorella	0.17
Greens Alkalized Detoxify	0.17
Life Hh1-Zyme Digestive Aid	0.17
Lorna Vanderhaeghe Meno Smart Plus	0.17
Swiss Sources Naturelles	0.17
Systemic Enzymes	0.17
Replavite	0.15
Corn Silk- Homemade	0.13
Gold Thread	0.13
Cinnamon	0.11
Anti-Stress, Ultimate, Brad Kings	0.10
Trivita Nerve Formula	0.10
Aconitum Napellus Homeopathic Medicine	0.09

Types of supplements reported to be taken	% of all supplements reported (n=849)
Airborne Immunity Booster	0.09
Greens	0.09
Mega Joint Wellness	0.09
Melaleuca	0.09
Melaleuca Replenex Extra Strength	0.09
Monavie Nutritional Gel Acai Blend	0.09
Natrol Fruit Festiv	0.09
Natrol Juice Festiv-Veggie Festiv	0.09
Ningxia Red	0.09
Perfect Eyes With Lutein Nature's Sunshine	0.09
Pharmanex Ageloc Vitality	0.09
Prairie Naturals Serotonin Peptidase Enzyme	0.09
Turmeric	0.09
Methsulformethanone	0.08
Elderberry Juice	0.04
Reliv Herbal Harmony Digestive Health	0.04
Reliv Innergize Sports Drink	0.04
Shark Cartilage	0.04
Tumeric	0.04
Collagen Sunn Herbal	0.03
Bee Pollen	0.01
Enzymedica	0.01
Isagenix Ageless Joint Support	0.01
Isagenix Brain Boost And Renewal	0.01
Isagenix Product B	0.01
Isagenix Rejuvute	0.01
Vitamins (Dialysis)	0.01

Appendix J. List of foods used to calculate the cost of a nutritious food basket.

Milk Products
2% Milk (fresh)
Cheese, processed food, cheddar, slices
Cheese, mozzarella, partially skim, block, not slices
Cheese, cheddar, block, not slices, medium
Yogurt, fruit flavoured, 1% to 2% M.F.

Eggs
Grade A large eggs

Meats, Poultry and Legumes
chicken legs, no back
sliced ham (11%)
Beef, hip, inside round steak
beef, hip, inside (top) round roast
ground beef (lean)
canned baked beans in tomato sauce
peanuts, dry roasted
lentils, dry
peanut butter, smooth
pork chops (loin, centre cut), bone in

Fish
canned flaked light tuna, packed in water
frozen fish fillets, block (sole, haddock, pollock, halibut)
canned chum or pink salmon

Orange vegetables and fruit
peach, canned halves or slices juice pack
melon or cantaloupe, raw
sweet potato
carrots

Dark green vegetables
beans, snap, frozen
romaine lettuce
frozen mixed vegetables
broccoli
peas, green frozen
green peppers

Other vegetables and fruit
apples, Macintosh
bananas
grapes, red or green
oranges
orange juice, frozen concentrate
pear
raisins, seedless
strawberry, frozen unsweetened
canned apple juice made from concentrate, unsweetened and vitamin C added
fresh potatoes
canned kernel corn (not creamed)
turnips, yellow (rutabaga)
cabbage
cucumber
celery
iceberg lettuce
mushroom, raw
onions, cooking
fresh tomatoes
canned whole tomatoes
vegetable juice cocktail

Whole Grain products
cereal, bran flakes with raisins
oatmeal, regular quick cooking
cereal, toasted oats Os
bread, pita, whole wheat
100% whole wheat bread, sliced
flour, whole wheat

Non whole grain products
social tea cookies
hot dog or hamburger buns (white)
crackers, saltine, unsalted top
enriched white bread, sliced
macaroni or spaghetti
flour, all purpose
long grain white rice

Fats and oils
canola oil
salad dressing, mayonnaise-type
salad dressing, Italian
tub, margarine, non-hydrogrenated

Appendix K. Healthy Food Guidelines for First Nations Communities

Guidelines for Communities

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.

[1] Adapted with permission from First Nations Health Council. 2009. Healthy Food Guidelines for First Nations Communities. The complete guidelines are available through the First Nations Health Council http://www.fnhc.ca/ in their nutrition section.

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.			

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 sherbert • 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, 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 filing	• 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, chillies, 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 L: Summary of Results for Ontario

First Nations Food, Nutrition and Environment Study (FNFNES)

Ontario 2011-2012

University of Ottawa
Université de Montréal
Assembly of First Nations

Summary of Results: Ontario

What was the study about?

A study was conducted in **18 First Nations communities** in Ontario during the fall of 2011 and 2012 to answer these questions:

- What kinds of traditional and store bought foods are people eating?
- How well are people eating?
- 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?

Who participated?

- 1429 adults from Ontario
- 896 women and 533 men
- Average age:
  38 years old (women)
  38 years old (men)

Which communities participated?

Aamjiwnaang First Nation
Akwesasne
Asubpeeschoseewagong Netum Anishinabek
Atikameksheng Anishnawbek
Attawapiskat First Nation
Batchewana First Nation of Ojibways
Fort Albany First Nation
Fort William First Nation
Garden River First Nation
Kingfisher Lake First Nation
Kitchenuhmaykoosib Inninuwug First Nation
Marten Falls First Nation
Moose Cree First Nation
Munsee-Delaware Nation
Sagamok Anishnawbek First Nation
Six Nations of the Grand River
Wauzhushk Onigum Nation
Webequie First Nation

What were the findings on health?

54% of women and 45% of men are obese

26% of adults reported having diabetes

49% of adults smoke

Thank you to everyone who participated!

Are households financially able to access sufficient, safe and nutritious food?

29% of First Nations households in Ontario experience food insecurity

- **30%** worried that their food would run out before they could buy more.
- **28%** said that they could not afford to eat balanced meals.

Average weekly cost of groceries to feed healthy meals to a family of four*:

First Nations Communities
Range: $161-$411

Ottawa

*Based on a list of 67 food items that require preparation. The cost of pre-packaged foods or items like spices and condiments

What kinds of traditional and store-bought foods are people eating?

Top traditional foods eaten:	Top store-bought foods eaten:
1. Walleye/Pickerel	1. Soup
2. Moose	2. Pasta
3. Whitefish	3. Vegetables
4. Canada goose	4. Cereal
5. Blueberries	5. Chicken

How well are First Nations in Ontario eating ?

First Nations adults in Ontario are not meeting the recommendations for healthy eating in *Eating Well with Canada's Food Guide - First Nations, Inuit and Métis.* Adults do not meet the minimum number of recommended servings in the following food groups: Vegetables and Fruit, Grain Products and Milk and Alternatives. The high intake of meat might contribute to a higher fat intake.

Recommendations:

- Eat 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.*

* For fish consumption guidelines, contact the Sport Fish Contaminant Monitoring Program (1-800-820-2716) or find up-to-date information online at www.ontario.ca/fishguide.

Is the water safe to drink?

The results from the 741 tap water samples collected from First Nations in Ontario showed that the water is generally safe to drink. In one community, increased sampling frequency was recommended due to seasonal fluctuations in uranium levels from the community well.

Are the levels of pharmaceuticals in the water safe?

The levels of pharmaceuticals found in the water sources near the communities are not harmful to human health. However, the health effects of the mixture of multiple pharmaceuticals found in some communities are unknown at this time.

Are people being exposed to harmful levels of mercury?

A total of 744 hair samples were collected from participants from First Nations in Ontario. All participants had levels of mercury that were within Health Canada's guideline normal acceptable range, with the exception of 16 individuals. Letters were sent to these individuals with suggestions on how to reduce their exposure to mercury.

Is traditional food safe to eat?

Traditional food is safe to eat and healthy for you.

- A total of 1241 food samples representing 115 different types of traditional food were collected for contaminant analyses.
- Levels of contaminants in traditional food are within levels that are typically found in this region.
- Elevated lead concentrations were found in some game meat. This was likely caused by contamination from lead shot.
- High concentrations of cadmium were found in moose liver and kidney samples.
- Intake of contaminants from traditional food was below guideline levels and is not a concern. The only exception is mercury intake from fish for some women of child bearing age.

Recommendations:

- Use steel instead of lead shot. Eating wild game contaminated by lead shot can be harmful to the brain, especially in children.
- Limit consumption of moose liver and kidney to avoid exposure to cadmium. Smokers should be especially careful since they are already exposed to high amounts of cadmium from cigarettes.
- Women of child bearing age (as well as teenagers and children) should choose smaller size walleye, pike, and lake trout.

Ontario 2011-2012

Key Results For All Participating First Nations in Ontario:

1. The diet of First Nations adults in Ontario does not meet nutrition needs, but the diet is healthier when traditional foods are eaten.
2. Overweight/obesity, smoking, and diabetes are major 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. Mercury exposure, as measured in hair samples and calculated through dietary estimates, is not a serious health concern.
6. Chemical contamination of traditional food is not worrisome, but it is important to have the data from this study for future monitoring of trends and changes.

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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