

FIRST NATIONS FOOD, NUTRITION & ENVIRONMENT STUDY

Results from British Columbia 2008 | 2009

University of Northern British Columbia | Université de Montréal | Assembly of First Nations 2011

“ HEALTHY ENVIRONMENT AND
HEALTHY FOODS FOR
HEALTHY FIRST NATIONS ”

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Forward from the AFN National Chief



Since creation, First Nations have relied on the land for spiritual needs and wellbeing. After contact, however, our traditions faded and our diets changed to the point where previously unknown chronic diseases like heart disease and diabetes are now rampant among our people. As stewards of the land it was always understood that our medicines, our foods, and our drinking water are gifts from the Creator, to be preserved and protected for future generations. In this modern age, though, what once sustained us as nations is rapidly becoming a scarce, contaminated resource. At least that is what we hear. Not only have species declined in numbers, but some foods like fish harvested from our waters have been found to be contaminated with mercury and other toxic chemicals originating from the industrialized south. This is aggravated by climate change, another factor threatening our way of life. As a result, people are reluctant to harvest those foods that have sustained us and are turning to high calorie, less nutritious processed foods. Too often, this results in diet related health problems. It is this observation that has prompted AFN to petition Health Canada for funding to implement a study on First Nation diets to determine the safety of traditional foods and the chemical content of our drinking water.

No nation can develop without the ability to conduct research. Research, whether it be based on Traditional Knowledge or western scientific methodologies, is nothing more than a systematic method for answering questions. It is only through research that we can understand the risks that surround us in the modern world and take action to protect ourselves. First Nations in BC have shown that being involved as active partners means answers can be found that will help us develop as nations.

I am pleased that this 10 year, nationwide First Nations Food, Nutrition and Environment Study was developed with First Nations concerns in mind. It is being implemented in a partnership arrangement that has resulted in information that can be used by First Nations now and in the future. This information is extremely important as it serves to evaluate our current diet and determine the safety of the food we harvest. The results of this study will help First Nations make informed choices and serve as a benchmark to assessing change in a changing world.

I would like to thank the funding agency, Health Canada, for its support and the First Nations of British Columbia for their contributions. We realize that this is just the first piece of a puzzle specific to First Nations. I look forward to reviewing each regional report as the project unfolds.

Shawn A-in-chut Atleo
National Chief
Assembly of First Nations

Forward from the BC Regional Chief

It is my pleasure to introduce the First Nations Food, Nutrition and Environment Study (FNFNES) Final Regional Report for British Columbia. BC was the first region to participate in this 10 year study currently being implemented across Canada.

I cannot overemphasize the importance of this report to BC First Nations. This document's key findings will provide baseline information across a number of areas pertinent to First Nations throughout Canada. The information is broken down by ecosystems, which is useful to assess and protect the plants and animal we harvest. Also, the results contained in this report are valuable to First Nations because communities will be able to set priorities for further action and advocacy whether it is based upon nutritional needs, environmental contaminants in foods or water or even as it relates to mercury exposure for all sources.

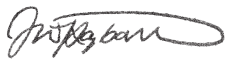
This project was developed with First Nations interests in mind and involves First Nations as equal partners respecting their needs. It was developed to comply with the principles of Ownership, Control, Access and Possession (OCAP) and has included the Assembly of First Nations (AFN) as a full and equal partner on the research team. First Nations communities are directly involved in project implementation, have ownership over the data, and have control over the use of the results. Not only has the project provided a modest income to those that participated as Research Assistants, it has increased the capacity of First Nations to carry out surveys and analyze the data collected.

The project was developed to answer questions considered to be important to First Nations such as: what is the nutritional value and contaminant content of traditional foods harvested in our territories; how healthy is our diet; are we being exposed to mercury though what we eat; are there trace metals of health concern in our drinking water; and, are pharmaceutical products being introduced into the waters where we fish or the water that we drink? This report provides answers that we can use to assess environmental health and improve our quality of life.

BC First Nations that participated will now have a better understanding of how and to what degree they are being exposed to environmental contaminants in their communities, traditional foods and medicines. It should be kept in mind that this project does not end with this report. The release of this information is just the beginning. It is now up to us, with support from Health Canada, to make use of it.

Thanks to all participating First Nations and the many individuals that have contributed to this important study and report. We can move forward with confidence to take the steps needed to improve health status.





Jody Wilson-Raybould
Assembly of First Nations Regional Chief, British Columbia

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ACRONYMNS AND ABBREVIATIONS

The following acronyms and abbreviations are used in this report:

AO:	Aesthetic Objective
BMI:	Body Mass Index
BW:	Body weight
CCHS:	Canadian Community Health Survey
CIHR:	Canadian Institutes of Health Research
DDE:	Dichlorodiphenyldichloroethylene
EHO:	Environmental Health Officer
FFQ:	Food Frequency Questionnaire
FN:	First Nations
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
n:	Number of participants or number of food, water or hair samples analyzed
PAH:	Polycyclic aromatic hydrocarbons
PBDE:	Polybrominated diphenyl ethers
PCB:	Polychlorinated biphenyls
PFC:	Perfluorinated compounds
PI:	Principal Investigator
POP:	Persistent Organic Pollutant
PPCP:	Pharmaceuticals and personal care products
PPM:	Parts per million
PSU:	Primary Sampling Unit
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
USDA:	United States Department of Agriculture

GLOSSARY

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

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: 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.

Ecozone/culture area: Regions/areas identified based on the distribution patterns of plants, animals, geographical characteristics and climate.

Food Security: Access by all people at all times to enough food for an active, healthy life. It can be estimated by questionnaire.

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

Mean (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.

Parts per million: A common unit typically used to describe the concentration of contaminants in food or environment. This is equivalent to one drop of water diluted into 50 liters (roughly the fuel tank capacity of a compact car), or about thirty seconds out of a year.

Standard error (SE): 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: is 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.

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

EXECUTIVE SUMMARY

The traditional diet of First Nations peoples is made up of the animals and plants found on the land and in the waters around their communities. In addition to serving as an important source of nutrients, traditional foods are also a very important component of the cultural identity of First Nations. However, unforeseen social and physical environmental changes have led to a general decline in the use of traditional foods which has adversely affected First Nations' physical, emotional, social and spiritual health. Moreover, in recent years, First Nations have also been concerned about the quality and safety of traditionally harvested foods versus store bought foods. However, little is known about the total diet or the proportion of traditional foods in the diet of most First Nations peoples, nor the levels of contaminants that may be present in traditional foods due to environmental pollution. Since 1969, Health Canada has conducted Total Diet Studies (TDS) in five different time periods to estimate the levels of chemicals to which Canadians are exposed to through the retail food supply. Although TDS provides valuable information on the chemical content of commercially available foods and exposure from the general urban diet, this data is not applicable to First Nations living on reserve. This study deals with filling a gap in knowledge about the diet of First Nations peoples living on reserve, south of the 60th parallel. In addition, baseline information on trace metals in drinking waters and human and veterinary pharmaceuticals in surface waters is being collected.

It is anticipated that information collected by this project will be useful for First Nations communities and health professionals in the development of dietary advice and food guidance for First Nations at the regional level. Also, data on background exposures to persistent organic pollutants, trace metals, pesticides, and pharmaceutical products is essential for First Nations in developing a baseline for future studies.

This study, called the First Nations Food, Nutrition and Environment Study (FNFNES) is being implemented region by region over a 10-year period, which started in British Columbia in 2008, in partnership with 21 randomly selected First Nations on-reserve communities. The BC regional study was implemented over a two-year period ending in 2010, and its findings are summarized in this report.

The FNFNES includes five study components: 1) household interviews for collecting information on dietary patterns, lifestyle and general health status, environmental concerns and food security; 2) traditional food sampling for a suite of contaminants; 3) drinking water sampling for trace metals; 4) hair sampling for exposure to mercury; and, 5) surface water sampling for pharmaceuticals.

Study Design

This project involves the active participation of First Nations. In British Columbia (BC), after introducing the study to the BC First Nations Health Summit and Health Council, randomly selected communities were invited to participate at a methodology workshop (in both year one and year two) to discuss and provide input into the design of study and research protocols. This was followed with a visit to each of the participating communities to discuss project activities. Project work did not start until after signing community research agreements, which outlined the nature of the work and the partnership arrangements.

Communities participated in all phases of the project. Locally recruited community research assistants were trained to collect all the data and samples. Written informed consent of each participant was obtained before any data were collected.

Upon completion of data collection and analyses, community specific reports were developed, and returned to the communities where the findings were explained and discussed by the project's supervisory staff. Communities were given an opportunity to provide input into the format and contextual information provided in these reports.

This study was guided by the principles of the Canadian Institutes of Health Research guidelines regarding Aboriginal people, and the Tri-Council policy statement on ethical conduct for research involving human subjects. Ethical approvals have been obtained from the Research Ethics Board of Health Canada, University of Northern British Columbia and Université de Montréal.

Results

In BC, individuals aged 19 years and over, living on-reserve and self-identified as First Nations were invited to participate in the study. Data were collected from 1,103 participants; one participant per household (398 men and 705 women); from 21 randomly selected communities. The overall participation rate was 68% for completion of questionnaires and

45% for hair sampling as indicator for mercury (Hg) exposure. The average age of the participants was 46 years old for men and 44 years old for women. Households were mainly comprised of individuals between 15 and 65 years of age (73%); children less than 15 years of age represented 19%, and elders over 65 year of age represented 8%. The median number of persons per household was four.

Results indicated that 38% of young women and men (aged 19-30) were overweight. Obesity rates were much higher for young men (49%) than for young women (15%) and increased in both sexes for adults 51 and over. Overall the rates of obesity were higher than in the Canadian general population, which indicates a substantial risk for diabetes and heart disease among First Nations.

The average amount of traditional food consumed was 98 g/person/day. Traditional food use consisted mainly of fish, which was harvested by 95% of all respondents; berries (86%); land mammals (84%); beach foods harvested close to shore (60%); root crops and greens (26%); mushrooms (24%); birds/fowl (17%); and foods harvested from trees (9%). Over 200 different types of foods were harvested, with salmon, moose and berries being the most prevalent. However, 91% of all participants indicated that they would harvest more food if it were not for a lack of equipment, transportation and time. From a list of possible external barriers, government restrictions and forestry were identified by two-thirds of the respondents as inhibiting factors, while one third said hydro installations and mining were a factor.[1] Seventy-five percent of respondents observed that climate change was affecting the availability of traditional foods for harvest, while almost half the respondents reported that climate change decreased the availability of traditional foods in their households. Overall, food insecurity affected 41% of First Nations households on reserve in BC: 34% "moderately" and 7% "severely." Food insecurity varied from 13% to 47% across ecozone/culture areas and affected 25% of households with children.

In terms of overall diet quality, the low intake of milk and other dairy products, as a source of calcium and other important nutrients, is a concern. Similarly, intake of fruits, vegetables and grain products are below the Canadian recommended levels. These low intakes from three out of the four food groups may lead to low intakes of calcium, vitamin A, vitamin C, folate, vitamin D, magnesium, potassium and fibre.

Dietary intakes of fat, protein and carbohydrates were similar to those of the Canadian general population. Nutrients associated with meat and fish consumption such as vitamin B12, niacin, thiamine, riboflavin and iron tended to be adequately provided in the diet, similar to the Canadian general population. However, at least 50% of the BC First Nations adult population are likely to need increased intakes of dietary fiber, vitamin A (except for older women), vitamin D, calcium, magnesium (for older men), potassium, as well as less sodium in their diet.

Traditional foods complemented market foods rather than substituted them. Dietary quality was much improved on days when traditional foods were consumed, as traditional foods were important contributors of protein, vitamin D, Vitamin A, iron, zinc and several other nutrients.

Among the 21 participating communities, 13 reported having an operational water treatment plant with one plant out of service at the time of the survey. Two communities had three water treatment systems, resulting in a total of 25 systems reviewed for this study. Two communities received piped water from a nearby treatment facility serving a non-First Nations community, and ten had no treatment facility at all. Source water for drinking purposes varied: 14 communities from wells; six from creeks/streams; two from a river; and four from lakes. One of the 25 systems treated both well and creek water.

Four communities reported issuing boil-water advisories ranging from one month in duration to continuous over the past year. Reasons for the advisories ranged from the use of surface water with only tablet disinfection available, to when tests showed positive for fecal coliform organisms.

The results of the tap water analyses indicated that only three out of 568 samples collected contained lead above the maximum acceptable guideline. However, two of the three showing lead were reduced to below guideline values after a five minute flush, indicating that the source of lead may be from solder used in household plumbing. Aluminum, copper, iron, manganese and sodium were observed to be present in some of the samples tested, but these chemicals are not considered to be of public health concern. Where there was a chemical

[1] More than one answer was possible per participant

exceedance, the householder was informed and letters were sent to the Chief and Council for their information and copied to Health Canada for follow-up action. An environmental health officer of the First Nations and Inuit Health (FNIH), British Columbia Region, was asked to re-sample the tap water at the sites where exceedances were observed.

Surface water sampling showed the presence of 13 human or veterinary pharmaceuticals in one or more communities. It should be noted that pharmaceuticals were found in some communities that had not reported their use on insurance claims indicating possible upstream or long range sources, for example, a livestock source. No pharmaceutical was found in a concentration of concern to human health.

Mercury was measured in the hair samples collected from 487 participants (44% of all participants). The average mercury level of all participants was 0.42µg/g. Out of the 248 women of childbearing age whose hair were sampled, only two (0.8%) had mercury levels that exceeded the proposed Health Canada's mercury biomonitoring guideline of 2 µg/g in hair. While these observed levels were not considered high enough to be a health concern to the participant, letters were sent to these women with suggestions on how to reduce their exposure to mercury.

A total of 429 food samples representing 158 different types of traditional foods were collected for contaminant analysis. Concentrations of four toxic metals including arsenic (As), cadmium (Cd), lead (Pb), mercury (Hg) and the more toxic methylmercury (MeHg) were measured in all samples. Results showed no evidence of point source contamination. Higher As concentrations were found in seaweed and seafood such as crab meat although it was in a non-toxic form that has minimal toxic effects. Some traditional foods are known to contain elevated levels of Cd as it accumulates in these foods/organs through biological processes. For example, the highest Cd concentrations were found in kidneys of terrestrial mammals such as beaver and moose. Lead concentrations in all food items were at background level except for beaver heart, Canada goose, deer and grouse meat. The highest Pb level was found in a grouse meat sample. The source of this Pb is likely from lead shot. Higher levels of Hg were found in predatory fish such as Arctic char and rockfish. Carp meat had a high total Hg concentration of 0.72 ug/g but the MeHg concentration was only at 26% of the total Hg content, which is lower than most of the other fish species tested (ranging from 70 to 100%).

Other chemicals such as polycyclic hydrocarbon (PAH), organochlorines, organophosphate pesticides, perflourinated compounds (PFCs), dioxins and furan were found in selected food items, but in trace amounts.

Estimates of Cd, Hg, and Pb intake showed that consumption of traditional foods on average pose minimal risk to the average consumers. However, heavy consumption of moose liver and kidney may result in increased risk of Cd exposure, especially among tobacco users, which adds to the total Cd body burden. Heavy consumption of fish that have high Hg concentrations may also result in increased risk of Hg exposure, as indicated by the results of hair analysis. It should be noted that there was a good correlation between the estimate of Hg intake and Hg found in the hair of the participants. Heavy consumption of some game meat may also have an increased risk of Pb exposure due to lead shot contamination.

Dietary intakes of other contaminants such as PAH, organochlorines, organophosphate pesticides, PFCs, dioxins and furans due to consumption of traditional food were all below guideline levels and therefore pose minimal health risk.



Community-specific results have been reported back to each of the participating communities. A summary of their feedback including suggestions for interventions has been included in this report. Many communities have already planned programs such as community gardens, food banks, community kitchen or lunch programs, educational programs for traditional food harvesting and cooking food preparation etc., all aimed at improving diet quality and food security in their communities.

Thus far, this study has been a valuable tool in addressing the gaps in knowledge about the diet, traditional food and environmental contaminants to which First Nations in BC are exposed. Information on contaminant levels in drinking water and hair samples have been reported back to the communities and appropriate follow-up actions have been taken to address the issues. It should be noted that this is the first study of this type to be done on a regional scale. The data collected in this report will serve as a benchmark for future studies of this type, and will help determine if man-made or natural changes in the environment are resulting in an increase or decrease in concentrations of chemicals of concern. These data will also be of use to relate current and future dietary practices to health.

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INTRODUCTION

The health status of First Nations is below the Canadian average in terms of life expectancy, infant mortality and sudden infant death syndrome.[1] First Nations sustain a disproportionate share of the burden of physical disease and mental illness.[2] The negative impact of dietary change on First Nations is evident as obesity, diabetes and cardiovascular disease reach epidemic levels.[3-5] Ailments are further exacerbated by rising food insecurity, erosion of a traditional lifestyle and social instability.[6, 7] Wellbeing is determined by multiple factors including diet and lifestyle, environmental health, genetics, household stability and socio-economic status, among other factors.[8]

Traditional food is nutritionally, culturally, and economically important for First Nations Peoples. As First Nations communities decrease the proportion of traditional foods in their diet, there is a risk of decrease in nutritional quality of the diet and rise in obesity. Currently, there is a dietary transition away from traditional foods in the diet that could be attributed to a multitude of factors, such as acculturation, food access and availability, food insecurity, environmental pollution and climate change.

Increasing industrialization in the last 50 years has led to global distribution of pollutants, now evident in all ecosystems. Due to the subsistence lifestyle and traditional diet, First Nations Peoples are particularly at risk to environmental contaminant exposure. 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 subsistence living. 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. There are also fears of new health problems developing 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, both the nutritional composition of the average diet of most First Nations and the levels of contaminants in their traditional foods are largely unknown.

Current medical knowledge has advanced to a point where we are starting to understand the influences that food toxicants, environmental contaminants and nutritional imbalances have in contributing to or causing 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.

Some food toxicants are naturally occurring such as mushroom toxins and can affect human health if consumed in sufficient amounts. Other toxicants can affect food that is normally safe to eat under certain conditions such as paralytic shellfish poisoning toxins found in shellfish collected during harmful algal blooms, also known as red tide. Other chemicals, like metals such as arsenic, cadmium, lead and mercury can be present in the natural environment and at the same time can be produced industrially or are emitted in effluent as a waste product (pollutant), while other chemicals are anthropogenic (man-made) and are derived only from industrial activities (e.g. PCBs) or for use in consumer products (e.g. PBDEs and PFCs). Burning of fossil fuels or oil pollution also release toxic chemicals such as polycyclic aromatic hydrocarbon (PAH) in the environment and pesticides such as organophosphates used in agriculture and forestry can also be contaminants found in the food supply.

Approximately 78,000 chemicals are currently in commercial use, with approximately 5 billion tons being produced annually around the world. It is estimated that 1,000 new chemicals are manufactured every year. Some of these organic chemicals, such as some 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 the biological food chains. These persistent organic pollutants (POPs) are of particular concern in aquatic environments as the aquatic food chains is 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 water fowl and marine mammals that consume them and eventually reaching humans. Fact sheets of the contaminants measured in this study can be found in Appendix H.

In the last few years, concern has also been raised about pharmaceuticals and personal care products (PPCPs) in the environment. 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.

In Canada, 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 toxicants (contaminants of public health concern), such as lead, dioxins and pesticides, from foods.
3. Measure 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).
4. Measure the presence of environmental toxins in human tissue samples and bodily fluids such as blood, urine and breast milk, such as the government run Canadian Health Measures Survey, a biomonitoring project.

These measurements provide data that can be used to assess risk and develop associations between certain chemicals and chronic illness.

Canada is one of the global leaders in conducting Total Diet Studies. The first Total Diet Study of the Canadian general population was conducted between 1969 and 1973. The second ran from 1976 to 1978, the third from 1985 to 1988, the fourth from 1992 to 1999, and the most recent one started in 2000. Results of the first four studies have been published in scientific literature and are used provincially and nationally for assessing exposure to contaminants through market food. These studies have focused only on store-bought foods that are available to the general Canadian population. Therefore, although they have provided very valuable information on the safety of the general urban diet, their findings are not applicable to First Nations peoples who continue to rely to a large extent on traditionally-harvested foods. A similar situation exists for the evaluation of dietary nutritional quality with the 2004 Canadian Community Health Survey[9], which has not involved First Nations peoples living on reserve.

Although there have been a number of dietary studies conducted in First Nations communities since the 1970s that provide a general understanding of the types of foods consumed by some First Nations on reserves, these studies were conducted at different times and by different research teams that have employed different investigative tools to address a variety of research objectives. With the funding support from the Northern Contaminant Program, three comprehensive dietary surveys were conducted in the Arctic in the 1990's providing much broader information on the diets, the nutritional value of foods eaten and the food pathways of exposure to environmental chemicals for Aboriginal people in the three northern territories compared to those First Nations south of the 60th parallel across Canada.[10] 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.

In summary, although there is a valuable but disparate patchwork of research that helps in assessing the nutritional benefits of traditional foods 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 food–related exposures to environmental hazards. This gap is targeted by this study titled First Nations Food, Nutrition and Environment Study (FNFNES). FNFNES is being implemented region by region over a 10 year period. A national baseline of background levels of key environmental chemicals of concern and an assessment of diet quality of First Nations are this study's main objective. Moreover, it also aims to quantify the intake of trace metals through drinking water and the presence of various pharmaceutically-active compounds that are used by First Nations that may find their way into surface waters that are used for fishing or as a source for drinking water. The pharmaceutical component is considered an important first step in determining the safety of traditional food in relation to these emerging contaminants.

FNFNES will eventually be representative of all Canadian First Nations regions south of the 60th parallel. It was first implemented in British Columbia (BC). Data collection proceeded in 2008 and 2009 in a total of 21 BC First Nations communities. Preliminary results were disseminated through meetings with each participating community and feedback on the content of these reports is included in this report.

In the development of this project the active participation of First Nations was considered paramount. It started with a resolution passed by the Chiefs in Assembly at the Assembly of First Nations' (AFN) General Assembly in Halifax, Nova Scotia on July 12, 2007. An ecosystem-based sampling approach was adopted and randomly selected communities were invited to a methodology workshop where information about the project was shared. Work began with signing of a Community Research Agreement between the researchers and the community leaders outlining the details of the partnership. Communities participated by providing input into the methodology and by identifying traditional foods making up the typical diet, hiring community research assistants to implement the survey, collecting food, water samples and hair samples for analysis, identifying surface water sampling sites and providing input into the development of the various reports. No surveys were conducted or samples collected without the written informed consent of the participant. FNFNES is led by three principal investigators; Dr. Laurie Chan from the University of Northern British Columbia, Dr. Olivier Receveur of the Université de Montréal, and Dr. Donald Sharp from the Assembly of First Nations.

This regional report, descriptive in its intent, was developed on the basis of aggregated information and provided to regional and national First Nations organizations, the communities that participated in the study and has been made publicly available.

The goal of this study is to provide information needed for the promotion of healthy environments and healthy foods for healthy First Nations. 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, trace 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.

METHODOLOGY

Sampling

For the purposes of this study, we sampled communities using a combined ecozone/culture area framework.

Terrestrial ecozones are very large scale divisions of the earth's suface based on distribution of plants and animals. Ecozones are separated by such features as oceans, deserts or high mountain ranges that formed barriers to plant and animal migration. Within Canada there are 15 terrestrial ecozones and five aquatic ecozones. The province of British Columbia contains 5 ecozones. The first National Ecological Framework Report from 1995 defined the Ecozones, Ecoregions, and Ecodistricts. The content of this report is available from the Canadian Council on Ecological Areas[11]

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 BC, there are 3 identified culture areas: northwest coast, subarctic and plateau.

Table I provides a brief description of the 5 ecozones within the BC AFN region[11].

Table I: Description of the five ecozones within British Columbia's AFN region

Ecozone Name	General Description
Pacific Maritime	This ecozone extends from B.C. marine islands and the land along the Pacific Coast to the Coast Mountains. A small corner of southwestern Yukon is also included.
Boreal Cordillera	Bordered by the Coast Mountains and extending North from the Montane Cordillera to the Mackenzie and Selwynn Mountains, this ecozone includes the northern half of British Columbia and the southern Yukon.
Boreal Plains	While most of the Boreal Plains Ecozone stretches across Alberta to Manitoba, a small corner of BC is included. This ecozone is considered to be the Great Plains of North America. The majority of the surface waters are part of three watersheds: those of the Saskatchewan River, the Beaver River, and Peace, Athabasca, and Slave rivers' watershed.
Taiga Plains	In the northeastern corner of BC can be found a small portion of the Taiga Plains. This ecozone is an area of low-lying plains centred on Canada's largest river, the Mackenzie, and its many tributaries. It is Canada's sixth largest ecozone. Approximately 90% of the Taiga Plains is located in the western Northwest Territories, with small extensions into northeastern British Columbia and northern Alberta. It is bounded to the east by Great Bear and Great Slave lakes, to the west by the rolling foothills of the Mackenzie Mountains, to the north by the Mackenzie Delta, and to the south by the spruce forest of the Boreal Plains.
Montane Cordillera	The Montane Cordillera ecozone extends south from north-central British Columbia into the United States and east from the Coast Mountains to the Alberta Foothills.

FNFNES relies on data collected from probability samples of adult members living in First Nations (FN) on-reserve communities. 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. In addition to the 19 randomly selected communities, two communities were added: Nuxalk Nation because of the existence of extensive dietary data to which the study results could be compared, and Skidegate because of the uniqueness of its ecology.

Table II presents a summary of the collection effort in each stratum. The numbers given in the table are the ones used to select the sample in BC.

Table II: Summary of collection effort for each stratum

Stratum Number	Total Population on Reserve per Stratum	Total Number of Communities per Stratum	Sample Allocation	Sample Actually Collected	Site Number	Total Population on IR per Community
1	1,032	5	2	2	4	310
					5	300
2	893	4	2	2	12	131
					13	413
3	12,223	47	2	2	21	517
					22	438
4	5,591	20	2	2	7	205
					8	563
5	2,899	8	2	2	6	660
					9	1422
6	33,877	106	5	5	2	204
					14	771
					15	836
					16	901
					17	620
7	1,728	5	2	3	18	101
					19	86
					20	1374
8	234	1	1	1	3	234
9	554	2	2	2	10	424
					11	130
Total	**59,031**	**198**	**20**	**21**	**-**	**10,640**

In the final analyses, the only community in stratum 8 was combined with the neighbouring communities of stratum 6 to form a total of 8 strata corresponding to eight ecozone/culture areas.

Sampling proceeded in three stages:

1. Systematic random sampling of communities Primary Sampling Units (PSUs) 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. Systematic random sampling of 125 households Secondary Sampling Units (SSUs) within each selected community. For communities with fewer households than the fixed number, every household in the community was selected. A larger sample of households than desired (100) was being fixed to adjust for expected non-response.

3. Random selection of one responding adult man or woman Tertiary Sampling Units (TSUs) in each household with the following inclusion criteria:
   - 19 years of age or older
   - Able to provide written informed consent
   - Self-identifies as being a First Nations person living on reserve.

The number of communities allocated to the province was distributed among the ecozones, allowing for a minimum of 2 communities per ecozone and a maximum of 4 (due to budgetary constrains) for the ecozone with the greatest population. The sampling strategy is similar to the one used recently in Ontario [12].

The statistics produced for this study are derived from data obtained through samples of communities, households and persons. For these statistics to be meaningful for a FN 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 assigning a 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. Basically, 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 G 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 G 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.

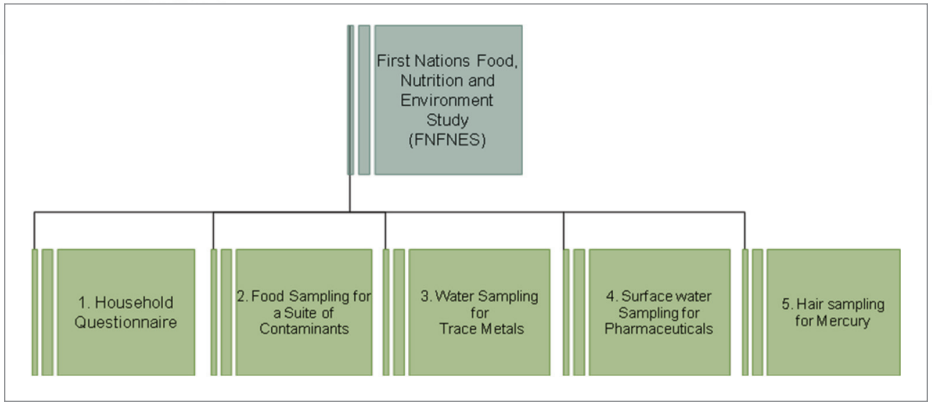
To resolve the apparent scale effect in the appreciation of sampling errors, *coefficients of variation* (cv) could be used. The cv of an estimate is a measure of the relative error rather than of the absolute error. It is very useful in comparing the precision of sample estimates, where their sizes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

Overall, participating rate was satisfactory with 1103 completed questionnaires obtained from 1624 eligible households (67.8 %).

Principle Study Components

The following chart shows the five components of the FNFNES:



1. Household Questionnaire: The administration of a series of questionnaires that focus on foods consumed, self-perceived health status, anthropometric measurements, and socio-economic issues including food security.
2. Food Sampling for a Suite of Contaminants: Traditional food that is commonly consumed by the participant First Nation is collected for analysis for the presence of environmental toxins.
3. Water Sampling for Trace Metals: 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.
4. Surface Water Sampling for Pharmaceuticals: Three separate sampling sites on surface water sources are selected by the participant community for sample analysis of the presence and amount of agricultural and human pharmaceuticals and their metabolites.
5. Hair Sampling for Mercury: Hair samples are collected from volunteers and analyzed for the presence of mercury enabling the project to estimate mercury exposure.

HOUSEHOLD INTERVIEWS

Traditional Food Frequency Questionnaire

This questionnaire was developed based on previous work conducted with Aboriginal Peoples in Canada[10]. Questions were developed that sought information (retrospectively for the four past seasons) on frequencies of consumption of all identified traditional foods. The traditional food list was constructed based on a review of existing literature for BC and after eliciting input of representatives of each participant community. Table III 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 each.

Table III: Categorization of frequency of consumption

Frequency	Average Days/Season
Very Rarely (< 1 day/month)	2 days/season
Rarely 1-2days/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.[2],

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)
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 Statistical Analyses section) to partially adjust for intra-individual variation. This method allows for a better approximation of the usual diet.

Socio/Health/Lifestyle Questionnaire

The SHL questionnaire incorporates several questions from the Canadian Community Health Survey 2.2 questionnaire (2004) and others derived from previous work with Canadian Aboriginal people[10] as appropriate, including:

- General Health
- Height and Weight (either measured or self-reported)
- Vitamin and Dietary Supplement Use
- Physical Activities
- Smoking
- Food security
- Socio-Demographic Characteristics
- Economic Activity

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

Food Security Questionnaire

This questionnaire is the US Food Security Survey Module developed by the USDA[13], used also in the in the CCHS2.2 questionnaire and further adapted for Aboriginal communities by Lawn and Harvey[14]. In its analyses, the criteria used by Health Canada in analyzing CCHS.2.2 were applied as shown in Table IV[9].



Table IV: 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**

FOOD SAMPLING FOR A TDS SUITE OF CONTAMINANTS

Traditional food composites were collected on the basis of input from communities so that collected foods represented 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 nutritional or environmental perspective; and, based on existing knowledge, foods that are known to accumulate higher concentrations of contaminants.
- Each food sample was a composite of tissues from 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.

- Perflourinated Compounds (PFCs)
- Polycyclic Aromatic Hydrocarbons (PAHs)
- Organophosphate and organochlorine pesticide residues
- Polychlorinated biphenyls (PCBs)
- Polychlorinated dibenzo-p-dioxins and polychlorinated dobenzofurans (PCDD/Fs)
- Polybrominated fire retardants (PBDEs)
- Trace elements and heavy metals
- Pharmaceuticals and Personal Care Products (PPCPs)

In addition, traditional food composites were analyzed for essential trace metals when data are missing.



Mixed Traditional Foods

All food samples were sent for analysis to MAXXAM Analytics, formerly CANTEST, in Burnaby, BC. 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 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

1.0g of homogenized tissue sample undergoes an alkaline digestion using 10mL of 10mM potassium hydroxide in methanol and shaking for 16 hours. A 5mL 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 1mL of 25mM sodium acetate at pH 4.0. The first fraction is eluted with 3mL of methanol to recover PFOSA. This is directly transferred to a vial for analyzed by LCMSMS in negative ion mode. The second fraction is eluted with 3mL of 0.1% ammonium hydroxide in methanol to recover the remaining PFCs. This fraction is evaporated and reconstituted with 1mL of 85:15 water: acetonitrile and analyzed by LCMSMS in negative ion mode.

PAH in Tissue Samples

Six grams of homogenized tissue is homogenized in dicloromethane (DCM) and filtered through anhydrous sodium sulfphate. The extract is evaporated to 6mL, and 5mL 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 GCMS in Selective Ion Monitoring (SIM) mode with an EI source.

Pesticides and PCB's in Tissue Samples

Six grams of tissue is homogenized in dicloromethane (DCM) and filtered through anhydrous sodium sulphate. The extract is evaporated to 6mL and 5mL 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 GCMS in Selective Ion Monitoring (SIM) mode with and EI source. Analysis for toxaphene is performed using GCMS in SIM mode with a CI source.

PCDD/F in Tissue Samples

Approximately 10-12 g 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 precleaned 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). 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 an Thermo Trace gas chromatograph. The column used is a 60 m RTX-DIOXIN2, 0.25 µm, 0.25 mm 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 g of tissue is spiked is spiked with 1-10 ng each of carbon-13 labeled PBDE standards (7) and then digested with 80 mL of precleaned 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 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). 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.

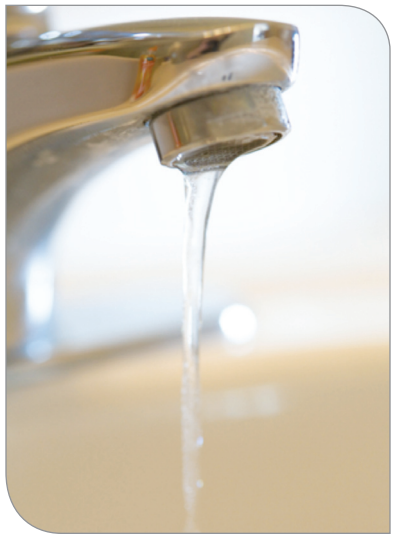
All samples are analyzed on a Thermo Instruments DFS high resolution mass spectrometer coupled with an Thermo Trace gas chromatograph. The column used is a 15 m DB-5HT, 0.1 µm, 0.25 mm i.d. An initial five point calibration (CS-1 to CS-5) consisting all PBDEs is run covering the range of 0.25 ng/mL to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

Please refer to Appendix A for detection limits.

WATER SAMPLING FOR TRACE METALS AND PHARMACEUTICALS

Tap Water Sampling

The drinking water component involved collecting samples from around 20 different households in each community. Selection of sampling sites was based on what would be considered representative of the 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 in water source, these were also sampled.[3]



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

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 A for detection limits.

In addition to sample collection and analysis, a survey was conducted soliciting information from community-based treatment plant operators about water treatment and distribution. The purpose of this survey was to obtain a profile of the water supply systems of participant communities. Data was collected from 9 communities[4] in year one and 13 communities in year two. In year two the questionnaire was modified to improve accuracy.

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[15]. 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 and human pharmaceuticals occurrence in surface water on reserves in Canada
- Determine the exposure of fish and shell fish (an important component of many First Nations’ diets) to pharmaceuticals in surface water on reserves in Canada
- Establish a pharmaceuticals priority list for future health and environmental effects studies

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

4 One of the nine communities surveyed in year 1 was located at three different geographical sites. For the purpose of this study each is treated as a separate community.

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) [16]. FNFNES has chosen a list of 40 pharmaceuticals that meet the above criteria and can be analyzed by the laboratory that is participating in the FNFNES study (Appendix A Table A.10).

Pharmaceuticals and Personal Care Products in Water

Two separate 250mL sample aliquots are required to analyze all of the target analytes. One aliquot is adjusted to pH 1.95-2.0 and mixed with 500mg of $Na_4EDTA{\cdot}2H_2O$. The sample is loaded onto a HLB solid phase extracting column. The column is washed with 10mL water and eluted with 12mL of methanol. The eluent is evaporated and reconstituted with 450µL water and 50µL internal standard. The extract is analyzed by LCMSMS in positive and negative ion mode.

The second 250mL aliquot is adjusted to pH 10 ± 0.5. The sample is loaded onto a HLB solid phase extracting column. The column is eluted with 6mL of methanol followed by 9mL of 2% formic acid in methanol. The eluent is evaporated and reconstituted with 450µL acetonitrile and 50µL internal standard. The extract is analyzed by LCMSMS in positive ion mode.

17α-Ethynylestradiol 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. 100µL of 100mM sodium bicarbonate (pH 10.5) is added followed by 100µL of 1 mg/mL Dansyl Chloride to derivatize the ethynylestradiol. 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 A for detection limits.

In each community, three sampling sites were chosen by the Band. 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 including some sea water sites. Samples were collected by an Environmental Health Officer (EHO), First Nations and Inuit Health Branch (FNIHB), British Columbia region.



HAIR SAMPLING FOR MERCURY

The First Nations Food, Nutrition and Environment Study 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 certified First Nations and Inuit Health Branch (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. The hair sample is sent to the FNIHB Laboratory for analysis.

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.

TIMELINE FOR DATA COLLECTION

First, randomly selected communities were contacted by the Assembly of First Nations and invited to send a representative to a centrally held 2-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 their Chief and Council and in some cases to the community at large. The main purpose of these visits was to introduce the project in person and 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 of both years. This was conducted under the supervision of the NRCs.

All collected data were entered into a database by the NRCs, except for information derived from the 24-hr recalls, which were entered by research nutritionists at the Université de Montréal. To insure the accuracy of data entry, a sub-sample of 10% of the records were entered twice and discrepancies reconciled.

ETHICAL CONSIDERATIONS

This research was conducted following the Canadian Institutes of Health Research (CIHR) guidelines regarding Aboriginal people[17], the Tri-Council policy statement on ethical conduct for research involving human subjects[18], and the document entitled: "Indigenous peoples & participatory health research: Planning & management · Preparing research agreements" published by the World Health Organization[19]. Its protocol was accepted by the Ethical Review Boards at Health Canada, the University of Northern British Columbia and the Université de Montréal. 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 included advice provided by a Steering Committee made up of the PIs and ex-officio members from Health Canada, and consultation with Statistics Canada for the sampling methodology and random sample selection.

STATISTICAL ANALYSES

All data were entered using Epi-Info version 3.4.3[5] except for the 24-hr recall which used CANDAT.[6] 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 B).

Data analysis used SAS/STAT software (version 9.2) with regional estimates generated according to the complex survey design using the bootstrapping SAS subroutines. The SIDE SAS sub-routine[7] was used to assess nutrient adequacy accounting for intra-individual variation and therefore approximating usual nutrient intakes.

The intent of the present regional report is descriptive with an aim to generate representative estimates (i.e. min., max., mean, median, 75 percentile, 95 percentile, etc) 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 looking at the relationships between the variables studied will be the object of separate publications.

For individuals interested in community level estimates, the respective Chief and Council need to be contacted to access the data. All regional data, blinded to community identifiers, have been archived at the Assembly of First Nations (thereafter named Data Custodian) and to which requests for accessing the regional data have to be presented.

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

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

RESULTS

This report contains information on sociodemographics; traditional food use; and income-related household food security, rates and severity, usual nutrient intake, food intake comparisons with Canada's Food Guide, health and environmental concerns, contaminant exposure, drinking water and hair analyses. Results are compared when applicable to the Canadian Community Health Survey (CCHS) and its BC component, to the British Columbia Nutrition Survey (BCNS), as well as to the Total Diet Studies (TDS) for its contaminants part.

Sample Characteristics

Data collection for BC was conducted in two phases (Table 1). Phase 1 was completed in the fall of 2008 and included 8 communities: Kitsumkalum, Hagwilget Village, Iskut, Moricetown, Nat'oot'en, Tahltan, Tl'azt'en Nation and Tsay Keh Dene. Phase 2 was completed in the fall of 2009 and included 13 communities: Fort Nelson, Prophet River, Doig River, Saulteau, Skidegate, Nuxalk Nation, Namgis, Sliammon, Samahquam, Douglas, Lil'wat, Lower Nicola and Splatsin (Figure 1).

The regional findings presented in this report are based on a total of 1103 records. All estimates presented in this report are weighted when possible to be considered representative of all BC First Nations households on reserve. A sufficient number of participants were included at each ecozone/culture area to present estimates at those levels. However these estimates are presented unweighted and illustrate only geographical variation when applicable. In cases where some variables have missing data, the corresponding sample size is indicated in the results graph or table.

The overall participation rate was 68% (1103/1624 eligible households), slightly less than the CCHS[9] of 76.5 % in 2004 and more than the BCNS (42-52%) in 1999. No formal probing into the characteristics of participants compared to non-participants was carried out, but women tended to participate more often than men (Table 2). This may be due to a combination of factors including the propensity of women to be more involved with food preparation, and also, in some communities, the fact that many men were away from home at work.

Sociodemographic Characteristics

The average age of the participants was similar for men (46 years old) and women (44 years old), which was quite stable across ecozone/culture areas (Table 3). Households comprised mainly individuals 15-65 years of age (73%) with children less than 15 years of age representing 19%, and elders, 8% (Figure 2).

Table 4 shows that the median household size was four people with 25% of households containing two or less people. The majority of households had one person working full time and 25% of the households had at least one person working part-time. Respondents had completed on average 12 years of schooling with 25% having completed more. The main source of income was combined wages (59% of participants), followed by social assistance (22%) and pension (10%) (Figure 3). Worker's compensation or unemployment insurance was the main source of income for 9% of participants. Figure 4 shows that the percent of participants on social assistance varied from a low of 7% to a high of 34% across ecozone/culture areas.

Health and Lifestyle Practices

Since there was no statistical difference between self-reported and measured body heights and weights, both values were used to calculate Body Mass Index (BMI) (Figures 5a-b). Overweight affected 38% of women and men aged 19-30 and remained quite stable except for men 31 to 50 years of age where it increased to 45%. Obesity rates were much higher for young men (49%) than for young women (15%), but became similar in the age-group 31-50 and increased in both sexes for older adults. In the Canadian general population, 23.1% of adults aged 18 years and older are obese, while 36.1% are overweight[20]. Similarly in 1999 in BC, 19% of adult men and 17% of adult women were obese[21]. The First Nations Regional Longitudinal Health Survey Phase 1 (2002/03) report revealed that 36% of First Nations adults living on reserve are obese[22]. Approximately 32% of BC FN adults were reported to be obese[23].

Figure 6 shows that a sizeable proportion of respondents said they were dieting to lose weight the day of the 24 hr-recall and that this practice increased with age. More BC First Nations women aged 19-30 years old were dieting than men of the same age, but similar proportions of men and women were dieting after age 30.

The utilisation of nutritional or non-nutritional food supplements appeared widespread and increased with age (Table 5), a trend also observed in the general BC population where nutritional or non-nutritional food supplements use is more prevalent and averages 64 percent of the total adult population[21]. The list of supplements used by participants is presented in Appendix C.

Figure 7 shows that 39% of all respondents smoked. The lowest percentage of smokers was in ecozone 7 (31%) while the highest percentage of smokers was in ecozone 8 (62%).

Self-perceived health was reported as "very good" to "excellent" for 13% of young women and 40% of young men, increased to 33% for women 31-50, but decreased to 23% for men 31-50, to reach 19% of women 51 and over and 39% of men 51 and over (Figure 8a-b).

In terms of physical activity, overall, 42% of adults declared being moderately to highly active with more men than women reporting high levels of physical activity (Figures 9 a-b). With age, the proportions remain quite stable except for the decline in highly active men.

The majority of adults (58%) reported eating vegetables or fruits from their garden or a community garden. This varied from a low of 18% to a high of 90% across ecozone-culture areas (Figure 10). The types of fruits and vegetables grown in these gardens are found in Appendix D.

Traditional food harvesting and gathering practices varied tremendously across ecozone/culture areas reflecting the geographical diversity of the communities. On average, fishing is the most common practice (35% of respondents), followed by collecting wild plants and berries (33%) and maintaining a garden (25%). Hunting was practiced by 20% of the respondents and 17% collected various seafood (Figures 11 a-b).

Traditional Food Use

Table 6 presents the BC traditional food system and its extent of use. Overall, fish is consumed by 95% of all respondents, berries (86%), land mammals (84%), beach foods (60%), wild plants, roots, shoots, or greens (26%), mushrooms (24%), birds (17%), and tree foods (9%). The traditional food system appeared extensive with well over 200 different types of food. While salmon, moose and berries are widely consumed in all ecozone/culture areas, other foods vary from one area to the next.

Similarly, while Table 7a shows little overall seasonal variation in traditional food consumption, possibly due to different preservation methods and exchange systems, seasonal variation is presented for key items within each ecozone/culture area, particularly for the high salmon harvesting areas (Tables 7b-i). For the overall BC region, the most popular traditional food items were salmon, moose meat and deer meat (Table 7a). On average, salmon was consumed about once a week, while moose and deer meat were consumed about twice a month. In some ecozone/culture areas we also note blueberries and elk (Table 7c), Labrador tea (Table 7d), blue huckleberries (Tables 7d-e-f), soapberries (Tables 7e-f-h), laver seaweed and halibut (Table 7g), black raspberries, pine mushrooms and trout (Table 7h), and blue or ruffed grouse (Table 7i) as traditional food items often consumed. Across the region, summer appears to be the time of highest consumption for the main traditional foods.



Figure 12 shows that when the question was asked openly, 91% of the participants would like to eat more traditional foods and that the main barriers preventing this are: a lack of appropriate hunting and fishing equipment, as well as transportation to and from harvesting sites. These barriers were followed by a lack of animals and time required to successfully

hunt, trap and fish (Figure 13). When a list of factors that could potentially undermine traditional food consumption was proposed and the respondents were instructed to select all those factors that may apply (Figure 14), government harvesting restrictions and forestry (tree harvesting practices) were identified by approximately two-thirds of the respondents as barriers preventing traditional food use. One-third identified hydro and mining as factors and about a quarter identified farming and oil/gas industries. These factors may reflect the relative importance of these sectors for the region overall. Their combined impact is largely perceived to affect access to salmon, deer, moose and berries but also a great variety of other traditional foods as shown in Table 8.

The healthy and nutritious attributes of traditional foods are readily understood by 33% of the respondents, followed by the perception of these foods being natural and safe (22%) (Figure 15). The benefits of market foods are perceived to be convenient and readily available (63% of respondents) and followed by variety (17%) among other answers (Figure 16).

Food Security

As far as traditional food is concerned, approximately one third of the population often worry that traditional food is insufficient in their diet with another third or so worrying sometimes while the last third did not worry about this (Table 9).

For FNFNES, food security as it related to market food was defined as per CCHS[9]. To be food secure, a household had to have a maximum of one affirmed answer to the standard 18 item questionnaire; moderately insecure households were identified by 2-5 affirmed answers; and, severely food insecure households, by more than 5 affirmed answers. Answers to the 18 questions are presented in Table 10. Overall, food insecurity affects 41% of First Nations households living on reserve in BC: 34% moderately and 7% severely (Table 11 and Figure 17). Households with children tended to report more insecurity (45%) than households without children (33%) (Figures 18-19). Food insecurity varies from a low of 13% to a high of 47% across ecozone/culture areas (Figure 20).

In Canada in 2004, 6% of the general Canadian population suffered from moderate food insecurity and 3% from severe food insecurity[24]. For the BC general population those numbers are 6.9% and 3.5% respectively (CCHS, 2007). The percentages observed in the present study identify food insecurity as a major issue for FN households on reserve in BC. When looked at in terms of main source of income, 34% of BC First Nations households earning wages/salaries report food insecurity compared to 7.3% in the general Canadian population (CCHS, 2007), 34.0% vs 4.9% for people receiving pension/seniors benefits, 63% vs 29% for people on workers compensation/employment insurance and 63.0% vs 59.7% for people on social assistance (Figure 21).

Table 11 shows that adults in households with children report more food insecurity (45%) than adults in households without children (33%) and that food insecurity affects fewer children than adults. This suggests that a greater part of the burden of going without food is taken on by the adults, probably to protect the children. Nevertheless food insecurity can be seen to affect 25% of children in First Nations households with children living on reserve in BC.

Nutrient Intake

The 24 hr diet recalls allow evaluation of the population diet quality by comparison to “Dietary Reference Intakes”[25] and “Eating Well with Canada’s Food Guide - First Nations, Inuit and Métis”[26]. Due to limited sample sizes in some age-gender groups and the fact that nutrient requirements are the same between these age groups (except for a slight difference for magnesium), the 19-30 and 31-50 age groups were combined. Pregnant and lactating women were also excluded from these analyses due to different nutrient requirements for these groups.

Table 12.1 shows that energy intakes appeared generally under-reported, particularly for men, with mean energy intakes of 2166 kcal/day for men aged 19-50 and 1784 kcal/day for men aged 51-70. Mean energy intakes for BC FN women were 1658 kcal/day for women aged 19-50 and 1808 kcal/day for women aged 51-50. In the general Canadian population, energy intakes were 2737 kcal/day for men 19-30 years of age and 2510 kcal/day for men aged 51-70. Energy intakes for Canadian women were 1902 kcal/day for women aged 19-30 years old and 1850 kcal/day for women aged 51-70[27]. Part of the difference may be due to energy from alcohol intake since it was recorded for the Canadian population but is not included in our estimates of the BC First Nations because in some communities, alcohol prohibition is

in effect. Alcohol consumption has been estimated at 130 kcal/day in BC[28]. Nevertheless the FNFNES estimates of energy intakes for women are very close to national averages and therefore our assessment of diet quality for women can be regarded as more reliable than for men.

In Tables 12.2-37 some overall observations can be made about nutrient intakes. BC First Nations women's diets contain exactly the same amount of fat, protein, and carbohydrates as in the Canadian general population, except for younger women who tended to consume less carbohydrates 197g vs 247g in the general population. The nutrients clearly associated with meat and fish consumption such as vitamin B12, niacin, thiamine, riboflavin, and iron, tended to be adequately provided in the diet, which compares to the Canadian general population.

Although large variability in intakes does not allow for the most precise estimates of adequacy (in Tables 12.1-37, when variability was too great, i.e. greater than 33.3%, no estimates are reported), it can be said that at least 50% of the population are likely to have insufficient intakes of dietary fiber, vitamin A (except for older women), vitamin D, calcium, magnesium (for older men), potassium, as well as too much sodium. The contribution of vitamin and mineral supplements was not, however, taken into consideration in these calculations.

Table 13 shows that traditional food seems to complement market food rather than substitute for it, since energy intakes are greater when traditional food is consumed. On days when traditional foods are consumed, diet quality is much improved for most parameters listed. This important contribution of traditional food to diet quality is further illustrated in Table 14 where traditional foods as consumed can be seen to be the major contributor to protein, vitamin D, iron, and zinc; and are among the 10 major contributors to energy, polyunsaturated fat, cholesterol, vitamin A, vitamin C and calcium.

Table 15a shows that BC First Nations do not meet "Eating Well With Canada's Food Guide - First Nations, Inuit and Métis" guidelines except for meat and alternatives. The guidelines recommend that adult men consume three servings of food from the meat and alternatives food group every day, while the recommendation for women is two servings. In this study, men consumed an average of 4 to 3 servings of meat per day and women consumed 3 servings per day. Men ate less than one serving and women had one serving from the milk and alternatives group. Neither men nor women met the recommendations of 2-3 servings per day of food from the milk and alternatives group, which may result in low intakes of key nutrients such as calcium, a mineral important for healthy bones and teeth. Intake of fruits and vegetables is also low, which may lead to low intakes of fibre, vitamin A, vitamin C and folate, important nutrients for overall health.

Tables 15b-c show the main contributors to the four food groups for women and men, respectively. To assign multiple food groups to mixed dishes, an 11 item categorisation was used (Appendix B). The greatest difference between the diet of BC FNs and the overall Canadian population is in the small contribution to the milk group. Fruits and vegetables are low but so is the Canadian average[29] and what had been reported for the BC general population[30]. In terms of overall diet quality, the low intake of milk and alternatives, fruits and vegetables as well as grain products are of concern. These low intakes from three out of the four food groups may be related to the observed low intakes of calcium, vitamin D, vitamin A, vitamin C, folate and fiber.

Tables 16a-b show the average quantities of the main market foods consumed for BC overall, and by ecozone/culture areas. Little variation is observed. Table 17 shows the same estimates (per capita figures) for all traditional foods reported to be consumed in the fall season.

Environmental Concerns

Many BC First Nations communities reported observing the effects of climate change in their territory. In this study, 75% of participants noticed significant climate change impacts in their communities (Figure 22). The range of positive response varied from 65% to 84% among the 8 ecozones identified in BC indicating that climate change was affecting First Nations communities in all regions across BC.

Almost half the respondents reported that climate change decreased the availability of traditional foods in their household (Table 18). Climate change affects the accessibility of traditional foods (harder to get), changing growth patterns of plants and affecting migration patterns and mating cycles and hence, the predictability of the harvest.

Tap Water Analyses

Figure 23 shows that 99% of participants have tap water, 83% drink it and 97% use it for cooking. The tap water comes mainly from the treatment plant (Figure 24). If tap water was not consumed or tap water was not available, 95% of participants drank or used bottled water to cook with (Figures 25 and 26).

Table 19 reports the characteristics of all BC participants' homes and plumbing systems. The average participant's home was built in 1988, with the oldest home in the study being built in 1935 and the newest home in 2009. A total of 13% of households had upgraded plumbing, 25% of households treated their water and 2% had outside water storage tanks. The majority of households (77%) had plastic pipes under their kitchen sink.

Table 20 lists the average consumption of water and water containing beverages/foods consumed per day. The main source of water for preparation of beverages or food was tap water.

Of the 21 communities participating in the BC regional study, two communities had three water treatment systems. Therefore a total of 25 water systems (locations) were surveyed. Fourteen water systems reported having a water treatment plant, however, only thirteen were operational at the time of the survey. Two communities reported that they got their drinking water from the neighbouring municipality. Ten water systems had no operational treatment facility at all. The age of these facilities ranged from one year to an estimated 30 years.

Drinking water was obtained from a variety of sources with 14 reporting wells as their primary source; 6 were from creeks/streams, 2 were rivers, and 4 lake sources. One of the 25 water systems surveyed treated both well and creek water.

Sand filtration was the most common filtration system (10 water systems); however reverse osmosis (1 system), ion exchange (2 systems), and nano-filtration (1 system) are other systems reportedly used. Eleven responded that no filtration was required or used.

Eight water systems reported that the water was not chlorinated/disinfected at the treatment plant, while most were using sodium hypochlorite or chlorine tablets for disinfection. Other chemicals used for water treatment were flocculates like aluminum sulphate, and softening agents. Two communities reported problems procuring required supplies and/or replacement parts, although all had sourced the parts at one time or another.

Five communities thought that their treatment plant was not up to date, two of which thought that the whole plant needed to be replaced. Others required component upgrades like chemical injection equipment. Three of the 25 locations did not have a trained water treatment plant operator, although one reported to be actively looking for one.

As for water availability and safety, three water systems reported issuing boil-water advisories ranging from one month to continuous over the past year. Reasons for the advisories ranged from the use of surface water with only tablet disinfection, meaning there may be times when the water is not safe to drink, or when tests showed positive for fecal coliform organisms. Four water systems reported intermittent disruptions in service due to water main breaks, one due to repairs, and another due to a community expansion project. One community reported that three major floods within the last 20 years had limited the availability of safe water. All communities reported using plastic (PVC) pipes with the exception of four with a mixture of plastic pipe combined with either copper, asbestos cement, or iron piping. Four locations had no water storage tanks on reserve (one of which received piped water from a neighboring municipality), the rest of which had a wide range of capacities and were constructed out of steel or concrete. Alternative water sources included nearby streams, used by elders; bottled water; and one instance each of a natural spring, private well and the capacity to access municipal water.

The primary concern about water quality for people living on-reserve was contamination of source water by sewage and garbage dumps. One community was concerned about the impact of mining and forestry on the watershed and ultimately the lake, which is their primary source of drinking water.

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[31] is exceeded:

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

The results of water sample testing for metals in drinking water are listed in Table 21. Only three samples had lead above the maximum acceptable guideline of 10 ug/L:

1. One in the Pacific Maritime/Plateau (12 ug/L). Note: After running the water for 5 minutes, the lead level was acceptable (0.9 ug/L).
2. Two in the Pacific Maritime/Northwest Coast. One sample (20.4 ug/L). Note: After running the sample for 5 minutes, the level was found to be acceptable (0.6 ug/L). The second sample in this region was initially acceptable (1.1 ug/L). However, after running the water for 5 minutes, the lead levels were found to be just above the guideline (10.8 ug/L), this may indicate a mistake in labeling the sample as this was not the case with other samples tested in this community.

Whenever an exceedance is identified, the Chief and Council, the Health Canada Environmental Health Officer (EHO) for the community, and the householders are made aware of the observed exceedances. The EHO responsible is notified and asked to re-sample and take follow-up action, if the exceedance is confirmed. Health Canada, British Columbia region will make appropriate recommendations after completing the investigation.

Aesthetic Objective (AO) Metals Sampled

The FNFNES quantified six metals that are not considered heath hazards. Concentrations above the aesthetic objective can cause drinking water to be rejected as unacceptable by the consumer[32]. The results for the metals below are listed in Table 22:

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

Five metals had concentrations above the aesthetic guidelines.

Aluminum: All aluminum samples above the guideline (200 ug/L) were in one community in the Montane Cordillera/Subarctic. The sample concentrations in the six samples above the AO for the first draw ranged from 206 – 262 ug/L. After a 5 minute flush, the aluminum concentrations were 205 – 287 ug/L in eight samples indicating that elevated Aluminum concentrations were originating from the treatment plant. The Chief and Council, the Health Canada EHO for the community and the householders have been made aware of these exceedances. Health Canada, British Columbia region have made the appropriate recommendations, after completing the investigation.

Copper: Sixteen homes had elevated levels of copper above the AO of 1,000 ug/L:

- One in the Boreal Plains - 1170 ug/L.
- Two in the Montane Cordillera/Plateau 1,340 – 2,200 ug/L
- Ten in the Pacific Maritime / Northwest Coast 1030 – 2,930 ug/L
- Three in the Pacific Maritime Plateau 1060 – 2,380 ug/L

After flushing for five minutes, all drinking water samples were below the copper aesthetic objective.

Iron: Three homes had elevated levels of iron above the AO of 300 ug/L:

- One in the Montane Cordillera/Plateau 1420 ug/L
- One in the Pacific Maritime / Northwest Coast 1280 ug/L
- One in the Pacific Maritime Plateau 576 ug/L

The Pacific Maritime / Northwest Coast home had a slight increase in iron concentration after a 5 minute flush to 1310 ug/L. One home in the Montane Cordillera/Plateau, that was initially measured at approximately half the 300 ug/L AO (154 ug/L), was found to have a concentration of 527 ug/L after a 5 minute flush.

Manganese: Six homes were found to have elevated levels of manganese above the AO of 50 ug/L:

- One in the Boreal Cordillera 69.8 ug/L
- One in the Boreal Plain 77.1 ug/L
- Four in the Montane Cordillera/Plateau 83 – 164 ug/L

One home in the Montane Cordillera/Plateau that was initially above the AO, had its value drop to one-half the AO after a five minute flush. A second sample that initially was measured at 126 ug/L, after a five minute flush was found to have a manganese level of 250 ug/L. As this result is not expected we have requested that this site be resampled.

Sodium: One home in the Montane Cordillera/Plateau had a sodium level of 298,000 ug/L that was above the AO of 200,000 ug/L. After a 5 minute flush the sample tested at almost an identical concentration of 292,000 ug/L.

Again, the Chief and Council, the Health Canada EHO for the community and the householders have been made aware of these exceedances. Health Canada British Columbia region are in the process of re-sampling the homes where chemical levels exceed the aesthetic objective.

Pharmaceutical Analyses in Surface Water

FNFNES quantified the 40 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.[33-39]

In all, 62 samples were collected (one community had only two sites). Of all 62 sampling sites, 32 (52%) revealed quantifiable pharmaceuticals (Table 24).

Thirteen pharmaceuticals were found in one or more communities; they are listed in Table 25 along with the maximum concentration found in the BC FNFNES sampling and a comparison to the highest levels reported in other Canadian or U.S. studies. The levels of pharmaceuticals found in the FNFNES at some remote First Nations communities are very similar to those found in surface waters in many urban areas of Canada or the United States referenced above.

Overview of Pharmaceuticals Detected by Type

The following describes the results of this component of the study. Results are aggregated by ecozone providing information on what was detected in each of the eight ecozones and why it might have been detected in those locations. This information is summarized in Table 24.

Acetaminophen was a prescribed pharmaceutical in the communities it was detected in and its presence reflects community use.

Atenolol was only found at a beach recreational site. It is not highly prescribed in the community where it was detected and therefore there must be alternative sources of this pharmaceutical.

Caffeine was the most prevalent pharmaceutical detected. It was detected in 10 of 21 communities and 14 of the 62 sites sampled throughout the province. Caffeine is a component of the most highly prescribed pharmaceutical in most communities across the

province. Caffeine is also present in many coffees, teas, soft drinks, energy drinks, and foods containing chocolate. Caffeine has been used in other studies as a marker for wastewater[40].

Ciprofloxacin is prescribed in the community it was detected in. However the number of prescriptions would not account for the level detected in the sample. This antibiotic's presence at this location is most probably an indication of its use in aquaculture.

Clarithromycin is highly prescribed in the community it was detected in and its presence probably reflects community use.

Clofibric acid remains in the environment for years (persistence in the environment of 21 years[41], so its presence may reflect either past consumption or an alternative source, (such as veterinary use).

Cotinine (metabolite of nicotine) was found at a swimming site in one community and near a waste water treatment plant in another community. 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 and its presence most probably reflects tobacco use.

Fluoxetine is not highly prescribed in the communities that it was detected in and its presence may reflect a veterinary source.

Ketoprofen is not used in the communities where it was detected as a pharmaceutical. Its presence may reflect a veterinary source.

Nifedipine is not highly prescribed in the community it was detected in and the presence of dehydronifedipine (metabolite of nifedipine) may reflect veterinary use.

Trimethoprim's presence can be explained by community use in the community that it was detected in.

Warfarin is not highly prescribed in the communities that it was detected. Its presence may reflect a veterinary source for this pharmaceutical.

Overview of Pharmaceuticals Detected by Ecozone

Boreal Cordillera: Two communities were sampled within the Boreal Cordillera ecozone. Four pharmaceuticals were detected within the ecozone: caffeine, clofibric acid, fluoxetine and trimethoprim.

Caffeine was detected in both communities sampled, while clofibric acid, fluoxetine and trimethoprim were detected in one community.

Boreal Plains

Two communities were sampled within the Boreal Plains ecozone. Three pharmaceuticals were detected within the ecozone: caffeine, dehydronifedipine and fluoxetine.

One community had no detectable levels of pharmaceuticals, while the other community had detectable levels of caffeine, dehydronifedipine and fluoxetine.

Montane Cordillera/Plateau: Two communities were sampled within the Montane Cordillera/Plateau ecozone. Two pharmaceuticals were detected within the ecozone: caffeine and cotinine.

One community had no detectable levels of pharmaceuticals, while the other community detectable levels of caffeine and cotinine were found.

Montane Cordillera/Subarctic: Two communities were sampled within the Montane Cordillera/Subarctic ecozone. Six pharmaceuticals were detected within the ecozone: atenolol, caffeine, cotinine, fluoxetine, ketoprofen and warfarin.

One pharmaceutical, fluoxetine, was found in a surface water sample collected below a sewage lagoon in one community.

Five pharmaceuticals were found in the vicinity of the second community, atenolol, caffeine, cotinine, ketoprofen and warfarin.

Montane Cordillera/Subarctic/Northwest Coast: Two communities were sampled within the Montane Cordillera/Subarctic/Northwest Coast ecozone. Five pharmaceuticals were detected within the ecozone: acetaminophen, caffeine, clofibric acid, dehydronifedipine (metabolite of nifedipine) and ketoprofen.

In one community three pharmaceuticals were found: acetaminophen, caffeine and dehydronifedipine (metabolite of nifedipine).

Two pharmaceuticals were found in the vicinity of the second community: clofibric acid and ketoprofen.

Pacific Maritime/Northwest Coast: Six communities were sampled within the Pacific Maritime/Northwest Coast ecozone. Five pharmaceuticals were detected within the ecozone: acetaminophen, caffeine, ciprofloxacin, dehydronifedipine, (metabolite of nifedipine) and fluoxetine.

Two communities sampled did not have any pharmaceuticals detected in surface water samples. In another two communities caffeine was the only pharmaceutical found.

One community had detection levels of ciprofloxacin and dehydronifedipine (metabolite of nifedipine).

Two pharmaceuticals were found in the vicinity of a single community: acetaminophen and fluoxetine.

Pacific Maritime/Plateau: Three communities were sampled within the Pacific Maritime/Plateau ecozone. Six pharmaceuticals were detected within the ecozone: atenolol, caffeine, clofibric acid, ketoprofen, pentoxyfylline and warfarin.

Caffeine was detected in a single community within the ecozone.

Clofibric acid was the only pharmaceutical detected another community sampled.

One community within the ecozone had detection levels of five pharmaceuticals: atenolol, clofibric acid, ketoprofen, pentoxyfylline and warfarin. The samples were all collected from the same lake, the closest water body to the community.

Taiga Plains: Two communities were sampled within the Pacific Maritime/Plateau ecozone. Two pharmaceuticals were detected within the ecozone: caffeine and clarithromycin.

In one community no pharmaceuticals were detected.

Two pharmaceuticals were found in the vicinity of the other community: caffeine and clarithromycin in a wetland discharge area.

Pharmaceutical Guidelines

Currently only one pharmaceutical in Canada has a guideline level, 17 alpha ethinyl estradiol at 0.5 ng/L in the province of British Columbia (BC MOE, 2009). This pharmaceutical was not detected in the BC FNFNES study.

The concentrations of the 13 pharmaceuticals in the FNFNES study would not pose a threat to human health or the aquatic environment.

Mercury in Hair Analyses

Of the 1103 FNFNES participants in British Columbia, 495 individuals consented to hair sampling for mercury. After the exclusion of two duplicate values, as well as the data from six individuals, who did not provide their age and sex information, the weighting of mercury analysis sample was based on data from 487 respondents. Therefore, all figures and tables represent results by age group based on data from 487participants.

The mercury sample was further adjusted to account for the way that sampling was performed, for the communities' response rates, and for the individual response rates within communities. These adjustments collectively resulted in a set of weights, which are factors that indicate how many other individuals in the on-reserve population each individual's response represents. For example, a weight of 335.79 implies an individual's response represents 335.79 people, or a weight of 73.21 implies that an individual's response represents 73.21 people. (Actual weights for the B.C. mercury sample varied from 1.09 to 1607.8, with a median of 18.58.)

The geometric means and associated percentiles and confidence intervals were calculated using the weights as above. However, due to software limitations, the weights used to create Figures 27, 28, 29 and 30 were rounded to whole numbers. For example, the weight of 335.79 was rounded up to 336, and the weight of 73.21 was rounded down to 73. This rounding results in small discrepancies, e.g., the total estimated population counts using un-rounded weights is 45566.77, and the sum of the rounded weights in 45547. This difference of 0.043% is solely due to the rounding.

The arithmetic mean of mercury concentration in hair among adult First Nations population living on reserve (sample data weighted and age-sex standardized) was 0.59µg/g, while the geometric mean was 0.36µg/g. For women of childbearing age (19-50 age category), the arithmetic mean of mercury was 0.43µg/g and geometric mean 0.28µg/g. The distribution of mercury in hair among First Nations living on reserves presented in Figure 27and Tables 26a indicate that the level of mercury body burden is considerably below the established Health Canada mercury guideline of 6 µg/g in hair for the general population (the 95th percentile (with 95% confidence) for BC First Nations living on reserves is 2.02µg/g +/- 0.651). At the same time, the age-sex adjusted data, weighted for First Nations population, suggests that the level of hair mercury among some women of childbearing age is approaching the recently proposed Health Canada guideline of 2µg/g in hair (the 95th percentile with 95% confidence for this group is 1.534 µg/g +/- 0.705). While the overall average results, illustrated in Figure 28, 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.

Table 26b suggests that for the majority of the First Nations population living on reserves, there is a clear pattern of increasing mercury exposure with age. As presented in Figure 29 and Figure 30, there appear to be certain identifiable differences in the body burden of mercury among First Nations general population and women of childbearing age living in different ecozones. These differences need to be further mapped out, analyzed and investigated in the future.

Food Contaminant Analyses

To estimate the daily contaminant intake, it is important to obtain the daily amount of traditional food consumed. Table 27 presents the results on typical amounts of traditional foods when they are eaten, as reported by participants in the 24-hr recall. In general, men consumed larger amounts of traditional food per serving than women, and the middle age group (51-70), consumed the biggest servings. We multiplied the serving size to the frequency of consumption of each traditional food (Table 7a) and obtained the estimated average intake of major traditional foods in (g/person/day). The average daily intake is presented in Table 28a and the 95th percentile intake is presented in Table 28b. The average amount of consumption of all traditional food combined was 97.53 g/person/day and the 95th percentile consumption rate was 290.30 g/person/day. Moose meat was the most commonly consumed traditional food. The average daily intake of moose meat was 20.84 g/person/day and the 95th percentile was 105.40 g/person/day. Salmon was the second most consumed traditional food (average=16.65 g/person/day and 95th percentile=68.60 g/person/day).

Concentrations of four toxic metals including arsenic (As), cadmium (Cd), lead (Pb), and mercury (Hg), which is further analyzed to quantify the more toxic form methylmercury (MeHg),

are presented in Table 29. These data are from pooled food samples collected from all participating communities. Both the average concentrations and the maximum concentrations are presented. The variations within species are typical of that of natural variations. In general, there is less than a 10-fold difference between the average and the maximum values indicating that there is no clear evidence of local point source pollution. The highest As concentrations were found in seaweed (25.27 ug/g) and seafood such as crab meat (8.29 ug/g). These marine plants and animals are known to bioconcentrate As from seawater. The As accumulated is mainly in non-toxic organic form known as arsenobetaine (AB) and should not be of any health concern[42]. Pine mushroom also had higher concentrations of As (6.52 ug/g). Again the major form of As in mushroom is AB[43] and non-toxic. Some of the traditional foods are known to contain elevated levels of Cd as Cd is accumulated in those food/organs through biological processes. For example, the highest Cd concentrations were found in the kidneys of terrestrial mammals such as beaver (21.6 ug/g) and moose (11.85 ug/g). Shellfish such as mussels and oysters, and seaweed, and willow bark also contained higher concentrations of Cd. The source of relatively high levels of cadmium found in the mussel (8.20 ug/g) and oyster (3.56 ug/g) samples collected warrants a follow-up study. Lead concentrations in all food items were at background level except for beaver heart, Canada goose meat, deer meat and grouse meat. The highest level was found in a grouse meat sample (60.6 ug/g). The source of this lead is likely from lead shot. 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[44].

Higher levels of Hg were found in predatory fish such as Arctic char (0.92 ug/g) and rockfish (0.38 ug/g). Carp meat had a high total Hg concentration of 0.72 ug/g but the MeHg concentration was only 0.187 ug/g or 26%, which is lower than most of the other fish species (ranging from 70 to 100%). It is interesting to note that pine mushroom had a relatively high concentration (average=0.28 and max=0.65 ug/g). Elevated concentration of Hg in wild mushroom was recently reported in Spain[45]. It is also important to note that all salmon species had very low concentrations of Hg (<0.1 ug/g).

Tables 30a-d shows the major source of As, Cd, Pb and Hg in all ecozones. As expected, seaweed and seafood were the major source of As in all ecozones. For Cd, the major sources were moose liver and kidney, seaweed and shellfish. The major source for Pb was from deer, grouse and moose meat. Even though the Pb concentrations in moose meat were not high (0.06 ug/g), it was a significant source because of the large amount consumed in the diet. Similarly, the concentrations of Hg in trout, salmon and halibut were not particularly high but they were the major source of Hg intake because of the large amount consumed.

Table 31 presents the concentrations of polycyclic aromatic hydrocarbon (PAH) in selected traditional food samples. All food showed only trace amount of PAH except for eulachon meat which had about 2 ng/g of PAH. This is partly due to the high fat content of eulachon, but some contamination from oil and gas production facilities could be a factor. However, these concentrations are still very low and should have no adverse effects on the health of the animals[46], or those persons that consume them.

Table 32 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 lipid (fat) content in different food. For example, eulachon grease showed the highest concentrations.

Table 33 shows the concentrations of organophosphate pesticides in selected traditional food items. None of the samples showed any detectable level of organophosphate. This is likely due to the short half-life (a few days) of organophosphate in the food samples and the environment where these foods are harvested [47].

Concentrations of the fire retardant chemical polybrominated diphenyl ethers (PBDE) are presented in Table 34. The concentrations were all very low at the parts per billion level. Higher concentrations were found in predatory fish such as trout and fish with high fat content such as eulachon.

Table 35 presents the concentration of perflourinated compounds (PFCs) in selected traditional foods. Only trace amounts were found in most food. The highest concentration was found in Chinook salmon eggs (12.5 ng/g). The reason is not known but may be due to the fact that higher PFCs levels were found in the surface water (10-20 cm)[48]; and spawning salmon may take up more PFCs. The lipid content of the food may also be a contributing factor.

Table 36 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 was found in seaweed (1.845 ng/g). The reason for this is not known but comparable concentrations were reported for seaweed in Japan[49].

Average and 95th percentile daily intake of the four toxic metals are presented in Tables 37a-b. We used both the mean concentration (Table 37a) as well as the maximum concentration (Table 37b) of each food to estimate the intake. The estimated intakes were compared to the guideline level presented as provisional tolerable intake (PTDI) as a hazard quotient (HQ=intake/PTDI). The risk will be negligible if the HQ is 1 or less.

Both the average As intake and the 95th percentile intake showed a HQ higher than 1. However, as discussed above, the major source of As was from seaweed and seafood. Therefore, the As would be in AB form which is not toxic. This exceedance of HQ is therefore not a health concern.

For Cd, the HQ for average intakes were both below one indicating the average consumer would have negligible risk of Cd exposure. However, for the high end consumers (95th percentile), the HQ was 1.17 when using the average Cd concentration in food for estimation and 2.23 when using the maximum Cd concentration. This result indicates that heavy consumers of moose liver and kidney can result in increased risk of Cd exposure. The long-term possible health effects include impaired kidney function and bone problems. Exposure to low levels of cadmium over a long period of time can lead to a build-up of cadmium in various organs, particularly in the kidneys. If the accumulated cadmium in the kidney reaches high enough level, it will cause kidney diseases. Long-term exposure to cadmium can also cause bones to become fragile and break easily.

Both the average and the 95th percentile intake of Hg had HQ less than 1 using either the average or maximum concentrations of food. This means that the adult participants in this study have negligible risk of Hg exposure. Because of the susceptibility of the fetus to Hg toxicity, the PTDI for women of child bearing age was lower at 0.2 ug/kg/day. Table 37c shows the results for the female participants of child bearing age. The HQ for the 95th percentile intake using the maximum Hg concentration in food was 1.15. This means that the high consumers of fish that have high mercury concentrations may result in increased risk of Hg exposure. This result is corroborated by the results of hair mercury data reported in the previous section. Two female participants of child bearing age had hair mercury levels higher than 2 ug/g. While these observed levels were not considered high enough to be of any health concern to the participant, letters were sent to these women with suggestions on how to reduce their exposure. The study also compared the estimated Hg intake from all traditional foods and the estimated Hg intake from fish consumption to the Hg in the hair sample of the participants. Both of them showed a strong correlation (Spearman r=0.54, Figures 31 and 32).

For lead, the HQ for 95th percentile intake and using the maximum concentrations in food was 2.19. This result indicates that a heavy consumer of game meat may have an increased risk of Pb exposure if the food is high in Pb as a result of lead shot contamination.

Tables 38a and 38b show 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 and the maximum concentrations respectively. All the HQs were below 1, indicating that there is negligible risk of exposure to these contaminants through consumption of traditional food.

COMMUNITY INPUT

Integral to the process of releasing this report was the active involvement and hard work of all 21 participant BC First Nations. As part of the FNFNES Guiding Principles it is recognized that participating First Nations are to be the first to receive their own research results. As such, visits were held with each participant community to explain the results and receive feedback. Results were presented by Nutrition Research Coordinators (NRCs) at a forum decided upon by the Chief and Council or Community Contact. The NRCs were also available during these sessions to answer questions from those present at the meetings. The feedback from communities contributed to the development of the BC Regional Report and each First Nation's respective community report.

Community Presentations:
Community input from those present at the meetings was recorded, the results of which are discussed below. Questions that were asked by the NRCs included:

1. What kind of educational resources would be beneficial?
2. Are there any gaps in the report?
3. Have we missed anything?
4. What else would you like to see in the report?
5. Where is the best place to release the regional report and results to assist communities/health professionals?
6. Is there an interest in learning the computer software to analyze your own data?
7. Where are the best places to offer training?
8. Any other concerns?

Community Reports:
Each of the participating First Nations received a draft report that had been written specifically for their community. These community reports included discussion of the results for the five key components as they related to that community and to BC as a whole.

Key Components

- Household Questionnaire
- Food sampling for a suite of contaminants
- Hair sampling for mercury
- Surface water sampling for pharmaceuticals
- Water sampling for trace metals

Community representatives from each First Nation were asked to provide feedback on their impressions of the draft community report, the appropriateness of its presentation and the usability of its results among other items. This feedback was then taken into account to produce a final community report and to choose the venue for the release of the BC regional report. In keeping with the study design, the community reports were released to each First Nation before the BC regional report.

As draft community reports were provided to most participating First Nations only days before the presentation by the NRCs, many First Nations stated that they would need more time to review the report before providing comments regarding potential changes to the report.

Educational Resources:
The participating BC First Nations were predominantly interested in having ready-made educational materials such as a PowerPoint presentation, summary and easy to read pamphlets that could be used to share the results with community members, interested health professionals or agencies. Other areas of interest included nutrition and food safety resources that would provide people with advice on reducing exposure to contaminants (i.e. avoiding lead shot, how much is safe to eat etc.). The communities were also interested in an outline of which traditional foods were key sources of nutrients and could be recommended to improve diet quality.

Additions to the Report and Study:
Some First Nations requested that there be a greater explanation of how their results varied from other BC First Nations and the rest of the Canadian population in terms of nutrition and food contamination. Other communities asked that the study be expanded to include children as food use has a large impact on long-term health (for example there was concern about calcium intake and bone development). One community recommended that the study explore in greater detail the barriers to traditional food harvesting and use and look to the community for suggestions on solutions. They provided an example of surveying people about the value of programs to increase the consumption of traditional food. One community asked that community efforts already in place to cope with health issues such as food insecurity be recognized in the BC regional report.

Nutrition:
A few communities asked that the nutrition results be provided at an ecozone or local level. For example, one participating community noted that because they did not eat salmon their intake of vitamin D might be different from coastal communities. A couple of communities asked that information on traditional foods be presented by portion rather than in grams. One community asked that the study look at measuring both the nutritive and medicinal value of the traditional foods in addition to the contaminant analysis.

During discussions with NRCs a number of community efforts to improve quality of diet and food security were identified. These programs were either currently in place or were in the planning stages and included community meals, food banks, BC "Food Skills for Families" and establishment of community gardens. This illustrated that many participant First Nations recognized that food insecurity was a large concern and were actively engaged in working to improve food security and provide more help to support families. A number of the communities also explicitly recognized how these study results could inform planning and programming within their communities, especially in terms of nutrition programming and health. It was also mentioned that this information will be valuable for reducing barriers that inhibit access to traditional foods in order to improve nutrition.

Contaminants:
The participating First Nations were generally pleased to be reassured that traditional foods were safe to eat and planned to communicate this to community members. Communities, however, did ask that there be additional information to assist in interpreting the results and risk. It was heard that communities would like to see recommendations as to how much of each traditional food they could eat. This was especially of concern for those foods that were found to have contaminants (lake trout, moose liver, moose kidney, oysters, mussels and halibut). Also requested were comparisons to the contaminant content in other commercial foods and game meats.

Release of the Report and Training Opportunities:
Participating First Nations were asked what would be the most appropriate forum to release this final regional report. Most responded by identifying the First Nations Health Council, followed by the Northern Health Authority. Opinions on the best place to offer training opportunities were mixed and included community health associations, the First Nations Health Council, Northern Health and other health conferences.

Concerns:
Some of the communities expressed concern regarding the perceived rushed nature of data collection of food and water samples and surveys. One community mentioned that the fall is a busy time for people to hunt and gather and therefore individuals might not have been available to fill out the survey as they were not home. Another community mentioned that the report and study lacked a youth voice. There was also the feeling from one community that there were younger people who ate more traditional foods but did not participate in the study and therefore were not represented in the results.

Overall Recommendations from Community Members:
A number of the communities observed that recommendations accompanying their results would have been very useful. Some suggested recommendations included intervention programs or changes in diet.

A number of First Nations stated that the return of their results (late October – early January) was inopportune due to flu season and inclement weather. Some felt that more time would have been beneficial to have had greater community participation and allowed report reviewers to provide critical feedback. As such, many communities recommended that another visit be planned well in advance for the spring to ensure a larger crowd and to better prepare for a presentation of results.

A number of individuals expressed interest in learning how to analyze the data collected for their community.

All communities were given the opportunity to provide specific and general comments. Many communities provided important feedback that will be incorporated into the final community reports, the BC regional report and the presentations themselves. A small number of communities agreed with the findings of the report but did not provide specific comments.

CONCLUSIONS

This is the first comprehensive study addressing some of the gaps in knowledge about diet, and environmental contaminants among First Nations in BC. Extensive consultations were conducted at the community, regional and national levels before the final research protocol was adopted. The strict ethical requirements adopted by this study can serve as a model for future community based research involving First Nations communities in Canada.

A robust sampling strategy was developed to ensure that the results provide a baseline snapshot of the diet quality and environmental issues that are representative for First Nations communities across BC. A total of 1103 participants from 21 BC communities participated in this study. The overall participation rate was 68% (1103/1624 eligible households).

The overall results indicated that traditional food is important in the diet in BC First Nations communities. It is a major source of protein, vitamin D, iron, and zinc; and among the 10 top contributors to energy, polyunsaturated fat, cholesterol, vitamin A, vitamin C and calcium. On the other hand, excess body weight is a concern as are the low intakes of calcium, vitamin A, vitamin D, folate, dietary fibre, as well as the high sodium intake.

Food insecurity is a concern. Many participants in all participating communities reported not having the food that they like and even not having enough food. Initiatives to encourage traditional food use and facilitate healthy market food selection are needed.

Many First Nations communities have also reported observations of climate change in their local environment resulting in a decrease in the availability of traditional foods in their households. Traditional food use appeared also limited by socioeconomic factors such as lack of equipment and lack of time, as well as by government regulations and hydro, mining, farming, and oil and gas projects. Further studies are needed to characterize these changes and develop plans for the communities to at least maintain and hopefully increase their supply of traditional food.

Our results of trace metals testing in drinking water showed that all levels were below guideline levels and hence should have no health concern. However, there were a few exceedances detected that were investigated and re-sampled by the Health Canada British Columbia Region EHOs, and these were either corrected or found to be within acceptable limits on retesting. Surface water showed trace levels of pharmaceuticals and some of them have not been prescribed in BC, indicating possible agricultural contamination from animals. However, all levels were very low and pose no health concern for either drinking or bathing.

A total of 495 community members participated in the hair sampling component of the study. Our results showed that all samples, except two, had mercury levels below Health Canada guidelines. While these levels were not considered high enough to be of any health concern, letters were sent to these two participants (two women of childbearing age) with suggestions on how to make changes in their food choices in order to manage and possibly reduce their mercury exposure in the future.

Contaminant levels in all traditional food samples collected were all at baseline levels and should pose no health risk to the consumers. There may be occasional contamination by lead from gun shot in game meat (such as grouse and moose) therefore consumers should be aware of the potential risk of eating large amounts of game killed by lead shot. Hunters should be using steel shot, rather than lead shot to avoid exposure to lead that could be potentially hazardous to both children and adults. High consumption of moose organs may also result in higher exposure to cadmium. Both hair sampling and diet estimate results showed that there is minimal concern of mercury exposure in the BC region. Further studies are needed to confirm that the arsenic in seafood, seaweed and mushroom collected in the regions are in the non-toxic form and sources of cadmium in mussels and oysters in some coastal communities will need to be identified.

Highlights of results:

1. Diet is overall of inadequate quality but much better when traditional food is consumed.
2. Excess body weight is a major issue.
3. Food insecurity is a major issue.
4. Water quality, as indicated by the trace metals levels, is overall satisfactory but close monitoring is warranted as water sources and treatments facilities vary greatly.
5. Mercury exposure as indicated by hair mercury concentrations, as well as dietary estimate, is not a health concern.
6. Chemical contamination of traditional food is not worrisome, but it is important to have the present data for future monitoring of trends and changes.

A project of this scale is unprecedented and therefore presented a number of challenges. Our commitment to community participatory research means that participating communities have to devote a lot of resources to lead and implement the project. As First Nations communities are very aware of the need for information-based decisions, there have been many research projects conducted in BC First Nations communities in recent years, resulting in research fatigue to some degree. Other communities were occupied with self-governance affairs resulting in a shortage of skilled personnel to take the lead on the project. For example, there were high attrition rates among the trained community research assistants in some communities making data collection very challenging. Collecting hair samples was particularly difficult due to a number of reasons such as the reluctance of many community members to provide hair samples for the study because of cultural beliefs and concerns. Many community members declined to have their hair tested for mercury despite the extra effort made to ensure the anonymity of participants, the strict security of samples, and assurances that any unused samples would be returned to the participants.

This report presents all the key findings from the study. All 21 participating communities received a report which documents their community-specific data and how they compared to the BC regional average. The communities will also receive a copy of their data in electronic form and a brief training session on the use of data for future initiatives. The Assembly of First Nations (AFN) is the custodian of all the data. Any future use of data, including secondary analysis at the regional level, will require applying to the AFN for approval. No community specific data will be released. Further analyses of the data will be performed and the results will be published in scientific journals. Copies of the published articles will be made available to interested FN communities.

The data collected in this report will serve as a benchmark for future studies of this type to determine if man-made or natural changes in the environment are resulting in an increase or decrease in concentrations of chemicals of concern. Information on contaminant levels in drinking water and hair samples have been reported back to the communities and appropriate follow-up actions have been taken to address the issues that were identified. These data will also be of use to relate current and future dietary practices to health. It is worth noting that many communities found their results useful for resource management and public health planning. In fact, many First Nations communities have already planned programs and projects such as community gardens, food banks, community kitchen or lunch programs, educational programs for traditional food harvesting, cooking, food preparation, etc.; all aimed at improving diet quality and food security in their communities.



TABLES AND FIGURES

Sample Characteristics

Table 1. List of participating BC First Nations communities and ecozones/culture areas

Ecozone/ culture area number	Ecozone/ culture area name	Name of participating communities	Year of data Collection	Number of participants
1	Boreal Cordillera/ Subarctic	Tahltan	2008	16
		Iskut	2008	64
2	Boreal Plains/ Subarctic	Doig River	2009	29
		Saulteau	2009	93
3	Montane Cordillera/ Plateau	Lower Nicola	2009	41
		Splatsin (Spallumcheen)	2009	52
4	Montane Cordillera/ Subarctic	Tsay Keh Dene	2008	36
		Tl'azt'en	2008	56
5	Montane Cordillera/ Subarctic/Northwest Coast	Moricetown	2008	39
		Nat'oot'en	2008	89
6	Pacific Maritime/ Subarctic/ Northwest Coast	Kitsumkalum	2008	34
		Hagwilget	2008	59
		Skidegate	2009	21
		Nuxalk	2009	81
		Namgis	2009	91
		Sliammon	2009	83
7	Pacific Maritime/Plateau	Samahquam	2009	20
		Douglas	2009	4
		Lil'wat (Mount Currie)	2009	93
8	Taiga Plains	Fort Nelson	2009	85
		Prophet River	2009	17
			TOTAL	1103

Figure 1. Map of participating BC First Nations communities and ecozones



Table 2. Number of BC FN on-reserve households surveyed and participation rate, by ecozone/culture area and total

		Ecozone/Culture Area								
		1	2	3	4	5	6	7	8	TOTAL BC
On-reserve population (aged 15 years and older)[1]		515	387	707	622	1617	2776	1199	381	8204
No. of occupied households		188	179	350	211	397	1162	460	193	3140
No. of HHs selected to participate		188	179	249	159	242	634	163	175	1989
No. of HHs contacted		117	151	161	147	225	558	148	138	1645
Not eligible		1	3	1	0	0	3	1	0	7
Reason for non-eligibility		non-FN	< 19 yrs old; non-reserve	non-FN	-	-	non-FN, health (deaf, dementia)	non-FN	-	Non-FN, under-age, health
Vacant homes		0	1	5	0	0	6	0	0	12
No. of eligible HHs		116	147	155	147	225	549	147	138	1624
HH Non-response	Refused	18	21	20	12	64	124	24	15	298
	Not home during interview period	14	3	41	13	30	50	4	6	161
	Number of incomplete records	4	1	1	30	5	6	2	15	64
No. of HHs (participants) that participated		80	122	93	92	128	369	117	102	1103
No. of participating females		63	73	64	59	71	229	78	68	705
No. of participating males		17	49	29	33	57	140	39	34	398
HH Participation rate (# participating HHs/ #eligible HHs)		**69%**	**83%**	**60%**	**63%**	**57%**	**67%**	**80%**	**74%**	**68%**

Indian and Northern Affairs Canada, 2009[50]

Sociodemographic Characteristics

Table 3. Average age of participants and age group distribution

		Ecozone/ Culture Area								
		1	2	3	4	5	6	7	8	ALL BC
Women	Age mean (SE)	37 (3)	43 (1)	44 (5)	37 (4)	40 (0)	46 (1)	41 (2)	35 (2)	44 (1)
	Age group 19-30 % (n)	28 (18)	17 (14)	12 (8)	37 (22)	30 (18)	13 (33)	24 (19)	38 (23)	16 (155)
	Age group 31-50 % (n)	46 (28)	60 (40)	53 (29)	37 (23)	48 (35)	43 (111)	52 (39)	51 (39)	46 (344)
	Age group 51-70 % (n)	19 (15)	15 (14)	26 (23)	22 (11)	16 (13)	35 (70)	25 (20)	7 (5)	30 (171)
	Age group 71+ % (n)	2 (1)	6 (3)	6 (3)	0 (.)	4 (3)	5 (14)	0 (.)	3 (1)	4 (25)
Men	Age mean (SE)	49 (0.1)	49 (1)	46 (3)	38 (2)	37 (6)	48 (2)	40 (7)	39 (3)	46 (2)
	Age group 19-30 % (n)	2 (1)	12 (6)	9 (2)	33 (9)	38 (16)	16 (18)	27 (6)	35 (11)	17 (69)
	Age group 31-50 % (n)	42 (7)	37 (18)	54 (15)	46 (16)	39 (26)	42 (54)	53 (23)	36 (12)	45 (171)
	Age group 51-70 % (n)	50 (7)	48 (22)	37 (12)	17 (6)	20 (14)	35 (60)	19 (9)	29 (11)	33 (141)
	Age group 71+ % (n)	4 (1)	3 (3)	0 (.)	1 (1)	0 (.)	7 (8)	1 (1)	0 (.)	4 (14)

Figure 2. Percent of household members by age group, BC FN living on-reserve

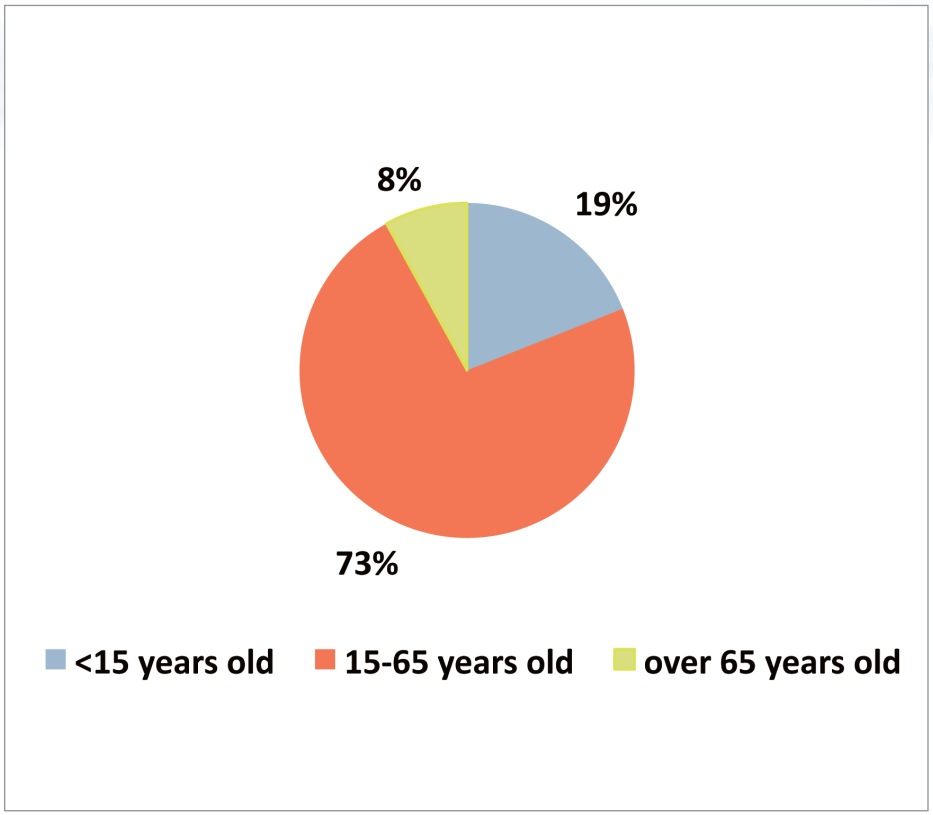
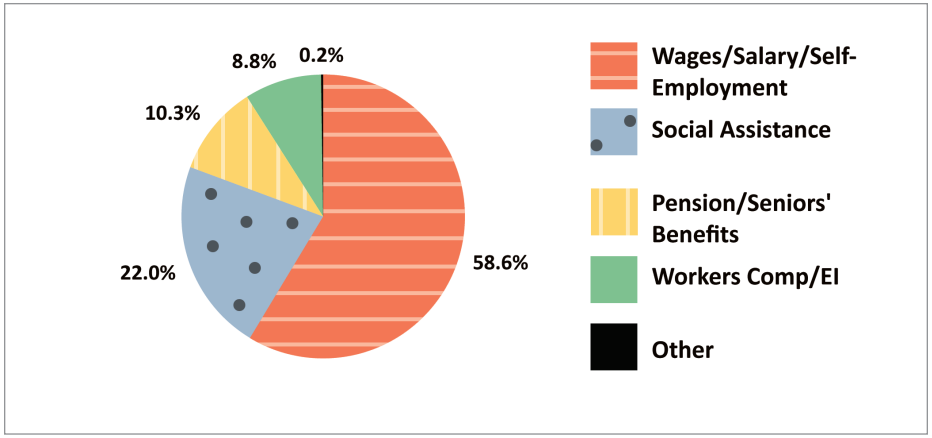


Table 4. Employment and education level of BC FN living on-reserve

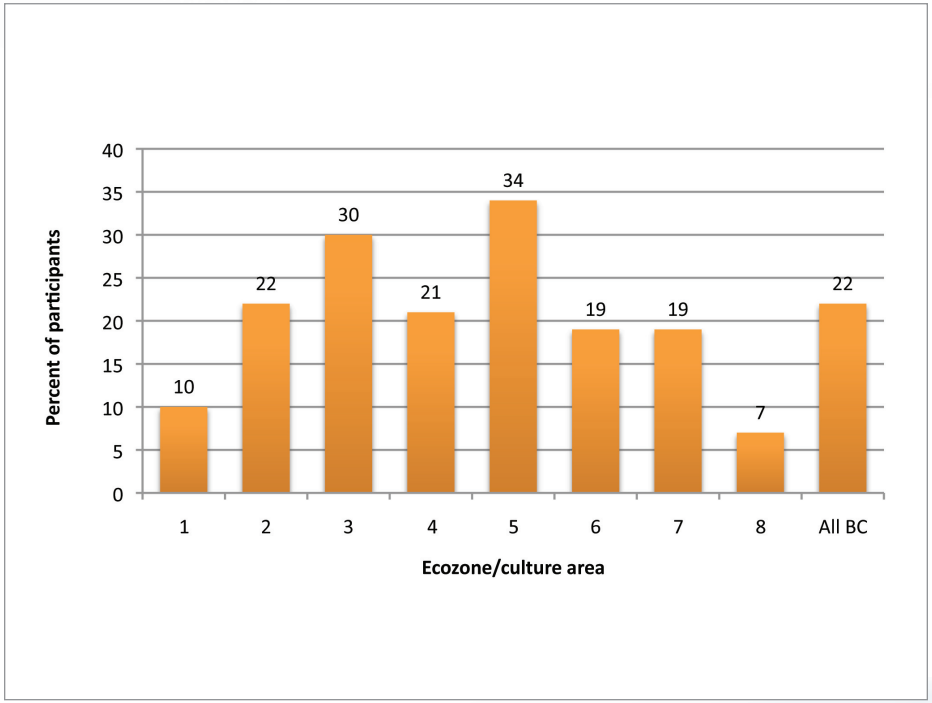
	Median (IQR)
Number of people in HH (n=1103)	4 (2-5)
Number of people in HH Employed Full-time (n=1095)	1 (0-2)
Number of people in HH Employed Part-time (n=1095)	0 (0-1)
Number of years of school completed (n=1078)	12 (10-12)

Figure 3. Main source of income for BC FN living on-reserve (n=1077)



*note: other sources of income only reported in 2009 (year 2 of data collection)
Workers Comp/EI= worker's compensation/ employment insurance

Figure 4. Percent of on-reserve BC FN on social assistance by ecozone/culture area and total



Health and Lifestyle Practices

Figure 5a. Overweight and obesity in BC FN women living on-reserve

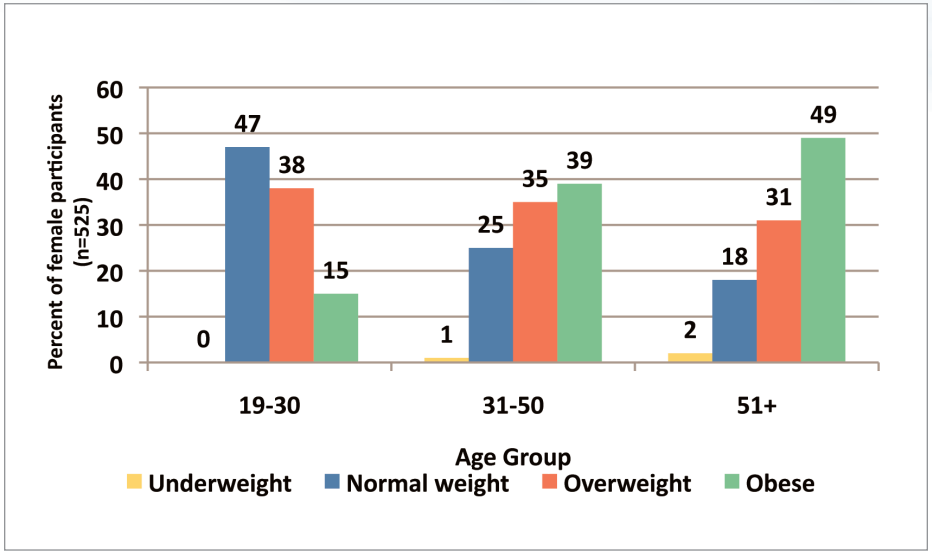
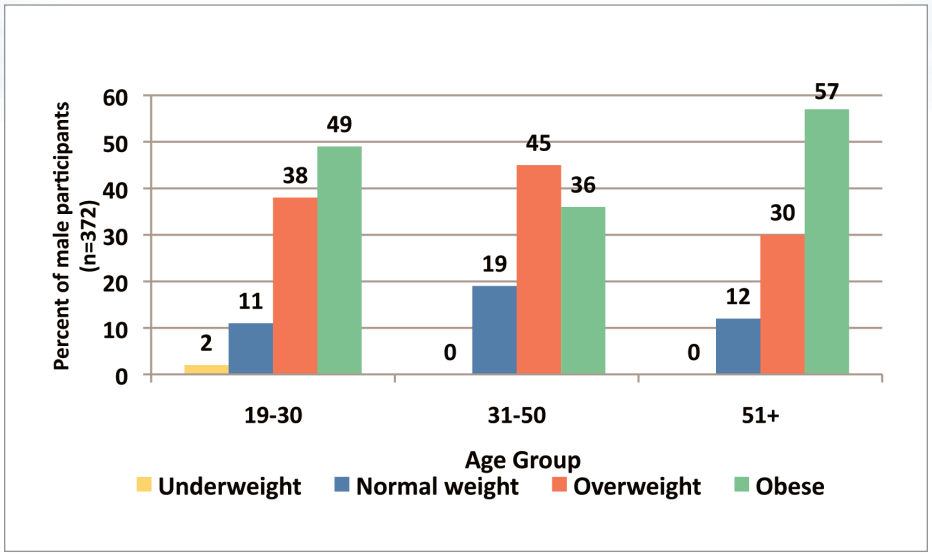


Figure 5b. Overweight and obesity in BC FN men living on-reserve[8]



[8] Classified using Health Canada's BMI categories[51].
Results include both measured and reported weight and height values; no significant differences found between measured (n=255) and reported (n=637) values; excludes pregnant and breastfeeding women (n=44)

Figure 6. Percent of on-reserve BC FN dieting (to lose weight) on the day before the interview

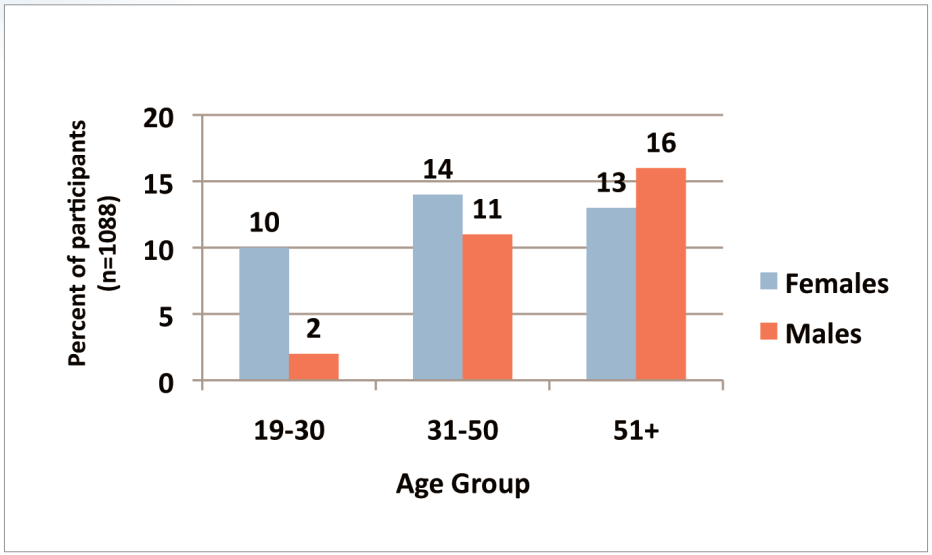


Figure 7. Percent of on-reserve BC FN who smoke, by ecozone/culture area and total

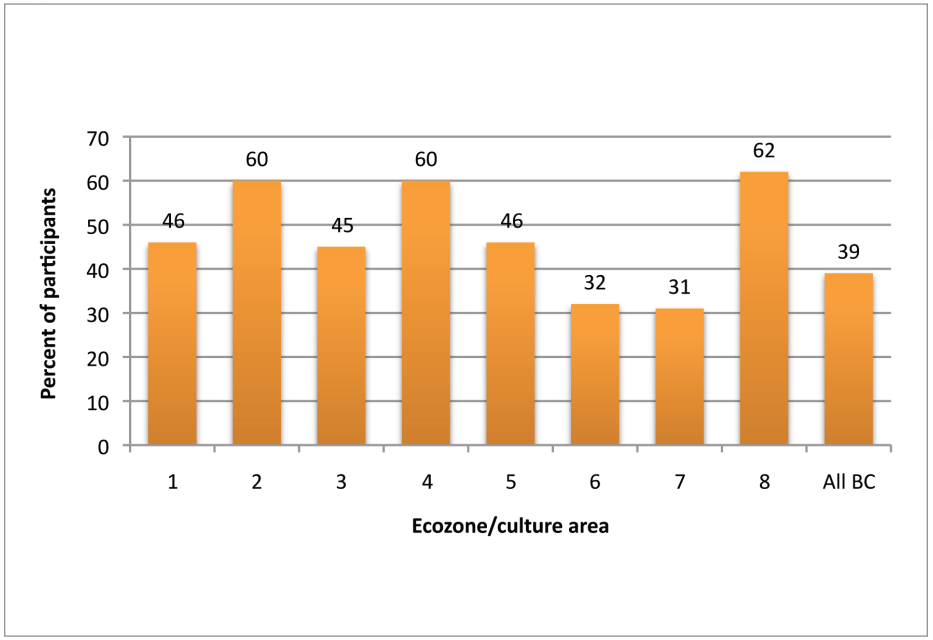


Table 5. Supplement use in BC FN living on-reserve

Gender	Age group (age in years)	All BC % (n)
Women	19-30	21 (40)
	31-50	34 (110)
	51+	48 (91)
Men	19-30	15 (8)
	31-50	29 (34)
	51+	33 (39)

Figure 8a. Self-perceived health in BC FN women living on-reserve, by age group

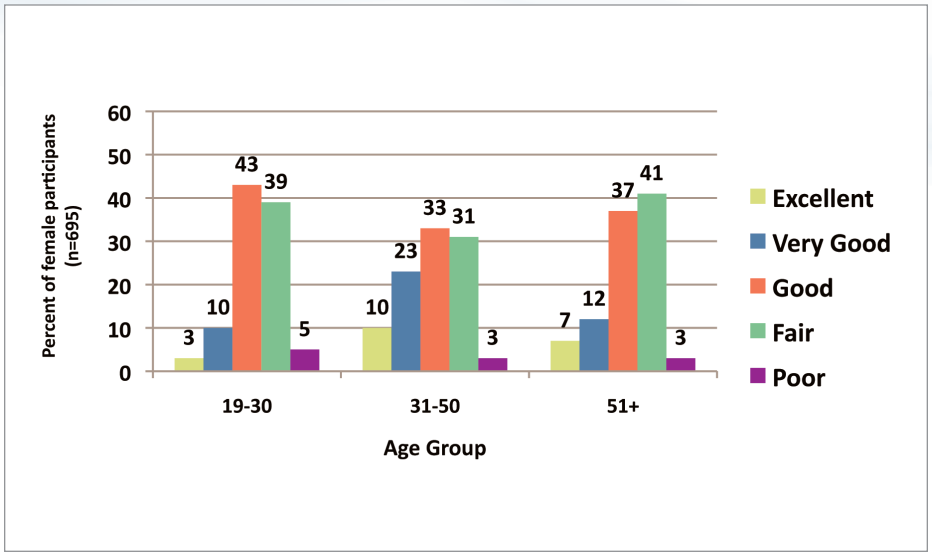


Figure 8b. Self-perceived health in BC FN men living on-reserve, by age group

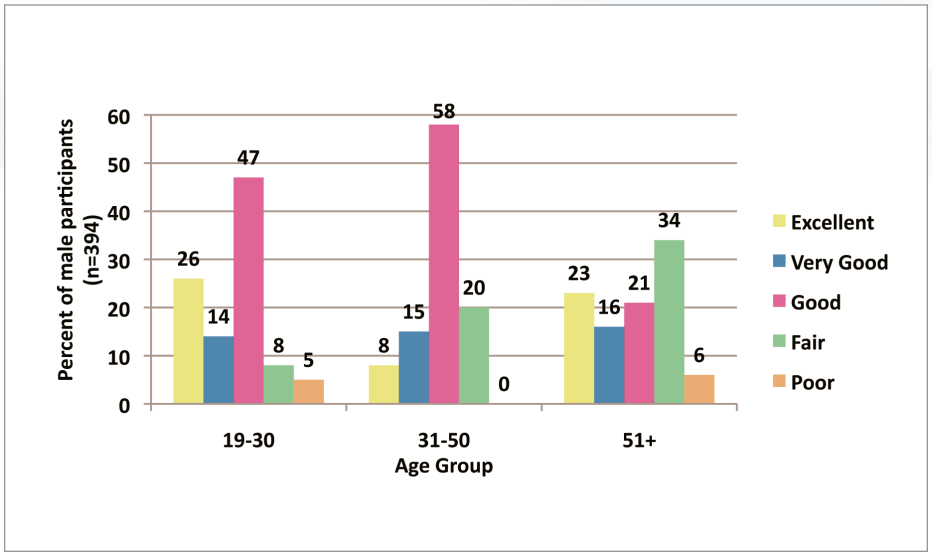


Figure 9a. Self-reported activity level in BC FN women living on-reserve, by age group

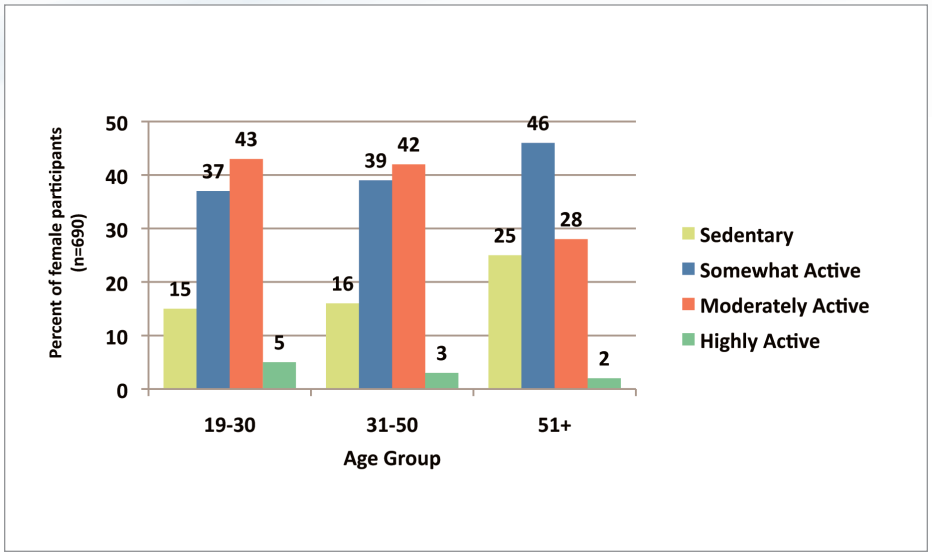


Figure 9b. Self-reported activity level in BC FN men living on-reserve, by age group

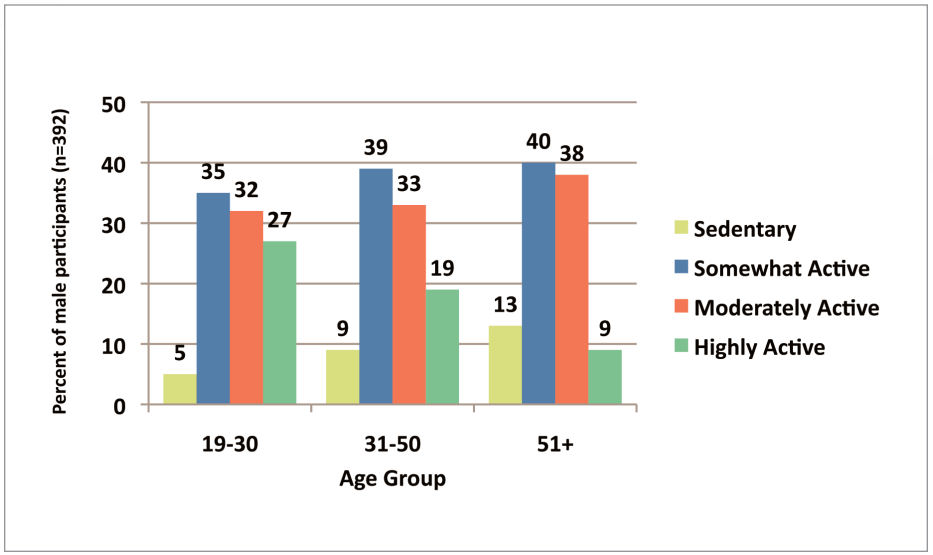


Figure 10. Percent of on-reserve BC FN who eat vegetables and/or fruits from their gardens or community gardens, by ecozone/culture area and total

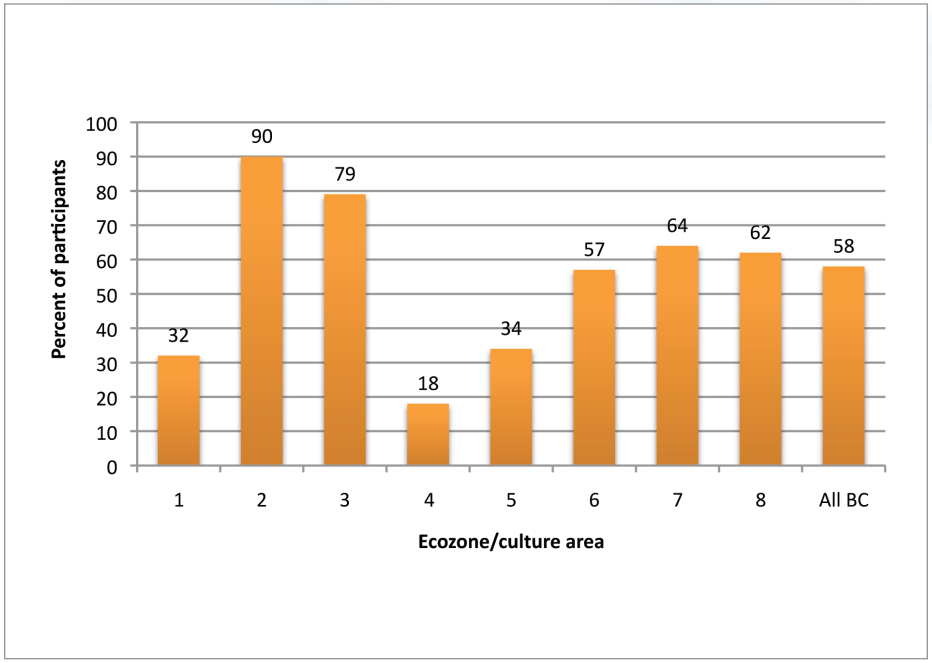


Figure 11a. Traditional food harvest practices by on-reserve BC FN by ecozone/culture area compared to all BC communities (n=1101)

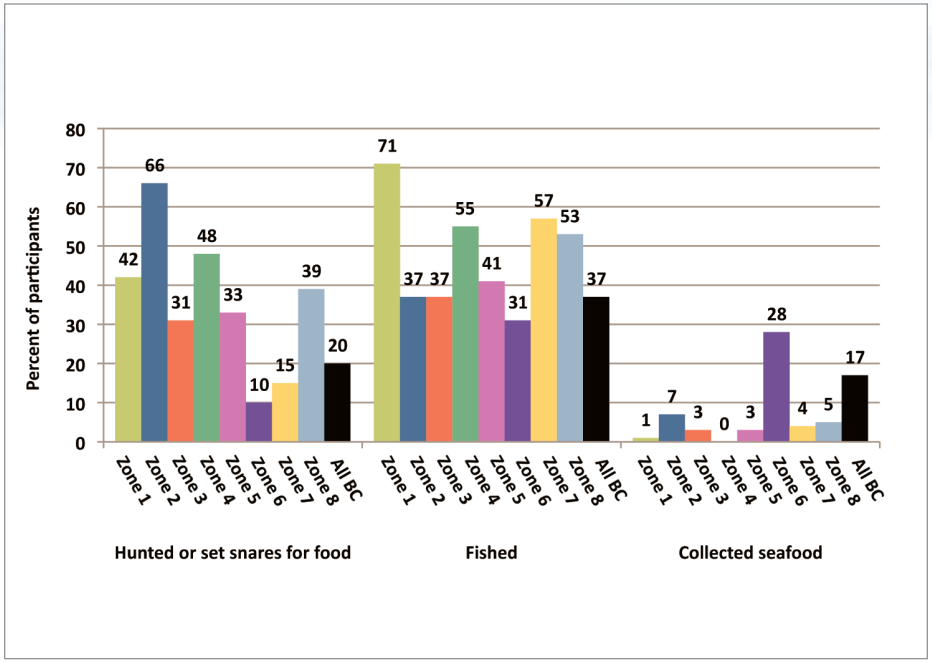
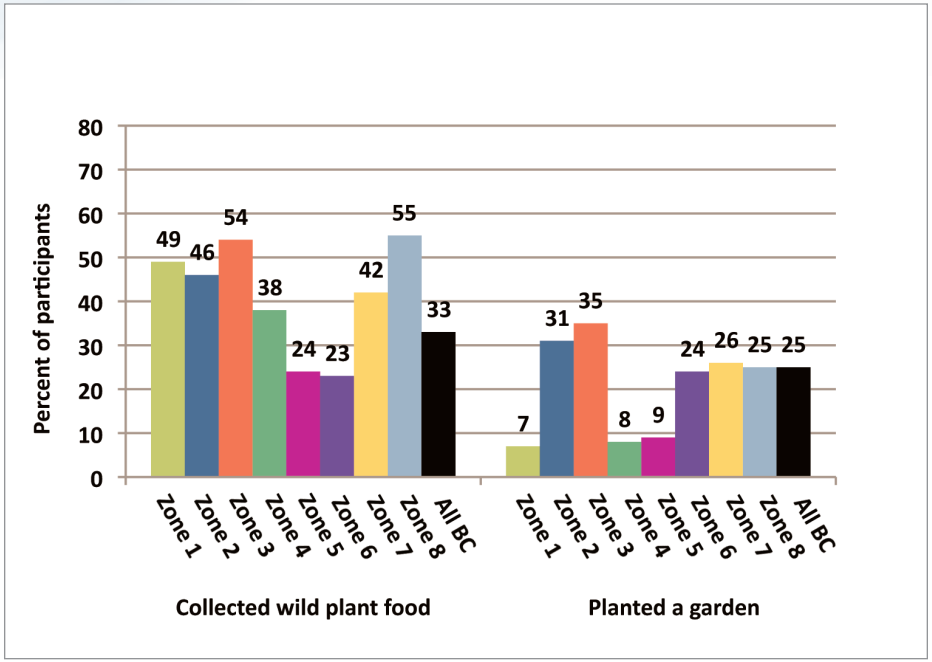


Figure 11b. Traditional food gathering practices by on-reserve BC FN by ecozone/ culture area compared to all BC communities (n=1101*)



*n=1102 for planted a garden results

Table 6. Percent of on-reserve BC FN consuming traditional foods in the past year, by ecozone/culture area and all BC

	Percent consumption								
	Ecozone/ Culture Area								
Traditional Food	1	2	3	4	5	6	7	8	All BC
FISH	98	75	93	86	99	99	94	74	95
Salmon (any type)	98	63	91	64	99	98	92	48	92
Salmon, Sockeye	90	34	78	32	85	88	66	19	79
Halibut	30	25	19	5	22	82	10	18	55
Salmon, Chinook (King/Spring)	71	9	55	10	31	45	47	3	43
Herring roe	47	0	2	2	19	61	1	0	37
Trout (any type)	54	33	52	61	22	24	55	42	36
Salmon eggs (pink/chum/coho/sockeye/ Chinook)	20	3	34	10	29	40	47	2	35
Eulachon grease	9	1	3	0	18	57	2	1	35
Salmon, Coho	4	8	29	3	23	41	44	8	33
Eulachon	21	1	3	0	29	52	1	1	32
Ling Cod	0	20	40	5	4	29	3	20	27
Salmon, Pink	4	30	17	11	14	32	16	17	25
Salmon, Chum (Dog)	1	5	5	0	5	40	3	0	24
Rockfish (rock, red snapper, black bass, tiger, quill)	1	1	2	0	2	39	3	1	23
Pacific Cod (Grey)	0	7	13	2	12	28	7	8	20
Trout, Rainbow	28	22	36	34	14	8	49	23	19
Black Cod (Sablefish)	5	1	6	0	4	27	1	1	18

	Percent consumption								
	Ecozone/ Culture Area								
Traditional Food	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**All BC**
Trout, Lake	12	14	28	20	6	2	14	16	11
Trout, Steelhead	20	0	13	2	4	12	21	0	11
Trout, Dolly Varden	24	19	6	37	1	5	36	23	10
Herring	5	0	2	0	2	13	1	2	8
Trout, Kokanee	0	0	22	7	1	0	5	0	6
Kelp greenling	0	0	1	0	3	6	0	1	4
Trout, Brook	0	3	16	0	0	0	3	1	4
Whitefish (round ,mountain, lake)	3	2	2	0	0	4	16	0	3
Trout, Cutthroat	0	0	2	0	0	3	0	0	2
Trout, Bull	0	6	6	4	1	0	5	5	2
Burbot	0	1	7	0	0	0	0	0	2
Trout, Brown	0	0	5	0	0	0	0	0	1
Arctic grayling	0	2	0	5	0	0	2	6	1
Sucker (longnose, largescaled)	0	1	1	2	0	0	1	4	1
Yellow Perch	0	1	1	0	0	1	1	0	1
Cisco	0	0	0	0	0	0	1	1	0
Inconnu (coney)	0	0	0	0	0	0	0	0	0
Northern pike	0	17	0	0	0	0	1	20	0
Walleye (Pickerel)	0	2	0	0	0	0	1	21	0
Chub (flathead, lake)	0	0	0	1	0	0	0	1	0

	Percent consumption								
	Ecozone/ Culture Area								
Traditional Food	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**All BC**
Bass (smallmouth, largemouth)	0	1	0	0	0	0	1	0	0
Black Crappie	0	0	0	0	0	0	0	0	0
Sturgeon (green/white)	0	0	0	2	0	0	4	0	0
OTHER FISH (arctic char, goldeye, grayling, jackfish, sucker eggs, tommy cod, trout eggs)	0	1	0	4	0	0	0	4	0
BEACH FOODS	26	22	23	4	32	91	14	6	60
Clams (any type)	13	5	8	0	8	73	4	0	45
Crab (Dungeness, King, Tanner)	15	15	8	3	17	65	6	5	41
Prawn	8	16	20	0	7	53	12	0	36
Shrimp	5	19	21	0	9	45	11	0	32
Butter clams	5	3	4	0	3	50	1	0	30
Basket Cockle	1	0	0	0	3	49	0	0	29
Steamer clams (littleneck/manilas)	0	1	4	0	0	39	2	0	23
Oysters	6	13	9	0	5	26	4	2	18
Mussels (large and small)	0	6	7	0	5	15	3	2	10
Scallops (Rock, Spiny, Giant Pacific)	4	10	6	0	4	13	4	2	10
Octopus	3	3	1	0	2	10	1	0	6
Sea prunes (black chitin)	0	2	0	0	0	8	0	0	5
China slippers (gumboot) –	0	0	0	0	0	9	0	0	5
Abalone	0	1	2	0	1	6	0	0	4
Geoduck clams	0	0	0	0	2	5	0	0	3

	Percent consumption								
	Ecozone/ Culture Area								
Traditional Food	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**All BC**
Razor clams	0	0	0	0	2	6	0	0	3
Sea Urchin eggs (green, red, purple)	0	0	1	0	0	4	0	0	3
Sea cucumber	0	0	0	0	0	5	0	0	3
Horse clams	0	0	1	0	0	1	0	0	1
Crab – guts (hepatopancreas)	1	2	0	0	1	2	0	0	1
Barnacle (goose neck, giant/acorn)	0	0	0	0	0	2	0	0	1
SEAWEED									
Laver	4	0	0	0	20	57	2	2	34
Kelp	3	0	0	1	0	5	3	0	3
Rockweed	0	0	0	0	0	0	0	0	0
Sea lettuce	1	2	0	0	0	0	1	0	0
OTHER BEACH FOOD (crab eggs, heiltsuk seaweed, lobster, sea asparagus, sea grass, spider crab)	0	0	0	0	0	1	0	0	1
SEA MAMMALS	1	0	0	0	0	5	0	0	3
Harbour Seal meat	1	0	0	0	0	4	0	0	2
Harbour Seal fat	0	0	0	0	0	1	0	0	1
Sea Lion meat	0	0	0	0	0	2	0	0	1
Harbour Seal organs	0	0	0	0	0	0	0	0	0
Sea Lion grease	0	0	0	0	0	0	0	0	0
Sea Lion organs	0	0	0	0	0	0	0	0	0
OTHER SEA MAMMALS	0	0	0	0	0	0	0	0	0

	Percent consumption								
	Ecozone/ Culture Area								
Traditional Food	1	2	3	4	5	6	7	8	All BC
LAND MAMMALS	100	100	89	97	93	79	81	97	84
Moose meat	100	97	70	94	93	48	48	97	60
Deer meat	6	40	86	12	22	46	80	26	52
Elk meat	0	67	40	45	1	30	14	39	32
Deer liver	1	7	41	5	3	10	29	2	17
Moose liver	64	24	20	19	20	7	8	28	13
Moose kidney	78	49	10	29	9	1	5	31	8
Caribou meat	46	7	3	18	3	3	3	6	5
Beaver meat	14	22	1	35	17	0	2	32	5
Rabbit (Snowshoe Hare/Jackrabbit meat, rabbit)	14	46	6	23	6	1	2	40	5
Deer kidney	1	2	14	5	1	1	7	0	4
Elk liver	0	7	8	8	0	3	2	4	4
Groundhog meat	15	0	2	23	0	0	0	1	3
Black bear meat	5	4	1	17	14	2	7	2	3
Black bear fat	40	5	2	21	8	0	1	7	3
Sheep meat (Bighorn, Stone/Dall's)	32	6	3	6	1	0	3	7	2
Mountain Goat meat	10	3	0	18	2	0	5	1	2
Elk kidney	0	7	2	6	0	0	1	2	1
Porcupine meat	5	3	0	5	0	0	0	8	1
Caribou liver	3	3	0	1	0	0	0	0	0
Caribou kidney	6	6	0	1	0	0	0	0	0

	Percent consumption								
	Ecozone/ Culture Area								
Traditional Food	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**All BC**
Muskrat meat	0	0	0	0	0	0	0	2	0
Gopher	4	0	0	0	0	0	0	0	0
OTHER LAND MAMMALS (buffalo, cougar, deer heart, lynx, moose heart, tongue and nose, squirrel)	0	10	4	0	1	1	2	2	2
WILD BIRDS	44	49	19	38	10	12	14	46	17
Grouse (Blue, Ruffed)	40	45	16	32	10	10	13	44	15
Ducks, non fish-eating (all combined)	3	15	1	4	0	4	1	23	3
Mallard	3	9	1	4	0	3	1	23	2
Geese (Canada, brant, snow, greater white fronted)	6	18	1	6	2	1	2	16	2
Goldeneye	0	0	1	0	0	1	0	4	1
Ptarmigan (Willow, white tailed, rock)	13	1	0	2	0	0	0	2	1
Scoter (surf, white winged, common	0	0	0	0	0	0	0	0	0
Oldsquaw (aka Stellar's Elder Duck, Old Duck)	0	0	0	0	0	0	0	0	0
Canvasback	0	0	0	0	0	0	0	0	0
Wood Duck	0	2	0	0	0	0	0	0	0
Ruddy Duck	0	0	0	0	0	0	0	0	0
American Wigeon	0	2	0	0	0	0	0	0	0
Northern Pintail	0	0	1	0	0	0	0	4	0
Northern Shoveler	0	0	0	0	0	0	0	2	0
Teal (Green-winged, blue-winged, cinnamon)	0	0	0	0	0	0	0	0	0

	Percent consumption								
	Ecozone/ Culture Area								
Traditional Food	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**All BC**
Loon (common, yellow billed, red throated)	0	0	0	0	0	0	0	0	0
Merganser (common, hooded)	0	2	0	0	0	0	0	0	0
Grebe (western, pied billed, horned)	0	0	0	1	0	0	0	0	0
Murre	0	0	0	0	0	0	0	0	0
Swan (mute, trumpeter)	0	1	0	0	0	0	0	3	0
Quail	0	0	0	0	0	0	0	0	0
Seagull eggs	0	0	0	0	0	0	0	0	0
Oystercatcher eggs	0	0	0	0	0	0	0	0	0
Goose eggs	1	0	0	2	0	0	0	1	0
Other bird eggs	0	0	0	0	0	0	0	2	0
OTHER BIRD OR BIRD egg (fools hen, pheasant, sharp-tail grouse, willow grouse)	0	1	5	0	0	0	0	0	1
WILD BERRIES	88	98	87	93	81	85	94	80	86
Salmonberries	0	0	6	1	2	60	34	5	37
Blueberries (alaska, oval leaved, bog)	66	82	33	26	33	37	43	52	36
Soapberries	60	5	52	57	66	20	67	23	34
Blackberry, large (himalyan)	1	6	12	12	1	51	34	6	34
Blue huckleberry	36	27	56	80	65	12	52	27	32
Raspberry (wild, creeping)	36	63	40	32	19	23	48	72	30
Wild Strawberry	36	72	45	42	20	17	42	58	28
Red huckleberry	3	15	20	3	6	34	35	3	26
Saskatoon berry	12	70	58	13	17	11	42	52	24

	Percent consumption								
	Ecozone/ Culture Area								
Traditional Food	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**All BC**
Blackberry, trailing	0	9	12	2	1	29	35	4	21
Thimbleberries	0	0	16	1	2	22	36	1	18
Crabapple	6	10	17	1	13	18	26	18	16
Salal berries	1	2	6	0	1	22	10	0	15
Cranberry (low-bush/lingonberry, bog)	24	25	13	12	7	9	5	38	11
Black caps (black raspberry)	0	3	17	2	2	6	60	3	10
Rose hips	8	14	23	8	2	6	13	17	10
Chokecherry	10	11	29	0	2	3	11	16	9
Highbush Cranberry	30	33	4	14	3	6	4	36	7
Gooseberry/currant	8	6	7	2	1	6	5	9	6
Hazelnut	0	0	9	0	2	1	12	1	3
Oregon Grape (low, dull, tall)	0	0	8	3	1	1	9	0	3
Bunchberries	0	2	4	2	1	0	2	3	2
Elderberry (blue, red)	0	0	2	0	1	2	1	0	2
Indian plum	0	0	3	0	0	2	4	0	2
Juniper berries	10	0	5	3	2	0	9	1	2
Crowberry	5	0	3	4	0	0	2	3	1
Cloudberries	0	3	0	0	0	0	3	7	1
Hawthorn (black, red)	0	0	2	0	0	1	1	0	1
Kinnikinnick Bearberry	0	0	1	0	0	0	3	3	0
False Solomon's Seal berries	0	0	0	0	0	0	1	0	0

	Percent consumption								
	Ecozone/ Culture Area								
Traditional Food	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**All BC**
OTHER BERRIES (bearberry, frog eye, elder berries, greengage plums, low bush berries, moss berries, red currants, rosehips, wild cherries)	10	0	1	0	0	0	1	2	1
WILD PLANT ROOTS, SHOOTS OR GREENS	32	48	43	21	5	18	54	29	26
Labrador Tea leaves	2	22	28	18	2	7	24	10	13
Thimbleberry, salmonberry shoots	0	0	4	0	0	10	5	0	7
Indian potato (Spring beauty)	0	0	20	1	0	0	1	0	5
Bitterroot	0	3	16	0	0	0	0	0	4
Stinging nettle leaves	1	3	5	0	1	3	20	1	4
Onion (nodding, hooker's)	0	4	9	3	0	1	4	0	3
Balsam root	5	0	3	1	0	2	3	0	2
Mariposa lily (sweet onion, wild potatoes)	0	0	7	0	0	0	1	0	2
Licorice Fern	0	0	4	0	0	1	0	0	2
Cow-parsnip shoots	1	3	0	1	1	1	31	0	2
Giant horsetail shoots	0	1	4	0	0	1	13	0	2
Northern rice root, Tiger or Chocolate lily	0	0	3	0	1	0	1	0	1
Yellow avalanche lily	0	0	5	0	0	0	0	0	1
Camas bulb	0	0	2	0	0	0	0	0	1
Bracken fern root	0	0	0	0	0	2	1	0	1
Wild Ginger	0	0	3	0	0	0	5	0	1
Thistle	0	0	4	0	1	1	3	0	1
Indian potato (Bear root, Eskimo potato, Alaska carrot, sweet vetch)	0	0	5	0	0	0	0	0	1

	Percent consumption								
	Ecozone/ Culture Area								
Traditional Food	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**All BC**
Rat root	0	23	2	1	2	0	5	24	1
Spiny wood fern root	0	0	0	0	0	0	0	0	0
Desert Parsley	0	0	0	0	0	0	0	0	0
Silverweed	0	0	0	0	0	0	0	0	0
Prince's Pine	0	0	0	0	0	0	0	0	0
Springbank Clover root	0	0	2	0	0	0	2	0	0
Wapato bulb	0	0	0	0	0	0	0	0	0
Fireweed shoots	1	0	0	0	0	0	2	0	0
Bigleaf Maple shoots	0	0	0	0	1	0	0	0	0
Desert parsley (Swale, barestem, nine-leaved)	0	0	2	0	0	0	0	0	0
Prickly pear cactus	0	0	0	0	0	0	1	0	0
Sorrel	0	0	0	0	0	0	0	0	0
Sheep sorrel	0	0	0	0	0	0	0	0	0
Western Dock	0	0	1	0	0	0	0	0	0
OTHER PLANTS (caribou weeds/ leaves, Susan smith clover, asparagus, beaver root, burdock, dandelion, devil's club, fiddleheads, Indian celery, Indian rhubarb, licorice root, mular, mullin, muskeg tea, nootka rose, pawawja, raspberry shoots, red willow leaves, rose petal, rose hips, skunk cabbage root, sour grass, St. John's wart, sword fern, thimble berry shoots, wild camas, wild peppermint, wild peppermint)	31	29	12	0	3	2	9	5	5

	Percent consumption								
	Ecozone/ Culture Area								
Traditional Food	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**All BC**
TREE FOODS	36	10	9	30	5	5	6	17	9
Balsam Tree inner bark	30	0	3	17	3	4	0	7	6
Balsam pitch	16	0	3	8	0	1	0	7	2
Lodgepole pine (jack pine) inner bark	0	2	5	0	0	0	0	0	2
Red willow (bark)	4	1	4	7	4	0	0	2	2
Red willow root	0	0	3	7	1	0	1	1	2
Birch inner bark	4	2	1	5	3	1	0	3	1
Birch pitch	3	0	2	0	0	0	2	2	1
Poplar (cottonwood) inner bark	0	6	1	4	2	0	0	2	1
Pine needle/twig tea	0	1	3	0	2	0	1	0	1
Pine pitch	14	2	2	2	2	0	0	0	1
Spruce (black or white) pitch	3	0	1	4	0	1	0	8	1
Black poplar buds	0	2	0	0	0	0	0	0	0
Spruce (black or white) inner bark	1	0	0	1	2	0	0	1	0
Other Tree Products (balsam bark-outer, alder bark, birch sap, cascara bark, juniper bark, poplar sap, pussy willows, spruce shoots/tips, swamp tea, white pine, yew bark)	8	0	3	2	2	1	2	6	2
MUSHROOMS	7	11	37	1	6	22	69	0	24
Pine	7	4	18	0	6	14	67	0	15
Chanterelle	0	1	11	0	2	14	14	0	11
Cottonwood	0	0	21	0	0	0	2	0	5
Morel	1	8	20	0	2	1	5	0	5

	Percent consumption								
	Ecozone/ Culture Area								
Traditional Food	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**All BC**
Oyster	0	1	8	1	0	1	2	0	3
Other Mushrooms (chicken of the wood, field mushroom, lightning, puffball, sand mushroom, shaggy mane)	0	3	16	0	0	4	3	0	6

Table 7a. Seasonal frequency of top ten consumed traditional food items for consumers and non-consumers combined, based on average days per year, BC FN living on-reserve

Traditional Food	Percent of consumers	Average days per season (SE) for all participants (n=1105)				Average days per year (SE)
		Summer	Spring	Winter	Fall	
Salmon (any type)	92	14 (2)	10 (2)	12 (2)	12 (2)	47 (8)
Moose meat	60	7 (1)	7 (1)	7 (1)	7 (1)	28 (4)
Salmon, Sockeye	79	8 (2)	6 (1)	7 (2)	6 (1)	27 (6)
Deer meat	52	5 (2)	5 (2)	5 (2)	5 (2)	19 (8)
Eulachon grease	35	3 (2)	3 (2)	3 (1)	3 (1)	12 (6)
Halibut	55	3 (1)	2 (1)	2 (1)	2 (1)	10 (3)
Salmon, Chinook (King/Spring)	43	3 (1)	2 (1)	2 (1)	2 (1)	9 (3)
Laver seaweed	34	2 (1)	3 (2)	2 (1)	2 (1)	9 (5)
Blueberries (alaska, oval leaved, bog)	36	3 (1)	1 (1)	1 (1)	1 (1)	7 (2)
Soapberries	34	2 (0)	1 (0)	2 (1)	1 (0)	6 (1)

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

Table 7b. Seasonal frequency of top ten consumed traditional food items for consumers and non-consumers combined, based on average days per year, ecozone 1, BC FN living on-reserve

Traditional Food	Percent of consumers	Average days per season (SE) for ecozone 1 participants (n=80)				Average days per year (SE)
		Summer	Spring	Winter	Fall	
Moose meat	100	27 (7)	26 (8)	29 (6)	27 (8)	109 (29)
Salmon (any type)	98	24 (4)	11 (0)	10 (1)	11 (0)	56 (5)
Salmon, Sockeye	90	15 (2)	6 (0)	6 (1)	6 (0)	32 (3)
Salmon, Chinook (King/Spring)	71	6 (1)	4 (0)	3 (1)	3 (0)	15 (0)
Trout (any type)	54	4 (2)	2 (1)	2 (1)	1 (0)	10 (4)
Balsam tree inner bark	30	2 (1)	2 (1)	2 (1)	2 (1)	8 (3)
Moose kidney	78	2 (0)	2 (0)	2 (0)	2 (0)	8 (0)
Caribou meat	46	2 (2)	1 (1)	2 (2)	3 (2)	7 (6)
Blueberries (alaska, oval leaved, bog)	66	2 (1)	1 (0)	1 (0)	2 (0)	7 (2)
Soapberries	60	2 (0)	1 (0)	2 (1)	2 (0)	7 (2)

"Fish is healthy and moose meat is high in iron, there are natural vitamins in these foods."

Table 7c. Seasonal frequency of top ten consumed traditional food items for consumers and non-consumers combined, based on average days per year, ecozone 2, BC FN living on-reserve

Traditional Food	Percent of consumers	Average days per season (SE) for ecozone 2 participants (n=122)				Average days per year (SE)
		Summer	Spring	Winter	Fall	
Moose meat	97	29 (5)	29 (5)	25 (1)	29 (5)	112 (17)
Elk meat	67	6 (0)	3 (1)	3 (1)	6 (1)	18 (1)
Blueberries (alaska, oval leaved, bog)	82	6 (1)	4 (1)	1 (1)	2 (1)	13 (1)
Salmon (any type)	63	4 (1)	2 (0)	2 (0)	3 (1)	11 (3)
Moose kidney	49	5 (4)	1 (1)	1 (1)	1 (1)	9 (7)
Wild Strawberry	72	4 (0)	2 (1)	1 (0)	1 (0)	7 (0)
Labrador Tea leaves	22	2 (1)	2 (1)	2 (1)	2 (1)	7 (5)
Saskatoon berry	70	4 (2)	1 (1)	1 (0)	1 (1)	7 (3)
Deer meat	40	2 (0)	1 (0)	2 (0)	2 (0)	7 (1)
Grouse (Blue, Ruffed)	45	1 (1)	1 (1)	1 (0)	1 (1)	5 (3)

"I believe traditional foods feed body, mind and spirit. Store foods feed the body."

Table 7d. Seasonal frequency of top ten consumed traditional food items for consumers and non-consumers combined, based on average days per year, ecozone 3, BC FN living on-reserve

Traditional Food	Percent of consumers	Average days per season (SE) for ecozone 3 participants (n=93)				Average days per year (SE)
		Summer	Spring	Winter	Fall	
Deer meat	86	15 (6)	16 (5)	15 (6)	15 (4)	62 (21)
Moose meat	70	6 (3)	6 (3)	9 (3)	8 (4)	30 (13)
Salmon (any type)	91	6 (1)	5 (1)	6 (1)	6 (1)	23 (4)
Salmon, Sockeye	78	6 (3)	5 (2)	6 (3)	5 (2)	23 (10)
Elk meat	40	4 (1)	3 (1)	4 (1)	4 (1)	15 (5)
Blue huckleberry	56	4 (1)	3 (1)	3 (1)	3 (1)	14 (4)
Labrador Tea leaves	28	3 (1)	3 (1)	4 (1)	4 (2)	14 (5)
Soapberries	52	4 (1)	2 (0)	2 (0)	2 (0)	11 (1)
Salmon, Chinook (King/Spring)	55	3 (1)	3 (1)	3 (2)	3 (2)	11 (6)
Red huckleberry	20	2 (1)	2 (1)	2 (2)	3 (2)	9 (6)

"I grew up on traditional food and I love it, it is our way of life."

Table 7e. Seasonal frequency of top ten consumed traditional food items for consumers and non-consumers combined, based on average days per year, ecozone 4, BC FN living on-reserve

Traditional Food	Percent of consumers	Average days per season (SE) for ecozone 4 participants (n=92)				Average days per year (SE)
		Summer	Spring	Winter	Fall	
Moose meat	94	22 (8)	19 (9)	22 (7)	22 (4)	86 (27)
Soapberries	57	5 (3)	3 (2)	5 (7)	2 (2)	14 (14)
Blue huckleberry	80	6 (0)	2 (1)	2 (1)	3 (0)	14 (1)
Salmon (any type)	64	4 (3)	2 (2)	3 (4)	2 (2)	11 (11)
Trout (any type)	61	4 (0)	2 (0)	2 (1)	2 (1)	9 (2)
Balsam pitch	8	2 (3)	2 (3)	2 (3)	2 (3)	9 (11)
Red willow root	7	2 (2)	2 (2)	2 (2)	2 (2)	8 (9)
Poplar (cottonwood) inner bark	4	2 (2)	2 (2)	2 (2)	2 (2)	7 (9)
Salmon, Sockeye	32	2 (3)	1 (1)	2 (2)	1 (1)	6 (7)
Black bear fat	21	1 (1)	2 (2)	1 (1)	1 (1)	6 (5)

"It is keeping our traditions alive."

Table 7f. Seasonal frequency of top ten consumed traditional food items for consumers and non-consumers combined, based on average days per year, ecozone 5, BC FN living on-reserve

Traditional Food	Percent of consumers	Average days per season (SE) for ecozone 5 participants (n=128)				Average days per year (SE)
		Summer	Spring	Winter	Fall	
Salmon (any type)	99	21 (4)	14 (1)	13 (1)	14 (0)	63 (5)
Moose meat	93	12 (5)	12 (5)	13 (5)	14 (5)	50 (21)
Salmon, Sockeye	85	13 (2)	9 (0)	9 (1)	10 (2)	41 (0)
Eulachon grease	18	4 (4)	4 (4)	4 (4)	4 (4)	16 (16)
Soapberries	66	4 (2)	4 (2)	4 (2)	4 (2)	16 (8)
Blue huckleberry	65	5 (0)	2 (1)	3 (1)	3 (1)	14 (3)
Laver seaweed	20	2 (2)	2 (2)	2 (2)	2 (2)	7 (7)
Salmon, Chinook (King/Spring)	31	3 (3)	1 (1)	1 (1)	1 (1)	7 (6)
Blueberries (alaska, oval leaved, bog)	33	3 (0)	1 (0)	1 (0)	2 (1)	7 (1)
Trout (any type)	22	1 (1)	1 (1)	1 (1)	1 (1)	5 (4)

"It's free and healthier. Teach our children about the culture. Teaching about our medicines, stories and history."

Table 7g. Seasonal frequency of top ten consumed traditional food items for consumers and non-consumers combined, based on average days per year, ecozone 6, BC FN living on-reserve

Traditional Food	Percent of consumers	Average days per season (SE) for ecozone 6 participants (n=369)				Average days per year (SE)
		Summer	Spring	Winter	Fall	
Salmon (any type)	98	18 (4)	14 (3)	15 (3)	16 (3)	63 (12)
Salmon, Sockeye	88	10 (3)	7 (2)	8 (2)	8 (2)	33 (9)
Eulachon grease	57	5 (2)	5 (3)	5 (2)	5 (2)	21 (10)
Halibut	82	4 (1)	4 (1)	4 (1)	4 (1)	16 (4)
Laver seaweed	57	4 (2)	5 (3)	3 (2)	3 (1)	15 (7)
Moose meat	48	3 (2)	3 (2)	3 (2)	3 (2)	13 (7)
Salmon, Chinook (King/Spring)	45	3 (1)	3 (1)	2 (1)	3 (1)	11 (4)
Blackberry, large (himalyan)	51	5 (3)	2 (1)	1 (1)	2 (1)	10 (6)
Prawn	53	3 (1)	2 (1)	2 (1)	2 (1)	9 (4)
Clams (any type)	73	2 (0)	2 (0)	2 (1)	2 (1)	8 (2)

"It's part of our culture. This helps maintain our heritage."

Table 7h. Seasonal frequency of top ten consumed traditional food items for consumers and non-consumers combined, based on average days per year, ecozone 7, BC FN living on-reserve

Traditional Food	Percent of consumers	Average days per season (SE) for ecozone 7 participants (n=117)				Average days per year (SE)
		Summer	Spring	Winter	Fall	
Salmon (any type)	92	14 (3)	11 (4)	12 (5)	13 (5)	49 (17)
Soapberries	67	9 (3)	7 (3)	6 (3)	6 (3)	28 (11)
Salmon, Sockeye	66	8 (2)	6 (2)	6 (2)	6 (2)	27 (6)
Deer meat	80	6 (3)	6 (2)	6 (3)	7 (2)	26 (10)
Trout (any type)	55	6 (4)	4 (4)	3 (2)	3 (1)	16 (10)
Pine mushrooms	67	2 (1)	2 (1)	3 (1)	6 (2)	12 (4)
Black caps (black raspberry)	60	7 (5)	1 (1)	2 (1)	2 (1)	12 (6)
Blue huckleberry	52	5 (1)	2 (1)	2 (1)	2 (1)	11 (3)
Moose meat	48	2 (1)	3 (2)	3 (2)	3 (2)	10 (6)
Blueberries (alaska, oval leaved, bog)	43	5 (3)	1 (1)	1 (1)	1 (1)	9 (4)

"The berries are nutritious and it makes me exercise while picking."

Table 7i. Seasonal frequency of top ten consumed traditional food items for consumers and non-consumers combined, based on average days per year, ecozone 8, BC FN living on-reserve

Traditional Food	Percent of consumers	Average days per season (SE) for ecozone 8 participants (n=102)				Average days per year (SE)
		Summer	Spring	Winter	Fall	
Moose meat	97	24 (3)	22 (3)	22 (3)	29 (3)	96 (11)
Grouse (Blue, Ruffed)	44	4 (1)	3 (1)	3 (1)	5 (2)	15 (6)
Rabbit (Snowshoe Hare/Jackrabbit meat, rabbit)	40	2 (1)	2 (1)	3 (1)	3 (1)	10 (4)
Raspberry (wild, creeping)	72	6 (1)	1 (0)	1 (0)	2 (0)	10 (1)
Blueberries (alaska, oval leaved, bog)	52	4 (1)	1 (0)	1 (0)	2 (0)	8 (1)
Saskatoon berry	52	4 (1)	0 (0)	1 (0)	3 (1)	7 (2)
Wild Strawberry	58	5 (1)	1 (0)	1 (0)	1 (0)	7 (1)
Beaver meat	32	2 (1)	2 (1)	1 (1)	1 (1)	7 (3)
Salmon (any type)	48	2 (1)	1 (0)	1 (0)	1 (0)	7 (1)
Deer meat	26	1 (1)	1 (1)	1 (1)	2 (1)	5 (3)

"Traditional food is best for you."

Figure 12. Percent of on-reserve BC FN whose households would like more traditional food

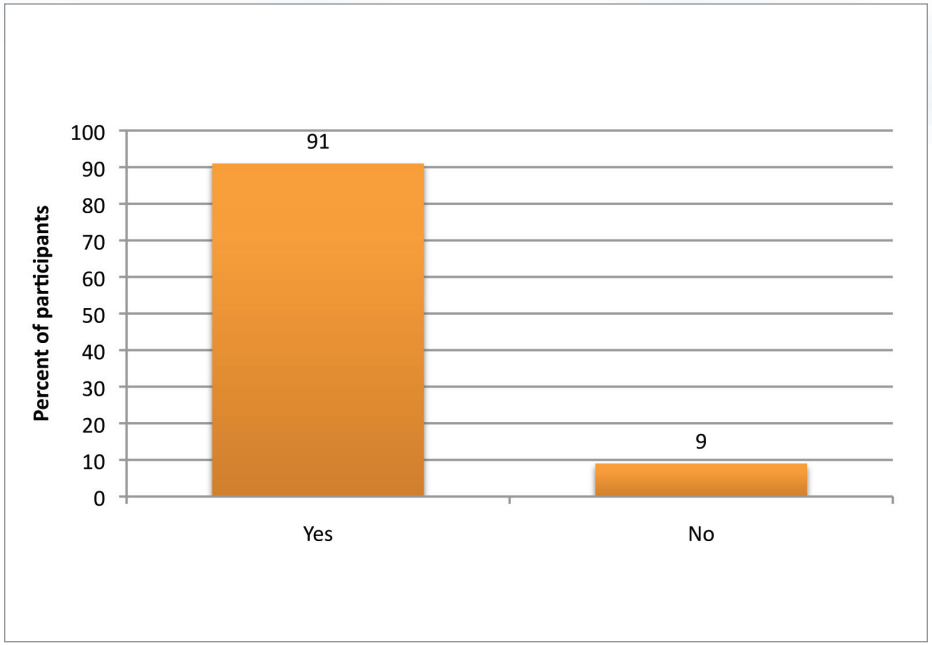
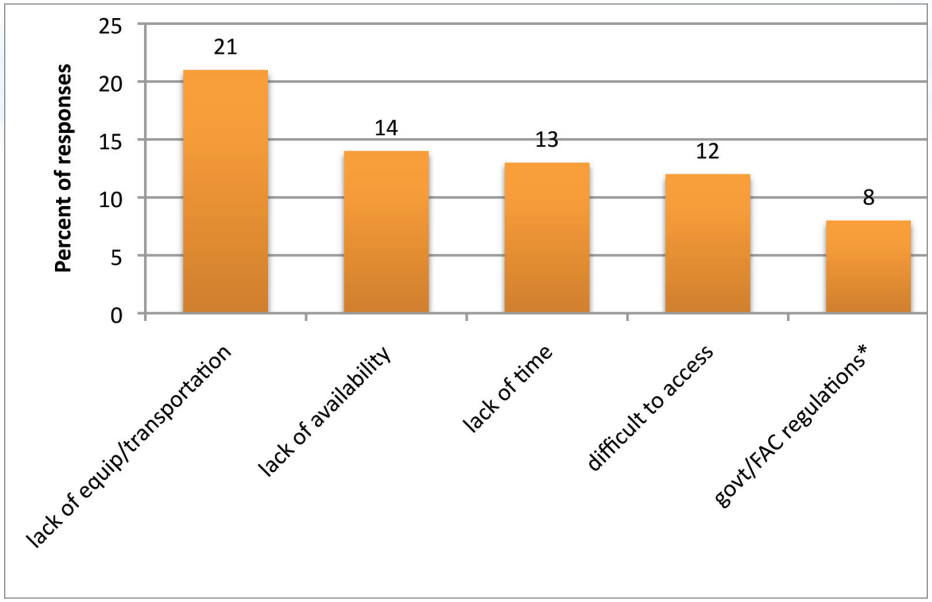


Figure 13. Top 5 barriers preventing on-reserve BC FN households from using more traditional food (n=972)



*govt/FAC regulations= government/firearms certificate regulations
Note: verbatim comments to this open-ended question were grouped according to similar categories

"Traditional foods bring family together when preparing traditional foods."

Figure 14. Percent of on-reserve BC FN who reported that the following affected (or limited) where they could hunt, fish or collect berries

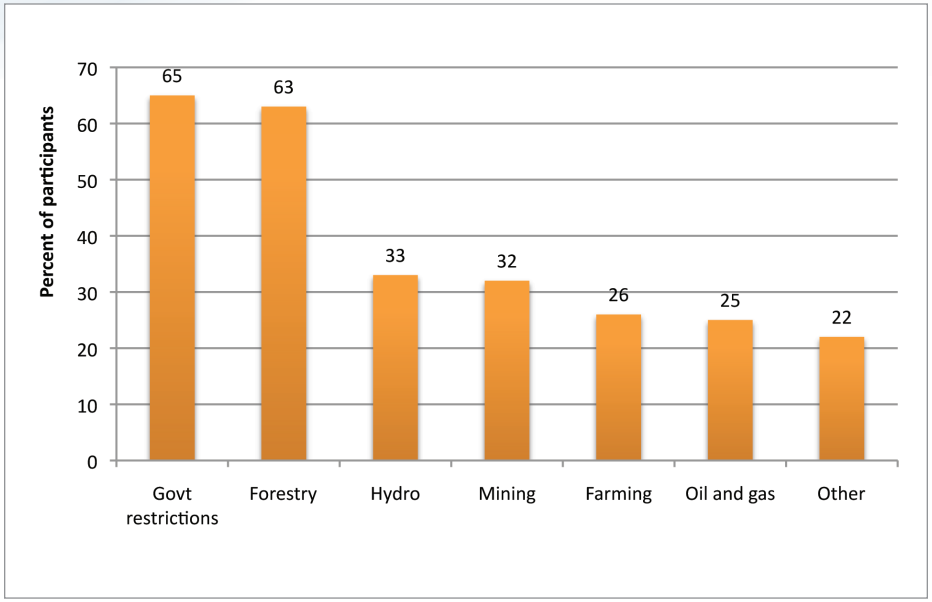
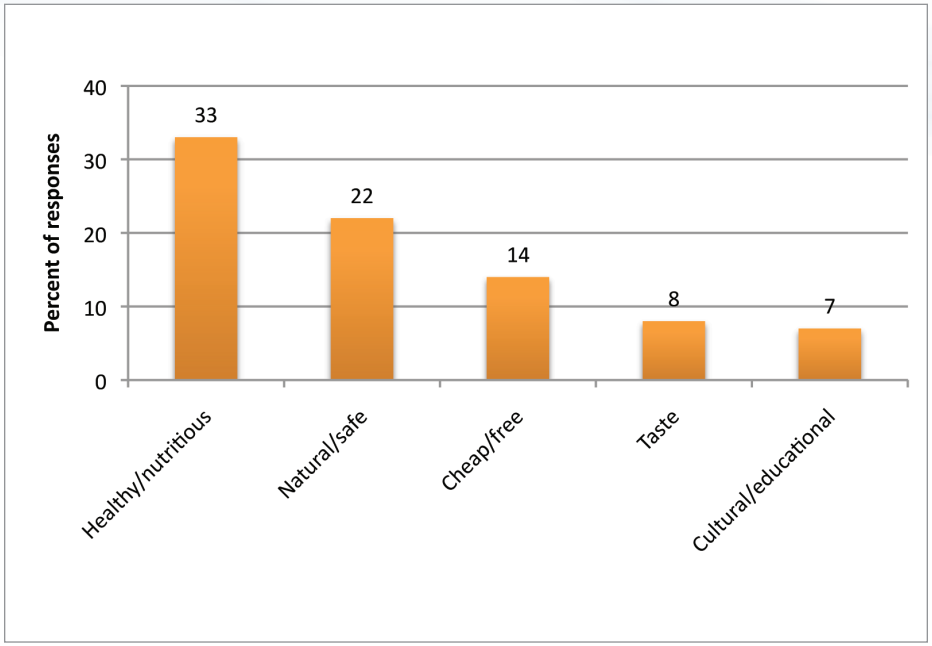


Table 8. Traditional foods made less available to BC FN living on-reserve because of the limits from Figure 14 (n=1101)

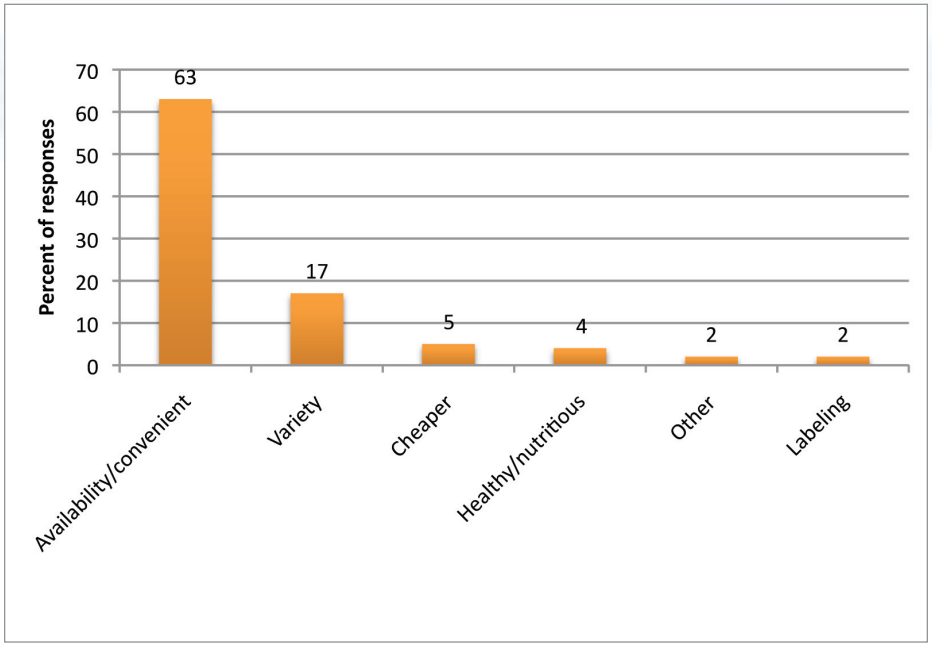
Traditional food	Yes %	No %	Don't Know %
Salmon	68	23	9
Deer	55	31	14
Moose	55	31	14
Berries	50	38	12
Shellfish	41	42	17
Small mammals	37	44	19
Other fish (arctic grayling, bull trout, arctic char, cod, snapper, halibut, eulachon, goldeye, halibut, herring, jackfish, lingcod, pickerel, lake trout, rainbow trout, walleye, northern pike, sturgeon, sucker, whitefish, all fish)	35	25	40
Other plants (mint, soapberry, asparagus, balsam, bear roots, blueberries, caribou leaves, cedar trees, chokecherries, clover root, cranberries, devil's club, fiddleheads, gooseberries, herbal plants, huckleberries, Indian rhubarb, medicinal plants, pine mushroom, muskeg tea, rat root, rose buds, sweet grass, wild potato, yew wood, all plants)	18	33	49
Other traditional food (abalone, bears, beavers, birds, ducks, caribou, fools hen, gopher, ground hog, grouse, rabbits, Indian celery, Indian tea, porcupine, raspberries, roots, shoots)	15	33	52

Figure 15. Top 5 benefits of traditional food reported by BC FN living on-reserve (n=1095)



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

Figure 16. Top 5 benefits of market food reported by BC FN living on-reserve* (n=1080)



*top 6 presented due to tied responses
Note: verbatim comments to this open-ended question were grouped according to similar categories

"Traditional food keeps the tradition on-going for the next generation."

Food Security

Table 9. Traditional food insecurity for BC FN living on-reserve

Did the following occur in your HH in the past 12 months?	Percent of responses (n)			
"We worried whether our traditional food would run out before we could get more".	**Often**	**Sometimes**	**Never**	**Don't know or refused**
Total (21 BC communities)	28 (286)	37 (352)	31 (393)	5 (55)
"The traditional food that we got just didn't last, and we couldn't get more."	**Often**	**Sometimes**	**Never**	**Don't know or refused**
Total (21 BC communities)	33 (278)	36 (382)	27 (379)	3 (47)

"We live here, nowhere else; this food in this area is for us to keep our body in tune with the environment."

Table 10. Percent of on-reserve BC FN who responded affirmatively to food security questions (in the last 12 months)

	Households affirming item					
	All Households N=1103		Households with Children N=642		Households without Children N=461	
	n	%	n	%	n	%
Adult Food Security Scale						
You and other household members worried food would run out before you got money to buy more	415	39.9	255	44.9	160	31.4
Food you and other household members bought didn't last and there wasn't any money to get more	369	35.9	221	39.9	148	28.9
You and other household members couldn't afford to eat balanced meals	363	37.0	205	39.4	158	33.0
You or other adults in your household ever cut the size of meals or skip meals because there wasn't enough money for food	123	11.7	75	14.7	48	6.5
You or other adults in your household ever cut size of meals or skip meals in 3 or more months	90	6.2	47	6.4	43	5.8
You (personally) ever ate less than you felt you should because there wasn't enough money for food	137	12.7	80	14.9	57	9.0
You (personally) were ever hungry but did not eat because you couldn't afford enough food	92	6.9	50	7.8	42	5.4
You (personally) lost weight because you didn't have enough money for food	63	4.6	31	5.3	32	3.5
You or other adults in your household ever did not eat for a whole day because there wasn't enough money for food	45	2.9	23	3.1	22	2.7
You or other adults in your household ever did not eat for a whole day in 3 or more months	33	2.3	17	2.6	16	2.0
Child Food Security Scale						
You or other adults in your household relied on less expensive foods to feed the children because you were running out of money to buy food	180	18.7	180	29.5	-	-
You or other adults in your household couldn't feed children a balanced meal because you couldn't afford it	139	17.6	139	27.7	-	-
Children were not eating enough because you and other adults in your HH just couldn't afford enough food	86	9.8	86	15.4	-	-
You or other adults in your household ever cut the size of any of the children's meals because there wasn't enough money for food	39	5.3	39	8.4	-	-
Any of the children were ever hungry but you just couldn't afford more food	23	2.8	23	4.4	-	-
Any of the children ever skip meals because there wasn't enough money for food	13	2.1	13	3.3	-	-
Any of the children ever skip meals in 3 or more months	10	0.7	10	1.2	-	-
Any of the children ever not eat for a whole day because there wasn't enough money for food	7	0.7	7	1.1	-	-

(-) denotes not applicable

Figure 17. Degree of food insecurity in BC FN living on-reserve[9] (n=1103)

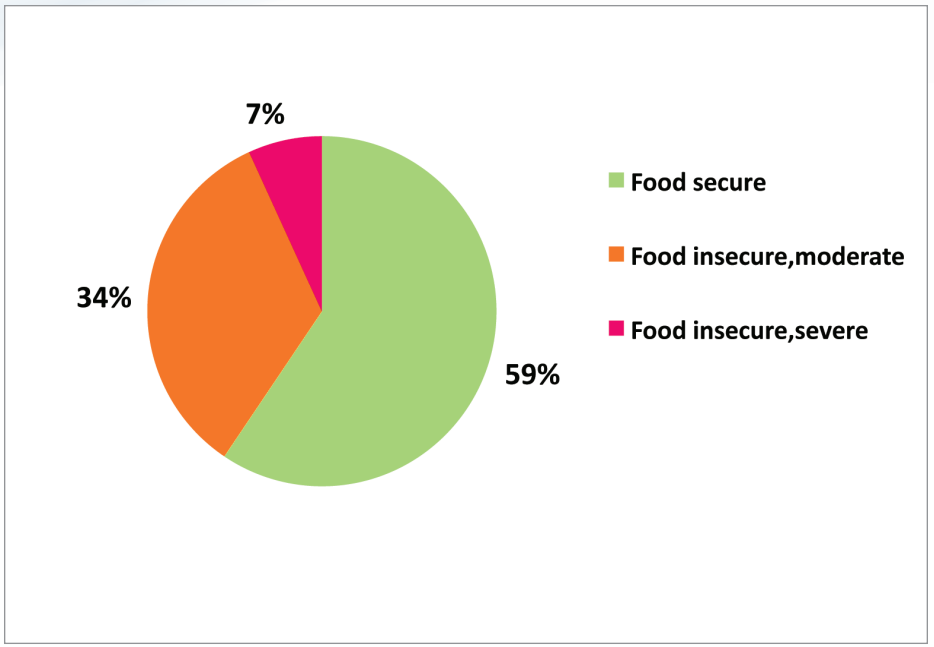
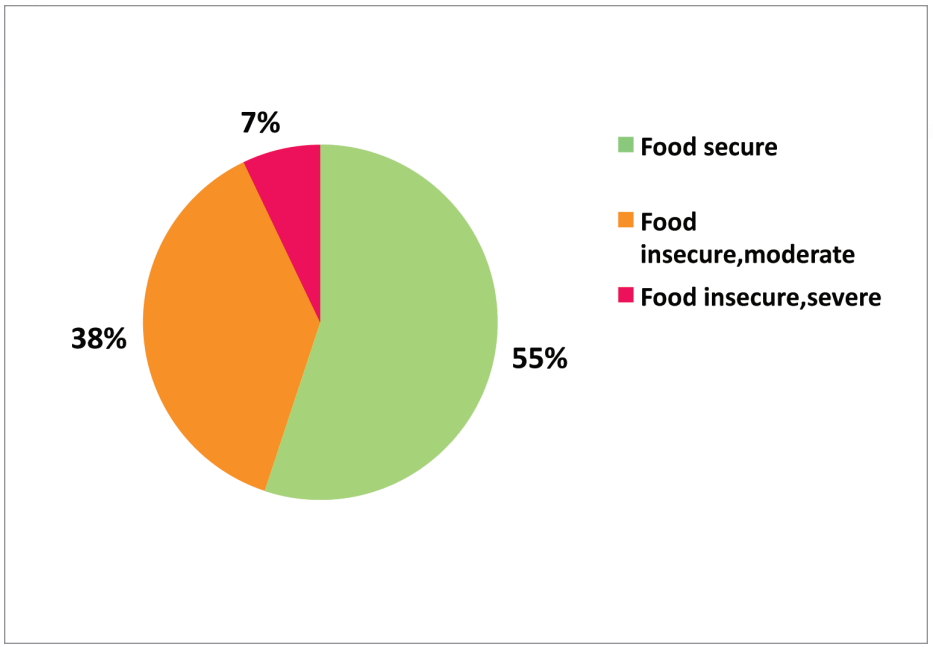


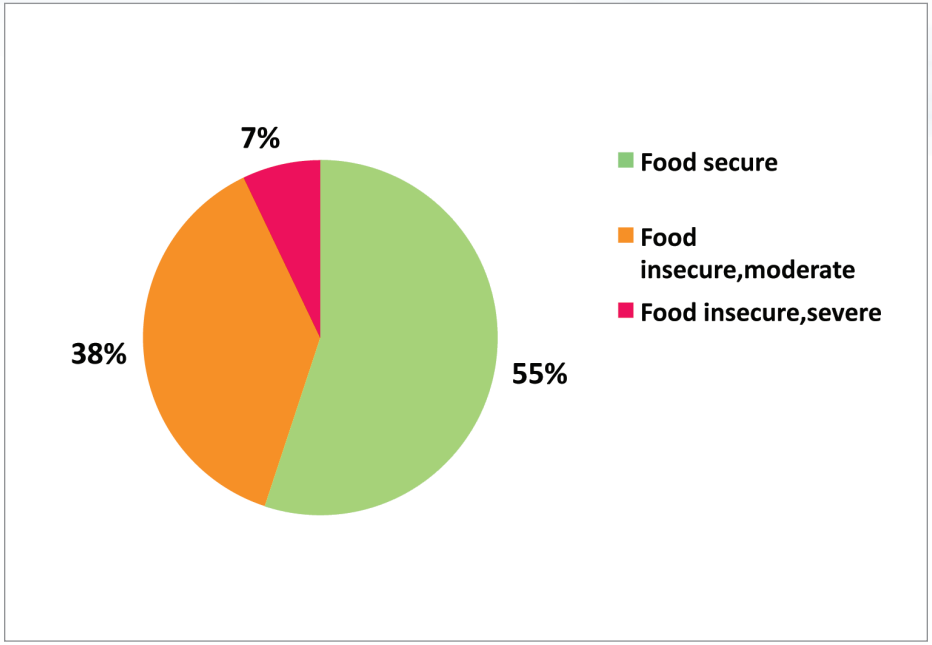
Figure 18. Degree of food insecurity in BC FN on-reserve households with children[10] (n=642)



[9] Classification of food security scale based on CCHS 2.29. Canadian Community Health Survey Cycle 2.2, Nutrition, H. Canada, Editor. 2004, Her Majesty the Queen in Right of Canada: Ottawa.

[10] Classification of food security scale based on CCHS 2.29. Ibid.

Figure 19. Degree of food insecurity in BC FN on-reserve households without children[11] (n=461)



11 Classification of food security scale based on CCHS 2.29. Ibid.

Table 11. Income-related BC FN on-reserve household food security status, 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	696	59	56-62	407	41	38-44	312	33	31-36	95	7	6-9
	Adult status	701	59	57-62	402	41	38-44	310	34	31-36	92	7	5-8
	Child status	963	84	82-86	140	16	14-18	125	13	11-15	15	2	2-3
Households with children	Household status	393	55	51-58	249	45	42-49	197	37	34-41	52	8	6-10
	Adult status	398	55	51-59	244	45	41-49	195	38	34-41	49	7	5-9
	Child status	503	75	72-79	139	25	21-28	125	21	18-24	14	4	3-5
Households without children	Household status	303	67	63-71	158	33	29-37	115	27	23-31	43	6	4-9

Figure 20. Income-related BC FN on-reserve household food insecurity by ecozone/culture area (n=1103), unweighted

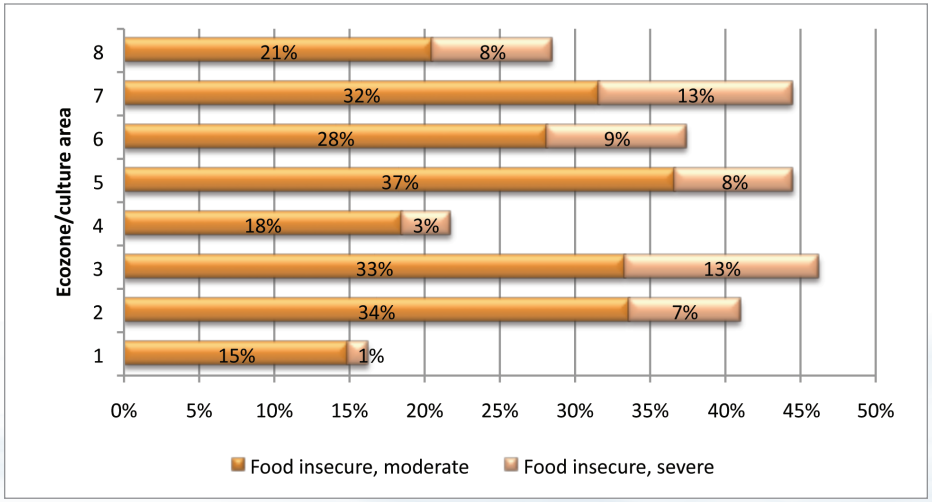
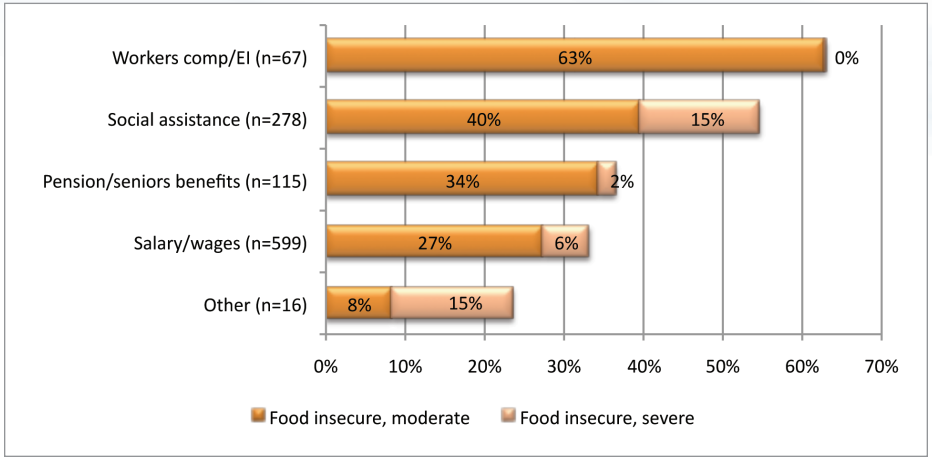


Figure 21. Income-related BC FN on-reserve household food insecurity by income sources (n=1075)



*note: other sources of income only reported in 2009 (year 2 of data collection)

Nutrient Intake

(Note that in Tables 12.1_37 (-)= data with a coefficient of variation (CV) >33.3%, suppressed due to extreme sampling variability)

Table 12.1 Total energy intake (kcal/d): Usual intakes from food, by DRI age-sex group, BC FN living on-reserve[12]

				Percentiles (and 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	240	2166 (191)	1366 (274)	1510 (256)	1778 (234)	2119 (236)	2503 (292)	2882 (433)	3123 (598)
	51-70	141	1784 (219)	1017 (194)	1142 (179)	1368 (174)	1666 (221)	2022 (318)	2369 (440)	2589 (539)
Female	19-50	456	1658 (79)	1130 (168)	1228 (152)	1407 (118)	1626 (86)	1869 (163)	2114 (237)	2275 (294)
	51-70	171	1808 (203)	1375 (194)	1474 (201)	1652 (212)	1855 (226)	2059 (255)	2255 (299)	2378 (336)

Table 12.2 Protein (g/d): Usual intakes from food , by DRI age-sex group, BC FN living on-reserve

				Percentiles (and 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	240	109 (13)	64 (10)	71 (11)	86 (12)	105 (14)	128 (17)	154 (21)	172 (25)
	51-70	141	75 (5)	47 (5)	52 (4)	60 (4)	69 (5)	81 (6)	92 (8)	101 (10)
Female	19-50	456	71 (4)	42 (8)	47 (8)	58 (6)	71 (4)	85 (7)	100 (13)	110 (18)
	51-70	171	86 (17)	61 (13)	65 (13)	72 (14)	80 (16)	89 (23)	(-)	(-)

12 No values presented for age group 71+ due to low sample size (n=25 women and n=14 men)

Table 12.3 Total carbohydrates (g/d): Usual intakes from food , by DRI age-sex group, BC FN living on-reserve

				Percentiles (and 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)
Male	19-50	240	255 (21)	125 (43)	148 (40)	193 (34)	250 (29)	311 (53)	375 (123)	(-)	100	(-)
	51-70	141	224 (43)	108 (25)	126 (23)	161 (23)	206 (35)	259 (60)	319 (96)	(-)	100	(-)
Female	19-50	456	197 (10)	124 (24)	137 (21)	160 (17)	190 (13)	225 (14)	261 (24)	285 (34)	100	(-)
	51-70	171	224 (22)	174 (40)	187 (36)	210 (29)	235 (21)	263 (18)	289 (26)	307 (36)	100	(-)

Table 12.4 Total fats (g/d): Usual intakes from food , by DRI age-sex group, BC FN living on-reserve

				Percentiles (and 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	240	80 (9)	50 (12)	54 (12)	64 (10)	75 (10)	88 (12)	101 (16)	110 (20)
	51-70	141	67 (4)	43 (11)	47 (9)	54 (8)	63 (6)	72 (6)	81 (8)	86 (11)
Female	19-50	456	67 (4)	47 (2)	51 (2)	57 (3)	66 (4)	75 (5)	84 (6)	89 (6)
	51-70	171	65 (6)	47 (6)	50 (6)	56 (7)	64 (7)	73 (7)	81 (8)	87 (8)

Table 12.5 Total saturated fats (g/d): Usual intakes from food , by DRI age-sex group, BC FN living on-reserve

				Percentiles (and 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	240	25 (3)	6 (1)	8 (1)	12 (1)	20 (3)	32 (6)	47 (9)	58 (10)
	51-70	141	21 (2)	(-)	7 (2)	12 (2)	16 (2)	25 (2)	39 (4)	45 (6)
Female	19-50	456	22 (2)	5 (1)	7 (1)	11 (1)	18 (1)	28 (4)	41 (6)	52 (8)
	51-70	171	21 (3)	(-)	7 (2)	11 (2)	17 (2)	26 (2)	36 (5)	47 (12)

Table 12.6 Total monounsaturated fats (g/d): Usual intakes from food , by DRI age-sex group, BC FN living on-reserve

				Percentiles (and 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	240	32 (3)	18 (5)	20 (5)	25 (5)	30 (4)	36 (5)	43 (8)	47 (10)
	51-70	141	25 (2)	20 (2)	21 (2)	22 (2)	23 (3)	25 (3)	26 (3)	27 (3)
Female	19-50	456	25 (2)	21 (1)	22 (1)	23 (1)	25 (1)	27 (2)	29 (2)	30 (2)
	51-70	171	24 (2)	19 (2)	20 (2)	22 (2)	23 (3)	25 (3)	27 (3)	28 (3)

Table 12.7 Total polyunsaturated fats (g/d): Usual intakes from food , by DRI age-sex group, BC FN living on-reserve

				Percentiles (and 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	240	15 (2)	7 (2)	9 (2)	11 (2)	14 (2)	18 (3)	22 (4)	25 (5)
	51-70	141	12 (1)	8 (2)	9 (2)	10 (1)	12 (1)	14 (1)	16 (2)	17 (3)
Female	19-50	456	12 (0)	9 (0)	10 (0)	11 (0)	12 (0)	13 (0)	14 (0)	15 (0)
	51-70	171	12 (1)	9 (1)	10 (1)	11 (1)	12 (1)	13 (1)	14 (1)	15 (1)

Table 12.8 Linoleic acid (g/d): Usual intakes from food, by DRI age-sex group, BC FN living on-reserve

				Percentiles (and 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 (SE)
Male	19-50	240	11 (1)	5 (2)	6 (2)	8 (1)	10 (1)	13 (2)	17 (3)	19 (5)	17	(-)
	51-70	141	9 (1)	5 (1)	5 (1)	7 (1)	8 (1)	10 (1)	12 (2)	13 (3)	14	(-)
Female	19-50	456	9 (0)	7 (0)	7 (0)	8 (0)	9 (0)	10 (0)	11 (0)	12 (0)	12	(-)
	51-70	171	9 (1)	6 (1)	7 (1)	8 (1)	9 (1)	10 (1)	11 (1)	11 (1)	11	(-)

Table 12.9 Linolenic acid (g/d): Usual intakes from food, by DRI age-sex group, BC FN living on-reserve

				Percentiles (and 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 (SE)
Male	19-50	240	1 (0)	1 (0)	1 (0)	1 (0)	1 (0)	1 (0)	2 (0)	2 (1)	1.6	(-)
	51-70	141	1 (0)	0 (0)	1 (0)	1 (0)	1 (0)	1 (0)	2 (1)	2 (1)	1.6	(-)
Female	19-50	456	1 (0)	1 (0)	1 (0)	1 (0)	1 (0)	1 (0)	2 (0)	2 (0)	1.1	43.8 (8.8)
	51-70	171	1 (0)	1 (0)	1 (0)	1 (0)	1 (0)	1 (0)	1 (0)	1 (0)	1.1	(-)

Table 12.10 Cholesterol (mg/d): Usual intakes from food, by DRI age-sex group, BC FN living on-reserve

				Percentiles (and 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	240	400 (34)	(-)	(-)	246 (62)	350 (53)	484 (51)	633 (72)	736 (95)
	51-70	141	326 (37)	(-)	158 (51)	206 (47)	273 (43)	359 (45)	454 (64)	521 (91)
Female	19-50	456	300 (48)	(-)	164 (47)	219 (46)	300 (51)	391 (69)	494 (101)	566 (129)
	51-70	171	273 (42)	194 (41)	212 (38)	244 (34)	282 (45)	322 (78)	363 (121)	(-)

Table 12.11 Total sugars (g/d): Usual intakes from food , by DRI age-sex group, BC FN living on-reserve

				Percentiles (and 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	240	77 (10)	31 (11)	38 (11)	52 (11)	71 (12)	95 (16)	121 (23)	140 (29)
	51-70	141	89 (27)	42 (14)	49 (14)	62 (15)	80 (18)	(-)	(-)	(-)
Female	19-50	456	62 (4)	43 (9)	47 (8)	53 (6)	61 (5)	69 (6)	78 (11)	84 (14)
	51-70	171	80 (9)	65 (10)	69 (11)	75 (13)	82 (16)	89 (19)	96 (23)	101 (25)

Table 12.12 Total dietary fibre (g/d): Usual intakes from food, by DRI age-sex group, BC FN living on-reserve

				Percentiles (and 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 (SE)
Male	19-50	240	14 (1)	8 (3)	9 (2)	11 (2)	13 (2)	16 (2)	19 (3)	21 (3)	38	(-)
	51-70	141	13 (3)	4 (2)	6 (2)	8 (2)	12 (3)	17 (4)	21 (6)	24 (7)	30	(-)
Female	19-50	456	12 (0)	7 (2)	8 (1)	9 (1)	11 (1)	14 (1)	16 (2)	18 (3)	25	(-)
	51-70	171	14 (2)	9 (3)	10 (2)	12 (2)	14 (2)	17 (2)	19 (2)	20 (2)	21	(-)

Table 12.13 Vitamin A (RAE/d): Usual intakes from food, by DRI age-sex group, BC FN living on-reserve

				Percentiles (and 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)
Male	19-50	240	531 (99)	(-)	(-)	413 (112)	543 (106)	710 (124)	898 (200)	1034 (290)	625	63.7 (19.1)
	51-70	141	509 (57)	(-)	278 (76)	367 (65)	482 (60)	617 (71)	756 (98)	848 (122)	625	76.2 (14.7)
Female	19-50	456	507 (42)	290 (77)	322 (70)	382 (55)	470 (36)	588 (61)	715 (122)	804 (168)	500	57.4 (9.8)
	51-70	171	558 (73)	(-)	328 (106)	420 (88)	539 (77)	675 (103)	820 (174)	923 (246)	500	(-)

Table 12.14 Vitamin C (mg/d): Usual intakes from food, by DRI age-sex group, BC FN living on-reserve

				Percentiles (and 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 (SE)
Male	19-50	240	119 (16)	97 (21)	100 (22)	107 (24)	114 (26)	122 (29)	130 (31)	134 (33)	75	(-)	2000	0 (0)
	51-70	141	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	75	(-)	2000	0 (0)
Female	19-50	456	77 (13)	15 (7)	20 (7)	35 (9)	58 (12)	95 (17)	142 (26)	178 (33)	60	51.5 (12)	2000	0 (0)
	51-70	171	105 (20)	51 (12)	63 (16)	(-)	(-)	(-)	(-)	(-)	60	(-)	2000	(-)

Table 12.15 Vitamin C (mg/d): Usual intakes from food (by smoking status), BC FN living on-reserve

				Percentiles (and SE) of usual intake										
Sex	Smoking status	n	Mean (SE)	5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)	EAR	%<EAR (SE)	UL	% > UL (SE)
Males 19+	Non-smoker	214	112 (22)	(-)	(-)	(-)	97 (27)	147 (32)	206 (48)	248 (67)	75	(-)	2000	0 (0)
	Smoker	183	133 (31)	52 (8)	62 (11)	84 (16)	117 (25)	160 (39)	212 (57)	250 (72)	110	(-)	2000	0 (0)
Females 19+	Non-smoker	355	96 (15)	39 (6)	47 (7)	63 (11)	(-)	(-)	(-)	(-)	60	(-)	2000	(-)
	Smoker	307	74 (14)	(-)	(-)	(-)	54 (15)	94 (21)	150 (38)	197 (62)	95	75.5 (10.4)	2000	(-)

Table 12.16 Vitamin D (µg/d): Usual intakes from food, by DRI age-sex group, BC FN living on-reserve

				Percentiles (and 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 (SE)
Male	19-50	240	5 (1)	(-)	(-)	3 (1)	4 (1)	6 (2)	(-)	(-)	10	97.4 (7.4)	100	0 (0)
	51-70	141	7 (2)	4 (1)	4 (1)	5 (1)	6 (2)	8 (2)	10 (3)	(-)	10	89.5 (11.5)	100	0 (0)
Female	19-50	456	5 (1)	3 (1)	4 (1)	4 (1)	5 (1)	6 (2)	(-)	(-)	10	99.9 (4.2)	100	(-)
	51-70	171	6 (1)	2 (0)	(-)	3 (1)	4 (1)	(-)	(-)	(-)	10	99.6 (4.3)	100	(-)

Table 12.17 Folate (DFE/d): Usual intakes from food, by DRI age-sex group, BC FN living on-reserve

				Percentiles (and 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)
Male	19-50	240	359 (51)	281 (40)	294 (42)	318 (47)	346 (53)	377 (60)	407 (67)	426 (71)	320	(-)
	51-70	141	356 (67)	232 (60)	255 (59)	297 (59)	347 (65)	403 (86)	459 (129)	496 (166)	320	(-)
Female	19-50	456	290 (22)	233 (18)	245 (19)	266 (21)	291 (23)	320 (25)	348 (27)	365 (28)	320	75.1 (17.2)
	51-70	171	366 (72)	245 (69)	266 (67)	306 (63)	359 (61)	421 (70)	486 (90)	530 (109)	320	(-)

Table 12.18 Vitamin B6 (mg/d): Usual intakes from food, by DRI age-sex group, BC FN living on-reserve

				Percentiles (and 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 (SE)
Male	19-50	240	2 (0)	1 (0)	1 (0)	1 (0)	2 (0)	2 (0)	3 (0)	4 (1)	1.1	(-)	100	0 (0)
	51-70	141	1 (0)	1 (0)	1 (0)	1 (0)	1 (0)	1 (0)	2 (0)	2 (0)	1.4	72.2 (18.5)	100	0 (0)
Female	19-50	456	1 (0)	1 (0)	1 (0)	1 (0)	1 (0)	2 (0)	2 (0)	2 (0)	1.1	33 (9.9)	100	0 (0)
	51-70	171	1 (0)	1 (0)	1 (0)	1 (0)	1 (0)	1 (0)	2 (0)	2 (0)	1.3	(-)	100	0 (0)

Table 12.19 Vitamin B12 (µg/d): Usual intakes from food, by DRI age-sex group, BC FN living on-reserve

				Percentiles (and 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)
Male	19-50	240	14 (2)	4 (1)	5 (1)	8 (2)	14 (3)	20 (5)	(-)	(-)	2.0	(-)
	51-70	141	(-)	4 (1)	(-)	7 (2)	(-)	(-)	(-)	(-)	2.0	(-)
Female	19-50	456	4 (0)	1 (0)	2 (0)	2 (0)	4 (0)	5 (0)	8 (1)	10 (2)	2.0	(-)
	51-70	171	(-)	(-)	(-)	(-)	(-)	9 (3)	(-)	(-)	2.0	(-)

Table 12.20 Thiamin (mg/d): Usual intakes from food, by DRI age-sex group, BC FN living on-reserve

				Percentiles (and 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)
Male	19-50	240	2 (0)	1 (0)	1 (0)	1 (0)	2 (0)	2 (0)	2 (0)	2 (0)	1.0	0 (0)
	51-70	141	1 (0)	1 (0)	1 (0)	1 (0)	1 (0)	2 (0)	2 (0)	2 (0)	1.0	(-)
Female	19-50	456	1 (0)	1 (0)	1 (0)	1 (0)	1 (0)	1 (0)	1 (0)	1 (0)	0.9	(-)
	51-70	171	1 (0)	1 (0)	1 (0)	1 (0)	1 (0)	2 (0)	2 (0)	2 (1)	0.9	(-)

Table 12.21 Riboflavin (mg/d): Usual intakes from food, by DRI age-sex group, BC FN living on-reserve

				Percentiles (and 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)
Male	19-50	240	2 (0)	2 (0)	2 (0)	2 (0)	2 (0)	2 (0)	3 (1)	3 (1)	1.1	(-)
	51-70	141	2 (0)	1 (0)	1 (0)	1 (0)	2 (0)	2 (0)	2 (0)	2 (0)	1.1	(-)
Female	19-50	456	2 (0)	1 (0)	1 (0)	1 (0)	2 (0)	2 (0)	2 (0)	3 (0)	0.9	(-)
	51-70	171	2 (0)	1 (0)	1 (0)	2 (0)	2 (0)	2 (0)	2 (0)	2 (0)	0.9	(-)

Table 12.22 Niacin (NE/d): Usual intakes from food, by DRI age-sex group, BC FN living on-reserve

				Percentiles (and 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)
Male	19-50	240	46 (5)	38 (5)	40 (5)	43 (5)	47 (6)	51 (6)	55 (6)	57 (6)	12	0 (0)
	51-70	141	34 (2)	21 (2)	23 (2)	27 (2)	31 (3)	37 (4)	43 (5)	48 (7)	12	(-)
Female	19-50	456	32 (1)	18 (3)	20 (3)	24 (3)	30 (2)	38 (3)	46 (5)	51 (7)	11	(-)
	51-70	171	37 (7)	25 (5)	27 (5)	30 (6)	34 (6)	38 (7)	43 (13)	(-)	11	0 (0)

Table 12.23 Calcium (mg/d): Usual intakes from food, by DRI age-sex group, BC FN living on-reserve

				Percentiles (and 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 (SE)
Male	19-50	240	631 (72)	371 (32)	413 (39)	493 (54)	602 (74)	737 (99)	886 (125)	990 (143)	800	82.7 (11.2)	2500	0 (0)
	51-70	141	542 (68)	336 (57)	371 (63)	440 (74)	528 (85)	617 (95)	703 (105)	762 (112)	800	96.9 (4.8)	2000	0 (0)
Female	19-50	456	531 (28)	321 (59)	356 (52)	422 (41)	511 (33)	618 (51)	731 (96)	809 (136)	800	94.6 (5.3)	2500	(-)
	51-70	171	558 (50)	398 (46)	429 (51)	488 (61)	564 (76)	655 (104)	754 (147)	823 (184)	1000	99.2 (4.6)	2000	(-)

Table 12.24 Iron (mg/d): Usual intakes from food, by DRI age-sex group, BC FN living on-reserve

				Percentiles (and SE) of usual intake										
Sex	Age	n	Mean (SE)	5th (SE)	10th (SE)	25th (SE)	50th (SE)	75th (SE)	90th (SE)	95th (SE)	EAR	% inadequacy	UL	% > UL (SE)
Male	19-50	240	18 (2)	16 (3)	16 (3)	17 (3)	18 (2)	20 (2)	21 (4)	22 (5)	6.0	(-)	45	(-)
	51-70	141	14 (1)	7 (2)	8 (2)	11 (2)	13 (2)	17 (2)	20 (3)	22 (4)	6.0	(-)	45	(-)
Female	19-50	456	11 (1)	7 (1)	8 (1)	10 (1)	11 (1)	13 (1)	15 (2)	17 (3)	8.1	(-)	45	(-)
	51-70	171	13 (2)	9 (2)	10 (2)	11 (2)	13 (4)	(-)	(-)	(-)	5.0	(-)	45	(-)

Table 12.25 Potassium (mg/d): Usual intakes from food, by DRI age-sex group, BC FN living on-reserve

				Percentiles (and 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 (SE)
Male	19-50	240	3023 (245)	1727 (470)	1958 (440)	2411 (362)	2985 (293)	3609 (462)	4269 (776)	4746 (1023)	4700	(-)
	51-70	141	2343 (229)	1193 (307)	1382 (286)	1736 (268)	2186 (288)	2698 (354)	3214 (446)	3548 (513)	4700	(-)
Female	19-50	456	2158 (116)	1247 (229)	1400 (199)	1692 (154)	2072 (129)	2521 (184)	3006 (335)	3344 (462)	4700	(-)
	51-70	171	2413 (411)	2090 (476)	2176 (477)	2323 (478)	2491 (479)	2664 (483)	2824 (498)	2921 (515)	4700	(-)

Table 12.26 Sodium (mg/d): Usual intakes from food, by DRI age-sex group, BC FN living on-reserve

				Percentiles (and 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 (SE)	UL	% > UL (SE)
Male	19-50	240	3302 (412)	1996 (446)	2206 (426)	2609 (402)	3162 (399)	3851 (460)	4602 (634)	5127 (800)	1500	99.5 (2.2)	2300	87.1 (11.9)
	51-70	141	2635 (251)	1604 (215)	1784 (212)	2091 (216)	2468 (246)	2923 (310)	3429 (402)	3786 (474)	1300	98.8 (1.8)	2300	61.4 (16.7)
Female	19-50	456	2939 (230)	2146 (307)	2283 (279)	2541 (232)	2907 (218)	3336 (325)	3748 (517)	4009 (674)	1500	100 (2)	2300	89.2 (9.9)
	51-70	171	2866 (292)	2419 (279)	2545 (300)	2765 (340)	3025 (397)	3296 (479)	3552 (587)	3713 (673)	1300	100 (0)	2300	97.7 (9.8)

Table 12.27 Magnesium (mg/d): Usual intakes from food, by DRI age-sex group, BC FN living on-reserve

				Percentiles (and 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	240	265 (24)	167 (40)	185 (39)	220 (36)	265 (31)	315 (42)	359 (53)	389 (68)
	51-70	141	221 (22)	119 (25)	135 (24)	166 (23)	207 (26)	253 (35)	297 (48)	325 (58)
Female	19-50	456	214 (9)	132 (21)	145 (18)	171 (14)	205 (11)	246 (19)	290 (32)	319 (41)
	51-70	171	247 (39)	150 (31)	168 (33)	200 (36)	241 (45)	286 (73)	(-)	(-)

"% <EAR not calculated since EAR differ by age-groups, therefore leading to large standard errors

Table 12.28 Phosphorus (mg/d): Usual intakes from food, by DRI age-sex group, BC FN living on-reserve

				Percentiles (and 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 (SE)
Male	19-50	240	1364 (138)	734 (206)	839 (195)	1051 (176)	1329 (167)	1638 (229)	1970 (322)	2209 (394)	580	(-)	4000	(-)
	51-70	141	1139 (131)	785 (102)	844 (105)	950 (114)	1087 (130)	1248 (158)	1421 (199)	1539 (234)	580	(-)	4000	(-)
Female	19-50	456	1098 (34)	752 (122)	819 (107)	940 (76)	1085 (42)	1245 (68)	1405 (139)	1510 (193)	580	(-)	4000	0 (0)
	51-70	171	1227 (222)	987 (183)	1028 (188)	1097 (196)	1176 (206)	1254 (217)	1326 (231)	1370 (240)	580	(-)	4000	(-)

Table 12.29 Zinc (mg/d): Usual intakes from food, by DRI age-sex group, BC FN living on-reserve

				Percentiles (and 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 (SE)
Male	19-50	240	16 (3)	11 (3)	12 (2)	13 (2)	16 (2)	18 (5)	(-)	(-)	9.4	(-)	40	(-)
	51-70	141	11 (1)	5 (1)	6 (1)	7 (1)	9 (1)	11 (2)	(-)	(-)	9.4	55.8 (14)	40	(-)
Female	19-50	456	10 (0)	5 (1)	6 (1)	8 (1)	9 (1)	12 (1)	14 (2)	16 (2)	6.8	(-)	40	(-)
	51-70	171	11 (2)	7 (2)	7 (2)	9 (2)	(-)	(-)	(-)	(-)	6.8	(-)	40	(-)

Table 12.30 Percentage of total energy intake from protein, by DRI age-sex group, BC FN living on-reserve

				Percentiles (and 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 (SE)	% within AMDR (SE)	% above AMDR (SE)
Male	19-50	240	21 (2)	13 (2)	15 (2)	17 (2)	20 (2)	24 (2)	28 (3)	31 (5)	10-35	(-)	97.7 (2.8)	(-)
	51-70	141	17 (1)	13 (1)	14 (1)	15 (1)	17 (1)	18 (1)	20 (1)	21 (1)	10-35	(-)	100 (0.1)	0 (0)
Female	19-50	456	18 (0)	14 (2)	14 (1)	16 (1)	17 (1)	19 (1)	21 (2)	23 (2)	10-35	(-)	100 (1.9)	(-)
	51-70	171	18 (1)	12 (2)	13 (2)	15 (2)	18 (1)	21 (1)	24 (2)	26 (3)	10-35	(-)	98.6 (2.8)	(-)

Table 12.31 Percentage of total energy intake from carbohydrates, by DRI age-sex group, BC FN living on-reserve

				Percentiles (and 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 (SE)	% within AMDR (SE)	% above AMDR (SE)
Male	19-50	240	47 (2)	42 (4)	43 (3)	45 (3)	48 (2)	50 (3)	52 (4)	53 (4)	45-65	(-)	77.4 (17.3)	(-)
	51-70	141	50 (2)	46 (2)	47 (2)	48 (2)	50 (2)	51 (2)	53 (2)	53 (2)	45-65	(-)	98.2 (12)	0 (0)
Female	19-50	456	48 (1)	43 (5)	44 (4)	46 (2)	48 (1)	50 (2)	52 (3)	53 (4)	45-65	(-)	81 (13.4)	(-)
	51-70	171	50 (2)	40 (2)	43 (2)	46 (2)	50 (2)	55 (3)	58 (5)	60 (6)	45-65	(-)	80.1 (8)	(-)

Table 12.32 Percentage of total energy intake from fats, by DRI age-sex group, BC FN living on-reserve

				Percentiles (and 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 (SE)	% within AMDR (SE)	% above AMDR (SE)
Male	19-50	240	32 (1)	26 (1)	27 (1)	29 (1)	31 (1)	34 (1)	36 (1)	37 (1)	20-35	0 (0)	86.3 (7.2)	(-)
	51-70	141	34 (1)	24 (3)	26 (3)	30 (2)	34 (1)	38 (2)	42 (4)	44 (4)	20-35	(-)	58.3 (15.1)	(-)
Female	19-50	456	35 (1)	30 (1)	31 (1)	33 (1)	35 (1)	37 (1)	39 (1)	40 (1)	20-35	0 (0)	48 (15.6)	52 (15.6)
	51-70	171	32 (1)	26 (1)	27 (1)	29 (1)	32 (1)	34 (1)	36 (2)	37 (2)	20-35	0 (0)	85.1 (11.9)	(-)

Table 12.33 Percentage of total energy intake from saturated fats, by DRI age-sex group, BC FN living on-reserve

				Percentiles (and 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	240	10 (1)	8 (1)	8 (1)	9 (1)	10 (1)	11 (1)	12 (1)	12 (1)
	51-70	141	10 (1)	8 (0)	9 (0)	9 (0)	10 (0)	11 (1)	12 (1)	12 (1)
Female	19-50	456	11 (0)	9 (0)	10 (0)	10 (0)	11 (0)	12 (1)	13 (1)	14 (1)
	51-70	171	10 (0)	8 (1)	8 (1)	9 (3)	(-)	(-)	(-)	(-)

Table 12.34 Percentage of total energy intake from monounsaturated fats, by DRI age-sex group, BC FN living on-reserve

				Percentiles (and 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	240	13 (1)	10 (2)	10 (2)	11 (1)	12 (1)	13 (1)	14 (2)	15 (2)
	51-70	141	12 (1)	9 (1)	10 (1)	11 (1)	12 (1)	14 (1)	15 (1)	16 (1)
Female	19-50	456	13 (0)	12 (0)	12 (0)	13 (0)	13 (0)	14 (0)	14 (1)	14 (1)
	51-70	171	12 (0)	10 (0)	10 (0)	11 (1)	11 (1)	12 (1)	12 (1)	13 (1)

Table 12.35 Percentage of total energy intake from polyunsaturated fats, by DRI age-sex group, BC FN living on-reserve

				Percentiles (and 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	240	6 (1)	5 (1)	6 (1)	6 (1)	6 (1)	6 (1)	6 (1)	6 (1)
	51-70	141	6 (0)	6 (0)	6 (0)	6 (0)	7 (0)	7 (0)	7 (0)	7 (0)
Female	19-50	456	6 (0)	6 (0)	6 (0)	6 (0)	6 (0)	7 (0)	7 (0)	7 (0)
	51-70	171	6 (0)	5 (2)	5 (2)	6 (2)	(-)	(-)	(-)	(-)

Table 12.36 Percentage of energy from linoleic acid, by DRI age-sex group, BC FN living on-reserve

				Percentiles (and 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	240	4 (0)	4 (0)	4 (0)	4 (0)	4 (0)	4 (0)	5 (0)	5 (0)
	51-70	141	5 (0)	4 (0)	4 (0)	4 (0)	5 (0)	5 (0)	5 (0)	5 (0)
Female	19-50	456	5 (0)	4 (0)	4 (0)	5 (0)	5 (0)	5 (0)	6 (0)	6 (0)
	51-70	171	4 (0)	3 (1)	3 (1)	4 (0)	4 (0)	5 (0)	5 (1)	5 (1)

Table 12.37 Percentage of energy from linolenic acid, by DRI age-sex group, BC FN living on-reserve

				Percentiles (and 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	240	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0)	1 (0)	1 (0)
	51-70	141	1 (0)	0 (0)	0 (0)	0 (0)	1 (0)	(-)	(-)	(-)
Female	19-50	456	1 (0)	0 (0)	0 (0)	0 (0)	1 (0)	1 (0)	1 (0)	1 (0)
	51-70	171	1 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0)	1 (0)	1 (0)

Table 13. Comparison of nutrient intake (lsmean ± SE) on days with and without traditional food (TF), BC FN living on-reserve, controlling for day of week (unweighted)

Nutrient	Days with TF (n= 396 recalls)			Days without TF (n=707 recalls)		
Energy (kcals)*	2018	±	51	1833	±	40
Protein (g)*	110	±	3	71	±	2
Fat (g)	71	±	2	72	±	2
Carbohydrate (g)	237	±	7	231	±	6
Total sugars (g)	81	±	4	85	±	3
Fibre (g)*	13	±	0.5	12	±	0.4
Cholesterol (mg)*	378	±	16	319	±	12
Total SFA (g)**	21	±	1	23	±	1
Total MUFA (g)	26	±	1	28	±	1
Total PUFA (g)	13	±	0.6	13	±	0.5
Linoleic acid (g)	10	±	0.5	10	±	0.4
Linolenic acid (g)*	1.3	±	0.1	1.1	±	0.1
Calcium (mg)*	577	±	30	546	±	23
Iron (mg)*	18	±	0.5	11	±	0.4
Zinc (mg)*	16	±	0.6	10	±	0.5

Nutrient	Days with TF (n= 396 recalls)			Days without TF (n=707 recalls)		
Magnesium (mg)*	285	±	7	215	±	5
Copper (mg)*	1.6	±	0.1	1.1	±	0.1
Potassium (mg)*	2947	±	75	2208	±	58
Sodium (mg)	3120	±	131	3008	±	102
Phosphorus (mg)*	1450	±	43	1019	±	33
Vitamin A (µg)*	679	±	63	457	±	49
Vitamin D (µg)*	10	±	0.6	3	±	0.5
Vitamin C (mg)*	108	±	13	96	±	10
Folate (µg)*	320	±	13	319	±	10
Thiamin (mg)	1.4	±	0.1	1.4	±	0.04
Riboflavin (mg)*	2.0	±	0.1	1.7	±	0.04
Niacin (mg)*	47	±	1	32	±	1
Vitamin B6 (mg)*	1.8	±	0.1	1.3	±	0.1
Vitamin B12 (µg)*	13	±	1	3.4	±	1

*significantly greater on days with traditional food, Wilcoxon rank sum test, $p<0.05$
**significantly greater on days without traditional food, Wilcoxon rank sum test, $p<0.05$

Table 14. Ten most important contributors to macro and micronutrients for BC FN living on-reserve (unweighted)

a) Energy		b) Protein		c) Fat		d) Carbohydrate	
FOOD	**% of total**	**FOOD**	**% of total**	**FOOD**	**% of total**	**FOOD**	**% of total**
Bread, white	4.7	Game meat, moose	13.7	Eggs	6.3	Carbonated drinks, regular	9.2
Carbonated drinks, regular	4.4	Pork, chops/ribs/ground	5.4	Margarine	5.8	Fruit drinks	7.5
Fruit drinks	3.5	Salmon	5.3	Popcorn/chips/salty snacks	4.9	Bread, white	7.1
Grains (barley, rice, wheat)	3.3	Eggs	5.1	Hash browns, french fries, onion rings	4.0	Jam/honey/syrup/ sugar	6.4
Eggs	3.1	Beef, ground	4.2	Butter	3.9	Grains (barley, rice, wheat)	5.8
Popcorn/chips/salty snacks	3.1	Chicken-fried	4.1	Cheese	3.9	Potatoes, boiled/baked/mashed	4.4
Hash browns, french fries, onion rings	3.0	Beef (roast,steak,brisket,ribs)	3.9	Vegetable oil	3.9	Bread, whole wheat	3.6
Jam/honey/syrup/ sugar	3.0	Chicken (baked/broiled)	3.7	Pork, chops/ribs/ground	3.8	Pasta/noodles (plain)	3.6
Game meat, moose	2.8	Bread, white	3.2	Beef, ground	3.7	Fruits, fresh/canned	3.4
Potatoes, boiled/baked/mashed	2.8	Cheese	2.5	Bacon	2.6	Iced tea	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**
Butter	8.0	Margarine	6.7	Margarine	10.0	Eggs	42.7
Cheese	7.9	Eggs	6.6	Popcorn/chips/salty snacks	8.0	Game meat, moose	6.7
Eggs	5.9	Vegetable oil	6.1	Vegetable oil	6.0	Pork, chops/ribs/ground	4.1
Beef, ground	4.6	Popcorn/chips/salty snacks	5.5	Eggs	5.5	Beef, ground	3.3
Pork, chops/ribs/ground	4.5	Hash browns, french fries, onion rings	4.4	Salad dressing	4.8	Chicken-fried	3.4
Hash browns, french fries, onion rings	3.8	Pork, chops/ribs/ground	4.3	Bread, white	4.3	Chicken (baked/broiled)	3.0
Popcorn/chips/salty snacks	3.2	Beef, ground	4.2	Hash browns, french fries, onion rings	3.7	Salmon	2.8
Margarine	2.9	Bacon	3.0	Chicken-fried	2.9	Cheese	2.5
Milk, fluid/evaporated/dry	2.9	Cheese	2.9	Salmon	2.4	Beef (roast,steak,brisket,ribs)	2.4
Bacon	2.8	Sausages	2.8	Nuts	2.3	Butter	2.2

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	19.9	Vegetables	11.4	Vegetables	23.1	Fruit drinks	35.3
Jam/honey/syrup/ sugar	16.7	Bread, whole wheat	10.0	Eggs	10.7	Fruit juice	21.9
Iced tea	9.6	Fruits, fresh/canned	7.4	Margarine	9.2	Vegetables	9.9
Fruit drinks	8.0	Potatoes, boiled/baked/mashed	7.2	Beef, liver, pan-fried	8.1	Fruits, fresh/canned	9.4
Fruit juice	6.5	Bread, white	6.7	Milk, fluid/evaporated/dry	5.5	Potatoes, boiled/baked/mashed	5.4
Fruits, fresh/canned	6.5	Hash browns, french fries, onion rings	5.4	Game meat, native, moose, liver, roasted	4.5	Popcorn/chips/salty snacks	2.7
Bread, whole wheat	3.9	Popcorn/chips/salty snacks	5.3	Soup	4.5	Hash browns, french fries, onion rings	2.0
Milk, fluid/evaporated/dry	3.6	Pasta/noodles (plain)	3.9	Butter	4.2	Game meat, moose	1.5
Vegetables	2.2	Cereal-hot	3.7	Cheese	3.7	Milk, fluid/evaporated/dry	1.1
Bread, white	1.6	Soup	2.9	Fruit drinks	3.3	Soapberry, raw	1.1

m) Vitamin D		n) Folate		o) Calcium		p) Iron	
FOOD	**% of total**	**FOOD**	**% of total**	**FOOD**	**% of total**	**FOOD**	**% of total**
Salmon	45.5	Bread, white	16.2	Milk, fluid/evaporated/dry	12.2	Game meat, moose	13.0
Margarine	12.4	Pasta/noodles (plain)	8.9	Cheese	11.0	Bread, white	7.9
Milk, fluid/evaporated/dry	11.1	Vegetables	5.9	Fruit drinks	7.5	Bread, whole wheat	4.4
Eggs	6.2	Pasta dishes	5.7	Bread, white	6.8	Cereal-ready to eat	4.0
Pasta dishes	3.6	Eggs	4.7	Pasta dishes	5.0	Eggs	3.8
Beef, ground	1.9	Fruit juice	4.5	Eggs	3.6	Vegetables	3.0
Pork, chops/ribs/ground	1.7	Ramen noodles	4.3	Pizza	3.3	Soup	2.9
Beef (roast,steak,brisket, ribs)	1.3	Tea	3.4	Vegetables	3.3	Pasta/noodles (plain)	2.8
Herring, atlantic, pickled	1.1	Bread, whole wheat	3.2	Salmon	3.1	Beef, ground	2.5
Potatoes, boiled/baked/mashed	1.0	Bannock	2.7	Coffee	2.8	Beef (roast,steak,brisket,ribs)	2.3

q) Sodium		r) Zinc	
FOOD	**% of total**	**FOOD**	**% of total**
Soup	13.0	Game meat, moose	20.2
Salt, table	8.6	Beef (roast,steak,brisket,ribs)	6.9
Bread, white	6.2	Beef, ground	6.4
Condiments	4.1	Pork, chops/ribs/ground	3.5
Bacon	3.4	Eggs	3.1
Pasta dishes	3.2	Bread, whole wheat	2.8
Popcorn/chips/salty snacks	3.2	Oysters	2.6
Bread, whole wheat	3.1	Cheese	2.3
Cheese	2.9	Chicken-fried	2.1
Ham	2.5	Grains (barley, rice, wheat)	2.0

Table 15a. Mean number of food guide servings consumed per day by BC FN living on-reserve compared to Canada's Food Guide (CFG) recommendations[4] (unweighted)

		Food group categories			
		Vegetables & Fruit	Meat & Alternatives	Grain Products	Milk & Alternatives
		Servings per day			
Men	All BC	4.6	4.3	4.3	0.8
	CFG Recommendations	7-10	3	7- 8	2- 3
Women	All BC	4.4	3.0	4.0	1.0
	CFG Recommendations	7- 8	2	6- 7	2-3

Canada's Food Guide [52]

Table 15b. Top 10 contributors to Canada's Food Guide (% of total group intake), BC FN women living on-reserve

	1	2	3	4	8	6	7	8	9	10	Others
VEG & FRUIT	Potatoes boiled/ french fried/chips / hash brown	Popcorn/ Sweet corn	Orange juice	Vegetables, mixed	Tangerine Orange	Carrot	Banana	Mashed potatoes	Apple	Celery	
%	19.2	4.4	5.3	3.8	3.3	2.9	2.6	2.6	2.1	0.6	53.2
MEAT & ALTERNATES	Moose meat	Chicken broiler/ roasting	Eggs-chicken	Pork	Beef	Salmon sockeye	Ham/ sausage	Soup/ stew beef & veg	Chicken chow mein w noodles	Rice fried w meat	
%	11.8	11.7	10.0	9.3	8.7	6.7	5.0	2.4	1.0	0.9	32.5
GRAIN PRODUCTS	Grains rice	Bread white	Bread whole wheat	Pasta spaghetti/ Macaroni	Cereals hot/ cold	Rolls/ buns	Soup chicken noodles	Bannock	Macaroni and cheese	Ramen noodles	
%	13.1	10.8	10.7	8.9	8.5	4.0	3.3	2.9	2.7	1.5	35.9
MILK & ALTERNATES	Milk fluid/ dry/evapo-rated	Cheese	Mashed potatoes	Macaroni &cheese	Yogurt plain/ fruits	Ice cream	Lasagna & meat	Pepperoni pizza	Cream, cereal, half&half	Pierogies	
%	25.3	24.6	12.2	6.8	6.3	2.7	2.0	1.5	0.9	0.6	17.1

Table 15c. Top 10 contributors to Canada's Food Guide (% of total group intake), BC FN men living on-reserve

	1	2	3	4	8	6	7	8	9	10	Others
VEG & FRUIT	Potatoes boiled/ french fries/ /chips / hash brown	Orange juice	Vegetable mixed	Mashed potatoes	Tangerine& Orange	Carrot	Popcorn & sweet corn	Apple	Banana	Chicken chow mein	
%	28.5	8.0	3.5	3.1	2.8	2.7	2.4	1.7	1.5	1.2	44.5
MEAT & ALTERNATES	Moose game meat	Beef	Eggs-chicken	Chicken broil/ roast	Pork	Salmon sockeye	Ham/sausage	Soup/ stew beef & veg	Rabbit / game meat	Bison/ game meat	
%	14.8	11.1	9.6	9.2	9.0	5.2	3.5	1.5	1.2	0.9	34.0
GRAIN PRODUCTS	Bread white	Bread whole wheat	Grains rice	Pasta spaghetti/ Macaroni	Cereals hot/ cold	Bannock	Rolls/buns	Ramen noodles	Macaroni and cheese	Soup chicken noodles	
%	15.7	12.0	12.3	8.4	7.7	4.8	3.1	2.4	2.2	2.2	32.9
MILK & ALTERNATES	Milk fluid/ dry/evap	Cheese	Mashed potatoes	Macaroni & cheese	Lasagna& meat	Yogurt plain/ fruits	Ice cream	Pepperoni pizza	Soup oyster / clam	pancake	
%	29.5	18.5	16.9	7.1	3.6	3.2	2.6	1.6	1.3	1.0	14.7

Table 16a. Top 10 consumed market food (g/person/day), consumers and non-consumers combined, ranked by overall decreasing amount of consumption, total and ecozones 1-4, unweighted

Total BC participants		Ecozone 1		Ecozone 2		Eccozone 3		Ecozone 4	
Market Food	g/person/day	Market Food	g/person/day	Market Food	g/person/day	Market Food	g/person/day	Market Food	g/person/day
BEVERAGES									
Coffee	532	Water, tap	795	Coffee	592	Coffee	593	Coffee	426
Water, tap	462	Coffee	564	Water, tap	583	Water, tap	387	Water, tap	291
Tea	221	Tea	341	Tea	247	Tea	185	Fruit drinks	170
Soft drinks, regular	200	Fruit drinks	116	Water, bottled	161	Soft drinks- regular	150	Tea	119
Fruit drinks[1]	133	Soft drinks, regular	80	Soft drinks, regular	161	Water, bottled	92	Soft drinks, regular	96
Iced tea	77	Iced tea	70	Fruit juice	124	Fruit drinks	86	Water, bottled	41
Water, bottled	75	Fruit juice	45	Fruit drinks	120	Milk	69	Milk	40
Fruit juice[2]	62	Milk	44	Milk	75	Soft drinks, diet	45	Iced tea	19
Milk	54	Water, bottled	43	Iced tea	39	Iced tea	29	Fruit juice	15
Soft drinks, diet	20	Sports drinks	7	Soft drinks, diet	24	Fruit juice	28	Soft drinks, diet	4
FOOD									
Soup	85	Soup	114	Soup	104	Vegetables	108	Soups	90
Vegetables[3]	68	Grains	97	Vegetables	86	Soups	93	French fries	50
Potatoes[4]	53	Vegetables	61	Potatoes	73	Fruits	72	Potatoes	49
Fruits	50	Fruits	54	Fruits	61	Potatoes	65	Pasta dishes	43
Grains[5]	48	Potatoes	49	Cereal- hot	49	Grains	42	Vegetables	43
Eggs	34	Pasta/noodles, plain	48	Pasta dishes	35	Eggs	38	Eggs	42
Bread, white	33	Eggs	42	Eggs	34	French fries[8]	35	Grains	42
Pasta dishes[6]	31	Pasta dishes	40	Bread, white	33	White bread	32	Pork	31
Cereal, hot	31	Cereal - hot	40	Sandwiches[7]	31	Chicken chow mein	32	Cereal-hot	29
Pasta/noodles, plain	28	Bread, whole wheat	24	Jam, honey, syrup, sugar	27	Beef vegetable stew	28	Chicken-fried	18

1 fruit drinks= fruit flavoured, sweetened drinks, frozen/crystals/canned
2 fruit juice= pure fruit juice, fresh/frozen/canned
3 vegetables includes fresh, frozen, canned (excludes potatoes)
4 potatoes includes boiled, baked, mashed (excludes French fries)
5 grains includes rice, barley, wheat
6 pasta dishes includes macaroni and cheese, lasagna, pasta with sauce, etc.
7 sandwiches=sandwiches/submarines
8 french fries also includes hash browns and onion rings

Table 16b. Top 10 consumed market food (g/person/day), consumers and non-consumers combined, ranked by overall decreasing amount of consumption, ecozones 5-8, unweighted

Ecozone 5		Ecozone 6		Ecozone 7		Ecozone 8	
Market Food	g/person/day	Market Food	g/person/day	Market Food	g/person/day	Market Food	g/person/day
BEVERAGES							
Coffee	596	Coffee	540	Water, tap	425	Coffee	575
Water, tap	318	Water, tap	526	Coffee	346	Soft drinks, regular	410
Soft drinks, regular	253	Soft drinks, regular	201	Tea	275	Water, tap	274
Tea	251	Tea	188	Soft drinks, regular	198	Bottled water	268
Fruit drinks	131	Fruit drinks	146	Fruit drinks	105	Tea	239
Iced tea	93	Iced tea	77	Fruit juice	96	Ice tea	234
Water, bottled	52	Milk	72	Iced tea	53	Fruit drinks	155
Milk	26	Fruit juice	64	Milk	41	Fruit juice	75
Sports drink	19	Soft drinks, diet	34	Water, bottled	24	Milk	23
Hot chocolate	13	Water, bottled	28	Hot chocolate	17	Sports drink	14
FOOD							
Soup	80	Vegetables	67	Soup	100	Soup	125
Grains	73	Fruits	60	Grains	70	Vegetables	63
Potatoes	56	Soup	55	Vegetables	65	Chicken	38
Vegetables	52	Potatoes	51	Fruits	63	Potatoes	36
Eggs	37	Bread, white	47	Ramen noodles	44	Eggs	35
Cereal, hot	32	Grains	39	Potatoes	44	Pasta dishes	33
Pork	31	Pasta/ noodles,plain	32	Cereal, hot	37	Pasta/noodles (plain)	29
Pasta/noodles, plain	30	Pasta dishes	31	Pasta dishes	33	Fruits	29
Bread, white	28	Eggs	30	Eggs	33	Grains	28
Fruits	27	Cereal, hot	25	French fries	33	French fries	28

Table 17. 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 (unweighted)

	Ecozone/ Culture Area								
Traditional Food	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Total BC**
	Percent of recalls with traditional food (Number of recalls over total recalls)								
	49% (39/80)	53% (65/122)	22% (20/93)	36% (33/92)	38% (49/128)	35% (128/369)	28% (33/117)	28% (29/102)	36% (396/1103)
	g/person/day								
Moose meat	66.10	58.38	16.67	84.53	29.91	3.68	7.44	61.11	30.85
Salmon	10.18	2.38	5.80	10.84	30.77	27.66	16.38	0.36	16.99
Deer meat	-	-	14.78	-	-	2.80	4.68	2.32	2.89
Elk meat	-	12.27	0.83	-	-	-	-	8.75	2.24
Rabbit meat	-	-	-	16.30	-	-	-	1.16	1.47
Crab	-	-	-	-	-	3.29	-	-	1.10
Halibut	-	-	-	-	1.03	2.89	-	-	1.09
Bison meat	-	-	12.73	-	-	-	-	-	1.07
Clams	-	-	-	-	-	2.46	1.45	-	0.98
Blueberry	-	4.45	0.03	-	-	1.09	-	-	0.86
Raspberry	-	1.35	-	-	-	1.33	2.00	0.60	0.86
Strawberry	-	0.74	-	-	-	1.51	0.71	1.46	0.80
Soapberry	-	-	2.80	-	1.48	0.51	0.61	-	0.64
Buffalo meat	-	3.89	-	-	-	-	-	-	0.43
Herring eggs	-	-	-	-	-	0.98	-	-	0.33
Lingcod	-	-	-	2.58	-	-	-	1.20	0.33
Cranberry	0.63	-	1.02	-	0.04	0.51	-	-	0.31

	Ecozone/ Culture Area								
Traditional Food	1	2	3	4	5	6	7	8	Total BC
Saskatoon berry	-	2.55	-	-	0.09	-	-	-	0.29
Caribou meat	3.75	-	-	-	-	-	-	-	0.27
Snapper	-	-	-	-	-	0.78	-	-	0.26
Eulachon grease	0.11	-	-	-	-	0.73	-	-	0.25
Eulachon meat	3.13	-	-	-	-	-	-	-	0.23
Moose fat	-	0.11	-	-	-	0.64	-	-	0.22
Herring eggs on giant kelp	-	-	-	-	-	0.64	-	-	0.21
Moose liver	-	-	-	-	-	0.00	1.89	-	0.20
Beaver meat	-	-	-	2.40	-	-	-	-	0.20
Moose kidney	1.49	0.20	-	-	-	-	-	0.66	0.19
Red huckleberry	-	0.07	-	-	0.13	0.28	0.52	-	0.17
Peppermint	-	0.75	0.87	-	-	0.01	0.06	-	0.17
Bear grease	0.49	-	-	0.97	-	-	-	-	0.12
Blackberry	-	-	-	-	-	0.34	0.03	-	0.12
Salal berries	-	-	-	-	-	0.33	-	-	0.11
Mussels	-	-	-	-	-	-	0.94	-	0.10
Crabapple	-	-	-	-	-	0.21	-	-	0.07
Grouse meat	-	0.61	-	-	-	-	-	-	0.07
Whitefish	-	0.61	-	-	-	-	-	-	0.07
Arctic char	-	-	-	-	0.57	-	-	-	0.07
Seaweed	-	-	-	-	0.02	0.15	0.04	-	0.06
Salmonberry	-	-	-	-	-	0.17	-	-	0.06

	Ecozone/ Culture Area								
Traditional Food	1	2	3	4	5	6	7	8	Total BC
Groundhog meat	0.75	-	-	-	-	-	-	-	0.05
Pine mushroom	-	-	-	-	-	0.13	-	-	0.04
Beaver meat	-	-	-	-	-	-	-	0.41	0.04
Bear meat	-	-	-	0.35	-	-	-	-	0.03
Moose bone marrow,	-	-	-	-	-	-	-	0.29	0.03
Moose intestines	-	-	-	-	-	-	-	0.16	0.01
Balsam tea, leaves, dried	-	-	-	-	-	0.02	-	-	0.01
Labrador tea, leaves, dried	-	-	0.02	-	-	-	0.01	-	0.003
Rosehips, raw	-	-	-	-	-	0.01	-	-	0.003

(-) denotes that the food was not reported on the fall 24hr recalls from this ecozone

Environmental Concerns

Figure 22. Percent of BC FN living on-reserve who noticed any significant climate change in their traditional territory in the last 10 years

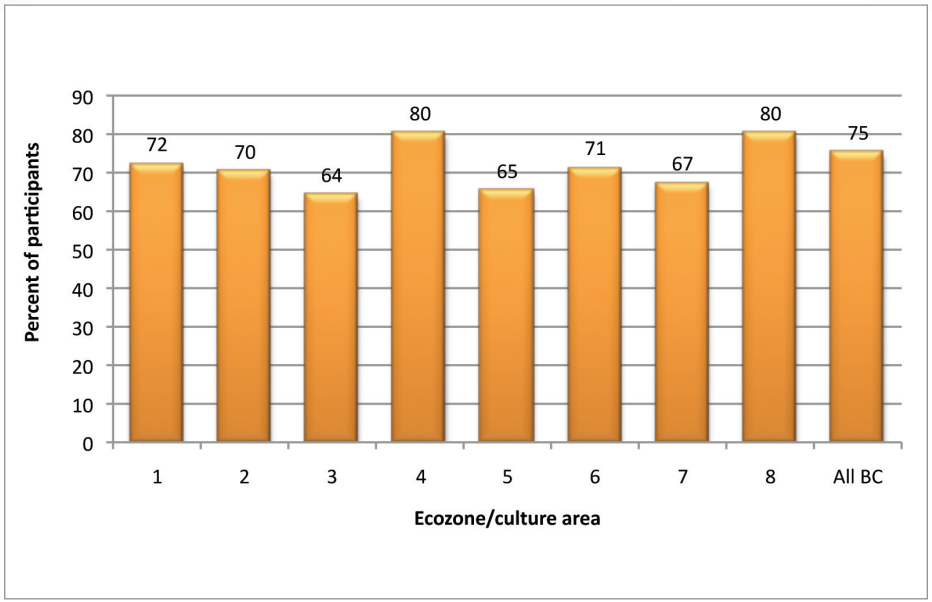


Table 18. Description of how climate change has affected traditional food availability in BC FN on-reserve households, unweighted

Effect on traditional food	Percent of responses (n=665)
Less availability of traditional food	47.4
General comments on weather changes	16.5
Harder to get traditional food	9.5
Growth of traditional food affected	8.6
Animal cycles/patterns affected	5.9
Fish runs changed	2.6
Contamination/disease observed	2.3
Comments non-related to climate change	1.8
Other comments	1.5
Ticks/sores on moose	1.1
Animals' food supply affected	0.8
Comments related to flooding	0.8
Different species observed	0.5
Pollution	0.5
Animals' feeding habits affected	0.3
Sick animals observed	0.3

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

Figure 23. Household water source and use, BC FN living on-reserve (n=1101)

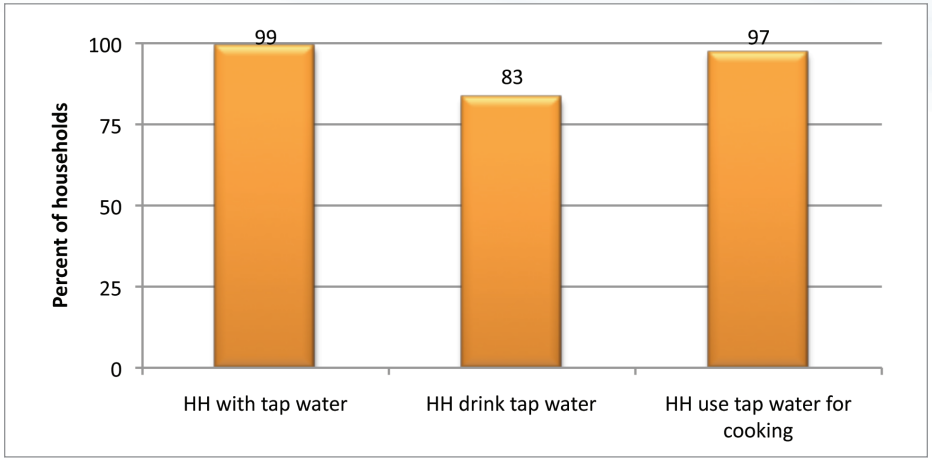
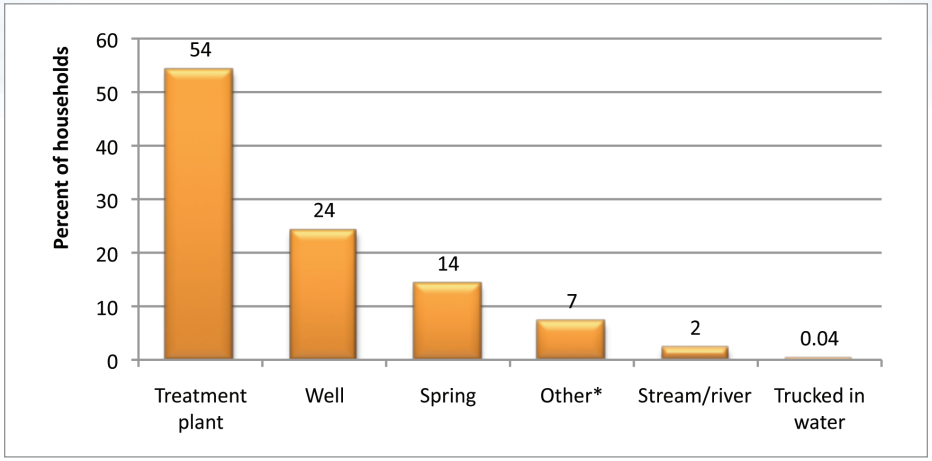
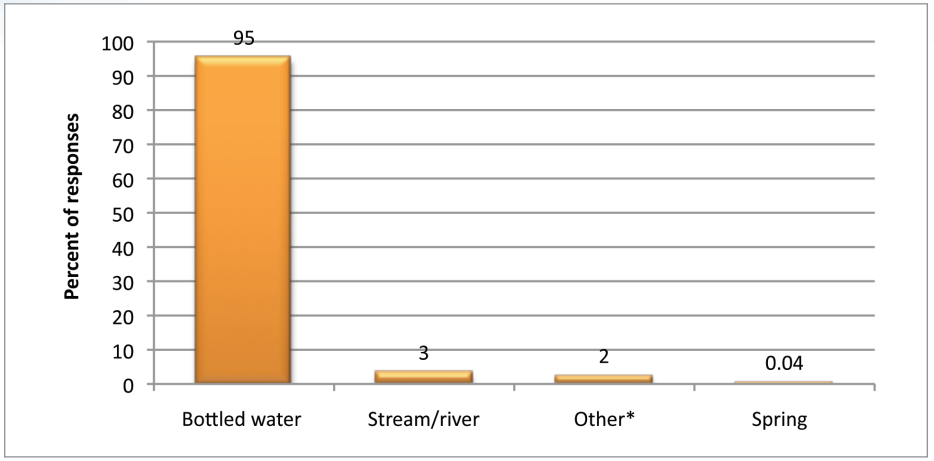


Figure 24. Source of tap water, BC FN living on-reserve (n=1096)



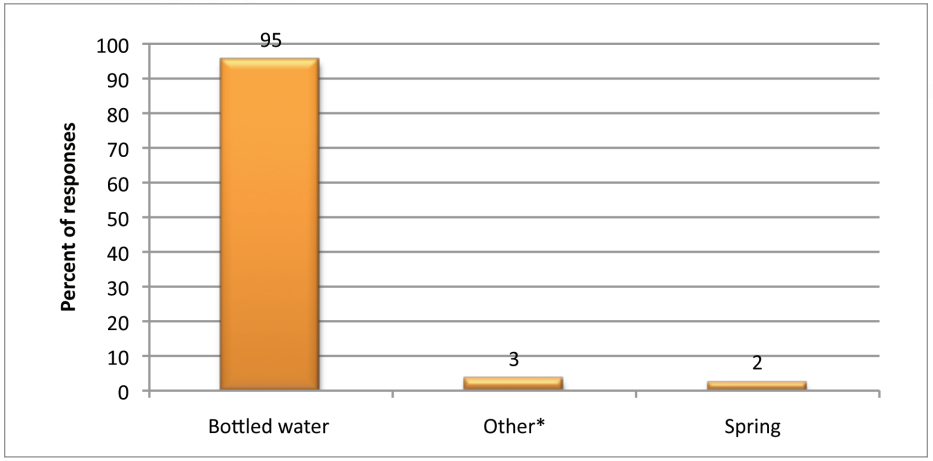
*top 3 other sources: municipality, community well and reservoir

Figure 25. Source of drinking water if no tap water or don't drink tap water, BC FN living on-reserve (n=151)



*top other source: community well

Figure 26. Source of water for preparation of food/beverages if no tap water or don't use tap water, BC FN living on-reserve (n=41)



*top other source: community well

Table 19. Characteristics of homes and plumbing, BC FN living on-reserve

Characteristic	Answer
Average year home was built (Range) (n= 794)	1988 (1935, 2009)
Percent of HH with upgraded plumbing (n=1096)	13
Average year plumbing upgraded (Range) (n= 121)	2001 (1966, 2009)
Percent of HH that treat water (e.g. with filters) (n=1101)	25
Percent of HH with outside water storage system (n=1101)	2
Percent of type of pipes under kitchen sink (n=1093)	
Metal	11
Plastic	77
Plastic with metal fittings	12

Table 20. Quantification of water consumption, BC FN living on reserve, unweighted

ITEM	Cups per day Mean (SD)	Main source of water
1. Water	4.8 (4.0)	Tap
2. Coffee	3.4 (4.2)	Tap
3. Tea (any kind)	2.1 (3.6)	Tap
4. Hot chocolate	0.2 (0.7)	Tap
5. Juice made from concentrated or crystals	2.2 (3.0)	Tap
6. Powdered milk	0.03 (0.4)	Tap
7. Broth	0.2 (0.7)	Tap
8. Soup	0.8 (1.3)	Tap
9. Stew	0.5 (1.0)	Tap
Total water consumed per day	14.3 (9.1)	

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

Trace Metal Detected	Maximum Detected (ug/L)	Detection Limit (DL) - ug/L	MAC - Maximum Allowable Concentration -GCDWQ, 2008- (ug/L)	Total Number of Samples in Excess			Comments
				First Draw	Flushed (5 Min)	Duplicate	
All Ecozones Combined							
Antimony, Sb	0.2	<0.2	**6**	0	0	0	Below guideline value.
Arsenic, As	5	<0.2	**10**	0	0	0	Below guideline value.
Barium, Ba	312	<0.2	**1000**	0	0	0	Below guideline value.
Boron, B	245	<10	**5000**	0	0	0	Below guideline value.
Cadmium, Cd	1.86	<0.04	**5**	0	0	0	Below guideline value.
Chromium, Cr	28.2	<0.2	**50**	0	0	0	Below guideline value.
Lead, Pb	20.4	<0.2	**10**	2	1	0	Exceedences are in the process of being re-sampled.
Selenium, Se	1.4	<0.2	**10**	0	0	0	Below guideline value.
Uranium, U	10.3	<0.1	**20**	0	0	0	Below guideline value.
Ecozones							
Boreal Cordillera							
Antimony, Sb	<0.2	<0.2	**6**	0	0	0	Below guideline value.
Arsenic, As	3.7	<0.2	**10**	0	0	0	Below guideline value.
Barium, Ba	76.3	<0.2	**1000**	0	0	0	Below guideline value.
Boron, B	39	<10	**5000**	0	0	0	Below guideline value.
Cadmium, Cd	<0.04	<0.04	**5**	0	0	0	Below guideline value.
Chromium, Cr	0.2	<0.2	**50**	0	0	0	Below guideline value.
Lead, Pb	6	<0.2	**10**	0	0	0	Below guideline value.
Selenium, Se	0.8	<0.2	**10**	0	0	0	Below guideline value.
Uranium, U	0.4	<0.1	**20**	0	0	0	Below guideline value.

Trace Metal Detected	Maximum Detected (ug/L)	Detection Limit (DL) - ug/L	MAC - Maximum Allowable Concentration -GCDWQ, 2008- (ug/L)	Total Number of Samples in Excess			Comments
				First Draw	Flushed (5 Min)	Duplicate	
Boreal Plains							
Antimony, Sb	<0.2	<0.2	**6**	0	0	0	Below guideline value.
Arsenic, As	0.5	<0.2	**10**	0	0	0	Below guideline value.
Barium, Ba	312	<0.2	**1000**	0	0	0	Below guideline value.
Boron, B	245	<10	**5000**	0	0	0	Below guideline value.
Cadmium, Cd	<0.04	<0.04	**5**	0	0	0	Below guideline value.
Chromium, Cr	28.2	<0.2	**50**	0	0	0	Below guideline value.
Lead, Pb	6.3	<0.2	**10**	0	0	0	Below guideline value.
Selenium, Se	1.1	<0.2	**10**	0	0	0	Below guideline value.
Uranium, U	1.2	<0.1	**20**	0	0	0	Below guideline value.
Montane Cordillera/Plateau							
Antimony, Sb	0.2	<0.2	**6**	0	0	N/A	Below guideline value.
Arsenic, As	3.1	<0.2	**10**	0	0	N/A	Below guideline value.
Barium, Ba	129	<0.2	**1000**	0	0	N/A	Below guideline value.
Boron, B	36	<10	**5000**	0	0	N/A	Below guideline value.
Cadmium, Cd	0.1	<0.04	**5**	0	0	N/A	Below guideline value.
Chromium, Cr	2	<0.2	**50**	0	0	N/A	Below guideline value.
Lead, Pb	3.6	<0.2	**10**	0	0	N/A	Below guideline value.
Selenium, Se	1.4	<0.2	**10**	0	0	N/A	Below guideline value.
Uranium, U	10.3	<0.1	**20**	0	0	N/A	Below guideline value.

Trace Metal Detected	Maximum Detected (ug/L)	Detection Limit (DL) - ug/L	MAC - Maximum Allowable Concentration -GCDWQ, 2008- (ug/L)	Total Number of Samples in Excess			Comments
				First Draw	Flushed (5 Min)	Duplicate	
Montane Cordillera/Subarctic							
Antimony, Sb	<0.2	<0.2	**6**	0	0	0	Below guideline value.
Arsenic, As	<0.2	<0.2	**10**	0	0	0	Below guideline value.
Barium, Ba	143	<0.2	**1000**	0	0	0	Below guideline value.
Boron, B	19	<10	**5000**	0	0	0	Below guideline value.
Cadmium, Cd	<0.04	<0.04	**5**	0	0	0	Below guideline value.
Chromium, Cr	0.7	<0.2	**50**	0	0	0	Below guideline value.
Lead, Pb	2.4	<0.2	**10**	0	0	0	Below guideline value.
Selenium, Se	<0.2	<0.2	**10**	0	0	0	Below guideline value.
Uranium, U	2.1	<0.1	**20**	0	0	0	Below guideline value.
Montane Cordillera/Subarctic/Northwest Coast							
Antimony, Sb	<0.2	<0.2	**6**	0	0	0	Below guideline value.
Arsenic, As	5	<0.2	**10**	0	0	0	Below guideline value.
Barium, Ba	186	<0.2	**1000**	0	0	0	Below guideline value.
Boron, B	<10	<10	**5000**	0	0	0	Below guideline value.
Cadmium, Cd	0.09	<0.04	**5**	0	0	0	Below guideline value.
Chromium, Cr	0.4	<0.2	**50**	0	0	0	Below guideline value.
Lead, Pb	2.9	<0.2	**10**	0	0	0	Below guideline value.
Selenium, Se	<0.2	<0.2	**10**	0	0	0	Below guideline value.
Uranium, U	0.5	<0.1	**20**	0	0	0	Below guideline value.

Trace Metal Detected	Maximum Detected (ug/L)	Detection Limit (DL) - ug/L	MAC - Maximum Allowable Concentration -GCDWQ, 2008- (ug/L)	Total Number of Samples in Excess			Comments
				First Draw	Flushed (5 Min)	Duplicate	
Pacific Maritime/Northwest Coast							
Antimony, Sb	<0.2	<0.2	**6**	0	0	0	Below guideline value.
Arsenic, As	4.6	<0.2	**10**	0	0	0	Below guideline value.
Barium, Ba	12.8	<0.2	**1000**	0	0	0	Below guideline value.
Boron, B	109	<10	**5000**	0	0	0	Below guideline value.
Cadmium, Cd	1.86	<0.04	**5**	0	0	0	Below guideline value.
Chromium, Cr	3.2	<0.2	**50**	0	0	0	Below guideline value.
Lead, Pb	20.4	<0.2	**10**	1	0	0	Exceedences are in the process of being re-sampled.
Selenium, Se	<0.2	<0.2	**10**	0	0	0	Below guideline value.
Uranium, U	0.6	<0.1	**20**	0	0	0	Below guideline value.
Pacific Maritime/Plateau							
Antimony, Sb	0.2	<0.2	**6**	0	0	0	Below guideline value.
Arsenic, As	2.2	<0.2	**10**	0	0	0	Below guideline value.
Barium, Ba	9.3	<0.2	**1000**	0	0	0	Below guideline value.
Boron, B	28	<10	**5000**	0	0	0	Below guideline value.
Cadmium, Cd	0.12	<0.04	**5**	0	0	0	Below guideline value.
Chromium, Cr	22.9	<0.2	**50**	0	0	0	Below guideline value.
Lead, Pb	12	<0.2	**10**	1	0	0	Exceedences are in the process of being re-sampled.
Selenium, Se	0.5	<0.2	**10**	0	0	0	Below guideline value.
Uranium, U	0.6	<0.1	**20**	0	0	0	Below guideline value.

Trace Metal Detected	Maximum Detected (ug/L)	Detection Limit (DL) - ug/L	MAC - Maximum Allowable Concentration -GCDWQ, 2008- (ug/L)	Total Number of Samples in Excess			Comments
				First Draw	Flushed (5 Min)	Duplicate	
Taiga Plains							
Antimony, Sb	<0.2	<0.2	**6**	0	0	0	Below guideline value.
Arsenic, As	<0.2	<0.2	**10**	0	0	0	Below guideline value.
Barium, Ba	72.6	<0.2	**1000**	0	0	0	Below guideline value.
Boron, B	30	<10	**5000**	0	0	0	Below guideline value.
Cadmium, Cd	0.04	<0.04	**5**	0	0	0	Below guideline value.
Chromium, Cr	0.7	<0.2	**50**	0	0	0	Below guideline value.
Lead, Pb	6.9	<0.2	**10**	0	0	0	Below guideline value.
Selenium, Se	0.8	<0.2	**10**	0	0	0	Below guideline value.
Uranium, U	0.8	<0.1	**20**	0	0	0	Below guideline value.

N/A = Information Not Available - Laboratory Data Missing

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

Trace Metal Detected	Maximum Detected (ug/L)	Detection Limit (DL) - ug/L	AO -Aesthetic Objective -GCDWQ, 2008- (ug/L)	Total Number of Samples in Excess			Comments
				First Draw	Flushed (5 Min)	Duplicate	
All Ecozones Combined							
Aluminum, Al	287	<1	**100/200***	6	8	3	Elevated levels pose no health concerns.
Copper, Cu	2,930	<0.2	**1,000**	16	0	0	Elevated levels pose no health concerns.
Iron, Fe	1,420	<10	**300**	3	4	0	Elevated levels pose no health concerns.
Manganese, Mn	250	<0.2	**50**	6	5	0	Elevated levels pose no health concerns.
Sodium, Na	298,000	<10	**200,000**	1	1	0	Elevated levels pose no health concerns.
Zinc, Zn	1,440	<1	**5,000**	0	0	0	Below guideline value.
Ecozones							
Boreal Cordillera							
Aluminum, Al	6	<1	**100/200***	0	0	0	Below guideline value.
Copper, Cu	602	<0.2	**1,000**	0	0	0	Below guideline value.
Iron, Fe	85	<10	**300**	0	0	0	Below guideline value.
Manganese, Mn	69.8	<0.2	**50**	1	1	0	Elevated levels pose no health concerns.
Sodium, Na	25,600	<10	**200,000**	0	0	0	Below guideline value.
Zinc, Zn	175	<1	**5,000**	0	0	0	Below guideline value.
Boreal Plains							
Aluminum, Al	7	<1	**100/200***	0	0	0	Below guideline value.
Copper, Cu	1,170	<0.2	**1,000**	1	0	0	Elevated levels pose no health concerns.
Iron, Fe	134	<10	**300**	0	0	0	Below guideline value.
Manganese, Mn	77.1	<0.2	**50**	1	1	0	Elevated levels pose no health concerns.
Sodium, Na	68,100	<10	**200,000**	0	0	0	Below guideline value.
Zinc, Zn	1,440	<1	**5,000**	0	0	0	Below guideline value.

Trace Metal Detected	Maximum Detected (ug/L)	Detection Limit (DL) - ug/L	AO -Aesthetic Objective -GCDWQ, 2008- (ug/L)	Total Number of Samples in Excess			Comments
				First Draw	Flushed (5 Min)	Duplicate	
Montane Cordillera/Plateau							
Aluminum, Al	16	<1	**100/200***	0	0	0	Below guideline value.
Copper, Cu	2,200	<0.2	**1,000**	2	0	0	Elevated levels pose no health concerns.
Iron, Fe	1,420	<10	**300**	1	2	0	Elevated levels pose no health concerns.
Manganese, Mn	250	<0.2	**50**	4	3	0	Elevated levels pose no health concerns.
Sodium, Na	298,000	<10	**200,000**	1	1	0	Elevated levels pose no health concerns.
Zinc, Zn	1,130	<1	**5,000**	0	0	0	Below guideline value.
Montane Cordillera/Subarctic							
Aluminum, Al	287	<1	**100/200***	6	8	3	Below guideline value.
Copper, Cu	370	<0.2	**1,000**	0	0	0	Below guideline value.
Iron, Fe	82	<10	**300**	0	0	0	Below guideline value.
Manganese, Mn	3	<0.2	**50**	0	0	0	Below guideline value.
Sodium, Na	3,010	<10	**200,000**	0	0	0	Below guideline value.
Zinc, Zn	325	<1	**5,000**	0	0	0	Below guideline value.
Montane Cordillera/Subarctic/Northwest Coast							
Aluminum, Al	50	<1	**100/200***	0	0	0	Below guideline value.
Copper, Cu	436	<0.2	**1,000**	0	0	0	Below guideline value.
Iron, Fe	81	<10	**300**	0	0	0	Below guideline value.
Manganese, Mn	34.6	<0.2	**50**	0	0	0	Below guideline value.
Sodium, Na	7,420	<10	**200,000**	0	0	0	Below guideline value.
Zinc, Zn	581	<1	**5,000**	0	0	0	Below guideline value.

Trace Metal Detected	Maximum Detected (ug/L)	Detection Limit (DL) - ug/L	AO -Aesthetic Objective -GCDWQ, 2008- (ug/L)	Total Number of Samples in Excess			Comments
				First Draw	Flushed (5 Min)	Duplicate	
Pacific Maritime/Northwest Coast							
Aluminum, Al	37	<1	**100/200***	0	0	0	Below guideline value.
Copper, Cu	2,930	<0.2	**1,000**	10	0	0	Elevated levels pose no health concerns.
Iron, Fe	1,310	<10	**300**	1	1	0	Elevated levels pose no health concerns.
Manganese, Mn	30.2	<0.2	**50**	0	0	0	Below guideline value.
Sodium, Na	62,300	<10	**200,000**	0	0	0	Below guideline value.
Zinc, Zn	725	<1	**5,000**	0	0	0	Below guideline value.
Pacific Maritime/Plateau							
Aluminum, Al	22	<1	**100/200***	0	0	0	Below guideline value.
Copper, Cu	2,380	<0.2	**1,000**	3	0	0	Elevated levels pose no health concerns.
Iron, Fe	576	<10	**300**	1	1	0	Elevated levels pose no health concerns.
Manganese, Mn	44.4	<0.2	**50**	0	0	0	Below guideline value.
Sodium, Na	36,100	<10	**200,000**	0	0	0	Below guideline value.
Zinc, Zn	636	<1	**5,000**	0	0	0	Below guideline value.
Taiga Plains							
Aluminum, Al	65	<1	**100/200***	0	0	0	Below guideline value.
Copper, Cu	337	<0.2	**1,000**	0	0	0	Below guideline value.
Iron, Fe	76	<10	**300**	0	0	0	Below guideline value.
Manganese, Mn	20.6	<0.2	**50**	0	0	0	Below guideline value.
Sodium, Na	4,150	<10	**200,000**	0	0	0	Below guideline value.
Zinc, Zn	745	<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 0.1 mg/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 quantified in BC FN on-reserve communities

Pharmaceutical	Human	Veterinary	Aquaculture	Primary Use
Acetaminophen	X	X		Analgesic/anti-inflammatory
Atenolol	X	X		Beta-blocker, antihypertensive
Atorvastatin	X			Statin, lowers cholesterol
Bezafibrate	X			Lipid regulator
Caffeine	X			Stimulant
Carbamazepine	X			Anticonvulsant
Chlortetracycline		X		Antibiotic
Cimetidine	X			Antacid, peptic ulcers
Ciprofloxacin	X	X	X	Antibiotic
Clarithromycin	X			Antibiotic
Codeine	X			Analgesic
Cotinine	X			Metabolite of nicotine (smoking cessation)
Clofibric acid	X	X		Lipid regulator
Dehydronifedipine	X	X		Antianginal metabolite
Diclofenac	X			Analgesic/anti-inflammatory
Diltiazem	X			Antihypertensive
Diphenhydramine	X			Antihistamine
17a-Ethinylestradiol	X			Oral contraceptive
Erythromycin	X	X		Antibiotic
Fluoxetine	X	X		Antidepressant

Pharmaceutical	Human	Veterinary	Aquaculture	Primary Use
Furosemide	X			Diuretic
Gemfibrozil	X			Lipid regulator
Hydrochlorothiazide	X			Diuretic
Ibuprofen	X			Analgesic/anti-inflammatory
Indomethacin	X			Analgesic/anti-inflammatory
Ketoprofen	X	X		Analgesic/anti-inflammatory
Lincomycin		X		Antibiotic
Metformin	X			Antidiabetic
Metoprolol	X			Beta-blocker, antihypertensive
Monensin		X		Antibiotic
Naproxen	X			Analgesic/anti-inflammatory
Oxytetracycline		X	X	Antibiotic
Pentoxyfylline	X	X		Antidiabetic
Ranitidine	X			Antacid
Roxithromycin	X			Antibiotic
Sulfamethazine		X		Antibiotic
Sulfamethoxazole	X			Antibiotic
Tetracycline	X	X		Antibiotic
Trimethoprim	X	X	X	Antibiotic
Warfarin	X			Anticoagulant

Table 24. Level of pharmaceuticals in surface water, by total and by ecozone

Pharmaceutical Detected	Max (ng/L)	Detection Limit (ng/L)	Number of Samples Collected	Number of Samples Non-detected
All Ecozones Combined: Pharmaceuticals Detected in Surface Water				
Acetaminophen	17.5	<10	62	60
Atenolol	6.7	<5	62	60
Caffeine	91.5	<10	62	48
Ciprofloxacin	29.4	<20	60*	59
Clarithromycin	9.4	<2	62	61
Clofibric acid	8.6	<1	62	54
Cotinine	15.8	<5	62	60
Dehydronifedipine	9.5	<2	62	59
Fluoxetine	50.7	<5	62	57
Ketoprofen	307	<2	62	53
Pentoxyfylline	4.5	<2	62	59
Trimethoprim	4.3	<2	62	60
Warfarin	6.9	<0.5	62	58
Boreal Cordillera: Pharmaceuticals Detected in Surface Water				
Caffeine	51.9	<10	6	5
Clofibric acid	8.6	<1	6	4
Fluoxetine	50.7	<5	6	4
Trimethoprim	4.3	<2	6	4
Boreal Plains: Pharmaceuticals Detected in Surface Water				
Caffeine	10.2	<10	6	5
Dehydronifedipine	3.1	<2	6	5
Fluoxetine	32.4	<5	6	5

Pharmaceutical Detected	Max (ng/L)	Detection Limit (ng/L)	Number of Samples Collected	Number of Samples Non-detected
Montane Cordillera/Subarctic: Pharmaceuticals Detected in Surface Water				
Atenolol	5	<5	6	5
Caffeine	91.5	<10	6	5
Cotinine	15.8	<5	6	5
Fluoxetine	18.3	<5	6	5
Ketoprofen	33.9	<2	6	3
Warfarin	3.9	<0.5	6	5
Montane Cordillera/Subarctic/Northwest Coast: Pharmaceuticals Detected in Surface Water				
Acetaminophen	13.8	<10	6	5
Caffeine	34	<10	6	3
Clofibric acid	2.3	<1	6	5
Dehydronifedipine	3.3	<2	6	5
Ketoprofen	45.2	<2	6	3
Pacific Maritime/Northwest Coast: Pharmaceuticals Detected in Surface Water				
Acetaminophen	17.5	<10	18	17
Caffeine	19.4	<10	18	15
Ciprofloxacin	29.4	<20	17*	16
Dehydronifedipine	9.5	<2	18	17
Fluoxetine	15.8	<5	18	17
Pacific Maritime/Plateau: Pharmaceuticals Detected in Surface Water				
Atenolol	6.7	<5	9	7
Caffeine	11.8	<10	9	7
Clofibric acid	4.1	<1	9	4

Pharmaceutical Detected	Max (ng/L)	Detection Limit (ng/L)	Number of Samples Collected	Number of Samples Non-detected
Ketoprofen	307	<2	9	2
Pentoxyfylline	4.5	<2	9	3
Warfarin	6.9	<0.5	9	3
Taiga Plains: Pharmaceuticals Detected in Surface Water				
Caffeine	8.4	<10	6	5
Clarithromycin	9.4	<2	6	5

* Missing reported results for this analysis due to laboratory error

Table 25. Number of pharmaceuticals detected by # of BC FN on-reserve communities and # of sites

	Pharmaceutical	# of Communities	# of Sites	FNFNES Max Concentration ng/L	Canadian & US Studies ng/L	Reference
1	Acetaminophen	2	2	17.5	3,500	Waiser, 2011
2	Atenolol	2	3	6.7	28.2	Li, 2010
3	Caffeine	10	14	91.5	1,470	Waiser, 2011
4	Ciprofloxacin	1	1	29.4	30	Waiser, 2011
5	Clarithromycin	1	1	9.4	79	Metcalfe, 2004
6	Clofibric Acid	4	8	8.6	175	Metcalfe, 2004
7	Cotinine	2	2	15.8	180	Alberta Env. 2005
8	Dehydronifedipine	3	3	9.5	22	Glassmeyer, 2005
9	Fluoxetine	4	5	50.7	46	Metcalfe, 2004
10	Ketoprofen	3	9	307	50	OMOE, 2010
11	Pentoxyfylline	1	3	4.5	9	Metcalfe, 2004
12	Trimethoprim	1	2	4.3	150	Waiser, 2011
13	Warfarin	2	4	6.9	15	Lietz, 2006

Mercury in Hair Analyses

Figure 27. Histogram of average total mercury in hair concentrations (µg/g or ppm) in First Nations population older than 19, living on First Nations reserves in British Columbia, First Nations Food Nutrition and Environment Study (2008/2009), sample data weighted and age-sex standardized (N=45547).

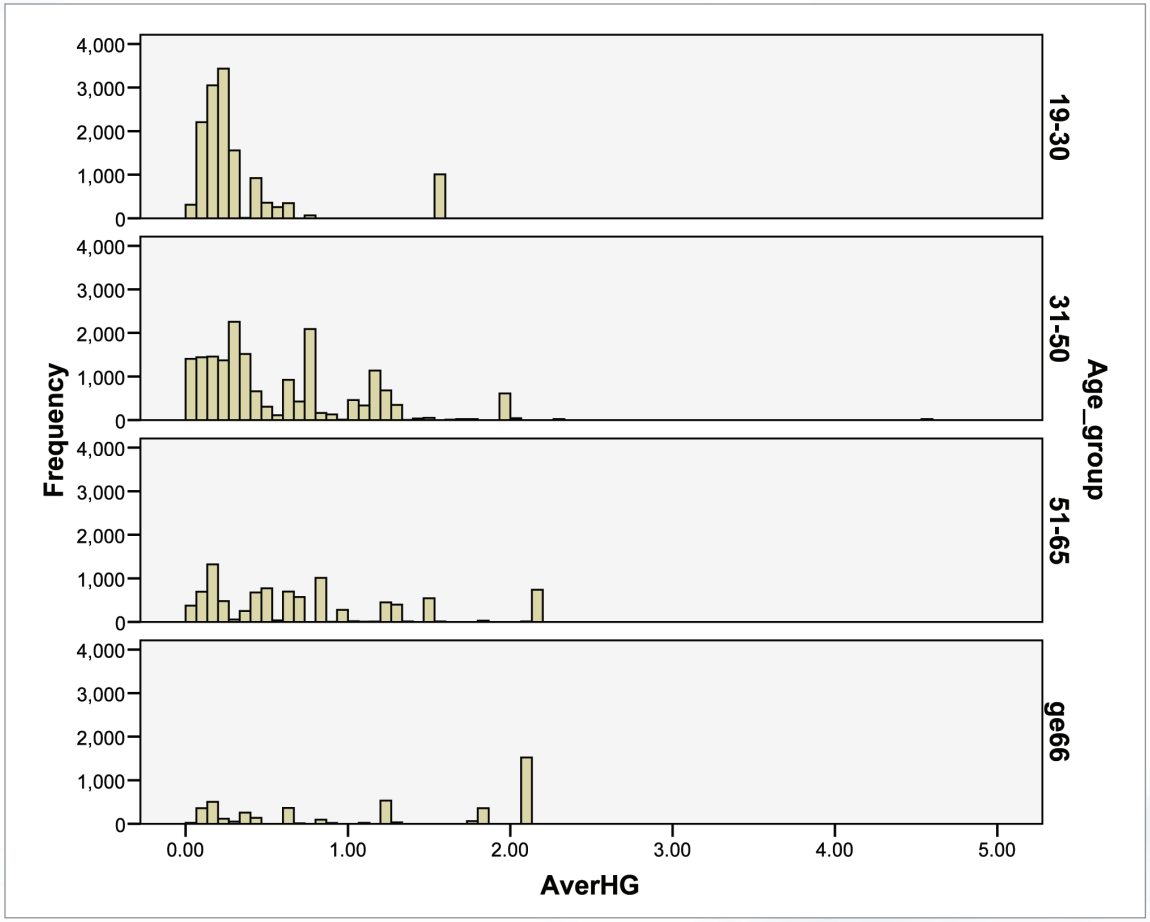


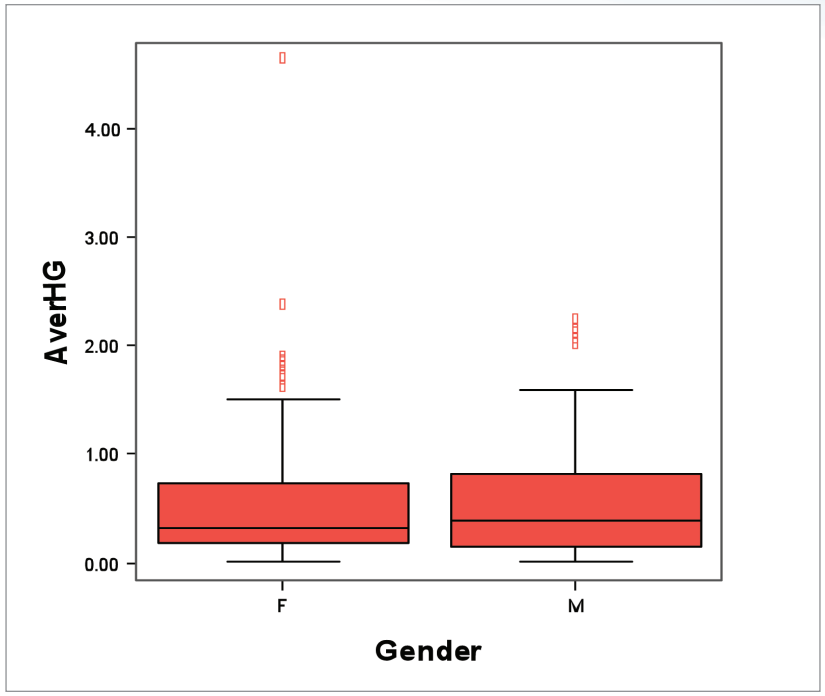
Table 26a. Arithmetic and geometric means of average total mercury in hair concentrations (µg/g or ppm) in First Nations population older than 19, living on First Nations reserves in British Columbia. First Nations Food Nutrition and Environment Study (2008/2009), sample data weighted and age-sex standardized.

Gender	Age Group	Sample Size	Weighted Size	A.M.	A.M.-LOW (95% CI)	A.M.-LOW (95% CI)	G.M.	G.M.-LOW (95% CI)	G.M.-UP (95% CI)
Total	19-30	94	13,525	0.335	0.095	0.576	0.231	0.156	0.343
Total	31-50	240	18,125	0.572	0.392	0.752	0.371	0.252	0.545
Total	51+	153	13,917	0.870	0.202	1.539	0.551	0.206	1.473
Total	Total	487	45,567	0.593	0.361	0.825	0.364	0.248	0.534
M	19-30	25	7,139	0.225	0.144	0.306	0.188	0.140	0.252
M	31-50	62	9,396	0.731	0.497	0.964	0.497	0.282	0.875
M	51+	55	6,967	0.953	0.120	1.787	0.548	0.184	1.632
M	Total	142	23,502	0.643	0.291	0.995	0.381	0.216	0.672
F	19-30	69	6,386	0.459	0.073	0.845	0.292	0.161	0.527
F	31-50	178	8,729	0.402	0.325	0.479	0.271	0.230	0.319
F	51+	98	6,950	0.787	0.262	1.312	0.553	0.215	1.426
F	Total	345	22,065	0.540	0.376	0.703	0.347	0.252	0.478
F	19-50	247	15,115	0.426	0.292	0.560	0.280	0.234	0.334

Table 26b. Selected percentiles of average total mercury in hair concentrations (µg/g or ppm) in First Nations population older than 19, living on First Nations reserves in British Columbia. First Nations Food Nutrition and Environment Study (2008/2009), sample data weighted and age-sex standardized.

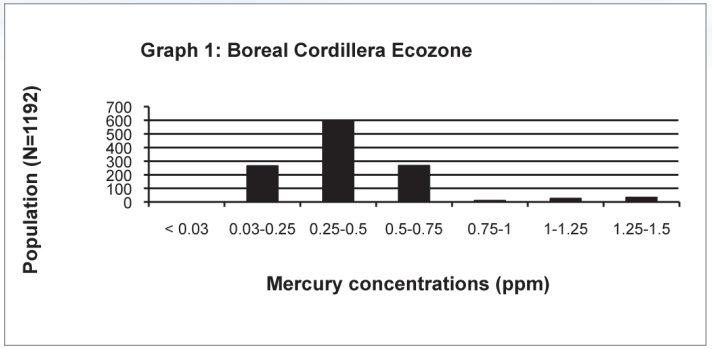
Gender	Age Group	Sample Size	Weighted Size	50th	50th LOW (95% CI)	50th UP (95% CI)	75th	75th LOW (95% CI)	75th UP (95% CI)	90th	90th LOW (95% CI)	90th UP (95% CI)	95th	95th LOW (95% CI)	95th UP (95% CI)
Total	19-30	94	7,171	0.216	0.125	0.307	0.304	0.057	0.550	0.641	0.201	1.082			
Total	31-50	240	22,857	0.369	0.061	0.677	0.734	0.351	1.118	1.200	0.878	1.521	1.303	0.589	2.017
Total	51+	153	15,539	0.636	0.041	1.232	1.284	0.264	2.304	1.976	0.356	3.597			
Total	Total	487	45,567	0.342	0.150	0.533	0.746	0.262	1.230	1.499	0.800	2.197	2.020	1.369	2.671
M	19-30	25	1,142	0.157	0.048	0.265	0.269	0.121	0.417	0.407	0.236	0.579	0.481	0.315	0.646
M	31-50	62	5,352	0.683	0.325	1.042	1.110	0.671	1.548	1.263	0.934	1.593	1.651	1.005	2.297
M	51+	55	3,102	0.563	-0.206	1.331	1.764	0.167	3.360						
M	Total	142	9,596	0.377	0.032	0.721	0.824	0.162	1.485	1.954	0.581	3.327	2.059	0.880	3.238
F	19-30	69	6,029	0.246	0.075	0.417	0.437	0.070	0.803						
F	31-50	178	17,504	0.323	0.296	0.349	0.445	0.354	0.536	0.773	0.314	1.232	1.176	0.696	1.656
F	51+	98	12,437	0.677	0.049	1.305	1.243	0.421	2.065	1.439	0.527	2.350	1.800	0.673	2.928
F	Total	345	35,971	0.323	0.214	0.432	0.720	0.324	1.116	1.298	0.950	1.646	1.540	1.272	1.808
F	19-50	247	23,533	0.283	0.226	0.340	0.446	0.229	0.662	1.171	0.435	1.907	1.534	0.829	2.239

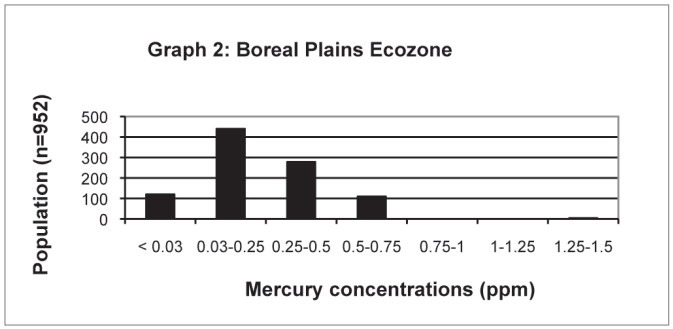
Figure 28. Average total mercury (AverHG) in First Nations population older than 19, living on First Nations reserves in British Columbia. First Nations Food Nutrition and Environment Study in British Columbia Region (2008/2009), sample data weighted and age-sex standardized for BC First Nations population. Males (N=23501), Females (N=22046)



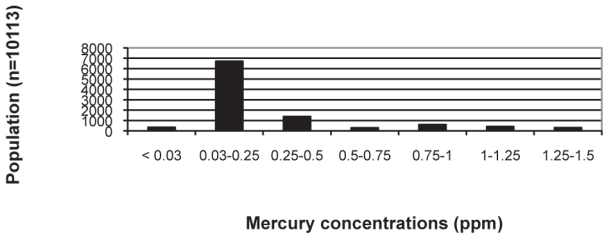
2 ppm in hair - proposed Health Canada guideline for women of childbearing age

Figure 29. Mercury Concentrations in Hair for First Nations older than 19, living on Reserves in British Colombia, by ecozone. First Nations Food, Nutrition and Environment Study (FNFNES, 2008-2009 sampling results, weighted and age-sex adjusted to BC First Nations Population (N=23501)

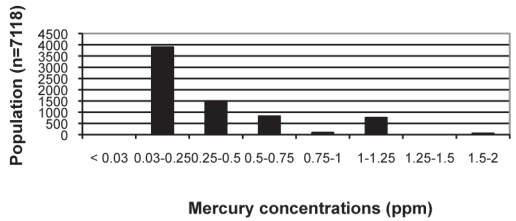




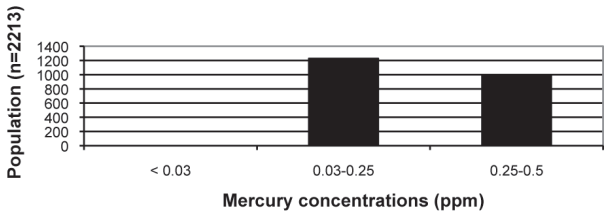
Graph 3: Montane Cordillera/Plateau Ecozone



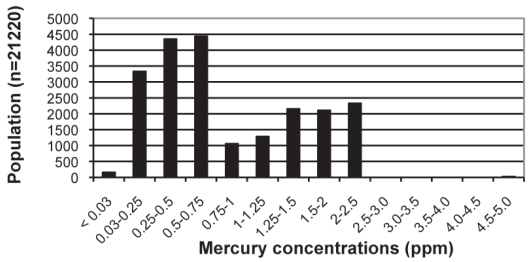
Graph 4: Montane Cordillera/Subarctic Ecozone



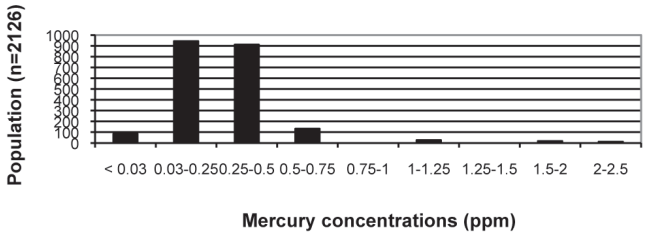
Graph 5: Montane Cordillera/Subarctic/Northwest Coast Ecozone



Graph 6: Pacific Maritime/Northwest Coast Ecozone



Graph 7: Pacific Maritime/Plateau Ecozone



Graph 8: Taiga Plains Ecozone

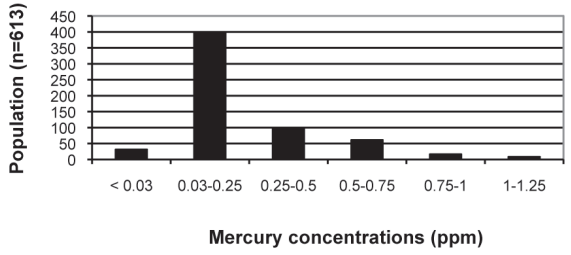
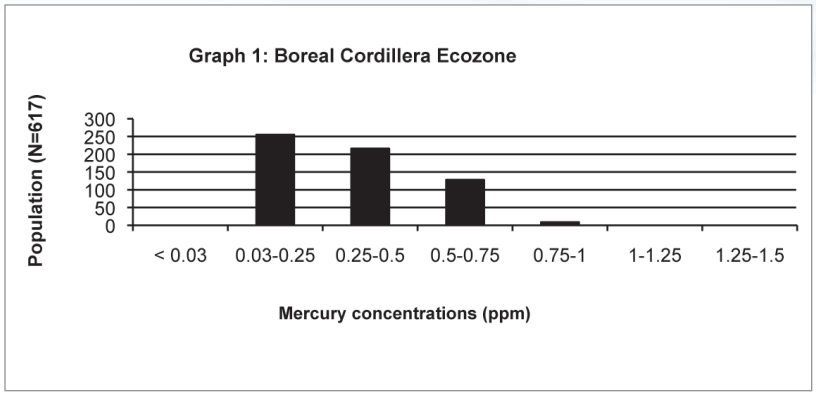
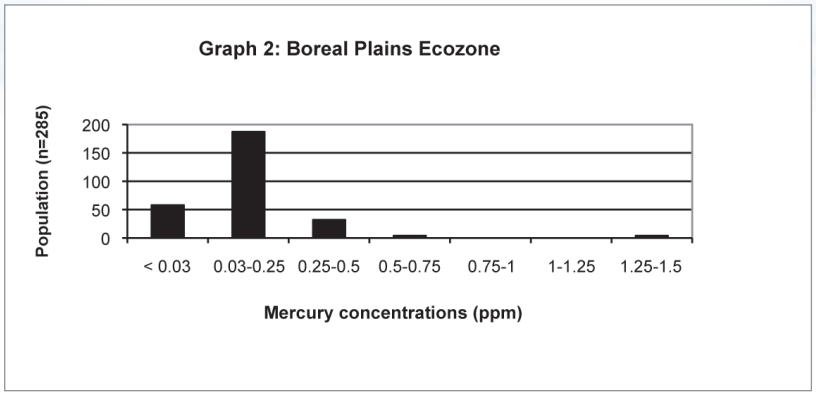
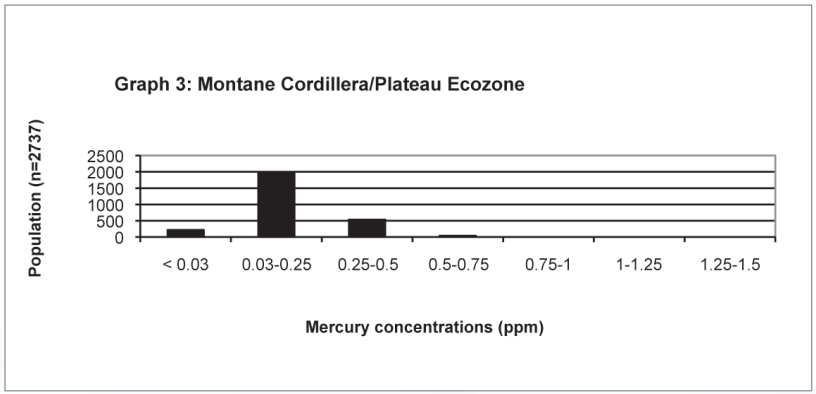
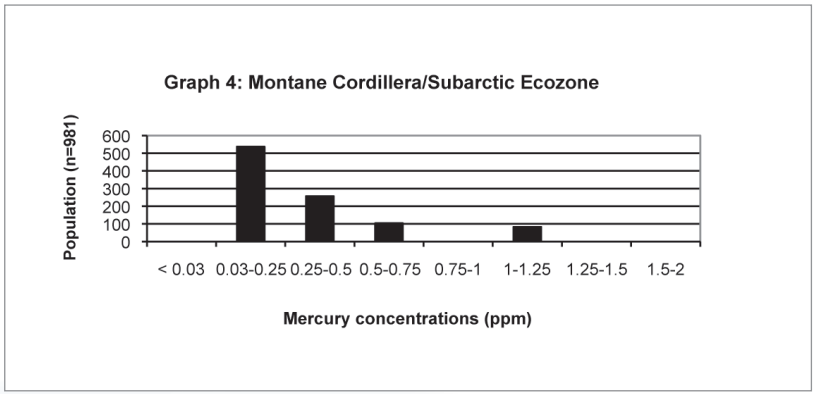


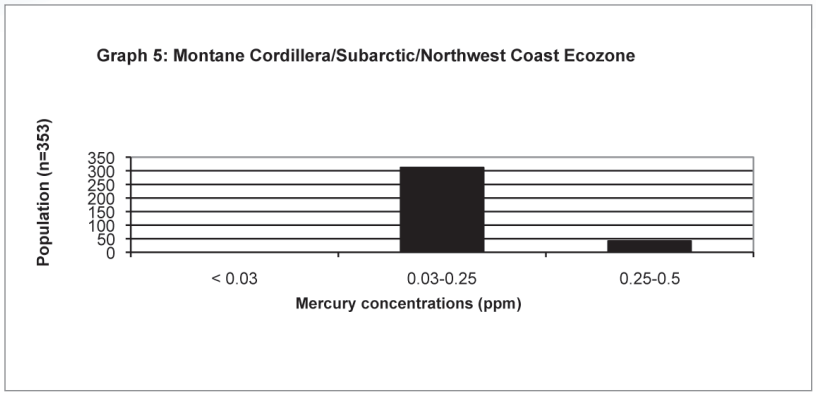
Figure 30. Mercury Concentrations in Hair for First Nations Women (Child Bearing Age 19 to 50) living on Reserves in British Colombia, by ecozone. First Nations Food, Nutrition and Environment Study (FNFNES, 2008-2009 sampling results, weighted and age-sex adjusted to BC First Nations Population (N=22046)

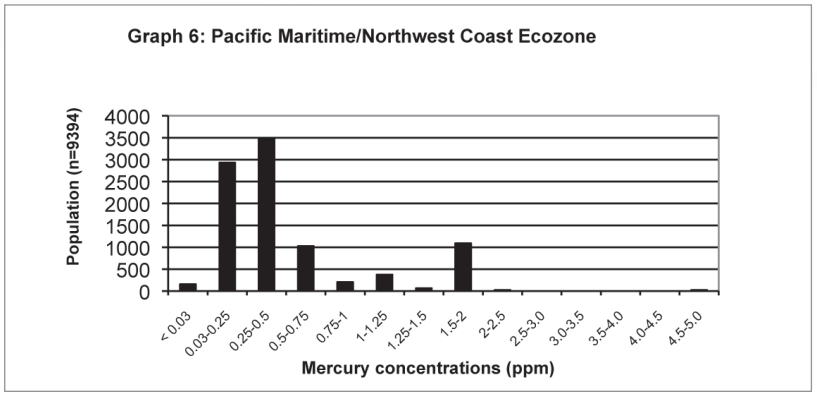


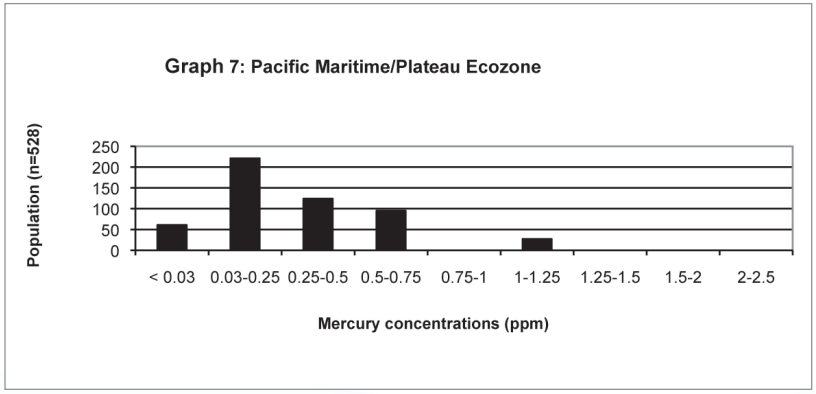







Graph 5: Montane Cordillera/Subarctic/Northwest Coast Ecozone
Population (n=353)
350
300
250
200
150
100
50
0
< 0.03
0.03-0.25
0.25-0.5
Mercury concentrations (ppm)


Graph 6: Pacific Maritime/Northwest Coast Ecozone
Population (n=9394)
4000
3500
3000
2500
2000
1500
1000
500
0
< 0.03
0.03-0.25
0.25-0.5
0.5-0.75
0.75-1
1-1.25
1.25-1.5
1.5-2
2-2.5
2.5-3.0
3.0-3.5
3.5-4.0
4.0-4.5
4.5-5.0
Mercury concentrations (ppm)


Graph 7: Pacific Maritime/Plateau Ecozone
Population (n=528)
250
200
150
100
50
0
< 0.03
0.03-0.25
0.25-0.5
0.5-0.75
0.75-1
1-1.25
1.25-1.5
1.5-2
2-2.5
Mercury concentrations (ppm)

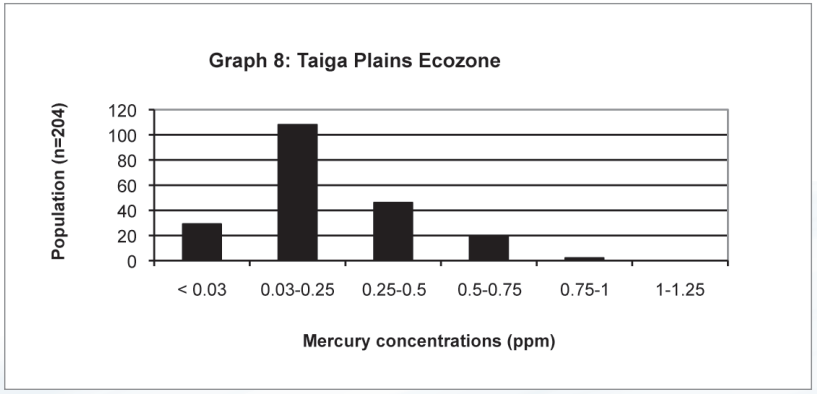

Graph 8: Taiga Plains Ecozone
Population (n=204)
120
100
80
60
40
20
0
< 0.03
0.03-0.25
0.25-0.5
0.5-0.75
0.75-1
1-1.25
Mercury concentrations (ppm)

Table 27. Mean portion size of traditional food categories, by gender and age group, as reported from 24hr recalls, BC FN living on-reserve, unweighted

Traditional food category	Women			Men		
	Age 19-50	Age 51-70	Age 71+	Age 19-50	Age 51-70	Age 71+
	Mean grams/serving			Mean grams/serving		
Fish	109	132	87	163	163	100
Fish oil	22	26	28*	28*	44	28*
Beach food	59	137	95*	156	47	95*
Sea mammals**	356	356	356	356	356	356
Land mammals	136	123	103	234	153	181
Land mammal fat (bear)	108	75*	75*	39	13	75*
Wild birds	75	75*	75*	75*	75*	75*
Bird egg***	144	144	144	144	144	144
Wild berries	56	41	57	74	39	18
Wild plants, roots, shoots or greens	18	1	12*	12*	7	12*
Tree foods	1*	1	1*	1*	1	1*
Mushrooms	48	48*	48*	48*	48*	48*

*imputed portion size from mean intake by total population
**imputed portion size from literature values: Inuit report ringed seal values[53]
***imputed portion size from literature values: Canadian nutrient file goose egg weight[54])

Table 28a. Estimated average intake of major traditional foods (g/person/day), using traditional food frequency results, unweighted

Traditional food	Women			Men			Total population (n=1103)
	Age 19-50 (n=499)	Age 51-70 (n=171)	Age 71+ (n=25)	Age 19-50 (n=240)	Age 51-70 (n=141)	Age 71+ (n=14)	
	Mean grams/serving			Mean grams/serving			
Total	**71.84**	**92.12**	**108.63**	**141.24**	**122.76**	**56.17**	**97.65**
Moose meat	18.34	14.52	17.10	30.24	21.20	5.80	20.84
Salmon, any	10.80	18.85	17.08	24.28	22.81	14.27	16.65
Sockeye salmon	5.73	8.82	6.75	12.61	11.20	8.72	8.46
Deer meat	4.09	4.67	2.69	9.45	6.08	2.69	5.55
Chinook salmon	2.32	4.80	3.16	3.97	5.18	2.57	3.43
Trout, any	1.40	2.00	1.31	3.95	3.43	0.88	2.28
Coho salmon	1.36	2.63	2.92	2.83	4.05	2.04	2.27
Elk meat	1.12	1.56	1.26	3.40	4.55	2.26	2.26
Halibut	1.32	1.92	2.93	2.06	2.55	2.93	1.81
Soapberries	1.60	1.36	2.24	2.00	0.63	0.02	1.44
Laver seaweed	0.59	2.85	7.27	1.46	0.89	0.70	1.38
Salmon eggs	0.94	1.26	2.34	1.85	1.57	0.37	1.29
Blue huckleberries	1.18	0.96	0.65	1.72	0.93	0.04	1.16
Blueberries	1.26	0.83	1.08	1.19	1.27	0.25	1.15
Prawn	0.68	1.10	2.41	1.50	0.59	0.89	1.07
Pink salmon	0.61	0.68	0.74	1.63	1.72	0.20	0.98
Chum salmon	0.55	0.73	1.12	1.48	1.76	0.71	0.95
Moose kidney	0.70	0.60	0.20	1.21	1.33	0.46	0.88
Rainbow trout	0.56	0.82	0.07	1.39	1.48	0.43	0.88

Traditional food	Women			Men			Total population (n=1103)
	Age 19-50 (n=499)	Age 51-70 (n=171)	Age 71+ (n=25)	Age 19-50 (n=240)	Age 51-70 (n=141)	Age 71+ (n=14)	
	Mean grams/serving			Mean grams/serving			
Crab	0.41	0.75	2.17	1.62	0.55	0.41	0.85
Moose liver	0.45	0.98	0.21	1.43	0.90	0.46	0.81
Raspberries	1.00	0.61	0.59	1.10	0.39	0.06	0.80
Herring roe	0.70	1.13	0.60	0.62	1.24	0.31	0.80
Deer liver	0.29	0.58	0.07	1.04	2.06	0.39	0.78
Clams	0.36	1.35	1.34	0.96	0.50	1.21	0.75
Rabbit meat	0.39	0.50	1.87	1.28	0.95	0.57	0.73
Ling cod	0.54	0.80	0.51	0.95	1.04	0.31	0.72
Wild strawberry	0.89	0.28	0.59	0.99	0.42	0.08	0.69
Shrimp	0.40	1.25	1.85	0.73	0.34	0.30	0.67
Beaver meat	0.22	0.30	0.79	2.02	0.39	0.14	0.62
Saskatoon berries	0.68	0.35	0.77	0.96	0.37	0.16	0.60
Blackberries, large	0.57	0.33	1.01	1.12	0.42	0.21	0.60
Caribou meat	0.46	0.77	0.20	0.49	0.69	0.71	0.56
Grouse	0.46	0.30	1.92	0.63	0.65	0.28	0.52
Eulachon grease	0.21	0.83	1.87	0.27	1.12	0.46	0.50
Salmonberries	0.53	0.32	0.74	0.87	0.30	0.17	0.50
Rockfish	0.28	0.41	0.32	0.51	1.48	0.37	0.50
Eulachon	0.27	0.51	0.56	0.56	1.15	0.08	0.48
Red huckleberries	0.43	0.18	1.15	0.89	0.31	0.14	0.45
Dolly varden trout	0.23	0.54	0.09	0.70	0.49	0.26	0.41

Traditional food	Women			Men			Total population (n=1103)
	Age 19-50 (n=499)	Age 51-70 (n=171)	Age 71+ (n=25)	Age 19-50 (n=240)	Age 51-70 (n=141)	Age 71+ (n=14)	
	Mean grams/serving			Mean grams/serving			
Lake trout	0.28	0.28	0.24	0.52	0.54	0.16	0.36
Herring	0.11	0.17	0.04	0.50	1.33	0.08	0.36
Oysters	0.18	0.32	0.30	0.60	0.24	0.32	0.35
Blackberries, trailing	0.34	0.16	0.02	0.71	0.21	0.20	0.34
Pacific/gray cod	0.18	0.43	0.21	0.29	0.97	0.16	0.34
Steelhead trout	0.09	0.23	0.04	0.49	1.14	0.04	0.32
Thimbleberries	0.37	0.18	0.53	0.42	0.28	0.02	0.32
Black caps	0.32	0.14	0.05	0.72	0.14	0.01	0.31
Deer kidney	0.10	0.20	0.02	0.26	0.84	0.14	0.27
Pine mushrooms	0.30	0.20	0.07	0.37	0.15	0.08	0.27
Black bear fat	0.40	0.19	0.10	0.17	0.03	-	0.26
Low bush cranberries	0.24	0.21	0.41	0.35	0.21	0.04	0.25
Black cod	0.17	0.26	0.09	0.15	0.73	0.16	0.25
Sheep meat	0.11	0.30	0.14	0.34	0.39	0.11	0.24
Crabapples	0.29	0.18	0.27	0.33	0.11	0.01	0.23
Elk liver	0.03	0.28	0.02	0.21	0.72	-	0.22
Salal berries	0.20	0.15	0.41	0.29	0.27	-	0.22
Black bear meat	0.17	0.05	0.23	0.47	0.22	-	0.22
Highbush cranberries	0.21	0.18	0.50	0.24	0.22	0.05	0.22
Rose hips	0.20	0.22	1.72	0.19	0.06	0.04	0.20
Basket cockle	0.07	0.38	0.45	0.17	0.19	0.26	0.18

Traditional food	Women			Men			Total population (n=1103)
	Age 19-50 (n=499)	Age 51-70 (n=171)	Age 71+ (n=25)	Age 19-50 (n=240)	Age 51-70 (n=141)	Age 71+ (n=14)	
	Mean grams/serving			Mean grams/serving			
Whitefish	0.15	0.20	0.13	0.21	0.29	0.16	0.18
Scallops	0.09	0.19	1.08	0.18	0.08	-	0.16
Kelp	0.12	0.34	0.03	0.13	0.06	-	0.16
Labrador tea leaves	0.14	0.02	0.59	0.05	0.11	0.04	0.15
Chokecherries	0.07	0.17	1.80	0.19	0.05	-	0.14
Mussels	0.08	0.30	0.29	0.17	0.06	-	0.14
Cutthroat trout	0.05	0.01	-	0.27	0.39	-	0.13
Chanterelle mushrooms	0.12	0.12	0.04	0.19	0.06	-	0.12
Gooseberries	0.14	0.07	-	0.19	0.04	0.01	0.11
Northern pike	0.07	0.06	0.13	0.13	0.21	0.16	0.11
Kokanee trout	0.05	0.14	0.02	0.25	0.08	-	0.11
Mountain goat meat	0.05	0.11	0.14	0.21	0.13	-	0.11
Octopus	0.06	0.17	0.27	0.18	0.03	-	0.10
Brook trout	0.09	0.04	-	0.17	0.10	-	0.10
Kinnikinnick bearberry	0.18	0.01	-	0.10	0.01	-	0.09
Kelp greenling	0.09	-	0.09	0.11	0.17	0.08	0.09
Elderberries	0.09	0.01	1.35	0.11	0.02	-	0.09
Groundhog meat	0.04	0.24	0.05	0.07	0.07	0.07	0.09
Juniper berries	0.04	0.04	1.50	0.14	0.02	0.01	0.08
Bull trout	0.03	0.14	-	0.15	0.09	-	0.08
Harbour seal meat	0.01	0.06	0.31	0.02	0.41	-	0.07

Traditional food	Women			Men			Total population (n=1103)
	Age 19-50 (n=499)	Age 51-70 (n=171)	Age 71+ (n=25)	Age 19-50 (n=240)	Age 51-70 (n=141)	Age 71+ (n=14)	
	Mean grams/serving			Mean grams/serving			
Abalone	0.07	0.04	-	0.03	0.05	-	0.07
Geese	0.05	0.08	0.08	0.03	0.20	0.03	0.07
Morel mushrooms	0.09	0.01	0.02	0.09	0.02	-	0.07
Ptarmigan	0.02	0.03	-	0.20	0.02	-	0.06
Harbour seal fat	0.01	-	-	0.02	0.38	-	0.06
Ducks	0.05	0.01	0.17	0.06	0.11	0.13	0.05
Crab guts	0.02	-	-	0.03	0.11	-	0.05
Walleye/Pickerel	0.04	0.02	0.04	0.09	0.07	-	0.05
Starry flounder/English sole	0.05	0.06	-	0.01	0.12	-	0.05
Hazelnut	0.02	0.06	0.07	0.14	0.02	0.01	0.05
Elk kidney	0.02	0.11	0.05	0.03	0.08	-	0.05
Sea urchin eggs	0.01	0.02	0.07	0.12	0.05	0.02	0.05
Oregon grape	0.02	0.01	0.15	0.17	0.02	0.01	0.04
Cloudberries	0.02	0.01	-	0.11	0.05	0.08	0.04
Burbot	0.00	-	-	0.10	0.09	-	0.03
Stinging nettles leaves	0.03	0.001	0.32	0.04	0.01	-	0.03
Indian plums	0.01	0.01	0.04	0.13	0.00	-	0.03
Crowberries	0.02	0.02	-	0.10	0.01	-	0.03
Caribou kidney	0.01	0.04	0.05	-	0.07	-	0.03
Bunchberries	0.01	0.01	0.04	0.09	0.03	-	0.03
Hawthorn	0.01	-	0.05	0.13	0.01	-	0.03

Traditional food	Women			Men			Total population (n=1103)
	Age 19-50 (n=499)	Age 51-70 (n=171)	Age 71+ (n=25)	Age 19-50 (n=240)	Age 51-70 (n=141)	Age 71+ (n=14)	
	Mean grams/serving			Mean grams/serving			
Cow parsnip shoots	0.03	0.002	0.09	0.03	0.01	0.02	0.03
Arctic grayling	0.02	0.004	-	0.02	0.06	0.08	0.02
Cottonwood mushrooms	0.01	0.01	0.02	0.04	0.05	-	0.02
Porcupine meat	0.02	0.02	0.01	0.02	0.02	-	0.02
Caribou liver	0.001	0.07	0.05	-	0.02	-	0.02
Rat root	0.02	0.003	0.03	0.02	0.01	0.05	0.02
Yellow perch	0.002	-	-	0.004	0.15	-	0.02
Sturgeon	0.01	0.08	-	0.01	0.01	-	0.02
Sea prunes	0.01	0.02	-	0.01	0.02	0.02	0.02
False Solomon's seal berries	-	0.003	-	0.09	-	-	0.02
Sea lion meat	-	-	0.23	-	0.07	-	0.01
Sea cucumber	0.001	0.004	-	0.02	0.03	-	0.01
Sucker	0.003	0.002	0.02	0.02	0.05	-	0.01
Cisco	0.01	-	-	-	0.05	-	0.01
Oyster mushrooms	0.01	-	0.02	0.03	0.02	-	0.01
Thimbleberry/salmonberry shoots	0.02	0.001	-	0.01	0.004	-	0.01
China slippers	0.003	0.01	-	-	0.03	-	0.01
Thistle	0.01	-	0.27	0.005	0.000	-	0.01
Sea lettuce	0.01	-	-	0.004	0.004	-	0.01
Seagull eggs	-	0.005	-	-	0.07	-	0.01
Barnacle	0.004	0.01	-	0.01	0.01	-	0.01

Traditional food	Women			Men			Total population (n=1103)
	Age 19-50 (n=499)	Age 51-70 (n=171)	Age 71+ (n=25)	Age 19-50 (n=240)	Age 51-70 (n=141)	Age 71+ (n=14)	
	Mean grams/serving			Mean grams/serving			
Brown trout	0.002	-	-	0.01	0.05	-	0.01
Bigleaf maple shoots	-	-	0.27	0.002	0.0003	-	0.01
Rockweed	0.001	0.07	-	0.01	-	-	0.01
Balsam tree inner bark	0.001	0.03	0.05	0.01	0.01	-	0.01
Onion (nodding, hooker's)	0.01	0.0002	-	0.01	0.01	0.01	0.01
Balsam root	0.01	0.0004	0.06	0.003	0.004	-	0.01
Giant horsetail shoots	0.01	0.001	-	0.01	0.001	-	0.01
Bitter root	0.005	0.001	-	0.01	0.001	0.01	0.01

Table 28b. Estimated high consumption (95th percentile rate) of major traditional foods (g/person/day), unweighted

Traditional food	Women			Men			Total population (n=1103)
	Age 19-50 (n=499)	Age 51-70 (n=171)	Age 71+ (n=25)	Age 19-50 (n=240)	Age 51-70 (n=141)	Age 71+ (n=14)	
	Mean grams/serving			Mean grams/serving			
Total	**201.89**	**279.27**	**244.74**	**413.22**	**358.33**	**181.35**	**304.70**
Moose meat	80.35	78.65	81.11	138.61	90.78	39.60	105.40
Salmon, any	43.70	56.08	42.97	99.30	94.80	62.67	68.60
Sockeye salmon	25.14	34.73	28.64	53.68	52.67	39.58	38.11
Deer meat	17.86	28.23	13.52	77.01	20.17	11.88	26.64
Chinook salmon	14.37	26.77	11.46	21.47	26.33	13.19	20.92
Coho salmon	7.18	17.37	11.46	20.13	21.07	13.19	13.08
Trout, any	7.18	10.85	2.39	23.26	14.04	4.40	11.43
Halibut	7.18	8.68	11.46	10.74	10.53	26.39	10.46
Elk meat	7.44	8.07	6.76	15.40	20.17	19.80	8.78
Laver seaweed	1.95	17.97	37.40	10.26	5.10	6.23	7.86
Salmon eggs	3.59	7.96	11.46	12.30	7.90	3.85	6.99
Chum salmon	3.29	5.07	5.73	9.84	10.53	6.60	6.97
Prawn	3.90	8.98	12.47	10.26	3.06	6.23	6.70
Soapberries	7.33	5.45	7.50	9.71	2.54	0.20	6.64
Blue huckleberries	7.33	5.45	5.62	9.71	3.18	0.20	5.81
Crab	2.60	6.74	12.47	10.26	3.06	3.12	5.27
Pink salmon	4.19	2.89	5.73	10.74	10.53	1.10	5.23
Blueberries	7.33	5.45	6.56	5.46	3.18	0.99	4.98
Moose liver	2.98	4.03	1.13	6.10	5.04	3.96	4.39

Traditional food	Women			Men			Total population (n=1103)
	Age 19-50 (n=499)	Age 51-70 (n=171)	Age 71+ (n=25)	Age 19-50 (n=240)	Age 51-70 (n=141)	Age 71+ (n=14)	
	Mean grams/serving			Mean grams/serving			
Clams	1.95	5.99	6.23	5.13	2.29	6.23	3.93
Shrimp	2.93	4.12	5.19	5.77	1.53	2.08	3.93
Blackberries, large	3.21	1.36	8.43	8.50	2.54	1.18	3.83
Raspberries	4.58	1.82	1.87	6.07	2.12	0.25	3.83
Rainbow trout	2.39	2.89	0.48	8.50	3.51	4.40	3.81
Moose kidney	2.98	2.69	1.13	5.13	3.36	3.96	3.66
Herring roe	2.99	4.34	2.86	3.58	3.51	3.30	3.49
Ling cod	2.39	2.89	1.91	4.92	5.27	2.20	3.49
Wild strawberry	3.66	1.36	1.87	4.86	2.54	0.39	3.32
Deer liver	0.74	4.03	0.56	7.38	3.78	1.98	2.93
Rabbit meat	1.12	2.69	6.76	2.57	5.04	6.93	2.93
Eulachon grease	0.95	4.70	9.17	1.83	5.79	2.75	2.89
Salmonberries	2.14	1.36	4.68	4.86	1.70	0.89	2.77
Saskatoon berries	3.05	1.82	2.81	4.86	1.27	1.23	2.77
Eulachon	1.80	2.89	2.86	3.58	5.27	0.55	2.54
Rockfish	1.20	2.89	1.91	3.58	8.78	2.20	2.54
Red huckleberries	1.83	1.36	3.75	4.86	1.27	0.69	1.94
Oysters	1.30	2.25	0.52	3.42	1.02	4.16	1.92
Dolly varden trout	1.50	2.89	0.48	3.80	2.63	2.20	1.91
Lake trout	1.20	2.89	1.91	2.68	3.51	2.20	1.91
Caribou meat	1.49	3.36	1.13	1.28	3.36	9.90	1.67

Traditional food	Women			Men			Total population (n=1103)
	Age 19-50 (n=499)	Age 51-70 (n=171)	Age 71+ (n=25)	Age 19-50 (n=240)	Age 51-70 (n=141)	Age 71+ (n=14)	
	Mean grams/serving			Mean grams/serving			
Blackberries, trailing	1.53	1.45	0.00	4.86	1.27	1.18	1.66
Thimbleberries	0.92	0.91	4.68	2.43	1.91	0.30	1.66
Grouse	1.64	0.91	1.23	1.64	3.29	1.64	1.64
Pacific/gray cod	0.90	2.47	0.95	1.12	3.51	2.20	1.59
Beaver meat	0.74	1.01	3.38	3.85	2.52	0.99	1.46
Black caps	0.92	0.68	0.31	4.86	0.42	0.20	1.11
Low bush cranberries	0.92	1.02	1.87	1.62	0.85	0.39	1.11
Pine mushrooms	1.18	1.58	0.53	2.24	0.79	1.05	1.05
Highbush cranberries	0.61	0.91	1.87	1.01	0.85	0.35	0.96
Black cod	0.60	1.09	0.72	0.89	3.51	2.20	0.95
Steelhead trout	0.60	0.72	0.48	3.13	3.51	0.55	0.87
Whitefish	0.30	0.72	0.95	1.12	1.76	1.10	0.87
Crabapples	0.92	0.91	1.25	1.21	0.42	0.20	0.83
Salal berries	0.31	0.91	1.87	1.21	1.27	-	0.83
Basket cockle	0.33	1.12	2.08	0.85	1.02	3.12	0.65
Scallops	0.65	0.75	12.47	0.85	0.25	-	0.65
Rose hips	0.92	1.36	7.50	0.40	0.42	0.20	0.64
Herring	0	0.72	0.48	0	1.76	1.10	0.64
Black bear fat	1.18	0.21	0.82	0.48	0.07	-	0.57
Sheep meat	0	0.67	0	0.64	0.84	0.99	0.56
Mussels	0.33	0.75	0.52	0.85	0	-	0.48

Traditional food	Women			Men			Total population (n=1103)
	Age 19-50 (n=499)	Age 51-70 (n=171)	Age 71+ (n=25)	Age 19-50 (n=240)	Age 51-70 (n=141)	Age 71+ (n=14)	
	Mean grams/serving			Mean grams/serving			
Labrador tea leaves	0.39	0.13	6.86	0.25	0.48	0.51	0.48
Black bear meat	0	0	2.25	1.60	0.84	-	0.37
Chokecherries	0.31	0.68	7.50	0.40	0.21	-	0.32
Northern pike	0	0	0.95	0.45	0.88	1.10	0.32
Gooseberries	0.31	0.23		0.40	0.21	0.05	0.28
Chanterelle mushrooms	0	0.13	0.53	0.99	0.53	-	0.26
Ducks	0.21	0.21	1.64	0.21	1.23	1.85	0.21
Geese	0	0	0.82	0.10	0.82	0.21	0.21
Rat root	0.05	0.01	0.25	0.13	0.08	0.51	0.08
Balsam tree inner bark	0	0.08	0.33	0	0.01	-	0.01

Table 29. Average and maximum levels of toxic trace metals in BC traditional food samples (µg/g fresh weight)

Traditional food	N	Arsenic		Cadmium		Lead		Mercury		Methyl Mercury	
		Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max
Alder bark	1	ND	ND	ND	ND	ND	ND	ND	ND	NM	NM
Aparagus	1	ND	ND	ND	ND	ND	ND	ND	ND	NM	NM
Arctic char meat	1	0.04	0.04	ND	ND	ND	ND	0.92	0.92	736	736
Arctic grayling head	1	0.06	0.06	0.01	0.01	ND	ND	0.02	0.02	NM	NM
Avalanche lily	1	ND	ND	ND	ND	ND	ND	ND	ND	NM	NM
Balsam bark	1	ND	ND	0.04	0.04	ND	ND	ND	ND	NM	NM
Balsam sap	2	0.10	0.20	0.18	0.25	ND	ND	0.01	0.01	NM	NM
Basket cockle meat	1	0.89	0.89	0.03	0.03	0.05	0.05	0.01	0.01	6	6
Bear fat	3	0.04	0.11	0.004	0.01	0.06	0.18	ND	ND	ND	ND
Bear liver	1	0.04	0.04	0.03	0.03	0.73	0.73	ND	ND	7	7
Bear meat	2	0.02	0.04	0.01	0.01	0.57	1.14	ND	ND	ND	ND
Beaver back feet	1	0.09	0.09	0.02	0.02	0.03	0.03	ND	ND	NM	NM
Beaver fat	1	0.05	0.05	0.05	0.05	0.77	0.77	ND	ND	NM	NM
Beaver heart	1	0.03	0.03	0.09	0.09	2.69	2.69	ND	ND	ND	ND
Beaver kidney	1	0.04	0.04	21.60	21.60	ND	ND	0.01	0.01	ND	ND
Beaver liver	1	0.03	0.03	3.44	3.44	0.03	0.03	ND	ND	ND	ND
Beaver meat	4	0.04	0.11	0.02	0.03	ND	ND	ND	ND	ND	ND
Beaver tail	1	0.13	0.13	0.03	0.03	0.20	0.20	ND	ND	NM	NM
Birch sap	1	ND	ND	ND	ND	ND	ND	ND	ND	NM	NM
Bison meat	1	0.03	0.03	ND	ND	ND	ND	ND	ND	ND	ND
Bitter root	1	ND	ND	0.22	0.22	ND	ND	ND	ND	NM	NM
Black cap berries	2	ND	ND	0.02	0.03	ND	ND	ND	ND	NM	NM

Traditional food	N	Arsenic		Cadmium		Lead		Mercury		Methyl Mercury	
		Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max
Black cod meat	2	0.64	0.65	ND	ND	ND	ND	0.04	0.05	70	80
Blackberries	4	ND	ND	0.003	0.01	ND	ND	ND	ND	NM	NM
Blue huckleberries	5	ND	ND	0.001	0.005	ND	ND	ND	ND	NM	NM
Blueberries	3	ND	ND	ND	ND	0.01	0.02	ND	ND	NM	NM
Bog cranberry	1	ND	ND	ND	ND	ND	ND	ND	ND	NM	NM
Buck brush	1	ND	ND	ND	ND	ND	ND	ND	ND	NM	NM
Buffalo meat	1	0.06	0.06	ND	ND	0.24	0.24	ND	ND	NM	NM
Bunchberries	1	ND	ND	0.03	0.03	ND	ND	ND	ND	NM	NM
Butter clam meat	5	4.22	4.96	0.11	0.18	0.06	0.17	0.004	0.02	4	14
Canada goose meat	1	0.03	0.03	0.01	0.01	2.65	2.65	ND	ND	ND	ND
Caribou meat	2	ND	ND	0.01	0.01	ND	ND	ND	ND	ND	ND
Caribou weeds	1	0.30	0.30	1.54	1.54	0.30	0.30	0.02	0.02	NM	NM
Carp meat	1	0.07	0.07	ND	ND	ND	ND	0.72	0.72	182	182
Cascara Bark-dried	1	ND	ND	ND	ND	0.90	0.90	ND	ND	NM	NM
Cattail-top and stems	1	0.31	0.31	0.03	0.03	0.07	0.07	ND	ND	NM	NM
Cedar	1	ND	ND	ND	ND	ND	ND	0.01	0.01	NM	NM
Chanterelle mushrooms	1	0.03	0.03	0.06	0.06	0.05	0.05	0.04	0.04	NM	NM
Cherries	1	ND	ND	ND	ND	ND	ND	ND	ND	NM	NM
Chinook salmon eggs	2	0.63	0.87	0.01	0.01	ND	ND	0.02	0.03	30	53
Chinook salmon head	1	0.43	0.43	0.01	0.01	ND	ND	0.01	0.01	10	10
Chinook salmon meat	9	0.84	1.02	0.003	0.02	ND	ND	0.03	0.10	47	77
Chokecherries	5	0.01	0.06	ND	ND	0.03	0.13	ND	ND	NM	NM
Chum salmon eggs	2	0.43	0.52	0.002	0.004	ND	ND	0.09	0.17	ND	ND

Traditional food	N	Arsenic		Cadmium		Lead		Mercury		Methyl Mercury	
		Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max
Chum salmon meat	2	0.42	0.50	0.003	0.01	0.02	0.03	0.03	0.03	33	37
Chum salmon-jarred	1	0.35	0.35	0.01	0.01	0.02	0.02	0.02	0.02	23	23
Clams	1	3.25	3.25	0.07	0.07	ND	ND	ND	ND	NM	NM
Cockles	2	1.61	2.10	0.09	0.15	ND	ND	0.07	0.15	71	141
Coho salmon eggs	2	0.42	0.52	0.01	0.01	ND	ND	0.09	0.17	3	6
Coho salmon head	1	0.66	0.66	ND	ND	ND	ND	0.12	0.12	32	32
Coho salmon meat	8	0.78	1.17	0.003	0.01	ND	ND	0.03	0.06	40	68
Cow parsnip shoot	1	ND	ND	0.004	0.00	ND	ND	ND	ND	NM	NM
Crab apples	3	ND	ND	ND	ND	ND	ND	ND	ND	NM	NM
Crab body with guts	1	3.48	3.48	0.58	0.58	0.19	0.19	0.01	0.01	25	25
Crab legs	1	5.37	5.37	0.02	0.02	0.02	0.02	0.03	0.03	134	134
Crab meat	3	9.45	12.80	0.10	0.19	ND	ND	0.05	0.08	57	92
Cranberries	1	ND	ND	ND	ND	ND	ND	ND	ND	NM	NM
Cutthroat trout whole fish	1	0.18	0.18	0.02	0.02	ND	ND	0.05	0.05	82	82
Dandelion-leaves and top	1	1.80	1.80	0.31	0.31	1.90	1.90	ND	ND	NM	NM
Deer heart	2	0.06	0.08	0.04	0.04	ND	ND	0.02	0.03	3	6
Deer liver	5	0.06	0.08	0.18	0.32	0.01	0.05	0.01	0.03	3	9
Deer meat	15	0.02	0.08	0.004	0.02	1.49	13.90	0.002	0.02	ND	ND
Devil's club bark	1	ND	ND	0.26	0.26	0.70	0.70	ND	ND	NM	NM
Devil's club stem	4	ND	ND	0.03	0.05	ND	ND	ND	ND	NM	NM
Dog fish meat-dried	1	0.70	0.70	ND	ND	ND	ND	0.07	0.07	54	54
Dog fish meat-half smoked	1	0.43	0.43	0.01	0.01	ND	ND	0.02	0.02	23	23
Dolly varden trout meat	5	0.09	0.19	ND	ND	ND	ND	0.10	0.34	332	694

Traditional food	N	Arsenic		Cadmium		Lead		Mercury		Methyl Mercury	
		Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max
Dungeness crab meat	1	7.76	7.76	0.09	0.09	ND	ND	0.03	0.03	36	36
Elk fat	1	ND	ND	ND	ND	ND	ND	ND	ND	NM	NM
Elk kidney	1	ND	ND	0.03	0.03	0.03	0.03	ND	ND	ND	ND
Elk liver	2	ND	ND	0.22	0.27	ND	ND	ND	ND	ND	ND
Elk meat	6	0.03	0.05	0.01	0.03	0.02	0.08	ND	ND	ND	ND
Goat meat	2	ND	ND	ND	ND	0.13	0.22	ND	ND	ND	ND
Gooseberries	3	ND	ND	0.02	0.05	ND	ND	0.02	0.06	NM	NM
Groundhog meat	1	ND	ND	0.01	0.01	0.06	0.06	0.09	0.09	NM	NM
Grouse meat	8	0.03	0.05	0.05	0.32	13.15	60.60	ND	ND	ND	ND
Halibut meat	6	2.46	3.37	0.002	0.01	0.15	0.90	0.19	0.33	252	378
Hazelnut	1	ND	ND	ND	ND	ND	ND	ND	ND	NM	NM
Herring eggs	5	0.53	0.80	0.05	0.08	0.01	0.02	ND	ND	ND	ND
Herring meat	1	1.06	1.06	0.02	0.02	0.03	0.03	0.02	0.02	26	26
Herring roe on kelp	1	3.60	3.60	0.34	0.34	ND	ND	ND	ND	ND	ND
High bush blueberries	3	0.01	0.02	ND	ND	ND	ND	ND	ND	NM	NM
High bush cranberries	4	ND	ND	0.01	0.01	ND	ND	ND	ND	NM	NM
Horse mint leaves/stems	1	0.20	0.20	0.02	0.02	0.20	0.20	ND	ND	NM	NM
Huckleberries	8	ND	ND	ND	ND	ND	ND	ND	ND	NM	NM
Huckleberry jam	1	ND	ND	ND	ND	ND	ND	ND	ND	NM	NM
Indian Celery	1	ND	ND	0.10	0.10	ND	ND	ND	ND	NM	NM
Kokanee trout meat	2	0.11	0.18	0.005	0.01	0.06	0.11	0.04	0.05	67	73
Laborador tea	7	0.04	0.10	0.01	0.07	0.07	0.30	ND	ND	NM	NM
Lake trout meat	3	0.11	0.24	ND	ND	ND	ND	0.13	0.31	172	392

Traditional food	N	Arsenic		Cadmium		Lead		Mercury		Methyl Mercury	
		Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max
Lamb's quarters	1	0.46	0.46	0.07	0.07	0.36	0.36	ND	ND	NM	NM
Laver Seaweed	1	35.10	35.10	4.81	4.81	0.11	0.11	ND	ND	ND	ND
Laver seaweed dried	1	21.70	21.70	3.38	3.38	ND	ND	ND	ND	NM	NM
Licorice fern	1	ND	ND	ND	ND	ND	ND	ND	ND	NM	NM
Ling cod meat	5	0.91	2.91	ND	ND	0.01	0.04	0.20	0.43	201	362
Lobster Mushrooms	1	0.03	0.03	0.06	0.06	0.05	0.05	0.04	0.04	NM	NM
Low bush blueberries	1	ND	ND	ND	ND	ND	ND	0.08	0.08	NM	NM
Low bush cranberries	3	ND	ND	0.002	0.01	ND	ND	ND	ND	NM	NM
Mallard duck meat	1	0.04	0.04	0.01	0.01	ND	ND	0.01	0.01	14	14
Manilla clams	1	4.85	4.85	0.44	0.44	0.03	0.03	0.01	0.01	5	5
Moose stomach	1	ND	ND	0.05	0.05	ND	ND	ND	ND	NM	NM
Moose bone marrow	2	ND	ND	0.01	0.02	ND	ND	ND	ND	NM	NM
Moose fat	3	ND	ND	0.001	0.004	ND	ND	ND	ND	NM	NM
Moose heart	3	ND	ND	0.02	0.03	ND	ND	ND	ND	ND	ND
Moose intestine	2	ND	ND	0.003	0.01	ND	ND	ND	ND	NM	NM
Moose kidney	6	0.03	0.06	11.85	27.00	0.17	0.85	0.01	0.04	ND	ND
Moose liver	8	0.04	0.08	3.51	8.46	ND	ND	0.003	0.01	ND	ND
Moose meat	15	0.004	0.04	0.02	0.04	0.06	0.90	ND	ND	ND	ND
Moose meat-canned	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Moose nose	1	0.03	0.03	0.01	0.01	0.05	0.05	ND	ND	NM	NM
Moose tongue	1	0.03	0.03	0.01	0.01	0.09	0.09	ND	ND	NM	NM
Morel mushrooms	1	0.20	0.20	0.32	0.32	ND	ND	ND	ND	NM	NM
Mushrooms	3	0.58	1.60	0.17	0.25	0.02	0.07	0.10	0.24	NM	NM

Traditional food	N	Arsenic		Cadmium		Lead		Mercury		Methyl Mercury	
		Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max
Muskeg tea-leaves	2	ND	ND	0.08	0.16	0.05	0.10	ND	ND	NM	NM
Mussels	3	3.72	6.30	3.67	8.20	0.06	0.17	0.01	0.02	8	9
Northern abalone meat	1	2.57	2.57	0.07	0.07	ND	ND	ND	ND	ND	ND
Northern pike	1	0.03	0.03	ND	ND	ND	ND	0.18	0.18	171	171
Octopus tentacle	1	9.07	9.07	0.01	0.01	ND	ND	0.04	0.04	43	43
Eulachon grease	5	3.53	6.68	0.002	0.01	0.01	0.03	0.001	0.003	3	6
Eulachon meat	4	0.98	1.22	0.03	0.03	0.02	0.06	0.01	0.02	16	19
Oregon grape	2	ND	ND	ND	ND	ND	ND	ND	ND	NM	NM
Oyster meat	1	2.24	2.24	3.56	3.56	0.03	0.03	0.01	0.01	5	5
Parsnip	1	0.10	0.10	0.22	0.22	ND	ND	ND	ND	NM	NM
Peppermint leaves	3	0.17	0.20	0.02	0.04	0.13	0.30	0.01	0.01	NM	NM
Pike	1	0.04	0.04	0.01	0.01	ND	ND	0.16	0.16	324	324
Pine mushrooms	3	6.52	12.70	0.18	0.42	0.06	0.10	0.25	0.68	NM	NM
Pink salmon fish candy	1	0.90	0.90	ND	ND	ND	ND	0.05	0.05	46	46
Pink salmon meat	3	0.46	0.65	0.001	0.004	ND	ND	0.02	0.04	24	38
Pink Salmon meat dried	1	0.84	0.84	0.01	0.01	0.02	0.02	0.01	0.01	24	24
Poplar tree	1	0.08	0.08	0.03	0.03	0.03	0.03	ND	ND	NM	NM
Prawn meat	3	8.91	10.20	0.02	0.04	0.02	0.06	0.01	0.02	23	29
Puffball mushrooms	1	0.10	0.10	0.10	0.10	0.08	0.08	ND	ND	NM	NM
Rabbit meat	6	0.01	0.03	0.40	2.40	0.24	0.65	0.003	0.02	ND	ND
Rainbow trout meat	5	0.04	0.08	0.002	0.01	ND	ND	0.06	0.14	101	136
Raspberries	3	0.01	0.03	0.01	0.01	ND	ND	ND	ND	NM	NM
Rat root	2	0.75	1.30	0.01	0.02	ND	ND	ND	ND	NM	NM

Traditional food	N	Arsenic		Cadmium		Lead		Mercury		Methyl Mercury	
		Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max
Razor clam meat	1	0.86	0.86	0.02	0.02	ND	ND	ND	ND	ND	ND
Red birch bark	1	ND	ND	0.08	0.08	ND	ND	ND	ND	NM	NM
Red currant	1	0.60	0.60	ND	ND	0.40	0.40	ND	ND	NM	NM
Red huckleberries	2	ND	ND	ND	ND	ND	ND	0.002	0.003	NM	NM
Red snapper meat	3	1.95	2.89	ND	ND	ND	ND	0.11	0.20	244	385
Rock scallop meat	1	0.76	0.76	0.58	0.58	ND	ND	0.01	0.01	15	15
Rockfish	1	3.78	3.78	ND	ND	ND	ND	0.38	0.38	412	412
Rosehips	5	ND	ND	0.003	0.02	ND	ND	ND	ND	NM	NM
Sage leaf	1	ND	ND	ND	ND	ND	ND	ND	ND	NM	NM
Salal berries	1	ND	ND	0.01	0.01	ND	ND	ND	ND	NM	NM
Salmon eggs	4	0.28	0.34	0.01	0.01	0.01	0.02	0.05	0.11	ND	ND
Salmon meat	4	0.75	0.90	0.01	0.02	ND	ND	0.03	0.04	47	66
Salmonberries	3	ND	ND	0.004	0.01	ND	ND	ND	ND	NM	NM
Saskatoon berries	9	ND	ND	0.02	0.05	0.003	0.03	ND	ND	NM	NM
Sea Cucumber	1	5.13	5.13	0.07	0.07	ND	ND	0.01	0.01	ND	ND
Seaweed	3	23.18	35.10	3.92	5.76	0.48	1.20	ND	ND	ND	ND
Sitka Spruce leaves	1	ND	ND	ND	ND	0.07	0.07	ND	ND	NM	NM
Soapberries	11	ND	ND	0.004	0.01	0.03	0.31	0.002	0.02	NM	NM
Sockeye salmon eggs	2	0.20	0.33	0.01	0.01	ND	ND	0.01	0.01	ND	ND
Sockeye salmon head	2	0.77	0.83	0.01	0.02	ND	ND	0.01	0.02	28	35
Sockeye salmon meat	12	0.64	1.12	0.01	0.02	ND	ND	0.03	0.06	45	67
Sockeye salmon meat jarred/canned	2	0.58	0.62	0.01	0.01	ND	ND	0.03	0.03	35	40
Spruce gum	1	0.05	0.05	0.01	0.01	0.07	0.07	ND	ND	NM	NM

Traditional food	N	Arsenic		Cadmium		Lead		Mercury		Methyl Mercury	
		Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max
Steelhead trout eggs	1	0.21	0.21	ND	ND	ND	ND	0.002	0.002	ND	ND
Steelhead trout meat	1	0.62	0.62	ND	ND	ND	ND	0.16	0.16	113	113
Stinging nettle	6	0.03	0.10	0.03	0.06	0.23	0.50	0.01	0.02	NM	NM
Strawberries	3	ND	ND	0.01	0.01	ND	ND	ND	ND	NM	NM
Strawberry blight	1	0.05	0.05	0.12	0.12	0.09	0.09	ND	ND	NM	NM
Tamorak	1	ND	ND	ND	ND	0.30	0.30	ND	ND	NM	NM
Thimbleberries	1	ND	ND	0.01	0.01	ND	ND	ND	ND	NM	NM
Trailing blackberries	1	ND	ND	ND	ND	ND	ND	ND	ND	NM	NM
Trout meat	2	0.06	0.07	ND	ND	ND	ND	0.19	0.28	257	360
Whitefish meat	2	0.09	0.18	ND	ND	ND	ND	0.09	0.15	92	145
Wild Rhubarb-stem	1	ND	ND	ND	ND	ND	ND	ND	ND	NM	NM
Willow bark	1	0.10	0.10	2.28	2.28	ND	ND	ND	ND	NM	NM
Yarrow	4	ND	ND	0.11	0.20	0.10	0.20	ND	ND	NM	NM
Yew Bark	1	ND	ND	0.31	0.31	ND	ND	ND	ND	NM	NM

N = no of pooled samples collected from all of BC
*ng/g fresh weight
ND=not detectable
NM=not measured

Table 30a. Top 10 contributors to arsenic intake, by ecozone/culture area and total, unweighted

Traditional Food (%)								
Ecozone1	Ecozone2	Ecozone3	Ecozone4	Ecozone5	Ecozone6	Ecozone7	Ecozone8	Total
Laver seaweed (34.6)	Prawn (26.1)	Salmon, any (19.3)	Salmon, any (41.7)	Laver seaweed (35.1)	Laver seaweed (43.3)	Salmon, any (32.5)	Salmon, any (23.2)	Laver seaweed (37.2)
Salmon, any (26.8)	Crab (18.6)	Sockeye salmon (14.7)	Sockeye salmon (21.8)	Salmon, any (23.3)	Prawn (11.0)	Pine mushrooms (21.7)	Herring (16.1)	Salmon, any (13.5)
Sockeye salmon (13.4)	Salmon, any (14.6)	Prawn (13.7)	Pink salmon (7.1)	Sockeye salmon (13.6)	Salmon, any (9.6)	Sockeye salmon (13.6)	Halibut (14.8)	Prawn (10.1)
Chinook salmon (8.2)	Halibut (6.3)	Chinook salmon (11.5)	Chinook salmon (5.3)	Prawn (5.3)	Crab (8.0)	Prawn (5.8)	Ling cod (8.9)	Crab (7.2)
Crab (4.3)	Sockeye salmon (6.3)	Crab (7.9)	Ling cod (4.0)	Eulachon grease (3.3)	Halibut (5.6)	Chinook salmon (5.2)	Sockeye salmon (5.5)	Sockeye salmon (5.9)
Prawn (3.0)	Ling cod (4.5)	Pine mushrooms (5.0)	Crab (3.5)	Crab (3.0)	Clams (3.7)	Coho salmon (4.5)	Pink salmon (5.5)	Halibut (4.9)
Halibut (2.3)	Chinook salmon (3.7)	Oysters (4.0)	Trout, any (2.3)	Pine mushrooms (2.8)	Sockeye salmon (3.5)	Salmon eggs (2.4)	Crab (3.2)	Chinook salmon (3.0)
Pine mushrooms (1.1)	Oysters (3.7)	Ling cod (3.1)	Steelhead trout (2.1)	Chinook salmon (2.3)	Rockfish (2.4)	Halibut (2.1)	Coho salmon (2.4)	Clams (2.9)
Herring roe (0.9)	Mussels (3.0)	Mussels (3.0)	Moose meat (1.6)	Halibut (1.8)	Chinook salmon (2.3)	Crab (1.9)	Moose meat (2.0)	Rockfish (2.0)
Clams (0.6)	Pink salmon (1.4)	Halibut (2.5)	Salmon eggs (1.3)	Octopus (1.7)	Coho salmon (1.9)	Rockfish (1.6)	Oysters (1.9)	Pine mushrooms (1.9)

Table 30b. Top 10 contributors to cadmium intake, by ecozone/culture area and total, unweighted

Traditional Food (%)								
Ecozone1	Ecozone2	Ecozone3	Ecozone4	Ecozone5	Ecozone6	Ecozone7	Ecozone8	Total
Moose kidney (76.4)	Moose kidney (77.9)	Moose liver (30.9)	Moose kidney (82.9)	Moose kidney (57.9)	Laver seaweed (65.0)	Moose kidney (45.2)	Moose kidney (63.1)	Moose kidney (48.1)
Moose liver (14.4)	Moose liver (11.7)	Moose kidney (21.9)	Moose liver (11.2)	Laver seaweed (19.1)	Oysters (11.2)	Moose liver (32.0)	Moose liver (22.1)	Laver seaweed (24.1)
Laver seaweed (5.7)	Oysters (3.4)	Oysters (20.1)	Moose meat (2.7)	Moose liver (14.7)	Moose liver (6.0)	Deer liver (3.7)	Rabbit meat (8.6)	Moose liver (12.9)
Moose meat (1.5)	Moose meat (2.1)	Mussels (9.2)	Rabbit meat (1.7)	Moose meat (1.7)	Moose kidney (5.5)	Oysters (3.7)	Moose meat (3.1)	Oysters (5.2)
Oysters (0.5)	Mussels (1.7)	Deer liver (6.2)	Elk liver (0.3)	Mussels (1.5)	Mussels (4.2)	Pine mushrooms (3.3)	Oysters (1.2)	Mussels (2.2)
Salmon, any (0.4)	Rabbit meat (1.7)	Moose meat (2.0)	Grouse (0.2)	Salmon, any (1.1)	Clams (1.2)	Mussels (2.5)	Grouse (0.7)	Moose meat (1.4)
Rabbit meat (0.3)	Scallops (0.4)	Elk liver (1.6)	Salmon, any (0.2)	Rabbit meat (1.0)	Salmon, any (1.2)	Salmon, any (2.4)	Beaver meat (0.3)	Rabbit meat (1.3)
Sockeye salmon (0.2)	Elk meat (0.2)	Deer meat (1.1)	Sockeye salmon (0.1)	Sockeye salmon (0.7)	Crab (0.8)	Sockeye salmon (1.2)	Laver seaweed (0.1)	Salmon, any (0.7)
Scallops (0.1)	Grouse (0.1)	Scallops (0.9)	Beaver meat (0.1)	Morel mushrooms (0.5)	Scallops (0.7)	Laver seaweed (0.9)	Herring (0.1)	Deer liver (0.6)
Grouse (0.1)	Salmon, any (0.1)	Salmon, any (0.8)	Deer liver (0.1)	Scallops (0.3)	Deer liver (0.6)	Scallops (0.6)	Salmon, any (0.1)	Clams (0.4)

Table 30c. Top 10 contributors to lead intake, by ecozone/culture area and total, unweighted

Traditional Food (%)								
Ecozone1	Ecozone2	Ecozone3	Ecozone4	Ecozone5	Ecozone6	Ecozone7	Ecozone8	Total
Grouse (68.4)	Grouse (49.4)	Deer meat (88.2)	Grouse (64.4)	Grouse (38.0)	Deer meat (66.2)	Deer meat (85.6)	Grouse (81.9)	Deer meat (46.1)
Moose meat (19.9)	Deer meat (28.4)	Grouse (8.7)	Moose meat (18.6)	Deer meat (27.3)	Laver seaweed (10.7)	Grouse (9.9)	Deer meat (7.1)	Grouse (37.6)
Moose kidney (3.5)	Moose meat (14.6)	Moose meat (1.7)	Deer meat (6.9)	Moose meat (16.7)	Grouse (7.7)	Moose meat (1.0)	Moose meat (6.0)	Moose meat (7.2)
Deer meat (2.5)	Geese (2.2)	Elk meat (0.3)	Black bear meat (2.9)	Black bear meat (5.8)	Halibut (7.1)	Black bear meat (0.8)	Rabbit meat (2.4)	Laver seaweed (2.3)
Laver seaweed (1.4)	Moose kidney (1.8)	Geese (0.2)	Moose kidney (2.0)	Laver seaweed (3.5)	Moose meat (2.8)	Soapberries (0.7)	Geese (1.7)	Halibut (1.5)
Geese (1.1)	Rabbit meat (1.7)	Halibut (0.1)	Rabbit meat (1.6)	Moose kidney (1.9)	Clams (0.9)	Pine mushrooms (0.5)	Moose kidney (0.4)	Geese (1.0)
Rabbit meat (0.6)	Elk meat (1.0)	Rabbit meat (0.1)	Geese (0.9)	Rabbit meat (1.4)	Geese (0.8)	Halibut (0.3)	Halibut (0.2)	Rabbit meat (0.9)
Black bear fat (0.6)	Halibut (0.4)	Black bear meat (0.1)	Black bear fat (0.8)	Geese (1.4)	Prawn (0.5)	Moose kidney (0.3)	Herring (0.1)	Moose kidney (0.8)
Halibut (0.5)	Black bear meat (0.1)	Deer liver (0.1)	Soapberries (0.6)	Halibut (0.9)	Chum salmon (0.4)	Stinging nettles leaves (0.2)	Elk meat (0.1)	Black bear meat (0.7)
Black bear meat (0.5)	Prawn (0.1)	Soapberries (0.1)	Mountain goat meat (0.3)	Soapberries (0.8)	Elk meat (0.4)	Geese (0.1)	Black bear meat (0.04)	Elk meat (0.3)

Table 30d. Top 10 contributors to mercury intake, by ecozone/culture area and total, unweighted

Traditional Food (%)								
Ecozone1	Ecozone2	Ecozone3	Ecozone4	Ecozone5	Ecozone6	Ecozone7	Ecozone8	Total
Trout, any (33.0)	Trout, any (28.0)	Trout, any (16.2)	Trout, any (16.2)	Salmon, any (24.7)	Halibut (25.1)	Trout, any (32.7)	Trout, any (29.4)	Trout, any (17.1)
Salmon, any (21.5)	Ling cod (15.3)	Ling cod (12.6)	Ling cod (12.6)	Trout, any (23.5)	Salmon, any (19.0)	Salmon, any (14.9)	Ling cod (12.8)	Salmon, any (17.1)
Sockeye salmon (12.2)	Salmon, any (7.9)	Salmon, any (12.4)	Salmon, any (12.4)	Sockeye salmon (16.3)	Rockfish (14.1)	Pine mushrooms (11.1)	Northern pike (10.3)	Halibut (14.0)
Rainbow trout (7.9)	Halibut (7.8)	Sockeye salmon (10.6)	Sockeye salmon (10.6)	Ling cod (6.4)	Sockeye salmon (7.9)	Sockeye salmon (7.1)	Halibut (7.7)	Sockeye salmon (8.5)
Chinook salmon (7.5)	Northern pike (6.2)	Chinook salmon (8.3)	Chinook salmon (8.3)	Halibut (4.3)	Ling cod (5.5)	Steelhead trout (4.5)	Whitefish (6.1)	Rockfish (7.3)
Halibut (4.2)	Lake trout (5.3)	Lake trout (5.9)	Lake trout (5.9)	Salmon eggs (3.9)	Coho salmon (5.3)	Dolly varden trout (4.2)	Walleye/Pickerel (5.8)	Ling cod (5.7)
Steelhead trout (3.0)	Dolly varden trout (4.1)	Salmon eggs (4.7)	Salmon eggs (4.7)	Pine mushrooms (3.3)	Chinook salmon (5.2)	Salmon eggs (4.2)	Salmon, any (5.3)	Chinook salmon (4.3)
Groundhog meat (1.9)	Sockeye salmon (3.9)	Rainbow trout (3.8)	Rainbow trout (3.8)	Rainbow trout (3.2)	Trout, any (3.0)	Rainbow trout (3.6)	Dolly varden trout (4.7)	Coho salmon (3.2)
Moose kidney (1.6)	Whitefish (3.4)	Halibut (3.6)	Halibut (3.6)	Chinook salmon (2.8)	Crab (2.4)	Coho salmon (2.8)	Lake trout (4.4)	Pine mushrooms (2.7)
Lake trout (1.6)	Rainbow trout (2.9)	Pine mushrooms (3.5)	Pine mushrooms (3.5)	Lake trout (2.4)	Salmon eggs (2.4)	Chinook salmon (2.7)	Rainbow trout (1.9)	Salmon eggs (2.5)

Table 31. Average and maximum levels of Polycyclic Aromatic Hydrocarbons (PAHs) in BC traditional food samples

Traditional Food	N	Average Total ng TEQ/g	Max Total ng TEQ/g
Basket cockle meat	1	0.01	0.01
Bear fat	2	0.003	0.006
Bear meat	2	0.01	0.01
Beaver meat	3	2.47	7.41
Black cod meat	1	0.09	0.09
Blueberries	2	ND	ND
Butter clam meat	5	0.86	4.27
Canada goose meat	1	0.001	0.001
Caribou meat	1	0.003	0.003
Caribou weeds	1	ND	ND
Chinook salmon eggs	2	0.27	0.54
Chinook salmon head	1	0.005	0.005
Chinook salmon meat	6	2.20	11.03
Chum salmon eggs	1	0.01	0.01
Chum salmon meat	1	0.54	0.54
Cockles	2	0.003	0.006
Coho salmon eggs	1	0.002	0.002
Coho salmon meat	7	0.21	1.12
Crab body with guts	1	0.01	0.01
Crab legs	1	ND	ND
Crab meat	3	0.001	0.002

Traditional Food	N	Average Total ng TEQ/g	Max Total ng TEQ/g
Cranberries	1	ND	ND
Cutthroat trout whole fish	1	ND	ND
Deer heart	1	0.001	0.001
Deer liver	2	0.001	0.001
Deer meat	3	0.001	0.002
Dog fish meat-dried	1	0.31	0.31
Dog fish meat-half smoked	1	0.61	0.61
Dolly varden trout meat	5	0.001	0.005
Dungeness crab meat	1	0.001	0.001
Elk meat	1	ND	ND
Goat meat	2	ND	ND
Groundhog meat	1	ND	ND
Grouse meat	2	ND	ND
Halibut meat	4	0.002	0.003
Herring eggs	4	0.003	0.005
Herring meat	1	0.003	0.003
Herring roe on kelp	1	0.001	0.001
High bush cranberries	1	ND	ND
Huckleberries	3	ND	ND
Kokanee trout meat	2	0.004	0.004
Lake trout meat	3	0.001	0.004

Traditional Food	N	Average Total ng TEQ/g	Max Total ng TEQ/g
Laver Seaweed	1	0.002	0.002
Ling cod meat	4	0.001	0.001
Manilla clams	1	0.002	0.002
Moose heart	1	ND	ND
Moose kidney	2	ND	ND
Moose liver	5	0.001	0.003
Moose meat	6	0.19	1.03
Mussels	3	0.11	0.31
Northern abalone meat	1	0.002	0.002
Octopus tentacle	1	0.002	0.002
Eulachon grease	3	0.21	0.53
Eulachon meat	3	10.68	24.88
Oyster meat	1	0.001	0.001
Pike	1	0.003	0.003
Pink salmon fish candy	1	0.05	0.05
Pink salmon meat	3	0.97	2.91
Prawn meat	3	0.003	0.008
Rabbit meat	2	0.001	0.001
Rainbow trout meat	4	0.001	0.002
Raspberries	1	ND	ND
Razor clam meat	1	0.001	0.001

Traditional Food	N	Average Total ng TEQ/g	Max Total ng TEQ/g
Red snapper meat	2	0.002	0.002
Rock scallop meat	1	1.63	1.63
Rockfish	1	ND	ND
Salmon eggs	2	0.005	0.010
Salmon meat	2	0.002	0.004
Saskatoon berries	2	ND	ND
Sea Cucumber	1	ND	ND
Seaweed	1	ND	ND
Soapberries	3	ND	ND
Sockeye salmon eggs	2	0.001	0.002
Sockeye salmon head	1	0.003	0.003
Sockeye salmon meat	9	1.84	6.72
Sockeye salmon meat jarred/canned	1	0.03	0.03
Steelhead trout eggs	1	ND	ND
Steelhead trout meat	1	ND	ND
Trout meat	1	0.005	0.005
Whitefish meat	2	2.19	4.32

N = no of pooled samples collected from all of BC
ND=not detectable

Table 32. Average and maximum levels of organochlorines in BC traditional food samples (ng/g fresh weight)

Traditional food	N	Hexachlorobenzene		p,p-DDE		sum PCBs		trans-Nonachlor		Toxaphene	
		Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max
Abalone meat	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Arctic char meat	1	0.54	0.54	ND	ND	1.63	1.63	1.90	1.90	3.14	3.14
Arctic grayling head	1	ND	ND	0.70	0.70	ND	ND	ND	ND	ND	ND
Bear fat	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bear liver	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bear meat	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Beaver back feet	1	ND	ND	1.59	1.59	0.58	0.58	ND	ND	ND	ND
Beaver fat	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Beaver heart	1	ND	ND	1.30	1.30	ND	ND	ND	ND	ND	ND
Beaver kidney	1	ND	ND	16.10	16.10	ND	ND	ND	ND	ND	ND
Beaver liver	1	ND	ND	13.80	13.80	ND	ND	ND	ND	ND	ND
Beaver meat	4	0.09	0.36	0.95	3.78	1.36	5.43	ND	ND	ND	ND
Beaver tail	1	ND	ND	9.75	9.75	8.83	8.83	ND	ND	ND	ND
Bison meat	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Black cod meat	2	0.22	0.44	2.56	4.17	0.62	1.23	ND	ND	0.24	0.47
Blue huckleberries	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Blueberries	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Buffalo meat	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Canada goose meat	1	0.80	0.80	4.96	4.96	ND	ND	ND	ND	ND	ND
Caribou meat	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Caribou weeds	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carp meat	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Traditional food	N	Hexachlorobenzene		p,p-DDE		sum PCBs		trans-Nonachlor		Toxaphene	
		Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max
Chinook salmon eggs	2	2.28	2.33	5.38	8.54	3.02	4.79	1.19	1.37	2.51	3.05
Chinook salmon head	1	1.26	1.26	3.18	3.18	0.48	0.48	1.01	1.01	1.55	1.55
Chinook salmon meat	9	1.67	2.51	3.30	7.20	0.97	2.74	0.89	2.02	2.25	7.69
Chum salmon eggs	2	1.07	1.46	1.49	2.17	0.17	0.34	ND	ND	ND	ND
Chum salmon meat	3	0.75	1.03	1.10	1.98	0.11	0.32	ND	ND	ND	ND
Clams	8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cockles	3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Coho salmon eggs	2	1.36	1.46	3.28	4.38	1.12	1.89	ND	ND	0.57	1.13
Coho salmon head	1	1.81	1.81	21.20	21.20	9.38	9.38	1.37	1.37	2.23	2.23
Coho salmon meat	8	1.18	2.77	3.38	10.90	0.66	1.70	0.14	1.09	0.78	2.46
Crab body with guts	1	ND	ND	0.50	0.50	0.34	0.34	ND	ND	ND	ND
Crab meat	5	ND	ND	1.82	9.09	ND	ND	ND	ND	ND	ND
Cranberries	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cutthroat trout whole fish	1	1.09	1.09	3.89	3.89	1.82	1.82	ND	ND	0.61	0.61
Deer heart	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Deer liver	5	0.20	0.52	ND	ND	ND	ND	ND	ND	ND	ND
Deer meat	15	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dog fish meat	2	0.84	1.03	0.44	0.87	ND	ND	ND	ND	ND	ND
Dolly varden trout meat	5	0.45	1.22	1.28	5.12	0.92	2.70	0.43	1.16	0.30	0.86
Elk fat	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Elk kidney	1	0.45	0.45	ND	ND	ND	ND	ND	ND	ND	ND
Elk liver	2	ND	ND	4.70	9.39	5.59	10.72	ND	ND	ND	ND
Elk meat	6	0.05	0.30	ND	ND	ND	ND	ND	ND	ND	ND

Traditional food	N	Hexachlorobenzene		p,p-DDE		sum PCBs		trans-Nonachlor		Toxaphene	
		Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max
Eulachon grease	5	13.82	17.50	21.12	30.30	0.89	4.45	ND	ND	4.49	15.92
Eulachon meat	4	1.69	2.78	2.54	4.10	0.14	0.55	ND	ND	ND	ND
Goat meat	2	0.32	0.64	ND	ND	ND	ND	ND	ND	ND	ND
Grouse meat	8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Halibut meat	6	0.12	0.38	1.50	3.69	0.73	2.67	0.34	1.04	0.08	0.47
Herring eggs	5	0.23	0.70	0.20	1.02	ND	ND	ND	ND	ND	ND
Herring meat	1	ND	ND	ND	ND	8.24	8.24	ND	ND	ND	ND
Herring roe on kelp	1	0.84	0.84	1.13	1.13	ND	ND	ND	ND	ND	ND
High bush cranberries	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Huckleberries	4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Kokanee trout meat	2	0.52	1.03	12.85	24.90	0.24	0.47	ND	ND	0.15	0.30
Lake trout meat	3	0.41	1.24	10.83	32.50	ND	ND	0.37	1.10	0.12	0.35
Ling cod meat	5	ND	ND	1.25	5.53	0.09	0.45	ND	ND	0.09	0.43
Mallard duck meat	1	ND	ND	1.24	1.24	ND	ND	ND	ND	ND	ND
Moose stomach	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Moose bone marrow	2	0.18	0.36	ND	ND	ND	ND	ND	ND	ND	ND
Moose fat	3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Moose heart	3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Moose intestine	2	0.46	0.91	ND	ND	ND	ND	ND	ND	ND	ND
Moose kidney	6	0.10	0.61	ND	ND	ND	ND	ND	ND	ND	ND
Moose liver	8	0.06	0.45	1.11	8.89	ND	ND	ND	ND	ND	ND
Moose meat	16	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Moose nose	1	1.77	1.77	2.55	2.55	ND	ND	ND	ND	ND	ND

Traditional food	N	Hexachlorobenzene		p,p-DDE		sum PCBs		trans-Nonachlor		Toxaphene	
		Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max
Moose tongue	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Mussels	3	0.13	0.38	0.39	1.16	0.16	0.48	ND	ND	ND	ND
Northern pike	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Octopus tentacle	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Oyster meat	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Pike	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Pink salmon meat	5	1.02	1.57	2.02	3.74	0.28	0.63	ND	ND	0.61	1.27
Prawn meat	3	0.14	0.41	0.61	1.83	1.39	4.16	ND	ND	ND	ND
Rabbit meat	6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Rainbow trout meat	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Raspberries	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Red Huckleberries	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Red snapper meat	3	ND	ND	2.33	4.89	0.40	1.19	ND	ND	ND	ND
Rock scallop meat	1	ND	ND	ND	ND	ND	ND	ND	ND	0.44	0.44
Rockfish	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Salmon eggs	4	0.50	1.64	0.62	2.49	0.12	0.49	ND	ND	0.52	2.09
Salmon meat	4	0.63	0.80	1.51	2.34	ND	ND	0.25	1.00	0.38	0.67
Saskatoon berries	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Sea Cucumber	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Seaweed	3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Soapberries	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Sockeye salmon eggs	2	1.06	1.60	2.00	2.37	0.20	0.39	0.55	1.10	0.57	1.14
Sockeye salmon head	2	1.62	2.26	5.25	6.64	1.83	2.48	0.70	1.40	2.02	3.38

Traditional food	N	Hexachlorobenzene		p,p-DDE		sum PCBs		trans-Nonachlor		Toxaphene	
		Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max
Sockeye salmon meat	14	0.84	1.25	2.01	3.48	0.32	1.02	0.21	1.00	0.79	3.35
Steelhead trout eggs	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Steelhead trout meat	1	0.62	0.62	1.37	1.37	ND	ND	ND	ND	0.45	0.45
Trout meat	2	ND	ND	3.43	6.29	1.06	1.74	ND	ND	ND	ND
Whitefish meat	2	0.64	0.82	0.56	1.11	0.23	0.45	ND	ND	0.18	0.35

N = no of pooled samples collected from all of BC
ND=not detectable

Table 33. Average levels of organophosphate pesticides in BC traditional food samples (ng/g fresh weight)

Traditional food	N	Phorate	Phorate sulfone	Phosalone	Phosmet	Terbuphos	Tetrachlorvinphos
Arctic char meat	1	ND	ND	ND	ND	ND	ND
Arctic grayling head	1	ND	ND	ND	ND	ND	ND
Basket cockle meat	1	ND	ND	ND	ND	ND	ND
Bear fat	5	ND	ND	ND	ND	ND	ND
Bear liver	1	ND	ND	ND	ND	ND	ND
Bear meat	2	ND	ND	ND	ND	ND	ND
Beaver back feet	1	ND	ND	ND	ND	ND	ND
Beaver fat	1	ND	ND	ND	ND	ND	ND
Beaver heart	1	ND	ND	ND	ND	ND	ND
Beaver kidney	1	ND	ND	ND	ND	ND	ND
Beaver liver	1	ND	ND	ND	ND	ND	ND
Beaver meat	4	ND	ND	ND	ND	ND	ND
Beaver tail	1	ND	ND	ND	ND	ND	ND
Bison meat	1	ND	ND	ND	ND	ND	ND
Black cod meat	2	ND	ND	ND	ND	ND	ND
Blue huckleberries	1	ND	ND	ND	ND	ND	ND
Blueberries	2	ND	ND	ND	ND	ND	ND
Buffalo meat	1	ND	ND	ND	ND	ND	ND
Butter clam meat	5	ND	ND	ND	ND	ND	ND
Canada goose meat	1	ND	ND	ND	ND	ND	ND
Caribou meat	2	ND	ND	ND	ND	ND	ND
Caribou weeds	1	ND	ND	ND	ND	ND	ND
Carp meat	1	ND	ND	ND	ND	ND	ND

Traditional food	N	Phorate	Phorate sulfone	Phosalone	Phosmet	Terbuphos	Tetrachlorvinphos
Chinook salmon eggs	2	ND	ND	ND	ND	ND	ND
Chinook salmon head	1	ND	ND	ND	ND	ND	ND
Chinook salmon meat	9	ND	ND	ND	ND	ND	ND
Chum salmon eggs	2	ND	ND	ND	ND	ND	ND
Chum salmon meat	2	ND	ND	ND	ND	ND	ND
Chum salmon-jarred	1	ND	ND	ND	ND	ND	ND
Clams	1	ND	ND	ND	ND	ND	ND
Cockles	2	ND	ND	ND	ND	ND	ND
Coho salmon eggs	2	ND	ND	ND	ND	ND	ND
Coho salmon head	1	ND	ND	ND	ND	ND	ND
Coho salmon meat	8	ND	ND	ND	ND	ND	ND
Crab body with guts	1	ND	ND	ND	ND	ND	ND
Crab legs	1	ND	ND	ND	ND	ND	ND
Crab meat	3	ND	ND	ND	ND	ND	ND
Cranberries	1	ND	ND	ND	ND	ND	ND
Cutthroat trout whole fish	1	ND	ND	ND	ND	ND	ND
Deer heart	2	ND	ND	ND	ND	ND	ND
Deer liver	5	ND	ND	ND	ND	ND	ND
Deer meat	15	ND	ND	ND	ND	ND	ND
Dog fish meat-dried	1	ND	ND	ND	ND	ND	ND
Dog fish meat-half smoked	1	ND	ND	ND	ND	ND	ND
Dolly varden trout meat	5	ND	ND	ND	ND	ND	ND
Dungeness crab meat	1	ND	ND	ND	ND	ND	ND
Elk fat	1	ND	ND	ND	ND	ND	ND

Traditional food	N	Phorate	Phorate sulfone	Phosalone	Phosmet	Terbuphos	Tetrachlorvinphos
Elk kidney	1	ND	ND	ND	ND	ND	ND
Elk liver	2	ND	ND	ND	ND	ND	ND
Elk meat	6	ND	ND	ND	ND	ND	ND
Goat meat	2	ND	ND	ND	ND	ND	ND
Grouse meat	8	ND	ND	ND	ND	ND	ND
Halibut meat	6	ND	ND	ND	ND	ND	ND
Herring eggs	5	ND	ND	ND	ND	ND	ND
Herring meat	1	ND	ND	ND	ND	ND	ND
Herring roe on kelp	1	ND	ND	ND	ND	ND	ND
High bush cranberries	1	ND	ND	ND	ND	ND	ND
Huckleberries	4	ND	ND	ND	ND	ND	ND
Kokanee trout meat	2	ND	ND	ND	ND	ND	ND
Lake trout meat	3	ND	ND	ND	ND	ND	ND
Laver Seaweed	1	ND	ND	ND	ND	ND	ND
Laver seaweed dried	1	ND	ND	ND	ND	ND	ND
Ling cod meat	5	ND	ND	ND	ND	ND	ND
Mallard duck meat	1	ND	ND	ND	ND	ND	ND
Manilla clams	1	ND	ND	ND	ND	ND	ND
Moose stomach	1	ND	ND	ND	ND	ND	ND
Moose bone marrow	2	ND	ND	ND	ND	ND	ND
Moose fat	3	ND	ND	ND	ND	ND	ND
Moose heart	3	ND	ND	ND	ND	ND	ND
Moose intestine	2	ND	ND	ND	ND	ND	ND
Moose kidney	6	ND	ND	ND	ND	ND	ND

Traditional food	N	Phorate	Phorate sulfone	Phosalone	Phosmet	Terbuphos	Tetrachlorvinphos
Moose liver	8	ND	ND	ND	ND	ND	ND
Moose meat	15	ND	ND	ND	ND	ND	ND
Moose meat-canned	1	ND	ND	ND	ND	ND	ND
Moose nose	1	ND	ND	ND	ND	ND	ND
Moose tongue	1	ND	ND	ND	ND	ND	ND
Mussels	3	ND	ND	ND	ND	ND	ND
Northern abalone meat	1	ND	ND	ND	ND	ND	ND
Northern pike	1	ND	ND	ND	ND	ND	ND
Octopus tentacle	1	ND	ND	ND	ND	ND	ND
Eulachon grease	5	ND	ND	ND	ND	ND	ND
Eulachon meat	4	ND	ND	ND	ND	ND	ND
Oyster meat	1	ND	ND	ND	ND	ND	ND
Pike	1	ND	ND	ND	ND	ND	ND
Pink salmon fish candy	1	ND	ND	ND	ND	ND	ND
Pink salmon meat	3	ND	ND	ND	ND	ND	ND
Pink Salmon meat dried	1	ND	ND	ND	ND	ND	ND
Prawn meat	3	ND	ND	ND	ND	ND	ND
Rabbit meat	6	ND	ND	ND	ND	ND	ND
Rainbow trout meat	5	ND	ND	ND	ND	ND	ND
Raspberries	1	ND	ND	ND	ND	ND	ND
Razor clam meat	1	ND	ND	ND	ND	ND	ND
Red huckleberries	1	ND	ND	ND	ND	ND	ND
Red snapper meat	3	ND	ND	ND	ND	ND	ND
Rock scallop meat	1	ND	ND	ND	ND	ND	ND

Traditional food	N	Phorate	Phorate sulfone	Phosalone	Phosmet	Terbuphos	Tetrachlorvinphos
Rockfish	1	ND	ND	ND	ND	ND	ND
Salmon eggs	4	ND	ND	ND	ND	ND	ND
Salmon meat	4	ND	ND	ND	ND	ND	ND
Saskatoon berries	2	ND	ND	ND	ND	ND	ND
Sea Cucumber	1	ND	ND	ND	ND	ND	ND
Seaweed	1	ND	ND	ND	ND	ND	ND
Soapberries	5	ND	ND	ND	ND	ND	ND
Sockeye salmon eggs	2	ND	ND	ND	ND	ND	ND
Sockeye salmon head	2	ND	ND	ND	ND	ND	ND
Sockeye salmon meat	12	ND	ND	ND	ND	ND	ND
Sockeye salmon meat jarred/canned	2	ND	ND	ND	ND	ND	ND
Steelhead trout eggs	1	ND	ND	ND	ND	ND	ND
Steelhead trout meat	1	ND	ND	ND	ND	ND	ND
Trout meat	2	ND	ND	ND	ND	ND	ND
Whitefish meat	2	ND	ND	ND	ND	ND	ND

N = no of pooled samples collected from all of BC; ND=not detectable

Table 34. Average and maximum levels of Polybrominated Diphenyl Ethers (PBDE) in BC traditional food samples (ng/g fresh weight)

Traditional Food	N	Average Total PBDEs	Max Total PBDEs
Basket cockle meat	1	0.03	0.03
Bear fat	3	0.37	0.64
Bear meat	2	0.05	0.10
Beaver fat	1	0.52	0.52
Beaver meat	1	0.20	0.20
Black cod meat	1	0.38	0.38
Butter clam meat	4	0.08	0.15
Canada goose meat	1	0.09	0.09
Caribou meat	2	0.41	0.67
Chinook salmon eggs	2	0.79	1.19
Chinook salmon meat	8	0.81	1.34
Chum salmon eggs	1	0.27	0.27
Chum salmon meat	2	0.27	0.44
Cockles	1	0.19	0.19
Coho salmon eggs	1	0.76	0.76
Coho salmon meat	7	0.73	2.03
Crab body with guts	1	0.66	0.66
Cutthroat trout whole fish	1	0.32	0.32
Deer liver	1	0.33	0.33
Deer meat	1	0.27	0.27
Dog fish meat-dried	1	0.43	0.43
Dog fish meat-half smoked	1	0.12	0.12
Dolly varden trout meat	4	5.05	12.62
Dungeness crab meat	1	0.09	0.09
Elk meat	1	0.16	0.16
Goat meat	1	ND	ND
Groundhog meat	1	ND	ND
Grouse meat	1	ND	ND
Halibut meat	4	0.62	1.41
Herring eggs	1	0.20	0.20
Herring meat	1	1.80	1.80
Herring roe on kelp	1	0.48	0.48
High bush cranberries	1	ND	ND
Huckleberries	1	ND	ND
Kokanee trout meat	2	2.55	2.74
Lake trout meat	1	9.73	9.73
Laver Seaweed	1	1.51	1.51
Ling cod meat	4	0.31	0.40
Mallard duck meat	1	0.35	0.35
Manilla clams	1	0.07	0.07
Moose fat	2	0.27	0.29
Moose kidney	1	ND	ND

Traditional Food	N	Average Total PBDEs	Max Total PBDEs
Moose liver	3	0.15	0.32
Moose meat	8	0.68	2.72
Mussels	2	0.13	0.13
Northern abalone meat	1	0.22	0.22
Northern pike	1	0.41	0.41
Eulachon grease	5	3.09	5.58
Eulachon meat	2	0.57	0.81
Oyster meat	1	0.29	0.29
Pike	1	0.29	0.29
Pink salmon meat	3	0.39	0.77
Prawn meat	1	0.02	0.02
Rabbit meat	1	0.11	0.11
Rainbow trout meat	3	0.53	1.25
Raspberries	1	ND	ND
Razor clam meat	1	0.09	0.09
Red snapper meat	2	0.81	1.52
Rock scallop meat	1	0.10	0.10
Salmon eggs	2	0.07	0.14
Salmon meat	2	0.84	1.68
Soapberries	1	ND	ND
Sockeye salmon eggs	1	0.32	0.32
Sockeye salmon meat	11	1.01	6.54
Trout meat	1	0.91	0.91
Whitefish meat	2	1.15	1.75

N = no of pooled samples collected from all of BC
ND=not detectable

Table 35. Average and total levels of Perfluorinated Compounds (PFCS) in BC traditional food samples (ng/g fresh weight)

Traditional Food	N	Average Total PFCs	Max Total PFCs
Basket cockle meat	1	ND	ND
Bear liver	1	0.69	0.69
Bear meat	1	ND	ND
Beaver kidney	1	ND	ND
Beaver liver	1	ND	ND
Beaver meat	3	ND	ND
Bison meat	1	ND	ND
Buffalo meat	1	ND	ND
Butter clam meat	2	ND	ND
Canada goose meat	1	ND	ND
Chinook salmon eggs	1	12.58	12.58
Chinook salmon meat	2	0.26	0.51
Chum salmon-jarred	1	ND	ND
Cockles	1	ND	ND
Coho salmon meat	1	0.72	0.72
Crab body with guts	1	ND	ND
Crab meat	2	0.89	1.78
Deer liver	4	0.67	1.15
Deer meat	11	ND	ND
Dungeness crab meat	1	ND	ND
Elk kidney	1	ND	ND

Traditional Food	N	Average Total PFCs	Max Total PFCs
Elk liver	1	1.89	1.89
Elk meat	5	ND	ND
Grouse meat	2	ND	ND
Halibut meat	1	ND	ND
Herring eggs	1	ND	ND
Kokanee trout meat	1	6.01	6.01
Laver Seaweed	1	ND	ND
Mallard duck meat	1	0.68	0.68
Moose bone marrow	1	ND	ND
Moose heart	1	ND	ND
Moose kidney	3	ND	ND
Moose liver	4	ND	ND
Moose meat	12	ND	ND
Moose meat-canned	1	ND	ND
Mussels	2	ND	ND
Northern abalone meat	1	ND	ND
Octopus tentacle	1	ND	ND
Eulachon meat	1	1.86	1.86
Oyster meat	1	ND	ND
Prawn meat	1	0.62	0.62
Rabbit meat	3	ND	ND

Traditional Food	N	Average Total PFCs	Max Total PFCs
Razor clam meat	1	ND	ND
Rock scallop meat	1	ND	ND
Salmon eggs	1	9.30	9.30
Salmon meat	1	0.82	0.82
Sockeye salmon meat	6	0.51	0.89
Trout meat	1	ND	ND
Whitefish meat	1	ND	ND

N = no of pooled samples collected from all of BC; ND=not detectable

Table 36. Levels of Dioxins and Furans in BC traditional food samples (ng TEQ/kg fresh weight)

Traditional Food	N	Average Dioxin and Furans	Max Dioxin and Furans
Basket cockle meat	1	0.001	0.001
Bear fat	3	0.06	0.09
Bear meat	1	ND	ND
Beaver fat	1	0.01	0.009
Beaver meat	1	0.07	0.07
Black cod meat	1	0.005	0.005
Butter clam meat	4	0.01	0.06
Canada goose meat	1	ND	ND
Caribou meat	2	0.09	0.10
Chinook salmon eggs	2	0.14	0.29
Chinook salmon meat	8	0.08	0.29
Chum salmon eggs	1	ND	ND
Chum salmon meat	2	0.002	0.004
Cockles	1	ND	ND
Coho salmon eggs	1	0.08	0.08
Coho salmon meat	7	0.03	0.11
Crab body with guts	1	0.20	0.20
Cutthroat trout whole fish	1	ND	ND
Deer liver	1	0.04	0.04
Deer meat	1	ND	ND
Dog fish meat-dried	1	0.001	0.001

Traditional Food	N	Average Dioxin and Furans	Max Dioxin and Furans
Dog fish meat-half smoked	1	ND	ND
Dolly varden trout meat	4	0.02	0.06
Dungeness crab meat	1	0.001	0.001
Elk meat	1	0.60	0.60
Halibut meat	4	0.03	0.10
Herring eggs	1	0.02	0.02
Herring meat	1	ND	ND
Herring roe on kelp	1	ND	ND
Kokanee trout meat	2	ND	ND
Lake trout meat	1	ND	ND
Laver Seaweed	1	1.84	1.84
Ling cod meat	4	0.005	0.02
Mallard duck meat	1	0.05	0.05
Manilla clams	1	ND	ND
Moose fat	3	0.02	0.06
Moose liver	3	0.26	0.47
Moose meat	6	0.03	0.11
Mussels	2	0.02	0.05
Northern abalone meat	1	ND	ND
Northern pike	1	0.05	0.05
Eulachon grease	5	0.49	0.85

Traditional Food	N	Average Dioxin and Furans	Max Dioxin and Furans
Eulachon meat	2	0.16	0.33
Oyster meat	1	0.33	0.33
Pike	1	0.004	0.004
Pink salmon meat	3	0.01	0.03
Prawn meat	1	ND	ND
Rabbit meat	1	ND	ND
Rainbow trout meat	3	0.004	0.01
Razor clam meat	1	ND	ND
Red snapper meat	2	0.004	0.01
Rock scallop meat	1	0.04	0.04
Salmon eggs	1	0.10	0.10
Salmon meat	1	ND	ND
Sockeye salmon eggs	1	0.17	0.17
Sockeye salmon meat	11	0.12	0.32
Trout meat	1	0.02	0.02
Whitefish meat	2	0.05	0.09

N = no of pooled samples collected from all of BC
ND=not detectable

Table 37a. Exposure estimates (µg/kg body weight/day) for metals from traditional food for BC FN living on-reserve using average concentrations (N=1103)

Metal	PTDI (ug/kg/day)	n>PTDI	Mean	Median	95th percentile	Mean/PTDI	95th/PTDI
Arsenic	1	266	1.10	0.28	4.58	1.10	4.58
Cadmium	1	62	0.26	0.02	1.17	0.26	1.17
Mercury	0.5	3	0.03	0.01	0.12	0.06	0.23
Lead	3.6	5	0.23	0.05	1.05	0.06	0.29

Table 37b . Exposure estimates (µg/kg body weight/day) for metals from traditional food for BC FN living on-reserve using maximum concentrations (N=1103)

Metal	PTDI (ug/kg/day)	n>PTDI	Mean	Median	95th percentile	Mean/PTDI	95th/PTDI
Arsenic	1	356	1.55	0.41	6.57	1.55	6.57
Cadmium	1	139	0.54	0.56	2.23	0.54	2.23
Mercury	0.5	10	0.06	0.03	0.23	0.13	0.46
Lead	3.6	114	1.68	0.46	7.87	0.47	2.19

Table 37c. Exposure estimates (µg/kg body weight/day) for mercury from traditional food (using average and maximum concentrations) among BC FN women of child bearing age, living on-reserve (N=499)

Level of mercury concentration	PTDI (ug/kg/day)	n>PTDI	Mean	Median	95th percentile	Mean/PTDI	95th/PTDI
Average	0.2	5	0.03	0.01	0.12	0.16	0.58
Maximum	0.2	16	0.06	0.03	0.23	0.31	1.15

Table 38a. Exposure estimates (µg/kg body weight/day) for organics from traditional food for BC FN living on-reserve using average concentrations (N=1103)

Organics*	PTDI (ug/kg/day)	n>PTDI	Mean	Median	95th percentile	Mean/PTDI	95th/PTDI
HCBs	0.27	0	0.0005	0.0002	0.0020	0.0018	0.0073
DDE	20	0	0.0004	0.0002	0.0014	0.0001	0.0003
PCB	1	0	0.0003	0.0001	0.0011	0.0003	0.0011
Chlordane	0.05	0	0.0001	0.0001	0.0006	0.0029	0.0113
Toxaphene	0.2	0	0.0004	0.0001	0.0015	0.0018	0.0075
PAH	40	0	0.0004	0.0002	0.0015	0.00001	0.00004
PFOS	0.08	0	0.0005	0.0002	0.0019	0.0059	0.0238
PBDE	0.1	0	0.0008	0.0005	0.0025	0.0075	0.0251
Dioxin and Furan	2.3 pg/kg/day	0	0.0001	0.00003	0.0003	0.00004	0.0001

*PAH, PFOS, PBDE, Dioxin and Furan TDI are reference dose used by USEPA.

Table 38b. Exposure estimates (µg/kg body weight/day) for organics from traditional food for BC FN living on-reserve using maximum concentrations (N=1103)

Organics*	PTDI (ug/kg/day)	n>PTDI	Mean	Median	95th percentile	Mean/PTDI	95th/PTDI
HCBs	0.27	0	0.001	0.0004	0.003	0.003	0.012
DDE	20	0	0.001	0.001	0.005	0.0001	0.0003
PCB	1	0	0.001	0.0004	0.004	0.001	0.004
Chlordane	0.05	0	0.001	0.0002	0.002	0.011	0.042
Toxaphene	0.2	0	0.001	0.0004	0.005	0.005	0.023
PAH	40	0	0.002	0.001	0.007	0.00004	0.0002
PFOS	0.08	0	0.001	0.0002	0.002	0.007	0.029
PBDE	0.1	0	0.002	0.001	0.007	0.022	0.071
Dioxin and Furan	2.3 pg/kg/day	0	0.0001	0.0001	0.0005	0.00005	0.0002

*PAH, PFOS, PBDE, Dioxin and Furan TDI are reference dose used by USEPA.

Figure 31. Correlation between exposure estimates from total dietary intake of Hg (µg/kg body weight/day) and hair Hg concentrations of BC FN living on-reserve (Spearman's r=0.54)

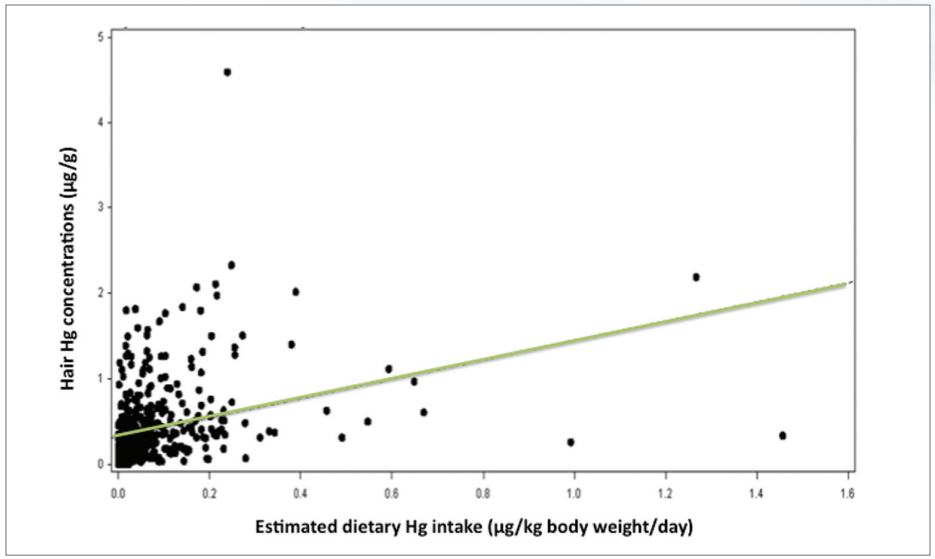
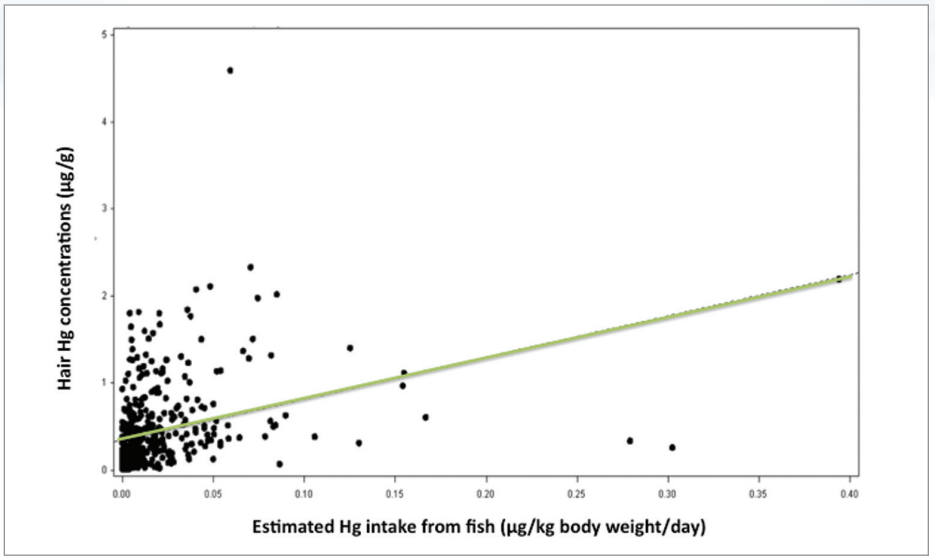


Figure 32. Correlation between exposure estimates from fall and summer fish intake of Hg (µg/kg body weight/day) and hair Hg concentrations of BC FN living on-reserve (Spearman r=0.54)



APPENDICES

Appendix A: Detection limit tables

Table A.1 OrganoChlorine Pesticides

PARAMETER	DL (ug/g)	PARAMETER	DLs (ug/g)
Chlordane, a-	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, a-	0.002
HCH, b-	0.010	HCH, g-	0.001
Heptachlor	0.001	Heptachlor epoxide (exo)	0.001
Heptachlor epoxide (endo)	0.010	Methoxychlor	0.020
Oxychlordane	0.005	Nonachlor, trans-	0.001
TDE, p,p'-	0.0005	TDE, o,p'-	0.0005
Mirex	0.002	Aldrin	0.001
Toxaphene parlar 50	0.0003	Toxaphene parlar 26	0.0005
Heptachlor epoxide (exo)	0.001	DDE, p,p'-	0.001

Table A.2 Organo Phosphate Pesticides

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

Table A.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 A.4a Methyl- Mercury in Food

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

Table A.4b Metals in Food

ELEMENT	SYMBOL	DLs (ppm) Based on Dry Weight	DLs (ppm) Based on Wet Weight
Aluminum	Al	0.5	0.1
Arsenic	As	0.1	0.02
Barium	Ba	0.1	0.02
Beryllium	Be	0.1	0.02
Bismuth	Bi	0.1	0.02
Cadmium	Cd	0.02	0.004
Calcium	Ca	5	1
Chromium	Cr	0.1	0.02
Cobalt	Co	0.1	0.02
Copper	Cu	0.1	0.02
Iron	Fe	5	1
Lead	Pb	0.1	0.02
Lanthanum	La	0.5	0.1
Magnesium	Mg	5	1

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 A.4b Metals in Food

ELEMENT	SYMBOL	DLs (ppm) Based on Wet Weight
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 CVAS)	Hg	0.00002

ELEMENT	SYMBOL	DLs (ppm) Based on Wet Weight
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 A.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 A.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 A.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 A.9 PAHs

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

Table A.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
Cimetidine	2	Ciprofloxacin	20
Clarithromycin	2	Codeine	5
Cotinine	5	Clofibric acid	1
Dehydonifedipine	2	Diclofenac	15
Diltiazem	5	Diphenhydramine	10
Ethinyl Estradiol	0.2	Erythromycin	10
Fluoxetine	5	Furosemide	5
Gemfibrozil	1	Hydrochlorothiazide	5
Ibuprofen	20	Indomethacin	15
Ketoprofen	2	Metformin	10
Metoprolol	5	Naproxen	5
Pentoxyfylline	2	Ranitidine	10
Roxithromycin	5		
Sulfamethoxazole	2	Tetracycline	10
Trimethoprim	2	Warfarin	0.5
Chlortetracycline	10		
Iso-Chlortetracycline	10		
Oxytetracycline	10		
Lincomycin	10		
Monensin	10		
Sulfamethazine	5		

Appendix B: 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 gnocci, 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	Tzaziki, 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	200	Clam chowder, Mixed dishes (chicken, broccoli, cheese), Salad with egg, cheese, vegetab.

Appendix C: List of types of supplements taken by BC FN living on-reserve*

Name of supplement	% of all supplements reported
Multivitamin/Mineral Supplement, Adults	18.0
Vitamin D	10.0
Calcium	8.0
Vitamin C	8.0
Vitamin B (B1, B3, B6, B12, Complex)	7.3
Prenatal Vitamin	3.5
Calcium + Magnesium	3.3
Multivitamin/Mineral Supplement, Women	3.1
Iron	2.0
Omega 3	1.6
Vitamin E	1.5
Cod Liver Oil	1.3
Garlic Pills	1.3
Glucosamine	1.3
Echinacea	1.1
Omega 3-6-9	1.1
Salmon Oil	1.1
Vitamin A	1.1
Calcium And Vitamin D	0.9
Multivitamin/Mineral Supplement, 50+	0.7
Zinc	0.7
Flax Seed Oil	0.6
Folic Acid	0.6

Name of supplement	% of all supplements reported
Ginseng	0.6
Fish Oil	0.4
Ginkgo	0.4
Halibut Liver Oil	0.4
Intramax	0.4
Mega Vim	0.4
New Chapter-Only One	0.4
Power Vitamins For Men	0.4
Rolaids	0.4
Udo's Choice Oil	0.4
Vital Greens	0.4
Acti Vit Beach Body	0.2
Actonel 35 Mg	0.2
Agel Packets	0.2
Albi Natural Acai Berry	0.2
Albi Naturals 1112 Mg	0.2
All In One- Dietary Supplement	0.2
Aloe Vera Juice	0.2
Astragialustincture	0.2
B100 Complex	0.2
Bazheng San Hj-073	0.2
Berdock Seed Tinture	0.2
Betacol	0.2

Name of supplement	% of all supplements reported
Black Coho	0.2
Blueberry Vitamin	0.2
B with C Complex	0.2
Calcium Manganate	0.2
Calcium Plus	0.2
Calmax Original-Dietary Supplement	0.2
Caltrate Plus	0.2
Children's Multivitamin	0.2
Chromium Gtf	0.2
Clinical Strength	0.2
Coenzyme Q10	0.2
Cold Fx	0.2
Cranberry Pill	0.2
Daily One Weight Sense	0.2
Digestive Enzymes	0.2
Enerex Super Phytoplankton	0.2
Enviro-D-T-X	0.2
Essiac	0.2
Extra Energy	0.2
Fibre Pill	0.2
Flaxseed	0.2
Florasil	0.2
Gdnoflifeprimaldefen	0.2

Name of supplement	% of all supplements reported
Genuine Healthgreens	0.2
Genuinehealthdailydetox	0.2
Graphite Lm	0.2
Green Tea, 1000 Mg	0.2
Ground Ginger	0.2
Herbal Liquid	0.2
Herbal Supplement	0.2
Hylands	0.2
Inno-Cal-Magnesium	0.2
Iron Infusion Hospital	0.2
Jamieson stress ease	0.2
Jamieson Super Vita Vim Super	0.2
Jamieson Vitam3	0.2
L-Carnitine Jamieson	0.2
Lecithin	0.2
Life Ester-C 500	0.2
Life Vitamin	0.2
Lutein , Natural Factors	0.2
Magnesium Citrate	0.2
Manganese	0.2
Metamucil Tablets	0.2
Mineral Complex With Calcium	0.2
Mona Vif	0.2

Name of supplement	% of all supplements reported
Mulberry Extract Caps	0.2
Multisure	0.2
Multisure For Women	0.2
Mylan Eti Cal	0.2
Natural Balance Chol-Less	0.2
Natural Factor Whey Factors	0.2
Natural Factors Men's +50	0.2
Neo Citran	0.2
Nf Hipotency B	0.2
Nf Learning Factors	0.2
Nordick Daily Supplement	0.2
Olive Leaf Pill	0.2
Oregano Oil	0.2
Osteo Pro Care	0.2
Pacific Seal Oil	0.2
Pariet	0.2
Praire Natural Cla Force	0.2
Proaxtina	0.2
Recovery Purica	0.2
Replavite	0.2
Replavite B And C Vitamins	0.2
Seal Oil -Omega 3	0.2
Selenium	0.2
Senekot	0.2

Name of supplement	% of all supplements reported
Silver Shield	0.2
Spectrum Multi-Vitamin	0.2
Stress Ease B Vitmai	0.2
Super Lysine W/ Vit C & 5 Herbs	0.2
Super Vitamin For Men Jamieson	0.2
The Ultimate One	0.2
Ultimate One For Men	0.2
Ultra Fibre	0.2
Vita-Vim Drink	0.2
Vita-Vim Jamieson	0.2
Vitalax	0.2
Vitamin A and D	0.2
Vitamin C and D	0.2
Vitamost- Ultragest	0.2
Vitavim Adult 50+	0.2
Voltaren Sr 100	0.2

*participants were allowed to report more than 1 type of supplement

Appendix D: Types of vegetables and/or fruits eaten from BC FN on-reserve gardens

Types of vegetables and fruits	%
Potatoes	11
Carrots	9.7
Tomatoes	8.8
Berries (raspberries, strawberries, blackberries, blueberries, Saskatoon berries, gooseberries, huckleberries, thimbleberries)	6.2
Greens (lettuce, swiss chard, spinach, bok choy)	6
Apples	5.9
Peas	5
Cucumbers	4.9
Onions	4.5
Plums	4
Beans	3.4
Beets	3.1
Zucchinis	3
Radishes	2.7
Squash (butternut, spaghetti, winter)	2.3
Cherries	2.2
Corn	1.9
Peppers (green, red, jalepeno)	1.9
Broccoli	1.4
Cabbage	1.4
Rhubarb	1.4
Pears	1.3

Types of vegetables and fruits	%
Turnips	1.2
Cauliflower	0.9
Peaches	0.9
Celery	0.8
Pumpkins	0.8
Currants	0.6
Garlic	0.6
Melons (canteloupe, honeydew, watermelon)	0.4
Apricots	0.3
Herbs (parsley, basil, dill, oregano, sage, thyme, cilantro)	0.3
Asparagus	0.2
Chives	0.2
Kale	0.2
Parsnips	0.2
Artichoke	0.1
Brussel Sprouts	0.1
Fig	0.1
Nectarines	0.1
Sunflower	0.1

(n = 3046 total responses)

Appendix E: 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

Appendix F: Average and maximum levels of selected essential trace metals in BC traditional food samples

Traditional food	N	Calcium		Copper		Iron		Potassium		Sodium		Zinc		Selenium	
		Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max
Abalone meat	1	313	313	1.36	1.36	8.7	8.7	3080	3080	2810	2810	10.6	10.6	0.19	0.19
Alder bark	1	8160	8160	3.7	3.7	8.6	8.6	5600	5600	25.3	25.3	40.2	40.2	ND	ND
Aparagus	1	241	241	1.64	1.64	7.1	7.1	3770	3770	22	22	9.8	9.8	0.36	0.36
Arctic char meat	1	482	482	0.44	0.44	17.2	17.2	3000	3000	6950	6950	7.6	7.6	0.21	0.21
Arctic grayling head	1	24700	24700	0.99	0.99	21.7	21.7	2980	2980	978	978	22.4	22.4	1.61	1.61
Avalanche lily	1	152	152	1.15	1.15	15.5	15.5	3500	3500	40.2	40.2	4.3	4.3	ND	ND
Balsam bark	1	7660	7660	3	3	14.4	14.4	1480	1480	394	394	14.4	14.4	ND	ND
Balsam sap	2	5645	9420	13.85	23.7	81.85	107	18875	35700	97.05	145	122	143	0.1	0.2
Bear fat	3	32.4	89.9	0.11	0.23	16.87	48.5	196.23	378	81.43	204	2	3	0.16	0.45
Bear liver	1	103	103	8.72	8.72	54.6	54.6	3760	3760	5130	5130	62.5	62.5	0.12	0.12
Bear meat	2	178	232	1.335	1.47	49.9	57.9	3730	3790	5420.5	10000	40.6	45.9	0.15	0.15
Beaver back feet	1	22100	22100	0.96	0.96	78.8	78.8	1050	1050	2570	2570	36.9	36.9	0.15	0.15
Beaver fat	1	263	263	0.94	0.94	42.1	42.1	2480	2480	1260	1260	19.3	19.3	0.18	0.18
Beaver heart	1	106	106	3.45	3.45	65.6	65.6	1780	1780	1560	1560	20.3	20.3	0.21	0.21
Beaver kidney	1	107	107	3.41	3.41	54.4	54.4	2140	2140	1300	1300	30.5	30.5	0.8	0.8
Beaver liver	1	55.8	55.8	3.27	3.27	166	166	2290	2290	871	871	35.9	35.9	0.25	0.25
Beaver meat	4	106.88	204	1.06	2.4	110.18	334	2678.50	4740	1708.48	4720	28.75	76	0.165	0.34
Beaver tail	1	3620	3620	1.09	1.09	135	135	674	674	1440	1440	16.9	16.9	0.1	0.1
Birch sap	1	105	105	0.14	0.14	ND	ND	1120	1120	3.5	3.5	3.4	3.4	ND	ND
Bison meat	1	449	449	0.95	0.95	24.3	24.3	4600	4600	6590	6590	49.1	49.1	0.22	0.22
Bitter root	1	923	923	1.3	1.3	30.5	30.5	5780	5780	95.1	95.1	23.6	23.6	ND	ND
Black cap berries	2	526	574	1.13	1.41	7.55	8.1	2190	2200	10.7	18.8	5.85	7.5	ND	ND

Traditional food	N	Calcium		Copper		Iron		Potassium		Sodium		Zinc		Selenium	
		Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max
Black cod meat	2	806	1200	0.24	0.31	0.75	1.5	4000	4350	1013	1490	6.8	9.7	0.63	0.77
Blackberries	4	370.25	452	1.13	1.35	4.7	6	1335	1640	5.75	13.6	2.125	2.6	ND	ND
Blue huckleberries	5	135.4	164	0.69	1.08	3	6.2	854.2	1260	42.62	183	1	1.2	ND	ND
Blueberries	7	168.23	272	0.65	0.9	5.8	17.7	904	1060	2.34	5	1.16	1.5	0.003	0.02
Bog cranberry	1	128	128	0.67	0.67	5.5	5.5	827	827	12.7	12.7	1.3	1.3	ND	ND
Buck brush	1	10200	10200	2.1	2.1	64.7	64.7	3170	3170	ND	ND	9.8	9.8	ND	ND
Buffalo meat	1	52.2	52.2	1.17	1.17	24.2	24.2	3640	3640	489	489	41.2	41.2	0.23	0.23
Bunchberries	1	3510	3510	0.79	0.79	25.8	25.8	2420	2420	5.2	5.2	4.5	4.5	ND	ND
Canada goose meat	1	73.5	73.5	3.94	3.94	45.1	45.1	4120	4120	514	514	17	17	0.22	0.22
Caribou meat	2	41.55	42.9	2.99	3.24	49	56.2	3740	3950	481.5	485	38.75	43.6	0.14	0.15
Caribou weeds	1	12200	12200	10.9	10.9	280	280	11900	11900	7.2	7.2	72.8	72.8	ND	ND
Carp meat	1	5670	5670	0.33	0.33	17.9	17.9	3790	3790	555	555	9.1	9.1	0.21	0.21
Cascara Bark-dried	1	27700	27700	1.9	1.9	76.8	76.8	4010	4010	22.4	22.4	6.3	6.3	ND	ND
Cattail-top and stems	1	1190	1190	6.83	6.83	433	433	4500	4500	130	130	6	6	0.17	0.17
Cedar	1	16500	16500	2.1	2.1	116	116	5200	5200	7.9	7.9	12.8	12.8	ND	ND
Chanterelle mushrooms	1	94.3	94.3	6.38	6.38	44.7	44.7	8340	8340	15	15	9.1	9.1	0.02	0.02
Cherries	1	180	180	0.88	0.88	2.2	2.2	2400	2400	3.1	3.1	0.9	0.9	ND	ND
Chinook salmon eggs	2	2922	5240	25.59	50.2	16.35	20.6	2690	3230	2338	3880	26.45	34.1	2.34	3.8
Chinook salmon head	1	9080	9080	0.63	0.63	18.3	18.3	1990	1990	1270	1270	15.8	15.8	0.32	0.32
Chinook salmon meat	9	5012.22	28000	0.81	1.09	9.8	20.3	4323.33	6350	3559	13600	9.4	18.8	0.48	0.87
Chokecherries	5	1782.2	5950	1.462	2.1	31.42	105	3412	4870	9.98	18.7	3.66	9.2	0.05	0.1
Chum salmon eggs	2	517.5	594	5.46	6.7	14.65	19.7	1675	2280	450	542	30.85	36.8	2.07	2.62
Chum salmon meat	3	881	1480	1.28	1.63	28.37	55.2	5420	7010	9760	13600	14.37	23.1	0.67	0.76
Clams	8	580	1060	1.5513	2.4	36.125	54.8	2535.25	3190	3035	4640	15.45	19.3	0.47	0.82

Traditional food	N	Calcium		Copper		Iron		Potassium		Sodium		Zinc		Selenium	
		Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max
Cockles	3	470	610	0.66	0.99	118.6	229	2140	2650	4193.33	7530	17.3	23.4	0.62	0.88
Coho salmon eggs	2	544.5	594	14.95	23.2	18.6	19.7	1990	2280	485	542	36.05	36.8	2.57	2.62
Coho salmon head	1	25300	25300	0.67	0.67	31.7	31.7	2470	2470	3020	3020	22.2	22.2	0.29	0.29
Coho salmon meat	8	1423.38	3610	0.79	1.8	7	12.3	4500	6160	5650.5	25200	8.6375	16.7	0.44125	0.67
Cow parsnip shoot	1	448	448	0.53	0.53	4.1	4.1	5590	5590	459	459	2.5	2.5	ND	ND
Crab apples	3	248.3	630	0.61	1.13	2.03	4	1390	2020	77.53	219	0.83	1.9	ND	ND
Crab body with guts	1	26600	26600	26.1	26.1	162	162	976	976	3600	3600	24.9	24.9	1.03	1.03
Crab meat	5	8797.2	41500	6.236	9.67	27.5	113	2512	3950	3596	4970	40.64	64.2	0.562	0.78
Cranberries	1	187	187	0.47	0.47	2.9	2.9	939	939	13.1	13.1	0.9	0.9	ND	ND
Cutthroat trout whole fish	1	4490	4490	1.03	1.03	26.6	26.6	3370	3370	851	851	19.4	19.4	0.71	0.71
Dandelion	1	6880	6880	9.7	9.7	3990	3990	10300	10300	482	482	40.1	40.1	0.2	0.2
Deer heart	2	35.85	40.7	24.3	24.4	73.15	85	2795	3190	810.5	929	26.95	29.7	0.66	0.92
Deer liver	5	48.52	80.6	28.262	60	104.96	214	2484	3320	1293.2	2590	32.88	56.3	0.90	1.63
Deer meat	15	118.95	479	2.09	7.01	34.23	48	3522	5770	1240.4	3190	45.71	74.4	0.19	0.38
Devil's Club bark	1	31700	31700	4.3	4.3	423	423	9480	9480	77.8	77.8	24.2	24.2	ND	ND
Devil's club stem	4	9050	17600	4.15	7.8	58.75	162	8045	16500	94.03	172	11.35	20.1	ND	ND
Dog fish meat	2	642	847	1.01	1.2	7.75	8.6	8920	13300	16030	23100	9.2	9.8	0.91	1.2
Dolly varden trout meat	5	2097.4	5870	0.508	0.72	5.42	8.2	4076	4340	545.4	609	7.98	15.7	0.608	0.89
Elk fat	1	5	5	ND	ND	ND	ND	18.5	18.5	13.6	13.6	0.1	0.1	ND	ND
Elk kidney	1	1.4	1.4	0.04	0.04	ND	ND	29.1	29.1	16.5	16.5	0.4	0.4	ND	ND
Elk liver	2	38.85	39.5	27.8	31.4	150	174	2935	3180	581.5	641	19.3	19.3	0.24	0.33
Elk meat	6	66.98	103	1.52	1.82	34.02	39.9	3710	4140	497.17	613	50.43	53.8	0.22	0.46
Goat meat	2	86.8	103	1.05	1.66	26.05	36.5	3230	3890	586	623	31.1	37.6	0.03	0.04
Gooseberries	3	3059	7830	1.33	2.3	18.57	35.7	4913.33	7750	6.47	11.8	10.73	27.3	ND	ND

Traditional food	N	Calcium		Copper		Iron		Potassium		Sodium		Zinc		Selenium	
		Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max
Groundhog meat	1	104	104	0.47	0.47	11.4	11.4	2000	2000	352	352	6.8	6.8	0.03	0.03
Grouse meat	8	1194.36	7430	4.83	30.8	22.31	45.1	3562.5	4260	546.88	683	8.26	14.7	0.3	0.75
Halibut meat	6	1413.53	7450	0.3	0.49	3.05	5.6	5036.67	6910	881.83	1720	7.15	11.9	0.84	1.29
Hazelnut	1	1320	1320	9.3	9.3	22.8	22.8	7740	7740	ND	ND	20.4	20.4	0.2	0.2
Herring eggs	5	215.2	284	4.524	20.6	14.28	44.7	1126	2040	13008	38300	10.46	19.2	0.996	1.81
Herring meat	1	3640	3640	0.55	0.55	16.6	16.6	2680	2680	1090	1090	11.7	11.7	0.63	0.63
Herring roe on kelp	1	1340	1340	1.1	1.1	41.3	41.3	8560	8560	50200	50200	18.2	18.2	2.5	2.5
High Bush Cranberries	4	309	337	0.525	0.58	3.5	4.1	1827.5	2070	1.6	2	1.675	1.9	0.005	0.02
Horse Mint leaves/stems	1	13700	13700	5.8	5.8	160	160	19600	19600	7.8	7.8	14.8	14.8	ND	ND
Huckleberries	8	194.34	344	0.76	1.03	3.56	7	837.75	973	2.66	4.3	1.18	1.6	ND	ND
Huckleberry jam	1	81.1	81.1	0.28	0.28	ND	ND	515	515	60.6	60.6	2	2	ND	ND
Indian Celery	1	6420	6420	6.4	6.4	55.2	55.2	22500	22500	8.7	8.7	32.7	32.7	ND	ND
Kokanee trout meat	2	1930	2410	11.445	22.3	8.4	11.9	3665	3870	1114	1400	30.15	36.9	1.25	1.86
Laborador tea	7	4865.71	6450	3.86	5.3	137.39	369	5090	8960	40.51	103	21.27	29.8	ND	ND
Lake trout meat	3	5470	13900	0.56	0.93	13.57	22.5	2509.33	4580	912.33	1690	11.87	20.6	0.58	1
Lamb's quarters	1	3780	3780	2.63	2.63	677	677	8190	8190	2210	2210	16.1	16.1	0.82	0.82
Licorice fern	1	1210	1210	1.4	1.4	14.2	14.2	4180	4180	1960	1960	16.5	16.5	ND	ND
Ling cod meat	5	364.8	844	0.368	0.98	1.84	4.8	4196	5010	444.2	538	4.94	7.4	0.724	1.2
Lobster Mushrooms	1	94.3	94.3	6.38	6.38	44.7	44.7	8340	8340	15	15	9.1	9.1	0.02	0.02
Low bush cranberries	3	174.67	213	0.49	0.63	3.6	6.8	1203.33	1500	7.47	20.8	1.27	1.4	ND	ND
Mallard duck meat	1	82.2	82.2	4.32	4.32	55.2	55.2	3540	3540	592	592	16.3	16.3	0.72	0.72
Moose stomach	1	989	989	0.95	0.95	17.7	17.7	1610	1610	1320	1320	30.5	30.5	0.09	0.09
Moose bone marrow	2	275.85	543	0.125	0.25	7.05	14.1	82.45	160	621.85	1240	0.7	1.4	0.025	0.05

Traditional food	N	Calcium		Copper		Iron		Potassium		Sodium		Zinc		Selenium	
		Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max
Moose fat	3	1.53	2.8	ND	ND	ND	ND	21.27	31.4	46.2	97	0.13	0.2	ND	ND
Moose heart	3	58.73	73.5	4.34	5.33	62.63	78.7	3150	3230	851	1040	28.37	38.3	0.31	0.38
Moose intestine	2	16.05	19.9	0.03	0.04	ND	ND	46.6	55.9	25.35	26.5	0.65	0.7	ND	ND
Moose kidney	6	79.97	100	2.89	4.2	46.75	68.2	2203.98	2880	1266.87	1670	22.5	37.3	0.645	1.13
Moose liver	7	47.61	67.7	43.68	94.3	195.96	421	2623.86	3590	643.81	947	28.34	40.5	0.90	1.79
Moose meat	17	69.53	134	1.79	7.28	40.4	60.2	3704.53	5200	1744.51	12700	57.99	95	0.2	0.49
Moose nose	1	103	103	0.93	0.93	36.9	36.9	1900	1900	1740	1740	17.2	17.2	0.12	0.12
Moose tongue	1	76.1	76.1	1.52	1.52	30.5	30.5	2720	2720	993	993	28.1	28.1	0.15	0.15
Morel mushrooms	1	1400	1400	18.1	18.1	80	80	36400	36400	178	178	84	84	0.2	0.2
Mushrooms	3	85.23	138	5.68	8.6	51.87	70.2	13890.00	32400	61.03	75.6	16.7	27.4	1.65	4.6
Muskeg tea-leaves	2	4650	4900	4.05	4.1	102.65	116	4850	5250	28.8	41.7	25	26.8	ND	ND
Mussels	3	4376.33	12400	1.60	2.3	45.7	60.7	3267	6420	12450	28800	40.37	58.6	1.14	2.3
Northern pike	1	1520	1520	0.21	0.21	4.9	4.9	2880	2880	364	364	8.4	8.4	0.37	0.37
Octopus tentacle	1	129	129	2.56	2.56	2.7	2.7	3100	3100	7330	7330	25.4	25.4	0.54	0.54
Eulachon grease	5	34.44	71.7	0.022	0.05	1.92	5.1	18.28	32.6	13	25.9	0.88	2.4	0.028	0.05
Eulachon meat	4	4627.5	7720	1.50	2.02	36.65	41	3307.5	6130	6700	21300	22.1	33	0.405	0.63
Oregon grape	2	101.8	125	0.74	1.15	12.2	21.5	1450	1630	22.95	32.3	2.75	4.9	ND	ND
Oyster meat	1	339	339	21.2	21.2	26.6	26.6	1760	1760	1240	1240	271	271	0.62	0.62
Parsnip	1	6530	6530	2	2	36.3	36.3	11200	11200	92.7	92.7	27.2	27.2	ND	ND
Peppermint leaves	3	12336.67	15600	8.63	10.3	157.2	332	19100	23300	438.2	1150	34.23	37.6	0.07	0.1
Pike	1	16200	16200	0.32	0.32	16.2	16.2	3120	3120	1360	1360	13.1	13.1	0.64	0.64
Pine mushrooms	3	122.07	311	7.38	16.6	45	78	16010	35700	154.5	234	32.17	77.3	4.04	10.4
Pink salmon meat	5	616	977	1.094	1.5	8.98	12.1	5438	8440	7488	15700	8.94	12.5	0.556	0.8

Traditional food	N	Calcium		Copper		Iron		Potassium		Sodium		Zinc		Selenium	
		Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max
Poplar tree	1	228	228	0.75	0.75	4.1	4.1	2990	2990	16.8	16.8	5.5	5.5	ND	ND
Prawn meat	3	1230.67	2430	5.15	11	5.17	12.2	2963.33	3430	2186.67	3390	14.53	21.8	0.42	0.56
Puffball mushrooms	1	104	104	9.98	9.98	128	128	3770	3770	12.5	12.5	17.8	17.8	0.23	0.23
Rabbit meat	6	3312.43	19000	1.985	3.03	69.88	257	3483.33	4170	702.17	1080	18.62	25.5	0.19	0.6
Rainbow trout meat	5	6608	11500	0.598	1.01	15.84	30.3	4756	6690	3711	15300	18.5	25.3	0.788	1.32
Raspberries	3	478	637	1.11	1.43	10.57	11.5	1700	1790	3.33	4.2	5.37	6.7	ND	ND
Rat root	2	5190	5320	4.85	4.9	2399	4300	13650	14200	668.5	931	25.1	27.4	ND	ND
Red birch bark	1	279	279	8.1	8.1	16	16	106	106	31.2	31.2	375	375	ND	ND
Red currant	1	11200	11200	7.5	7.5	287	287	12400	12400	123	123	19.4	19.4	0.3	0.3
Red Huckleberries	2	189	256	0.605	0.62	4.6	6.8	674.5	706	9.6	12.5	0.95	1.1	ND	ND
Red snapper meat	3	1827.5	5150	0.28	0.32	2.23	4.1	4016.67	4830	745.67	1490	4.67	5.5	0.85	1.03
Rock scallop meat	1	122	122	0.18	0.18	3.3	3.3	4030	4030	1010	1010	17.4	17.4	0.27	0.27
Rockfish	1	179	179	0.19	0.19	2.6	2.6	3770	3770	516	516	4.8	4.8	0.69	0.69
Rosehips	5	2428	3370	1.472	3.1	14.98	18.2	5516.8	11400	21.78	89.9	5.04	12	0.006	0.03
Sage leaf	1	122	122	0.03	0.03	ND	ND	208	208	58.6	58.6	0.2	0.2	ND	ND
Salal berries	1	516	516	0.6	0.6	3.6	3.6	1390	1390	85.9	85.9	2.1	2.1	ND	ND
Salmon eggs	4	472	598	23.415	35.4	32.025	64.3	1719	2160	532	674	25.35	34.7	2.46	3.3
Salmon meat	4	747.1	1830	1.0825	1.36	10.125	18.7	4250	6080	2275.75	4620	9.2	16	0.37	0.45
Salmonberries	3	197.67	271	1.4	2.23	6.57	11.5	1723.33	2120	30.7	50.5	2.93	4.6	ND	ND
Saskatoon berries	9	974.89	1830	1.54	2.62	9.23	16.6	3260	5050	7.64	26.7	5.47	8.3	0.01	0.04
Sea Cucumber	1	306	306	1.47	1.47	26.1	26.1	2100	2100	1820	1820	15.6	15.6	0.44	0.44
Seaweed	5	1488.2	2000	2.366	3.44	78.92	129	25404	34700	24864	33900	13.64	20.7	0.218	0.3
Sitka Spruce leaves	1	58.5	58.5	0.17	0.17	4	4	42.6	42.6	7.2	7.2	13.5	13.5	ND	ND

Traditional food	N	Calcium		Copper		Iron		Potassium		Sodium		Zinc		Selenium	
		Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max
Soapberries	11	171.85	285	1.48	8.09	7.43	17.1	1666.45	2620	9.11	25.3	2.52	7.4	0.05	0.36
Sockeye salmon eggs	2	289.5	457	23.15	34	12.9	17.6	907.45	1760	339.5	561	28.6	38.3	2.5	4.14
Sockeye salmon head	2	9905	10100	0.455	0.49	13.2	15.3	1690	2240	1675	1980	24.35	25.8	0.28	0.28
Sockeye salmon meat	14	2057.36	9070	0.98	3.7	13.81	31.7	4509.29	7320	3122.5	6760	10.76	35.3	0.45	0.77
Spruce gum	1	716	716	0.97	0.97	71	71	237	237	11.2	11.2	8.1	8.1	ND	ND
Steelhead trout eggs	1	504	504	5.52	5.52	21.7	21.7	1570	1570	560	560	25	25	2.1	2.1
Steelhead trout meat	1	923	923	0.7	0.7	10.7	10.7	3000	3000	773	773	8.4	8.4	0.33	0.33
Stinging nettle	6	26716.67	46500	7.85	11.6	110	143	29118.33	37900	45.72	87.3	43.08	77.4	ND	ND
Strawberries	3	500.47	1140	0.59	1.16	3.2	6.9	1383	2770	7.5	15	1.33	2.5	ND	ND
Strawberry blight	1	1280	1280	1.44	1.44	90.3	90.3	6200	6200	5.8	5.8	31.9	31.9	ND	ND
Tamorak	1	2460	2460	6.2	6.2	479	479	2650	2650	17.2	17.2	24.9	24.9	ND	ND
Thimbleberries	1	1020	1020	1.33	1.33	7	7	1880	1880	6.4	6.4	4.4	4.4	ND	ND
Trailing blackberries	1	368	368	1.02	1.02	3.7	3.7	1510	1510	4.7	4.7	2.6	2.6	ND	ND
Trout meat	2	3630	4900	1.055	1.5	13.1	19	4275	4510	1120.5	1640	25.1	26.9	0.44	0.58
Whitefish meat	2	1735.5	3070	0.9	1.5	14.25	17.3	3100	3980	21835.5	43300	11.85	14.9	0.63	0.66
Wild Rhubarb-stem	1	647	647	0.35	0.35	3.9	3.9	5370	5370	6.2	6.2	1.5	1.5	ND	ND
Willow bark	1	15200	15200	2.6	2.6	29.8	29.8	5470	5470	27.5	27.5	185	185	ND	ND
Yarrow	4	5872.5	8610	10.125	15.1	115.975	182	19670	26500	73.125	223	25.8	38.9	ND	ND
Yew Bark	1	26900	26900	2.1	2.1	23.1	23.1	3480	3480	36.1	36.1	99.4	99.4	ND	ND

N = no of pooled samples collected from all of BC;
ND=not detectable; NM=not measured

Appendix G: 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 nh selected, then the non-response adjustment factor is given by:

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

In BC, there were two communities that decided not to participate, but they were replaced by similar communities. Thus, $r_h = n_h$ and $WADJ1_{hi}$=1 for all communities.

2. Bootstrap method for Standard Error

i) Draw a simple random sample of m_h=n_h-1 communities with replacement from the 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

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

If the (hi)-th community is not selected in the bootstrap sample, m^*_{hi} 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: $cv(\hat{\theta}) = \frac{se_{BOOT}(\hat{\theta})}{\hat{\theta}} \times 100\%$



Better Information for Better Health

First Nations Food, Nutrition and Environment Study (FNFNES)

Chemical Factsheets

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

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

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UNDERSTANDING CHEMICAL POLLUTANTS

What chemicals in the environment are we worried about?

We often hear that we are unknowingly being exposed to chemicals in the air we breathe, food we eat and water we drink. What are they and what do they do? The following is a list of chemicals that are commonly found in the Canadian environment. The First Nations Food, Nutrition and Environment Study (FNFNES) collected traditional food and drinking water samples from First Nations communities and measured the concentrations of these chemicals to assess the risk of exposure. The results of testing are presented in the Regional Reports. These factsheets are included to provide background information to the general reader on these chemicals. 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.

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. First Nations have long relied upon traditional foods for a healthy, balanced and nutritious diet. Traditional foods are an optimal food choice that can be found locally and acquired with traditional knowledge. Studies, such as this one, show that those who consume traditional foods have a more nutritious and healthier diet than those that don't and that traditional foods can make important contributions to the intake of several important nutrients.

Persistent Organic Pollutants (POPs)

Persistent organic pollutants are organic compounds that are resistant to environmental degradation through chemical, biological, and photolytic (broken down by sunlight) processes. 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.

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.

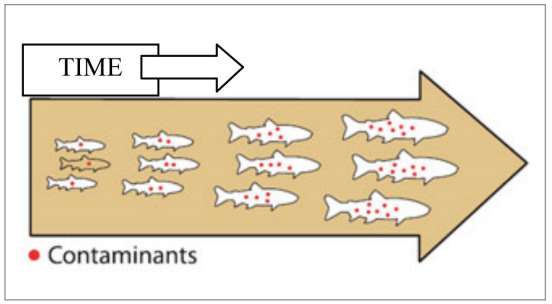


Illustration of how POPs accumulate in animals and people faster than the body can excrete the substance

Pesticides and Herbicides:

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

Where are they found? Pesticide residues are common food contaminants. Older pesticides such as organochlorines (like DDT) can be found in fatty tissues such as meat, fish and milk products while modern pesticides such as organophosphates are mainly found on the surface of fruits and vegetables. Since organophosphates are water soluble, they can be easily

washed away. Therefore, always wash fruits and vegetables thoroughly with water before eating. Due to surface runoff, pesticides and herbicides can also be found in surface water, if there has been heavy use in the area. This may be a concern as it could contaminate drinking water from surface supplies.

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

What are the guideline levels in water and food and daily intake?
The tolerable daily intake (TDI) established by Health Canada for DDT, a classic organchlorine pesticides and for chlorpyrifos, a common organophosphate pesticide, is 0.01 mg/Kg BW/day.

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

Polychlorinated byphenyls (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.[vii] Most PCBs enter the environment from landfill sites and leaks from old equipment. Food is the largest source of exposure but air, water and soil can play a part as well. [viii]

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

What are the guideline levels in water and food and daily intake?
The tolerable daily intake (TDI) established by Health Canada is 0.001 mg/Kg BW/day.[x]

Flame Retardants - Polybrominated Diphenyl Ethers (PBDEs)

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

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

What are the major health effects? Many are considered harmful, as they are linked to adverse 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.[xi]

What are the guideline levels in water and food and daily intake?
There is no guideline level for PBDE from Health Canada.

Dioxins and Furans

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

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

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

What are the guideline levels in water and food and daily intake?
Officially, the Health Canada TDI for PCDD/PCDF is 10 pg/Kg BW/day (Health Canada, 1996); however, the WHO/FAO Joint Expert Committee on Food Additives and Contaminants (JECFA) recently proposed a revised TDI of 2 pg/Kg BW/day.

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. 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.[xvii] Although, exposure to PAHs can damage lungs, liver, kidneys and skin of humans.[xviii] 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.

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.[xix]

What are the guideline levels in water and food and daily intake?
There is no guideline level for PFCs from Health Canada.

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

Cadmium

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

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

What are the major health effects? Long-term exposure to lower levels can cause kidney and lung damage, fragile bones and an increase in cancers.

What are the guideline levels in water and food and daily intake?
The drinking water guideline for Cd is 0.005 mg/L. The tolerable daily intake (TDI) established by Health Canada is 0.008 mg/Kg BW/day.

Lead:

What is it? Lead is found naturally in the environment and has many industrial uses.
Where is it found? Lead was once commonly used in gasoline, paint, pipes 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.

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 foetus 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 foetus.

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

The drinking water guideline for mercury is 0.001 mg/L. The maximum limit set by Health Canada is 0.5 ppm in edible portion of all retail fish, with six exceptions: 1 ppm total mercury for the edible portion of escolar, orange roughy, marlin, fresh and frozen tuna, shark, and swordfish. The provisional tolerable daily intake (pTDI) for methylmercury established by Health Canada is 0.47 mg/Kg BW/day for adults and 0.2 ug/Kg BW/day for women of child bearing age. [xx]

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.[xxi] 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 1.7 mg/Kg BW/day.

Appendix I: Summary of results sheets for BC

First Nations Food, Nutrition and Environment Study (FNFNES)

University of Northern British Columbia
Université de Montréal
Assembly of First Nations

Summary of Results: British Columbia

What was the study about?

A study was conducted in **21 BC First Nations** communities during the fall of 2008 and 2009 to find out:

- What kinds of traditional and market foods were people eating?
- How well were people eating?
- What level of mercury were people exposed to?
- What amount of trace metals and pharmaceuticals were in the water?
- Is traditional food safe to eat?

Who participated?

- 1103 adults from BC
- 705 women and 398 men
- average age:
  44 years old (women)
  46 years old (men)

Which communities participated?

- Kitsumkalum
- Hagwilget Village
- Moricetown
- Tahltan First Nation
- Iskut
- Tsay Keh Dene
- Tl'azt'en Nation
- Nat'oot'en Nation
- Fort Nelson
- Prophet River
- Doig River
- Saulteau
- Skidegate
- Nuxalk Nation
- Namgis
- Sliammon
- Samahquam
- Douglas
- Lil'wat
- Lower Nicola
- Splatsin

What kinds of traditional and market foods were people eating?

Top 5 traditional foods eaten in BC:	Average amount eaten per week	Top 5 market foods eaten in BC:	Average amount eaten per week
1. Moose meat	1/2 cup	1. Soup	~2 1/2 cups
2. Salmon	1/2 cup	2. Vegetables	2 cups
3. Deer meat	~3 tbsp	3. Potatoes	1 1/2 cups
4. Trout	2 tbsp	4. Fruits	1 1/2 cups
5. Elk meat	2 tbsp	5. Grains (rice, barley)	1 1/3 cups







Thank you to everyone who participated!

How well are BC First Nations eating compared to the recommendations?










Food Group	Gender	BC First Nations Current Intake	Canada's Food Guide Recommendations
		Servings/day	
Vegetables and Fruits	men:	5	7-10
	women:	4	7-8
Suggestion for change: Eat more vegetables and fruits. 1 serving= 1/2 cup of dark green or orange vegetables, or 1/2 cup of wild plants, or 1/2 cup of berries or fruits			
Grain Products	men:	4	7-8
	women:	4	6-7
Suggestion for change: Eat more whole grains. 1 serving= 1 slice of whole wheat bread or bannock, or 1/2 cup of whole wheat pasta, or 1/2 cup of wild or brown rice			
Milk and Alternatives*	men:	1	2-3
	women:	1	2-3
Suggestion for change: Eat more milk products. 1 serving= 1 cup of milk or fortified soy milk, or 3/4 cup of yogurt, or 50 grams (1 1/2 oz) of cheese *Individuals who do not eat or drink milk products should seek advice from a health care provider			
Meat and Alternatives	men:	4	3
	women:	3	2
Intake of meat and alternates met the recommendations. 1 serving =1/2 cup of traditional meats and wild game, fish or shellfish, or 2 eggs, or 3/4 cup of beans			

Food insecurity is an important problem in BC First Nations communities:



41% of BC First Nations experience food insecurity

- **40%** worried that their food would run out before they could buy more
- **36%** said that food they bought didn't last and there wasn't any money to buy more
- **12%** cut the size of their meals or skipped meals
- **7%** were hungry but did not eat because they couldn't afford enough food

91% of BC FN participants would like to eat more traditional food.



Participants said that these are the 5 main barriers that prevent them from using more traditional food:

1) Lack of equipment or transportation
2) Lack of availability
3) Lack of time
4) Difficult to access
5) Government/firearms certificate regulations



Depending on age, 53-80% of BC First Nations women and 81-87% of men are overweight or obese



Trace Metals in Drinking Water

Only 1 out of 568 water samples collected contained lead above the maximum acceptable guideline. Other trace metals found in the drinking water were within an acceptable range established in the Guidelines for Canadian Drinking Water Quality.



Pharmaceuticals in Water Sources Near the Communities

The levels of pharmaceuticals found in the water are not harmful to human health.



Mercury in Hair

Only 2 out of the 487 hair samples had levels of mercury that were above Health Canada's guideline normal acceptable range. Letters were sent to these 2 participants with suggestions on how to reduce their exposure to mercury.



Contaminants in Traditional Food

A total of 429 food samples representing 158 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.
- Intake of contaminants (except cadmium) from traditional food is below the guideline levels and is not a cause for concern.
- To decrease exposure to cadmium (which can cause kidney problems and weak bones), limit intake of the following foods:
  - moose kidney and liver: not more than 1/2 cup per month
  - seaweed: not more than 1/2 cup per day
- It is recommended to replace lead shot with steel shot. Lead contamination of traditional foods can cause toxic effects to the brain, especially in children.

Traditional food is safe to eat and healthy for you

Key Results For All BC Communities:

1. Overall, the nutritional quality of food intake is below what is required for optimal health but it is improved when traditional food is eaten.
2. Excess body weight (overweight and obesity) is a major health issue.
3. Food insecurity is an important problem.
4. Water quality is overall satisfactory but close monitoring is recommended.
5. Mercury exposure, as measured by mercury levels in hair and food intake, is not a health concern.
6. Chemical contamination of traditional food is not a health concern, but it is important to have the information that was collected in this study to monitor any future 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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