

INUIT HEALTH SURVEY 2007–2008

CONTAMINANT ASSESSMENT IN NUNAVUT



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and the

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Nunavut Steering Committee Member Organizations:

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Table of Contents

Acknowledgements	3
Table of Contents	4
Key Messages from the Contaminant Portion of Inuit Health Survey:	5
Executive Summary	6
Overview	8
What Adults Ate	12
Traditional Foods and Nutrient Intake.....	16
Selenium - As a Nutrient.....	16
Polyunsaturated Fatty Acids	18
Omega-3 Fatty Acids	19
Traditional Foods and Contaminant Exposure.....	20
Mercury	21
Cadmium	24
Lead	26
Selenium – As A Contaminant.....	28
PCBs	30
Polybrominated Diphenyl Ethers (PBDEs).....	32
Toxaphene.....	33
DDE & DDT.....	34
Chlordane	34
Trade off Between Mercury and Nutrient Intake	35
Intervention: Options for Nunavummiut	37
Glossary	39
Appendix A: Foods Included in the Food Frequency Questionnaire	41

Key Messages from the Contaminant Portion of Inuit Health Survey:

NUNAVUT

Country foods provide many essential nutrients that can lower the risk of chronic diseases.

Most Inuit adults in Nunavut need not be concerned about contaminant-related effects from country food consumption.

Generally, the benefits of eating country foods outweigh the risks from contaminant exposure.

Inuit women of child-bearing age who may become pregnant, are planning to get pregnant, or are pregnant should avoid eating ringed seal liver due to its high mercury content. Instead, ringed seal meat is a great and healthy alternative.

Smoking is a major problem for many reasons. One such reason is that smoking exposes Inuit to high levels of cadmium.

Eating more nutritious store bought food and more country food is critical to protecting the health of Inuit in Nunavut.



Caribou ribs drying

Executive Summary

This report provides a summary of the results from the contaminant component of the Inuit Health Survey: Health in Transition and Resiliency conducted in Nunavut in 2007 and 2008.

BACKGROUND

Inuit in Nunavut have expressed a desire to have health information that is of practical relevance so that informed decisions can be made in the face of the rapid changes that are affecting all dimensions of life in Arctic communities. In response to these concerns, a large and complex participatory health research project for those 18 years of age and above was developed and undertaken in 25 communities in Nunavut in 2007 and 2008. In addition, the Nunavut Child Inuit Health Survey was conducted to assess the nutritional health, healthy growth and bone development, mercury exposure, vision, and medical history of children aged 3 to 5. The goal of the adult survey was to obtain an overview of the health status and living conditions of Inuit aged 18 and over in Nunavut. To achieve this goal a household survey was conducted to assess overcrowding, disabilities, and food security and a health survey was conducted to assess chronic disease risk, nutrition, physical activity, and mental health. To supplement this work, a **contaminant** survey was included to assess environmental exposure of Inuit to chemical contaminants. The key research question for the contaminant portion of the Inuit Health Survey was “How do diets and contaminants affect the health of Inuit in Nunavut?” This report focuses solely on the contaminant portion of the adult survey and does not contain any results from the Nunavut Child Inuit Health Survey.

FUNDING

Funding for this project was received from the Northern Contaminants Program (which is jointly funded by Health Canada and Aboriginal Affairs and Northern Development Canada), Government of Canada’s Program for International Polar Year, Canadian Institutes for Health Research, University of Toronto, and ArcticNet.

ETHICS APPROVAL

All work was approved by the Institutional Review Boards of University of Northern British Columbia and McGill University. The work was also approved by hamlets through community-university agreements. A research license was issued by the Nunavut Research Institute.

HEALTH BENEFITS AND RISKS

- » Country foods provide many essential nutrients like **selenium** and **omega-3 fatty acids** that can lower the risk of **chronic diseases**.
- » In light of the findings on this study, most Inuit adults in Nunavut should have minimal concern of contaminant-related effects from country food consumption.
- » Generally, the benefits and nutritional value of eating country foods outweigh the risks from contaminant exposure.
- » In light of the high percentage of Inuit women of child-bearing age with blood mercury levels over the Health Canada guideline, women between 18 and 45 (who may become pregnant, are planning to get pregnant, or are pregnant) are advised:
 - » To avoid eating ringed seal liver and instead eat ringed seal meat.

- » The concentrations of cadmium in the blood of Inuit in Nunavut are critically high. The best way to decrease one's exposure to **cadmium** is to quit smoking.

COUNTRY FOOD CONSUMPTION

- » Caribou and arctic char meat are frequently consumed, in large quantities, by a large percentage of Inuit in Nunavut.
- » Generally, the health of Inuit could be improved by increased access to and consumption of country foods.

Age and Sex Differences

- » Participants over 40 years of age ate more country food than participants under 40.
- » Men ate larger portions of country food more often than women.

BLOOD SAMPLING RESULTS

- » A total of 1372 households and 1923 individuals participated in the survey in Nunavut.
- » Blood concentrations of contaminants for Inuit in Nunavut were consistently higher than the average levels for the Canadian general public. However, average concentrations for Inuit in Nunavut were generally below **guideline** levels set by Health Canada, the World Health Organization, Centers for Disease Control, and the Occupational Safety and Health Administration. This means that most Inuit in Nunavut were at very low risk from contaminants.
- » A moderate percentage of participants from Nunavut had blood contaminant concentrations above guideline levels. This percentage, which varied between 5% (selenium) and 73% (cadmium), was different for each contaminant.
- » Cadmium – which largely comes from smoking – was the only contaminant for which average blood concentrations were above the guideline level. This means that cadmium levels in the blood of Inuit in Nunavut must be lowered to protect human health.

Age & Sex Differences

- » On average, Inuit participants over 61 years of age had higher blood concentrations of **mercury, lead, PCBs, DDT & DDE, toxaphene, and chlordane** than participants between 41 and 60 years of age. Participants between 18 and 40 tended to have the lowest blood concentrations of each of these contaminants.
- » Men tended to have higher blood concentrations of mercury, lead, PCBs, DDT & DDE, toxaphene, and chlordane than women.
- » Inuit participants between 18 and 40 years of age had higher cadmium blood concentrations than participants over 41 years of age.
- » The concentration of **PBDEs** in the blood of Inuit adults in Nunavut was not affected by age.

MAJOR SOURCES OF CONTAMINANT INTAKE

Mercury

- » The primary dietary source of mercury for Inuit adults in Nunavut was ringed seal liver.
- » On average, ringed seal liver contributed 49% of mercury intake for Inuit women of child-bearing age in Nunavut.

Cadmium

- » The primary source of cadmium for Inuit in Nunavut was smoking.

PCB and Other Organochlorines

- » The primary sources of PCBs and **organochlorines** were beluga and narwhal blubber. However, current levels of PCBs in the blood of Inuit in Nunavut are generally not high enough to cause health problems.

MAJOR SOURCES OF NUTRIENT INTAKE

Selenium

- » For Inuit in Nunavut, the primary dietary sources of selenium (an essential **micronutrient**) were caribou meat, beluga muktaaq, and arctic char.

Polyunsaturated Fatty Acids (PUFA)

- » Arctic char meat contributed, on average, 27% of the **PUFA** that Inuit in Nunavut consume from country foods.

Omega-3 Fatty Acids

- » Arctic char meat was the primary source of **omega-3 fatty acids** for Inuit in Nunavut.



Roasted duck, fish, and dried whale meat

Overview

Human health can be profoundly affected by the health of the environment as a whole. This principle is especially true for Inuit in Nunavut who live close to the land and heavily rely upon locally harvested and hunted foods. For this reason, environmental degradation, habitat loss, and the contamination of the land, water, and air has the potential to dramatically harm the health and food security of Inuit in Nunavut.

For many years now, researchers with the Northern Contaminants Program (NCP) and Arctic Monitoring and Assessment Program (AMAP) have monitored the role that human activities have played in changes seen in water quality and the levels of **contaminants** in air, water, sediments, and **biota**. From these studies, it is now known that:

- » Concentrations of many **Persistent Organic Pollutants (POPs)** are declining in the Arctic due to successful international efforts to ban the use of these chemicals in the developed world.
- » No such consistent declines have been observed for **mercury** in the Arctic. In some cases, mercury concentrations in Arctic fish and wildlife have continued to increase over the historical baseline.
- » Climate change may accelerate the conversion of mercury into its more hazardous form (**methylmercury**) in Arctic ecosystems.
- » **Acidification** of Arctic lakes due to global sulfur emissions could increase the concentrations of some heavy metals in lake water while also favoring the conversion of mercury into methylmercury.

Prior to the Inuit Health Survey, there was relatively little information regarding the way these changes in the Arctic environment interact with lifestyle and nutritional factors to affect the health of Inuit in the Inuvialuit Settlement Region, Nunavut, and Nunatsiavut. Therefore, researchers at McGill University, the University of Toronto, and the University of Northern British Columbia combined efforts to address these concerns using a participatory research project designed to mirror a similar study conducted in the northern Québec region of Nunavik in 2004:

- » The Inuit Health Survey in Nunavut was conducted in 2007 and 2008.
- » The goals of the survey were to: obtain an overview of the health status and living conditions of Inuit in Nunavut, evaluate the levels of contaminants in country foods and in the blood of Inuit in Nunavut, and assess the benefits and risks of eating country foods.
- » A total of 1374 households and 1923 individuals 18 years of age or older participated.
- » Average age of participants in the survey was 41 years. More women than men and more individuals over 40 years of age took part in the survey.

Participation by Inuit in Nunavut

	Age		Sex	
	<40 yr	≥40 yr	Men	Women
Number of participants	963	955	772	1151

25 communities representing Nunavut's three regions participated:

Qikiqtaaluk (2007)

- Sanikiluaq
- Hall Beach
- Igloolik
- Cape Dorset
- Kimmirut
- Iqaluit
- Pangnirtung
- Qikiqtarjuaq
- Clyde River
- Grise Fiord
- Arctic Bay
- Pond Inlet
- Resolute Bay (2008)

Kivalliq (2007)

- Arviat
- Whale Cove
- Rankin Inlet
- Chesterfield Inlet
- Coral Harbour
- Repulse Bay
- Baker Lake (2008)

Kitikmeot (2008)

- Kugluktuk
- Cambridge Bay
- Gjoa Haven
- Taloyoak
- Kugaaruk



Recruiting participants



Transporting participants to and from the ship

Who Participated and What Did It Involve?

Households in each community were randomly selected to participate. From these households, women and men over 18 years of age who wished to participate could do so. From August to September 2007, the Inuit Health Survey traveled to 18 coastal communities in the Qikiqtaaluk and Kivalliq regions of Nunavut. The survey was well received by the communities and the participation reached the target of 12% of populations in the communities. There were 1203 participants in the 2007 survey, 1069 samples for **organochlorine** analysis and 1178 samples for metals in blood analysis were collected. Detailed health, diet, and lifestyle questionnaires were also completed by participants. In August and September 2008 the survey visited six coastal communities in the Kitikmeot Region of Nunavut, and completed a land-based survey in Baker Lake. In the Kitikmeot Region of Nunavut, there were 611 participants with 481 samples collected for OCs, and 488 collected for metals. In Baker Lake 107 samples were collected for OCs, and 107 for metals.

People who chose to participate completed the initial parts of the survey on land in their community. For participants in coastal communities, the second part of the survey required participants to come aboard the Canadian Coast Guard Ship Amundsen for a questionnaire and a medical exam. Health care professionals tested participants' heart health, diabetes risk, height, weight, and body composition, infections, bone health, and nutrient status. The questionnaire included two types of dietary surveys: a Food Frequency Questionnaire and a 24-hr Recall. The Food Frequency Questionnaire asked participants to describe in detail the types of foods they consumed over the past year so that the survey could account for seasonal differences in country food availability. The 24-hr recall asked participants to

describe in great detail the types and amounts of foods they consumed during the 1-day period prior to questionnaire. The entire process, including blood collection, took about 4 hours to complete for each participant. Additional information is available at www.inuithealthsurvey.ca

What Do These Results Mean?

The blood concentrations in this report describe how much of a contaminant are in an individual's blood. We express the units in **parts-per-billion (ppb)**. One ppb is equivalent to one grain of rice in a standard 20' sea-can.

The presence of a chemical in a person's body does not necessarily mean that a person will experience any health problems from that chemical. As per the community research agreements, if any participant had blood **contaminant concentrations above the guideline**, they would be contacted by the Government of Nunavut Chief Medical Officer of Health (CMOH) to re-test the person's blood and, if necessary, take follow-up action.

What do Guidelines Tell Us? Guidelines help scientists and health professionals determine whether or not a contaminant is likely to affect peoples' health. For numerous contaminants, there is not yet enough information to set a guideline.

Several organizations publish guidelines for contaminants; however, no single organization has created guidelines for every contaminant studied in the Inuit Health Survey. Therefore, this report utilizes Health Canada guidelines whenever possible; but, if no Health Canada guideline was available, the report uses guidelines from the Centers for Disease Control, World Health Organization, and/or the Occupational Safety and Health Administration. It should be pointed out that there are different types of guidelines:

Population guidelines: These guidelines are set so that public health professionals can identify potential health problems caused by contaminant exposure. If more than 20% of a population has blood levels that exceed the guideline, public health professionals assess the need to follow up to identify the source of exposure and develop interventions to lower the overall intake within the applicable population. It is important to note that just because an individual has a blood concentration above this guideline, it does not mean that the health of that individual has been or will be affected.

Individual guidelines: These guidelines are usually developed from workplace settings and are used to screen individuals for elevated contaminant exposure that can result in adverse effects to their health. Individuals whose blood level exceeds this guideline should be followed up with by a medical professional to identify ways to lower their intake level.

All data presented are based on the actual number of participants in Nunavut (n = number of participants). Please note that the data presented is not specific to any single community, but report findings across Nunavut as a whole. The reporting structure is being carried out as outlined in the community research agreements for Inuit Health Survey related projects.

Nunavut Food Guide

Choose country foods and healthy store-bought foods for a strong body



Unhealthy

If you don't buy these, you will have more money for healthy food.



Choose fats wisely

Fats from fish and sea animals are very good for you.



Choose healthy store-bought fats.

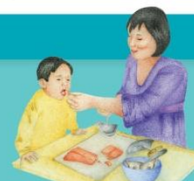


Eat less of these:



Variety is important

Traditional values teach us to eat a variety of country foods. A traditional way of eating is balanced.



When you eat store-bought foods... A balanced meal has 3 to 4 food groups. Healthy snacks have 1 to 2 food groups.



For more information on health and nutrition visit
www.hss.gov.nu.ca



For more information on healthy eating please consult the Nunavut Food Guide

What Adults Ate: Country Food

- » What we eat affects our risk for **chronic diseases** such as heart disease, diabetes (high blood sugar) and osteoporosis (weak bones).
- » Country food is a very good source of many nutrients essential for good health. However, these same foods may also contain **contaminants**.

RESULTS FROM THE FOOD FREQUENCY QUESTIONNAIRE

In the 12 months prior to the survey:

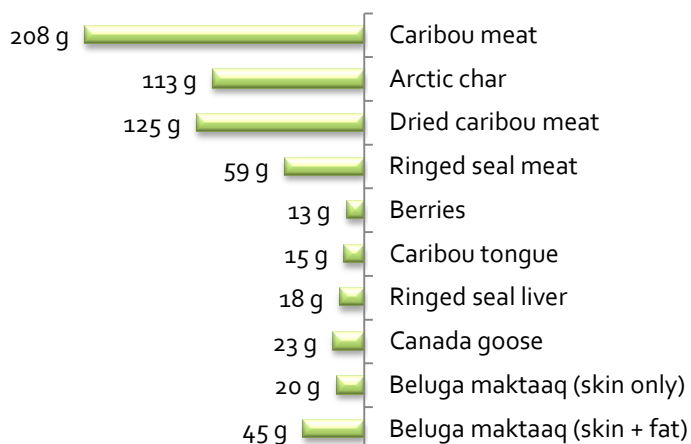
- » Men ate larger portions of country food more frequently than women.
- » Fresh caribou meat and arctic char meat were eaten very often and in large quantities.
- » Participants over 40 years of age ate more country food those under 40.

The most commonly consumed country foods in Nunavut:

This column shows on average how much of each food was eaten by those who consumed each food.



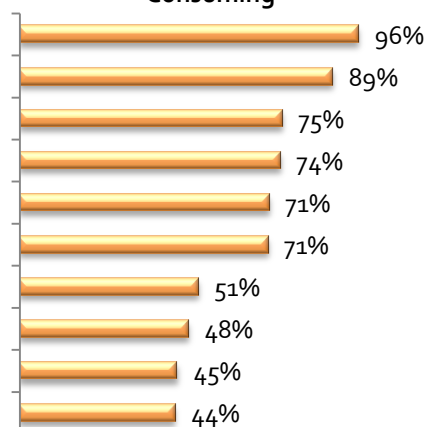
Average Grams per Day



This column shows the percent of Inuit in Nunavut who reported eating each country food.



Percent of Participants Consuming



Country foods are an important source of nutrients for Inuit in Nunavut.

- » The most commonly consumed country foods differ between communities due to differences in local scarcity and abundance. The ten foods listed above are overall averages for Inuit in Nunavut and therefore do not reflect any single community.
- » Since 2007 and 2008, declines in the availability of some country foods and the increase in access to others mean that food consumption data obtained in the survey may no longer represent current usage.

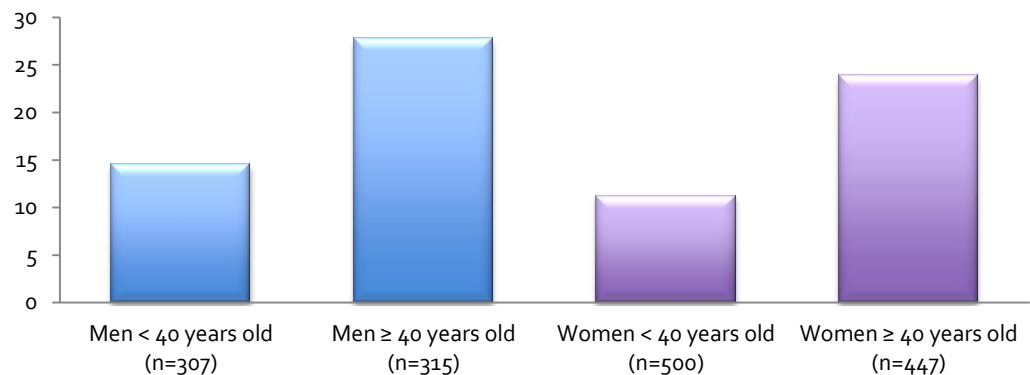
RESULTS FROM THE 24-HR RECALL

On the day before the survey:

- » The average proportion of total **Calories** that came from country food was higher among older participants than younger participants.

Adults under 40 years of age eat far less country food than those over 40 years of age.

% Calories from country food on the day before the interview



What does this mean for Inuit in Nunavut?

- » Country foods are an integral part of the diet for Inuit in Nunavut.
- » In light of the findings of this survey, strategies and programs that increase the access of country foods for Inuit (especially those between 18 and 40 years of age) are of great importance.



Arctic char hanging to dry



Country Foods and Nutrient Intake

SELENIUM - AS A NUTRIENT

See Page 28 for "Selenium - As A Contaminant"

SYNOPSIS

Selenium may protect against the harmful effects of mercury.

What is it? It is important to note that **selenium**, a naturally occurring trace element, is *both* an essential nutrient and a possible **contaminant** of concern. Everyone needs some selenium to be healthy; however, too much selenium can harm.

Which foods have it? Fish, meats, and some types of nuts are important sources of dietary selenium for Canadians that live in the south. Great country food sources of selenium for Inuit in Nunavut include caribou meat, ringed seal meat and ringed seal liver.

Why do I need it? Once eaten, selenium is built into important enzymes in the body that protect people from cellular damage brought about by **free radicals**. These harmful free radicals can be produced by some types of contaminants, including **mercury**. Therefore, having a good supply of selenium in your diet may offer some protection against some types of contaminants.

How much is enough? Adults should consume at least 0.38 mg of selenium per week. Adverse effects are possible if intake exceeds 2.80 mg per week.



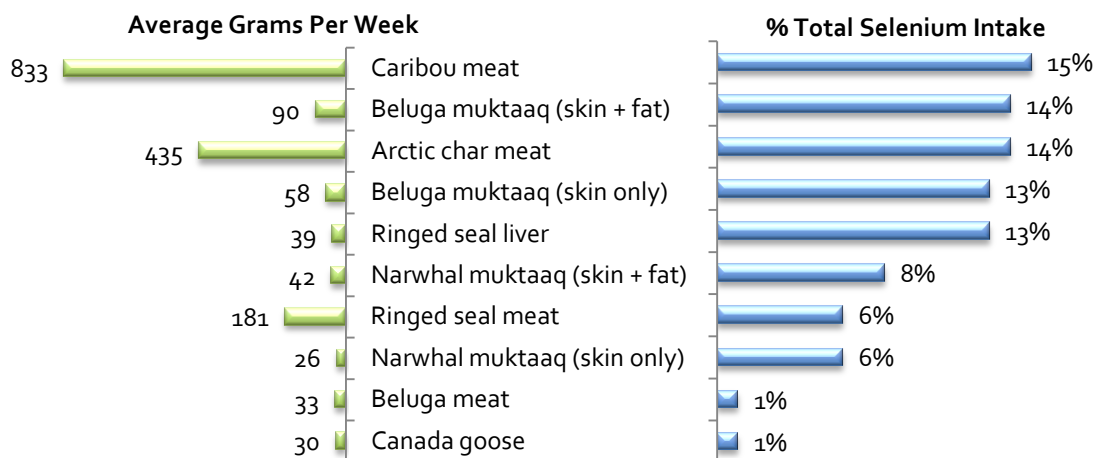
Arctic char and caribou skins drying

MAJOR SOURCES OF SELENIUM INTAKE

This column shows on average, how much of each country food was eaten by each participant.



This column shows on average, how much each country food contributed to selenium intake.



Caribou meat, beluga muktaaq, and Arctic char are the main sources of selenium for Inuit in Nunavut.

This figure shows that:

- » These top ten country food sources combine to provide, on average, 91% of the weekly intake of selenium by Inuit in Nunavut.
- » Eating a small amount (eg. 39 g) of ringed seal liver provides a relatively large percentage of selenium intake (13%).
- » On average, caribou meat, beluga muktaaq, and arctic char contribute more selenium than other country foods.

What does this mean for Inuit in Nunavut?

- » All Nunavut participants of the Inuit Health Survey had adequate levels of selenium in their diet.
- » Most Inuit in Nunavut (approximately 60%) get all the selenium they need from country foods alone.
- » Eating a palm sized portion of ringed seal meat (100 g) and a palm sized portion of arctic char meat (100 g) provides all the selenium per day that the body needs to be healthy.
- » It is important to eat a variety of country food so that our bodies can get all of the different nutrients that they need.

POLYUNSATURATED FATTY ACIDS

SYNOPSIS

What are they? *Polyunsaturated fatty acids (PUFA)* are a type of fat that people must consume for good health.

Which foods have them? Nuts and seeds (such as walnuts, sunflower seeds, and peanuts), peanut butter, vegetable oil, canola oil, tuna, and salmon are all important dietary sources of PUFA for Canadians that live in the south. Great country food sources of PUFA for Inuit in Nunavut include arctic char meat and ringed seal blubber.

Why do I need them? People that do not consume sufficient levels of PUFA are at risk of developing adverse symptoms (reduced growth, skin rashes, and **neurological** problems). High intakes of PUFA are associated with a lower risk of coronary heart disease.

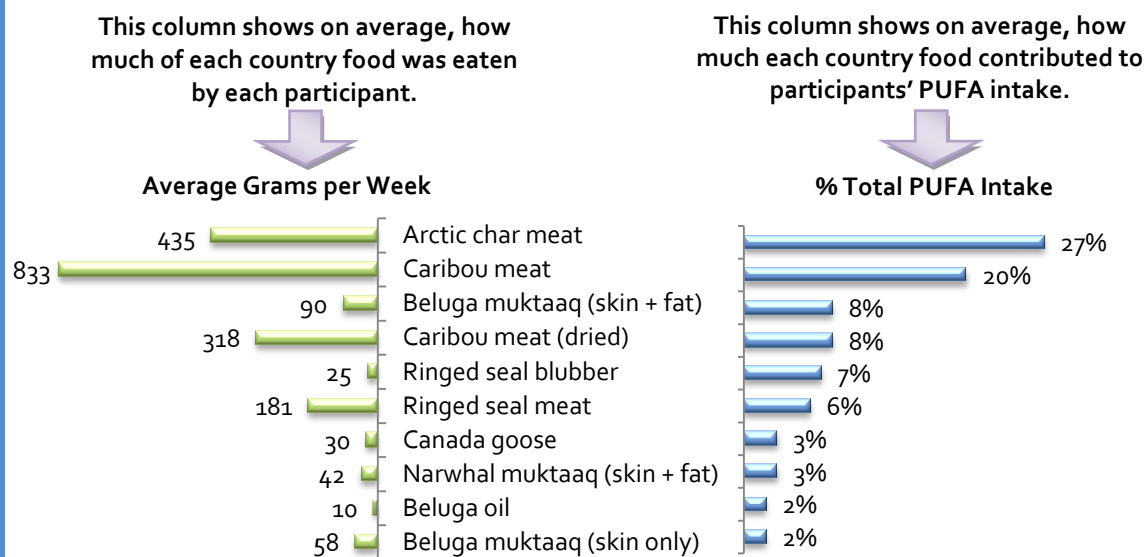
How much is enough? Adults that consume 98 grams per week of PUFA are at very low risk of deficiency.

PUFAs are good for your heart.

Arctic char and caribou meat are the main country food sources of PUFA for Inuit in Nunavut.

Eating a small amount of ringed seal blubber provides a large amount of the PUFA people need to be healthy.

MAJOR SOURCES OF PUFA INTAKE



This figure shows that:

- » Arctic char and caribou meat are the main dietary sources of PUFA for Inuit in Nunavut.
- » A small amount of ringed seal blubber provides a proportionally large amount of PUFA.

What does this mean for Nunavut?

- » Country foods alone provide adequate PUFA intake for 5% of Inuit in Nunavut.
- » Eating 2 tbsp of ringed seal blubber (30 g) and a palm sized portion of arctic char (100 g) provide 50% of the PUFA per day necessary for a healthy diet.
- » It is important to eat a variety of country food so that our bodies can get all of the different nutrients that it needs.
- » It is important to choose healthy oils buying store-bought fats. In particular, canola oil, olive oil, and non-hydrogenated margarine are great choices.

OMEGA-3 FATTY ACIDS

SYNOPSIS

What are they? *Omega-3 fatty acids* are a subgroup of *PUFAs* that are especially important to maintaining good health. Two of the best omega-3 fatty acids (called *EPA* and *DHA*) are found at high levels in numerous country foods.

Which foods have them? EPA and DHA are found in some types of fish (arctic char, herring, salmon) with salmon being one of the major sources for Canadians that live in the south. Foods from marine mammals (such as seal oil, beluga blubber, ringed seal blubber) are exceptional sources of EPA and DHA for Inuit in Nunavut.

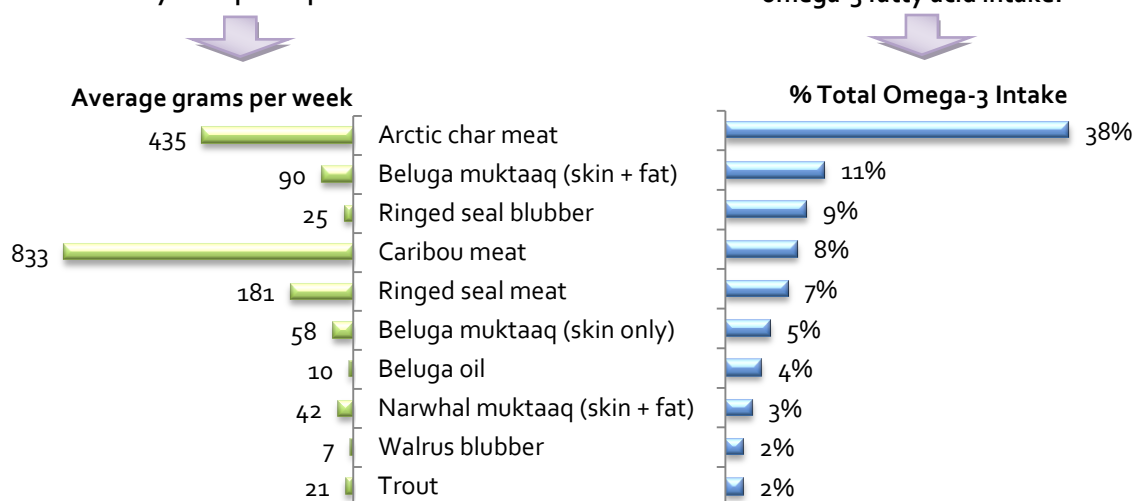
Why do I need them? EPA and DHA are essential nutrients that promote mental development, learning ability, and good vision. Additionally, EPA and DHA help protect against cardiovascular disease and may alleviate symptoms of *chronic inflammatory disorders*.

How much is enough? Adults that consume 375 mg per week of EPA and 375 mg per week of DHA are at low risk of obvious deficiency. However, adults should consume at least 1400 mg per week of both EPA and DHA to maximize their beneficial health effects.

MAJOR SOURCES OF OMEGA-3 INTAKE

This column shows on average, how much of each country food was eaten by each participant.

This column shows on average, how much each country food contributed to omega-3 fatty acid intake.



This figure shows:

- » The results for the omega-3 fatty acid DHA. Similar results were observed for EPA.
- » That arctic char meat is the main source of omega-3 fatty acids for Inuit in Nunavut
- » A small amount of ringed seal blubber provides a large amount of omega-3's.

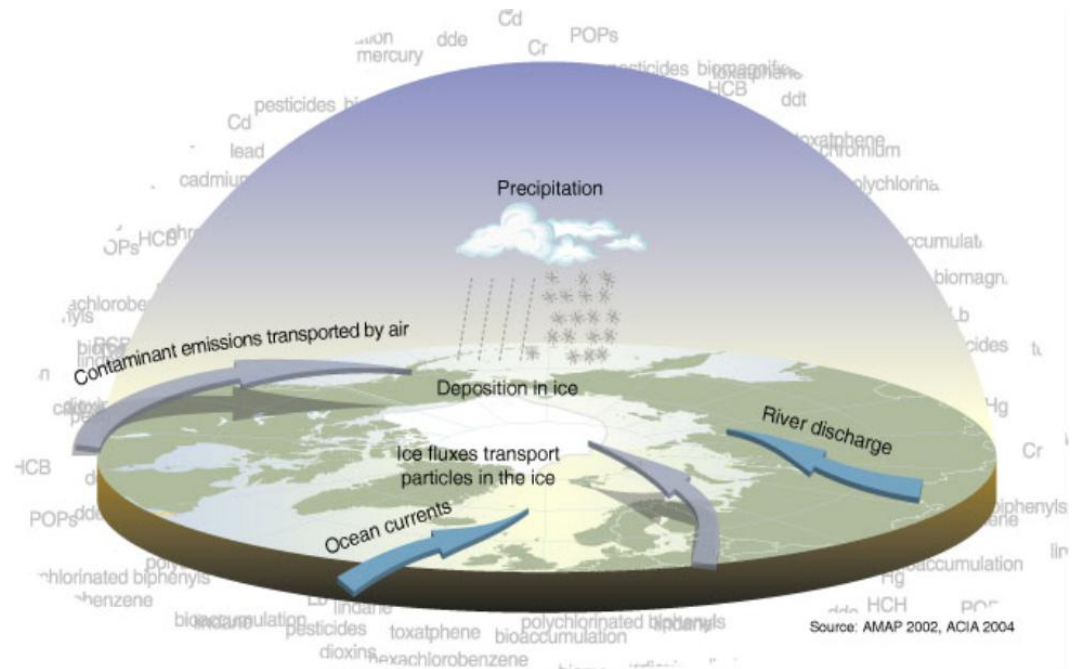
What does this mean for Inuit in Nunavut?

- » Country foods provided 85% of participants with sufficient omega-3's to prevent deficiency.
- » Country foods provided 65% of participants with enough omega-3's to maximize their beneficial health effects.
- » Inuit in Nunavut have a much healthier level of omega-3 fatty acid intake than Canadians living in the south.

Country foods are very rich sources of the omega-3 fatty acids that are good for your eyes and your heart.

Arctic char is the largest single country food source of omega-3 fatty acids for Inuit in Nunavut.

Eating just a little bit of ringed seal blubber provides Inuit in Nunavut with lots of omega-3 fatty acids!



Courtesy of Arctic Monitoring and Assessment Programme (AMAP)

Long Range Transport: This diagram depicts how contaminants from human activity in predominantly southern latitudes are transported to the Arctic. Contaminants are transported by wind, rivers, and ocean currents in a process referred to as Long Range Transport

Country Foods and Contaminant Exposure

MERCURY

SYNOPSIS

What is it? *Mercury* is a naturally occurring metal that can exist as several different forms in the environment. Mercury is moderately **persistent** in the body; it takes approximately 2 months for 50% of a mercury dose to be eliminated from the body.

Where is it found? A particularly hazardous form of mercury called **methylmercury** is often found in large predatory fish and marine mammals, which are the major exposure sources for Inuit in Nunavut. Other smaller sources include dental fillings and fluorescent lights. Mercury is released into the environment through natural processes (eg. volcanoes) and human activities (river damming, waste incineration, fossil fuel burning, and mining).

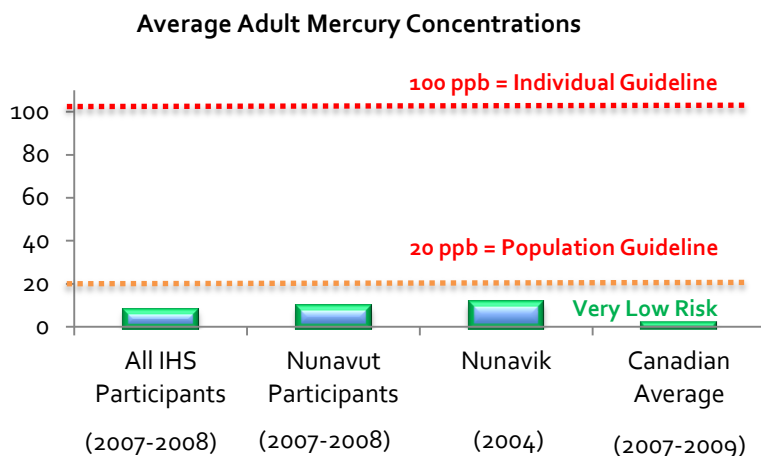
What are the major health effects? Long-term exposure to mercury can affect brain functions, weaken the immune system, and cause **neurological** damage. High-level exposure can permanently damage the brain, kidneys, and developing fetus and produce tremors, changes in vision or hearing and memory problems.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

How much is too much? Populations that have more than 20 **ppb** (Health Canada) of total mercury in their blood may be at risk. Since the fetus and nursing infants are more sensitive, the population guideline is set at 8 ppb for women of child-bearing age (Health Canada). Individuals with more than 100 ppb in their blood may require immediate follow-up.

High levels of mercury are harmful to the brain and developing fetus.

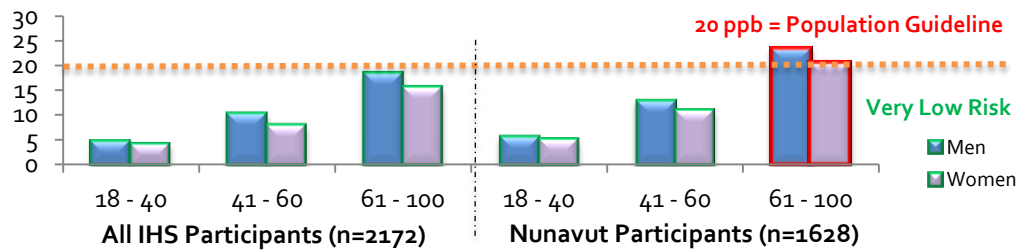
MERCURY BLOOD CONCENTRATIONS OF INUIT IN NUNAVUT

- » Inuit in Nunavut have higher mercury levels in their blood than the general population in Canada.
- » Average mercury blood levels for Inuit in Nunavut are well below the population guideline value of 20 ppb and the individual guideline of 100 ppb.



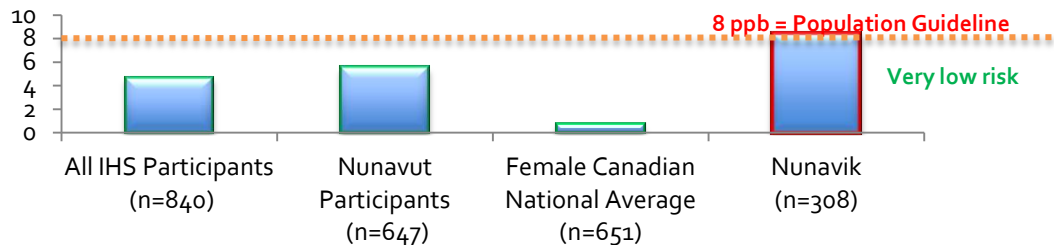
Inuit in Nunavut are exposed to more mercury than non-Inuit in Canada; but, the average levels for Inuit in Nunavut are below guideline values.

Mercury Blood Concentrations By Age and Gender:



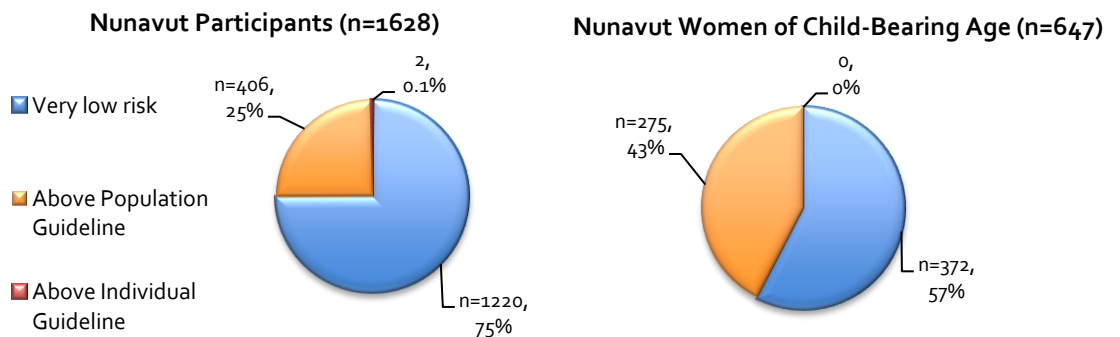
- » Men had higher mercury concentrations in their blood than women.
- » Participants over 61 years of age had higher blood mercury levels than participants between 18 and 60 years of age.
- » Average blood mercury concentrations of Inuit men and women in Nunavut aged 61 and above exceed the guideline of 20 ppb.

Mercury Blood Concentrations of Women of Child-Bearing Age:



- » The guideline for women of child-bearing age is 8 ppb (instead of 20 ppb) since the fetus and nursing infants are especially sensitive:
- » The average mercury blood concentration of 18 – 45 year old Nunavut women is 7.9-times that of the female Canadian average. However, this average blood concentration for Nunavut participants is below the 8 ppb guideline.

Proportion of Population Above Blood Mercury Guidelines:



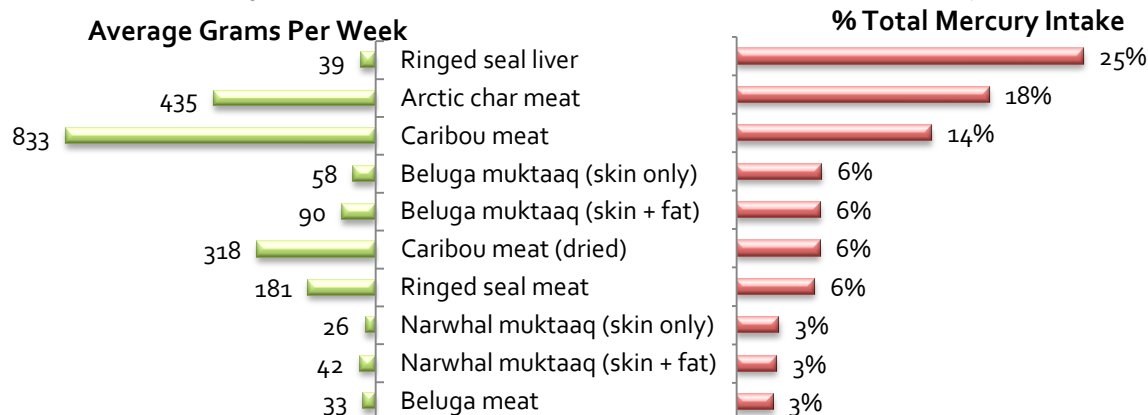
- » Only 0.1% of Nunavut participants had mercury levels above 100 ppb (individual guideline) but 25% had mercury levels above 20 ppb (population guideline).
- » 43% of Inuit women of child-bearing age in Nunavut had mercury blood concentrations above the population guideline of 8 ppb.

MAJOR COUNTRY FOOD SOURCES OF MERCURY INTAKE

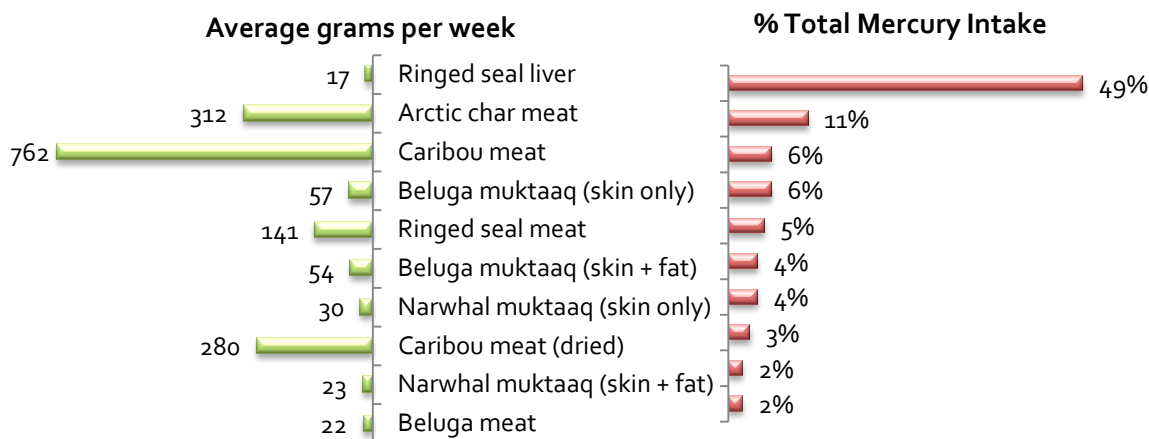
This column shows on average, how much of each country food was eaten by each participant.

This column shows on average, how much each country food contributed to mercury intake.

All 1564 Nunavut Participants



Inuit Women of Child-Bearing Age in Nunavut who Ate Country Foods (n=637)



These figures show:

- » Concentrations of mercury are always low in these terrestrial mammals relative to marine mammals. This makes the meat of large game a great and healthy food choice.
- » Ringed seal liver provides 25% of the total mercury intake for Inuit in Nunavut. This percentage goes up to 49% for Inuit women of child-bearing age in Nunavut.

What does this mean for Inuit in Nunavut?

- » Considering that 43% of Inuit women of child-bearing age have blood mercury levels above the screening level Health Canada guideline:
 - » Inuit women of child-bearing age in Nunavut who may become pregnant, are planning to get pregnant, or are pregnant are advised to eat ringed seal meat instead of ringed seal liver.

Ringed seal liver is the main source of mercury for Inuit in Nunavut.

Inuit women of child-bearing age in Nunavut who may become pregnant, plan to get pregnant, or are pregnant should eat ringed seal meat instead of ringed seal liver

CADMIUM

SYNOPSIS

What is it? Cadmium is a naturally occurring metal that is found in soils and rocks. It is corrosion resistant and is used in many applications such as batteries, some plastics, and metal coatings. Cadmium is very persistent in the body; it takes approximately 26 years for 50% of a dose of cadmium to be eliminated from the body following exposure.

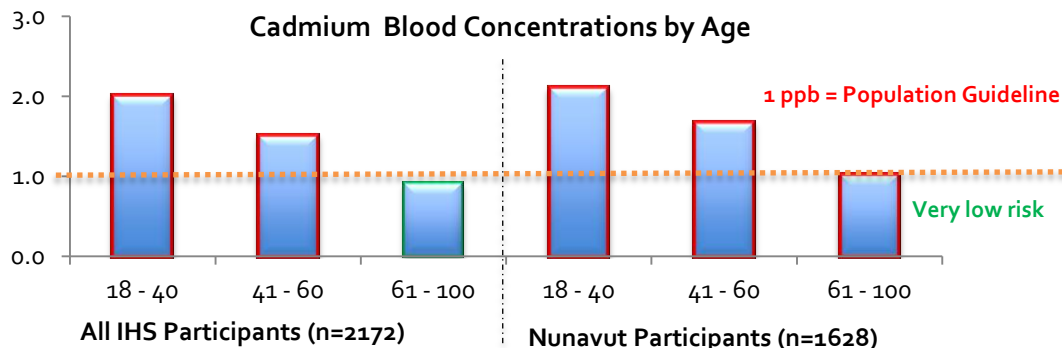
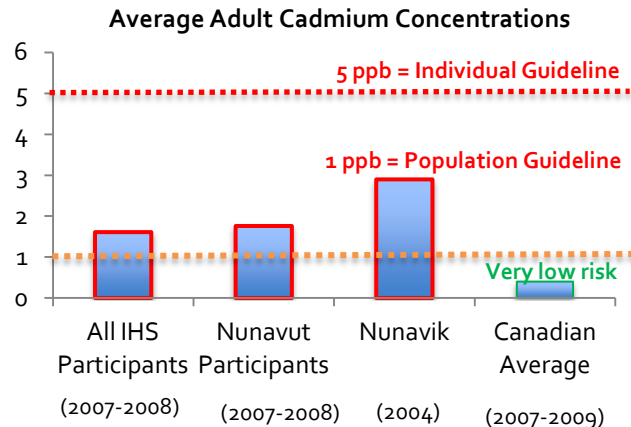
Where is it found? Cigarette smoke is a major source of exposure and can effectively double the average daily intake. Some country foods (e.g. caribou kidney, caribou liver) also contain cadmium; however, considering the high smoking rates in Nunavut, these sources are relatively minor.

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

How much is too much? Health Canada has not published blood concentration guidelines for cadmium; however, screening guidelines from two United States federal agencies are included here for reference points. Populations with blood concentrations more than 1 ppb (Centers for Disease Control) may face risk while individuals with blood concentrations more than 5 ppb (Occupational Safety and Health Administration) may require follow-up.

CADMIUM BLOOD CONCENTRATIONS OF INUIT IN NUNAVUT

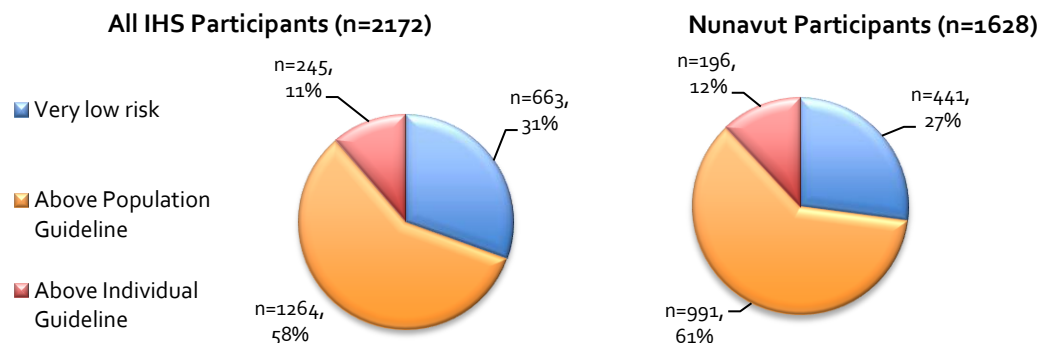
- » Inuit in Nunavut tended to have slightly higher blood cadmium concentrations than the average of all IHS participants.
- » Average cadmium blood concentrations for Inuit adults in Nunavut were higher than the population guideline value of 1 ppb.
- » Men and women of the same age had similar cadmium blood concentrations.
- » Participants between 18 and 40 years of age had higher blood cadmium concentrations than those between 41 and 60 those above 61 years of age



Smoking increases the amount of cadmium in your blood.

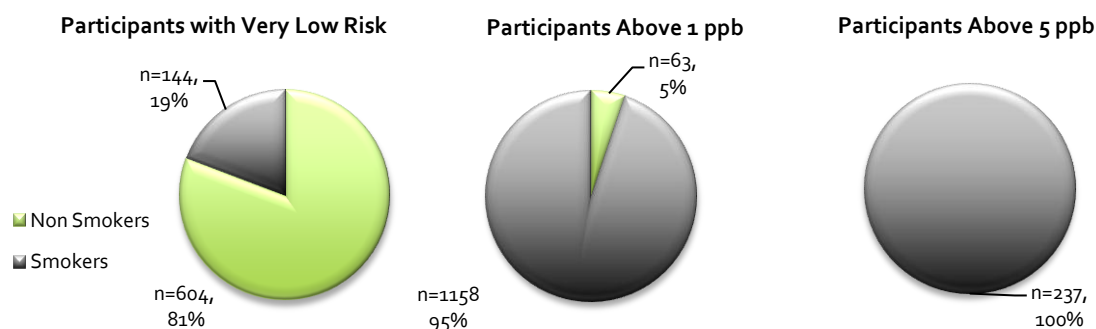
Nunavut participants between 18 and 40 years of age had the highest blood cadmium concentrations relative to the other age groups.

- » 73% of Inuit in Nunavut had cadmium blood concentrations above the population guideline of 1 ppb with 12% of Nunavut participants above the 5 ppb individual guideline:



Levels of cadmium in the blood of Inuit in Nunavut are critically high and must be lowered to protect people's health.

- » Smoking is the single largest cause for elevated cadmium blood concentrations for Inuit:



- » Results from the Inuit Health Survey show that, in 2007-2008, 73% of the study's participants from Nunavut were smokers and only 5% had never smoked.
- » Smoking cessation programs will be critical to decrease the cadmium exposure of Inuit in Nunavut.

What does this mean for Inuit in Nunavut?

- » Current cadmium levels put many Inuit in Nunavut at risk of developing bone and kidney problems.
- » Quitting smoking is the best way for Inuit in Nunavut to decrease cadmium exposure and improve health.

The best way for a person to lower the amount of cadmium in their blood is to quit smoking.

Using lead shot when hunting can expose you and your family to this harmful metal.

For most Inuit in Nunavut, blood lead concentrations are below those likely to cause health problems.

LEAD

SYNOPSIS

What is it? *Lead* is found naturally in the environment and is used in the production of numerous items including batteries, ammunition, pipes and solder. Lead is moderately persistent in the blood (it takes approximately 1 month for 50% of a dose to be eliminated from the blood) but it takes 27 years to eliminate 50% of a dose from bone.

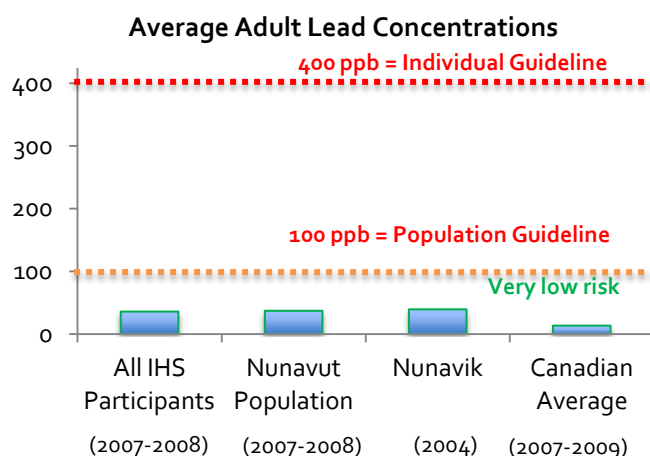
Where is it found? Lead was once commonly used in gasoline, paint, pipes and lead shot, although those uses are now restricted. It can still be found in some types of batteries, toys, solder, and PVC plastic. Lead can find its way into the drinking water of homes with old pipes and into the meat of birds killed with lead shot. Lead shot fragments may be too small to be detected by the person eating the bird.

What are the major health effects? Lead contributes to nervous system, kidney, and reproductive system problems. Long term exposure can also cause *anemia*. Recent studies in children suggest that amounts of very low levels of lead can contribute to impaired intelligence.

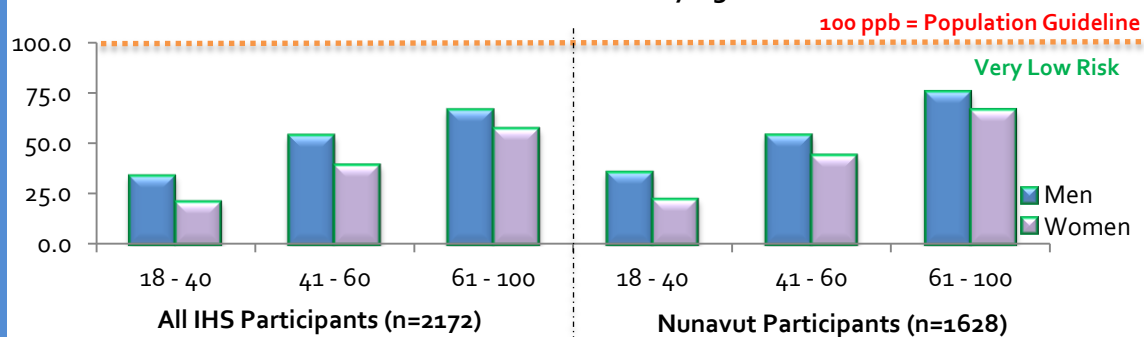
How much is too much? Populations with more than 100 ppb of lead in their blood are at risk of health effects (Health Canada). Individuals with blood concentrations greater than 400 ppb may require immediate follow-up (Occupational Safety and Health Administration).

LEAD BLOOD CONCENTRATIONS OF INUIT IN NUNAVUT

- » On average, Inuit in Nunavut have similar blood lead concentrations to the average of all Inuit Health Survey participants. But, Nunavut participants had much higher levels than the general population in Canada.
- » Men had higher concentrations of lead in their blood than women.
- » Participants over 61 years of age tended to have the highest blood lead concentrations.



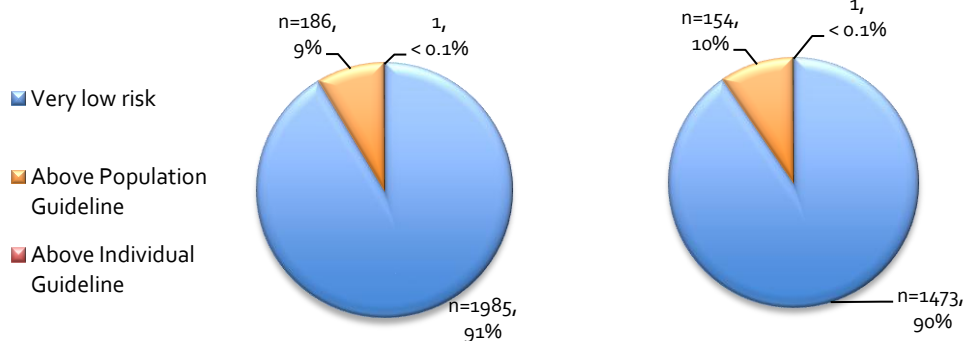
Lead Blood Concentrations By Age and Sex



- » 10% of Inuit adults in Nunavut had lead blood concentrations above the 100 ppb guideline and <0.1% had lead blood concentrations above the 400 ppb guideline:

All IHS Participants (n=2172)

Nunavut Participants (n=1628)



10% of Inuit in Nunavut had blood lead levels above Health Canada's guideline of 100 ppb.

What does this mean for Inuit in Nunavut?

- » The major source of lead for Inuit with blood concentrations above 100 ppb is not yet known; but, one of the likely contributors is lead shot.
- » Follow-up work is occurring with the Nunavut Inuit Health Survey Steering Committee to identify the sources of lead exposure. The results will inform actions to reduce exposure.

SELENIUM – AS A CONTAMINANT

See Page 16 for "Selenium - As A Nutrient"

SYNOPSIS

What is it? *Selenium* is a natural element commonly present in rocks and soil. It is important to note that selenium is *both* an essential nutrient and a possible **contaminant** of concern. Everyone needs some selenium to be healthy; however, too much selenium can harm. Selenium is not very persistent in the body following exposure as it only takes 12 days for 50% of a selenium dose to be eliminated from the body.

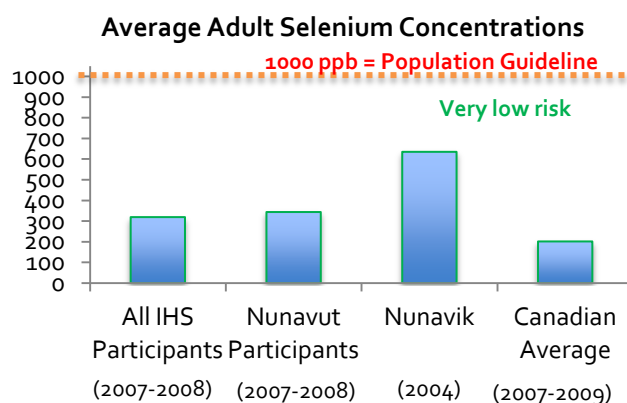
Where is it found? Everyone is exposed to low levels of selenium from the consumption of food and, to a lesser extent, from the air we breathe and water we drink. People living near hazardous waste sites may be exposed to higher levels of selenium.

What are the major health effects? Selenium has both beneficial and harmful effects so it is important to have selenium doses that are not too low but are also not too high. Although very rare in North America, low levels of selenium can lead to **cardiovascular**, hormonal, and immune problems. Too much selenium can lead to a range of symptoms that include hair loss, nerve damage, and harm the intestinal tract.

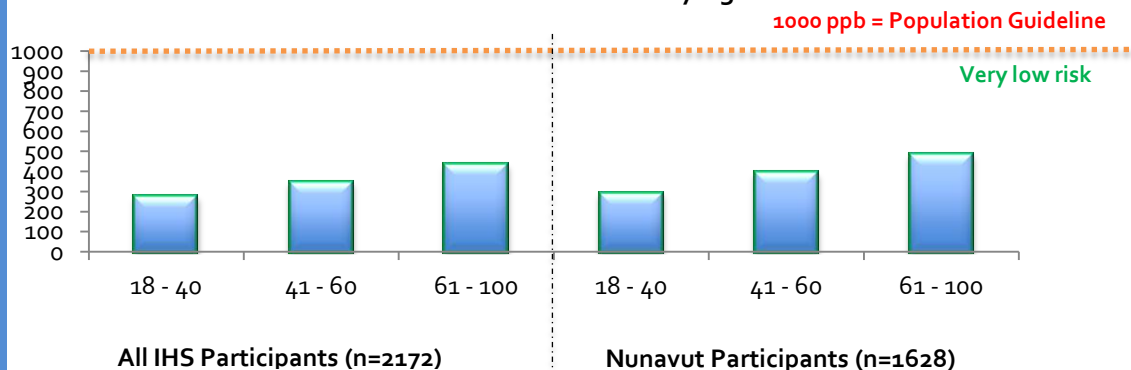
How much is too much? Populations that have more than 1000 ppb of selenium in their blood are at increased risk of effects.

SELENIUM BLOOD CONCENTRATIONS OF INUIT IN NUNAVUT

- » Inuit in Nunavut tended to have slightly higher blood selenium concentrations than the average of all IHS participants.
- » Inuit in Nunavut had substantially higher blood selenium concentrations than the average Canadian value
- » Men and women have similar levels of selenium in their blood.
- » Participants over the age of 61 had higher selenium blood concentrations than participants between 18 and 40 years of age and participants between 41 and 60 years of age.
- » Average blood concentrations of Inuit were consistently less than the guideline value of 1000 ppb.



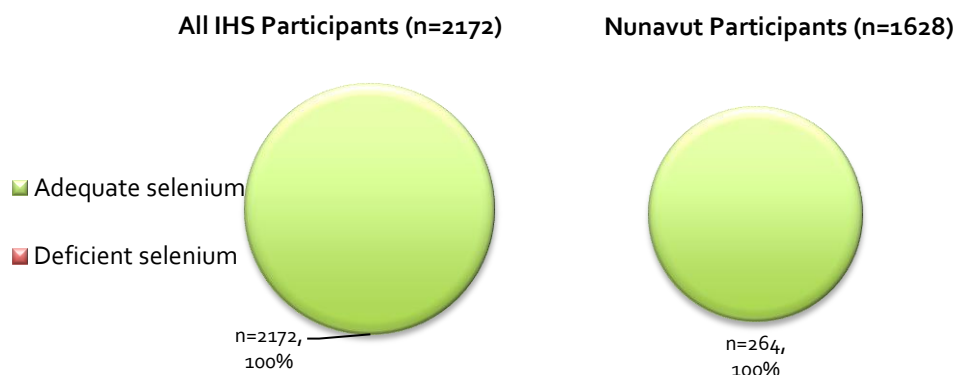
Selenium Blood Concentrations by Age



Our bodies need selenium to be healthy; but, too much can cause nerve damage and harm the intestinal tract.

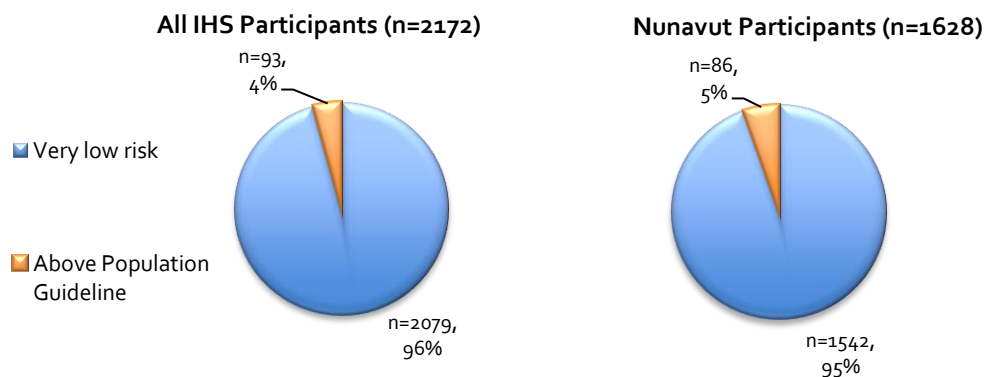
Current levels of selenium for Inuit adults in Nunavut are generally not high enough to cause harm.

- » 100% of IHS participants – both inside and outside of Nunavut – have sufficient concentrations of selenium in their blood to prevent symptoms of deficiency:



Inuit in Nunavut have adequate levels of selenium to prevent deficiency

- » Only 5% of Inuit in Nunavut have selenium blood concentrations above the guideline of 1000 ppb:



What does this mean for Inuit in Nunavut?

- » All Nunavut participants of the Inuit Health Survey had adequate levels of selenium in their diet.
- » Most Inuit in Nunavut (approximately 60%) get all the selenium they need from country foods alone.
- » Eating a palm sized portion (100 g) of ringed seal meat and a palm sized portion of arctic char meat (100 g) provide all the selenium per day that the body needs to be healthy.
 - » It is important to eat a variety of country food so that our bodies can get all of the different nutrients that it needs.

Most of the PCBs in our bodies came from fatty foods we have eaten.

PCBs

SYNOPSIS

What are they? *PCBs* are a class of compounds that include 209 different **chlorinated hydrocarbons**. Different PCBs sometimes act differently from one another, and some are more resistant to break down in the environment than others. Similarly, some PCBs are more **persistent** in the body than others. Generally speaking, PCBs are persistent and it can take more than 20 years to eliminate 50% of a dose from the body.

Where are they found? PCBs are still found in fatty foods of animal origin (eg. some fish, meats, dairy products) even though their use in paints, lubricants and electrical equipment is now banned. Most PCBs enter the environment from landfill sites and leaks from old equipment. Food is the largest source of exposure for Inuit in Nunavut but air, water and soil can also play a part.

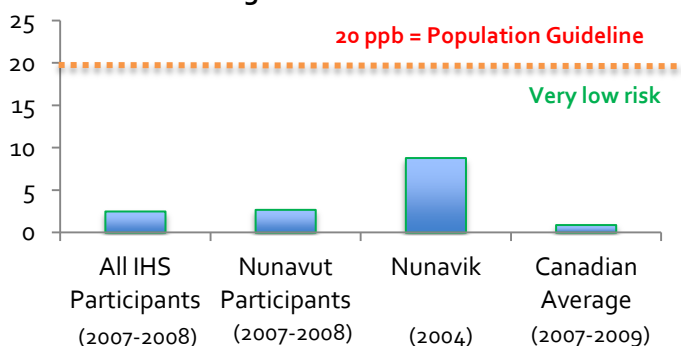
What are the major health effects? Exposure to PCBs can affect the immune system, impair the reproductive system (eg. PCBs shorten menstrual cycles and PCBs may impair the ability of women to have children), harm motor skills and short-term memory. Long-term, high level exposure may cause liver and kidney cancer. Fetal exposure to PCBs can cause decrease the IQ of children.

How much is too much? Populations that have PCB blood concentrations greater than 20 ppb may be at risk of health effects (Health Canada). Since the fetus and nursing infants are more sensitive, this blood PCB guideline is set at 5 ppb for women of child-bearing age (18 – 45 years old).

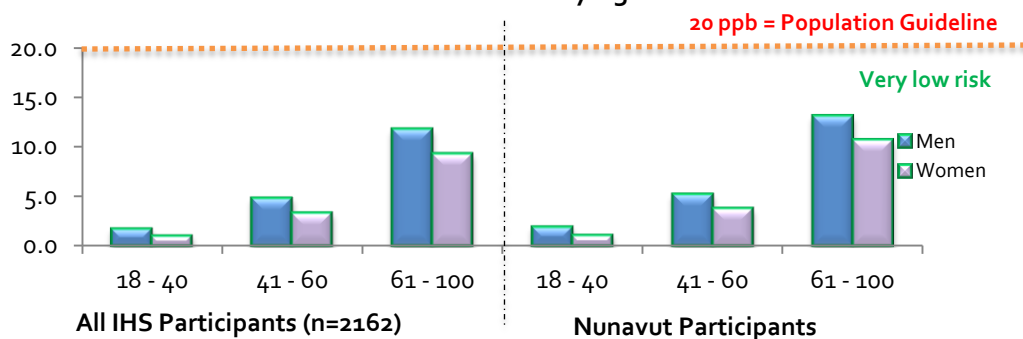
PCB BLOOD CONCENTRATIONS OF INUIT IN NUNAVUT

- » Inuit in Nunavut had lower PCB blood concentrations than the average of all IHS participants but had higher PCB concentrations than the Canadian national average.
- » Men had higher PCB concentrations in their blood than women.
- » Participants over 61 years of age tended to have higher PCB concentrations than those between 41 and 60 and those between 18 and 40.

Average Adult PCB Concentrations

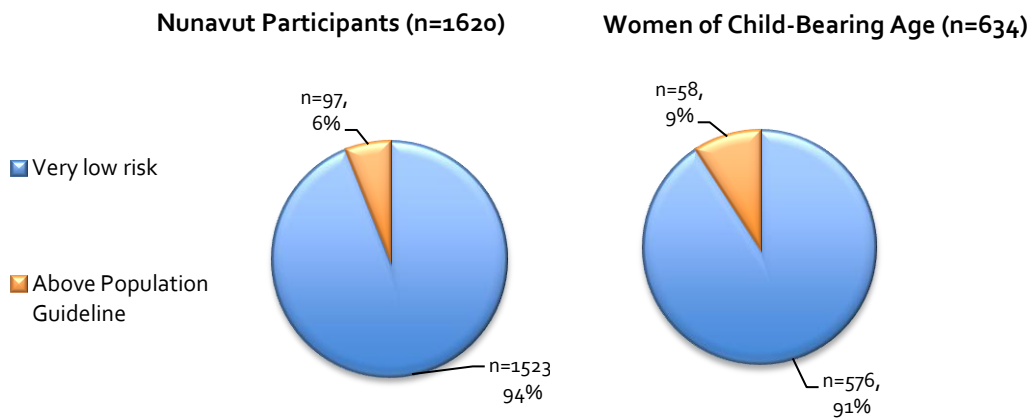


PCB Blood Concentrations By Age and Sex



For most Inuit adults in Nunavut, the current levels of PCBs in their blood are likely not high enough to cause harm.

- » 9% of Nunavut women between 18 – 45 years old had PCB blood concentrations greater the guideline value of 5 ppb:



- » Inuit in Nunavut get most of their PCB exposure from beluga and narwhal maktaaq.

What does this mean for Inuit in Nunavut?

- » Current PCB levels do not pose substantial health risks for most Inuit in Nunavut.

POLYBROMINATED DIPHENYL ETHERS (PBDEs)

SYNOPSIS

What are they? *PBDE* flame retardants are added to some plastics, electrical equipment, upholstered furniture, non-clothing textiles and foam products to prevent the spread of fire. PBDEs are not especially *persistent* in the body although there are some differences between specific types; 50% of a dose of PBDEs is likely to be excreted within a few days to weeks of exposure.

Where are they found? PBDEs have been found both in the environment and in humans (including 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.

What are the major health effects? Many are considered harmful, as PBDEs are linked to adverse liver, thyroid, reproductive and *neurological* effects. Concerns are being raised because of their *persistence*, *bioaccumulation*, and potential for toxicity, both in animals and in humans.

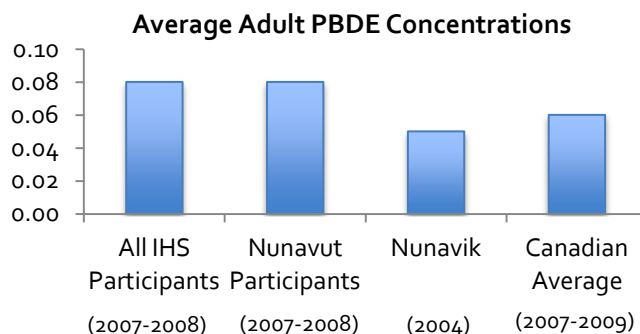
How much is too much? As of yet there is no guideline for PBDEs published by Health Canada.

PBDE BLOOD CONCENTRATIONS OF INUIT IN NUNAVUT

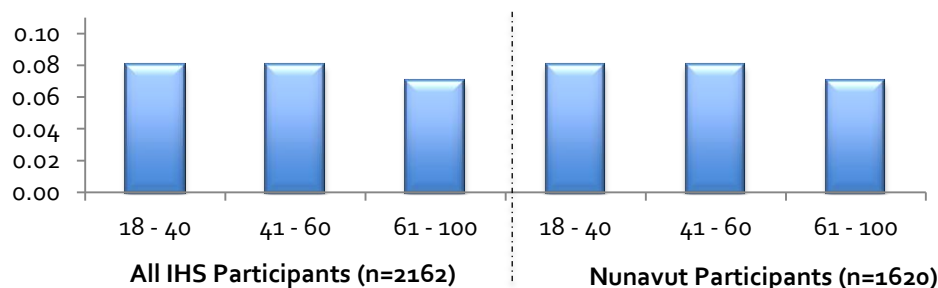
» Men and women had similar PBDE concentrations in their blood.

» Age did not have any effect on PBDE blood concentration for Inuit in Nunavut.

» Inuit in Nunavut have similar PBDE blood concentrations to the average of all IHS participants and the general population in Canada.



PBDE Blood Concentrations by Age



What does this mean for Inuit in Nunavut?

» Inuit in Nunavut are exposed to similar levels of PBDEs as Canadians living in the south.

PBDEs were used as flame retardants in many items but have since been banned since they take very long to break down in the environment.

Inuit – both those living inside and outside of Nunavut – have similar PBDE blood concentrations compared to the Canadian national average.

TOXAPHENE

SYNOPSIS

What is it? Toxaphene is a mixture of hundreds of related chemicals. It was widely used as pesticide until the 1980s. Toxaphene is not particularly persistent in the body with 50% of ingested dose being excreted within days or weeks of exposure.

Where is it found? Although its use in developed countries was banned 2 decades ago, it is still found in many foods in Polar Regions. As such, most people are primarily exposed through the consumption of contaminated foods, especially fatty foods of animal origin. People living near hazardous waste sites can also be exposed through contaminated air and drinking water.

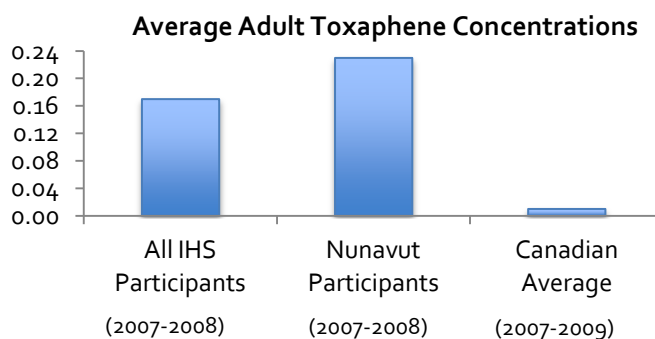
What are the major health effects? Exposure to toxaphene can damage the nervous system, liver, and kidney. It can also affect the immune system and is a possible human *carcinogen*.

How much is too much? Health Canada has not published a regulatory guideline for toxaphene.

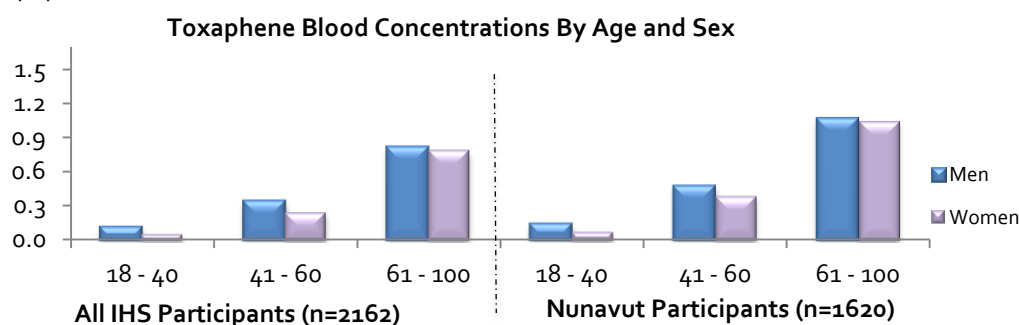
Toxaphene is a pesticide that can harm the nervous system

TOXAPHENE BLOOD CONCENTRATIONS OF INUIT IN NUNAVUT

- » Men tended to have slightly higher blood concentrations of toxaphene than women.
- » Participants over the age of 61 tended to have higher concentrations of toxaphene in their blood than those between 41 and 60 and those between 18 and 40.
- » Inuit in Nunavut tended to have higher blood concentrations than the average of all IHS participants.
- » Inuit in Nunavut had much higher levels of toxaphene in their blood than the general population in Canada.



Inuit in Nunavut generally have higher levels of toxaphene in their blood than the average of all IHS participants and much higher levels than the Canadian average.



What does this mean of Inuit in Nunavut?

- » Inuit in Nunavut – especially those over 61 years of age – are exposed to much higher levels of toxaphene than Canadians that live in the south.

DDT is still used in many developing nations to protect against malaria.

DDE & DDT levels are higher in Nunavut than the Canadian average.

DDE & DDT

SYNOPSIS

What are they? DDT was once widely used to protect crops from insects and to kill mosquitoes in the fight against malaria. Once in the body, DDT is broken down into DDE. DDT is relatively **persistent** in the body; it takes 120 days for 50% of a dose to be eliminated from the body.

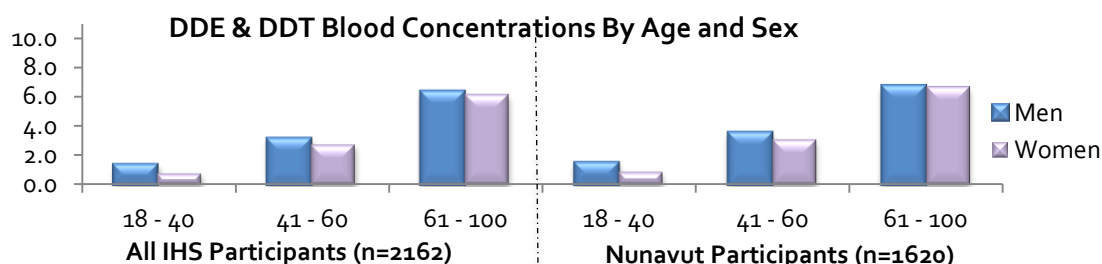
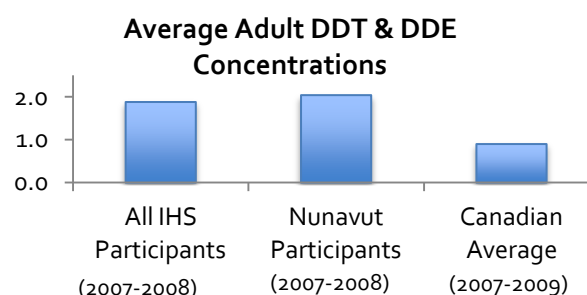
Where are they found? Since the use of DDT was banned in many countries, levels in the environment have decreased substantially. But, it is still found in many foods, especially fatty foods of animal origin (fish, meats, dairy). It can also be found in the breast milk of exposed mothers; however, the benefits of breast feeding have always outweighed contaminant risk.

What are the major health effects? Exposure to DDT affects the nervous system and large quantities can lead to tremors and seizures. Exposure to low levels over long periods of time may damage the liver and may increase the risk of having pre-term infants. In addition, DDT is able to mimic the activity of natural hormones in the body and may cause developmental problems in children. DDT is classified as a possible human carcinogen.

How much is too much? Health Canada has not published a blood concentration guideline for DDT and DDE.

DDT & DDE BLOOD CONCENTRATIONS OF INUIT IN NUNAVUT

- » Men tended to have slightly higher DDE & DDT blood concentrations than women.
- » Participants over 61 years of age tended to have higher DDE & DDT blood concentrations than participants between 41 and 60 and those between 18 and 40.
- » Inuit adults in Nunavut had similar DDE & DDT blood concentrations to the average of all IHS participants.
- » Inuit in Nunavut tended to have higher blood levels of DDE & DDT than the Canadian average.



What does this mean for Inuit in Nunavut?

- » Inuit in Nunavut have much higher DDE & DDT blood levels than Canadians that live in the south.

CHLORDANE

SYNOPSIS

What is it? *Chlordane* is a pesticide used on corn and citrus crops and on home lawns and gardens. Its use was banned in the 1980s due to environmental and human health concerns.

Where is it found? People can be exposed to chlordane through the consumption of contaminated foods, primarily fish, shellfish, and fatty foods. Plants can also contain chlordane if grown on contaminated soils. In addition, exposure can result for people living in homes fumigated with chlordane to control termite infestations.

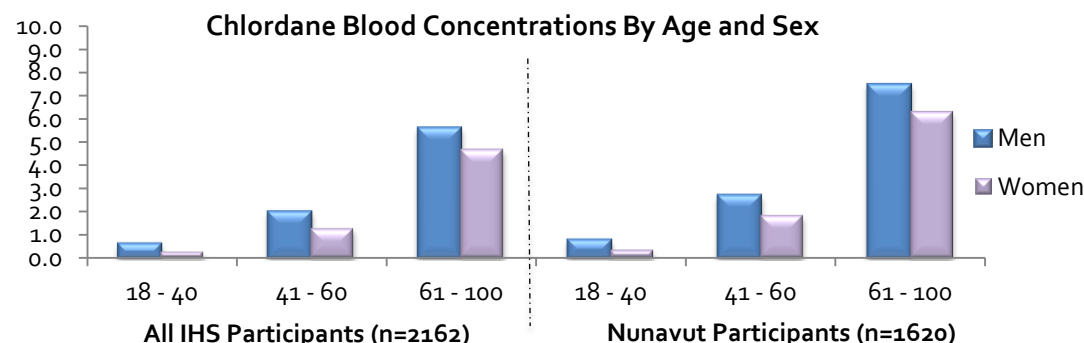
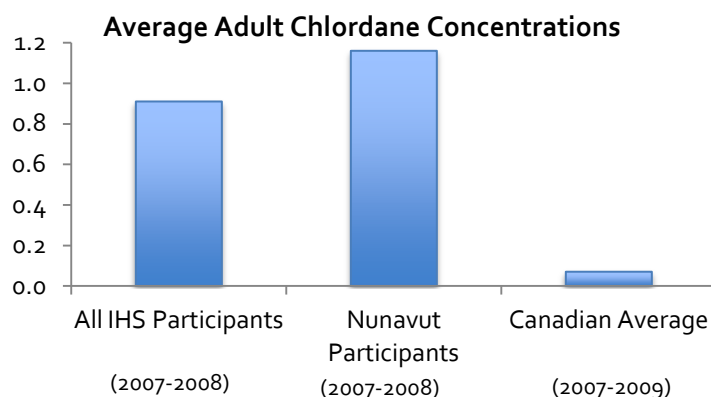
What are the major health effects? Excessive exposure to chlordane can damage the nervous system, digestive tract, and liver. It is considered a possible human *carcinogen*.

How much is too much? Health Canada has not published a blood concentration guideline for chlordane.

Too much exposure to chlordane can harm the nervous system.

CHLORDANE BLOOD CONCENTRATIONS OF INUIT IN NUNAVUT

- » Men tended to have higher levels of chlordane in their blood than women.
- » Participants over 61 years of age have higher chlordane blood concentrations than participants between 41 and 60 and those between 18 and 40.
- » Inuit adults in Nunavut had higher blood levels of chlordane than the average of all IHS participants.
- » Inuit in Nunavut have higher levels of chlordane in their blood than the Canadian average.



Men have higher levels of persistent organic pollutants, like chlordane, in their blood than women.

What does this mean for Inuit in Nunavut?

- » Inuit in Nunavut have much higher chlordane blood levels than Canadians that live in the south

TRADE OFF BETWEEN CONTAMINANT AND NUTRIENT INTAKE

Country foods like caribou meat, arctic char, and ringed seal meat are great sources of **selenium**, **polyunsaturated fatty acids**, and **omega-3 fatty acids**. Each of these nutrients is vitally important for our health.

Inuit culture and country food are fundamentally linked. It is an important element of our culture. The fact that there are high levels of country food consumption in Nunavut tells us this part of our culture is strong.

These same foods also lead to the exposure of Inuit in Nunavut to contaminants like heavy metals and **persistent organic pollutants**. Current exposure levels for Inuit are generally below guideline levels of concern.

There are two areas in which human health effects should be considered in food and lifestyle choices:

1. Mercury

Because mercury is found in higher levels in ringed seal liver, women of child-bearing age (ie. who plan to get pregnant, may become pregnant, or are pregnant) should avoid ringed seal liver. Mercury can accumulate over time in the bloodstream and affect the neurological development of an unborn child. Alternate nutritious food choices include ringed seal meat (mercury levels are significantly lower in the meat) and arctic char.

2. Cadmium

Smoking is also the leading source of exposure to cadmium in the territory. Inuit in Nunavut have the power to control exposure to cadmium. Lowering exposure can be achieved by decreasing the amount of cigarettes smoked, limiting exposure to second hand smoke, or by quitting smoking. Taking these steps will significantly reduce exposure.

It is important to understand that country food is an important source of nutrients and helps maintain a healthy diet. It is the best dietary option when compared to highly processed store bought food like French fries, hotdogs, and chips, which are considered unhealthy. A diet of unhealthy food can lead to severe chronic diseases like heart disease and diabetes.

Generally, Inuit in Nunavut should not fear contaminants in country food. All Inuit in Nunavut should continue to eat country foods, while understanding the risks, because of the health benefits they provide.

Government, Inuit Organizations, and Researchers are working together, using best available information, to ensure Inuit have accurate and thoroughly assessed information on contaminants in country food.

INTERVENTION: OPTIONS FOR INUIT IN NUNAVUT

We know that the majority of contaminants found in the Arctic originate from other regions of the world. There are actions that can be taken at an individual and community level to reduce exposure to contaminants.

LIMITING IMPACT ON HUMAN HEALTH

Food Choices:

Women who may become pregnant, are planning to get pregnant, or are pregnant should not eat ringed seal liver due to elevated levels of mercury. Unborn children, especially their neurological development, can be altered by too much mercury. Ringed seal meat is a healthy alternative to ringed seal liver. Please remember that country food continues to be the healthiest food choice generally.

Whenever possible, eating the meat and eggs of younger smaller fish rather than meat from large, long living, predatory fish can also keep your contaminant exposure low.

Changing one's diet by eating more highly processed store bought foods may lead to nutritional deficiencies. Junk food like French fries, hotdogs, chips, etc. contain unhealthy amounts of sodium, trans-fat, and simple sugars which can lead to many serious health problems like obesity, diabetes, and heart disease.

Country food is good for the mind, body, and Spirit. Foods like caribou, arctic char, and ringed seal meat are sources of essential nutrients such as selenium. Inuit have high levels of selenium and this is very positive for overall health.

For more information on making healthy food choices, please consult Nunavut's updated Food Guide. It contains important information on country foods and healthy store bought food choices. A copy may be obtained at your local Health Centre.

Smoking Habits:

Smoking is the primary source of cadmium exposure. Cadmium exposure can be controlled by you – quitting smoking is the most effective approach. Other approaches that can reduce harm include decreasing the amount of cigarettes smoked as well as avoiding exposure to second-hand cigarette smoke (ie. do not allow smoking in the home)

Resources available to you:

1. As a first step you can talk to your Healthcare Provider. Under the Non Insured Benefits Program, beneficiaries of the Nunavut Land Claims Agreement have access to a number of smoking cessation products to assist with the process of quitting. Products include:
 - Nicotine Replacement Products: Nicotine patch, gum, inhaler, and lozenge.
 - Medications: Zyban and Champix. To access these drug therapies you will need to visit your Health Centre.
2. You can also use Nunavut's Quitline (1-866-368-7848) to receive counselling support on how to quit.

Disposal of Hazardous Waste

Household hazardous waste is produced as a result of the daily operation of your home. Some of this waste is considered to be Hazardous Household Waste such as paints, lube, and batteries containing acid, and cleaning products. Liquid waste should never be poured down a drain or thrown in the garbage.

You can take steps to dispose of household hazardous waste safely that can reduce potential local sources of contaminants. For example, the new spiral shaped energy efficient light bulbs contain small amounts of mercury and should never be thrown in the trash.

To learn more about safely disposing of household hazardous wastes, please contact your local Hamlet for more information on disposal options.

Gaps in Research and Policy Interventions

Methods for detecting contaminants have advanced more than the ability to determine potential health risks. There is a need to better coordinate and correlate epidemiological and toxicological exposure assessments in order to better establish links between contaminants and potential human health effects.

Methods for communicating known risk must be developed and thoroughly evaluated for cultural appropriateness and effectiveness. As an initial step, the partners of the NIHS will evaluate the efficacy of the IHS Contaminants Communication in order to inform other contaminants related processes in the Territory.

The results of contaminants research have not been communicated effectively to the public and policy makers within Nunavut. Strategies for assessing health risk and reporting to individuals and communities must be better coordinated. There is a need for increased communication.

There must be continued regulatory action at an international level to reduce and eliminate POPs and other contaminants in the Arctic. There must be long-term protection of the Arctic ecosystem and its people. A country food diet is integral to exercising identity as Inuit; contaminants arriving as a result of Long Range Transport from other parts of the world are impacting this important dimension of Inuit culture.

GLOSSARY

Acidification: Decrease in the pH of a lake or stream. Acidification can result from certain types of pollution. One example of such pollution is the release of sulfur into the atmosphere that can result in 'acid rain'. This process can harm communities of fish and wildlife that live in the affected area.

Antioxidant: Substances that alleviate the harmful effects of free radicals in the body.

Bioaccumulation: The build-up of chemical contaminants like persistent organic pollutants in the tissues of plants and animals over time.

Biota: Plant and animal life.

Cadmium: A heavy metal that people are exposed to from cigarette smoke that can damage the bones and kidney.

Calories: A unit of energy. Calories are commonly used to describe how much energy foods provide. High calorie foods provide a lot of energy.

Carcinogen: Something that causes cancer.

Chlordane: A banned persistent organic pollutant that used to be used as a pesticide.

Chlorinated hydrocarbons: Types of chemical substances that feature carbons atoms bonded to chlorine atoms. Many chlorinated hydrocarbons are Persistent Organic Pollutants (eg. PCBs, DDT, Toxaphene).

Chronic disease: A persistent and long-lasting disease. Examples include asthma, cancer, heart disease, diabetes, and osteoporosis.

Chronic inflammatory disorder: Type of chronic diseases that involve prolonged periods of inflammation. Such disorders include atherosclerosis (hardening of arteries) and arthritis.

Contaminants: Chemical substances which may be found in air, water, soil, or living things that are not normally present. It should be noted that contaminants differ from parasites and usually cannot be seen with the naked eye. Instead contaminants are detected using chemical techniques in the laboratory.

Contaminant concentration above the guideline: When the level of a contaminant in people's blood is higher than the guideline value, the population will be at increased risk of experiencing health problems.

DDE & DDT: DDT, an example of a persistent organic pollutant, is a pesticide that was banned in many countries due to environmental concerns. DDE is a related toxic chemical that is formed during the breakdown of DDT.

DHA: Docosahexaenoic Acid is a type of omega-3 fatty acid and is a very important component of ones' diet.

EPA: Eicosapentaenoic Acid is a type of omega-3 fatty acid and is a very important component of ones' diet.

Epidemiological: A type of human health study that tests the association between exposures (eg. chemicals) in the environment and health effects.

Free radical: Extremely reactive chemical substances that, when unchecked by antioxidants, damage living cells.

Guideline: A scientifically accepted dose or concentration of a contaminant that should not be exceeded. A high percentage of individuals exceeding the guideline of a contaminant means that the population will be at increased risk of experiencing negative health effects.

Lead: A heavy metal that can cause health problems by harming the nervous system.

Mercury: A heavy metal that can harm the nervous system and kidneys. Children are especially sensitive.

Methylmercury: A very hazardous form of mercury that is formed in the environment

Micronutrient: Elements and vitamins that are needed (in small quantities) to keep the body healthy.

Neurological: Having to do with the nervous system.

Omega-3 Fatty Acid: An important type of polyunsaturated fatty acids that are good for the brain and heart and are found in many country foods (eg. fish, marine mammals).

Organochlorine: See chlorinated hydrocarbon.

Parts-per-billion (ppb): A unit that describes the concentration of a contaminant in blood. One ppb equals one-millionth of a gram of a contaminant per liter of blood. This is equivalent to one grain of rice in a standard 20' sea-can.

PBDEs: Polybrominated flame retardants that are very persistent and bioaccumulate.

PCBs: An example of persistent organic pollutant. PCBs were used in many industrial applications but have now been banned due to health and environmental concerns.

Persistence: How long it takes for a chemical to break down in the environment. A very persistent chemical (like DDT) can take years before it is broken down. Persistence can also refer to how long it takes for a chemical to be eliminated from the body following exposure.

Persistent: A very persistent chemical is one that takes a long time to be broken down in the environment and/or a chemical that takes a long time to be eliminated from the body.

Persistent Organic Pollutants (POPs): Harmful organic chemical substances that take a very long time to break down or dissipate in the environment. They can stay in your body for a very long time.

Polyunsaturated fatty acid (PUFA): A type of fat that promotes good heart and brain health.

Selenium: An example of a micronutrient and antioxidant that people require for good health. However, having too much selenium can cause health problems.

Toxaphene: A mixture of numerous of related chemicals that were used as a pesticide until they were banned due to health concerns.

APPENDIX A: FOODS INCLUDED IN THE FOOD FREQUENCY QUESTIONNAIRE

NUNAVUT

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|-----------------------------|----------------------------------|
| 1. Seagull eggs | 26. Muskox meat |
| 2. Ptarmigan | 27. Polar bear meat |
| 3. Canada goose | 28. Rabbit meat |
| 4. Goose or Eider duck eggs | 29. Caribou tongue |
| 5. Goose eggs | 30. Caribou stomach |
| 6. Eider duck eggs | 31. Ground squirrel |
| 7. Lesser Canada Goose | 32. Caribou kidney |
| 8. Arctic loons | 33. Beluga blubber |
| 9. Red throated loons | 34. Narwhal blubber |
| 10. Eider duck | 35. Ringed seal liver |
| 11. Arctic char | 36. Bearded seal meat |
| 12. Trout | 37. Ringed seal meat |
| 13. Whitefish | 38. Walrus meat |
| 14. Rock cod | 39. Beluga oil |
| 15. Atlantic cod | 40. Beluga muktaaq (skin + fat) |
| 16. Turbot | 41. Narwhal muktaaq (skin + fat) |
| 17. Halibut | 42. Beluga meat |
| 18. Mussels | 43. Narwhal meat |
| 19. Clams | 44. Beluga meat (dried) |
| 20. Shrimp | 45. Beluga muktaaq (skin only) |
| 21. Caribou heart | 46. Narwhal muktaaq (skin only) |
| 22. Caribou liver | 47. Ringed seal oil |
| 23. Caribou meat (fresh) | 48. Walrus blubber |
| 24. Caribou meat (dried) | 49. Blueberries |
| 25. Moose meat | |



IPY – INUIT HEALTH SURVEY

If you have any questions, please contact the Government of Nunavut's Office of the Chief Medical Officer of Health at

1-867-975-5772

— www.inuithealthsurvey.ca —