Community Report for

Bisphenol A, Triclosan, 1-Hydroxypyrene, and Perfluorochemicals

Fond du Lac Community Biomonitoring Study

October 30, 2015

MINNESOTA MDH DEPARTMENT OF HEALTH

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

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Most of all, we are indebted to the 491 volunteers who took part in the study so we may all better understand our relationship with the chemicals in the world around us.

Contents

Background

About This Report

This report summarizes biomonitoring results for seven chemicals: bisphenol A, triclosan, 1-hydroxypyrene, and four perfluorochemicals (PFNA, PFHxS, PFOA, and PFOS) from the Fond du Lac (FDL) Community Biomonitoring Study. The intended audience of this report is the FDL Community, including people who took part in the study.

This is the final community report from this project. The ***Community Report for Cadmium, Lead, and Mercury*** was released in July 2014. The ***Community Report for Persistent, Bioaccumulative Chemicals*** was released in June 2015. Both reports are available on the FDL Human Services biomonitoring webpage: http://www.fdlrez.com/HumanServices/biomonitoring.htm

For more information about the project, visit the webpage above or call the Minnesota Department of Health at 651-201-4897 (toll free 1-800-657-3908) or send an email to health.hazard@state.mn.us.

Study Background

The Great Lakes are among the world's most important freshwater resources. The lakes and the surrounding lands provide natural beauty and are vital to the lives of millions of people. Unfortunately, a long history of careless practices contaminated the Great Lakes ecosystem and Lake Superior watershed with numerous chemicals and byproducts of modern life. Sources of chemical releases include industrial discharges, spills, contaminated runoff, waste disposal, and use of consumer products.

The U.S. Great Lakes Restoration Initiative (GLRI) was established under the stewardship of the U.S. Environmental Protection Agency (EPA) in 2009. The GLRI aims to protect, restore, and maintain the Great Lakes ecosystem. With GLRI support, the Agency for Toxic Substances and Disease Registry (ATSDR), within the Centers for Disease Control and Prevention, created a Great Lakes Biomonitoring Program. This program funds projects to gather baseline data on environmental chemicals in people who may have a higher risk of exposure to Great Lakes contaminants. In September 2010, ATSDR awarded funds to state health agencies in Minnesota, Michigan, and New York to conduct biomonitoring. These funds support the FDL Community Biomonitoring Study.

From January through November 1, 2013, the Fond du Lac Band of Lake Superior Chippewa, in partnership with the Minnesota Department of Health, collected blood and urine samples, and questionnaire data from 491 people who took part in the FDL Community Biomonitoring Study.

> ***Biomonitoring is a tool used to understand exposures to environmental chemicals. It involves measuring the amount of specific chemicals in people's bodies (often in blood or urine).***

Study Purpose

The goals of the FDL Community Biomonitoring Study were to identify:

1. the amount of certain chemicals in participants' blood or urine;
2. how the amounts found in participants compare to other populations;
3. whether any groups (such as women or elders) are exposed to greater amounts of study chemicals; and
4. possible sources of exposure to the chemicals found in participants' blood or urine.

The FDL Study Results section of the report addresses these four goals under the headings:

- *Amounts Measured and Comparison to Other Populations*
- *Groups with Greater Chemical Amounts*
- *Sources*

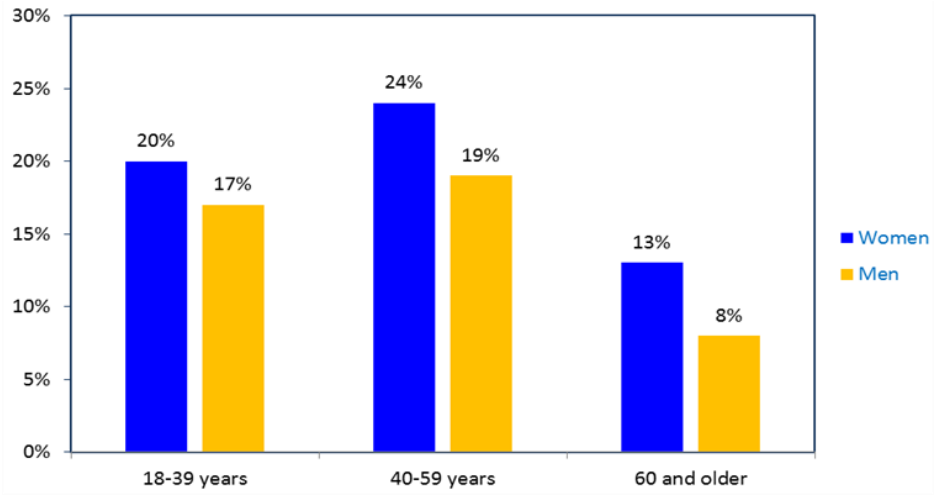
Study Participants

Study participants were members or affiliates of any federally recognized tribe, including but not limited the FDL Band of Lake Superior Chippewa, and who met the eligibility requirements. To be eligible, a person had to be at least 18 years old and live in the FDL clinics' service area.

Between January and November 2013, study staff invited 1,343 people (chosen randomly from the FDL Human Services "client list") to take part in the study. The goal was to contact each person to find out if the person was eligible and willing to be in the study.

Study staff reached 829 people, of whom 60 were not eligible and 278 declined. The remaining 491 people gave blood and urine samples and completed a questionnaire. The participants came from Cloquet (52%), Duluth (31%), and other communities and rural areas (17%). More women (57%) than men (43%) took part. The bar chart below shows participants by age group and gender.

Age and Gender of Study Participants*



* Fewer men and young adults participated than expected based on the full "client list".

Chemicals in this Report

This report summarizes biomonitoring results for seven chemicals: bisphenol A, triclosan, 1-hydroxypyrene, and four perfluorochemicals (PFNA, PFHxS, PFOS, and PFOA). These chemicals are common in the environment, in the products we use, and in some foods we eat. As a result, they are frequently found in people.

Finding these chemicals in people's blood or urine does not mean their health is affected or that they will get sick. It only means they were exposed to the chemicals. People are regularly exposed to very small amounts of these chemicals without any obvious harm. Although we do not know what an individual participant's results mean for their health, amounts measured in all participants as a whole are meaningful. The results tell us:

- "baseline" levels of these chemicals in participants that can be used to monitor changes over time
- whether certain groups of people within a population have greater exposure than others
- about possible exposure sources in participants, when combined with questionnaire information
- how the amounts of these chemicals in participants compare to other populations

Understanding the Biomonitoring Results

This section will help you understand the information in the Results Summary and the chemical-specific Results (starting on page 5).

Chemical Amounts

BPA, triclosan, and 1-hydroxypyrene results are reported as ***micrograms*** of chemical per gram of creatinine in urine. A ***microgram*** is a tiny amount -- one millionth of a gram. ***Creatinine*** is a natural component of urine that corrects for hydration differences between individuals. The four PFCs are reported as micrograms of PFC per liter of blood serum.

BPA, triclosan, and **1-hydroxypyrene** pass through the body quickly. Therefore, the amount in people's urine reflects exposure that occurred very recently – generally within a week prior to sample collection. The four **PFCs** in this report are persistent and bioaccumulative.[1] The amount of these PFCs in blood reflect exposures that may have occurred recently or in years past.

Chemical Results

This report shows three types of summary results:

[1] "Persistent" chemicals stay in the environment and in people's bodies for a long time – often years. "Bioaccumulative" chemicals build up in the food chain. They also build up in people's bodies over time.

1. **Percent of people with a detectible level.** This is the number of participants with a measurable amount of the chemical in their blood, divided by the total number of people tested. It tells us how widespread exposure to the chemical is in people.
    - A person has a detectible level when the chemical amount found in blood is the same or greater than the detection limit. The detection limit is the lowest level a chemical can be measured accurately by the lab.
2. The **middle value**. The middle value is where half of people tested were below and half were above the value. It represents the middle of the results, similar to an average. The middle value is also known as a "median" or "50th percentile".
3. The **95 percent value**. Ninety-five percent of people tested had a result that was less than the 95 percent value. It is a standard way to show a value at the higher end of the range of results.

> ***A result above a middle value or 95 percent value does not signify a health concern.*** *Rather, the values help us understand whether the participants in this study look similar to other populations when comparing the middle and upper-end of the results.*

Other Populations' Results

For comparison, we show summary results from two other populations:

- **U.S. General Population**. These are people across the U.S. tested by the Centers for Disease Control and Prevention from 2011-2012. For more information, go to www.cdc.gov/exposurereport.
- **First Nations Canada**. These are people in 13 First Nations communities across Canada who were tested by the Assembly of First Nations in 2011. For more information, go to www.afn.ca/uploads/files/afn_fnbi_en.pdf.

Possible Sources of Exposure

We compared participants' responses from the questionnaire with their blood and urine results to look for possible explanations for the amounts and the sources of chemicals measured in their samples. The questionnaire asked about activities (such as work, hobbies, recreation, and smoking), use of personal hygiene and consumer products, and certain foods eaten. The questionnaire focused on traditional foods that participants ate in the last year, including wild rice, wild game, and fish.

> You can read about the amounts and kinds of fish participants said they ate on page 8 of the ***Community Report for Cadmium, Lead, and Mercury*** available at: *http://www.fdlrez.com/HumanServices/biomonitoring.htm*

Summary of Chemical Amounts in Study Participants

The table below summarizes the results for the seven chemicals covered by this report. We found these chemicals in almost all participants. Of the three chemicals we measured in urine, triclosan had the highest middle and 95 percent values. Of the four PFCs we measured in blood, PFOS had the highest middle and 95 percent values.

Summary Results from the FDL Community Biomonitoring Study*

	Percent of people with a detectible level	Middle value	95 percent value
Chemicals measured in urine (in micrograms per gram of creatinine in urine)			
Bisphenol A (BPA)	98%	1.4	7.5
Triclosan	93%	6.9	210.8
1-Hydroxypyrene	99%	0.2	0.7
Chemicals measured in blood (in micrograms per liter of blood serum)			
PFNA (perfluorononanoic acid)	96%	0.5	1.6
PFHxS (perfluorohexane sulfonate)	95%	0.9	3.0
PFOS (perfluorooctane sulfonate)	97%	4.9	16.0
PFOA (perfluorooctanoic acid)	95%	1.1	2.9

*See page 3 to help you understand the information in the table.

We looked for four additional PFCs, shown in the table below. They were not found, or were found in very few participants. As such, we could not study them further.

Results for other PFCs measured in the FDL Community Biomonitoring Study

PFC	Percent of people with a detectible level
PFBA (perfluorobutanoic acid)	4%
PFBS (perfluorobutane sulfonate)	0%
PFHxA (perfluorohexanoic acid)	Less than 1%
PFPeA (perfluoropentanoic acid)	0%

Chemical Information and FDL Study Results

This section of the report includes background information on each chemical and more detailed results from the 491 study participants.

Bisphenol A (BPA)

Frequently Asked Questions

What is BPA?

BPA is a man-made chemical used in certain plastics and as a coating inside food and beverage cans. BPA may also be present in thermal-paper products, such as cash register and ATM receipts. Some dental sealants, composites, and medical devices contain BPA.

How are people exposed to BPA?

While BPA is found at low levels in the environment (air, dust, and water), BPA in food and beverages accounts for the majority of people's exposure.

- BPA can leach into food from the lining of metal food and beverage cans.
- BPA can leach out of plastic food storage containers and water bottles, especially if heated at high temperatures.

Some exposure may also occur from handling cash register receipts or from dental sealants. BPA is not persistent in people. It passes through the body within a few days.

Can BPA harm people's health?

- Some animal studies have raised concerns that BPA may cause reproductive problems, developmental effects, and changes to the liver, heart, kidney, and reproductive organs. Scientists do not yet know if, or how, these findings apply to humans.
- A scientific review by the U.S. Food and Drug Administration in 2014 found that BPA in food containers and packaging does not pose health risks. However, due to growing public concern, manufacturers stopped using BPA in baby bottles, sippy cups, and infant formula cans in 2013.

How can I limit my exposure to BPA?

- Select alternatives to canned foods when possible, such as frozen and dried food, or items in glass packaging, pouches or cartons. *From a nutritional standpoint, the benefit of eating fruits and vegetables, even if they come from canned goods*, *outweighs the possibility of BPA exposure.*
- Check to see if your plastic food storage containers contain BPA. Containers marked on the bottom with recycle codes 3 or 7 may contain BPA. If food containers have these codes:
    - Avoid microwaving the containers or putting very hot or boiling liquid in them. Instead, use glass, ceramic, or stainless steel containers for hot food or liquids.
    - Throw out scratched and worn plastic containers.
- If you handle paper receipts frequently (like at work), wash your hands often.

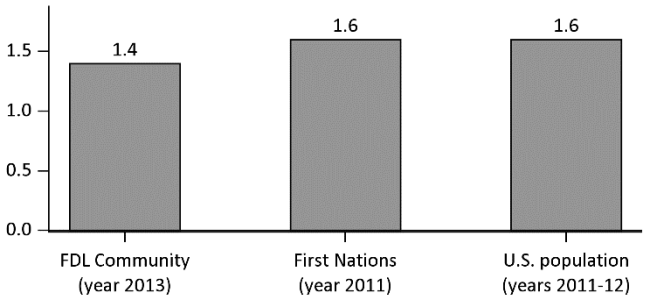
FDL Community BPA Results

Amounts Measured and Comparison to Other Studies

The figures below show the middle value and 95 percent value for participants in the FDL Community Biomonitoring Study compared to both U.S. and First Nations populations. FDL study participants as a whole have lower BPA levels.

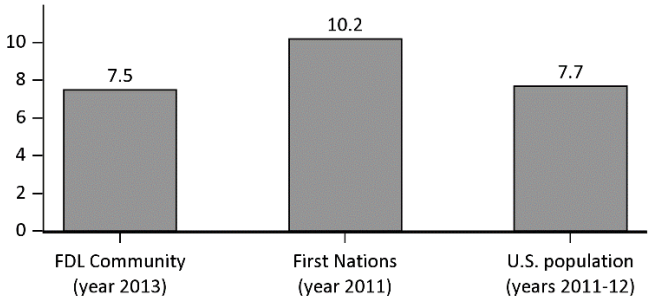
Middle Values for BPA

in micrograms of BPA per gram of creatinine in urine



95 Percent Values for BPA

in micrograms of BPA per gram of creatinine in urine



Groups with Greater BPA Amounts

We did not find consistent differences in BPA amounts between men and women, or by age.

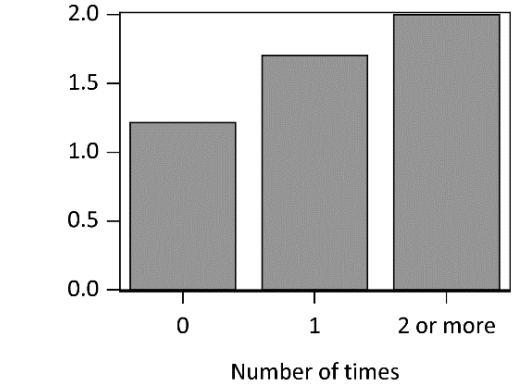
BPA Sources

We asked participants how many times they ate meals prepared with canned foods and how many times they drank canned beverages in the past 24 hours. Since low levels of BPA have been found in some lakes and rivers in Minnesota, we also looked at fish and wild rice consumption.

- As shown in the bar chart, people who reported recently eating canned food had higher levels of BPA[2]. We did not find increased levels of BPA in people who recently drank canned beverages.
- We did not find increased BPA in people who ate fish in the past week or greater amounts of wild rice.

BPA middle values by number of times canned food was eaten in past 24 hours

in micrograms of BPA per gram of creatinine in urine



[2] The middle values in the chart do not account for other factors that may influence BPA levels.

Triclosan

Frequently Asked Questions

What is triclosan?

Triclosan is a man-made chemical added to many consumer products to kill bacteria. Beginning in the 1990s, triclosan use greatly expanded into hundreds of antibacterial products. A Minnesota law banning triclosan in most consumer hygiene products will take effect in 2017. Environmental concerns were a factor in the ban since low levels of triclosan in wastewater can end up in lakes and other water bodies in Minnesota.

How are people exposed to triclosan?

When people use consumer products containing triclosan, they absorb small amounts through the skin or the mouth. Common triclosan-containing products include some antibacterial soaps, deodorants, lotions, toothpastes, and dishwashing liquids. Triclosan is not persistent in people; it passes through the body within a few days.

Can triclosan harm people's health?

Animal studies have shown that triclosan may interfere with hormones needed for normal brain and reproductive development. Scientists do not yet know if and how these animal studies apply to humans.

How can I limit my exposure to triclosan?

Before you buy personal hygiene products or other antibacterial products, check to see if they contain triclosan.

- Antibacterial soaps, body washes, and toothpastes will list triclosan as an ingredient in the "Drug Facts" box on the label.
- If a cosmetic contains triclosan, it is included in the ingredient list on the product label.

According to the U.S. Food and Drug Administration, ***soaps with triclosan are no more effective at preventing illness or reducing bacteria on the skin than plain soap.***

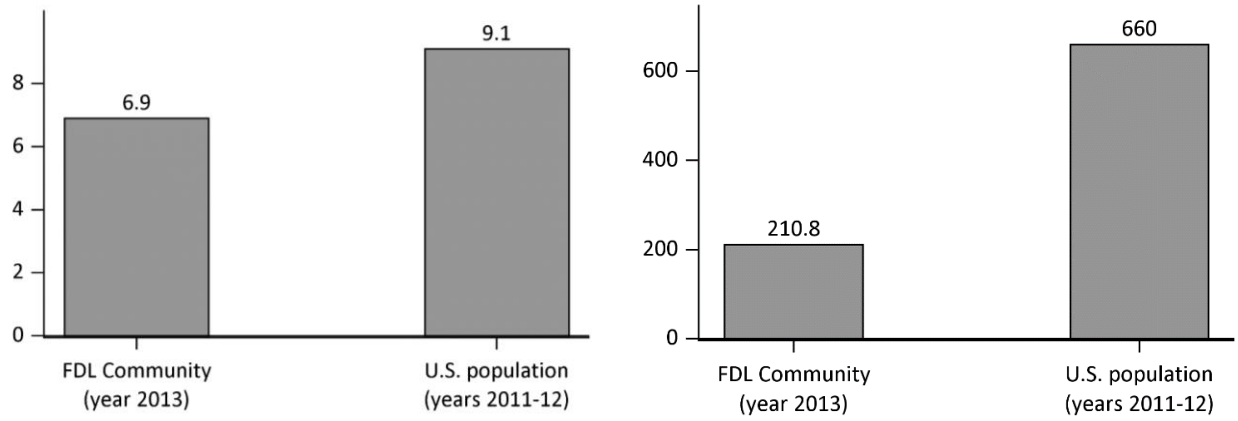
FDL Community Triclosan Results

Amounts Measured and Comparison to Other Studies

The charts below show the triclosan middle value and 95 percent value for participants in the FDL Community Biomonitoring Study compared to the U.S. population. First Nations of Canada did not measure triclosan. Triclosan levels in FDL study participants were lower compared to the U.S. population.

Middle Values for Triclosan **95 Percent Values for Triclosan**

in micrograms of triclosan per gram of creatinine in urine



Groups with Greater Triclosan Amounts

We did not find consistent differences in triclosan amounts between men and women, or by age.

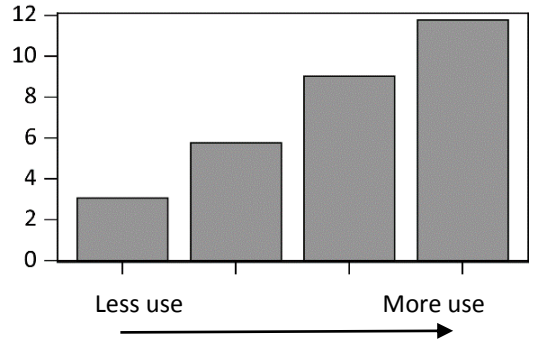
Triclosan Sources

We asked participants how many times they used a variety of personal hygiene products in a typical day. Since small amounts of triclosan have been found in some lakes and rivers in Minnesota, we also looked at fish and wild rice consumption.

- In general, people who reported using liquid hand soaps, deodorant, toothpaste, and liquid cleansers had higher triclosan amounts, compared to people who did not use these products or used them less frequently. The bar chart shows increased triclosan amounts with increased use of these products[3].
- We did not find increased levels of triclosan in people who ate fish in the past week or greater amounts of wild rice.

Triclosan middle values by reported use of four personal hygiene products[3]

in micrograms of triclosan per gram of creatinine in urine



[3] The number of times participants reported using liquid hand soap, deodorant, toothpaste, and liquid cleanser in a typical day were added together to create a measure of "total product use". The four bars in the chart represent the four quartiles of total product use frequency: Quartile 1=1-6, Quartile 2=7-8, Quartile 3=9, Quartile 4=10-20. The middle values in the chart do not account for other factors that may influence triclosan levels.

1-Hydroxypyrene

Frequently Asked Questions

What is 1-hydroxypyrene?

1-Hydroxypyrene is formed in the body after exposure to pyrene, which is a type of **polycyclic aromatic hydrocarbon (PAH)**. PAHs are a group of naturally occurring chemicals formed when materials such as coal, oil, gas, wood, garbage, and tobacco are burned. The presence of 1-hydroxypyrene in urine means that the person was recently exposed to a mixture of PAHs.

How are people exposed to PAHs?

People are commonly exposed to PAHs by:

- Smoking cigarettes
- Breathing air contaminated with vehicle exhaust, cigarette smoke, wood smoke, or fumes from asphalt
- Eating food that is grilled, smoked, or charbroiled

PAH contamination exists at several sites along the lower St. Louis River and in the St. Louis and Superior Bays. It is possible that people could be exposed to PAHs by contacting contaminated sediments and soil in these locations.

Can PAHs harm people's health?

Long-term exposure to high levels of some PAHs increases the risk of cancer.

How can I limit my exposure to PAHs?

- Seek help to quit smoking. Contact the Wiidookawishin (Help Me) Smoking Cessation Program at (218) 878-3726 (Min No Aya Win) or (218) 279-4064 (CAIR).
- Avoid secondhand smoke.
- Avoid breathing in smoke from fires (for home heating or recreational use) and exhaust from vehicles.
- Eat less charbroiled, chargrilled, and smoked food.

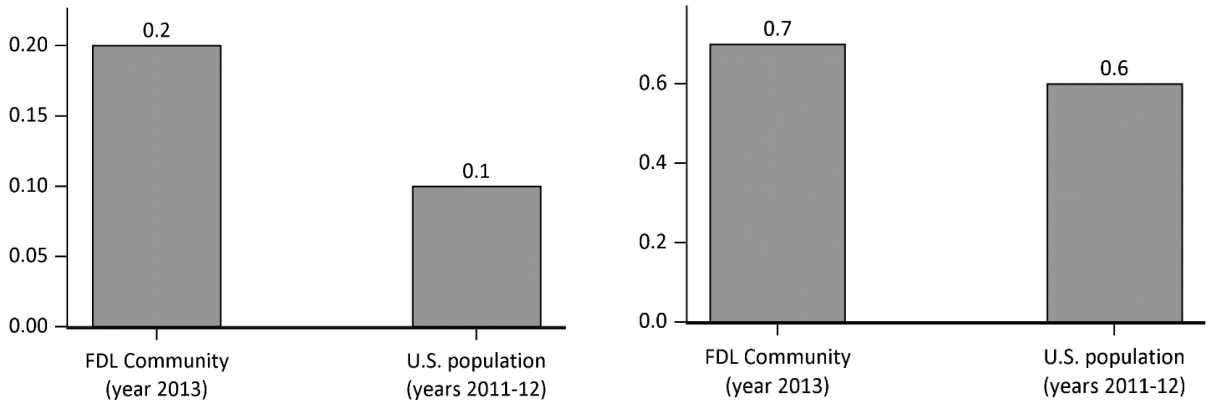
FDL Community 1-Hydroxypyrene Results

Amounts Measured and Comparison to Other Studies

The charts below show the 1-hydroxypyrene middle value and 95 percent value for participants in the FDL Community Biomonitoring Study compared to the U.S. population. First Nations of Canada did not measure 1-hydroxypyrene. Middle values and 95 percent values for 1-hydroxypyrene are higher in FDL Study participants. This is likely due to the higher smoking rate among FDL study participants compared to the general U.S. population.

Middle Values for 1-Hydroxypyrene **95 Percent Values for 1-Hydroxypyrene**

in micrograms of 1-hydroxypyrene per gram of creatinine in urine



Groups with Greater 1-Hydroxypyrene Amounts

We did not find consistent differences in 1-hydroxypyrene amounts between men and women, or by age.

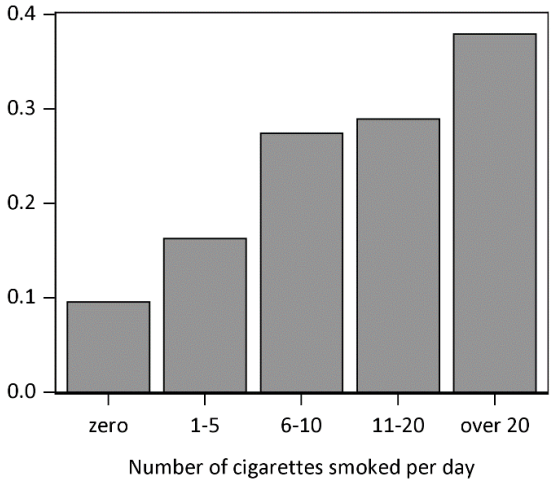
1-Hydroxypyrene Sources

We asked participants questions related to PAH sources. Examples include home heating and cooking fuels, smoking history, exposure to secondhand smoke in the home or workplace, and recently eating food cooked over a flame. Since there is PAH contamination of sediments in nearby waters, we also looked at fish and wild rice consumption. We found:

- Smokers had higher amounts of 1-hydroxypyrene. As shown in the chart below, 1-hydroxypyrene increased as the daily amount of cigarettes smoked increased[4].
- Smokers living in homes where they, or other people smoke indoors tended to have higher levels.
- We did not find increased levels in people who ate fish in the past week or consistent differences in 1-hydroxypyrene by amount of wild rice eaten in the past year.

1-Hydroxypyrene Middle Values by Daily Smoking Amount

in micrograms per gram of creatinine



[4] The middle values in the chart do not account for other factors that may influence 1-hydroxypyrene levels.

Perfluorochemicals (PFCs)

Frequently Asked Questions

What are PFCs?

- PFCs have been used in a variety of consumer products since the 1950's. Common uses are stain-protective coatings on carpet and textiles, nonstick coatings on cookware and food packaging, and waterproof coatings on fabric and paper. PFCs may also be in "Class B" firefighting foams used for fuel fires.
- PFCs are persistent in the environment. The four PFCs described here (PFNA, PFHxS, PFOS, PFOA) bioaccumulate in wildlife and people and take years to clear from the body.
- U.S. companies agreed to phase-out production of bioaccumulative PFCs starting in 2000. Production of these four PFCs will end by 2016.

How are people exposed to PFCs?

- Food may be the major source for most people. Meat, dairy, and fish products generally have higher levels of bioaccumulative PFCs.
- Carpet and consumer products can release PFCs, which then collect in dust inside people's homes. House dust may be an important exposure source for children who crawl or play on floors/carpets and frequently put their hands in their mouths.
- Low levels may also be in drinking water, groundwater, and surface water. Higher levels in water may occur near industrial facilities that make or use PFCs. They may also be in water near airports or fire-training facilities where Class B firefighting foams are used.

U.S. biomonitoring studies show that levels of these four PFCs in blood have declined in response to the production phase-out. Since they remain in the environment for a long time, they will continue to be found in people for many years.

Can PFCs harm people's health?

Animal and human studies show potential links between PFC exposure and effects on the liver, thyroid, and immune system; changes in hormone and cholesterol levels; increased risk of certain cancers; and effects on development. However, these effects have been typically found at levels higher than what the general public is exposed to, and more research is needed to confirm or rule out these possible links.

How can I limit my exposure to PFCs?

- Follow the safe eating guidelines for fish, found on the FDL biomonitoring webpage: http://www.fdlrez.com/HumanServices/biomonitoring.html. *In most Minnesota fish tested, PFCs have not been detected or are so low, there is no advice to limit amounts that people can eat.* However, there is advice for some specific bodies of water based on levels of PFOS in fish[5]:
    - Wild Rice Reservoir, Fish Lake Flowage, and Miller Creek (all three near the

[5] See the MDH webpage for lake-specific advice: http://www.health.state.mn.us/divs/eh/fish/eating/sitespecific.html

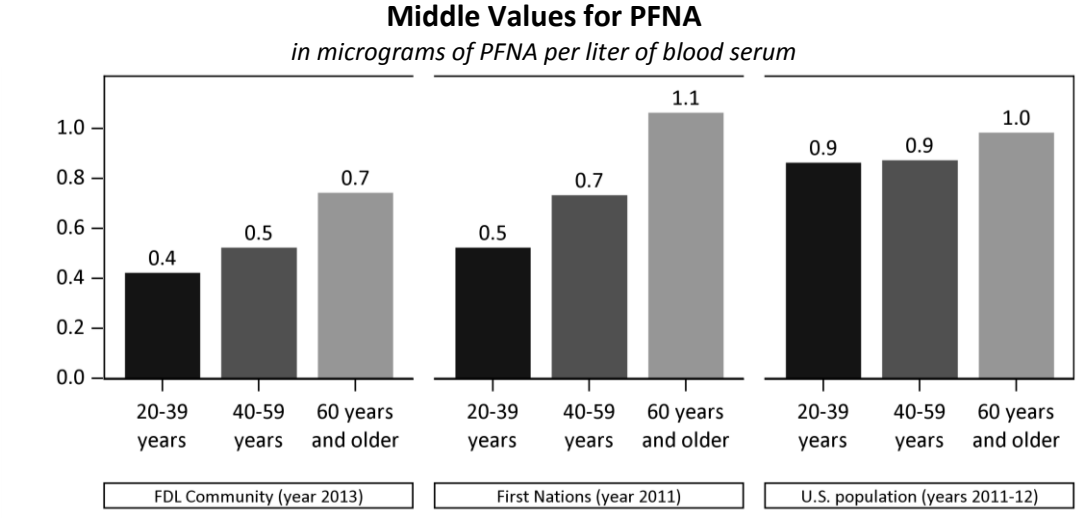
Duluth airport) have advice to limit consumption to *one fish meal per week* for many species.
    - Some lakes/rivers in the Twin Cities metro have advice to limit consumption to one fish meal *per week* or one meal per *month* for many species.
- Avoid using chemical treatments to repel stains on carpets and furniture. Buy carpet, furniture, and fabrics that have not been pre-treated to repel stains.
- Regular damp-dusting and cleaning of floors will help remove PFCs indoors.

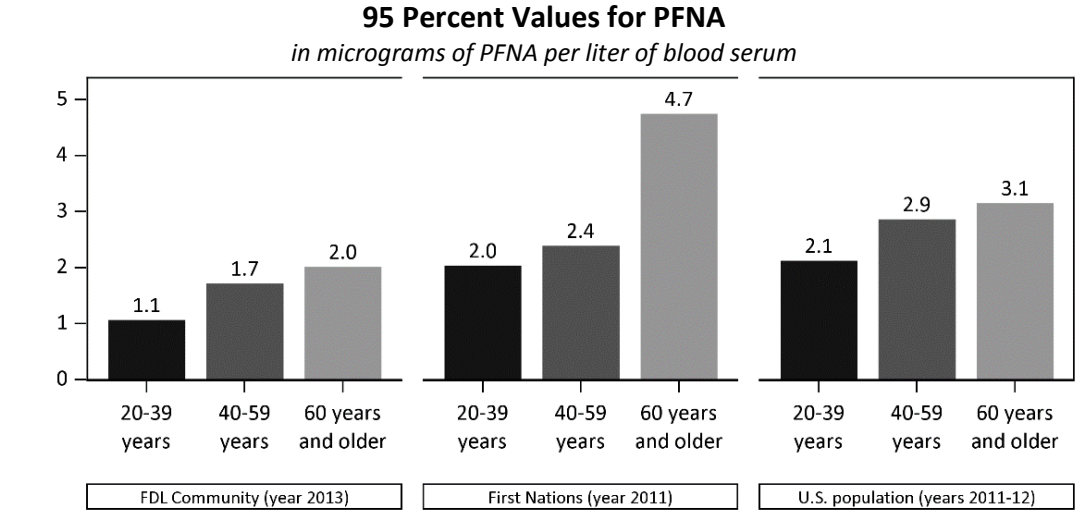
FDL Community PFC Results

Amounts Measured and Comparison to Other Studies

As shown in the graphs that follow, FDL study participants' *middle values* and *95 percent values* for all PFCs were about the same as, or lower than, both U.S. and First Nations populations for nearly every comparison. Since PFC levels generally increase with age, the results are shown by age group.

PFNA

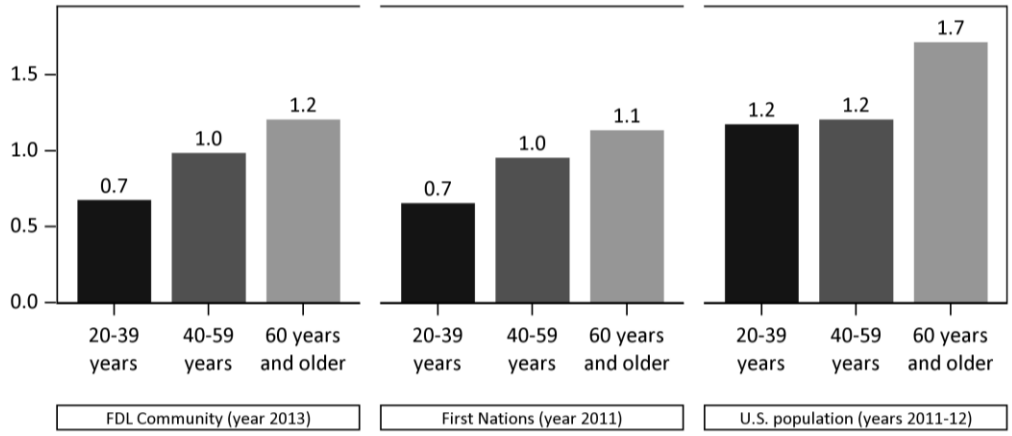




PFHxS

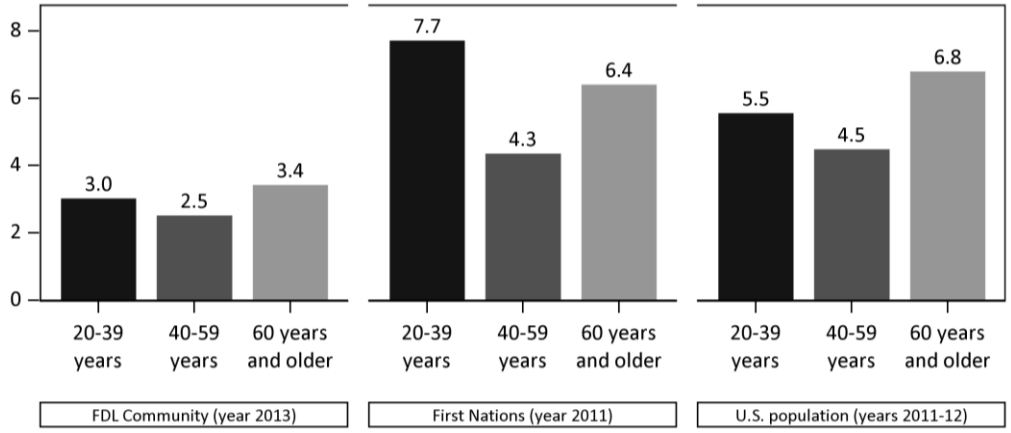
Middle Values for PFHxS

in micrograms of PFHxS per liter of blood serum



95 Percent Values for PFHxS

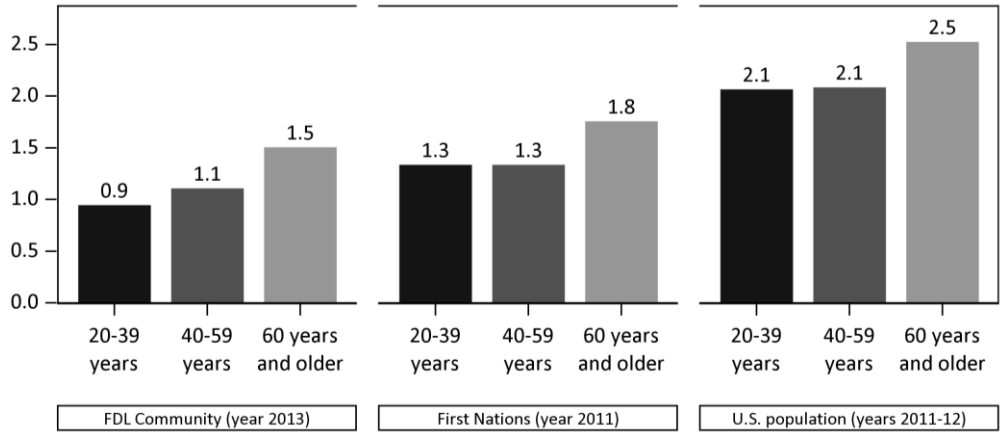
in micrograms of PFHxS per liter of blood serum



PFOA

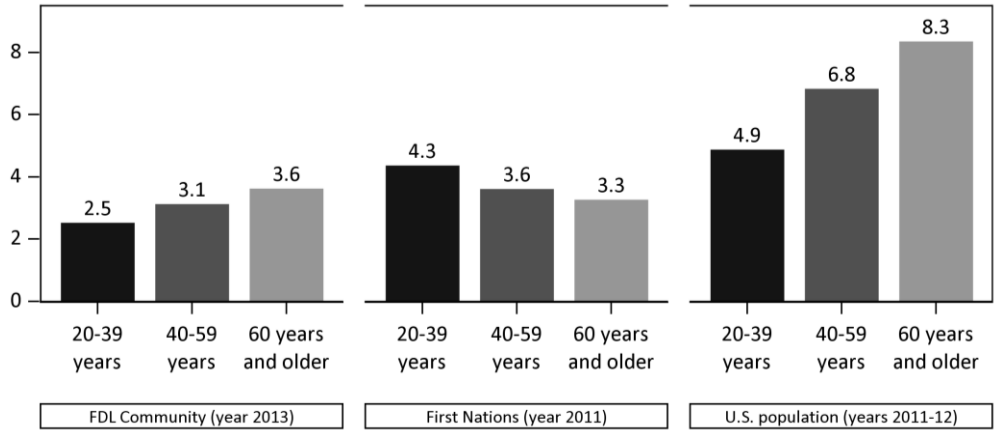
Middle Values for PFOA

in micrograms of PFOA per liter of blood serum



95 Percent Values for PFOA

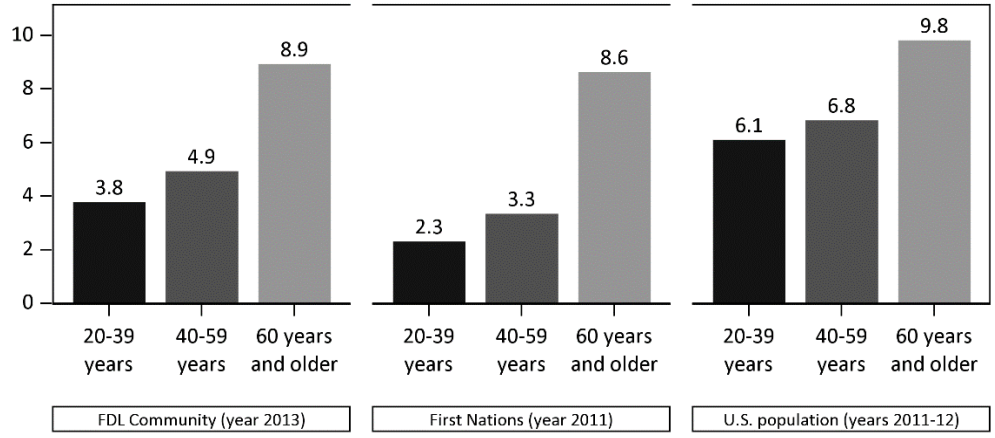
in micrograms of PFOA per liter of blood serum



PFOS

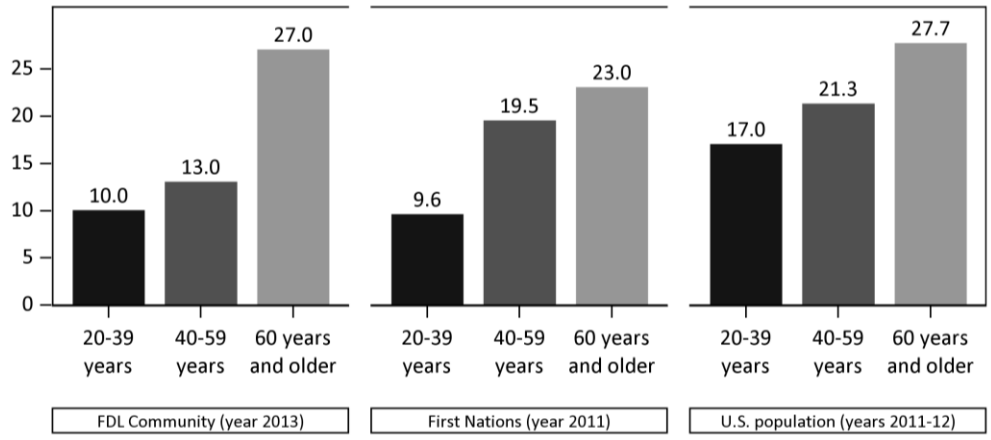
Middle Values for PFOS

in micrograms of PFOS per liter of blood serum



95 Percent Values for PFOS

in micrograms of PFOS per liter of blood serum



Groups with Greater PFC Amounts

Men tended to have higher levels of all four PFCs compared to women. The U.S. population study and other studies also find that men have higher blood levels compared to women. We do not fully understand the reasons for this, but it is likely related to biological differences in how men and women clear PFCs from their bodies. In addition, studies show that pregnancy, breastfeeding, and menstruation are important factors in the removal of PFCs from the body. Men in the FDL Community Biomonitoring Study had about the same, or lower PFC levels compared to men in the U.S. population study.

All four PFCs generally increased with age (as shown in bar charts above). Persistent, bioaccumulative chemicals are typically higher in older people compared to younger people because the chemicals have had more time to accumulate in the bodies of those who have lived longer.

PFC Sources

People can be exposed to PFCs from many sources. In this study, we focused on traditional foods such as fish, wild rice, and wild game.

- We found that men eating greater amounts of fish that they, or someone else caught, tended to have higher amounts of PFNA, PFHxS, PFOA, and PFOS compared to men eating no fish or lesser amounts of locally-caught fish. The relationship between PFC levels and eating locally-caught fish was strongest for PFNA and PFOS.
- Women eating greater amounts of locally-caught fish tended to have higher amounts of PFNA. We did not see a relationship between eating locally-caught fish and PFHxS, PFOA, and PFOS amounts in women[6].
    - Although we found links between eating locally-caught fish and levels of some PFCs in study participants, *PFOS is the only PFC known to accumulate in Minnesota fish to levels that may limit consumption*. Some bodies of water in Minnesota have advice to limit consumption of fish based on PFOS (see PFC Frequently Asked Questions on page 12).
- We did not find any links between PFC amounts and eating wild rice or game.

[6] Multivariate regression modeling was used to test relationships between locally-caught fish consumption and PFC levels in blood. Since age, gender, and other factors greatly influence PFC levels in blood, it is not possible to show simple middle value bar charts of PFC levels by fish consumption amount.

Conclusions and Discussion

We expected to find these chemicals in participants' blood and urine because they are common in the environment, food, and products people use. This study showed:

- BPA, triclosan, 1-hydroxypyrene, and four PFCs (PFNA, PFHxS, PFOA, and PFOS) were found in nearly all participants. Other biomonitoring studies have also found these chemicals in the majority of people tested.
- FDL participants are similarly or less exposed to these chemicals than the other populations with the exception of 1-hydroxypyrene. Higher 1-hydroxypyrene levels in FDL study participants compared to the U.S. population is likely due to a higher smoking rate in the FDL Community.
- In general, men had higher amounts of **PFCs** compared to women and PFC amounts tended to increase with age.
- Links between increased amounts in blood or urine and exposure to certain types of products and foods that may contain these chemicals, including:
    - Cigarette smoke and **1-hydroxypyrene**
    - Certain personal care products and **triclosan**
    - Canned foods and **BPA**
    - Locally-caught fish and certain **PFCs**.

Our ability to relate answers on the study questionnaire to biomonitoring results was limited for BPA, triclosan, and 1-hydroxypyrene. Participants were asked many questions about foods they ate and activities they did *in the past year*. This timeframe is useful for linking questionnaire responses to levels of persistent chemicals in the body. Since **BPA, triclosan,** and **1-hydroxypyrene** pass through the body within a few days, it is difficult to relate a single measurement for these chemicals to questionnaire responses based on the past year. Consequently, we focused on relating these urine results to questionnaire items that asked about recent exposures[7].

The Minnesota Pollution Control Agency tests fish from lakes and rivers across Minnesota for PFCs. **PFOS** is the only PFC known to accumulate to levels of health concern in fish. However, PFCs are low or not detected in most Minnesota fish tested (see Recommendations, below).

We expect people's levels of **triclosan** and **PFCs** to decrease over time in response to recent regulatory actions restricting their production and use. The results from this study can serve as baseline data to monitor changes over time if future testing is done.

[7] For example, since 1-hydroxypyrene is short-lived in the body, we could not reliably link urine results to questions about swimming and wading in, and eating fish from, the Saint Louis River below the dam *in the past year*; or smoking meat/fish as a hobby *in the past year*.

Recommendations

Based on the findings in this report, people in the FDL Community can:

- Eat fish as part of a healthy diet.
    - Follow the **safe eating guidelines for fish,** available on the FDL biomonitoring webpage: http://www.fdlrez.com/HumanServices/biomonitoring.htm. Following the guidelines will keep PFCs and other chemicals from building up to harmful levels in your body.
        - Some water bodies in Minnesota have advice to limit consumption of fish based on levels of PFOS in the fish. See the PFC "Frequently Asked Questions" section of this report and the MDH webpage "*Fish consumption advice for specific lakes or rivers"* for more information: http://www.health.state.mn.us/divs/eh/fish/eating/sitespecific.html.
    - For further questions about eating fish safely, please contact Nancy Schuldt - FDL Natural Resources Division - at (218) 878-7110.
- Partake of a traditional diet including eating local wild produce and game.
- Make personal choices about whether to limit one's exposure to these chemicals. The *Frequently Asked Questions* pages list actions one can take to lower exposure to these chemicals.

Next Steps

Although this is the final "Community Report" from this project, the FDL Band, MDH, and ATSDR will continue to evaluate the information collected from this study. Findings of interest may be presented at community and scientific meetings; or reported in the FDL newspaper, scientific journals, or other publications. MDH and the FDL Band intend to explore future opportunities to identify and address exposure to environmental contaminants within the FDL Community.