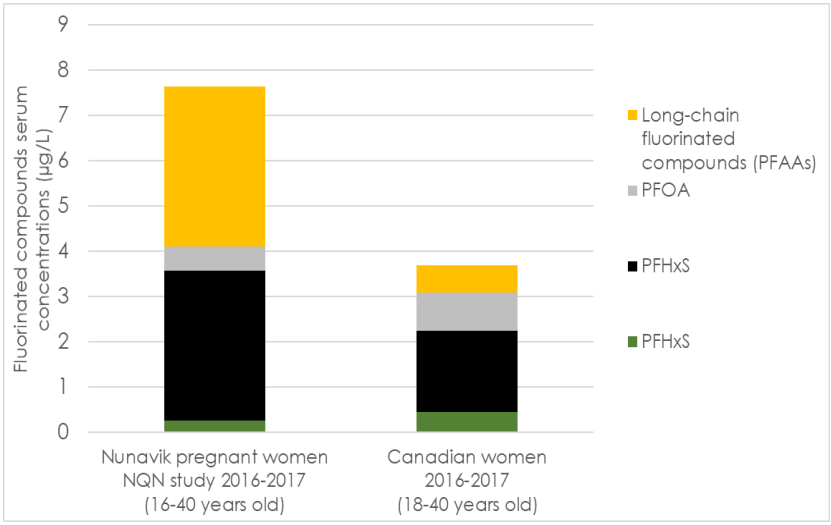
Fluorinated compounds in Nunavik: recent findings to be shared with Nunavimmiut

The *Nutaratsaliit Qanuingisiarningit Niqituinnanut* (NQN) – Pregnancy wellness with country foods project was carried out in 2016-2017 in collaboration with 97 pregnant women in Nunavik, the Nunavik Nutrition and Health Committee, and several regional organizations. We studied the multiple nutritional benefits of eating country foods and the exposure to different contaminants with the **overall goal to promote healthy pregnancies and healthy child development in the communities of Nunavik and other circumpolar regions**.

As part of the NQN project, we examined contaminants called fluorinated compounds or perfluoroalkyl acids (known as PFAAs or PFASs). PFAAs are chemicals which help repel oil and water, and which used to be found in many consumer goods such as Teflon pans, GoreTex jackets, market food packaging (i.e. microwave popcorn), carpet and furniture treatments, weather-proofing paints, cleaning products, personal care products (toiletries and cosmetics), etc. Most PFAAs are now regulated to limit their use. Older PFAAs are regulated at the international level (PFOS and PFOA), whereas more recent PFAAs (long-chain PFAAs) are regulated in Canada and the US, but not yet at the international level. However, similar compounds called fluorotelomers alcohols (FTOHs) are still used in consumer goods and transported to the Arctic via atmospheric currents where they locally degrade into PFAAs. PFOS and long-chain PFAAs strongly accumulate in wildlife. Indeed, these chemicals are currently measured in high concentrations in several Arctic wildlife species despite the absence of major local emission sources of PFAAs.

What did we do? In the NQN project, we studied the changes in the concentration of various PFAAs in Nunavimmiut pregnant women over time (2004-2017) and compared the concentrations of PFAAs to the exposure of women from the general Canadian population. We also investigated if the consumption of country foods during pregnancy was associated with lower or higher exposure to PFAAs.

What did we find out? The concentrations of older regulated PFAAs, such as PFOS and PFOA, have declined in Nunavik pregnant women between 2004 and 2017. However, the concentrations of long-chain PFAAs (PFNA, PFDA and PFUdA) have increased since 2011, most likely due to the degradation of FTOHs. In 2016-2017, the overall concentration of PFAAs was twice as high in pregnant Inuit women who participated in the NQN study than among the general Canadian population. Our results also show that marine country food consumption is associated with higher exposure to PFAAs. Further studies are on-going to better understand how Nunavimmiut are exposed to PFAAs (country foods, consumer goods, etc.) and to understand their possible effects on Inuit health.



Country foods play a key role in a healthy diet, and the nutritional and cultural benefits of country foods are very important for healthy pregnancies and babies.

You can count on our team and Nunavik colleagues to strongly advocate against the use of PFAAs and FTOHs at the national and international level to protect the exceptional quality of country foods in Nunavik.

This research was funded by the Northern Contaminants Program of Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC). The scientific paper presenting these findings has been recently published in Environment International: https://www.sciencedirect.com/science/article/pii/S0160412020321243

Fluorinated compounds in Nunavik: recent findings to be shared with Nunavimmiut

Contact person for the NQN project:

Mélanie Lemire,
Littoral Research Chair, Laval University
melanie.lemire@crchudequebec.ulaval.ca
418-866-1138

Contact person for PFAAs in Arctic wildlife:

Amila da Silva,
Environment and Climate Change Canada
amila.desilva@canada.ca
905-220-9508

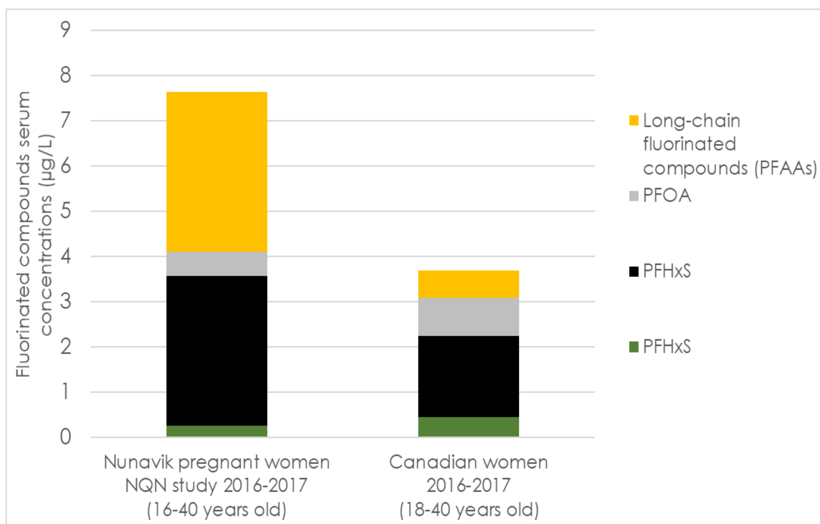
ᖃᑯᖅᓯᓕᐅᑎᖅᓵᓖᑦ ᓱᒃᑯᓇᕐᑐᔦᑦ ᓄᓇᕕᒻᒥᐅᑦ- ᖃᐅᔨᓵᐅᖅᖃᒥᒃ ᓄᓇᕕᒻᒥᐅᓄᑦ ᖃᐅᔨᓴᐅᒥᐊᓖᑦ

ᓄᑕᕋᖅᓵᓖᑦ ᖃᓄᐃᖕᖏᓯᐊᕐᓂᖏᑦ ᓂᕿᑐᐃᓐᓇᓄᑦ (NQN) – ᓇᖅᔨᓯᓂ ᖃᓄᐃᖕᖏᓯᐊᕐᓂᑦ ᓂᕿᑐᐃᓐᓇᑐᕐᓯᑎᒃ ᐱᓇᓱᐊᓚᖅᓴᖑᕐᑕᐅᔪᕕᓂᖅ ᐋᑐᑎᔭᐅᓂᑰᕗᖅ 2016-2017ᒥ ᐱᓇᓱᐊᖃᑎᖃᕐᓯᑎᒃ 97 ᐳᓯᐊᓪᑕᖏᓐᓂ ᓇᖅᔨᔪᐃᑦ/ᐱᐊᕋᖅᓵᓖᑦ ᐊᕐᕿᑦ ᓄᓇᕕᒻᒥ, ᓄᓇᕕᒻᒥ ᓂᕿᖅᓯᐊᑐᓂᕐᒧᑦ ᖃᓄᐃᖕᖏᓯᐊᕐᓂᒧᑦ ᑲᑎᒪᔨᐅᕕᐊᐱᓐᓂ, ᐊᒥᓱᓂᒃ ᓄᓇᓕᓖᑦ ᑎᒥᖁᑎᖏᓐᓂ. ᖃᐅᔨᓴᕐᕕᖃᓚᐅᕐᓯᒪᔪᑦ ᐊᒥᓱᐃᓕᖕᖓᔦᑦ ᓂᕿᑐᕐᓂᒧᑦ ᓂᕿᑐᐃᓐᓇᓂᑦ ᐱᕙᓪᓕᑕᕐᑕᐅᓯᐊᕐᐸᓂᕆᔭᖏᓐᓂ ᐊᒻᒪᓗ ᓱᒃᑯᓇᕐᑐᔭᕐᓂᑦ ᓱᕋᑕᐅᑦᑕᖃᑦᑕᓂᕕᓂᖏᓐᓂ **ᐃᓗᓐᓃᒧᑦ ᖁᕙᕆᐊᕆᓚᓱᐊᕐᓯᑕ ᖃᓄᐃᖕᖏᓯᐊᓚᓱᐊᕐᓂᕝᖓᔪᓂᑦ ᓲᕐᓗ ᐱᐊᕋᖅᓴᖃᑦᓯᐊᕐᑯᒧᑦ ᐱᐊᓪᓗ ᐱᕈᕐᐸᓕᐊᑦᓯᐊᕐᑯᒧᑦ ᓄᓇᓕᖕᖏᓐᓂ ᓄᓇᕕᐅᑉ ᓯᓚᕐᔪᐊᓗ ᑲᖅᔨᖕᖓᓂᒥᐅᔭᕐᑕᕐᑯᑎᖏᓐᓂ.**

ᐃᓚᐅᑎᓪᓗᒋᑦ NQNᑯᑦ ᐱᓇᐊᒧᓱᐊᓚᖅᓴᖑᕐᓯᒪᔭᖓᓄᑦ, ᕿᒥᕐᕈᖃᑦᑕᓚᐅᔪᔪᑦ ᓱᒃᑯᓇᕐᑐᔭᕐᓂᒃ ᐊᑦᓯᕋᕐᑕᐅᒍᓯᓕᓐᓂᒃ. fluorinated compoundsᓂᑦ (ᖃᑯᖅᓯᓕᕆᐅᑎᖅᓴᔦᑦ) ᐅᕝᕙᓘᓐᓃᑦ perfluoroalkyl acidsᓂᑦ (ᐆᑦᓯᓲᖅᓴᔦᑦ) (ᐊᑦᓯᕋᖅᓯᑕᐅᓂᖃᓲᒍᒻᒥᓱᑎᒃ PFAAs ᐅᕝᕙᓘᓐᓃᑦ PFASs). PFAAs ᐅᐊᕈᑎᓵᑦ ᐃᑲᔪᖅᓯᓲᓂᑦ ᐅᖅᓱᐊᓗᔭᖅᓴᔭᒥᒃ ᐃᒪᕐᒥᓘᓐᓃᑦ ᒥᓗᑦᓯᖃᔭᖕᖏᑑᑎᑦᓯᓱᑎᒃ, ᑕᑯᔭᐅᕙᓕᕐᓱᑎᓗ ᐊᒥᓱᓂ ᓂᐅᕕᕐᑕᐅᕙᑦᑐᓂᑦ ᐆᑦᑐᕋᐅᑎᒋᓗᒋᑦ ᐃᒐᐅᑏᑦ ᓂᐱᓇᖅᑯᑎᔭᓖᑦ, ᐅᓕᑲᑦᑌᑦ ᓯᓚᐸᑦᓴᔭᓖᑦ, GoreTexᒥᒃ, ᓂᖁᑦ ᐳᖅᑐᓯᒪᔦᑦ (ᖃᓚᑦᓯᒍᐊᕐᑐᔭᒧᑦ ᖃᓚᑕᐅᓲᑦ ᐸᒃᑯᐋ ᐆᑦᑑᑎᒋᓗᒍ), ᓇᑎᖅᓴᔦᑦ, ᐱᐅᓕᓂᐊᓚᑦᑎᓂ ᓲᕐᓗ ᐃᑦᓱᕚᐅᑖᓗᑦᑎᓂ ᓴᓗᒣᓇᑎᑦᓯᒍᑏᑦ, ᐃᒻᖃᔭᖕᖏᑐᖅᓴᔦᑦ ᒥᖑᐊᕈᑏᑦ, ᓴᓗᒻᒪᓴᐅᑏᑦ, ᐃᒻᒥᓂᑦ ᑲᒪᒐᓱᐊᕈᑎᖅᓴᔭᑦ (ᐃᖅᑰᑎᖅᓴᔦᑦ ᐱᐅᓴᐅᑏᑦ), ᐊᓯᖏᓗ. ᐃᓗᓐᓇᑲᓭᑎᒃ PFAAs ᒪᓕᒐᖅᓴᖃᖅᑎᑕᐅᓕᖅᑐᑦ ᐊᑐᑲᑦᑕᑦᑕᐅᓂᖏᑦ ᐃᑯᓪᓚᒪᑎᑕᐅᓇᓱᐊᒧᑦ. PFAAsᑐᖃᐅᓂᖅᓴᓕ ᒪᓕᒐᖃᖅᑎᑕᐅᓕᖅᑎᓗᒋᑦ ᓄᓇᕐᔪᐊᓕᒫᒥ (PFOSᔦᑦ PFOAᔪᓗ), ᐁᑉᐹᒍᓕ, ᓄᑖᔭᐅᓂᖅᓴᑦ PFAAs (ᐱᑐᑦᓯᒪᐅᑎᔪᑯᑖᑦᓴᔦᑦ PFAAs) ᒪᓕᒐᖃᖅᑎᑕᐅᓕᖅᑐᑦ ᑳᓇᑕᒥ ᐊᒥᐊᔩᑲᒃᑯᓗ ᓄᓇᖓᓂ, ᓄᓇᕐᔪᐊᓕᒻᑳᒃᑯᑎᒎᖕᖏᑐᐃᓐᓇᑐᓯᓕ. ᑭᓯᐊᓂᓕ, ᐊᑦᔨᐸᓱᔭᖏᑦ ᐊᑦᓯᕋᕐᑕᐅᒍᓯᓖᑦ fluorotelomers alcohols (FTOHs) ᐊᑐᕐᑕᐅᕙᖏᓐᓈᑐᑦ ᓂᐅᕕᐊᖅᓴᔭᕐᓃᓱᑎᒃ ᐅᑭᐅᕐᑕᑑᔭᕐᑕᐅᕙᑦᓯᑎᒃ ᐊᓂᕐᓂᐅᑉ ᐊᐅᓚᓂᖓᓄᑦ ᐅᑭᐅᕐᑕᑑᒥᓕᕋᒥᓗ PFAAsᖑᕐᐸᓯᑎᒃ, PFOSᖑᕐᐸᓯᑎᒃ, ᐱᑐᑦᓯᒪᐅᑎᔪᑯᑕᖕᖑᓯᑎᓗ PFAAs ᓄᐊᑦᓯᓂᐊᓕᕋᒥᒃ ᐆᒪᔪᖁᑎᑦᑎᓂ. ᓱᓕᔪᖅ, ᐅᓄᕐᑐᒪᓇᐊᓘᕙᓕᖅᑐᑦ ᓄᐊᒪᓂᖏᑦ ᐊᒥᓱᓂ ᐆᒪᔫᔪᓂᑦ ᓇᑭᐅᔮᖕᖏᑐᖅ, ᐊᑕᐅᖅ,PFAAsᑖᖅᕕᓴᖃᖕᖏᑲᓗᐊᕐᒪᑦ ᐅᓄᕐᑐᓂᑦ ᐅᑭᐅᕐᑐᓪᓚᓇᒻᒥ.

ᖃᓄᐃᓗᓚᐅᔪᕕᑖ? NQNᑯᑦ ᐱᓇᓱᐊᓚᖅᓴᖑᕐᓯᒪᔭᖓᑎᒍᑦ, ᖃᐅᔨᓴᐅᔪᕗᒍᑦ ᐊᓯᑦᔨᓯᒪᓕᕐᓂᖏᓐᓂ ᐅᓄᕐᓂᖏᑦᑕ project, we PFAAsᓴᔦᑦ ᓄᓇᕕᒻᒥ, ᓇᖅᔪᓂᑦ ᐊᕐᓇᓂ ᓯᕕᑐᔪᖃᓪᓚᒥ (2004ᒥ 2017ᒧᑦ) ᐊᒻᒪᓗ ᑲᓇᑕᓕᒫᑉ ᐊᕐᓇᖏᑦᑕ ᐃᑉᐱᒋᑦᓯᒋ5 ᖃᓄᓪᓗᐊᑎᒋᔪᒥᒃ ᐊᑦᔨᐅᖏᓐᓂᖃᒪᖔᑕ ᖃᐅᔨᓴᕐᓯᑕ. ᖃᐅᔨᓴᕐᓂᖃᓚᐅᕝᒥᔪᑦ ᓂᕆᕙᓐᓂᒥᓄᑦ ᓂᕿᑐᐃᓐᓇᓂᑦ ᓇᖅᔪᐃᑦ ᐱᑕᑦᓯᔫᒥᓲᖑᒻᒪᖔᑕ ᖏᒻᒪᖔᑕᓘᓐᓃᑦ PFAAᓂᑦ.

ᓱᓇᒦᒃ ᖃᐅᔨᓚ ᕿᓚᐅᔪᕕᑕ? ᐅᓄᕐᓂᖏᑦ PFAAsᓴᔭᐅᓂᖅᓴᑦ, ᓲᕐᓗ PFOS ᐊᒻᒪᓗPFOA, ᑲᑕᔩᒥᓯᒪᓕᖅᑐᑦ ᓄᓇᕕᒻᒥᐅᑦ ᐱᐊᕋᖅᓴᖃᔨᐊᕕᓂᖏᑦ 2004ᒥ 2017ᒧᑦ. ᑭᓯᐊᓂᓕ, ᐱᑐᑦᓯᒪᐅᑎᔪᑯᑖᖅᑕᓕᓐᓂ PFAAs (PFNA, PFDA and PFUdA) ᐅᓄᖅᓯᔩᒥᓯᒪᓕᖅᑐᑦ 2011ᒥᓂᑦ, ᐃᒻᒪᖅ FTOHsᓴᔦᑦ ᐊᓯᑦᔨᑕᖅᓯᒪᓕᖅᓂᖏᓐᓄᑦ. 2016-2017ᒥ, ᐅᓄᕐᓂᖏᑦ PFAAs ᓲᕐᓗ ᐃᓗᒻᒥᑕᐅᓕᖅᓯᑎᒃ ᒪᕈᓗᐊᓄᑦ ᐅᓄᖅᓯᔩᒥᔪᕕᓃᑦ ᐱᓪᓗᒋᑦ ᐊᕐᕿᑦ ᐃᓚᐅᔪᕕᓃᑦ NQNᑯᑦ ᖃᐅᔨᓴᖅᑕᖓᓄᑦ ᓴᓂᐊᓂ ᑲᓇᑕᒥᐅᓕᒫᑦ ᐊᕐᓇᖏᑦ. ᓴᖅᑭᓚ ᕿᔨᐊᕗᓗ ᑕᑯᑦᓴᐅᑎᑦᓯᔪᑦ ᐃᒪᕐᐱᒥᐅᔦᑦ ᓂᕆᔭᐅᓲᑦ PFAAsᓴᔭᖅᑕᖃᓂᖅᓴᕕᓃᑦ. ᖃᐅᔨᓴᖅᕕᐅᑲᓂᖅᑐᖅ ᑕᒪᓐᓇ ᑐᑭᓯᑦᓯᐊᕈᒪᓂᑯᑎᓄᑦ ᖃᓄᖅ ᓄᓇᕕᒻᒥᐅᑦ. PFAAs ᓴᔭᖅᑖᑕᖅᒪᖔᑕ (ᓂᕿᑐᐃᓐᓄᑦ, ᓂᐅᕕᐊᖅᓴᑦ ᓂᕿᑦ, ᐊᓯᖏᓗ), ᑐᑭᓯᑦᔩᒥᒍᒪᒧᓗ ᖃᓄᖅ ᓱᖅᑐᓂᖃᖃᑦᑕᒪᖔᑕ ᐃᓄᐃᑦ ᖃᓄᐃᖕᖏᓯᐊᓚᓱᐊᕐᓂᖏᓐᓂ.



ᓂᕿᑐᐃᓐᓇᑐᕐᓃᑦ ᖃᓄᐃᖕᖏᓯᐊᓚᓱᐊᕐᓂᐅᔪᒧᑦ ᐃᓚᐅᓪᓚᕆᐸᑦ, ᓂᕿᑦᓯᐊᔭᐅᓂᖏᑦ ᐃᓕᕈᓯᑦᑎᒍᓗ ᐱᕙᓪᓕᓯᐊᓲᒍᓂᖏᑦ ᐱᒻᒪᕆᐅᓗᑦᓯᑎᓗ ᖃᓄᐃᖕᖏᓯᐊᕐᓗᑎᒃ ᐱᐊᕋᖅᓴᖃᕙᑦᑐᓄᑦ ᐱᐊᕋᕐᓄᓗ.

ᑕᑎᖃᕈᓐᓇᓯᐊᕐᐳᑎᑦ ᐃᓕᑦᑎᓂ ᓄᓇᕕᒥᐅᓂᓗ ᐊᑭᕋᕐᑐᓂᑦᑎᓂ ᓂᐸᖃᕐᓂᐊᑎᓪᓗᑕ ᐊᑐᕐᑕᐅᕙᓐᓂᖏᑦᑕ PFAACᑖᑦ FTOH ᑕᓖᓪᓗ ᑲᓇᑕᓕᒫᒥ ᓄᓇᕐᔪᐊᓕᒫᒥᓗ ᓴᐳᒻᒥᒪᔭᐅᕐᑯᒧᑦ ᓂᕿᑐᐃᓇᔭᑦᓯᐊᕋᓘᕙᑦᑐᑦ ᓄᓇᕕᒥ.

ᖃᑯᕐᓯᓂᐅᑎᑦᓴᓃᑦ ᓱᒃᑯᓇᕐᑐᔪᑦ ᓄᓇᕕᒻᒦᑐᑦ- ᖃᐅᔨᓴᐅᕐᖃᒦᒃ ᓄᓇᕕᒻᒥᐅᓄᑦ ᖃᐅᔨᓴᐅᒋᐊᓃᑦ

ᑖᓐᓇ ᖃᐅᔨᓴᕐᓂᕕᓂᖅ ᑮᓇᐅᔭᖃᕐᑎᑕᐅᔪᕕᓂᖅ ᑲᓇᑕᐅᑉ ᑕᕐᕋᖓᓂ ᓱᒃᑯᓇᕐᑐᓕᕆᓂᐅᑉ ᐱᓪᓗᒋᑦ ᓄᓇᖃᕐᖄᓯᒪᔪᔪᑦ ᑲᓇᑕᒥ (CIRNAC).
ᐊᑐᐊᒐᑦᓴᖑᕐᑕᐅᒪᔪᖅ ᐋᐳᕐᖁᓴᓂᕐ ᒨᖓᑦᓯᓂ ᓴᕿᑎᑕᐅᕐᖃᒥᒃ ᐅᕘᓇ ᐊᕙᑎᓕᕆᓂᖅ ᓄᓇᔪᐊᕐᒥ:
https://www.sciencedirect.com/science/article/pii/S0160412020321243

ᖃᓄᕐᑑᕕᐅᒍᓐᓇᑐᖅ NQN ᑯᑦ ᐱᓇᓱᐊᒐᑦᓴᖑᕐᓯᒪᔪᒨᖓᔪᓂᑦ:

ᒣᓕᓐ ᓕᒥᐊ,
Littoral ᖃᐅᔨᓴᕐᓂᒧᑦ ᐃᑦᓱᕙᐅᑕᓇᔭᖅ, ᓚᕙᓪ ᐃᓕᓐᓂᐊᕕᕐᔪᐊᖅ
melanie.lemire@crchudequebec.ulaval.ca
418-866-1138

ᖃᓄᕐᑑᕕᐅᒍᓐᓇᑐᖅ PFAAs ᒨᖓᔪᓂᑦ ᐱᓪᓗᒋᑦ ᐅᑭᐅᕐᑕᑑᑉ ᐆᒪᔪᕐᑯᑎᖏᑦ

ᐊᒥᓚ ᑕ ᓯᓪᕙ
ᐊᕙᑎᓕᕆᓂᖅ ᓯᓚᐅᓪᓗ ᐊᑦᓯᔾᐸᓪᓕᐊᓂᖓᓄᑦ ᑲᓇᑕᒥ
amila.desilva@canada.ca
905-220-9508