

Baseline measures of Persistent Organic Pollutants in Eeyouch

Summary for health workers of an article by Eric Liberda, Leonard Tsuji, Ian Martin, Suzanne Cote, Pierre Ayotte, Eric Dewailly and Evert Nieboer, titled “Plasma concentrations of persistent organic pollutants in the Cree of Northern Quebec, Canada: Results from the multi-community environment-and-health study.”

PURPOSE

This study examines the levels of 17 “Persistent Organic Pollutants” (POPs) in Eeyouch. The results provide baseline data against which we can compare future studies. In addition, the results tell us which groups and communities are most exposed to these chemicals.

BACKGROUND

What are POPs?

POPs are pollutants that take a very long time to break down. Because they last so long, they tend to build up in the food chain. These pollutants move from smaller fish or animals into the larger ones that eat them, and eventually end up in fish and game that might be eaten by humans.

Many of these POPs are harmful to humans if too much builds up in our bodies. They can damage nerves, damage the immune system, and affect childhood development. At present, very few people in Eeyou Istchee have elevated levels of these POPs in their blood. However, since many northern communities are exposed to POPs, we want to monitor the situation.

This study looked at three classes of POPs:

- PCBs (a chemical mixture that is now banned, but that used to be in equipment like electric transformers).
- Organochlorine pesticides such as DDT (also now banned).
- Bromine compounds that are used as fire retardants in many household products, from upholstery to electrical appliances.

The study did not measure every possible POP. It looked at:

- 14 of the PCBs
- 11 organochlorine pesticides
- 5 of the bromine compounds that are used as fire-retardants.

For simplicity, the rest of this text will simply speak of “PCBs,” “pesticides,” and “fire retardants.”

Where do these POPs come from?

How do Eeyouch get exposed to these POPs? For the first two types—PCBS and pesticides—there are several possibilities. The biggest source is usually traditional foods. Because POPs don't break down easily, they can be carried all over the world by wind and water. Then they end up in the soil, the plants, and eventually the fish and animals. Resource activities like hydro generation, logging, and mining can also add some pollutants to the environment.

The third group of POPs—the fire retardants—are a bit different. These contaminants can leach out of household products and end up in house dust. Children often have the highest levels of these chemicals, because they play on the floor and usually ingest more dust than adults.

METHODS

The data for this study were drawn from the Nituuchischaayihititaa Aschii Environment-and-Health project. The project took blood samples from people (age 8 and over) in all nine communities, over the years 2002 to 2009, and checked those samples for pollutants. The participation rate was 55% in the two communities studied in 2002, and 47% in the last seven communities.

The research team used statistical techniques (analysis of variance and Principal Component Analysis) to detect patterns in the data.

RESULTS

Higher levels in Eeyou Istchee than elsewhere

The POP levels found in this study, while generally safe, were higher than those recorded for many First Nation communities in Canada. Levels of specific POPs were also higher than for Canadian adults in general. The levels of one specific fire-retardant were slightly higher than in Nunavik Inuit, and distinctly higher than in southern Canadians.

Age pattern differs with the type of POP

As is typical, older adults tended to have higher levels of both PCBs and pesticides in their blood than younger adults or children. For the fire-retardant compounds the opposite was true: children 8-14 tended to have higher levels. This is consistent with an explanation in terms of house dust, although it does not explain why the study also found higher levels in males than in females.

Some differences by sex

One interesting finding was that women over 40 seem to have higher levels of DDT and one particular PCB (PCB 128) than others. The researchers could not explain this, but noted that a similar pattern was found in two of the Cree communities on the Ontario side of James Bay. Older women also seemed to have lower levels of the fire-retardant compounds.

Substantial variation from community to community

Levels of all three types of POPs—PCBs, pesticides, and fire-retardants—varied significantly from community to community. In particular, the researchers noticed that pesticide levels were highest in two of the inland communities, and lowest in two of the coastal ones.

What could explain the variations in exposure to POPs? The authors note several possibilities that would be worth exploring in future:

- Diet: preliminary analysis suggests that people in the Inland communities eat more traditional food, and this is probably the main contributor to POP levels.
- The hydro development, mining, and logging that is taking place in the eastern part of *Eeyou Istchee*
- Improper shut-down of the Mid-Canada Radar Line sites in the western part of *Eeyou Istchee*

Since food is the biggest suspect, we need to consider how air currents carry pollutants into the region and deposit them. Several factors are at play here:

- Boreal forests tend to take in compounds like pesticides and fire-retardants, and seven of *Eeyou Istchee*'s nine communities are located in the boreal forest zone.
- Latitude has an effect: research shows that the greatest deposition of pesticides happens between 50 and 70 degrees north, the range in which nearly all of the *Eeyou* communities fall.
- Finally, there's an effect of vegetation: deciduous trees accumulate more pesticides than conifers.

To really identify the sources of the pesticides, and therefore explain the variations between communities, we'd need to look at all these things. We'd also need to consider the effect of community relocations, since some of the communities have moved several times over the years.

CONCLUSIONS

Residents of *Eeyou Istchee* are at increased risk of exposure to POPs because they rely so heavily on the land. This study provides a much-needed baseline for the region. The age patterns are as expected, and underline how important it is to consider age group in these kinds of studies.

Future studies should try to clarify how much of people's exposure to these pollutants is due to their diet, and how much is due to geography. They should also look at whether these pollutants are affecting people's health.