



Mercury in Newborns in the Lake Superior Basin

Introduction

The “Mercury in Newborns in the Lake Superior Basin” study was conducted by the MDH Fish Consumption Advisory Program and the MDH Public Health Laboratory from 2007 to 2011, in collaboration with state newborn screening programs in Minnesota, Wisconsin, and Michigan. It was funded by the U.S. Environmental Protection Agency (EPA), the MDH Fish Consumption Advisory Program, the MDH Public Health Laboratory and the MDH Environmental Health Tracking and Biomonitoring Program.

What was the purpose of the study?

The main goal of this study was to see how much mercury newborn babies born to mothers living in the Lake Superior Basin have in their blood. Fetuses, infants, and young children are most at risk from mercury exposure because small amounts of mercury can harm the developing brain and nervous system. The mercury measured in newborns represents exposure to the fetus that occurred near the time of birth. Most mercury exposure to unborn babies occurs when the mother eats fish or shellfish contaminated with a form of mercury called methylmercury.

How was the study conducted?

While a newborn is still in the hospital, a few drops of blood are routinely collected from the baby’s heel to send to a state’s newborn screening program. Newborn screening programs test for a number of heritable or congenital conditions. The Mercury in Newborns in the Lake Superior Basin study tested total mercury in blood left over from newborn screening. Assessing the feasibility of this new laboratory method was another purpose of the study. In Minnesota, informed consent was obtained from a parent before a baby’s blood was tested for mercury. To be eligible, the mother had to reside in Minnesota, Wisconsin, and Michigan; near Lake Superior. From 2008 to 2010, a total of 1,465 babies were tested. The blood samples were anonymized; meaning, there was no personally-identifying information attached to the blood sample. However, information was retained on the baby’s sex, month and year of birth, state of residence, and whether the mother lived in an urban or non-urban area (Minnesota only).

What were the results?

- Most infants were found to have low or undetected total mercury levels.
- Eight percent of tested newborns had mercury levels above the U.S. EPA reference dose for methylmercury (the form of mercury found in fish).
- In Minnesota, ten percent of tested newborns had concentrations above the reference dose. This means that some pregnant women in the Lake Superior region, and in Minnesota, have mercury exposures that need to be reduced.
- Three percent of the Wisconsin samples were above the U.S. EPA dose limit.
- No Michigan samples were above the U.S. EPA dose limit.
- No relationships were seen between the level of mercury and the baby's sex or urban/non-urban residence.
- Babies born during the summer months were more likely to have an elevated mercury level. This seasonal effect suggests that increased consumption of locally caught fish during the warm months is an important source of pregnant women's mercury exposure in this region.

What are the strengths and limitations of this study?

- This is the first study to use bloodspots to report mercury levels in newborns, a group vulnerable to the neurotoxic effects of mercury.
- Making use of pre-collected newborn screening blood spots made it possible to measure mercury in a large sample of newborns without the need for invasive and medically-unnecessary procedures.
- Because this is the only study to report mercury levels in newborn bloodspots, it is unknown how these results compare to maternal and newborn mercury levels reported in other studies. Research conducted by MDH

suggests that mercury levels in newborn blood spots are strongly correlated with levels found in cord blood. No statewide or national comparison data for newborns exists.

- This was a large study; about 30 percent of the Minnesota babies born in the study area were tested. However these results may not be representative of the newborns in the Lake Superior Basin or in Minnesota.
- Although the seasonal effect suggests the source of mercury was methylmercury from eating fish, only total mercury was measured in this study. While several studies have shown that eating fish is the way most people are exposed to mercury, other sources are possible, including dental fillings, broken thermometers, or cosmetic uses of mercury such as skin lightening creams or ethnic medicinals.

How will the study results be used to improve public health?

MDH has been sharing specialized fish consumption information with women and their health care providers. Even so, the study results show that pregnant women and those planning pregnancy need more information on how to select fish low in mercury. As a result of the study, MDH is strengthening outreach and communication efforts to health care providers and others, to ensure that the public has information that promotes eating fish low in mercury.

MDH is conducting additional biomonitoring surveys:

- The Fish Consumption Advisory Program is evaluating interventions and actions to determine effective ways to reduce mercury exposure in women of child-bearing age in the Lake Superior region.
- The Minnesota Biomonitoring Program is measuring newborn exposure to mercury and other metals to find out whether the levels measured in this study are found in other parts of the state and in vulnerable groups, and to identify the sources of the exposure.

Ongoing biomonitoring conducted will track the progress of interventions and actions to reduce mercury exposure and protect future generations.

Where can I obtain more information

[Final Report to EPA: Mercury Levels in Blood from Newborns in the Lake Superior Basin \(PDF: 2637KB/181 pages\)](http://www.health.state.mn.us/glnpo.pdf)
(<http://www.health.state.mn.us/glnpo.pdf>)

[Guidelines for safe fish consumption for pregnant women, women planning pregnancy and children under age 15, as well as the general public](http://www.health.state.mn.us/divs/eh/fish/eating/safeeating.html) (<http://www.health.state.mn.us/divs/eh/fish/eating/safeeating.html>)

[Mercury in Residual Bloodspots of Newborns from the Lake Superior Basin Region \(PDF: 192KB/1 page\)](http://www.health.state.mn.us/divs/eh/hazardous/topics/studies/winconpost0112.pdf)
(<http://www.health.state.mn.us/divs/eh/hazardous/topics/studies/winconpost0112.pdf>)

[Biomonitoring Studies in the MDH Environmental Health Division](http://www.health.state.mn.us/divs/eh/risk/studies/biomonitoring.html)
(<http://www.health.state.mn.us/divs/eh/risk/studies/biomonitoring.html>)

[Minnesota Biomonitoring Program](http://www.health.state.mn.us/biomonitoring) (<http://www.health.state.mn.us/biomonitoring>)

[Pregnancy and Newborns Exposure Study](http://www.health.state.mn.us/divs/hpcd/tracking/biomonitoring/projects/pnes.html)
(<http://www.health.state.mn.us/divs/hpcd/tracking/biomonitoring/projects/pnes.html>)

[Minnesota Public Health Data Access: Chemicals in People-Mercury](https://apps.health.state.mn.us/mndata/biomonitoring_mercury)
(https://apps.health.state.mn.us/mndata/biomonitoring_mercury)

[Fish Consumption Advice](http://www.health.state.mn.us/divs/eh/fish/index.html) (<http://www.health.state.mn.us/divs/eh/fish/index.html>)

[Mercury](http://www.health.state.mn.us/divs/eh/hazardous/topics/mercury/index.html) (<http://www.health.state.mn.us/divs/eh/hazardous/topics/mercury/index.html>)

[Chemicals of Special Concern to Children's Health](http://www.health.state.mn.us/divs/eh/children/chemicals.html) (<http://www.health.state.mn.us/divs/eh/children/chemicals.html>)

Information for Health Care Providers

[Mercury Levels in Newborns Study Information for Health Care Providers \(PDF: 136KB/2 pages\)](http://www.health.state.mn.us/divs/eh/hazardous/topics/studies/newbornhghc.pdf)
(<http://www.health.state.mn.us/divs/eh/hazardous/topics/studies/newbornhghc.pdf>).

[Quick Reference Guide for Clinicians: Fish Consumption to Promote Good Health and Minimize Contaminants](http://www.arhp.org/publications-and-resources/quick-reference-guide-for-clinicians/fish-and-health)
(<http://www.arhp.org/publications-and-resources/quick-reference-guide-for-clinicians/fish-and-health>).

[Mercury poisoning from skin lightening products: Fact sheet for health care providers](http://www.health.state.mn.us/topics/skin/provfs.html)
(<http://www.health.state.mn.us/topics/skin/provfs.html>).

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