

# Lead in Canadians

December 2021



Health  
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Canada

Canada

**Health Canada is the federal department responsible for helping the people of Canada maintain and improve their health.** Health Canada is committed to improving the lives of all of Canada's people and to making this country's population among the healthiest in the world as measured by longevity, lifestyle and effective use of the public health care system.

Suggested citation:

Health Canada. 2021. Lead in Canadians. Ottawa, ON. Available: <https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/environmental-contaminants/human-biomonitoring-resources/lead-canadians.html>

Également disponible en français sous le titre :

Santé Canada. 2021. Le plomb dans la population canadienne. Ottawa (Ont.).

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Publication date: December 2021

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Cat.: H129-119/5-2021E-PDF  
ISBN: 978-0-660-40595-7  
Pub.: 210380

## BACKGROUND



### What is lead?

Lead (CASRN 7439-92-1) is a naturally occurring metal. It enters the environment through both natural and industrial processes. Lead persists in the environment and can accumulate over time.



### Where is lead found?

Lead is present in bedrock, soils, sediments and bodies of water. Lead released from industrial emissions can be a major source of environmental contamination, especially near smelters or refineries. Lead is used in some consumer products and can be found in many foods.



### How are people exposed to lead?

Canadian adults are exposed to lead mainly in food and drinking water. Infants and children may be further exposed by ingesting non-food items, such as house dust, paint, soil and consumer products.



### How is lead measured in people?

Lead is absorbed into the bloodstream after being ingested. Measurement of lead in blood is the preferred indicator of exposure.



### What are the potential health impacts of lead?

Chronic low-level exposure to lead has been associated with nervous system effects, cardiovascular disease, decreased kidney function and reproductive problems. Lead exposure in infants and children is associated with lowered intelligence quotient (IQ) and a greater risk of attention-related behaviours. No safe level of exposure is known to exist for these neurodevelopmental outcomes. The International Agency for Research on Cancer has classified inorganic lead compounds as probably carcinogenic to humans.



### What is the Government of Canada doing to lower human exposures to lead?

Lead is identified as toxic under the *Canadian Environmental Protection Act, 1999*. It is subject to numerous federal risk management initiatives directed toward industrial releases. Regulations under the *Canada Consumer Product Safety Act* limit the amount of lead in various consumer products. Health Canada has established maximum levels for lead in some foods. There are also guidelines in place for lead in Canadian drinking water. Health Canada's risk management strategy for lead outlines additional regulations. The Government of Canada continues to monitor and assess lead.

## DATA SOURCES

**Table 1. Biomonitoring initiatives and their target populations**

<b>Initiative</b>	<b>Target population</b>
Canadian Health Measures Survey (CHMS)	General Canadian population living in the 10 provinces
First Nations Biomonitoring Initiative (FNBI)	First Nations people living on-reserve south of the 60° parallel
Maternal-Infant Research on Environmental Chemicals (MIREC) study	Pregnant women and their infants recruited from obstetric and prenatal clinics in 10 cities across Canada
International Polar Year Inuit Health Survey (IPY IHS)	Inuit populations from the Inuvialuit Settlement Region (ISR), Nunavut and Nunatsiavut
U.S. National Health and Nutrition Examination Survey (NHANES)	General U.S. population

This fact sheet presents nationally representative data from the CHMS. These data are compared with data from the FNBI, the MIREC study, the IPY IHS and the U.S. NHANES.

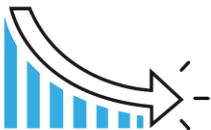
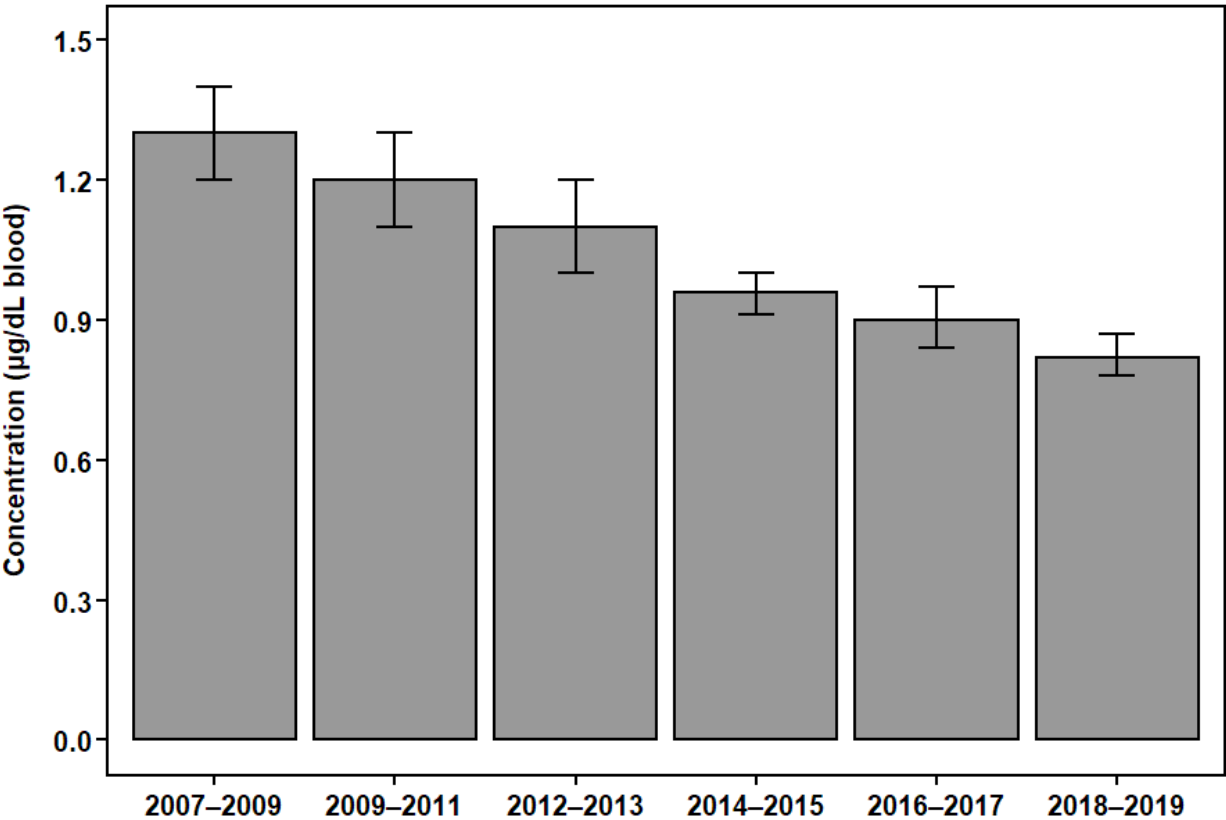
**Table 2. Biomonitoring initiatives and their collection periods, participant age ranges, matrices sampled and biomarkers measured**

Collection period	Age range (years)	Matrix	Biomarker
<b>CHMS</b>			
2007–2009	6 to 79	Blood	Lead
2009–2011	3 to 79	Blood	Lead
2012–2013	3 to 79	Blood	Lead
2014–2015	3 to 79	Blood	Lead
2016–2017	3 to 79	Blood	Lead
2018–2019	3 to 79	Blood	Lead
<b>FNBI</b>			
2011	20+	Blood	Lead
<b>MIREC study</b>			
2008–2011	18+	Blood	Lead
<b>IPY IHS</b>			
2007–2008	18+	Blood	Lead
<b>U.S. NHANES</b>			
2007–2008	1+	Blood	Lead
2009–2010	1+	Blood	Lead
2011–2012	1+	Blood	Lead
2013–2014	1+	Blood	Lead
2015–2016	1+	Blood	Lead

# RESULTS

## Canadian population

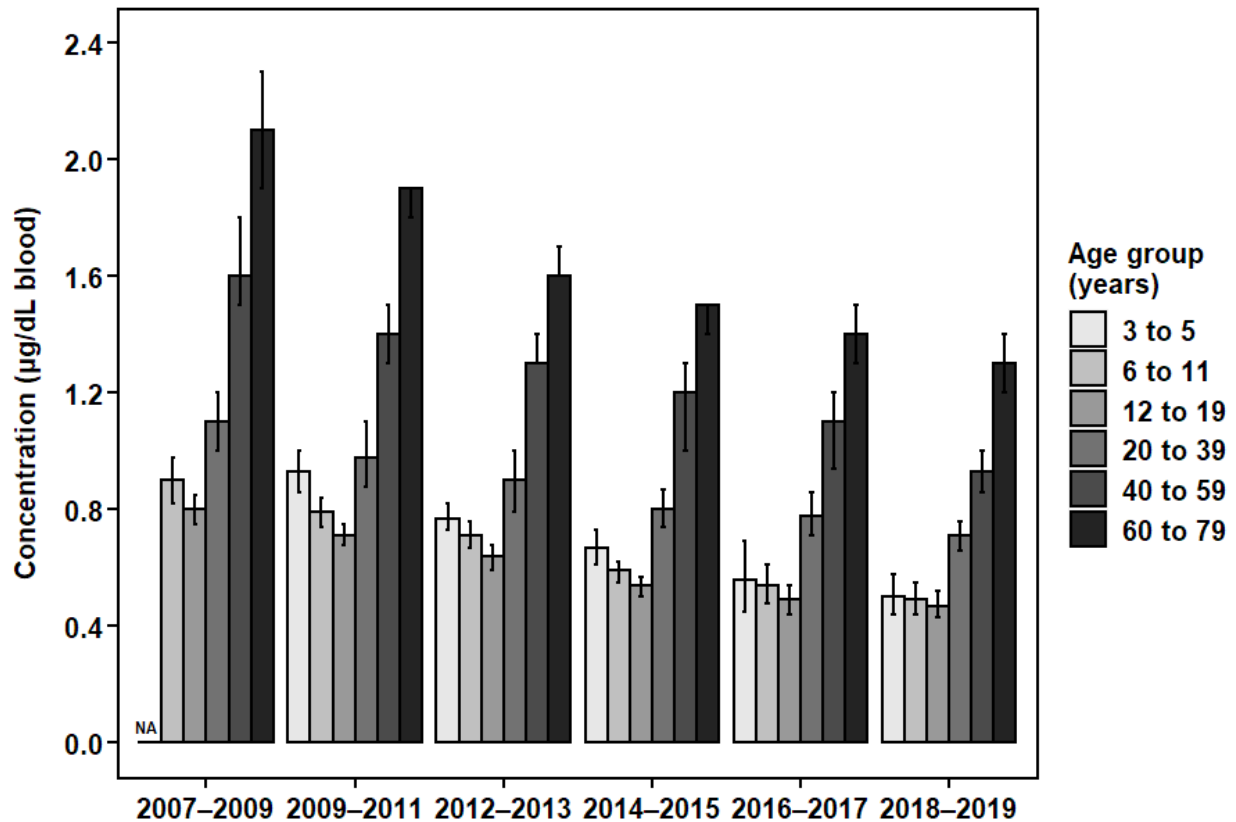
**Figure 1. Lead concentrations in the Canadian population aged 6 to 79.** This figure shows the geometric mean concentrations of lead in blood ( $\mu\text{g}/\text{dL}$ ) in the Canadian population from the CHMS (2007–2019).



There was a statistically significant decreasing trend ( $P < 0.001$ ) in lead concentrations in the Canadian population aged 6 to 79. Concentrations declined by 38% between 2007–2009 and 2018–2019.

## Canadian population, by age group

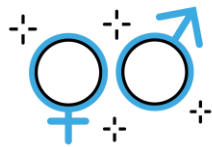
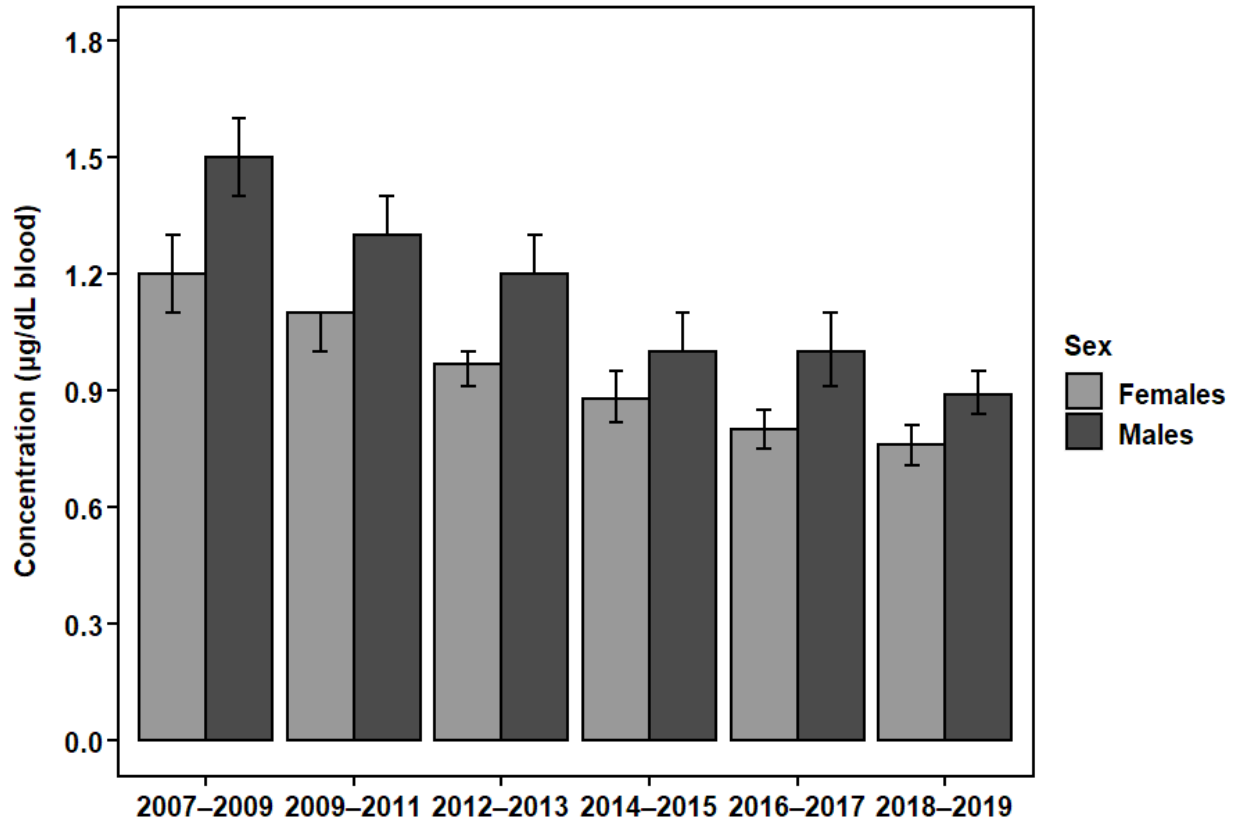
**Figure 2. Lead concentrations in the Canadian population, by age group.** This figure shows the geometric mean concentrations of lead in blood ( $\mu\text{g}/\text{dL}$ ) in the Canadian population by age group from the CHMS (2007–2019). Lead was measured in individuals aged 6 to 79 in 2007–2009. Concentrations were therefore not available (NA) for individuals aged 3 to 5.



Concentrations of lead were higher in older adults than in children, adolescents and younger adults in the Canadian population.

## Canadian population, by sex

**Figure 3. Lead concentrations in the Canadian population aged 6 to 79, by sex.** This figure shows the geometric mean concentrations of lead in blood ( $\mu\text{g}/\text{dL}$ ) in the Canadian population by sex from the CHMS (2007–2019).

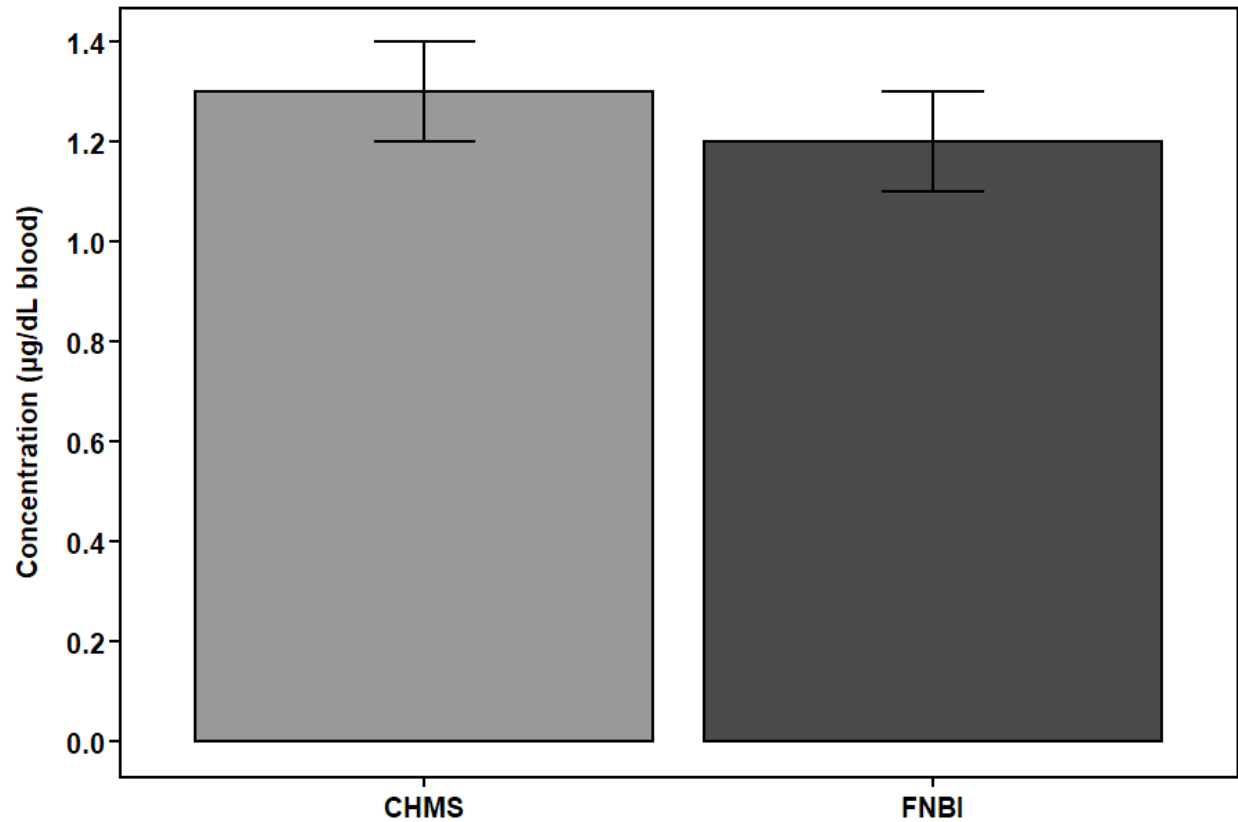


Concentrations of lead were higher in males than in females in the Canadian population.



## Comparison of the general population and First Nations on-reserve population in Canada

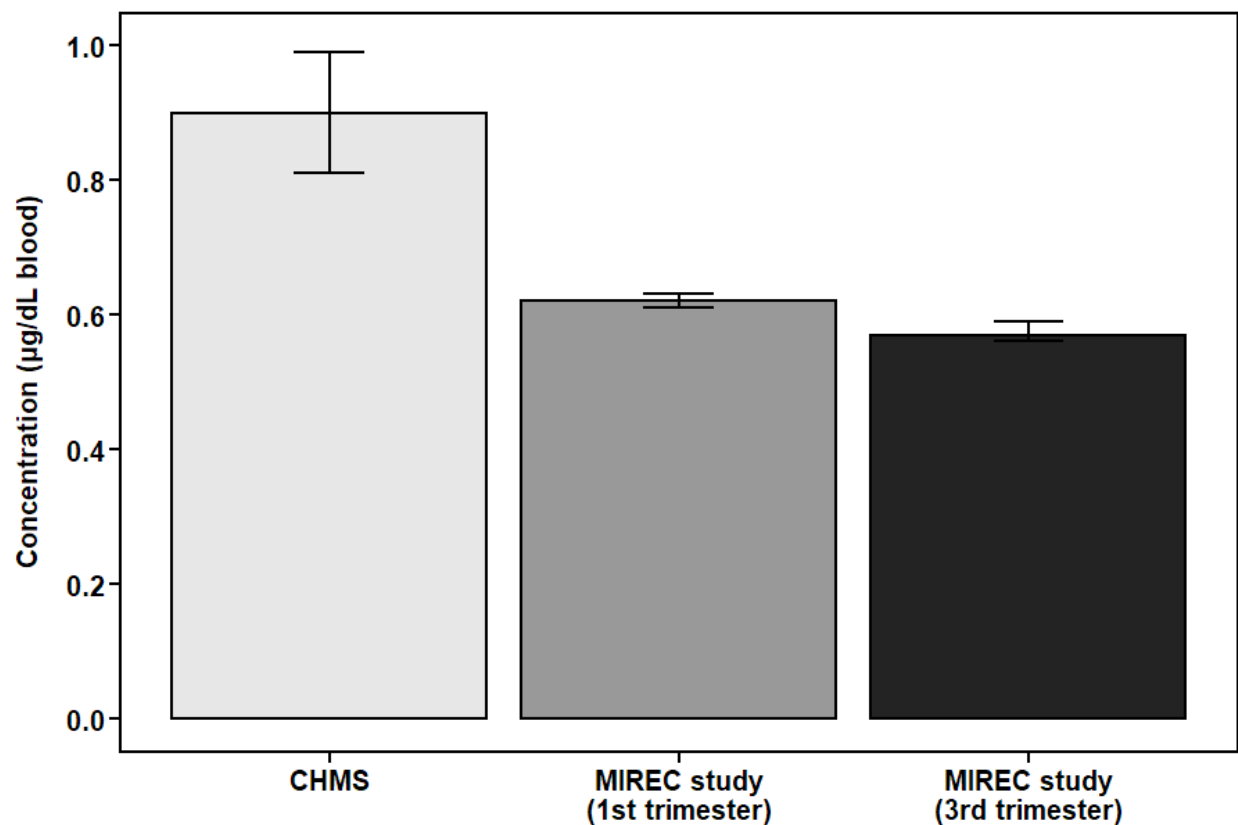
**Figure 4. Lead concentrations in the general population and First Nations on-reserve population in Canada.** This figure shows the geometric mean concentrations of lead in blood ( $\mu\text{g}/\text{dL}$ ) in the general population aged 20 to 79 from the CHMS (2009–2011) and in the First Nations on-reserve population aged 20 and older from the FNBI (2011).



Concentrations of lead were similar between the general population and First Nations on-reserve population in Canada.

## Comparison of women of child-bearing age and pregnant women in Canada

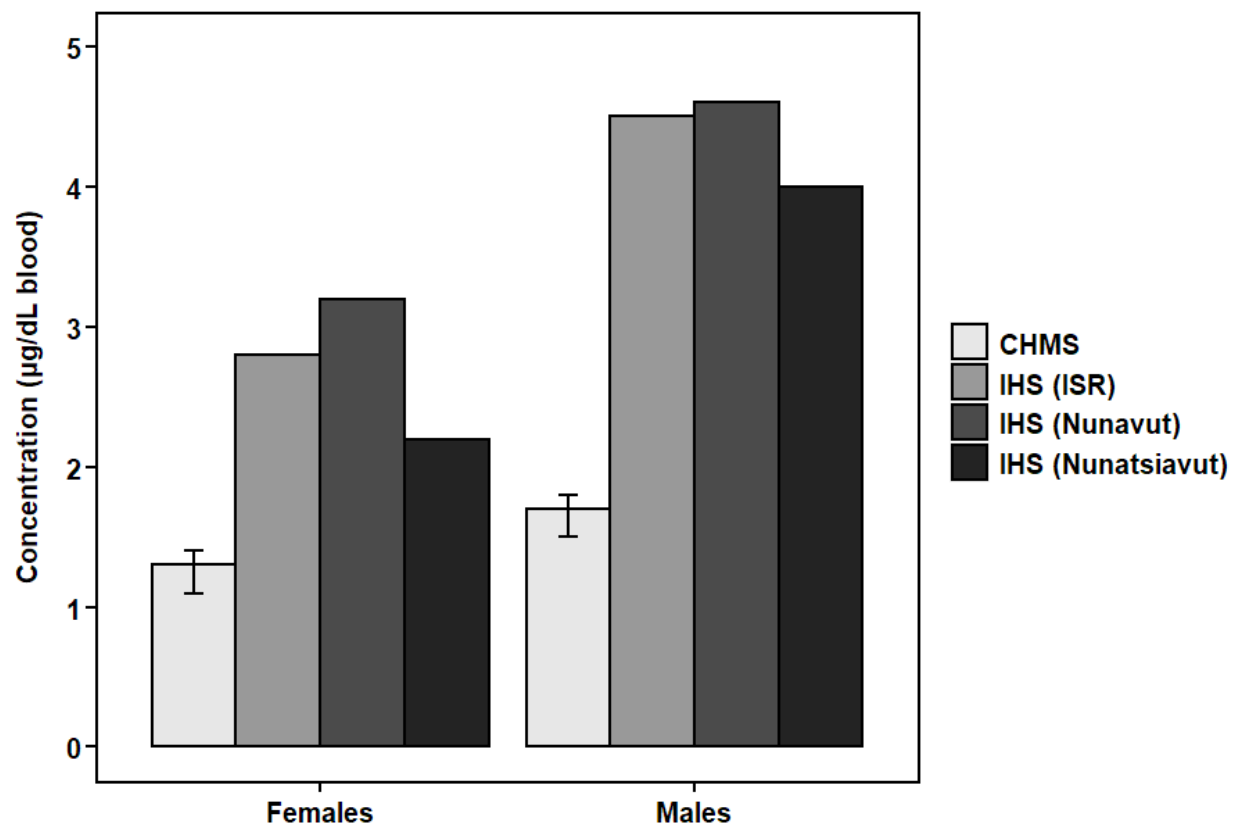
**Figure 5. Lead concentrations in women of child-bearing age and women in the first or third trimester of pregnancy in Canada.** This figure shows the geometric mean concentrations of lead in blood ( $\mu\text{g}/\text{dL}$ ) for women of child-bearing age (18 to 49) in the general population from the CHMS (2009–2011) and for women in the first or third trimester of pregnancy from the MIREC study (2008–2011).



Concentrations of lead were higher in women of child-bearing age in the general population than in women in the first or third trimester of pregnancy in cities across Canada.

## Comparison of the general population and Inuit populations in Canada

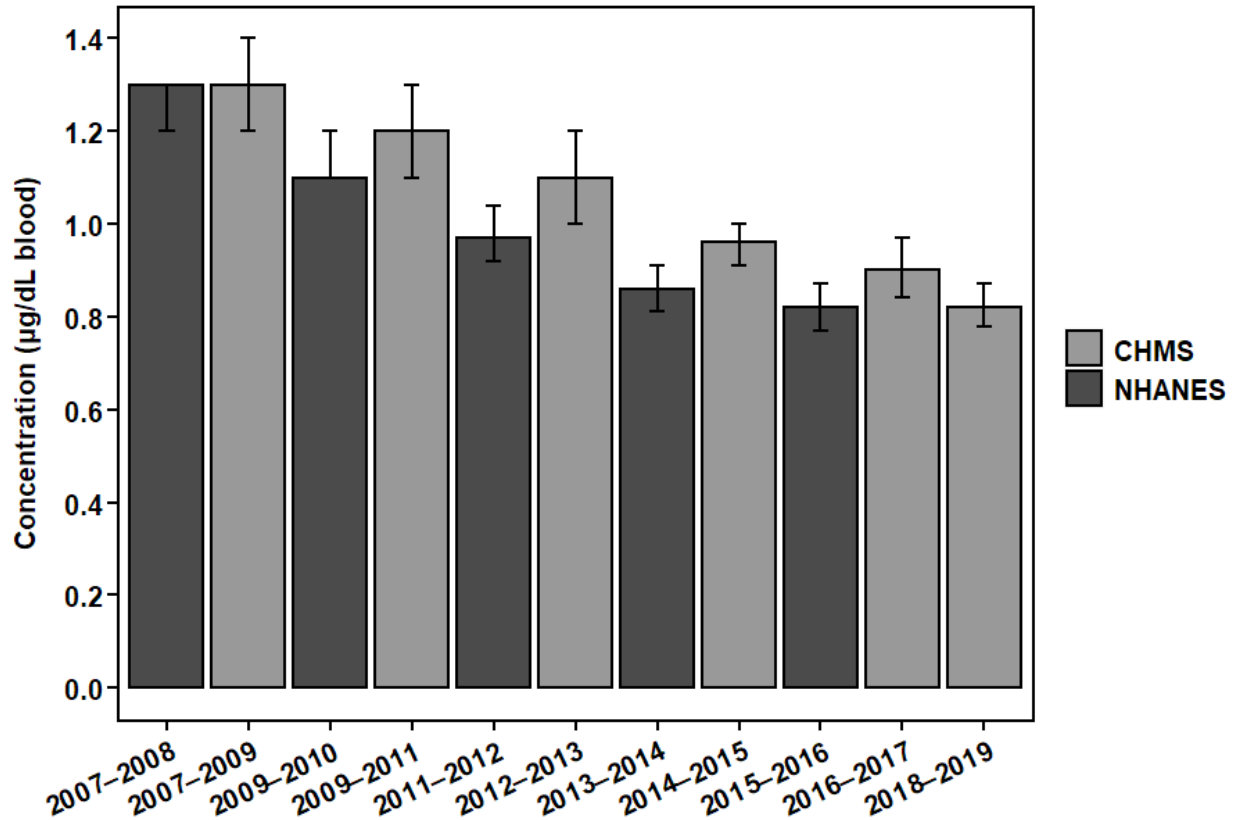
**Figure 6. Lead concentrations in the general population and Inuit populations in Canada, by sex.** This figure shows the geometric mean concentrations of lead in blood ( $\mu\text{g}/\text{dL}$ ) in females and males in the general population aged 18 to 79 from the CHMS (2007–2009) and in Inuit populations aged 18 and older in the ISR, Nunavut and Nunatsiavut from the IPY IHS (2007–2008).



Concentrations of lead were higher in Inuit populations in the ISR, Nunavut and Nunatsiavut than in the general population in Canada.

## Comparison of the Canadian and U.S. populations

**Figure 7. Lead concentrations in the Canadian and U.S. populations.** This figure shows the geometric mean concentrations of lead in blood ( $\mu\text{g}/\text{dL}$ ) in the Canadian population from the CHMS (2007–2019) and in the U.S. population from the NHANES (2007–2016). Note that there are slight differences between the surveys in sampling (such as the age ranges of participants) and analysis (such as the limits of detection).



Concentrations of lead were similar between the Canadian and U.S. populations.

## ADDITIONAL INFORMATION

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