Methyl Mercury Exposure and Women's Bodies

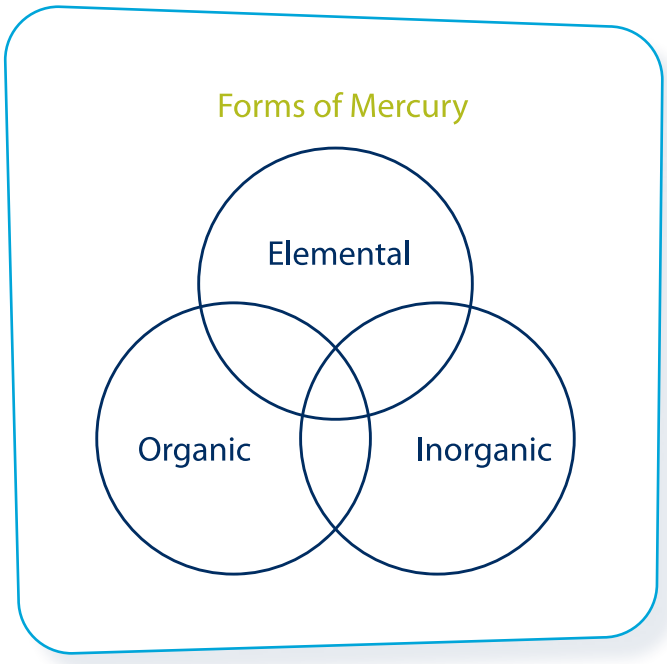
by Dayna Nadine Scott and Alexandra Stiver

Introduction

This case study arose in the context of growing public and political concern about the environment and its impact on human health. More and more we appreciate the ways in which natural disasters, such as earthquakes, forest fires and floods, are related to global changes in the environment. At the same time, researchers are learning more about the threats to health posed by exposure to chemical contaminants: radon gas, air pollutants and chemicals in foodstuffs. Yet, only a small number of researchers and activists – and fewer decision makers – are paying attention to the ways in which environmental hazards affect women and men differently. This case study consequently focuses on mercury contamination as a way to understand the critical need for recognizing female and male vulnerabilities in environmental planning and policy.

How Does Mercury Exposure Occur?

Mercury exists in three different forms – elemental, inorganic and organic – and exposures can occur through breathing, eating or swallowing and skin contact.[1] The type of mercury most toxic to humans is methyl mercury. It is in this form that mercury accumulates in fresh and salt water fish and shellfish, making the consumption of these animals – especially larger fish that have lived longer and have had more time to build up mercury in their bodies – the primary source of human exposure. In addition, the consumption of marine mammals, such as seal, who feed on sources of food with concentrations of mercury also pose health risks for humans.



Although mercury occurs naturally in the environment, it is also produced through industrial processes, such as combustion, metal mining and smelting. When it makes its way into water, this mercury converts to the toxic methyl mercury, which is then absorbed by fish through the aquatic environment.[2,3] Human activities also redistribute and concentrate mercury by incorporating it into certain consumer items such as dental fillings and some cosmetics.[1] Moreover, the effects of mercury can be compounded by exposure through a variety of avenues including industrial, energy, commercial, residential, agricultural and transportation-related sources.

How Much of a Health Threat Does Mercury Pose?

While we might expect researchers to have established with certainty the dangers associated with mercury – and policy makers to have created adequate regulations – in fact a great deal of debate and uncertainty exists about how much mercury is "too much." Methods of estimating levels of exposure vary and experts continue to debate the existence of minimum "thresholds" of contaminants for health effects. Moreover, the extent of damage caused by mercury can fluctuate, depending on whether exposures are seasonal or chronic, acute or indirect. But we are certain about one thing: mercury poisoning causes a host of harmful effects.[4]

Mercury is particularly dangerous to human health for three reasons: it is toxic, it does not break down in the environment, and it can build up, or "bioaccumulate," in living systems over time.[4] The range of damage associated with mercury exposure can involve the brain, spinal cord, heart, kidney and liver. Specifically, mercury has been associated with developmental delays, various forms of cancer, infertility, impaired vision and speech, muscle weakness and incoordination and cardiovascular disease.[5-7] Although more studies are needed, existing research suggests that mercury also has the potential to influence the development of neurological symptoms, such as altered sleep cycles, tremors and difficulties with hand-eye coordination later in life.[7]

Why Is Mercury Pollution an Issue for Women, Specifically?

Mercury exposure represents health risks for everyone, but we know – without question – that it affects women disproportionately.[5] Sex differences between women and men heighten the risks associated with mercury exposure. Women's bodies tend to have more fat than men's. Given that mercury adheres to fat and accumulates over time, the average woman stands to absorb a much larger amount of mercury in her lifetime and suffer a greater impact from even a single mercury exposure than the average man.[6] Mercury pollution not only affects women themselves, but bioaccumulated mercury can also be passed on to children, both to a fetus in utero and to an infant through breastfeeding.[1,8]

Does Mercury Pose the Same Risks for All Women?

While all women exposed to mercury face similar risks, research shows that the type and frequency of exposure vary between different groups of women. Women living in First Nations and coastal communities, for example, are more likely to be exposed to mercury because they consume fish, shellfish and marine mammals in greater amounts and more frequently than other women in the country. Studies confirm that First Nations women have elevated blood mercury levels and experience related health risks, as do women living in coastal communities, especially those along the Atlantic Ocean.[9] Researchers suspect that women in these areas not only consume more fish, which registers as increased methyl mercury in blood, but that the bioaccumulation of such contaminants also compounds their risk over time and across generations.[9]

COMMENTARY

Evidence for Caution: Women and Statin Use

Statins – cholesterol-lowering drugs – are the most widely prescribed drugs in the world and about half of all individuals taking them are women. Women are commonly prescribed statins to protect against cardiovascular diseases, but for women without previous heart problems, there is little evidence to suggest that lowering cholesterol actually reduces a woman's risk of experiencing cardiovascular events, such as heart attack, stroke or even death.[1-4] In fact, there has never been a clinical trial showing the benefits of statin use among women who have not previously experienced cardiovascular health issues,[5] yet 75 percent of women taking statins fall into this category. For women who already have heart problems, statins do reduce the risk of heart attacks, the need for angioplasty, bypass surgery and coronary heart disease-related deaths, but do not reduce overall mortality.[1,6] At the same time, there is growing evidence linking statins to breast cancer,[7,8] miscarriage,[9] and birth defects.[9-11] Thus, statin therapy seems to have no effect on preventing overall deaths among women with or without previous heart disease,[1,3,12,13] raising concern that we may be trading off heart disease deaths for other causes of death, such as cancer. As well, statin use has been related to depression[14-15] and muscle impairments[16] in both women and men. It is difficult for women and their doctors to make informed choices about statins or understand normal life course increases in cholesterol levels during pregnancy or menopause because of a lack of sex- and gender-based analysis in this area. To increase knowledge about the effects of statin use, public funding should be made available for randomized clinical trials exclusively for women. Additionally, information detailing crucial adverse events for both women and men must be gathered and fully disclosed. Further research is also needed on the gender dimensions of diagnosis and treatment for cardiovascular diseases, including prescription of statins.

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What Policies Currently Exist to Address Mercury Pollution? Are These Policies Effective?

To date, the standard governmental response – both federally and provincially – to the issue of mercury contamination has been to issue retail and sport fish consumption advisories, which distinguish between dangerous and non-dangerous levels of fish consumption.[1] Given the established risks associated with mercury exposure, this action is wholly inadequate. It neglects to consider the danger of compounding effects as well as the regularity with which some populations consume fish high in mercury.[10] In the case of First Nations and coastal communities, for example, there are important socio-cultural, economic and nutritional benefits associated with fish, shellfish and marine mammal consumption that must be weighed against the health risks associated with the consumption of mercury. At the same time, fish and shellfish consumption advisories neglect the role of industry and the obligations of governments to regulate industries in order to prevent mercury pollution.[3]

Although less mercury is being released into the environment by individuals and industries[2] (as established and measured through federal standards on industrial emissions and mercury containing lamps and dental amalgams[a]) and there is growing recognition of the need for risk management tools and pollution prevention planning, we still need emissions control standards and protocols that are binding.[2] Tighter controls on emissions are the most direct way to diminish mercury contamination and to reduce the dangers of fish and shellfish consumption, which many people living in Canada currently have to weigh against the health benefits of eating such animals.

Alongside efforts to reduce mercury contamination, it is also important that policy initiatives include a gendered approach and an awareness that mercury does not have a uniform impact across communities. For example, pregnant women currently receive mixed messages about fish and shellfish consumption, with health educators

a The Canada-wide Standards (CWSs) for mercury emissions refer specifically to smelters and waste incinerators as well as emissions from lamps and waste.

simultaneously praising their benefits (e.g., protein, unsaturated fatty acids, omega-3 fatty acids) while warning against their dangers (e.g., contaminants, methyl mercury).[11] For many women living in coastal communities, food that comes from the sea is a primary source of diet, making mixed messages and the threat of mercury contamination increasingly stressful for pregnant women in those communities. In addition, better tools are needed to measure mercury contamination as well as data that are disaggregated by sex, age, ethnicity, geography and other determinants of health. Ultimately, a thorough and effective approach to the issue of mercury contamination requires involvement at all levels of government as well as collaboration from Native leaders and public health units.

Conclusion

Sex- and gender-based analysis helps us to better understand the ways in which environmental contaminants pose different biological risks for women and men. It also encourages us to consider the health impacts of pollution for different populations of women and men. This study of mercury demonstrates the importance of sex-disaggregated data in ascertaining cause and effect. In this case, the acknowledgement that mercury contamination presents unique risks for women, particularly in First Nations and coastal communities, is an important platform from which to assess and anticipate future policy on mercury and highlights the issues of bioaccumulation, chronic low-level exposure and in-utero contamination.

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