SUMMARY

ENVIRONMENTAL CONTAMINANTS: METALS

QANUILIRPITAA ? 2017

Nunavik Inuit Health Survey

Inuit residing in Nunavik face elevated exposure to metals, including mercury, lead, and cadmium. Exposure to **mercury** occurs through consumption of certain country foods that contain elevated mercury levels stemming mainly from global emissions that are carried to northern latitudes by oceanic and atmospheric transport and then biomagnified in Arctic food webs. As the Inuit traditional diet comprises large amounts of wild animals, Inuit are more exposed to mercury compared to populations living in southern regions. Beluga meat consumption has been identified as the main contributor to mercury exposure in Nunavik. Meanwhile, previous studies have identified the consumption of wild meat hunted with **lead** ammunition, the use of firearms fired with lead ammunition and exposure to lead-containing house dust produced perhaps by the cleaning of firearms inside or near the house, as key pathways to elevated lead exposure in the Arctic. Additionally, past studies have shown that elevated exposure to **cadmium** among Nunavimmiut is primarily associated with the high prevalence of cigarette smoking, since tobacco plants accumulate cadmium from soils. One previous study reported that non-smoking Nunavimmiut were also mildly exposed to cadmium from the consumption of caribou organs since cervid species rely on lichen that can likewise accumulate cadmium from the environment.

The objectives of this report are: (i) to document blood levels of mercury, lead and cadmium among Nunavimmiut aged 16 years and over, by age and sex, and to compare those levels with guideline values; (ii) to compare the results to those of the 1992 Santé Québec survey and the 2004 *Qanuippitaa*? Nunavik Health Survey, other Inuit populations in Canada, and the general Canadian population; and (iii) to examine associations between potential contemporary determinants of exposure and blood concentrations of these toxic metals among Nunavimmiut.

Globally, blood mercury, lead and cadmium levels in 2017 exceeded guideline values among 40%, 4% and 7% of Nunavimmiut, respectively. Moreover, nearly six out of ten women of childbearing age (57%) exceeded Health Canada's mercury blood guideline value, whereas 9% exceeded the U.S. blood lead guideline value for pregnancy or lactation. Over the past 25 years, mercury levels have decreased by 44%, lead levels

by 71% and cadmium levels by 58% in Nunavimmiut. When compared to 2004, mercury levels in 2017 had declined only moderately (by 18%, 51 vs. 42 nmol/L), whereas lead levels had decreased by 37% (0.19 vs. 0.12 μmol/L) and cadmium levels by nearly half (48%, 27 vs. 14 nmol/L). Still, blood mercury levels in Nunavimmiut in 2017 were 12-fold higher than those of the general Canadian population in 2014-2015, while blood lead levels were two-fold higher and blood cadmium levels five-fold higher than those of that same population.

Blood mercury and lead levels were higher among older Nunavimmiut, while blood cadmium levels were higher among younger Nunavimmiut. Blood mercury levels were also higher among women and the residents of Hudson Strait villages, whereas blood lead levels were higher among men and the residents of Hudson Bay villages. Blood cadmium levels did not exhibit any differences between sexes, but they were higher in Hudson Bay and Hudson Strait villages.

Marine mammal and fish consumption was associated with higher blood mercury levels, and more in-depth analyses are under way to identify the specific country foods that contribute the most to mercury exposure. Interestingly, blood mercury levels were strongly and positively associated with long-chain omega-3 polyunsaturated fatty acids in red blood cells. This supports the previous observation that the consumption of country foods, and particularly marine foods, which are exceptionally rich in these high-quality fats, contributes to mercury exposure.

Blood lead levels were higher among Nunavimmiut who went hunting frequently, used lead pellets and reported living in houses where guns were cleaned indoors. Such findings suggest that lead ammunition, and particularly lead pellets, might still contribute to lead exposure in Nunavik. Blood lead levels were also higher among people who reported consuming cigarettes or cannabis as well as among those who declared being regularly exposed to second-hand smoke. Wild birds, marine mammals and fish consumption were associated with higher blood lead levels. More in-depth multivariate analyses are needed to confirm these findings.

In keeping with the results of previous surveys, current smokers exhibited elevated blood cadmium levels. Blood cadmium levels were also high in ex-smokers and people who reported consuming cannabis or being frequently exposed to second-hand smoke. No association was found between blood cadmium levels and country food consumption.

These findings indicate that mercury exposure is still an important public health issue in Nunavik, especially among women. The findings also highlight the importance of on-going activities to promote the use of lead-free ammunition, reduce tobacco and cannabis consumption and encourage smoke-free homes, with the ultimate goal of continuing to decrease lead and cadmium exposure in Nunavik.

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Qanuilirpitaa? 2017 is a population healthy survey carried out in Nunavik from August to October 2017. A total of 1 326 Nunavimmiut aged 16 and over from all 14 villages participated to this survey.

Nakurmiik to all Nunavimmiut who contributed to this important health survey!