Pollution and Community Health in the Arctic

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The Arctic has around seven million inhabitants, about one million of these are Indigenous, and three-quarters of the Arctic population resides in settlements of more than 5000 people. Arctic environment is in change due to climate warming which already has or will have big impacts on the 5 million inhabitants living in permafrost regions. The other challenges for populations are food and water security, biological invasive species, and worldwide circulation of anthropogenic contaminants and existing and new infectious diseases.

Populations living the Arctic are exposed to mainly long-ranged pollution from the southern part of the globe, and the most vulnerable are Indigenous peoples, whose diets comprise a large proportion of traditional terrestrial and marine foodstuffs. Heavy metals, persistent organic pollutants (POPs) and radioactive substances have long ecological half-lives in the Arctic.

Mercury (Hg) levels in humans have been among highest in the Arctic populations, especially Inuit, and these exposures have impacts on health. Hg exposures are through dietary intake from local food (marine mammals, fish), which has nutritional and cultural benefits for human health and well-being. However, Hg exposures are associated with adverse health effects (e.g., neurodevelopmental, cardiovascular) during the lifetime from childhood to old age. Risk communication needs to be culturally balanced and done together with locals to reduce the exposures.

The growing awareness of the usefulness of the One Health paradigm as a way to improve the ability of Arctic residents, public health agencies, and wildlife resource managers to address existing environmental threats and recognize emerging ones at an early stage. Warming climate and permafrost thaw may influence both contaminant exposure and the spread of zoonotic infectious diseases. Migration from smaller to larger communities and urban centers, is a growing trend in the circumpolar North, and may be accompanied by changes in exposure to pollution.

Concentrations of most POPs and metals are declining in Arctic regions where time trend data exist. However, climate change and new chemicals may change the exposure situation of Arctic populations and wildlife. Epidemiological human disease models are needed, as well as new approaches to integrate existing and future monitoring data. The models should enable estimates of the risk and magnitude of human and wildlife health impacts, and changes in disease and contaminant exposure in response to different climate change scenarios both in the Arctic and globally. All this needs multi- and transdisciplinary research, including lifetime contaminant accumulation, lifetime exposure to zoonotic pathogens, and health consequences for wildlife and human consumers.

Keywords

Persistent organic pollutants, Hg, Climate change, One Health