



Arctic Health Risks: Impacts on health in the Arctic and Europe owing to climate-induced changes in contaminant cycling

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ArcRisk Project Contact
Janet Pawlak
AMAP Secretariat
Gautadalléen 21
N-0349 Oslo
Norway
Phone: +47 21 08 04 80
Phone: +45 39 64 08 65
E-mail: mail@arcrisk.eu
www.arcrisk.eu



The ArcRisk Project

Human health effects of environmental contaminants are a consequence of:

- Use and releases of persistent, toxic and bioaccumulative chemicals.
- Contaminant uptake and transfer through food webs, especially when this leads to contaminant accumulation in predatory fish species and marine mammals.
- Human dietary exposure via consumption of the above species.

Human health effects of environmental contaminants are influenced by:

- Environmental transport and fate of these chemicals (and their precursors and degradation products).
- Food web structures.
- Human behaviour, resource development, policy development, dietary change, etc. which in turn link back to use of chemicals and dietary exposure.

Climate change will exert impacts on all of the above.

The ArcRisk project studied these processes, and their impacts and connections in the Arctic and selected areas of Europe to gain insights into the potential scale of future changes and to inform future policy- and decision-making.



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Industry stakeholders

History has many examples of how chemicals used in society have been released to the environment causing harm to ecosystems and health effects on humans exposed to these chemicals.

Increasing awareness of these issues in recent decades has resulted in action on the part of governments, industry and the global community that has reduced the use and releases of many harmful chemicals, such as PCBs, DDTs, and HCHs. These chemicals, however, still persist in the environment as 'legacy contaminants' as a result of past use.

At the same time, new chemicals are continually being introduced, some as replacements for chemicals that have been phased-out. Climate change will affect demand for chemicals used in agriculture, industry and consumer products and alter their patterns of use.

The appearance of new substances that are insufficiently characterized with regard to their risk for environmental transport and health effects is a major concern. Past lessons need to be learned to ensure that future use of chemicals is responsible and sustainable.

Society and industry stakeholders need to act together to support efforts to eliminate ongoing emissions of legacy pollutants from stockpiles, wastes and products still in-use; and to further develop and strengthen implementation of EU directives and initiatives concerning chemicals currently used in society, and complement these with voluntary measures. Climate and energy strategies that maximise the co-benefits of reducing emissions of greenhouse gasses and unintentionally produced persistent organic pollutants and mercury from the same sources should be promoted.



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AMAP-Sekretariat
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Arctic residents

Levels of 'legacy contaminants', such as PCBs, DDTs and HCHs are gradually decreasing in the Arctic; but new contaminants are appearing.

Human dietary exposure to 'legacy contaminants' has decreased with decreasing environmental levels but also due to changes in dietary habits.

In some cases, changes in diet have been recommended to reduce contaminant intake by critical groups such as young women and children; these measures can be effective but are not a substitute for tackling the issue of eliminating hazardous chemicals from the environment.

Changes in diet are also occurring as a result of increasing consumption of store-bought foods instead of traditional foods. Traditional foods are an important source of nutrients and healthy fats. Many store-bought foods are less healthy, containing high amounts of sugar and unhealthy fats that can increase risks for heart disease and obesity.

The Arctic is rapidly changing as a result of climate change and Arctic residents need to know how these changes will affect their access to healthy foods that they have relied on for generations in order to minimize their exposures to contaminants without introducing new health risks.

A changing Arctic will also see the introduction of new shipping routes, increased exploration of natural resources and an increasing Arctic population which may all affect both levels of contaminants and availability of traditional food.



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European residents

The rapid environmental and societal changes that are occurring in the Arctic due to climate change provide lessons to communities in other parts of the world.

Climate change will affect the way environmental contaminants are distributed between air, water and soils (generally promoting movement from soils and waters into air for semi-volatile substances). This can enhance their potential for long-range atmospheric transport.

For 'legacy contaminants' (i.e. contaminants already subject to controls or bans), modelling indicates that reductions in releases of chemicals achieved through actions to curb their use, combined with enhanced degradation will outweigh any possible increases in levels of these contaminants from increased (re-)emissions due to climate change. The effect of climate change on legacy pollutants like PCBs and HCHs is therefore expected to be low in comparison to their (still quite slow) removal from the environment.

For newly emerging contaminants the picture is less clear, with climate change having the potential to increase environmental transport. Knowledge and models are lacking at present to reliably predict how changes in food web structure resulting from climate change could also affect the picture.

Populations in the Arctic and other parts of Europe that rely on marine diets including high levels of consumption of fish and marine mammals can receive high dietary exposures to contaminants that can lead to increased risks for subtle health effects.



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ArcRisk Consortium members



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