

Project information

Keywords

hazardous substances, metals, dioxins, border regions, industrial pollution

Project title

Contaminants, food- and health security in the border region of Norway, Russia and Finland.

Year

2015

Project leader

Eldbjørg Heimstad NILU and Torkjel Sandanger, NILU/UiT

Participants

Project leader: Eldbjørg S. Heimstad (NILU) & Torkjel Sandanger (NILU/UiT)

Fram Centre Participants:

University of Tromsø (Gunhild Hoogensen, Erik Anda)

Akvaplan-niva (Anita Evenset and Guttorm Christensen)

NORUT (Eirik Mikkelsen, Anne K. Normann)

Statens strålevern (Anna Nalbandyan, Inger Eikermann)

External collaborators:

County governor Finnmark

University of Oulu, Northern and environmental issues, Finland

Finnish Meteorological Institute, Finland

The Northwest Public Health Researcher Center, St Petersburg, Russia

Murmansk Country Birth Registry (MCBR), Murmansk, Russia

Institute of the Industrial Ecology Problems of the North KSC RAS, Apatity, Russia

Flagship

Hazardous Substances

Funding Source

Kolarctic ENPI CBC funding (25.10.2012-24.09.2015)

The Programme Kolarctic ENPI CBC is one of the ENPI financing instruments of the European Union. The ENPI programmes are being implemented on the external borders of the EU.

Total funding 3 mill NOK (Norwegian partners) 25.10.2012- 24.09.2015 where Kolarctic Norway is financing: 50 %, Troms fylkeskommune: 20 %, Flagship "Miljøgifter" 15 % and University of Tromsø 15 %

Summary of Results

The Kolarctic ENPI CBC project got an extension to September 24 2015. Kolarctic final report is ongoing these days. Through the Kolarctic project (2012-2015), more than 200 food samples (different fish species, reindeer, moose, mushrooms and berries) were sampled from Norway, Russia and Finland. Analyses of pooled food samples show that local industry is responsible for elevated concentrations of selected metals in local food in some areas. More specifically mushrooms and berries on the Norwegian and Russian side of the border, sampled close to Nikel city, show elevated concentrations of Ni, Cu and Co, and in some samples also of other metals (Cd, Pb). Reindeer meat shows elevated concentrations of dioxins in Norwegian samples. The lack of international guidelines (EU) for a number of food items makes it hard to conclude in terms of risk to the local inhabitants. However, the dioxin concentrations in reindeer meat gives reason to believe that intake in families consuming large amounts of reindeer products is above tolerable weekly intake (TWI) of toxic equivalents. The sources of the dioxin contamination is not fully understood and needs to be elucidated.

Maternal blood concentrations of toxic elements in Russia and Finland show some differences, but we have not been able to link these differences to local food consumption. Cd concentrations are higher in Russia, and comparing to northern Norwegian data indicate elevated As concentrations and lower Se concentrations in the Northern Norwegian samples.

Highlights

- The concentration of nickel (Ni), an important trace element from the smelter industry, in berries and mushrooms from Sør-Varanger region were higher than concentrations in same samples from Inari region, Finland. Highest concentrations and comparable with Russian concentrations near Nikel city, were found in north-northeast directions of the Nikel smelter, in the Jarfjord/Karpdalen area near the Russian border.
 - Some samples of *Cortinarius caperatus* (Rimsopp) from Durvatn and Gardsjøen had cadmium levels above EU maximum levels for fungi (1.0 mg/kg ww). Mushrooms collected in Finland and Russia had lower Cd-levels
 - Two samples of perch from Tjærebukta had mercury (Hg) levels above the maximum level set by the EU (0.5 mg/kg ww). This was also the case for one of five samples from Rundvannet, however the average was still below the threshold. One of three samples of moose from Pasvik had a lead (Pb) level above the maximum level set by the EU (0.10 mg/kg ww) for meat of bovine animals, sheep, pig and poultry, however again the average was still below the threshold.
 - The findings of elevated dioxin concentrations in reindeer meat from the Jarfjord area indicate that concentrations have been elevated the last two decades. If this is the case the intake among people who consume large amounts of local reindeer meat could have been above guideline values. This will be followed closely during 2016.
 - The radioactivity analysis of environmental samples indicates large variations in activity concentrations of radioactive substances between different species and sampling area/country. However, the activity concentrations of ¹³⁷Cs in all environmental samples from Norway, Finland and Russia were below the national limits set for the commercial retail.
 - The lack of international guidelines for a number of food items makes it hard to conclude firmly in terms of risk to the local inhabitants. Risk will naturally depend on the frequency and amount of intake of these local food products.

For the Management

Through the Kolarctic project (2012-2015) together with international partners, we have successfully gathered more than 200 food samples (different fish species, reindeer, moose, mushrooms and berries) from Norway, Russia and Finland. Analyses of pooled food samples show that local industry is responsible for elevated concentrations of selected metals in local food in some areas. More specifically mushrooms and berries on the Norwegian and Russian side of the border, sampled close to Nikel city, show elevated concentrations of Ni, Cu and Co, and in some samples also of other metals (Cd, Pb). Reindeer meat shows elevated concentrations of dioxins in Norwegian samples. The lack of international guidelines for a number of food items makes it hard to conclude in terms of risk to the local inhabitants. However, the dioxin concentrations in reindeer meat gives reason to believe that intake in families consuming large amounts of reindeer products is above tolerable weekly intake (TWI) of toxic equivalents. The sources of the dioxin contamination is not fully understood and needs to be elucidated.

Results from the questionnaire survey and answers from the general population of Inari, Pechenga and Sør-Varanger municipalities/regions indicate some differences in risk perception between different groups. The population in Pechenga, females and the higher educated ones are generally more concerned about the risks related to pollution, with geography and education as the most marked origins of differences. There is a higher level of concern for what pollution can mean for the local nature/ecosystem than for local food sources. There does not seem to be differences in risk perceptions between those who have grown up in the border region and those who have not, nor between major age groups, nor between those that are pregnant or want more children, and those that are not pregnant or do not want children

Published Results/Planned Publications

Ongoing publications 2015:

- Risk perceptions related to hazardous substances in the Norwegian-Finnish-Russian border area. Mikkelsen E. et al
- Industrial Contaminants In Local Food Items From The Finnish -- Norwegian - Russian Border Area. By Hansen M. (PhD) et al

-Contents of radioactive substances in natural food products from Northern Norway, Finland and Northwest Russia in 2013-2014. By Nalbandyan A. et al.

Abstract at International conference – 8th Dresden Symposium ‘Hazards – Detection and Management’ August 2015

Anna Nalbandyan, Bredo Møller, Arja Rautio, Päivi Myllynen. Food safety: monitoring of radioactivity in natural food products from Northern Norway and Finland in 2013-2014. Book of Abstracts. - SARAD, Germany, P.12, 2015 (also on conference CD electronically).

Accepted presentations at the Arctic Frontier conference, January 2016, Tromsø:

Evenset et al.: *Industrial Contaminants In Local Food Items From The Finnish -- Norwegian - Russian Border Area*

Mikkelsen et al.: *Risk Perceptions Related To Hazardous Substances In The Norwegian-Finnish-Russian Border Area*

Communicated Results

Several Norwegian project participants participated in a stakeholder meeting “Pasvik seminaret” 20-21 April 2014. The project participants presented results from the project for “Formannsskapet” (local politicians) and the mayor in Kirkenes, in addition to representatives from Food safety authority (Mattilsynet), Ministry of Climate and Environment (KLD), Kolarctic JMA (Norway) and several others. Presentations are available at the project web site

<http://kolarctic.nilu.no/april-2015-newsletter/>

Undersøkelser av mat og helse i grenseområdet

Eldbjørg Heimstad, NILU: Bakgrunn for nytt helseprosjektet, NILU- rapport 2013

Guttorm Christensen, Akvaplan-niva: Miljøgifter i mat fra naturen i grenseområdene

Torkjel M Sandanger, UiT/ NILU: Matsikkerhet og humane nivåer

Anne Katrine Normann, NORUT: Spørreskjema og folks bekymring

Anna Nalbandyan, NRPA: Radioaktivitet i miljø: status 2011-2014

The Norwegian partners arranged a meeting with the Norwegian Food Safety Authority (Mattilsynet) September 7 2015 in order to communicate the results of dioxin analysis in 3 pooled samples of reindeer meat (see 2014 report). As a follow study, additional reindeer samples from reindeer districts in Sør-Varanger have been sampled this month and will be analysed during December this year. The results from these analysis will be communicated to all relevant stakeholders (Norwegian Food Safety Authority, reindeer herders and local politicians).

Oral presentation; «Industrial Contaminants In Local Food Items From The Finnish -- Norwegian - Russian Border Area. By Hansen M. (PhD) “ at the Collaborative Arctic Summer School in Epidemiology 2015 in Yellowknife, Canada. https://uit.no/forskning/forskningsgrupper/gruppe?p_document_id=396223

Press:

Sør Varanger avis:

22.04.15 [Prøver fra luft, mose, bær og sopp viser alle forhøyde nivåer av tungmetaller](#)

Nord24

23.05.15 Så giftige er bærene langs grensen til Russland

<http://www.nord24.no/nikel/russland/sa-giftige-er-barene-langs-grensen-til-russland/s/5-32-24822>

Interdisciplinary Cooperation

The project is a true inter-disciplinary cooperation with the following disciplines:

Epidemiology (human biomonitoring, birth registries)

Ecotoxicology

Ecology

Environmental Chemistry

Social sciences

Human security, risk communication

Socio-economic sciences

The number of disciplines involved in the human health project is large and this is clearly an asset to all. At the same time, it is not always easy to communicate across all disciplines and it is challenging to publish the interdisciplinary work. The challenge in publishing the interdisciplinary work lies both in the fact that the traditions and way of writing are different and in the fact that it is not easy to find good and suitable journals that are interested in publishing these elements. This is indeed an aspect that deserves special attention from the Flagship and even the whole Fram Centre where interdisciplinarity is a key element.

The project also succeeds in bridging the gap between research and environmental management, and the project has challenged the National Food Safety Authorities in the issue of dioxins in reindeer.

Budget in accordance to results

The flagship financing 2012-2015 has been vital for the research of the Norwegian partners in the Kolarctic ENPI project "KO467- Food and health security".

Funding from the flagship in year 2015 has made a significant contribution to the project for the coordination and administration by the lead partner NILU, the chemical analysis of local food samples and human samples, radioactivity data analysis for environmental samples collected in all three countries, publication and outreach activities.

Could results from the project be subject for any commercial utilization

No

Conclusions

a) The project has led to:

- PhD student Martine D. Hansen started year 2015. Hansen continues the work with central topics from the ongoing project on food and health security issues in the border region in addition to lead author of one ongoing scientific papers.
- The relatively higher concentrations of dioxins in reindeer meat from Sør- Varanger region compared to Finnish reindeer data, support future studies and an assessment of the potential risk for people with a high intake of reindeer meat.
- Combined risk assessments of different pollutants (metals, organic pollutants and radionuclides) in the same environmental samples.

b) The project collaboration has developed the following common methodology:

- Common questionnaire for risk perception of pollution to be used in the border region of Norway, Russia and Finland
- Food safety issues of local nature resources such as of game, fish, berries and mushrooms in the border region
- Use of birth registries for potential future risk factors for disease, diet information in addition to chemical analysis of blood samples:

Kirkenes MISA (40 mothers 2008-2009)

Murmansk County Birth Registry (50 mothers)

Inari region, National program (25 mothers)

Expected impact after 2015:

- Communication and dissemination of information and results from the project to stakeholders, decision makers and the general public.
- Recommendations and joint actions towards future environmental and health projects, monitoring and regulations in the region.
- Food security strategies including nutritional aspects specific for each country.