



## RESULTS FROM THE NUNAVIK CHILD DEVELOPMENT STUDY (NCDS): PUBLIC HEALTH IMPLICATIONS

### General statement

The Nunavik Nutrition and Health Committee and the Public Health Director of Nunavik strongly believe that country food is generally the best food for Nunavimmiut, including pregnant women and their children. The 2004 Qanuippitaa Survey has shown that country food consumption has significantly decreased over the last decade. Therefore Nunavimmiut must be incited to increase their consumption of country food, the only limitation being for women of childbearing age who should limit their consumption of beluga meat.

### Omega-3 fatty acids

Results from the NCDS indicated that higher blood concentrations of omega-3 fatty acids during pregnancy, particularly during the last 3-4 months of pregnancy, are beneficial for many aspects of child development at school age.

Although previous studies conducted in several different populations with children have reported beneficial effects of prenatal intake of omega-3 fatty acids on vision and cognitive development during the first year of life, very few have examined its long term effects on child development. Other studies have also found that omega-3 fatty acids during pregnancy increased the pregnancy duration by few days, meaning that babies were born heavier and more mature.

The 2004 Qanuippitaa Survey conducted in Nunavik in the general population has shown that blood levels of omega-3 fatty acids have decreased by about 30% over the last decade, likely due to a decreased consumption of country food.

Fish, especially Arctic char, and marine mammal fat such as blubber and misirag are good sources of omega-3 fatty acids. Canola oil is also a good source of omega-3 fatty acids and a good fat to cook with. Any wild game, such as caribou, ptarmigan and goose, contains higher concentrations of omega-3 fatty acids than beef, pork and chicken.

Nunavimmiut, especially pregnant women and those of childbearing age, should therefore increase their omega-3 fatty acid intake.



## Mercury

Results from the NCDS indicated that prenatal exposure to mercury was associated with poorer intellectual function, and poorer attention in classroom according to the child's teacher. By contrast, adverse effects were not seen from postnatal exposure to mercury.

In previous studies, prenatal exposure to mercury has been associated with impaired performance on attention tasks, but the extent to which these cognitive deficits translate into behavioural problems remained unknown. For the first time, results from the NCDS suggest that prenatal mercury exposure is a risk factor for attention deficit disorder in childhood.

Even though we have no evidence that mercury has decreased in Nunavik environment, the 2004 Qanuippitaa Survey indicated a significant decrease in blood mercury levels (a good marker of methylmercury exposure) between 1992 and 2004, likely due to a decreased consumption of country food. However, from the same health survey, we found that three (3) women of childbearing age out of four (4) continued to have blood content of mercury that exceeds the recommended level.

International negotiations aimed at limiting mercury emissions are under way, and the Canadian government along with Inuit Tapiriit Kanatami (ITK) and Inuit Circumpolar Council (ICC), the national and international organizations representing the Inuit, are likely to play an important role. Results from the NCDS strongly support the need for international actions aimed at reducing mercury emissions.

In Nunavimmiut, the main source of mercury exposure is beluga meat. Therefore, until we have evidence of a decrease of the mercury content in this specific country food, pregnant women and those of childbearing age should decrease their consumption of beluga meat.

## PCBs and pesticides

In contrary to other studies conducted with fish eating populations, the NCDS shows that prenatal exposure to PCBs and pesticides is not related to intellectual function and child behaviour at 11 years. Childhood exposure to PCBs (but not with pesticides) was related to small decreases in height and head size, an effect not previously reported in fish eating populations exposed to PCBs.

A substantial decline in PCB and pesticide exposure among Nunavik adults was observed in the 2004 Qanuippitaa Survey and in newborns from time trend analysis conducted with cord blood. Similar declines have been observed in Arctic wildlife species that are the primary sources of exposure for Nunavik Inuit. This decline can be explained, in part, by the implementation of the 2004 Stockholm Convention on POPs. This Convention is an agreement among many countries including Canada aiming to



eliminate the release of these chemicals into the environment. As a result of these actions, this decline is expected to continue. International actions by Inuit leaders contributed to the signing of this Convention.

The Inuit are exposed to these compounds primarily through the consumption of marine mammal fat. Although we found some effects of these contaminants on child development, observed declines in the environment and in blood levels of Nunavimmiut decrease the likelihood of any significant effect in the future among Nunavik children.

## Lead

Prenatal exposure to lead is associated with reduced body and head size and poorer intellectual function at school age. Lead exposure during childhood is also related to a greater risk of rule-breaking behaviours and hyperactivity in school as reported by the child's teacher. The NCDS replicates previously reported associations between childhood lead exposure and child behaviours, and corroborates the main conclusion of the most recent lead studies, which is that negative effects are seen at very low exposure levels. However, few other studies have reported negative effects from prenatal lead exposure.

As previously researched in the region, exposure to lead in Nunavik is mainly due to the ingestion of country food hunted with lead ammunition. In 1998, a regional ban on the sale of lead shots was adopted by major Nunavik organizations. It has been followed by a marked decrease in blood lead levels in adults and newborns. However, a recent monitoring of ammunition in Nunavik stores indicated that the ban is no longer effective, and most evidently widespread use of lead shots has resumed. In order to reduce and prevent the adverse effects of prenatal and childhood lead exposure documented in this study, we strongly emphasize the need to ban all further use of lead shots.

## Other determinants of child development

Due to the well known association between smoking during pregnancy and low birth weight and the effects of maternal smoking on child behaviour seen in the NCDS as in other cohorts, there is a need to encourage women to consider quitting smoking during pregnancy and to support those making this decision. Similarly, alcohol consumption during pregnancy is a well known risk factor for child development. Also pregnant women should be encouraged to decrease their alcohol consumption, if not totally abstaining.

As in other populations, children raised in families struggling with socioeconomic stressors tend not to develop optimally. Economic precariousness in Nunavik is also related to experience of food insecurity, which is linked to poorer intellectual and



behavioural development. Better access to work and increased education are certainly assets to be promoted.

### **A need for integrated intersectorial approaches**

Results from the NCDS, from the previous infant development study and from the 2004 Qanuippitaa survey provided us with very useful information on numerous factors that are impacting on Nunavik children physical, intellectual, emotional, psychological and social wellbeing. Although some specific actions have been proposed in the previous sections (reinstalment of the regional ban on the lead ammunition sale, smoking counselling during pregnancy, etc.), it is obvious that we need to develop and implement innovative integrated intersectorial approaches to tackle more effectively the different issues related to maternal health and child development.

One such integrated approach is the development and implementation of a regional food policy. Such a policy should be used to increase the consumption of country food (by promoting the benefits of country food, by increasing its accessibility, etc.). But it may also serve to define regional solutions to other food-related problems like the high prevalence of food insecurity in the region, the appropriate use of food subsidies, etc. In order to have a regional food policy for Nunavik, it will require the full participation and support from all the regional organizations.

### **A need for monitoring**

Finally there is a need to monitor the effectiveness of these recommendations in decreasing the exposure of babies to contaminants and other risk factors. Therefore we strongly support the implementation of a monitoring program for all Nunavik pregnant women. This monitoring program will provide public health authorities with the necessary data to evaluate future exposure to harmful factors in order to readjust the actions if needed. Also, continuous monitoring for the presence of contaminants in country food and in the environment should be maintained or implemented in various arctic regions.

### **Partners and collaborators**

