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# TRADITIONAL FOOD SYSTEMS RESEARCH WITH CANADIAN INDIGENOUS PEOPLES

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## ABSTRACT

Traditional food systems research with Canadian Indigenous Peoples has revealed many aspects of benefits and risks of the use of this food. Traditions based in hunting, fishing and gathering contain a great variety of species of wildlife plants and animals that provide rich cultural and nutritional benefits. Dietary change for Indigenous Peoples in Canada has resulted in the use of traditional food to provide usually less than 30% of total dietary energy; however this portion of the total diet contributes significantly more of essential nutrients. It also results in exposure to organochlorine and heavy metal contaminants that exceed the tolerable intake levels for some areas. A successful research and education intervention program with one British Columbia community demonstrated that increasing traditional food use can improve health status for vitamin A, iron and folic acid. It is concluded that traditional food systems are rich with potential for research and public health education intervention programs for Indigenous Peoples. (*Int J Circumpolar Health* 2001; 60: 112-122)

Key words: *traditional food, Indigenous People, nutrient composition, contaminants, food use*

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Understanding the impact of traditional food resources on the total diet and health of Indigenous Peoples is a research pursuit that has many facets. One must first be clear in definition of the key terms, "traditional food system" and "Indigenous People," and be clear as well in knowing the contemporary circumstances in which Indigenous Peoples live. The concept of dietary change includes knowing the way in which food use patterns evolve over time, and the risks and benefits of the consequences of dietary change.

Two definitions have facilitated the ongoing research and education activities of the Centre for Indigenous Peoples' Nutrition and Environment (CINE), and are implied through-

out this paper:

*Traditional food system* – All food within a particular culture available from local natural resources and culturally accepted. It includes sociocultural meanings, acquisition and processing techniques, use, composition, and nutrition consequences for the people using the food.

*Indigenous People* – A cultural group in a particular ecological area that developed a successful subsistence base from the natural resources available in that area. The plural form, "Indigenous Peoples," refers to more than one cultural group (1).

Throughout this paper the terms Indigenous People, Aboriginal People and Native People are used interchangeably.

In Canada today, there are approximately 670 communities of Indigenous Peoples with diverse cultures as evidenced by 79 distinct languages in 11 linguistic affiliations. Inuit communities are located in Labrador, Northern Quebec, Nunavut, and coastline areas of the Northwest Territories. Metis are recognized as living primarily in the Northern areas of Canada's Prairie Provinces and the Western Northwest Territories. First Nations communities are located throughout Canada, with population concentrations in Southern Canada and British Columbia. As elsewhere in the Western Hemisphere many Indigenous Peoples have left their home communities and reside in urban areas. This presentation focuses on research data from communities of Inuit, First Nations of Dene and Metis of the Northwest Territories and Yukon, and the Nuxalk Nation of coastal British Columbia.

## DIETARY CHANGE

Many Indigenous People view the increasing amounts of chronic disease as being related to changing lifestyles, in particular those related to diet. Diabetes, cancer, heart disease, fetal alcohol syndrome, and dental disease are viewed as resulting from taking on the "white man's" diet, and ignoring cultural food traditions (Kuhnlein, 1995). While having "enough to eat" is not the most pressing issue, elders and community leaders have expressed concerns about decreasing use of traditional food, associated deteriorating health in communities, and the loss of culture and cultural morale this implies.

Throughout Canada, Indigenous Peoples are assuming a greater role in determining the kind of research that takes place with them. Health and nutrition research issues that receive support from community leadership councils and in-

dividual participation need to be in recognized problem areas. For example, infant mortality rates have declined dramatically from the mid-50's to the present time for Canadian Indigenous Peoples; but suicide rates, particularly among young indigenous people are dramatically higher than for non-Native people (3,4). An opinion survey conducted with First Nations, Metis and Inuit in the early 1990's demonstrated that people felt the greatest community health problems centered in suicide, drug abuse, alcohol abuse and family violence (25 to 61% reporting these as problems) in contrast to 8% who felt that lack of food was a community problem (3).

The Aboriginal to all-Canadian mortality ratios are another way to understand priority issues in health. Female mortality ratios for First Nations and Inuit in selected areas where health statistics are recorded have shown that infection, respiratory disease, perinatal conditions and injury/poisoning are major concerns for health. These conditions are recognized as occurring in higher rates than for non-Native people, and as well, Indigenous Peoples also have other health and community concerns, especially those related to poor employment, low education levels and substandard housing conditions (5).

Indigenous People have clear perceptions of factors contributing to environmental change, lifestyle change and ultimately to dietary change — that is, the replacement of traditional food resources with those purchased in food markets. In Canada, among Peoples who have had traditional food systems historically based in hunting, fishing and gathering, these factors have been described to include: a reduced density of species and available harvesting areas; restricted harvesting in accessible areas; time and energy limitations for traditional harvesting, interruption of knowledge transfer to youth due to employment of adults and schools for children; the availability and accessibility of new food products; acceptability of new food products as a result of media, social contact and education; and concerns for wholesomeness and the presence of contaminants in traditional food (6).

It is evident that Canadian Indigenous Peoples, who have traditional food systems based in hunting, fishing and gathering, are now consuming diets much higher in fat and carbohydrate and lower in protein than was the case when a greater proportion of the diet was from traditional food. Among the Dene and Inuit of the Northwest Territories, Yukon Territory and Nunavut, the contemporary diet contains approximately 60 - 70% of total energy from market food, with the balance from traditional foods that are primarily lean game meats, fish,

and (for the Inuit) sea mammals. The majority of protein in contemporary diets is locally harvested fish and game, with dietary fat and carbohydrate contributed in the main from market food. This dietary pattern results in a nutrient profile that is more than adequate for nutrients associated with lean meats and fish, less than adequate for nutrients usually associated with plant foods such as fruits and vegetables, and with considerable amounts of energy as refined carbohydrates and fats (2, 7-9).

## WEIGHING THE BENEFITS AND RISKS OF TRADITIONAL FOOD USE

Recent evidence on the presence of environmental contaminants in traditional wildlife and fish food species of Indigenous Peoples throughout Canada has raised concern for health risk from using these foods (10, 11). While the balance of current evidence indicates greater benefit from using the food, than from not using it, there are continuing questions about benefits and risks. Benefits include taste and cultural preferences, sociocultural values, fitness and recreation during hunting and fishing, children's education, nutritional benefits, and savings on food costs. Risks include the largely unknown risks of low level contaminant exposure, possibility of accidents during hunting and fishing excursions, and the now recognized risks of increasing chronic disease from lack of participation in traditional lifestyle and diet.

An example of nutrient benefits can be seen in Figure 1, which demonstrates the differing nutrient densities per 1000 kcal of the traditional food portion in contrast to the market food portion of the diet as consumed by Inuit women of a community of Baffin Island. It can be seen that of the nutrients assessed, there is more protein, iron, zinc, magnesium, vitamin A and copper in the traditional portion of the diet. Calcium is a nutrient consumed more in market food; however, the amount consumed from both sources is not sufficient to meet current recommended levels of 1200 mg/day (8,12).

A review of the cost of a standard food basket for a family of 4 during one month in northern Canadian communities revealed prices that ranged from \$640 (Yellowknife, NWT) to \$1406 (Old Crow, Yukon) for the same basket of food items that cost \$543 in Ottawa. It is clear that purchasing good quality food in rural northern communities is prohibitively expensive, and especially so when families are living on social assistance (welfare). The entire social assistance pay-

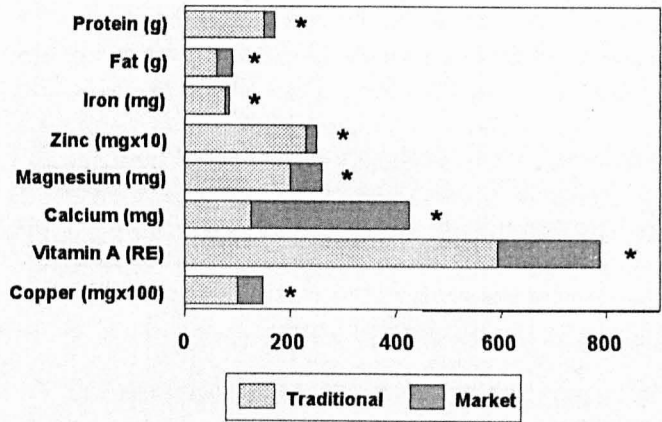


Fig. 1. Nutrient density in traditional and market portions of Baffin Inuit women's diets (n=291;88). Values with an asterisk are significantly different (p<0.05).

Table 1. Important social and cultural functions of traditional food recognized by Dene/Métis.

Harvesting and using traditional food by the family:

- contributes to physical fitness/good health
- is a favourite outdoor recreation activity
- provides people with healthy food
- keeps people "in tune with" nature
- favours sharing in the community
- saves money
- is an essential part of the culture
- brings respect from others
- builds one's pride and confidence
- adults can display responsibility for their children
- provides education on natural environment

Note: based on ≥ 90 % agreement (N=356 interviews)

ments to cover all expenses for the same family size at the time when pricing was done ranged from \$1054 to \$1715/month (13).

Reported social and cultural functions contributed by the use of traditional food by the Dene/Métis of the Western Northwest Territories are given in Table 1. Randomly selected adults in 9 communities were interviewed with dietary and sociocultural questionnaires. The attributes shown in Table 1, were derived through open-ended questions and interviews with community leaders before they were incorporated into a structured questionnaire. There was overwhelming agreement among adults that harvesting and using traditional food was important to them and their families for a broad range of physical, mental, educational, economic, and societal functions. These values cannot be underestimated when evaluating the impact of dietary change on the health of Indigenous Peoples, and underscores the value of social science research to define their importance (14).

Canada's Arctic Environmental Strategy (AES) and Northern Contaminants Program (NCP) has recently documented global long-range transport of airborne and waterborne organochlorine contaminants which accumulate in the food chain of many species of traditional food of Indigenous Peoples (11). This is particularly true for the Arctic, due to the cold climate which causes a "sink" of these contaminants in the North. In addition, there are point-sources of contaminants in many areas inhabited by Canadian Indigenous Peoples due to military and mining industry activities. Organochlorine contaminants have accumulated in Arctic sea mammals used in the traditional Inuit food system to such an extent that people in remote Arctic communities using traditional locally-harvested food may have higher contaminant

exposure than those living in Southern Canada. As shown in Figure 2 and 3, mean and median intakes of toxaphene and chlordane in the diets of Baffin Inuit women exceeded the tolerable daily intakes (TDIs), and many women had diets that exceeded the TDI for dieldrin and PCB's (15,16). High concentrations of lead, cadmium and mercury were also found in some of the same traditional foods of the community, with

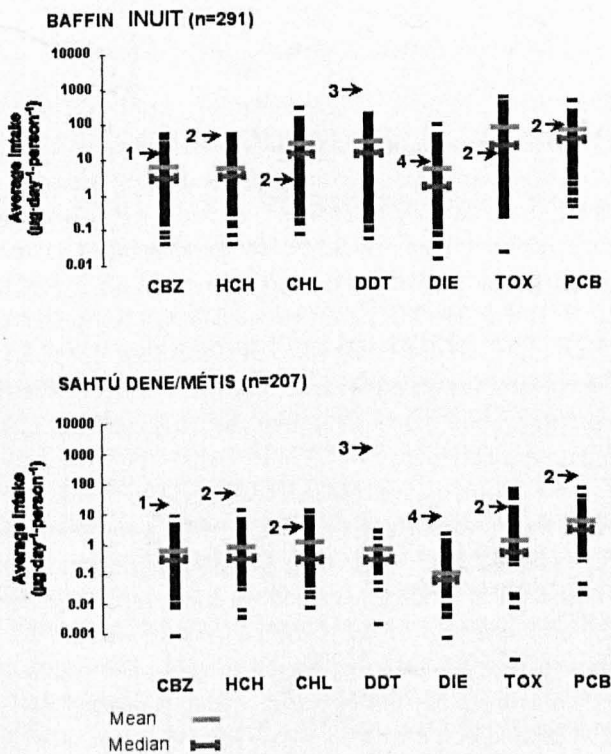


Fig. 2. Distribution of organochlorine exposure from traditional food consumed by Arctic indigenous women (Source: ref 16).

mercury intakes exceeding the safe intake guidelines for women, men and children (17). In contrast, the land-based food system of the Sahtu Dene/Metis did not contribute organochlorine intake in excess of TDI for most women. Later research with 10 Yukon First Nations, 15 Dene/Metis communities and 18 Inuit communities corroborated these results. Figure 4 demonstrates the extent of intakes assessed with 24-hour dietary recalls of the organochlorines, chlordane and toxaphene, and the heavy metal, mercury, in contrast to the TDIs. Mean intakes by Inuit exceeded the TDIs for chlordane and toxaphene, and mean intakes in none of the three areas exceeded the TDIs for mercury. The variance in intakes represented from one 24-hour recall is considerable, with exposure varying among individuals from zero to more than 5 fold the TDI.

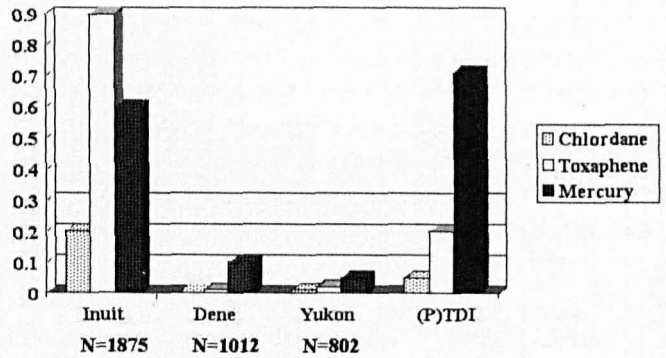


Fig. 3. Mean intakes of chlordane, toxaphene and mercury in Northern Canada (ug/kg/d)

While it is recognized that TDI's are established based on often limited toxicological knowledge and safety factors of up to 1,000, it is alarming that traditional food system portions of diets that contribute only 30% of total energy intake can contribute contaminants that exceed TDI in such a remote part of the world. The impact on individual health is not certain. This is especially distressing when the food items contributing the contaminants are the same food items that provide the majority of some essential nutrients, such as protein, iron, zinc, and omega fatty acids.

Thus, an imperative research challenge is to devise appropriate means to evaluate the relative benefits and risks of using traditional food. To illustrate this point, Figure 4. presents the traditional food contribution to daily intake of selected nutrients and contaminants for Baffin Inuit women 20-40 years of age. Intakes represented in 24-hour recalls are shown as the % of the reference values (Canadian RNI or TDI) for zinc, iron, protein, omega-3 fats, PCB's, chlordane and toxaphene. The overall diet, including market food, was adequate for the three nutrients presented, however, traditional food contributed 57% of vitamin A recommended intake, while providing ample amounts of iron and n-3 fatty acids; at the same time, however, traditional food as consumed contained higher than acceptable levels of certain contaminants. Evaluating the benefits and risks of such a diet is challenging. Could alterations of the daily mix of traditional food decrease exposure to contaminants while maintaining nutrient adequacy, and still be acceptable economically and culturally? Indeed, a formidable challenge exists for nutritionists and other scientists and Indigenous Peoples to influence and direct environmental policy for the protection of food systems and human health.

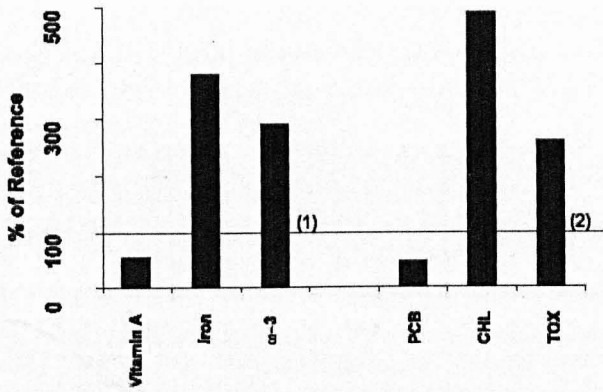


Fig. 4. Traditional food contribution to daily intake of selected nutrients and contaminants for Baffin Inuit women 20-40 years of age (n=217). (1) Recommended nutrient intake (2) Tolerable daily intakes.

### TRADITIONAL FOOD AND MARKET FOOD

The numbers of traditional food species used by the Indigenous Peoples of Canada are many. CINE research with Dene/Metis, Yukon First Nations and Inuit communities revealed, respectively, 62, 53, and 129 species of animals used. Plant species numbered 40, 48 and 42 in the three areas. In addition to considering the numbers of species, the researcher must also be aware of the various parts of the species as well as preparation methods which influence both nutrient and contaminant intakes.

Figure 5. shows the spread of average total traditional food intake represented as percent of total energy in recent CINE research using 24-hour dietary recalls conducted in 10 Yukon First Nations, 15 Dene/Metis communities and 18 Inuit communities. It is clear that communities closer to urban centres and those easily accessible by road consume less traditional food than do those in more rural areas. Nevertheless, as noted earlier, this extent of traditional food use contributes meaningful amounts of nutrients and cultural benefits.

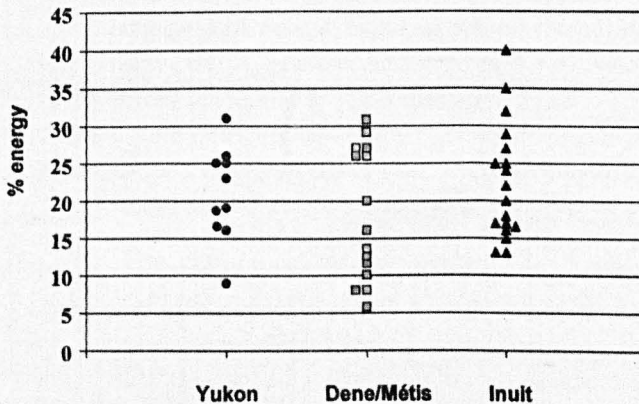


Fig. 5. Percent energy from traditional food from Yukon, Dene/Metis, and Inuit communities.

## TRADITIONAL FOOD FOR HEALTH PROMOTION- A CASE STUDY WITH THE NUXALK NATION

The Nuxalk Nation is in the Bella Coola Valley in a rural area of the west coast of British Columbia. There are approximately 150 homes and 800 First Nations residents on the reserve. Employment is often seasonal in fishing and logging industries, other employment opportunities are in local commerce and services; however unemployment often exceeds 30% and education beyond the 9<sup>th</sup> grade is often not attained (18). Traditional to the Nuxalk culture is a food system which emphasizes seafood, particularly salmon and shellfish, berries, game, roots, greens, fats of marine origin, and the inner bark of trees (6). Health concerns are similar to those of other rural communities of Indigenous Peoples in Canada: obesity, diabetes, dental caries, alcoholism, high-risk infants, and problems of mental health (19).

Upon request of the Nuxalk Nation Council, a series of research and education activities, including a nutrition education program which promoted use of locally available traditional food resources were conducted on the reserve. Table II shows the flow of activities that were guided by a local advisory committee who had the strategy to use traditional knowledge and the traditional food system to encourage dietary and lifestyle improvements. The first activities were to document the use of traditional food resources, and sample the food species for nutrient composition analyses. Several types of educational activities were conducted, including food events and feasts, school sessions on dental health, fitness events, traditional food preservation using traditional and modern equipment, plant harvesting excursions, etc. (20). During the course of the program, a total of 375 educational events emphasizing traditional Nuxalk food and lifestyles took place. A final tally of event participation showed 7,521, with many people participating in multiple events. Food use interviews before and after the program showed increases in use of fish, berries, fish oil, and greens. Also, families reported spending less on food which was related to the increased use of home harvested and preserved food and learned economical shopping practices (20).

Nutritional health assessment evaluations were conducted before (May, 1983) and after (May, 1986) the intervention education program. A variety of assessments were conducted, and blood samples were taken from volunteers 13 years and older. Key nutrients in these assessments were vitamin A

Table II. Nuxalk Food and Nutrition Program: Improving food use and nutritional status with traditional food.

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5 year program, 3 year intervention, 500 people

**Year 1-2:** Nutrient composition of traditional food  
Patterns of food use

**Year 3-5:** Intervention program

- Community and school events

2 full-time facilitators

Food – 66	Schools – 94
Adult Ed – 123	Fitness – 189

- Baseline and final nutrition assessments

**Results:**

- Food use : fish, fish roe, fish oil, game, wild fruit
  - Serum retinol, carotene, folate, ferritin
  - number of individuals with 2 or more low levels of micronutrients
-

as retinol and carotene, iron as ferritin and haemoglobin, and erythrocyte folic acid, as these are nutrients generally recognized as limited in diets of the poor. Participants in the assessment were 199 in 1983 and 267 in 1986, with 107 participating in both time periods. Significant improvements were shown in overall community serum retinol, carotene and folate. The overall indicators of iron status did not change; however, the haemoglobin for women 41-60 years increased significantly, and the percentage of teens at risk for low ferritin was reduced. Furthermore, the number of individuals manifesting multiple micronutrient deficiencies declined (21).

This research demonstrated that a program for Indigenous People emphasizing the positive nutritional benefits and cultural traditions of food use can improve nutrition and health status. Furthermore, it shows that intervention programs based in food, rather than in single nutrients as supplements or fortificants, have the capacity to improve multiple nutrient status. Worldwide, it is usually the case that multiple nutrient deficiencies exist, but it is interventions with single nutrients that are conducted. The intervention program with the Nuxalk demonstrated success in improving health with a culturally relevant food-based program simultaneously for vitamin A, iron and folate.

## CONCLUSIONS

Traditional food system research with Indigenous Peoples has a tremendous capacity for generating new knowledge in the form of nutrient and contaminant composition of food, and human exposure to these entities. It also demonstrates how local ecology and the natural environment can be successful in providing human nutrition, and ultimately the prevention of chronic diseases that originate in excessive and imbalanced market food use. Indigenous Peoples' traditional food system research for these benefits and risks can stimulate environmental conservation programs and efforts for global pollution control that will benefit the entire planet.

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