

Environmental and Health Benefits of Hunting Lifestyles and Diets for the Innu of Labrador

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Summary

The Innu of Northern Labrador, Canada have undergone profound transitions in recent decades with important implications for conservation and health policy. The change from permanent nomadic hunting, gathering and trapping in 'the country' (*nutshimit*) to sedentary village life (known as 'sedentarisation') has been associated with a marked decline in physical and mental health. The overarching response of the national government has been to emphasize village-based and institutional solutions. We show that changing the balance back to country-based activities would address both the primary causes of the crisis and improve the health and well-being of the Innu. Drawing on ethnographic fieldwork, interviews with Innu older people (*Tshenut*), empirical data on nutrition and activity, and comparative data from the experiences of other indigenous peoples, we identify pertinent biological and environmental transitions of significance to the current plight of the Innu. We show that nutrition and physical activity transitions have had major negative impacts on individual and community health. However, hunting and its associated social and cultural forms is still a viable option as part of a mixed livelihood and economy in the environmentally-significant boreal forests and tundra of Northern Labrador. Cultural continuity through Innu hunting activities is a means to decelerate, and possibly reverse, their decline. We suggest four new policy areas to help restore country-based activities: i) a food policy for country food; ii) an outpost programme; iii) ecotourism; and iv) an amended school calendar. Finally, we indicate the implications of our analysis for people in other countries.

Keywords: Indigenous peoples, Innu, sedentarisation, hunting, conservation, health, nutrition, physical activity

Summary word count 247 words

Background to the Sedentarisation of the Innu

The Innu are Algonquian speaking people of the Labrador-Quebec peninsula. For some 8,000 years, they and their ancestors were permanent nomadic hunters ranging over an area the size of France. In the boreal forests and tundra of the interior of the peninsula they hunted caribou, including the vast George River herd, as well as bear, marten, lynx, fox, beaver, otter, muskrat, partridges, ptarmigan, ducks, geese, several species of fish and occasionally seals in the coastal bays. Archaeological evidence suggests that the ancestors of the Innu also had a maritime element in their economy and that the ancestors of the Innu moved inland to concentrate on caribou hunting following Inuit expansion to the Labrador coast around 1300 (Loring, 1997, Loring, 1998, Loring & Ashini 2000, Loring *et al.* 2002).

But from the 1600s onwards, the Innu way of life was gradually reshaped following contact with European colonists and by subsequent pressures placed upon it by missionaries, fur traders, and the Canadian state (Leacock 1954, 1995, Henriksen 1973, Samson 2003a). In the mid 20th century, the Indian Act was implemented in Quebec and those Innu coming to trade at the various posts, which eventually became villages, were registered and officially regarded as domiciled there. In Labrador, the focus of this study, the provincial authorities initiated an aggressive assimilation campaign soon after Newfoundland joined the Canadian confederation in 1949. This resulted in the sedentarisation of Innu hunting families in the late 1950s in the village of Sheshatshiu, on the opposite shore to the North West River trading post on Lake Melville in Central Labrador, and in Davis Inlet (or Utshimassits) on Iluikoyak Island, across from the old Davis Inlet trading post on the North Labrador coast in 1967. Davis Inlet is now abandoned following a further relocation of the Mushuau (or ‘tundra’) Innu to Natuashish on the mainland in 2003. Today, there are some 18,000 Innu in Labrador and Quebec, of whom some 2,100 live in the two villages in Labrador (Indian & Northern Affairs Canada, 2005a, Indian & Northern Affairs Canada, 2005b).

Sedentarisation inevitably undermined the relationship of the Innu to their hunting culture, because mobility was central to its efficiency (Loring 1997, p.198) and the land provided the basis for their social, economic and religious ideas and practices. As with other indigenous people across North America, “*breaking the Indian relation to the land had concrete as well as symbolic significance*” (Rogin 1987, p.155). The vast interior of Labrador-Quebec suddenly became free of mobile populations. Severing the relationship between people and land was then an important precursor to natural resource exploitation and extraction for timber, energy and minerals (Samson 2003a, pp. 86-96). In addition, placing the Innu in villages also had vast symbolic value, as the authorities saw it as a measure of their integration into Canadian society. At the centre of the sedentarisation project was the conversion of the Innu not simply to Christianity but to a western and modernist worldview. Formal

schooling was central to the goal of making Innu think more like Canadians and, it was thought, eventually helping them accept the change from subsistence hunting to lives of paid wage labour.

However, to date no reliable source of wage labour has been found for the Innu, and most families survive on welfare payments. With the exception of a few individual political leaders, Innu are at best peripheral to all decisions about economic development and the environment in Labrador. Most employed Innu work in the government created institutions of the villages. Only a handful work in Goose Bay or in resource extraction industries, such as the Voisey's Bay mine, 75 kilometres north of Davis Inlet. These latter jobs primarily offer sporadic and temporary employment. Similarly, experiences of the Innu around Bersimis (Charest 1982, p 421-2) and Schefferville, both in Quebec, indicate that only a handful were employed in hydroelectric and mining projects respectively, and then only at low levels on below average salaries.

Instead of employment, sedentarisation has been accompanied by an increase in heavy drinking, suicide, solvent abuse and sexual abuse (Samson *et al.* 1999, Samson, 2003b). Ironically, much of the employment for the Innu is now in non-professional jobs in clinics, homes, shelters and treatment programmes in the villages. The advent of village-based social pathology among peoples immersed in what had hitherto been a relatively stable nomadic society is similar to changes recorded in other Northern native communities subject to similar pressures (Brody, 1981, Bussidor & Bilgen-Reinart 1997, Boothroyd *et al.* 2001; Inuit Tapiiriit Kanatami 2004). The loss of self-esteem, manifested in ubiquitous alcohol abuse, child gas sniffing and suicides, has had a profound effect on the Innu and their way of life. More than two decades ago, Brody (1981: 72) described the pathology of similarly situated aboriginal communities elsewhere in Canada: *"many northern reserves appear to be grim and even hateful little places, clusters of houses crowded together by planners in order to achieve economies of administration and services... Such compression of a people distinctive for their free roamings through unbounded forest is bizarre and painful."*

The feeling of loss experienced by the Innu is bound up with a tension that has built up between the past life in the country and the present life in the villages. The nomadic hunting way of life is often regarded as strenuous and sometimes demanding to the point of life-threatening, but it is healthy, vibrant and connects people to a core of their cultural and environmental identity. Typically, hunting families are spread out across a vast expanse of territory, and so have little aggregate impact on resources. Settlements, on the other hand, are seen as permeated by misery created by alcohol, sexual abuse, family rivalries, boredom and the physical confinement to a relatively small area. Because the village is now the site of so many recent personal tragedies the feeling of loss is magnified, especially among the generation that have known both country and village life. The remarks of Kanikuen Penashue, a resident of Sheshatshiu are typical: *"the problem is that we are so scared because the*

things that exist today are not explainable. They are so new to us. The whole world changed right under our feet. We are lost." (Innu Nation & Mushuau Innu Band Council 1993, see also, Innu Nation and Mushuau Innu Band Council 1995, p 24-41). Local settlers at North West River have also observed a change in the Innu from their confidence and generosity in the country to their trauma and suspicion of whites after sedentarisation (Plaice 1990, p 74-87).

The primary response of the Canadian government has been to fund village-based solutions such as medical and quasi-medical establishments, emergency medical evacuations to Newfoundland, and housing, sports and building infrastructure (especially for alcohol programmes, clinics and homes). The relocation of the Mushuau Innu from Davis Inlet, where they endured life in shacks without sanitation and running water from 1967 to 2003 to the new C\$152 million village of Natuashish can also be seen as part of these efforts (Indian & Northern Affairs Canada 2005b). The Labrador Innu Comprehensive Healing Strategy implemented by the Canadian government is almost entirely 'community-based' (see Treasury Board Secretariat 2004). Despite these efforts, social pathology has continued to worsen since the move with four suicides in the first year and with the discovery that 75% of a group of children treated for gas sniffing also had Fetal Alcohol Syndrome (FAS) (Omni Television 2004). A recent government survey found that 35% of students at the Natuashish school also had FAS (Canadian Broadcasting Company 2004). While some government policy reactions to the visible health crisis among the Innu have been welcomed, by ignoring the importance of Innu connections to the land, they fail to address some of the root causes of that crisis.

Our objectives in this paper are to examine the biological and environmental underpinnings of this crisis, and use them as a basis to show how country-oriented solutions might offer more hope of stemming the physical, psychological and cultural decline of the Innu. We make our case for a country-oriented shift in policy by arguing that two transitions have been fundamental to recent Innu history.

Firstly, a nutrition transition can be discerned in the abrupt shift from consumption of wild foods to processed foods. This is paralleled by a physical activity transition, from regularly active and strenuous exercise to much less demanding set of activities in the village. We investigate these transitions through both historical sources and interviews with Innu, and then explore how such changes have impacted upon health. We also compare nutritional properties of country foods with those of foods consumed in the village, as well as compare activity patterns in the country and in the village. We then use medical and environmental data to examine how the new junk food diets and lack of exercise are affecting the health of the Innu. Finally, we look at how practical policy changes and economic activities such as those being promoted by the Tshikapisk Foundation (2004), an association of Innu hunting families, could be put into effect to restore hunting activities and address

some of the manifold health problems of the Innu. The research is based on the fieldwork of one of authors (CS) with the Innu since 1994, and joint research since 2002, involving interviews, observations and data collection in Sheshatshiu and in the country at Kenemau.

The Nutrition Transition

The Indigenous Relationship with the Land

A key to understanding the crisis of the Innu lies in setting their recent experiences in the villages in contrast to their historical and continuing connections with the land. In the country, the Innu experience daily connectedness and respect for nature, and the closeness of families and communities. When Innu look at the country, they do not just see animals, trees and water. Like many other indigenous peoples, they see places with stories, they locate events, they see ancestors wandering the land, they see past and present intimately linked, they see tracks and signs, and nature tied together with them (Brody 1981, Lopez 1986, Basso 1996, Cruikshank 1998, Posey 1999, Clayton & Opotow 2003). But when Canadian and Newfoundland policymakers turned their attentions to Labrador, they instead saw the economic value of timber, of reservoirs for hydro-electricity, of iron ore and nickel in the rocks, and of the wildlife that needed protecting (Samson 2003a, p 96-111).

This core difference in values is critical. For the Innu, to destroy a part of a connected system is eventually to undermine the whole. In the country, the Innu feel they have much greater autonomy and freedom. They are able to choose when to hunt and when to rest. Their decisions affect the land and its resources, and their knowledge accrued over hundreds of generations of observation and experimentation determines their success. By contrast, life in the village is quite different. Because the economy required to support wage labour never materialised as the provincial authorities had earlier promised (Samson 2003a, p 96, 142-147), there are few secure jobs for Innu, and thus a dependence on welfare has emerged with little opportunity for self-reliance or self-determined life choices. A significant component of this change involves food. In the country, the Innu were self-reliant in providing for their sustenance. Contacts with missionaries and traders brought firearms, tea, flour and tobacco, but because they were relatively autonomous until sedentarisation, the Innu diet largely consisted of wild meat, fish, waterfowl and berries (Samson 2003a, p 127-142).

The Transition to Processed Foods

The nutrition transition is a well-established phenomenon in both industrialised and developing countries (Popkin 1998). In almost all of these industrialised and developing country contexts, people have been largely dependent on the produce from agriculture for several thousand years, and the

nutrition transition has involved a change from one diet based largely on foods from domesticated crops and animals to another with similar derivation but with increased processing. For the most recently settled hunter-gatherer societies, such as the Innu and other indigenous peoples of Canada, their transition has occurred directly from wild foods to modern refined (and often junk) foods.

In the Arctic and Subarctic regions, indigenous peoples' diets have changed from foods that are typically nutrient-dense, with high levels of protein and fat (especially omega-3 fatty acids), and vitamins and minerals (eg vitamin C, selenium), but relatively low levels of carbohydrates, to diets high in carbohydrates and saturated fats and low in essential nutrients (McGrath-Hanna *et al.* 2003, p 230-1). Importantly, these changes are on the whole very recent, with Northern peoples such as the Innu and Eastern James Bay Cree (Delormier & Kuhnlein 1999, p.182) still engaged in some hunting activities while domiciled in villages. Hence, their diets consist of both country and modern, largely processed, foods. While country foods can remain a significant part of the sustenance and nutritional intake of some Northern peoples, the diet that has become the norm over recent decades is one that is deficient in many of the healthy properties of food. A survey of seven Northern aboriginal communities in the 1990s characterised this pattern as being low in fruits, vegetables and dairy products, high in sugar, fat and saturated fat, and consisting of intakes of calcium, magnesium, folate, vitamin C and vitamin A that do not reach recommended doses (Lawn *et al.* 2002, p10).

Amongst Innu *Tshenut*, there is a widespread view that store bought food is both unhealthy and makes people ill. This was evident almost as soon as the Innu were sedentarised in the 1950s and 1960s when Father Frank Peters (1972, p 10-11) quoted Innu at the new Davis Inlet village as feeling hungry after eating processed food, and feeling that chicken, pork and beef were not as substantial as caribou meat. At the same time, he also noted the rapid deterioration of the teeth of the population, a condition he attributed to the sudden availability of sweets and soft drinks in the store. Other observers noted exactly the same unfavourable comparisons being made between store and country food at the time (Henriksen 1977, p 4), and as late as the 1990s, many Innu believed that the foods in the store were also adulterated, stale and unsafe to eat (Innu Nation & Mushuau Innu Band Council 1995, p 39). By contrast, a visiting physician reported that people in the country were remarkably healthy, with very few cardiovascular or lung problems, and good dental health (Sarsfield 1977). The major causes of mortality were trauma from accidents and infant illnesses.

These observations of the worries Innu had about store food in the early days of Utshimassits are backed up by the reminiscences of people who remember the times of transition from permanent country living to semi-sedentary village life. Some believed that their children would starve because store food is not as good for them as caribou, beaver and porcupine (Elizabeth Penashue, interview, 1994). Others observed high numbers of children getting sick in the community (Shimiu Penashue,

interviewed 1995) and other Innu maintain that the food purchased in the stores does not taste good (Pien and Lizette Penashue, interviewed 1997). These sentiments were shared by Mary Adele Penashue, (interviewed 2003), who remarked, “*I have strange feelings when I’m in the house eating store-bought food...It’s making us sick and weak, this fast food*” Despite these views, store bought processed food has become increasingly dominant in the diets of Innu in the villages, and is starting to be preferred by the younger generations.

Nutritional Content of Country and Store Foods

Once there has been a lifestyle change brought about by sedentarisation, then indigenous people have no constant access to country food throughout the year, and so come to rely on store-bought food derived from distant agricultural systems. This becomes a health problem as hunted and gathered foods are very different in nutrient content and density than store bought foods. Table 1 shows the energy, protein, fat and key vitamin content of eight types of wild meat and fish compared with eight domestic meats available in local shops. This data shows energy and protein levels similar to those measured *in situ* for the Cree (Berkes *et al.* 1994). Table 2 contains details of the recommended daily allowances (RDAs) for adults and children, and shows that RDAs for minerals, vitamins and energy can be reached with relatively modest quantities of country foods.

For this sample of 16 foods, store food has 75% more energy content than country food (1.26 MJ 100g⁻¹ compared with 0.72 MJ 100g⁻¹), 37% less protein (20.9g compared with 28.7g), and more than four times as much fat (23.2g compared with 5.7g), of which 8.7 g are saturated fats. These saturated fats are known to be an important risk factor in coronary heart disease and also contribute to the addition of body fat.

Country foods also contain more iron (4mg 100g⁻¹ compared with 1.68g in store foods). Iron deficiency is now a recognised problem for an increasing number of mothers and children worldwide following the adoption of modern diets (ACC/SCN 2000). There is more than three times the vitamin C in this sample of country foods, 50% more riboflavin, 67% more niacin, though less than half the thiamine. These high concentrations of vitamins in country foods are important for hunters such as the Innu with little or no cereals or vegetables in their traditional diets. Some country foods are very high in certain vitamins – ptarmigan, for example, has ten times as much niacin than other meats and fish (Mackey 1987), and caribou and duck are high in thiamin. A variety of berries are important sources of vitamin C, even though only relatively small amounts are consumed as a result of the short growing season. Clearly, these country foods were once able to supply the necessary macro- and micro-nutrients to ensure adults and children remained healthy over thousands of years.

How do these foods compare with a typical 'junk' food meal of the sort now increasingly available to the Innu and other indigenous peoples? One typical meal of a cheeseburger with French fries, each of some 170g in weight, would supply some 52g fat (of which 16g are saturated), 31g of protein, and a total of 4.29 MJ (35% of the daily recommended total for adult males and 47% for women). By contrast, a 340g meal of caribou meat would supply 15g of fat (of which 5.8g are saturated), 101g of protein, and 2.37 MJ (20% of male and 26% of female RDAs). A similar meal of salmon provides 25g of fat, 93g of protein, and 2.62 MJ of energy, and of beaver 23.7g of fat, 119g of protein, and 3.01 MJ of energy. The nutritional value of hunted, fished and gathered foods is magnified still further because almost all edible parts of foods are consumed by Northern peoples. With the caribou, for example, all the organs are eaten, as well as bone marrow, both of which provide important sources of fat from an animal that is typically very lean (Tracy & Kramer 2000, p. 48).

A variety of studies of indigenous groups across the Canadian sub-arctic have recorded how much country food is consumed after the lifestyles of aboriginal peoples were shifted from being nomadic to settled. These vary from a low of 52 kg per person per year in Manitoba communities, to 96 kg yr⁻¹ for Inuit in Labrador, 115 kg yr⁻¹ for the James Bay Cree, 146 kg yr⁻¹ for Omushkego Cree in Ontario, 221 kg yr⁻¹ for groups in the Keewatin region, and 285 kg yr⁻¹ for the Inuit of north Quebec (Mackey & Orr 1987, Wein *et al.* 1991, Berkes *et al.* 1995a). These amount to a daily consumption of between 140g and 781g of country food. Some 200g of country food supplies the recommended daily protein requirement for adult males, while 175g is sufficient for adult females (see Tables 1 and 2). Clearly, continuing to consume country food will be good for the physical health of Innu and other northern peoples. The hunter-gatherer nutritional regime is the oldest human diet and is well-suited to human physiologies (Eaton and Eaton 1999, p. 449).

The Decline in Country Food Consumption

Country foods still remain a part of the diets of the Innu and other Northern peoples. Among the Cree, for example, 29 species of wildlife are still eaten, each with 2-11 edible parts, with fish and birds the most consumed in summer, and large and small mammals the most important in winter (Delormier & Kuhnlein 1999). During summer, about half of the fat consumed by women comes from country foods, with Canada goose the most important single source (14.3%). In winter, though, only one of the top 20 sources of fat was a country food (goose again), with the top source now french fries (9.6% of total fat). Among the Cree, Chipewyan and Metis peoples around Buffalo National Park, Wein *et al.* (1991) estimated that households ate country foods six times per week during the late 1980s.

Wagner's (1986) study of ten reserve communities in Manitoba indicated that the harvest size and diversity of country foods depended on the local availability of wildlife habitats and cultural

preferences. Harvests were greater in the more sparsely populated northern communities. By comparing documented records for 1912-14, it was clear that consumption of country foods had declined (Table 3). Using a caesium tracing method, Tracy & Kramer (2000) found that caribou consumption in northern Canada had declined by 80% in 11 communities from 183 g day⁻¹ in 1967-8 to 35.1 g day⁻¹ in the 1990s.

Similar declines in country food consumption have been recorded amongst the Inuit of Greenland (Pars *et al.* 2001). In the north-west, country foods (including here seal and whale) provided 54% of daily energy intake in 1952, but this had fallen to 25% by 1991. Once again, younger people consume fewer country foods, as do those in households resident in larger towns compared with those in villages. The youngest group consumed the most soft drinks, fruit syrups, and fruit and vegetables. Most studies have found that young people now consume less country food than elders (Wein *et al.* 1991, Tracy & Kramer 2000, p.46), and that there have been declines in consumption over time. Delormier & Kuhnlein (1999) found that there had been a decline in use of traditional foods among the Cree of Quebec, particularly by the younger generation. Berkes *et al.* (1995a, 1995b) found similar changes amongst the Cree of northern Ontario. An Indian and Northern Affairs Canada (INAC) nutrition survey (Lawn *et al.* 2002:4) found that among adults over 45 in Inuit communities in Nunavik (Northern Quebec) about a third of energy was obtained from country foods, compared with only 22% among younger women and 18% among younger men. Older people were also reported to be eating much less junk food than their younger counterparts.

There are few data on changes in consumption of country foods by the Innu over time (Usher 1976; Mackey & Orr 1987). Usher (1976) found that the major source of food and income in northern Labrador came from harvesting country foods. In the 1980s, Mackey (1987) indicated that 30-65% of the Innu in Labrador continued to spend the autumn and/or spring months in the interior hunting, trapping, fishing and gathering. This has fallen dramatically since the withdrawal of funding for the Outpost Program, which enabled Innu families to spend several months a year in the country.

Health Consequences

Changes in diet have had severe and costly public health consequences in most industrialized countries (CDC 1996; Ferro-Luzzi & James 2000; Eurodiet 2001; Nestle 2002). One of the most serious consequences of poor diet is the emerging obesity epidemic, the costs of which are some US \$117 billion per year in the USA, compared with US \$97 billion for smoking (Kenkel & Manning 1999). The Eurodiet (2001) study has also concluded that disabilities associated with high intakes of saturated fat and inadequate intakes of vegetable and fruit exceed the cost of tobacco use. It is further acknowledged that sedentary lifestyles are a major public health problem.

However, unlike most Europeans and North Americans, the Innu are still fortunate enough to have wild foods at their disposal in the vast Labrador-Quebec interior. A wide range of country foods are still consumed by all indigenous peoples in Canada, with more than 50 species of animals and birds regular in diets, including caribou, moose, rabbit, muskrat, beaver, porcupine, muskox, squirrel, lynx, fish, duck, geese, ptarmigan and grouse, together with a variety of fish, marine mammals, berries, wild rhubarb, wild onions and Labrador tea (Mackey & Orr 1987; Berkes *et al.* 1995a; Wein *et al.* 1996). While Northern peoples have been consuming these foods, the incidence of obesity, diabetes and cardiovascular diseases has been relatively low. It has been suggested that this is partly due to the high content of omega-3 fatty acids and antioxidants in the traditional diet (McGrath-Hanna *et al.* 2003, p 230).

Although one facet of the changes occurring among Northern indigenous peoples should never be taken in isolation, the public health consequences of new diets are now known to be serious contributors to a wide range of ailments. Some health problems arise from nutritional deficiencies of iron, iodide, folic acid, vitamin D and omega-3 polyunsaturated fatty acids, but most are due to excess consumption of energy and fat (causing obesity), sodium as salt (high blood pressure), saturated and trans fats (heart disease) and refined sugars (diabetes and dental caries). Diet is thought to be a factor in 30% of cases of cancer in developed countries (Riboli & Norat 2001).

While degenerative diseases such as diabetes, coronary heart disease and cancer have been relatively rare in hunter gatherers, they are now becoming common among hunting peoples who have been sedentarised. As well as more energy expenditure and lifestyles that are more protective of the body (for example, the shorter gap between menarche and childbirth among hunter gatherers protects against breast cancer), hunter-gatherer diets are comprised of foods that are denser and more fibrous, have a high protein to fat ratio and lack the high amounts of sugar, salt, saturated fats and high calorie counts characteristic of many diets of people in industrialised societies. There is, therefore, much to learn from the qualities of the hunter-gatherer diet and lifestyle in terms of health promotion (Eaton and Eaton, 1999). Analysing broad epidemiological changes over time, McKeown (1988, p 37) has found that diseases such as cancer, obesity, diabetes, hypertension and heart disease, as well as non-communicable diseases, are uncommon in hunter-gatherers and peasant agriculturists, appearing only when traditional ways of life are abandoned or disturbed.

Amongst Native North Americans, the result of the transition has been a rapid increase in recent years in diet-related health problems, particularly of type II diabetes, coronary heart disease and obesity (Thouez *et al.* 1989, Hegele *et al.* 1997, Story *et al.* 2003). This follows significant advances in reducing infant mortality, such as from 150 per 1000 live births amongst the Inuit in mid 20th century

to 10 per 1000 towards the end of the century (Young, 1994). One study of Cree women in Quebec found 30% with a BMI of 25-29.9, and 57% in the obese category of a BMI of more than 30 kg m⁻² (Delormier & Kuhnlein 1999). Fifty percent of the 36 women surveyed in Davis Inlet in 1992 had a BMI of greater than 30% and 75% of these women exceeded a BMI of 27%, making Mushuau Innu women the most obese of all the seven Northern aboriginal communities surveyed by the INAC study (Lawn *et al.* 2002, p.44). These are problems shared by many circumpolar peoples (McGrath-Hanna *et al.* 2003), and this extends to indigenous peoples across North America. Story *et al.* (2003) suggest that “*obesity is now one of the most serious public health problems facing American-Indian children*”. Hovering at an average of 25%, the rates of obesity among aboriginal populations in Canada are almost twice that of Canadians as a whole (Canadian Institute for Health Information 2004, p. 116).

As well as the adverse effects on physical health, there is also evidence that the change in diets for indigenous peoples may be implicated in the high rates of mental health problems suffered by these populations in recent years. Based on an extensive review of literature, McGrath-Hanna *et al.* (2003, p 233-5) argue that the sudden shift from diets derived from hunting, fishing and gathering to those based on Western store-bought foods is an important risk factor linked with the deterioration in the mental health of circumpolar peoples. This claim is based on several lines of evidence. For example, the decline in consumption of omega-3 fatty acids has important implications for neuronal and brain development, function and health, and this has been associated with increased levels of aggression, depression, postpartum depression and suicide. Given the scientific evidence on the adverse effects of store food on the health of aboriginal peoples, it is not surprising that some indigenous groups view this so-called ‘whitemans’ food’ as literally and symbolically polluting (Adelson 2000, p 104).

Pollution and Country Foods

The decline in aboriginal wild food consumption has a generational basis (Wein *et al.* 1991; Tracy & Kramer 2000, p. 46; Pars *et al.* 2000, Lawn *et al.* 2002), and this coincides with policies of relocation and sedentarisation, as well as with the acceleration of resource extraction activities from indigenous peoples’ land and water resources. Not only do such activities bring with them an influx of non-native people requiring processed and frozen foods (this region is beyond the zones of agricultural production), but the industries themselves disrupt the relationships between aboriginal peoples and the lands. The decrease in country food consumption among aboriginal peoples affected by industry has been shown to be closely related to difficulties in hunting and reduced availability of animals, and to community concerns over the taste and safety of the wild foods (Loney 1995, p 233). Hence, industrialization of aboriginal lands creates both a push factor, discouraging hunting and fishing, and a pull factor, drawing people to processed foods because of fears over the adulteration of wild foods

from industry (see Horton 2004, p 10A). In Northern areas, processed foods have been even more attractive because of the lower costs compared with fresh produce, which is perishable, and consequently relatively expensive, especially to aboriginal families living on welfare.

The decline of country food consumption has coincided with the new threat from contaminants in country foods. For example, radioactive caesium (Tracey & Kramer 2000, p.48) and cadmium (Adelson 2000, p.84) have been found in caribou in the Canadian north. Methylmercury has been discovered in fish caught by Eastern James Bay and northern Manitoba Cree (Delormier & Kuhnlein 1999, p. 182; Loney 1995, p.239), along with mercury, PCBs and pesticides in traditional foods consumed by Inuit populations in Greenland (Pars *et al.* 2000, p. 29). One of the most notorious cases of mercury poisoning affects the Ojibwa people of Grassy Narrows, Northern Ontario. In the 1970s, it was discovered that a pulp mill was the source of mercury poisoning of fish caught by Ojibwa. On recent visits to the Grassy Narrows and Wabaseamong reserves, the Japanese neurologist who publicised the first cases reported that some of the residents experienced increased symptoms of the poisoning with age (Aiken 2004). Even if the industrial developments are not as malign in their effects as this case, there are always some adverse changes to local ecosystems. Many aboriginal peoples believe that such damage diminishes the abundance of animals (Adelson 2000, p 84).

For the Innu in Labrador, environmental threats are posed by a number of large industrial projects. These include, mercury in fish caught in some of the water passing through the Churchill Falls hydroelectric project, adverse changes to animal habitats (e.g. waterfowl migration patterns), water pollution from the Voisey's Bay mine, the creation of the Trans-Labrador highway, connecting Goose Bay with Labrador City, and low level flight training (see Samson 2003a, p 96-116). As with similar industrial projects in Canada, these also have much wider negative effects on the social fabric of the peoples themselves. The creation of hydroelectric generating projects has been found to be associated with interpersonal violence, family break-ups, alcohol and drug abuse and cultural disintegration among aboriginal peoples across Canada (Loney 1995, Kirkness 2000, p 309).

The Physical Activity Transition

Activity Transition in Settled and Agricultural Societies

The second transition of significance to Innu physical and mental health is the activity transition. Like the nutrient transition, this has already occurred in industrialised countries, and is having a significant impact on health and well-being (CDC 1996, Wanless 2004, Lang & Heasman 2004, Pretty *et al.* 2005). Along with diet, physical activity is now known to be an important determinant of health and well-being. Again, human metabolism and genetic make-up have been unable to adapt to the rate of

change and magnitude of changes in lifestyle that have taken place over recent decades. People in both industrialised countries and urban settlements in developing countries have become increasingly sedentary in all aspects of daily life, including during leisure time, in traveling to and from work, and during work itself. In Europe, there has been a dramatic fall in physical activity over the past 50 years with on average 2 MJ less energy output per day in adults aged 20-60 years (Eurodiet 2001). Yet the public health consequences of these changes have not, until very recently, been widely discussed or accepted (DCMS 2002; DoH 2004). The Eurodiet (2001) study states “*the importance of physical activity has been underestimated for many years by both doctors and policy-makers*”. In the USA, the report of the Surgeon General (CDC 1996) documented similar alarming declines in physical activity and consequent increases in ill-health, finding that 60% of Americans are not regularly active, and 25% are not active at all.

Although there is no systematic data to establish long-term trends, it is clear that lifestyles have changed in many countries, and that even leisure time is increasingly filled with sedentary behaviour (CDC 1996). Echoing Popkin’s phrase (1998), we believe that modern societies have also gone through an ‘activity transition’ in the past two to three generations (Pretty *et al.* 2004, 2005), with people no longer active in the workplace nor in traveling to and from work, nor during leisure time. This too has very significant health consequences for whole populations.

Yet physical activity is known to reduce the risk of dying from coronary heart disease, the leading cause of death in industrialized countries, and also reduces the risk of developing diabetes, hypertension and colon cancer. It enhances mental health, fosters healthy muscles and bones, and helps maintain health and independence in older adults (Paffenbarger *et al.* 1994; CDC 1996; Hermansen *et al.* 2002). Compared with active people, those who are sedentary have a 1.2-2 fold increased risk of dying (Paffenbarger *et al.* 1993), with levels of cardiovascular fitness strongly associated with overall mortality (Berlin and Colditz 1990). Physical activity provides a protective effect in later life, though taking up physical activity at any time can have an immediate effect on long-term morbidity (Paffenbarger *et al.* 1994).

A variety of studies have also shown that aerobic exercise improves self-esteem as well as having an antidepressant effect (Fox and Corbin 1989, North *et al.* 1990, McDonald & Hodgdon 1994, Scully *et al.* 1999, Frumkin 2002, Pretty *et al.* 2005). Exercise appears to affect an undetermined psychophysiological mechanism, leading to improved fitness and/or weight loss, more autonomy and personal control, and a better sense of belonging and significance. However, there is much about the underlying mechanisms that is not known (Camacho *et al.* 1991, Farmer *et al.* 1998). It appears that if the amount of activity decreases in active individuals, then the risk of depression increases (North *et al.* 1990, McDonald & Hodgdon 1994, Dishman 1995). Paffenbarger *et al.* (1994) found that men

who engaged in three hours or more of sporting activity had a 27% reduction in the risk of developing depression at follow up compared to those who did an hour or less. There was also some important evidence for a dose response. Those who expended 10.5 MJ or more per week were 28% less at risk of developing clinically recognisable depression than those expending less than a 4 MJ wk⁻¹; those who expended between 4-10 MJ wk⁻¹ had a 17% risk reduction compared to those in the least active group.

Physical Activity in the Country

The importance of sedentarisation as a factor in reducing physical activity has been documented elsewhere in Canada amongst Cree communities, where efforts to increase physical activity have centred on aerobic classes, walking and cycling, and swimming (Lavallée *et al.* 1994), even though 19% of those questioned said they preferred traditional activities such as wood-cutting or snowshoeing. Medical professionals working with the Innu have also recommended organised physical activities, but there has been little take up as a result of ongoing social problems in the villages and the foreign nature of such activities which separate exercise from purposeful physical activity.

By contrast, physical activity in the context of hunting is an integral part of a way of life. Innu almost unanimously speak of hunting as fulfilling and therapeutic, providing a stark contrast to the inactive and stressful life in the villages. Observing the changes brought about when Innu leave the villages and spend months in the country, Andrew & Sarsfield (1984, p 429) remark, “*alcohol abuse suddenly stops. A combination of improved diet, a rigorous lifestyle and the stable emotional and social environment offered by a functioning Innu society, make for a startling contrast with life in the villages.*” In his seminal study of Northern Athapaskan people, Brody (1981: 253) describes similar transformations in which “*tense people relax; the uncertain and shy become more confident,*” and all members of the hunting camp find the physical activity satisfying.

The activity transition for the Innu has been more rapid and pronounced than it has been for people in industrialised countries. Their transition has been from a nomadic lifestyle centred on physically-demanding hunting, gathering and fishing to a modern lifestyle with its associated motorised vehicles and inactive jobs. As late as the end of the 1960s, the entire Mushuau Innu population was using dog teams, walking in winter on snowshoes and transporting themselves across long distances in blizzards, often under sub-zero temperatures with no guarantees of a successful hunt.

The anthropologist Henriksen (1973, p 21-24) recounts Innu endurance and stamina that indicates just how much physical activity could be involved in Innu life. The camp in which he was staying in the

1960s was situated one hundred miles inland from Davis Inlet. There a group of men decided to go to the trading post to purchase some provisions. They rose at one in the morning and set off on sleds, taking turns to ride and run beside the sled. Some of the men shot ptarmigan along the way. They travelled non-stop until noon, having only a fifteen minute tea break, before travelling further until five o'clock when it became dark. They then had to find a suitable campsite near a creek. The tent frame and supports were then fashioned from surrounding trees and the canvas tent thrown over the frame. A floor was built by shovelling away snow and then tramping down the remaining snow. The dog's meat was boiled and the dogs tied up before the men were able to prepare their own food for the night. After eating, the men got up and tramped down a path in the snow to make their passage easier the next day. They returned to the camp at one o'clock in the morning, having been up for twenty-four hours, then rose after two hours sleep and finally arrived at Davis Inlet by the next afternoon. After spending a short night at Davis Inlet, the group set off back for their camp one hundred miles distant, and returned in the same fashion as the outward journey. Even today, with snowmobiles and outboard motors, the Innu hunting life is highly physically demanding for all members of the camp, from the older *Tshenut* to the children.

Energy Expenditure

There are no time and motion studies to illustrate the precise difference in physical activities in the country compared with life in the village. However, both written records and the testimony of Innu indicate large difference in energy expenditure. Table 4 summarises the hourly calorific output for a selection of activities typical to both country and village life. In the country, most days involve long periods of physical activity. First, Innu have to get to where they will camp. In the past, this would have been by walking, with loads carried or dragged on sledges. Today, most use snowmobiles in winter. From the camp, men engage in hunting and trapping, and fuelwood cutting and hauling. Often they will be away for the whole day. Women engage in gathering plants and boughs of spruce for tent floors, snaring rabbits, setting nets for fishing, and a wide range of camp activities, including preparing and cooking foods, collecting water, looking after infants, repairing cloths and tents, and taking care of meat and hides. Jean-Pierre Ashini, interviewed in 2004, told us that, "*we were always busy in the country. I didn't consider this hard work*". Only when there were heavy snow storms or days of continuous rainfall did activity diminish in Jean-Pierre's camps (see also, Ambler 1996, Pratt 2002).

Hunting days would typically begin at daybreak so that Innu could maximise the hours of daylight while hunting. This could mean 12-15 hours of walking a day, which during the spring and summer would require 19-25 MJ of energy expenditure, and up to 38-48 MJ in winter. Another typical day might involve 6 hours of cutting trees and hauling wood for fuel – with an expenditure of 17.5 MJ.

Innu today recognise what such activity does to them physically. Jean-Pierre Ashini says, “*I eat a lot in the country, but I burn it off. Even though I am eating fatty foods, I am still 20-30 lbs lighter than when I live in the village*”.

Some Innu recall acts of extraordinary physical endurance and capacity. Jean-Pierre Ashini recalls carrying a whole caribou of some 160 kg weight some 2.5 km back to camp. Dominic Pokue, interviewed in 2003, remembers as a young man canoeing 65 km in two days, and travelling 110 km in five days to reach camp at Minaipi Lake. Sometimes travel to the camp could involve walking both day and night, often carrying or dragging heavy loads. When men were hunting, they could travel very long distances, often spending 1-2 days away from the camp until they were successful in the hunt. Mary May Rich (interviewed in 2003) says women were active all day until they went to bed – chopping wood, collecting boughs, preparing foods. She did not consider this hard work, but an integral part of life and her identity. She said, “*I miss life in the country. It hurts to be in the village now*”.

It is clear that physical activity in the country involves energy expenditure in excess of the normal recognised maximum intake for adult women and men (8-10 MJ day⁻¹). A typical day in the village might only involve expenditure of 0.8-2.1 MJ on physical activity (not counting sitting, lying etc). By contrast, a typical day in the country might involve expenditure of 12.5-50 MJ, depending on time of year and activities. Consumption of food calories would therefore rarely exceed energy expenditure. In the village, however, intake greatly exceeds expenditure. For those Innu without jobs, a typical day may involve no more physical activity than an hour of walking from house to house or to the local store. Some children with bicycles may be more active and new sports facilities in the villages now occupy the time of some Innu children. Despite this, without access to the country, the Innu have little or no regular physical activity to fill the vacuum created by lack of hunting, trapping and gathering. It is, therefore, inevitable that energy input from food, even around recommended maximum intakes, will exceed expenditure. As we have shown, the situation is considerably worsened by the adoption of modern diets dense in fats and calories.

Restoring Country-Based Activities

This disconnection from the country has a profound effect on the Innu’s identity and their sense of connection to places and to each other. Underlying the nutritional and physical activity transitions is a fundamental change from largely self-reliant nomadic lifestyles in close contact with the land to welfare-dependent settled existences in villages. The Innu are virtually unanimous in describing *nutshimit* (the country) as synonymous with health (Samson 2003a, p 255-262). Despite the open admission of some hardships, the country is depicted as providing the physical, mental and spiritual

sustenance needed to survive as well as the social solidarity needed to maintain the Innu as a distinct society. For example, in a vast amount of Innu testimony on the changes imposed upon them since sedentarisation, *nutshimit* was mentioned repeatedly as a source of healing and revitalisation, often making direct links between wild food, physical activity, collective autonomy, and physical and psychological strength (Innu Nation & Mushuau Innu Band Council 1995). Reports from explorers, scientists, and other non-native observers before sedentarisation also depict the Innu as a healthy, vibrant and self-reliant people, living into advanced age (Turner 1979, [1889], p.106, Tanner 1944, p 599, 663)

The idea that being in the country can bring mental health and esteem benefits should not come as a surprise, as it has been established by a variety of empirical studies on largely urban-based people in industrialised countries (Pretty 2004). These include analyses of the effects of views from the window or in pictures (Moore 1981; Ulrich 1984; Tennessen & Cimprich 1995; Kaplan 2001; Kuo & Sullivan 2001; Diette *et al.* 2003), of incidental exposure to nature (Cooper-Marcus & Barnes 1999; Wells 2000; Whitehouse *et al.* 2001; Wells & Evans 2003), and of immersion in wild nature (Hartig *et al.* 1991, 2003; Fredrickson & Anderson 1999; Williams & Harvey 2001; Herzog *et al.* 2002). We must, therefore, assume that the same applies to the Innu. This is reinforced by a growing body of research in social psychology and epidemiology relating to other aboriginal communities in Canada. These studies indicate that a command of traditional knowledge, spirituality, and higher levels of cultural continuity are associated with less suicide, solvent abuse and self-destructive tendencies (Chandler & Lalonde 1998, Dell *et al.* 2002). Researchers noting the close association between suicide and rapid social and cultural change in the Far North have recommended both “*activities directed towards continuity of valued practices...continue to be developed*” (Kral 2003, p 38) and a ‘recovery of tradition’ (Kirmayer *et al.* 2003, p. S16).

Given the profound loss of autonomy and change in lifestyle brought about by sedentarisation, it is doubtful that the Innu will revert to permanent nomadic hunting. But, with only very limited wage labour options and no viable educational training or economic plan for the Innu villages, it is clear that country-based activities could be vital for both economic and cultural survival of a sizeable number of Innu. Several policy options are available to increase access to the country whilst not contributing to any further natural resource declines. These would not represent a ‘backward’ step for the Innu, but would rather seek to make the best use of available technologies and practices.

We suggest four key policy changes:

- i) a regional food policy to promote country food sourcing and consumption;

- ii) following the recommendations of the Canadian Human Rights Commission (Backhouse & McCrae, 2002), a fully-funded outpost or hunter support programme to strengthen regular connections to the country;
- iii) an ecotourism programme to increase visitor travel to the country and expenditure for Innu goods and services;
- iv) a new school calendar policy to ensure that children can visit the country for a month or more in spring and autumn without increasing their likelihood of being held back a year for missing school time.

Establish a Food Policy for Country Food

Some countries, such as Greenland, have progressive policies to support hunting lifestyles and consumption of country foods (Marquardt & Caulfield 1996). The Greenland Home Rule government has been promoting local country food markets since 1988, and hunters regularly sell via formal kiosks, informally to relatives and neighbours, directly to schools, hospitals and senior citizens' homes, and directly to government-controlled processing facilities. The aim of the policy is to support country food consumption as a substitute for expensive and less healthy imported foods. At the same time, such a policy helps to promote the economic viability of indigenous communities. Country foods are not permitted to be exported. An important factor which enables this in Greenland is that there is effective indigenous control over land and sea tenure systems (Marquardt & Caulfield 1996, p 116).

Experience closer to Innu country shows that as long as Innu were able to maintain collective control of certain lands and waters, as consistent with the United Nations Draft Declaration on the Rights of Indigenous Peoples, such a policy could be a possibility. In the Inuit and Cree regions of Northern Quebec, a Hunter's Support programme has been in existence since 1982 when the Quebec provincial government legalized it. The programme operates by the province releasing funds to aboriginal organisations that pay Inuit and Cree hunters for the meat and fish they bring home. It also helps to subsidise the purchase of hunting equipment, transportation and a small fee for the hunters' time. After taking some of the food from the hunters, the aboriginal organisations then distribute food throughout the villages for free. The aim of the programme is to encourage the perpetuation of hunting and to offer alternatives to aboriginal hunting families that are excluded from, or do not wish to participate in, wage labour (Kishigami, 2000).

It is clear that a similar policy could assist in maintaining hunting, fishing and trapping activities as well as improve the diets of the Innu. If pursued, such a governmental investment could be perceived

as a preventive health measure, avoiding healthcare costs and averting some of the suffering associated with sedentary village life. To date, the government of Newfoundland has not been as imaginative as its Quebec counterpart in implementing such a programme.

A further suggestion is a policy in Labrador to encourage local food sourcing by stores and institutions (e.g. hospitals, schools). While this policy may conflict with the religious antipathy many Innu feel to the buying and selling of animals, especially the caribou, it would be possible to source some fish and wildfowl. How to revise incentives for the private food stores is more difficult. Northern stores in Canada are smaller than their southern counterparts, with, according to one study, 457 items compared with 10-20,000, and 20-50 times less the floor space (Green & Green 1987). Very few sell fresh meat, fish and country foods. If an accelerated programme of activities in the country were to be initiated, however, a reinvigorated communal system of food distribution could make some commercial transactions superfluous and reduce reliance on cash.

Reinstate the Outpost Programme

Access to the country now requires money and technologies, especially for older Innu. With no settler communities and few industrial incursions except the Voisey's Bay mine, the Innu in Natuashish can access the immediate country relatively easily. However, further excursions to favoured hunting and fishing locations such as Kamestastin and Ashuapun require snowmobiles or airplanes. Because of settler and industrial activity in Central Labrador, the Innu living in Sheshatshiu are more heavily reliant on money and technology to reach preferred locations in the country. Unfortunately, the Outpost programme which funded Innu hunting encampments in the autumn and spring of each year has been discontinued. This is despite a recommendation from the Canadian Human Rights Commission in 1993 that this programme should be continued indefinitely as a crucial enabler of Innu cultural continuity (Backhouse & McCrae 2002, p.7).

In this regard, the government has yet to honour its own obligations towards the Innu. The follow up report concluded that "*the Government has not implemented that aspect of the second recommendation in the 1993 Report that called on the Government of Canada to preserve 'the unique aspects of existing arrangements such as the outposts program'*" (Backhouse and McCrae 2002, p.3). An immediate reinstatement of funding for this important project (or one like it) is necessary if Innu health is to be restored and cultural continuity maintained. While no research has been done on the uptake that a reintroduced Outpost programme would have, there is ample anecdotal evidence that a large numbers of the Innu population would avail themselves of the opportunities to experience healthier and more meaningful activities in the country and remove themselves from the many sources of suffering and pain in the villages. A Band Council commissioned study of *Tshiskutamashun*, an

Innu experiential learning project in the country in 1999, found widespread support for its continued existence, with unanimous support among adults (Samson, 2000/01, Samson, 2003a, p 218-221).

Promote Ecotourism

At present, the Innu are almost totally reliant on funds from the Canadian state for their village-based livelihoods. Ecotourism provides an opportunity to build a small Innu economy that would encourage more contact with the country, while also having little ecological impact on the landscape. Possible projects could include many of those now being formulated by the Tshikapisk Foundation, an organisation of Innu hunting families dedicated to revitalising Innu country life through specifically Innu educational projects and revenue generating activities. The Foundation has secured funds for the construction of an Innu cultural centre at Kamestastin Lake. From Kamestastin and other locations, the unspoiled terrain of boreal forests, rivers and tundra affords numerous opportunities for fishing, caribou migration viewing, trekking, cross-country skiing and variants of cultural tourism in which clients would share in Innu country activities of fishing, hunting, and gathering. Paying clients would also be involved in learning camp skills, Innu crafts, and events would be organised so that we would hear about the history of the Innu, including, Innu legends and cosmology. Ecotourism along these lines could provide valuable funding for the various Tshikapisk experiential learning projects by which Innu youth could undertake a rigorous curriculum of Innu learning and be exposed to country life for a prolonged period of time. Equally important is that ecotourism could provide employment for those Innu preferring a more country-based life, lessening their dependence on welfare and government funds (Tshikapisk Foundation 2004).

Amend the School Calendar

A relatively simple adjustment to the school calendar could be made to assist Innu families with balancing country activities and village obligations. At present, schoolchildren are in session during the most important hunting seasons, the autumn and spring, and are on vacation during the long summer months when the presence of blackflies and the migration patterns of the animals make hunting less desirable. The Innu themselves and outside researchers including Henriksen (1993, p. 6) for the Mushuau Innu of Davis Inlet and Samson (2000/01) on behalf of the Sheshatshiu Innu Band Council have made recommendations to the Labrador School Board to change the calendar, but no action has been taken by the authorities.

In Quebec where several school boards have been devolved to Innu control, modifications to the school calendar, enabling Innu children to participate in hunting activities for short periods during the autumn and spring have been made. Similarly, the Cree School Board serving ten Cree communities

around the James Bay and Northern Quebec areas is strongly committed to instruction in the Cree language and value system. School calendars primarily follow the dominant North American model of instruction from August to June, but make some allowance for country activities in May through the 'floating goose break.' Although the Labrador School Board which controls Innu schools in Sheshatshiu and Natuashish has included 'culture days' in its curriculum, these consist primarily of *Tshenut* providing instruction in Innu skills or storytelling in the school building, and therefore, out of the predominant context of the country in which these are most meaningful (Samson 2003a, p 189-192).

In some other parts of Canada, similar arrangements have been made to incorporate native activities within schools. On the whole, however, very little has been done across North America to reconcile the conflict between the statutory schooling schedule and the seasonal rhythms of Native American cultural activities. This is because an agricultural society model has simply been imposed, reflecting the need for 'summer holidays,' originally designed to allow children to help with the harvests, a need which is nonsensical in the Far North. The model was also indirectly imposed as a means of eradicating indigenous practices, sensibilities and orientations to time, and inculcating a different time discipline necessary for wage labour (Pickering 2004).

Concluding Comments

If the scale of health problems experienced by indigenous populations with longer standing experiences of assimilation and colonization is any indication, the future of the Innu looks bleak. According to a recent report by the US Commission on Civil Rights (2004), Native Americans in the US are 770% more likely to die from alcoholism, 650% more likely to die from tuberculosis and 420% more likely to die from diabetes than the general population. If figures could be obtained for the Innu they are likely to approximate to the US rates for alcoholism and diabetes, though not for tuberculosis.

Part of the problem lies in the fact that while much money is invested in treatments for the medical, social and psychological pathologies that afflict the Innu, hardly any resources are devoted to prevention. Canadian authorities take the contemporary village as the baseline for social intervention, devoting funds almost exclusively to village-based solutions. This is lamentable for the Innu who continue to receive largely Western-based institutional treatments. This, we argue, deals only with the individual symptoms of the larger processes of cultural, spiritual and physical dispossession incurred by sedentarisation. It is also costly to continue to treat what are clearly preventable conditions. The costs of the treatment of the social and health problems arising from new diets and sedentary lifestyles are likely to far exceed the costs of a restoration of country-based activities we suggest here.

But this will require a fundamental change in the way local, regional and national policy makers conceive of the problems that the Innu face. Canadian policymakers will have to be more imaginative in working with the Innu. They will have to embrace 'bottom-up' ideas such as the various programmes offered by the Tshikapisk Foundation. Of course, it is not helpful to look to the government for all the answers. The initiatives of many Innu to spend time in the country practising their way of life, eating wild foods and benefiting from the plentiful exercise of country life is vital to the success of any of the positive changes we are endorsing in this paper. These endeavours could be facilitated by a combination of some government subsidies through an Outpost or Hunter Support Program and the development of non-profit revenue generation through ecotourism and other activities consonant with Innu hunting life.

It is clear, too, that the changes suggested here also have some relevance for people elsewhere in industrialised countries who are suffering ill-health from inappropriate diets and sedentary lifestyles. Better connections to food and the land, supported by reformed agricultural, food and land policies, could do much to promote wider and long-lasting changes in behaviour (Pretty 2002, Pretty *et al.* 2004). However, the trends seen through most food systems towards commodification and processing of foods, combined with the self-interest of manufacturers and retailers, will make these changes difficult to sustain unless individuals and communities are able to take the links between health, food and the natural environment seriously, and act to develop new projects to address them. Being in the country for the Innu has considerable resonance for people in other societies who too have become disconnected from nature, land and food, yet who have a greater political voice to do something about these disconnections.

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Table 1. Nutrient content for wild and store foods (USDA National Nutrient Database 2003, Gebhardt and Thomas 2002)

Food	Energy (MJ 100g ⁻¹)	Protein (g 100g ⁻¹)	Total fat (g 100g ⁻¹)	Satur- ated fat (g 100g ⁻¹) ¹	Iron (mg 100g ⁻¹)	Vitamin C (mg 100g ⁻¹)	Thiamin (mg 100g ⁻¹)	Ribo- flavin (mg 100g ⁻¹)	Niacin (mg 100g ⁻¹)
Caribou	0.69	29.8	4.42	1.7	6.17	3	0.25	0.9	5.8
Pheasant	1.03	32.4	12.1	3.5	1.43	2.3	0.07	0.18	7.5
Beaver	0.89	34.9	6.96	2.1	10.0	3	0.05	0.31	2.2
Rabbit (wild)	0.72	33.0	3.51	1.1	4.85	0	0.02	0.07	6.4
Moose	0.56	29.3	0.97	0.29	4.22	5	0.05	0.34	5.3
Duck	0.51	19.9	4.25	1.32	4.51	6.2	0.42	0.31	3.4
Salmon	0.77	27.4	7.50	1.59	0.71	1	0.12	0.16	7.8
Trout	0.63	22.9	5.80	1.52	0.38	2	0.15	0.09	5.8
Average for country foods	0.72	28.7	5.69	1.64	4.03	2.8	0.14	0.30	5.5
Luncheon meat	1.40	12.5	30.3	10.8	0.72	1	0.37	0.19	3.1
Bologna beef/pork	1.27	15.2	24.6	9.7	1.21	0.8	0.22	0.19	2.5
Pork loin chops	1.03	27.9	14.5	5.3	1.05	0.9	0.77	0.22	4.6
Beef, braised	1.43	26.9	25.7	10.2	3.04	0	0.07	0.23	2.5
Steak	1.07	28.0	15.2	6.1	3.04	0	0.10	0.27	3.9
Beef corned	1.04	26.9	15.2	6.2	2.10	0	0.02	0.14	2.4
Beef/pork frankfurter	1.34	11.1	28.9	10.7	1.10	0	0.20	0.11	2.7
Pork sausage	1.54	19.2	30.8	10.8	1.15	3.8	0.73	0.27	4.6
Average for store foods	1.26	20.9	23.2	8.7	1.68	0.81	0.31	0.20	3.3

Table 2. Recommended daily dietary allowances of key nutrients, minerals and vitamins (Gebhardt and Thomas 2002)

	Energy (MJ)	Protein (g)	Iron (mg)	Vitamin C (mg)	Thiamin (mg)	Riboflavin (mg)	Niacin (mg)
Children	7.11	24	10	20	0.55	0.55	7
1-10 years							
Males							
11-18	11.50	52	12	60	1.1	1.1	14
18-50	12.12	61	10	90	1.2	1.3	16
> 51	9.61	63	10	90	1.2	1.3	16
Females							
11-18	9.20	45	15	55	1.0	1.0	13
18-50	9.20	48	15	75	1.1	1.1	14
> 51	7.95	50	10	75	1.1	1.1	14

Table 3. Changes in annual household consumption of country foods between 1912-14 and 1983-84 (Wagner 1986)

	Central Quebec 1912-14 (numbers of each animal; fish in kg)	Manitoba 1983-84 (numbers of each animal; fish in kg)	Changes (%)
Moose	0.8	0.54	-32.5%
Caribou	2.5	0.07	-97.3%
Beaver	94.3	5.6	-94.1%
Muskrat	70.5	23	-67.4%
Black bear	4.5	0.03	-99.4%
Rabbit	5740	3	-99.9%
Duck	135	15	-88.9%
Fish (kg)	7215	78	-98.9%

Table 4. Energy expenditure in various country and village activities (for adult of 77 kg, 170 lb) (McArdle *et al.* 1996)

Activity	Energy expenditure (MJ hour ⁻¹)
Sitting or lying (watching TV)	0.42
Writing	0.54
Cooking	0.88
Shopping	1.21
Walking in country	1.59
Walking at 6.4 kph (4 mph)	1.88
Running across country	3.16
Fishing	1.21
Canoeing	1.42
Snowmobile	1.46
Snowshoeing	3.26
Woodcutting with axe	3.76
Hand sawing	2.36
Stacking firewood	1.71
Playing ice hockey	4.01

Note: energy expenditure rises with body weight (eg a 47 kg (104 lb) person snowshoeing expends 2 MJ hr⁻¹, whereas a 98 kg (216 lb) person expends 4.1 MJ hr⁻¹).