*J*ournal of *R*ural and *C*ommunity *D*evelopment

Understanding Local Food Behaviour and Food Security in Rural First Nation Communities: Implications for Food Policy

Authors: Mirella L. Stroink, & Connie H. Nelson

Citation:
Stroink, M. L., & Nelson, C. H. (2012). Understanding local food behaviour and food security in rural First Nation communities: Implications for food policy. *The Journal of Rural and Community Development, 7*(3), 65-82.

Publisher:
Rural Development Institute, Brandon University.

Editor:
Dr. Doug Ramsey

ISSN: 1712-8277 © Journal of Rural and Community Development
www.jrcd.ca

Understanding Local Food Behaviour and Food Security in Rural First Nation Communities: Implications for Food Policy

Mirella L. Stroink
Lakehead University
Thunder Bay, ON, Canada
mstroink@lakeheadu.ca

Connie H. Nelson
Lakehead University
Thunder Bay, ON, Canada
cnelson@lakeheadu.ca

Abstract

The health and sustainability of rural and remote communities is undermined by the international market-based food system. In the reality of these communities the cost of store-bought food is high, the nutritional quality low, and the availability tenuous. Furthermore, homogenization of the market-based food system undermines the diversity and ecological relevance of residents' food knowledge, and thus their resilience and capacity to innovate. Development of a local food system that emerges organically from the unique human and ecological setting encourages the utilization of both locally sourced and market-based food that may strengthen the autonomy and economic vitality of these communities. We will present findings from three research projects with First Nation communities in Northern Ontario. The aim of this research was to understand local and market-based food behaviour from the perspective of community members. Relationships were examined among food behaviour, food knowledge, food values, perceived food security, cultural connection, and well-being. In one study we also explored the effects of perceived land contamination on these variables. The findings from the research suggest policies in natural resource management, agriculture, and other areas that will support the emergence of a local food system that incorporates forest, cultivated, and store-bought foods and may strengthen the health and sustainability of rural and remote communities.

Keywords: market-based food system, local food system, sustainability, First Nation communities, food security, holistic health

1.0 Introduction

Aspects of both the industrialized, international, market-based food system and the local food system of nearby lands and waters feed rural and remote communities. The local food system of hunted, fished, grown and gathered foods may also be known as the traditional food system, especially in reference to Aboriginal communities, but this term is limited by its implication that the foods and methods of acquiring them are rooted in the past and have not, or should not, evolve with new knowledge and technology. While both the industrialized and local food

systems may be present in rural, remote, and Aboriginal communities, we argue that neither system alone fully meets the nutritional and food security needs of the communities nor provides for their holistic health.

The health and sustainability of rural and remote communities is undermined by dependence on the international market-based food system. (Elton, 2010; Kneen, 1995; Lapping, 2004). Store-bought food in these communities are high in cost, generally low in nutritional quality, and often tenuous in terms of availability, particularly for fresh vegetables and fruit (INAC, 2008; Lawn & Harvey, 2003; Lawn & Harvey, 2004; Ledrou & Gervais, 2005).

Foods from local land and waters are critical for maintaining health, preserving cultural identity and promoting well-being (Chan et al., 2011; Stroink & Nelson, 2009; Desjardins & Govindara, 2005; Price, 2008). However, a complex set of factors are decreasing peoples' access to their traditional lands and territories, and potentially undermining the nutritional qualities of the food through contamination. The result is that residents of rural and remote communities are now eating less locally-sourced foods, and consuming more food products supplied through the industrial, market-based food system (Curtis & Jones, 1998; Lyall, 2003). In addition to its effects on healthy nutrition, food also connects families and communities through shared meals and feasts, connects people to land through traditional food gathering practices, and inter-connects the people, the land and the culture through the spiritual aspects of food gathering, preparation, and ceremony (Ray, 2008). Thus, the shift from locally-sourced to market-based foods is having profound effects on the health, social, economic and cultural well-being of aboriginal peoples (Higginson, 2008; INAC, 2009; Kattides & Lima, 2008; La Rusic, Bouchard, Penn, Brelsford, & Deschenes, 1979; Power, 2008).

Many past and persistent historic events have accelerated an orientation to the market based food system and the associated food culture in aboriginal communities. In this food culture, food is assumed to be available for purchase from an external source, and it is believed that this store-bought food is necessary and sufficient for good health. Through their adaptation to this food culture, people gain knowledge of the market-based food system, but have limited or no knowledge of locally available food, and hold values, beliefs, and assumptions that do not orient them to these local food sources.

1.1 Factors Supporting the Dominance of the Market-Based Food System

The following is a brief synopsis of commonly-known persistent threats that have thwarted adaptation to the local food system and encouraged accelerating adaptation to a market-based food system in aboriginal communities. For example, the residential school system eroded the basic family structure essential for gathering and harvesting local food sources (Castellano, Archibald & Degagne, 2008; Schissel & Wotherspoon 2003). Moreover, the transfer of generational knowledge so essential to the sustainability of the local food system was diminished when residential school attendees were far from home and assimilated to lose their language and customs. In addition, many negative associations arose during residential school experiences where cultivated gardening was a forced activity to provide daily food for both the staff and children of the residential schools.

The reserve structure itself concentrated settlement in a manner that could not be sustained by nearby local food sources (Steegmann, Hurlich & Winterhalder,

1983). Food systems and the cultural knowledge and practices that support them co-evolve with the environments in which they are rooted. Traditional aboriginal food systems were adapted to a harsh environment and favoured seasonal mobility (Rogers, 1983). By confining people to a limited territory, the reserve system disrupted this naturally evolved culture and food system dynamic, requiring people to travel further out to acquire food and return to one settlement. Beginning in the late 1970's, new technologies like snow machines and in the late 1990's all terrain vehicles compensated for the longer distances needed to secure local food sources. In the last decade however, the rising cost of fuel in remote communities has severely raised the cost associated with the acquisition of local food sources.

Place contamination like flooding of land associated with hydroelectric energy projects, leakage of toxic substances from improper mine closures, and limitations in environmental safety of current mining and forest management practices, such as herbicidal spraying, have further thwarted the process of cultural adaptation to the local food system. This is again exacerbated in a reserve system that confines people to a limited and degraded physical environment (Nelson & Stroink, 2009). Living on a reserve thus places people in an environment that radically lessens their ability to maintain a local food system that can support the holistic health of the community (Durie, 2004). Therefore, while the increasingly dominant market-based food system is not adequate to support the holistic health of the community, factors such as contamination and the reserve system render the local food system less than ideal as well.

1.2 Food Ecosystems and Culture

While food systems and cultures typically co-evolve with the environments in which they are rooted, this process is altered in the case of the industrialized, global, market-based food system. Food obtained through this system generally bears little or no connection to the geographic or cultural ecosystem of its consumers. Instead, this food system is part of the wider ecosystem of the international consumer economy.

Culture is the dynamic emergent property of a network of people of varying ages thinking, remembering, and interacting with one another and their environment as they acquire food and otherwise survive and adapt in a particular ecosystem. Thus, as we acquire food and seek survival and adaptation within the industrialized food system, we are also developing a culture that supports and is supported by the international, media-communicated consumer ecosystem. In other words, the consumer economy may become the ecosystem within which people seek adaptation, exchange information, and develop culture (Hooper, 2010; Stroink, 2009). The result may be that our beliefs, values, assumptions, and food related knowledge become disconnected from the actual physical place within which we reside. The environment or ecosystem within which the group of people currently interact and adapt is thus critical to the emerging and continually evolving shape of a community (Saul, 2008).

People living in rural, remote, and aboriginal communities who access both the market-based and local food systems may thus move within and between more than one ecosystem, including both the physical ecosystem of the immediate surroundings and, increasingly, the ecosystem of the consumer economy (Hooper, 2010; Stroink, 2009). Therefore, the emergent cultural knowledge, values, and practices of these people will reflect adaptation and interaction within this mix of food ecosystems. Geertz (1973) adds to this understanding when through his well-

known essay on "thick description" he encourages viewing how the nature of the community co-evolves with the food system.

Given that neither the industrial, market-based food system nor the local food system alone are adequate to support the holistic health of aboriginal communities, we suggest that an approach which blends aspects of the industrial food system and its infrastructure with the local food system may result in the best outcomes. Specifically, we argue that a local food system that emerges organically from the unique human and ecological setting of the community will strengthen autonomy, well-being, and economic vitality. Such a food system, rooted in human interaction and adaptation in the actual physical ecosystem mutually reinforces a set of relevant cultural knowledge and beliefs. With such an approach, people will continue to adapt within their actual physical ecosystem as well as the increasingly dominant market-based ecosystem, and emerging culture will be adaptive to both settings.

Despite the challenges listed above, such a blended food system exists in many First Nation communities in Northwestern Ontario. Indeed, the boreal forest has been aptly documented as an intricate and dynamic setting for food acquisition, requiring extensive experiential knowledge and skill (Winterhalder, 1983). However, little is currently known about people's food choices and behaviours, the factors influencing these behaviours, and their impacts on health and culture. The aim of this research was to better understand food behaviour, including the acquisition of both market-based and local food, from the perspective of First Nation community members. This research draws on survey findings from studies in three First Nation communities in Northwestern Ontario to explore three research questions. First, what are the patterns of association among food behaviour and various indicators of health and well-being? Second, to what degree is local food behaviour occurring in the studied communities? Finally, what are the factors that limit and support local food behaviour? Through these research questions we are able to examine how food choices interact with people's perceptions of the land, their knowledge and values, and their health and well-being.

2.0 Methods

The three communities in this study shared an interest and a concern with their food security, citing changes in traditional food practices and the high cost, low nutritional value, and low availability of store bought foods in their communities. As a result of these concerns, these three studies were conducted between summer of 2008 and fall of 2009. By telling the stories emerging from the three studies together, we are able to present a more comprehensive picture to address the research questions.

University ethics approval was obtained in all three studies, and from Health Canada for studies 2 and 3. Both ethics processes require adherence to the OCAP (Ownership, Control, Access, Possession) (First Nations Information Governance Centre, 2010) principles for research involving Aboriginal communities. For example, all three studies were run at the invitation of each community. Each community led the research design and implementation, and received the resulting knowledge. In Studies 2 and 3, funding was received and administered by the communities, and supported community coordinators and youth assistants in all three studies. In all three studies appropriate ethics procedures including informed consent were followed throughout the duration of the research.

Communities. Study 1 was conducted in partnership with Ginoogaming First Nation as part of a learning program designed to increase knowledge and

community capacity for vegetable gardening and berry harvesting. Ginoogaming is a community of approximately 160 on-reserve residents located 300km northeast of Thunder Bay adjacent to the town of Longlac. Study 2 was conducted in partnership with Aroland First Nation as part of a larger study on contaminants in the food chain. Aroland is a community of approximately 350 on-reserve residents located 330km northeast of Thunder Bay near the town of Nakina. Study 3 was an extension of study 2 and included participants from both Aroland and Eabametoong, a community of approximately 1100 on-reserve residents located 150km north of Lake Nipigon. Eabametoong has no summer road access and has the greatest distance from larger towns.

Study 1. Study 1 was run as part of a learning program on vegetable gardening and berry harvesting hosted by the Ginoogaming Health Centre in the summer of 2008. Workshops were held throughout the summer and were variously attended by a total of 47 individuals including children in a science class, youth workers on summer employment with the Band, health centre staff, elders and other adults. Volunteer survey respondents were the 20 individuals who participated regularly in the workshops, primarily health centre staff, adults and elders with an interest in vegetable gardening and forest food. There were 14 females and 6 males ranging in age from 15 to 66 with a mean age of 32. Participants completed the survey during a break in a workshop with the assistance as needed of the community workshop coordinator. Qualitative data including participatory observation and dialogue were also gathered throughout the gardening season with this group of participants. For the purposes of this paper we will describe portions of the survey findings and will draw upon the qualitative insights only to give direction and context to the survey findings (see Stroink & Nelson, 2009).

The survey included demographic information and the following measures: (1) physical health, as assessed with a single item on which participants rated their physical health in general on a 5-point scale (1 = poor to 5 = excellent); (2) life satisfaction, which is a 5-item measure of well-being (Diener, Emmons, Larsen, & Griffin, 1985); (3) self-ratings of current foods eaten; (4) self-rated knowledge of how to access food from fishing, hunting, gathering, and cultivated gardening; (5) food values, which is a measure developed for this study of how important each of 15 considerations, including healthiness, price, convenience, localness, and cultural connectedness, is in guiding their choice of food; and (6) social capital, a 12-item measure of perceived trust, support, and connectedness within the community and between the community and outside resources specific to First Nation communities (Mignone, 2003).

Study 2. The survey for this study in Aroland included two sections, the first on eating patterns, perceived contamination, and food security and the second half on health, well-being, and demographics. Respondents included 35 volunteer residents of Aroland First Nation who completed the first half of the survey and 24 who completed the second half. Of this latter portion, the age range was 30 to 78 with a mean age of 44. There were 14 males and 7 females who indicated gender. The two sections of the survey were linked with an anonymous participant code. The opportunity to participate in a study on contamination and food was announced by the Band Office. Contamination of local food was, and remains an issue of concern to many in the community and may have particularly drawn volunteer participants who were actively involved in gathering local foods, such as fishers, hunters, and berry gatherers. Surveys were self-administered in either the

community's meeting hall, in the band office, or in the individuals' homes with the assistance of a community co-ordinator as needed.

In the first section of the survey, entitled Eating Patterns, participants were asked to identify and name areas (e.g., waterways, patches of land) where they caught fish (as well as the type of fish), gathered blueberries, wild rice, and grouse. For each area they indicated how often they acquired the food on a 5-point scale. They then indicated how many of their meals included locally caught fish, blueberries, wild rice, and grouse in each of winter, spring, summer and autumn on a 5-point scale. To assess food insecurity, participants completed 4 items that were drawn from measures assessing participants' level of concern that their food would run out in the previous year (Bickel, Nord, Price, Hamilton, & Cook, 2000). Participants then completed a section entitled Perceptions of Contamination. Participants were asked to indicate on a 5-point scale the degree to which they believed that each of the areas they identified and named as places where they acquired food in the Eating Patterns survey were clean and safe as opposed to contaminated. They were then asked how much their perception of contamination affects the amount of the food they are willing to eat from that area on a 5-point scale. This sequence was completed for each of the local foods being studied, fish, grouse, wild rice and blueberries.

In the second section of the survey entitled Health and Well-Being, participants completed items including: (1) physical health as assessed with a single item on which participants rated their health in general on a 5-point scale; (2) life satisfaction; and (3) connectedness with the land including 10 items from the Connectedness with Nature scale (Mayer & Frantz, 2004), 5 items assessing participants' sense of connection with the traditional lands of the community, and 5 assessing the degree to which gathering and eating traditional foods was important to participants' sense of connection with culture, history, and land. The latter 10 items were developed for the purpose of this research. All items were rated on a 5-point scale of agreement. (4) Social support (Ryff, 1989) was assessed using 9 items from the psychological well-being scale; (5) sense of purpose, believed to be a deeper and perhaps less culturally specific measure of well-being than self-esteem was assessed using 13 items from Ryff's measure; and (6) nutrition and exercise were assessed with 2 single items assessing self-rated nutritional quality of diet, and self-rated physical exercise.

Study 3. In this study, 18 individuals from each of Aroland and Eabametoong completed a survey on eating patterns and health. In Aroland, volunteer participants in this study ranged in age from 25 to 60 with a mean age of 44. There were 14 males and 3 females who indicated gender. In Eabametoong, participants ranged in age from 18 to 56 with a mean age of 32. There were 12 males and 4 females who indicated gender. These shorter surveys were again completed in either the community's meeting hall or in the individuals' homes with the assistance of a community co-ordinator and were announced and administered in the same manner as Study 2.

The first portion of the survey on eating patterns and perceived contamination was similar to that used in Study 2. The main difference was that instead of grouse, participants were asked how often they ate moose hunted in various areas and through each season, and how contaminated they felt each of those areas to be. They were again asked about fish, wild rice, and blueberries. As in study 2, the second portion of the survey also assessed participants' food insecurity, life satisfaction, self-rated health, nutrition, and exercise, and connectedness with the

land. In this study, participants were also asked to complete a 12-item scale assessing their beliefs about contamination and health. These items were grouped into 3 subscales. Participants indicated their agreement with these items on a 5-point likert scale. The first 4 items assessed beliefs that herbicidal spraying could affect people's health when they eat blueberries, wild rice, moose, and fish respectively. The next 4 assessed similar beliefs regarding past mining practices in the area. The final 4 assessed beliefs that eating local traditional food from the area causes health problems and the degree to which this worried participants.

3.0 Results and Discussion

Rather than present the results of the three studies separately, we will weave the findings of these studies through a 3-part story about food behaviour in these three First Nation communities. We begin by summarizing the various ways in which local food behaviour is associated with health and well-being, and then sketch an outline of how local food behaviour is occurring in these communities. We will note that while local food consumption remains an important part of the fabric of these communities, rates of participation are fairly low. We will conclude our presentation of the results by outlining some of the variables that were associated with local food behaviour and which may shed light on some of the factors affecting levels of participation in local food.

3.1 Local Food, Health and Well-Being

Across the three studies some consistent and intriguing relationship patterns emerge among traditional food behaviour, health, and well-being. In Study 1 with Ginoogaming First Nation, Pearson correlation analyses revealed that the degree to which participants engaged in fishing and hunting was positively correlated with both life satisfaction, $r=.49$, $p < .05$, and social capital, $r=.50$, $p < .05$. Neither forest food-gathering nor gardening was significantly correlated with well-being in Study 1. In Study 2 with Aroland First Nation, it was found that the degree to which participants consumed locally caught fish in both spring and summer were significantly correlated with life satisfaction, $r=.49$, $p<.05$ and $r=.48$, $p<.05$, respectively. Likewise, consuming locally caught fish in summer and fall were both significantly correlated with sense of purpose, $r=.72$, $p<.01$ and $r=.67$, $p<.01$. Consuming local berries, grouse, and wild rice were not significantly correlated with the well-being variables in this study.

In Study 3 with Aroland and Eabametoong correlations between local food behaviour and health and well-being were examined for the two communities separately. For Eabametoong, the more remote community, there was only one significant correlation. The larger the proportion of the local diet that they reported to be meat and fish, the lower participants' reported level of food insecurity. The degree to which they reported consuming local fish, moose, wild rice, and blueberries was not significantly associated with any of the other health or well-being variables. However, it should be noted that the pairwise N for some of these analyses was as low as 5, as many of the participants from this community did not complete the health and well-being section.

For Aroland, it was found that participants who were happier with their level of nutrition consumed more fish in spring, $r=.64$, $p=.02$, summer, $r=.82$, $p=.001$, and fall, $r=.67$, $p=.02$. It was also found that consuming moose in winter was associated with better self-rated diet, $r=.59$, $p=.03$, while consuming moose in

spring was associated with lower food insecurity, r=-.58, p=.04. Consuming moose in summer was associated with overall self-rated health, r=.59, p=.04, and consuming moose in fall was associated with both better weight, r=.57, p=.04 and better overall health, r=.55, p=.05. Consuming local blueberries in winter was associated with better self-reported weight, r=69, p=.04, while consuming blueberries in spring was associated with lower food insecurity, r=-.64, p=.05. Consuming local blueberries in summer was positively associated with both diet, r=.76, p=.01, and exercise, r=.64, p=.05. Overall, participants from Aroland who indicated that a larger proportion of their local diet was meat indicated feeling better about their diet, r=.86, p=.001.

Across the three studies an image of the role of local food in fostering health and well-being emerges. Those who report consuming greater amounts of locally caught fish and locally hunted meat report better health outcomes on a number of indicators. Gathering and consuming local blueberries is also an important part of the health profile for people in Aroland. This community has an active community-based blueberry harvesting and trade program. Those who have presumably gathered and successfully stored blueberries even report lower food insecurity in spring. It is interesting that participation in hunting and fishing was associated with sense of purpose in Study 2 and with social capital and life satisfaction in Study 1. These findings suggest that the benefits of participation in local food extend beyond diet, exercise, and physical health to include a sense of inner purpose and collective well-being. These findings lead us to wonder to what extent individuals in these communities actually participate in local food behaviour.

3.2 Levels of Local Food Behaviour

In Study 1, Ginoogaming participants were asked to indicate how frequently they accessed food from 9 different sources. Findings indicated that the most frequent source of food was the nearby grocery store, followed by the convenience store, then fishing and hunting (Table 1). They were also asked to indicate how frequently they ate a variety of foods. Findings indicated that the 7 most frequently eaten foods (all above 3 or "occasionally" on the 5-point scale) were store-bought foods such as chicken, apples, and bananas. Fish and moose were both rated half-way between "a little" (2) and "occasionally" on the scale.

Table 1. *Mean Ratings of How Frequently Participants Accessed Food from Each of 9 Sources*

Food Source	M	SD
Nearby grocery store	4.25	1.21
Convenience store	3.30	1.38
Fishing	3.25	1.29
Hunting	2.85	1.27
Sharing	2.75	1.45
Trapping	2.05	1.54
Gathering berries	1.85	1.56
Big urban grocery store	1.60	1.67
Growing vegetables	1.15	1.31

Note. The following scale was used, 5 = Always; 4 = Often; 3 = Sometimes; 2 = Rarely; 1 = Never.

In Study 2, Aroland participants were asked to indicate the approximate proportion of their diet that came from the local area given the options none, less than 20%, less than 50%, and less than 75%. Figure 1 shows the percentage of people indicating each of these categories; note that a combined total of 58% of the sample eat no local food or less than 20% of local food. In Study 2, Aroland participants were also asked to indicate the frequency with which meals included the various local foods by season. Table 2 displays the resulting means and standard deviations.

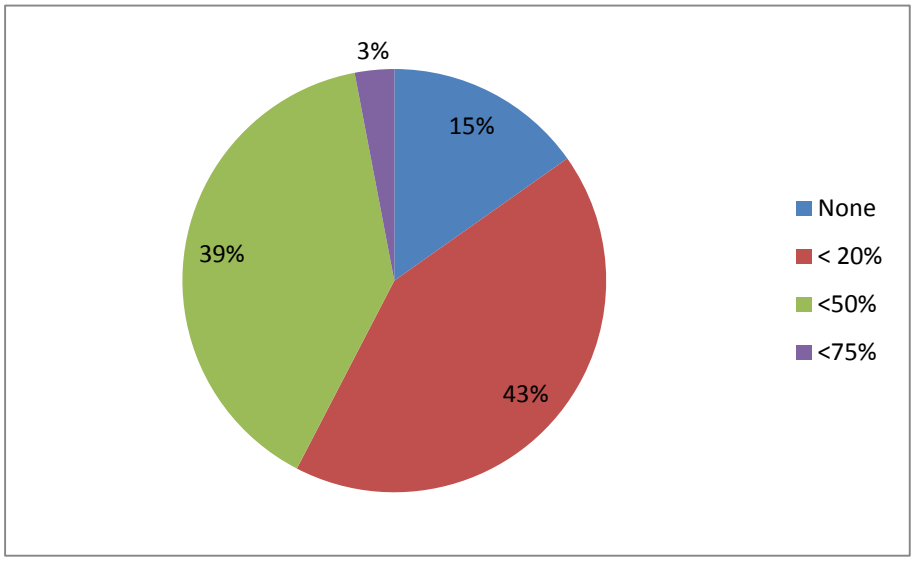

Figure 1. Percent of Aroland Diet that is Local (Study 2)

Table 2. *Mean and standard deviation of self-estimated frequency with which meals include a given local food by season (Aroland, Study 2)*

	Winter	Spring	Summer	Autumn
Fish	1.65 (1.20)	2.03 (1.22)	2.14 (1.20)	1.59 (1.34)
Blueberries	.57 (1.00)	.50 (.96)	2.20 (1.03)	.82 (1.25)
Wild Rice	0.00 (0.00)	0.00 (0.00)	.16 (.57)	.09 (.30)
Grouse	.45 (.91)	.59 (1.02)	.84 (1.09)	1.20 (1.39)

* Note: 0=none, 1=a little, 2=some, 3=most, 4=all

In Study 3, eating patterns were analyzed separately for the two communities. An analysis of variance revealed that Aroland and Eabametoong did not differ significantly from each other in the reported levels of consumption of local fish or moose by season. The number of respondents to the wild rice and blueberry items (the latter in Eabametoong) was too low to compare the communities. Table 3 shows the mean reported levels of consumption of fish, moose, wild rice, and blueberries by season for the two communities. In both Studies 2 and 3 the most frequently caught type of fish was Pickerel / Walleye followed by Whitefish.

Table 3. *Mean and Standard Deviation of Self-Estimated Frequency With Which Meals Include a Given Local Food by Season (Aroland and Eabametoong, Study 3*

		Winter	Spring	Summer	Autumn
Aroland	Fish	1.43 (1.02)	2.07 (1.07)	2.67 (1.11)	1.78 (1.19)
	Blueberries	0.80 (.79)	0.60 (.70)	2.50 (1.38)	2.00 (1.67)
	Wild Rice	0.10 (.32)	0.00	0.00	0.56 (1.33)
	Moose	1.87 (1.19)	1.00 (.96)	1.64 (.84)	2.33 (1.40)
Eabametoong	Fish	1.43 (1.27)	2.25 (1.28)	3.00 (1.15)	1.57 (.98)
	Blueberries	0.67 (1.15)	0.33 (.58)	2.50 (1.76)	1.00 (1.73)
	Wild Rice	0.50 (.71)	0.00	0.00	1.00 (1.41)
	Moose	1.44 (1.01)	1.22 (1.09)	1.89 (1.36)	2.90 (.88)

* Note: 0=none, 1=a little, 2=some, 3=most, 4=all

Across these three studies it is evident that fish, particularly in spring and summer, is an important part of the local diet, being consumed in approximately "most" and "some" of participants' meals in these seasons. Blueberries are important in the summer diet and to some extent in the fall diet for Aroland. Moose is an important part of the diet in fall, and to a lesser extent in winter for both Aroland and Eabametoong, being consumed in approximately "most" fall meals for Eabametoong, and "some" in Aroland and mid-way between "a little" and "some" for both communities in winter. Study 2 indicated that grouse was a fairly small part of the local diet in Aroland, consumed "a little" in fall and between "none" and "a little" in the remaining seasons.

While inconsistencies in the question format limits comparison across communities, it appears that local fish and game are consumed about as often in Ginoogaming as in the other communities. While we did not ask about store-bought foods in Studies 2 and 3, the findings from Study 2 shown in Figure 1 suggests that store-bought food represents at least half of the diet for all but 3% of the sample in Aroland. It would be interesting to see how individuals from Eabametoong respond to this item, given their greater distance to stores. The lack of difference between Eabametoong and Aroland in consumption of moose and fish suggests that store-bought food may also be an important part of the diet in this community. Given the observed levels of local food behaviour in these communities and the concomitant importance of local food to health and well-being, it is important to explore factors that may act as barriers or supports to local food behaviour.

3.3 Factors Associated with Local Food Behaviour

In order to better understand the factors that limit and support local food behaviour, correlations were examined among the various food behaviour items and measures such as food knowledge, food values (Study 1), perceived contamination (Studies 2 and 3), and connection to land, culture, and community (Study 2).

In Study 1, Ginoogaming participants were asked to self-rate how knowledgeable they felt in accessing food from various sources. It was found that participants felt most knowledge about locating edible berries in the forest (2.63; close to "moderately" or 3 on a 5-point scale), less knowledgeable about hunting birds and

game (2.33; above "a little" or 2), and least knowledgeable in locating where wild rice grows (1.26; just above "not at all" or 1). Note that while there were no significant gender differences in this study, the number of female participants was higher than the number of males (14 compared to 5), which was not the case in the other two studies. Gender may be a factor in how knowledgeable people feel about gathering and hunting foods.

Participants were also asked how important various food values were in guiding their food choices. Three clusters of these food values emerged from the 15 items provided. Participants agreed most strongly that price, tastiness, ease, convenience, familiarity and availability at the store were important in guiding their food choices with a mean of 3.65 on a 5-point scale of agreement. Participants also agreed that the healthiness of the food was a guiding consideration (healthy; not too salty, sweet, or processed), with a mean of 3.26. The localness and cultural relevance of the food was rated the lowest at 2.84, indicating slight disagreement. In order to determine whether food knowledge and food values impact local food behaviour, we examined correlations among these variables. It was found that people who engage in fishing and hunting more often also self-rated their knowledge of hunting more highly, $r=.69$, $p<.01$, and rated more highly the food values of cheap/tasty/easy, $r=.68$, $p<.01$, and local/cultural, $r=.52$, $p<.05$. This indicates that engaging in fishing and hunting is supported by greater hunting knowledge and stronger endorsements of these two sets of food values. There were no significant correlations involving the frequency of gathering other forest foods.

In the context of our qualitative work in Ginoogaming, the contamination of the land emerged as an important factor affecting local food behaviour that we had not assessed in our survey. Therefore, perceived contamination of the land and food chain were examined in Studies 2 and 3. In Study 2, participants were asked the degree to which their consumption of particular local foods was affected by perceived contamination. Means and percent frequency of responses is shown in Table 4. These findings indicate that particularly for fish, but also to some degree for blueberries, individuals in Aroland perceive that their consumption of the foods is affected by contamination.

Table 4. *Degree to Which Participants' Consumption of Local Foods is Affected by Perceived Contamination*

	Mean (SD)	Percent frequency of response				
		Not at all affected	A little affected	Somewhat affected	Quite affected	Very much affected
Fish	2.72 (1.16)	19.4	19.4	36.1	19.4	5.6
Blueberries	2.48 (1.48)	40	12	20	16	12
Grouse	2.00 (.92)	36	36	28	0	0
Wild rice	1.92 (.81)	40	20	40	0	0

To further examine patterns in how fish consumption is affected by perceived contamination, correlations were examined between participants' ratings of the level of contamination of each lake and the frequency with which they report eating fish from that lake. It was found that across 14 different named waterways, levels of consumption only correlated with perceived contamination for 3 waterways. In the first, perceived contamination was correlated with consumption

at r=.44, p=.05, for the second the correlation was, r=-.46, p=.04, and the third was r=.52, p=.04. Therefore, actual consumption of fish was only correlated in the expected negative direction with perceived contamination for one lake. In the other two the positive correlations suggest that familiarity with the lake is leading to increased perceptions of contamination but that perception is not leading to reduced consumption of the food. Interestingly, there were a number of other positive correlations across waterways. For example, perceptions of contamination in certain waterways were associated with increased consumption of fish from other waterways. This suggests that rather than specifically reduce consumption from the lake perceived to be contaminated, people may instead be shifting their eating patterns to emphasize fish from other lakes.

In Study 3, the perceptions of contamination for fish, moose, and blueberries were compared between Aroland and Eabametoong. Through an analysis of variance it was found that Aroland (Mean = 2.92, SD=1.08) rated their blueberries as being significantly more contaminated than did Eabametoong (Mean = 1.62, SD=.92), F(1.18) = 7.67, p=.01, but there were no significant differences between the communities for fish or moose. For each community, correlations were examined between perceived overall contamination of the food and how often the food was consumed by season. In Aroland, overall contamination of fish was significantly correlated with how often winter meals included fish, r=.60, p=.03. No other correlations were significant for either community.

The two communities were also compared on their beliefs about contamination from herbicidal spraying, mining, and health impacts using an analysis of variance. No significant differences were found. Correlations between these beliefs and local food behaviour were then examined for each community. In Eabametoong, it was found that the degree to which the person's diet was local was marginally negatively correlated with the belief that herbicidal spraying affects the food system, r=-.63, p=.07, and with their overall score on the contaminants belief scale, r=-.65, p=.06. In Aroland, the belief that herbicidal spraying affects the food system was positively correlated with number of fish meals in the summer, r=.68, p=.02, the number of moose meals in winter, r=.60, p=.04, and the number of blueberry meals in the summer, r=.65, p=.04, as well as marginally correlated with the number of fish meals in autumn, r=.59, p=.06. These findings suggest that in Aroland greater participation in local food is perhaps leading to increased awareness of contamination issues, but so far that awareness has not resulted in a net decrease in local food behaviour. In Eabametoong on the other hand, overall beliefs about herbicidal spraying was associated with reduced reports of general local food consumption, but not specific to any one food.

The final factor that may play a role in shaping local food behaviour is connection to culture, nature, and the traditional lands of the community. The causal direction between food behaviours and culture is necessarily ambiguous. It has been argued that culture evolves over time in particular patterns as a result of a group of people's efforts to adapt and survive (critically including food acquisition) in a particular ecological place (e.g., Matsumoto & Juang, 2007; Stroink, 2009). Likewise, in a mutually reinforcing relationship, the degree to which individuals adhere to particular cultural meanings will affect their food behaviours. Relatively recent and ongoing disruptions to the land and culture of First Nation people may be altering these dynamic patterns of interaction among food acquisition and culture (e.g., Nelson & Stroink, 2009).

Study 2 presents the strongest data to explore these relationships. Correlations were examined between consumption of local food and participation in Aboriginal culture, connection to nature, connection to traditional land, and the belief that food builds connection to land. Significant correlations were found involving fish only, and these are shown in Table 5. In addition, correlations between these socio-cultural variables and well-being were examined and are shown in Table 6.

Table 5. *Correlations between Seasonal Fish Consumption and Socio-Cultural Variables*

	Fish-Winter	Fish-Spring	Fish-Summer	Fish-Autumn
Connection to nature	.47*	.37	.46*	.52*
Connection to land	.22	.23	.65**	.49
Connection to land via food	.39	.29	.63**	.51*
Aboriginal participation	.25	.66**	.44	.24

Note. Significance levels for correlations indicated with ** $p < .01$, * $p < .05$

Table 6. *Correlations between the Belief That Traditional Food Connects the Individual with the Land and the Health, Well-Being, and Other Socio-Cultural Variables*

	Land-Food
Self-rated general health	.44*
Nutrition	.67**
Exercise	.59**
Food Security	.58**
Life Satisfaction	.62**
Connection to nature	.71**
Connection to land	.78**
Aboriginal participation	.46*
Social Support	.43*
Purpose	.65**

Note. Significance levels for correlations indicated with ** $p < .01$, * $p < .05$

Therefore, participation in fishing is positively associated with a matrix of variables including connection with nature and traditional lands, participation in Aboriginal culture, and the belief that food can strengthen connection with the land. This latter belief is in turn associated with a number of well-being variables. We believe that when local food behaviour is conducted in the context of a belief that doing so connects the individual with culturally meaningful lands, it becomes part of a healthful lifestyle that interconnects the individual in a human-nature bond that builds individual and community well-being. We will explore these relationships further in future research.

4.0 Conclusion

The purpose of this paper was to explore the context of local food behaviour from the perspective of First Nation community members in Northwestern Ontario. The findings discussed above from Ginoogaming, Aroland, and Eabametoong First Nations relay an intriguing story about the importance of a local food system to

community health and the factors that hinder and support that system. It is evident from these findings that participation in local food may bring benefits not only for nutrition and physical health but also for individual and community well-being on the broader level. Furthermore, despite the dominance of the market-based food system, local food behaviour continues to occur in these communities, particularly fishing and to lesser degrees hunting and blueberry gathering. Nevertheless, people do seem to depend upon the market-based system for at least half of their diet with some variation by season.

In this research, we were particularly interested in identifying factors that limit and support local food behaviour, as these may shed light on policy developments that could support emerging local and blended food systems in these communities. Lack of knowledge of local food behaviour emerged as an important factor in Study 1. Likewise, valuing the taste, ease, and cultural relevance of the food was associated with fishing in this study, suggesting that community-based learning opportunities that emphasize these values and the required knowledge would support increased local food behaviour.

Perceived contamination played an ambiguous role in affecting local food behaviour in Studies 2 and 3. While general beliefs about contamination was associated with reports of reduced local food consumption in Eabametoong, the more numerous and more specific positive correlations observed in Aroland suggested that greater familiarity with local foods was associated with greater reports of perceived contamination. Likewise, perceptions of contamination in specific lakes in Aroland were associated with eating fish from different lakes. However, these perceptions were not associated with net decreases in fish consumption.

Finally, the belief that eating local food connects the individual with traditional lands was positively associated with eating fish and with many indicators of well-being. Furthermore, connectedness with traditional land and with nature in general was also associated with eating local fish. These findings support the suggestion that cultural beliefs and values emerge in a mutually reinforcing relationship with local food behaviour, and point to one set of such beliefs that may strengthen community engagement with local food.

Rural and remote communities face many unique challenges in maintaining food security. Some of the barriers experienced by rural communities in Northwestern Ontario include the increased cost, lower quality and poorer nutritional value of store-bought foods, limited agricultural infrastructure, climactic and geographic barriers to food growing, contamination of the environment, and a loss of traditional knowledge in Aboriginal communities. Many of these barriers stem from an increased dependence upon an international, industrial, market-based food system that is not well adapted to the circumstances of remote communities.

Industrial agriculture systems have persisted for decades bolstered by an economic paradigm based on regulations, subsidies, and trade agreements that are contributing to loss in ecosystem resilience (King, 2008). Policies that would promote a more local approach could enhance connectivity to people and their food. Our findings support policies that enhance investment in northern agriculture that includes northern food sources such as wild rice, blueberries and fish; and policies for forestry, mining and hydro developments that address the impact on potential contamination of locally available food sources. Food systems evolve within context (Freire, 2005). Policies that support a food system that begins with

the local and allows for the integration at a local level of forest food resources and selected cultivated sources can create a food system that promotes new forms of social and associational relationships (Marsden, 2003). Post-industrial alternative agriculture models supported by appropriate policies can embrace local food production, local processes and the very necessity of local itself (Hassanein, 2003).

5.0 Addendum

Conceivably as the world struggles with a reorientation of food supply driven by accelerating climate change, swelling global population and recognition of the non-sustainability and vulnerability of an oil-based food production and distribution system, the dynamics as described in this study perhaps are a mere foreshadowing of what is occurring globally as we explore new models of food security. Characteristics of aboriginal peoples for communal approaches to theacquisition and distribution of food sources and their ability to traditionally limit the accumulation of wealth and power may provide approaches worth exploring (Lee, 1992). Saul (2008) suggests that if we attempt to rethink societal and environmental issues such as food security with the input of indigenous philosophy we would promote policies characterized by a more complex and interconnected understanding of the issues determining the dynamics of food behaviours and food security.

6.0 References

Indian and Northern Affairs Canada (INAC). (2008, December). *Revised Northern Food Basket - Highlights of Price Survey Results for 2006, 2007and 2008*. Retrieved April 9, 2011, from: http://www.ainc-inac.gc.ca/ps/nap/air/hpsr0607-eng.asp

Indian and Northern Affairs Canada (INAC). (2009). *Food Mail Review: Interim Report*. Minister of Public Works and Government Services Canada Catalogue No. R3-99/1-2009E.

Bickel, G., Nord, M., Price, C., Hamilton, W., & Cook, J. (2000, March). *Guide to Measuring Household Food Security, Revised 2000*. Alexandria, VA: U.S. Department of Agriculture, Food and Nutrition Service.

Castellano, M. B., Archibald, L., & Degagne, M. (2008). *From truth to reconciliation: transforming the legacy of residential schools*. Ottawa, ON: Aboriginal Healing Foundation.

Chan, L., Receveur, A., Sharp, D., Schwartz, H., Ing, A., & Tikhonov, C. (2011). *First Nations Food, Nutrition and Environment Study (FNFNES): Results from British Columbia 2008/2009*. Prince George: University of Northern British Columbia.

Curtis, S. & Jones, I.R. (1998). Is there a place for geography in the analysis of health inequality? *Sociology of Health and Illness*, *20*(5), 645-72.

Desjardins, E. & Govindara, S. (2005). *Proceedings of the Third National Food Security Assembly*. Region of Waterloo, Ontario, Canada.

Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The Satisfaction with Life scale. *Journal of Personality Assessment, 49*, 71-75.

Durie, M. (2004). Understanding health and illness: research at the interface between science and indigenous knowledge. *International Journal of Epidemiology, 33*, 1138-1143.

Elton, S., 2010. *Locavore: from farmers' fields to rooftop gardens - how Canadians are changing the way we eat.* Toronto: Harper Collins Publishers Ltd.

First Nations Information Governance Centre (2010). The First Nations Principles of OCAP. Retrieved April 20, 2012, from http://www.rhs-ers.ca/node/2

Freire, P. (2005). *Education for Critical Consciousness*. New York: Continuum.

Geertz, C. (1973). Thick Description: Toward an Interpretative Theory of Culture. In C. Geertz (Ed.), *The Interpretation of Cultures* (pp. 1-30). New York: Basic Book.

Hassanein, N. (2003). Practicing food democracy: a pragmatic politics of transformation. *Agriculture and Human Values*, *19*, 77-86.

Higginson, L. A. (2008). The time bomb of aboriginal health: Can the fuse get any shorter? *Canadian Journal of Cardiology*, *24*(4), 257-9.

Hooper, M. (2010). *Food Security Research Needs: A Perspective from the Federal Health Portfolio.* CIHR-INMD Advancing Food and Health Research Priorities Workshop, Office of Nutrition Policy and Promotion, Health Canada. Retrieved April 9, 2011, from http://www.afmnet.ca/httpd-eb/documents/cihr/Theme%204/Hooper%20slides.pdf

Kattides, M. L. A. & Lima, M. G. B. (2008). Changing food systems and implications for sustainable communities: Cyprus, Canada and Brazil. *Environments Journal*, *36*(1), 45-58.

King, C. A. (2008). Community resilience and contemporary agri-ecological systems: Reconnecting people and food, and people with people. *Systems Research and Behavioural Science*, *25*, 111-124.

Kneen, B. (1995). *From land to mouth: Understanding the food system* (2nd ed.). Toronto, ON: NC Press Lt.

La Rusic, I. E., Bouchard, S., Penn, A., Brelsford, T., & Deschenes, J. G. (1979, October). *Negotiating a way of life: Initial Cree experience with the administrative structure arising from the James Bay Agreement*. Prepared for the Research division, Policy, Research and Evaluation Group of the Department of Indian and Northern Affairs, Ottawa.

Lapping, M. B. (2004). Toward the recovery of the local in the globalizing food system: the role of alternative agricultural and food models in the US. *Ethics, Place and Environment*, *7*(3), 141-150.

Lawn, J. & Harvey D. (2003). *Nutrition and Food Security in Kugaaruk, Nunavut: Baseline Survey for the Food Mail Pilot Project*. Ottawa: Indian and Northern Affairs Canada.

Lawn, J. & Harvey D. (2004). *Nutrition and Food Security in Fort Severn, Ontario: Baseline Survey for the Food Mail Pilot Project*. Ottawa (ON): Minister of Indian Affairs and Northern Development; 2004. Catalogue No. R2-350/2004E.

Ledrou, I., & Gervais, J. (2005). Food Insecurity. *Health Reports*, *16*(3), 47-50.

Lee, R. B. (1992). Art, science, or politics? The crisis in hunter-gather studies. *American Anthropologist*, *94*, 31-54.

Lyall, D. (2003). Exploring strategies to reduce the high cost of food in northern Manitoba. *Northern Food Prices Project Report*. Prepared for Healthy Child Committee of Cabinet by Northern Food Prices Project Steering Committee.

Marsden, T. (2003). The condition of rural sustainability: issues in the governance of rural space in Europe. In C. Kasimis & G. Stathakis (Eds.), *The Reform of the CAP and Rural Development in Southern Europe* (pp.19-37). Aldershot: Ashgate.

Matsumoto, D. & Juang, L. (2007). *Culture and Psychology*. (4th ed.). Belmont, CA: Thomson Wadsworth.

Mayer, F. S., & Frantz, C. M. (2004). The connectedness to nature scale: A measure of individuals' feeling in community with nature. *Journal of Environmental Psychology, 24*(4), 503-515.

Mignone, J. (2003). *Social Capital in First Nations Communities: Conceptual Development and Instrument Validation*. Unpublished doctoral dissertation, Department of Community Health Sciences, University of Manitoba, Winnipeg, Manitoba, Canada.

Nelson, C.H. & Stroink, M. (2009, November 18) *Food security and its impact on First Nation communities.* 1st Nishnawbe Aski Nation Food Symposium. Best Western Nor'Wester Resort Hotel, Thunder Bay, Ontario.

Power, E. M. (2008). Conceptualizing food security for Aboriginal people in Canada. *Canadian Journal of Public Health, 99*(2), 95-97.

Price, W. A. (2008). *Nutrition and physical degeneration*.(8th ed.). La Mesa, CA: Price-Pottenger.

Ray, L. (2008). *Exploring well-being in a First Nation community: A qualitative study. Unpublished Master of Public Health thesis*. Lakehead University, Thunder Bay, Ontario, Canada.

Rogers, E. S. (1983). Cultural adaptations: The northern Ojibwa of the Boreal Forest 1670-1980. In A. T. Steegmann Jr. (Ed.), *Boreal forest adaptations: The northern Algonkians* (pp. 85-141). New York: Plenum Press.

Rosset, P. (2006). Moving forward: Agrian reform as a part of food sovereignty. In P. Rosset, R. Patal & M. Courville (Eds.), *Promised Land: Competing Visions of Agrarian Reform* (pp. 301-321) Food First Books.

Ryff, C. D. (1989). Happiness is everything, or is it? Explorations on the meaning of psychological well-being. *Journal of Personality and Social Psychology, 57*, 1069-1081.

Saul, J. R. (2008). *A Fair Country: Telling Truths about Canada*. Toronto: Viking Canada.

Schissel, B. & Wotherspoon, T. (2003). *The legacy of school for Aboriginal people: education, oppression, and emancipation*. Don Mills, ON: Oxford University Press.

Steegmann, A. T. Jr., Hurlich, M. G., & Winterhalder, B. (1983). Coping with cold and other challenges of the boreal forest: An overview. In A. T. Steegmann Jr. (Ed.), *Boreal forest adaptations: The northern Algonkians* (pp. 317-351). New York: Plenum Press.

Stroink, M.L. (2009). Marketplace as ecosystem of adaptation: Understanding unsustainable patterns of behaviour. Paper presented at the 5th World Congress on Environmental Education. Montreal, QC.

Stroink, M.L. & Nelson, C.H. (2009). Aboriginal health learning in the forest and cultivated gardens: Building a nutritious and sustainable food system. Journal of Agromedicine, 14(2), 263-269.

Winterhalder, B. (1983). Boreal foraging strategies. In A. T. Steegmann Jr. (Ed.), *Boreal forest adaptations: The northern Algonkians* (pp. 201-243). New York: Plenum Press.