Journal of Agromedicine
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t792303961

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Online Publication Date: 01 April 2009

To cite this Article Stroink, Mirella L. and Nelson, Connie 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
To link to this Article: DOI: 10.1080/10599240902739737
URL: http://dx.doi.org/10.1080/10599240902739737

Journal of Agromedicine, 14:263–269, 2009

ISSN: 1059-924X print/1545-0813 online
DOI: 10.1080/10599240902739737

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Aboriginal Health Learning in the Forest and Cultivated Gardens: Building a Nutritious and Sustainable Food System

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ABSTRACT. Sustainable food systems are those in which diverse foods are produced in close proximity to a market. A dynamic, adaptive knowledge base that is grounded in local culture and geography and connected to outside knowledge resources is essential for such food systems to thrive. Sustainable food systems are particularly important to remote and Aboriginal communities, where extensive transportation makes food expensive and of poorer nutritional value. The *Learning Garden* program was developed and run with two First Nation communities in northwestern Ontario. With this program, the team adopted a holistic and experiential model of learning to begin rebuilding a knowledge base that would support a sustainable local food system. The program involved a series of workshops held in each community and facilitated by a community-based coordinator. Topics included cultivated gardening and forest foods. Results of survey data collected from 20 Aboriginal workshop participants are presented, revealing a moderate to low level of baseline knowledge of the traditional food system, and a reliance on the mainstream food system that is supported by food values that place convenience, ease, and price above the localness or cultural connectedness of the food. Preliminary findings from qualitative data are also presented on the process of learning that occurred in the program and some of the insights we have gained that are relevant to future adaptations of this program.

KEYWORDS. Aboriginal, cultivated gardening, food security, forest foods, health, learning, place

INTRODUCTION

For people in remote communities, fresh food is difficult and expensive to import through the mainstream food system, resulting in poorer quality of produce and lower nutritional value of food.[1,2] Sustainable food systems are those in which a diverse base of food production exists near a vibrant market for that food, and in which there is an open and evolving local knowledge base that supports all processes within the food system.[3] For Canada's Aboriginal peoples, a culturally rooted knowledge base about the local food system has been dwindling as a result of

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The authors gratefully acknowledge their partner communities, Ginoogaming First Nation and Aroland First Nation, and the community-based coordinators, Joseph Dore and Sheldon Atlookan, for bringing the Learning Garden program to life. We also thank Brian McLaren and Joseph LeBlanc for their knowledge of the forest gardens and their dedication to this project. Funding for this research was provided by the Canadian Council on Learning.
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disruptions to intergenerational transfer, past policies and practices of forced assimilation, and environmental contamination.[4–6] In this paper, we report the findings of the *Learning Garden* program, the goal of which was to strengthen this knowledge base and to lay the foundation of a sustainable, diverse, local food system with two First Nation communities in northwestern Ontario.

The *Learning Garden* program draws on the First Nations Holistic Lifelong Learning Model,[7] and is thus experiential, holistic, and place-based. Holistic education focuses on education for the whole individual,[8] fosters connections with family, community, nature, and society,[9] and has been found to restore balance and promote individual and community health.[10] Place-based learning connects the individual with all levels of the human and biological ecology, grounding the person in the local bioregion and in the history and culture of the community.[11] The program goals also included improved nutrition, activity, and health, as these have been shown to be affected by participation in local food or garden projects.[12] The purpose of the research was to evaluate the process and outcomes of the *Learning Garden* program using both qualitative and quantitative (survey) methods.

METHODS

Communities

This research was designed and conducted in partnership with two First Nation communities: Ginoogaming First Nation, which is located 300 km northeast of Thunder Bay near the town of LongLac and has an on-reserve population of approximately 160, and Aroland First Nation, which is located 330 km northeast of Thunder Bay near the town of Nakina and has an on-reserve population of approximately 350. Several individuals from a third community, Constance Lake, population 283, participated in the workshops held in Ginoogaming.

Workshop Design

Workshops were held twice monthly in each community and were designed and facilitated by community-based coordinators hired for this project. Each workshop ran for 4 to 6 hours through the day and was based out of the community health center. Topics and activities included cultivated garden planting, soil preparation, composting, weeding, and harvesting, forest garden harvesting activities and mapping, as well as discussions on cultural values, food and health, food journaling, and kitchen workshops. Each workshop included experiential components, preparation of healthy meals and snacks, and discussion. Box gardens were established in each community as experiential learning gardens.

Quantitative Methods

Participants

Survey respondents included 20 individuals who participated regularly in the workshops. There were 14 females and 6 males in the sample with ages ranging from 15 to 66, with a mean age of 32 years.

Measures and Procedure

Cover letters were provided and informed consent was obtained from all participants. Surveys 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[13]; (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 of how important each of 16 considerations, including healthiness, price, convenience, localness, and cultural connectedness, is in guiding their choices of food; (6) perceived food security, a 17-item measure of participants' confidence in their ability to access nutritious and safe food that is being developed by the first author of this paper and has shown adequate psychometric properties in pilot research; (7) 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 Nations communities[14]; and (8) identification with Aboriginal culture, measured with Cameron's 3-factor model of social identity.[15]

Qualitative Methods

Participants

There were 6 adults and 12 children who participated in workshops in Aroland, as well as 12 adults and 17 secondary students who participated in workshops in Ginoogaming, including 5 who came from Constance Lake. Workshop attendance ranged from 4 to 15, and several workshops included elementary and secondary school classes.

Procedure

Individuals participating in the workshops were provided with cover letters describing the research component of the project, and explaining the audio recording that would take place. One of two research assistants attended each workshop, took audio recordings, and observational notes. Qualitative data collection thus included participatory observation and dialogue with program participants. This method for gathering knowledge and stories is ideal because it provides a narrative forum within which community members can debate, discuss, and react to each other's comments.[16–18] It also enabled us to observe the dynamic unfolding of learning in a variety of experiential settings. Audio recordings were transcribed and analyzed along with observational notes for emergent themes. Although a thorough review of the findings from the qualitative analysis is beyond the scope of the present paper, some of the insights gained about the process of learning in the program will be integrated into the discussion section.

RESULTS

Baseline Food System Knowledge and Use

Participants' mean ratings of how frequently they access food from each of nine sources are shown in Table 1 in descending order. These responses were analyzed using a repeated measures analysis of variance, which indicated significant differences among the nine food sources listed, $F(8,152) = 12.54$, $p = .000$. Specifically, post hoc paired samples t tests of adjacent means revealed that participants were significantly more likely to access food from the convenience store than from fishing, and more likely to fish than hunt. Participants' ratings of the foods they currently eat are shown in Table 2 in descending order. These responses were analyzed using a repeated

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.

TABLE 2. Mean Ratings of the Frequency with Which Select Foods were Eaten

Food	M	SD
Chicken	3.72	.96
Apples	3.50	1.29
Bananas	3.39	1.50
Beef	3.39	.92
Potatoes	3.39	1.04
Oranges	3.33	1.33
Lettuce	3.06	.94
Blueberries	3.00	1.14
Pork	2.72	1.32
Raspberries	2.72	1.13
Fish	2.72	1.27
Moose meat	2.56	.98

Note. The following scale was used: 5 = very often; 4 = often; 3 = occasionally; 2 = a little; 1 = not at all.

measures analysis of variance, which indicated significant differences among the 11 foods listed, $F(11,187) = 2.81$, $p = .002$. Post hoc paired samples t tests of adjacent means revealed that participants were significantly more likely to eat chicken than apples, more likely to eat apples than bananas, and more likely to eat fish than moose meat.

Participants' ratings of how knowledgeable they felt in accessing food from various sources was assessed on a 5-point scale where 1 was "not at all," 2 was "a little," 3 was "moderately," 4 was "quite a bit," and 5 was "extremely." Participants were most knowledgeable in locating edible berries in the forest (at 2.63) and least knowledgeable in locating places where wild rice grows (at 1.26). Cultivated vegetable gardening was rated 2.38, and a combination of hunting birds and game and trapping was rated 2.33. Three clusters of food values emerged from the 16 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 generally agreed that the healthiness of the food was a guiding consideration (healthy; not too salty, sweet, or processed), with a mean of 3.26. However, that the food connects them with their cultural heritage or comes from the land nearby was rated the lowest at 2.84, indicating slight disagreement. These responses were analyzed using a repeated measures analysis of variance, which indicated significant differences among the three value clusters, $F(2,38) = 6.32$, $p = .004$. Specifically, paired samples t tests indicated that although the healthiness of the food did not differ significantly from either of the other two clusters, the price and ease cluster was rated significantly higher than the local and cultural cluster, $t(19) = 3.50$, $p = .002$.

Relationship of Food System Variables with Well-Being

Relationships among food sources, food values, food knowledge, and the outcome variables of health, life satisfaction, social capital, and food security were examined using Pearson Product correlations and a minimum type one error rate of $p < .05$. Results of these correlations are shown in Table 3.

DISCUSSION

Participants' ratings of how frequently they accessed food from each of nine sources reveals an integration of indigenous and western food

TABLE 3. Correlations Among Food Sources, Food Values, Food Knowledge, and the Outcome Variables of Health, Life Satisfaction, Social Capital, and Food Security

	Food source: gather and grow	Food source: fish and hunt	Food knowledge: hunt	Food knowledge: garden	Value cheap, tasty, easy	Value local and culture	Value healthy
Food source: gather and grow	—						
Food source: fish and hunt	.18	—					
Food knowledge: hunt	–.28	.69**	—				
Food knowledge: garden	.41†	–.22	–.18	—			
Value cheap, tasty, easy	.15	.68**	.40†	.07	—		
Value local and culture	.42†	.52*	.30	.05	.35	—	
Value healthy	.17	.21	–.01	.23	.50*	.27	—
Physical health	.16	.19	.02	.26	.08	.59**	–.08
Life satisfaction	.43†	.49*	.16	.29	.47*	.67**	.17
Social capital	.34	.50*	.06	–.26	.54*	.67*	.40†
Perceived food security	–.05	.18	.17	.33	.49*	.01	.44*

**$p < .01$;
*$p < .05$;
†$p < .08$.

systems, with fishing in particular being an important source of food alongside the grocery store. However, there is also a clear emphasis on the dominant food system, with the grocery and convenience stores being the primary destination for regular food needs. Participants' ratings of their currently eaten foods likewise reveals a diet that depends largely on the dominant, global food system, with bananas and oranges being consumed more frequently than blueberries and raspberries, both abundant in the region. Participants' self-rated knowledge of cultivated gardening and the forest food systems revealed a relatively low to moderate knowledge base for the local food system overall, although this did vary somewhat across the different components of the system, with people more knowledgeable about how to find and gather berries than about hunting, trapping, or harvesting wild rice. Finally, analysis of participants' self-rated food values revealed that participants' food choices were guided significantly more by the price, taste, ease, convenience, and familiarity of the food than by the degree to which it connects the individual with their culture or land. In sum, these analyses reveal that the knowledge base for cultivated and forest food is currently limited and it is largely convenience and price that drive people to the dominant food system.

Nonetheless, correlational results indicated that engaging in forest food activities such as hunting and fishing, and valuing local foods were associated with positive, healthy qualities such as self-reported health, life satisfaction, and social capital. Therefore, even though knowledge and use of the local food system is limited, there may be benefits to accessing this food system for well-being. However, perceived food security, or feeling secure about one's food system, was associated with valuing healthy foods, valuing convenient and affordable food, and getting food from the grocery store, and was not related to accessing or valuing the local food system. In other words, accessing the local food system was not associated with perceived food security. This is consistent with other research we have conducted with university students.[19] People who rely on the dominant food system generally feel quite secure about that as a source of food.

The food knowledge variables, reflecting participants' knowledge of hunting, fishing, gathering, and growing their own food, were not directly correlated with the health and well-being outcomes, but were correlated with accessing the associated food source. These food source behaviors were in turn correlated with some beneficial outcomes. In other words, knowledge of hunting was correlated with hunting behavior, and this hunting behavior was correlated with life satisfaction and social capital. In sum, participants in these two First Nation communities indicated having a limited knowledge base of local foods and values that reinforce the dominant food system. However, having knowledge of local foods and accessing local foods was associated with various beneficial outcomes, reinforcing the broader objectives of the *Learning Garden* program.

Observations on the Process of Learning

Qualitative data collected throughout the *Learning Garden* program reveal several intriguing observations and preliminary findings. These findings speak to both the successes of the program and to insights that may be beneficial in the design of similar programs in the future.

There was clear evidence of learning taking place within the program. The Holistic Lifelong Learning Model recognizes that traditional indicators of learning such as high school graduation rates may be inappropriate for Aboriginal people. Instead, enhanced individual and community well-being is seen to be a critical indicator of learning. The purpose of the *Learning Garden* program was to promote well-being on several levels by building the knowledge base underlying a sustainable local food system. Evidence for an increased knowledge base that benefited the wider community can be seen in the behavior of a group of workshop participants who used the garden planting skills they gained in the workshop to plant the garden of an elder. In addition, the participants from Constance Lake applied the skills they gained in the Ginoogaming workshop to build a garden for the residents of their elders' housing complex in Constance Lake.

The learning that took place within the program integrated western and indigenous sources of knowledge. For example, when seeking knowledge of cultivated gardening practices and local forest foods, workshop participants would draw on books and the Internet, as well as community elders. Workshops in Ginoogaming were opened with traditional ceremonies or activities and those in both communities were blended with community feasts and traditional events. Participants demonstrated a clear preference for experiential learning, and workshops generally occurred either out in the bush with the coordinator, or around the box gardens, with questions being addressed while everyone worked together on weeding or thinning of plants, for example. Learning was also clearly understood to be lifelong, as attendance within one workshop could vary from a class of elementary school students to adults and elders.

The *Learning Garden* program was explicitly designed to be holistic, addressing the whole individual, including emotional, mental, spiritual and physical aspects, as well as his or her connections with community and nature. However, participants showed us a new depth to the idea of holistic learning that depends upon and reflects the particular cultural orientation of the individuals involved. Specifically, we found that the bimonthly schedule of workshops held at a set time in the health center worked well with some participants but also seemed to prevent other potential participants from joining in. When set up as a formal workshop in this manner, community members sent their children, suggesting the belief that children learn formally. However, many adults in the community preferred to do "workshops" at a kitchen table, or in the bush, to do them spontaneously one on one with the coordinator, to immerse their learning into their settings and routines of daily living. This style of immersed learning is profoundly holistic.

Differences in cultural understandings of the garden were also observed. The western view of gardens and gardening knowledge is scientifically based, precise, and carefully cultivated. For example, seeds are planted each to its specifications and in a careful row. Soil is mixed to have just the right properties. The Aboriginal worldview is less manipulative of nature than the western worldview, so the approach to gardening is also different. Observations revealed that the Aboriginal view of gardens is spontaneous and naturally unfolding. For example, gardens are planted in or near forested areas, seeds or potatoes are placed in the ground in a more spontaneous manner, and intervention is minimized throughout the growing season. Aboriginal communities and individuals are diverse, however, and whereas some participants adopted the western approach to gardens, others preferred a more Aboriginal approach. For example, the workshop participants and coordinator in Ginoogaming chose to plant behind the health center. Those in Aroland planted their learning gardens a considerable drive out of the community in the bush, which was perceived to be a cleaner location, less polluted by humans and dogs. Therefore, the particular approach to gardening and to the workshop structure depends upon the bicultural orientation of the particular participants. For some, the structured and precise approach may be best, for others the spontaneous and immersed approach may be best. This is why the presence of a community-based learning coordinator is key to the success of programs like this. The coordinators in both communities were effective at identifying the preferred approach of the particular individuals and adapting the program to suit their needs.

In this paper, we have reported the findings of the *Learning Garden* Program, which was based on a holistic, experiential, lifelong model of Aboriginal learning. The purpose of the program was to work with two First Nations communities to strengthen a local, sustainable, and nutritious food system through increased knowledge of cultivated gardening and forest foods. Findings indicated that a strong local food system is important to health and well-being for First Nation individuals and communities, and that although baseline knowledge of local foods is low, a biculturally flexible, holistic, lifelong-learning garden program can have an impact on local food knowledge. As this knowledge base increases, a sustainable local food system that integrates both forest and cultivated gardens may become a reality, benefiting individuals, communities, and the environment.

CONCLUSION

Initiatives that aim to enhance the overall sustainability of food systems in Aboriginal communities will engage a complexity of approaches. This study reveals the weaving of both traditional ways and western ways into the acquisition of food. A post-oil economy destabilizes a heavy reliance on an imported western dominant food system for nutritious and affordable food, but simultaneously environmental threats pose challenging issues for securing local traditional food sources. Thus, the data reveal the need for bicultural balance where diversity in approaches provides collective strength for a community sustainable food system.

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