ORIGINAL ARTICLE

Community-based health research led by the Vuntut Gwitchin First Nation

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ABSTRACT

Objectives. This paper documents an exceptional research partnership developed between the Vuntut Gwitchin Government (VGG) in Old Crow, Yukon, with a group of scientists to examine northern food security and health as part of a larger, multidisciplinary International Polar Year (IPY) research program. We focus on the elements that enabled a successful community-researcher relationship.

Study design. The VGG led the development of the research and acted as Principal Investigator on the IPY grant. The multidisciplinary collaboration spanned the physical, biological and health sciences, including issues related to food security.

Methods. The food security and health component of this research was carried out using a series of complementary methods, including focus groups, structured interviews, a household questionnaire, an interactive workshop, community meetings, transcript analysis and a caribou flesh exposure assessment.

Results. Results from the food security component are informing local and regional adaptation planning. The legacy of the research collaboration includes a number of results-based outputs for a range of stakeholders, a community-based environmental monitoring program, long-term research relationships and improved community capacity.

Conclusions. The type of collaboration described here provides a useful model for new types of participatory health research with northern communities.

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Keywords: community-based research, First Nations, Yukon, food security, climate change, multidisciplinary
INTRODUCTION

Traditional food is central to the social, cultural and physical well-being of Aboriginal peoples in the Arctic. At the same time, changes in the physical and biological environment, in the context of rapidly changing sociocultural dynamics and globalization, are having a particular impact on food security in northern regions (1–11).

Food security refers to the continued, adequate and secure access of individuals and households to safe, nutritious and personally acceptable food to meet the dietary requirements for a healthy and productive life (12,13). Cultural aspects of food procurement, preparation and consumption are particularly important in Aboriginal contexts (14). Food insecurity has been associated with multiple aspects of poorer health, where food-insufficient households are more likely to report poorer functional health, restricted activity, chronic conditions, depression and distress, and less social support (15). Food insecurity is identified as a significant concern in northern Canada (2,16). Market foods in remote Arctic communities can cost more than double the price of what they cost in southern supply centres (17,18) due to high distribution costs and small markets, and less expensive choices often lack nutrient density (7). It is well recognized that the continued presence of traditional foods in the diets of Aboriginal peoples contributes in multiple ways to better health (7,19,20). Community members, however, experience challenges to accessing sufficient, healthy amounts of these species to meet their food needs and preferences.

Northern food production systems are under stress from a variety of social, economic, political and environmental forces. Many northern Aboriginal communities regularly experience periods of interruption of traditional food supply due to the temporal fluctuations in natural resources (21,22); for example, “no-summer” summers where the sea ice never breaks up and whales cannot be hunted (23), or years with irregular caribou migration patterns, that reduce accessibility for hunters (24). Climate change may exacerbate this situation by affecting species distribution, population abundance, morphology and behaviour (25). In the Arctic, climate change is already challenging food harvesting methods as well as socio-economic relationships that dictate the distribution of subsistence harvests, which have worked to sustain populations for many generations (11,23,26,27).

The extent of such impacts and their implications for the continued nutritional well-being of individuals and communities in the Arctic are largely unknown. Participatory research is a useful approach for addressing such gaps in health research. Where Aboriginal issues are involved, the research approach requires additional considerations. It is now recognized that northern researchers have practical and ethical responsibilities to actively engage with communities to carry out mutually beneficial research (28). A new northern research paradigm has emerged, promoting research that is collaborative, interdisciplinary, policy-oriented and reflective of northern priorities (29–31). Effective collaboration relies on early initiation and continued communication with community members and relevant local, regional and national organizations; community input on research design and process; incorporation of capacity-building and/or employment opportunities; and dissemination of research outcomes in accessible formats (32,33). Wolfe et al. (31) also highlight the importance of an enabling context, including community capacity, convergence of community and researcher interests, supportive funding guidelines for innovative and cost-intensive collaborations, flexibility
Community-based health research led by VGFN

and strong relationships. The human component is primary, where mutual respect is paramount, as is valuing the knowledge and expertise of community members (34). These imperatives reflect the importance of research that is jointly managed between research institutions and communities, where appropriate and mutually agreed upon terms and conditions are specified in a research agreement (35).

While the above aspects of collaborative health research were initially developed as guidelines, the diverse cultural, social and political contexts among Aboriginal communities and the cultural and institutional differences between university-based researchers and Aboriginal communities pose a great challenge for allowing them to evolve into standard practice for successful engagement. A number of models of collaboration have been proposed to address the diverse range of interests in health research (e.g., 4,8,10). Here we provide insight into one such research model.

This paper discusses our experience conducting a community-based study in partnership with the Vuntut Gwitchin First Nation (VGFN) in Old Crow, Yukon. We outline the development of a multidisciplinary, multi-year research project that materialized as part of the International Polar Year, and focus on the food security component undertaken by our University of Northern British Columbia (UNBC) research team. The project, which was called “Environmental Change and Traditional Use of the Old Crow Flats in Northern Canada: Yeendoo Nanh Nakhweenjjet K’atr’ahanahtyaa (YNNK),” was led by the Vuntut Gwitchin Government (VGG), in collaboration with the Yukon Government, Parks Canada and a multidisciplinary team of researchers from across the country. Its aim is to improve understandings of how the community of Old Crow and the surrounding traditional territory are being affected by climate change. By outlining various facets of the project, opportunities and lessons learned, we can focus on the elements that enabled a successful community–researcher relationship.

MATERIAL AND METHODS

The community of Old Crow

Old Crow is a small Gwich’in community in the northern Yukon with a population of approximately 250, most of which are VGFN members. The VGFN also includes a number of individuals with Dagoo (or Tukudh) ancestry (36). Accessible only by air, apart from the occasional winter road, the cost of living is quite high relative to southern Canada; for example, a Revised Northern Food Basket (including both perishables and non-perishables) is 2.4 times more expensive than in Whitehorse (37). Residents continue to rely in large part on traditional foods such as caribou from the Porcupine Herd, which has long provided a primary source of sustenance for Vuntut Gwitchin families. Recent changes in caribou availability and the ability of hunters to access harvesting areas have community members concerned about long-term food security under changing climatic conditions (24).

Initiating a researcher-community collaboration

In January 2006, the VGG invited a team of northern researchers, including three of the six Northern Research Chairs from the Natural Sciences and Engineering Research Council of Canada (NSERC), to Old Crow to discuss their concerns regarding the impacts of climate change on the environment and health of the local population and their research needs. Two full days of exchanging ideas with the Chief and VGG staff
resulted in the identification of research questions and the development of a detailed research plan. Under the leadership of the VGG, the multidisciplinary team of northern scientists brought a breadth of expertise to the project. Their research spans the physical, biological and health sciences, including issues related to food security.

The unique nature of this research program began from the pre-proposal stages. The design and development of the program took place in the community of Old Crow. The principal objectives for the program were developed at that time through consultations among the research team, the VGG, organizations such as the local North Yukon Renewable Resources Council and Parks Canada and the community-at-large. All parties supported the idea that the VGG lead the research program, and a proposal was co-developed with the VGG as the Principal Investigator and the research team leaders as Co-Investigators. A grant application was submitted to NSERC through the 2007–08 International Polar Year (IPY) program, which listed "Science for Climate Change Impacts and Adaptation" and "Health and Well-being of Northern Communities" as science priorities.

The research objectives were as follows: (1) to document environmental change in Crow Flats (an important harvesting area within VGFN traditional territory) from the last interglacial period to the present from a unique assemblage of archives; (2) to assess the distribution and abundance of vegetation and targeted wildlife species, and identify the relationships between these and the changing physical environment; (3) to evaluate the impact of changes in biophysical systems on traditional VGFN food sources; and (4) to develop a long-term, community-based environmental monitoring program. Researcher expertise spanned a range of disciplines, including quaternary paleontology, dendroclimatology, permafrost science, hydroecology, terrestrial ecology, wildlife biology, community health sciences and traditional knowledge of the land and its processes. The incorporation of traditional knowledge was also recognized as essential. While drawing on the collective experience of the interdisciplinary group of researchers, this paper focuses primarily on the food security and health component of the research.

Research program components

Research activities

The food security and health component of this research was carried out using a series of complementary methods, including focus groups, structured interviews, a household questionnaire, an interactive workshop, community meetings, transcript analysis and a caribou flesh exposure assessment. Each methodological component involved consultation, data collection, data verification through on-site community presentations and public reporting via written and oral presentations. A research coordinator and research assistants were hired to assist with data collection, verification and reporting. Here, we briefly describe each of the research components undertaken. The Council of Yukon First Nations was invited to join as a partner for the food security component to facilitate the sharing of research experiences with other communities in the Yukon.

Climate change impacts on food security and adaptation planning

Four focus groups and 41 interviews were conducted in October–November 2007 to gather information on traditional food consumption, availability of and access to traditional foods, and perceived reasons for dietary changes. A one-day workshop was held in October 2009 with 19 community leaders and
decision-makers representing the government and local agencies, with a focus on health and environment sectors. The discussion centred on strategies to address issues and concerns raised by local residents about food security over the long term.

**Traditional food use patterns and perspectives on food security**

Twenty-nine interviews were conducted with community members in April–May 2008 to determine (a) the frequency and quantity of traditional food consumption, and (b) local perspectives on food security. Food frequency results were compared with similar data collected by Wein and Freeman (38) in the early 1990s to identify any changes over time (24).

**Food security adaptations documented in oral history**

A wealth of information is contained in the oral history database of interview transcripts maintained by VGFN. Using the database index, we selected approximately 100 interviews with the highest density of food security-related keywords, and coded relevant sections to identify historical food security challenges and adaptations.

**Training and community involvement**

**Capacity-building**

Community members were involved in multiple ways in this research program. This involvement was largely successful due to existing community capacity, which was bolstered through additional capacity-building opportunities. A major strength was the involvement of a Vuntut Gwitchin consultant who proved to be a very competent community coordinator. This support on the ground ensured the smooth operation of community meetings, focus groups, workshops and the hiring and coordination of local research assistants.

Several people were hired and trained as research assistants to collect data through one-on-one interviews. One of the local partners coordinated the hiring process, spreading word of the opportunities and collecting names of interested parties. Two individuals were hired to conduct qualitative interviews on food security and climate change in the fall of 2007. Subsequently, three additional research assistants developed their skills during a thorough two-day training in March 2008, which focused on food frequency questionnaires and quantitative food security interviews. They then conducted interviews over the subsequent two months. A UNBC researcher was on-site during the first two weeks to supervise and address any questions that arose, and later provided support via telephone and email.

**Nutrition program**

In April 2008 one of the UNBC researchers presented an interactive nutrition program for students in Grades 4 to 6 at Chief Zzeh Gittlet School in Old Crow, entitled “What Makes Food ‘Healthy’? (And Why Does It Matter?)”. Students explored why certain nutrients are important for well-being and in which foods they can be found, with an emphasis on traditional foods. A second component focused on making informed dietary choices. Students compared nutrition labels from market foods from the local Northern store (e.g., whole wheat versus white bread) and also compared the nutritional value of traditional and market foods (e.g., salmon versus pre-packaged lunch meat). They were also asked to keep a journal of the foods they ate over several days. Following the nutrition program, the researcher visited the annual youth culture camp organized by the school and VGFN, where youth participated in hands-on experiences that included muskrat trapping and storytelling.
Youth climate change workshops

IPY researchers participated in the January 2009 “Nits’oo nakhwanan, nits’ oo gwiidandii juk ch’ijuk gweedhaa, Our Changing Homelands, Our Changing Lives Conference.” Organized by the Arctic Health Research Network-Yukon and supported by the VGFN, the conference brought together Vuntut Gwitchin youth to discuss the challenges facing their community, particularly climate change. Vuntut Gwitchin elders and traditional knowledge experts shared their experiences with youth, and IPY scientists held interactive workshops based on their IPY research on topics ranging from permafrost to tree ring history. In the workshop entitled “What’s For Lunch? Climate Change Impacts on Wildlife and What You Eat,” IPY food security research team members facilitated a discussion among youth about their perceptions of the factors affecting their community’s food security. In the second workshop component, organized by IPY wildlife researchers, students participated in a radio-tracking activity and spent time learning about the furs and biology of animals trapped in the Yukon. IPY researchers also made public presentations in the evenings to update community members on the progress of their respective studies. Since validation meetings had already been held for the food security work, these presentations incorporated the initial community feedback for a second round of verification.

Summer institute on global Indigenous health research

The partnership with Old Crow enabled the participation of a paired team (a food security researcher with a Vuntut Gwitchin youth leader) in the week-long 5th annual Summer Institute (SI-5) sponsored by the Canadian Coalition for Global Health Research in Duncan, British Columbia. The 2008 SI-5 focused specifically on addressing Indigenous health research challenges, with the intention of engaging those who are new to the field of global health research. The joint participation allowed the development of a genuine personal and professional connection between the researcher and VGFN member, while also allowing both members to build their own research capacity and networks. SI-5 encouraged participants to explore the challenges faced by the researchers and Indigenous populations working together; strengthened participants’ understanding of selected global forces that affect the health of Indigenous peoples; provided opportunities for skill development of relevant competencies such as advocacy, leadership, partnership building and knowledge translation; and discussed issues related to global health research of particular interest and importance to those considering a career in this field. Field trips and speaker presentations exposed participants to the health research challenges faced by many First Nations. The SI-5 culminated in the one-day “Global Indigenous Health Research Symposium” at the University of Victoria, where participants co-presented research posters.

Collaborations

This multidisciplinary, community-based program has offered many opportunities for collaboration, and indeed would not have been feasible without strong partnerships among the IPY researchers, the VGG and the Council of Yukon First Nations (CYFN). In a novel arrangement for a research program of this size, the VGG is the Principal Investigator on the grant, while the researchers are Co-investigators. From the initial proposal planning meeting in Old Crow in January 2006, VGFN community members, local organizations such as the North Yukon Renewable Resources Council, Parks Canada and VGG representatives have
Community-based health research led by VGFN

played an active role in shaping program objectives, guiding program development, providing feedback on findings and determining appropriate products and outputs to ensure that results can be effectively communicated to a range of stakeholders for use at various levels of organization. Community members also participated in the research process in multiple ways as community coordinators and research assistants. Capacity-building initiatives were implemented where feasible (see above).

Throughout the program, the eight lead researchers and their team members maintained frequent contact with the group and with the VGFN research coordinators, freely sharing updates and results. We also committed to annual face-to-face meetings in Old Crow, where members from each research team and other partner organizations gathered for a week of community meetings.

The validation of food security study results via community visits in March 2008 and January 2009 was central to the success of the research. In each case, the researchers provided a draft report and a one-page summary for each research component, and orally presented preliminary results in a public meeting. Among other feedback, the food frequency data provoked a lively discussion that provided a critical context for the interpretation of results and highlighted important themes.

The Council of Yukon First Nations (CYFN) played a vital role in helping the researchers liaise with appropriate community contacts when necessary (especially in early program stages). Both the Circumpolar Relations and Health Departments supported the program and provided feedback on research methods and findings. CYFN also hosted monthly meetings of the Health Commissioners from all Yukon First Nations, where the food security team presented periodic updates.

An additional collaboration was initiated with the Arctic Health Research Network-Yukon (AHRN-Yukon), leading to participation in multiple phases of their project, entitled “Vuntut Gwitchin Climate Change and Health Research in Northern Yukon: What Do Our Changing Homelands Mean for Our Health?” Phase 1 included the “Youth Climate Change Conference” held in Old Crow in January 2009 (described above), where UNBC research team members participated as workshop leaders and keynote presenters. During Phase 2 – “Knowledge into Action” – UNBC researchers acted as members of the Advisory Committee to offer guidance on research design and training for community youth who carried out interviews on food security adaptation strategies. Phase 3 focused on implementing adaptation strategies, with the UNBC team continuing to offer support.

RESULTS

Food security research
Together, the results from the food security and other multidisciplinary studies in Old Crow and the VGFN traditional territory are contributing to a holistic understanding of the human-environment system and the manner in which it is evolving due to changing climatic and other sociocultural, economic, political and environmental conditions. The results from the food security component are informing the local adaptation planning process in Old Crow. They also contributed to a March 2010 regional workshop of leaders in health and environment sectors from all Yukon First Nations, which resulted in a plan of action for addressing food security issues in the Territory.

Collaborative process
The collaboration among the VGG, researchers and other organizations led to a number of outcomes...
during the process, as described above (e.g., youth climate change workshops, a school nutrition program, co-participation in a week-long summer institute on global Indigenous health). At the same time, the need for effective translation of research results to policymakers and other stakeholders was recognized, stimulating significant discussion about the project's legacy. Building on periodic interactions throughout the project, the project leaders organized a structured "Leaving a Legacy" workshop to discuss and develop research products, held during the February 2010 annual researcher-community meeting.

As well, we discussed a range of possible outputs that would target our diverse array of stakeholders. In addition to having manuscripts published in academic journals, the Natural Resource Department requested a series of structured research summaries for each component, based on a co-developed template. The primary product for community members at large was a coffee table book, which included images of project partners and community members matched with text describing each research component and highlighting researcher-community relationships. Further plans were made to write up a series of articles in Yukon's popular North of Ordinary magazine. In the first of these articles, the Natural Resources Director of the VGG and the YNNK Principal Investigator outlined some of the benefits of the research collaboration from the community's perspective. The project provided the impetus for the construction of an Old Crow Arctic Research Facility and has led to the process of establishing a community-based environmental monitoring program (ongoing). It also "exposed the realities of the changes affecting the Vuntut Gwitchin way of life, fostered community spirit, encouraged awareness of career opportunities for youth in science, and prioritized the importance of partnerships in science" (39, p. 13). Several research components are continuing beyond IPY as a result of community interest.

**DISCUSSION**

The community of Old Crow and surrounding Vuntut Gwitchin traditional territory are distinctive in the Yukon largely due to their unique geography. The territory is both remote and home to the Crow Flats, an internationally recognized wetland ecosystem that acts as a breeding and staging area for migratory waterfowl, a passageway for the Porcupine Caribou Herd and a refuge for other arctic wildlife. The traditional territory's natural resources are integral to the culture and traditional activities of the Vuntut Gwitchin. Much of the territory is currently under protected area status or falls within the Integrated Management area, much of which is designated as Zone 1 (lowest development) (40).

The community’s remoteness and continued reliance on the Porcupine Caribou Herd has led to a concerted, community-sanctioned effort to draw attention to the plight of the herd and, through their intimate connection, the predicament of the Vuntut Gwitchin themselves. Community leaders have taken bold action in periodically sending representatives to lobby the United States government against drilling for oil in the Arctic National Wildlife Refuge in Alaska (the Porcupine Caribou Herd’s calving grounds), and in drawing international attention to this human-environment conundrum in an area of great ecological sensitivity where there are also strong resource development interests. The leadership displayed in dealing with this issue has brought community members together in support of a common cause.
Together, the sensitivity of the location — further heightened by climate change impacts — and the salience of the issue — which engages a broad range of stakeholders — have drawn the attention of researchers in both natural and social sciences. VGFN has capitalized on this interest to engage researchers in order to generate information and interest about their cause and their land. Furthermore, they have a history of effectively nurturing internal talent while at the same time drawing on external human and financial resources, as necessary. This combination of a unique geography, a salient livelihood issue of communal importance, significant human resources and capacity, and an openness to working with outside researchers has made this multidisciplinary, community-based research possible.

The essential role of healthy ecosystems in providing a context for healthy people and livelihoods has been brought forward in several recent international initiatives (e.g., the Millennium Ecosystem Assessment, and the World Health Organization's Commission on the Social Determinants of Health). In recognition of the interrelatedness of ecological and social well-being, it behooves environmental health researchers to approach these issues from a more holistic, systems-oriented perspective, one that clearly resonates with the Aboriginal community. Parkes and Horwitz promote “reciprocal exchange between different modes of thinking, and a flow of new ideas into areas where such thinking has been non-traditional — including growing awareness of the cross-cutting relevance of (eco)systemic approaches and thinking” (41, p. 98). This collaborative, stakeholder-driven, multidisciplinary research program attempts to follow these guidelines while adhering to the new northern research paradigm. It draws on many different perspectives and types of knowledge to better understand the system that supports the many, interconnected facets of continued health and well-being of the Vuntut Gwitchin people.

This research project developed through a fully participatory partnership that was initiated before funding was sought and research began, which meant that VGFN members could shape the research agenda and help to determine the types of outputs that would best suit their needs. As a result, the research will produce recommendations that are applicable at both local and regional levels. Policy recommendations already have support from stakeholders, improving possibilities for implementation.

Participation in this research continues to have multiple benefits for all those involved. While we actively addressed community interests and pushed to improve the manner in which academics partner with Aboriginal communities, we also benefitted on a personal level. The participatory design of this research program allowed us to hear the unfiltered voices of community members speak about the challenges facing their community. The warm welcome that we received each time we visited stems from a long-standing relationship of mutual respect between community members and researchers. These personal connections afforded us unique opportunities to get to know families and spend time on the land, contributing additional perspectives to our work. We were fortunate to share stories and traditional foods with community members, and to participate in activities such as snowshoeing, dog-sledding and pulling fish nets. These experiences helped us to learn about and connect with an exceptional environment and people in a remote part of our country, and to develop an appreciation for Vuntut Gwitchin knowledge, culture and tenacity in the face of many changes. These relationships are fundamental to effective collaboration.
Through this research, we are linking environment and health research in a novel manner, using food security as a cornerstone to engage community members and scientists from multiple disciplines, as well as relevant regional organizations. Through active engagement with Vuntut Gwitchin community members in Old Crow, our research has helped to improve understandings of environmental change and community-environment relationships, while offering a range of training and capacity-building opportunities.

While all research relationships have their challenges, our project’s success was largely dependent on certain community characteristics and external factors. First, the community of Old Crow has a positive history of working with researchers. Second, it has significant capacity to take a lead role in carrying out a sustained, collaborative research program. Third, both the researchers and community showed substantial and sustained leadership throughout. Fourth, the northern Yukon provided a unique context in which to study environmental change. The distinctive community context (remoteness, cultural connectivity, reliance on the Porcupine Caribou Herd, self-governance) combined with that of the surrounding territory (particularly Crow Flats, a Ramsar Wetland of International Significance) warranted the attention of a multi-disciplinary team of researchers. Fifth, the nature of the research was such that it required the input of both science and traditional knowledge. Sixth, community priorities were well matched with researcher interests. Finally, the timing and availability of a major source of funding for a large, multiyear project matched well with researcher and community intentions. While each research context will vary, the type of research collaboration described in this paper provides one useful model for new types of participatory health research with northern communities.

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