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RESEARCH ARTICLE

Using participatory research to communicate environmental health risks to First Nations communities in Canada

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ABSTRACT

This paper describes a network of three interconnected, multidisciplinary research projects designed to investigate environmental health issues faced by First Nations in Canada. These projects, developed in collaboration with academia, used a participatory approach meant to build capacity, raise awareness, and initiate change. The first project, which began in British Columbia in 2008, gathered information on the traditional diet; for example, its composition, nutritional quality, and potential for chemical exposure. This 10-year, Canada-wide project served as a model for two follow-up projects: one on biomonitoring and another on indoor air quality. All three projects provided community ownership over the data and communicated results in a culturally sensitive manner to encourage interest in research and initiate risk reduction activities. The Assembly of First Nations, a national advocacy organization representing over 630 First Nations communities across Canada, participated in all aspects of the research while coordinating communications and arranging timely dissemination of results. These projects showed how properly executed, community-based research can be a valuable tool for stimulating interest in scientific studies while promoting self-reliance, components often missing from academic research.

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Introduction

There are over 630 First Nations communities across Canada, many of which still rely on the natural environment for their physical, spiritual, and cultural well-being (Sharp, 2009). Being close to the land and recognizing that a healthy community requires a healthy environment, First Nations have learned to sustainably manage culturally important natural resources with knowledge handed down from generation to generation. However, government support for economic development in the "North" is resulting in changes that are affecting the balance between sustainable environmental management and indigenous community development, thus prompting an examination of health risks, as well as the social, cultural, and economic impact of mineral extraction processes on the First Nation's way of life (AFN, 2005; Myers, 2001; O'Rourke & Connolly, 2003). As environmental contaminants have been found in remote rural areas of Canada (Gamberg et al., 2005), the risks

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to environmental health must be assessed and effective solutions found to reduce exposure. Statistics show that chronic diseases such as diabetes, tuberculosis, heart disease, upper respiratory infections, asthma, and some cancers are significantly higher among First Nations than the general population (Bramley, Herbert, Jackson, & Chassin, 2004; Health Canada, 2011; Marrett & Chaudhry, 2003; Newbold, 1998; Sharp, 2009). This phenomena is not unique to Canada, but is prevalent wherever Indigenous Peoples have had a history of colonization or have become "minority" populations relative to European or other racially different groups (Adelson, 2005; Bramley et al., 2004; Bramley, Hebert, Tuzzio, & Chassin, 2005; Dart, 2008). These health inequalities, which extend the disparity from generation to generation, are due in part to lifestyle issues aggravated by poverty, rapid population growth, and isolation (some northern First Nations communities are accessible only by air or ice roads). Food insecurity, dietary issues (obesity), overcrowded and poorly ventilated housing, and exposure to cigarette smoke are common where morbidity rates are high (Clark, Riben, & Nowgesic, 2002; Harris, Glazier, & McMurray, 1998; Newbold, Padilla-Banks, Jefferson, & Heindel, 2008; Reading & Nowgesic, 2002). Exposure to environmental contaminants, including polychlorinated biphenyls, organochlorine pesticides, dioxins, furans, and heavy metals such as mercury and lead, is a more recent cause for concern and may contribute to observed higher than normal rates of chronic illnesses (Carpenter, 2008; Kwiatkowski, 2010; Sharp, 2009).

In some regions, natural resources such as timber, oil, gas, and minerals are being exploited at an increasing rate. It is expected that in the next 10 years $500 billion Canadian dollars will be invested in resource extraction projects alone (Natural Resources Canada, 2012). Although industry takes steps to avoid environmental disruption, the long-term impact of the extraction process, and the chemicals used, is a concern (AFN, 2007b; Corvalán, Kjellström, & Smith, 1999). For example, pristine bodies of water where fish are harvested for food are being used as tailings impoundment areas, a practice allowed under Schedule II of Canada's Metal Mining Effluent Regulations (Government of Canada, 2012; Zilker, 2013). In addition, logging operations can disrupt the harvesting of forest dependent foods and traditional medicines, and road and power line construction needed for extraction processes has resulted in habitat disruption (Ascher, 2001; Trombulak & Frissell, 2000). Furthermore, toxic chemicals that are used to refine gold and extract natural gas are being dispersed into the natural environment where they can enter the food chain (AFN, 2005, 2007a; Getaneh & Alemayehu, 2006; O'Rourke & Connolly, 2003).

Recent knowledge about the toxic properties of certain chemicals has led to an upsurge of research on environmental contamination, especially in the Canadian North (Abelsohn, Gibson, Sanborn, & Weir, 2002; Chan et al., 2011, 2012; Mackenzie, Lockridge, & Keith, 2005; Sharp, 2009). This knowledge, combined with observations of environmental disruption from industrial activity, climate change, extreme weather events, and government conservation policies that restrict hunting access to traditional territories, has resulted in decreased availability of traditional foods, an important source of quality protein for First Nations (AFN, 2005; Friendship & Furgal, 2012; Gardner & Nelson, 1981; Power, 2008). The result is a disturbing rise in food insecurity.

In many First Nations communities, access to healthy "store bought" foods is limited as well as more expensive than in urban centers (Chan et al., 2011, 2012). A lack of nutrient-rich foods, combined with a sedentary lifestyle, contributes to high rates of chronic disease, a situation that is increasing in prevalence and severity (Uradnik, 2011; Young, Reading,

Elias, & O'Neil, 2000). Also, lifestyle changes that result in spending more time indoors in crowded, poorly built, and inadequately ventilated homes exacerbate these health problems (Samet, Marbury, & Spengler, 1987).

In an attempt to address these concerns, AFN Resolution No. 03/2008 mandated the Assembly of First Nations (AFN, 2008) to investigate environmental health issues on reserves. This article describes AFN's role as a national advocacy organization in the development and implementation of three interconnected projects where participatory methodologies were used to promote interest, trust, ownership, self-reliance, and community action.

Methods

Of three environmental projects undertaken by the AFN, the oldest, largest, and most complex is the First Nations Food, Nutrition, and Environment Study (FNFNES). The FNFNES is a Canada-wide (south of the 60th parallel), multidisciplinary initiative, developed to investigate a First Nation's concern that traditional foods (those harvested from the wild)[1] may be contaminated with toxins (natural and industrial) and, therefore, not fit for human consumption (AFN, 2007a, 2007b; Friendship & Furgal, 2012). The FNFNES along with two follow-up projects, the First Nations Biomonitoring Initiative (FNBI) and the First Nations Indoor Air Study (FNIAS), aimed at assessing, communicating, and reducing the risks associated with exposure to toxic chemicals.

First Nations Food, Nutrition, and Environment Study

In 2007, the AFN requested support from Health Canada to launch the FNFNES. This project was designed to engage up to 100 First Nations communities over a 10-year period. The project was developed in partnership with AFN and two academic institutions: the University of Northern British Columbia (UNBC)[2] and the Université de Montréal (U de M). Previously, AFN's role in research had been as an observer; however, in this case AFN selected qualified staff from within the Environmental Stewardship Unit (ESU) to participate as equal partners with academia. Each institution was assigned a project component based on interest and experience: the UNBC focused on toxicology and project management; the U de M on nutrition and data analysis; and the AFN on drinking water quality and communications. Health Canada (the funding agency) was involved in providing scientific input on mercury exposure, chemicals in drinking water, and pharmaceuticals in surface water (see Figure 1). The AFN also monitored First Nations' concerns, protocol compliance, and communication of research results. The communications component involved the development of community-specific educational materials and reporting mechanisms for informing First Nations' leadership at the community, regional, and national levels on project objectives, progress, and results. With the assistance of project field staff and input from First Nations participants, AFN developed public awareness materials, such as brochures, fact sheets, posters, press releases, radio scripts, and an informational video. A website was developed for sharing project information and progress reports (www.fnfnes.ca).

The main objective of the FNFNES was to investigate the presence of chemical contaminants in traditional foods (wildlife, fish, edible plants, and berries) and drinking

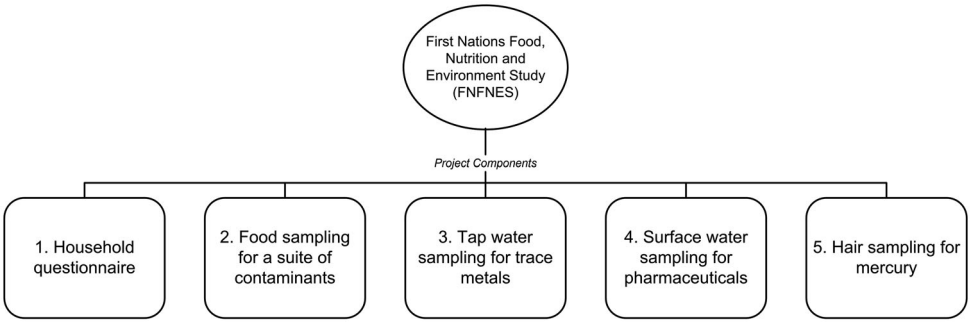

Figure 1. The five principle components of the FNFNES.
Source: A detailed description of each component can be found at: www.fnfnes.ca

water and determine if these contaminants were of public health concern. This required a toxicological examination of food and water samples and information on the nature of the typical diet (consumption patterns of both market and traditional foods). Other objectives included investigating food security issues, assessing exposure to mercury by analyzing hair samples, and establishing a sampling program to determine the presence of pharmaceuticals in surface water at water supply intakes and sites where fish are harvested.

To maintain clarity and ensure an equitable relationship between partners, guiding principles were developed (a document outlining roles and responsibilities). Other documents included a Community Research Agreement (CRA), standard operating procedures (SOPs) for each project component, and a participant consent form. Sample documents can be found on www.fnfnes.ca.

A Steering Committee, composed of representatives from the three partner institutions and ex officio members from Health Canada, reviewed and approved the communications materials and SOPs as they were developed. These were also reviewed and approved annually by ethics committees at UNBC, U de M, and Health Canada. As living documents, these materials were subject to change in response to differing cultures, ecozones, lessons learned, and input from participant communities as the project progressed.

Each year, partner communities were selected starting with British Columbia in 2008, Manitoba in 2010, and Ontario in 2011 and 2012. Alberta is the focus for 2013–2015. Within each province the project began by randomly selecting communities using an ecozone sampling approach developed specifically for this project by Statistics Canada (see Regional Reports for British Columbia (pp. 7–9), Manitoba (pp. 7–9), and Ontario (pp. 4–6), (Chan et al., 2011, 2012, 2014)). Ecozones were considered the most appropriate basis for sampling as the foods harvested within each ecozone were expected to be consistent from community to community, an advantage in that ecozones overlap political boundaries and are beneficial for both survey implementation and analytical reasons. The Chiefs and Councils of each selected community were then requested to appoint a representative to attend a "methodology workshop", the purpose of which was to explain the nature of the study, discuss implementation plans, and initiate agreed-upon community-based activities. This two-day workshop also provided an opportunity for

the research teams to meet one another, ask questions, and contribute to the methodology. Discussion topics included potential benefits for First Nations, confidentiality, data security issues, reporting procedures, and ownership of results. A region-specific pictorial guide of wild game, fish, and edible plants, identified by their local names, was also developed.

Shortly after the methodology workshop, communities were contacted to schedule an on-site presentation (project overview) to the Chief and Council and the community at large. The Community Health Representative, Land Manager, and/or Environment Director, as well as interested elders, women's groups, and youth council members were invited. After discussing the project, the leadership was provided with a draft CRA, meant to be modified to meet local needs. Once finalized, a "Funding Transfer Agreement" was negotiated to cover local implementation costs. A maximum of 100 households per community were then randomly selected to participate.

In order to develop local research capacity, each community was asked to select up to four Community Research Assistants and a Community Coordinator. A project Nutrition Research Coordinator was assigned as field supervisor to take responsibility for on-the-job training and coordination of data collection. Once all documents were signed, personnel recruited and trained, and equipment in place, the project began.

At the community level, project implementation began with Community Research Assistants visiting selected households to discuss the project and obtain their written permission to participate. It was made clear that participation was voluntary and anyone could drop out at any time without ramifications. A questionnaire was then administered and anthropometric measurements taken of selected household participants. The research assistants arranged to collect hair samples for mercury analysis, coordinated food sampling for contaminant analysis, and in some cases collected tap water samples to be analyzed by a commercial laboratory for routine "water quality parameters". Trained environmental health officers collected surface water samples, which were sent to a Health Canada laboratory for detection of pharmaceutical residues.

Once the laboratory results were received and survey data analyzed, draft community reports were written and sent to each participating community for review. Sharing this information, both orally and in writing, was an opportunity for community members to discuss the results and advise the project on how to best present the data so that they are well understood by the community at large.

After finalizing the community reports, a data training workshop was held for "Data Custodians". A Data Custodian is a community representative selected to be responsible for safeguarding, maintaining, and using the communities data set. This workshop focused on basic analytical techniques using Epi Info™, a free (downloadable) data analysis tool for visualization and reporting using epidemiologic methods (CDC, 2008). A session on proposal writing and a discussion on how data can be used to support further research and/or advocacy programs were included. At this workshop the data set was officially transferred to the community (on CD-ROM) and a take-home exercise was provided on the use of the software. The exercise consisted of a series of questions that required using the analytical techniques demonstrated at the workshop, but with the community's actual data set. Later, AFN followed up to provide advice/guidance (if needed) and to document any community action taken or plans being discussed as a result of this project.

First Nations Biomonitoring Initiative

In 2010, after extensive regional consultation with First Nations across Canada, the FNBI was developed. The FNBI, funded by Health Canada, was designed to provide baseline data for future studies as well as information for developing policies concerning chemicals' management on reserves.

The FNBI began the winter of 2010/2011 with a pilot project in two First Nations communities in Manitoba: one at a remote location and another near an urban center. The purpose of the pilot was to assess issues associated with logistics, response rates, sample collection (blood and urine), cold storage, and the timely transport of samples from remote communities to a designated laboratory (La Corte & Wuttke, 2012).

Although the biomonitoring initiative was developed independently of FNFNES, the project followed the same protocols and a similar implementation strategy. Also, this project provided an opportunity to determine if environmental chemicals identified in food samples were present in humans, and whether these chemicals are present at levels considered to be a risk to public health.

Participant communities were selected by random selection; however, some communities had already participated in FNFNES. In these communities, the same Community Research Assistants were recruited, expediting training. Also, modified versions of the same consent forms and CRAs were used. Sample collection procedures were based on the Canadian Health Measures Survey Cycle 1 with blood and urine samples analyzed for a similar suite of chemicals (Health Canada, 2010b; La Corte & Wuttke, 2012). Other components of the study included anthropometric measurements and a household survey to obtain information on lifestyle and health status.

Following the pilot phase, 13 randomly selected communities across Canada were invited to participate in the study. In each community, 42 volunteers over 20 years of age were randomly selected to participate (La Corte & Wuttke, 2012). The results of this study can be found on online (AFN, 2013).

First Nations Indoor Air Study

In 2010/2011, an AFN indoor air pollution study, also funded by Health Canada, was developed and implemented. Called the FNIAS, it was designed to assess the quality of air in typical homes on reserves. To build upon the work that had already been done, the study was carried out in one of the same communities that participated in the two previously discussed studies. This allowed an opportunity to take advantage of the lessons learned from the previous initiatives and draw upon the skills of those already trained as research assistants. For logistical reasons, a community in southern Manitoba (near Winnipeg) was chosen.

In this community, air quality tests were conducted in 20 randomly selected homes and consisted of analyses for benzene, polycyclic aromatic hydrocarbons, and nitrogen dioxide. Also, household ventilation and presence of particulate matter were assessed. A questionnaire on household activities was administered and biometric tests conducted to determine cardiovascular and respiratory health. In addition, commercially available air filters were installed in all participant households, half with an "operating" air filter

and the other half with a "placebo" filter, which served as a control. The purpose of this component was to determine if these appliances were capable of lowering pollutant levels (Weichenthal et al., 2013).

The air filtration units, along with a gift certificate for use at the local grocery store or gas station, were given to the participants as compensation for their time, effort, and costs associated with operating the air filters. Again, previously used project documents and protocols were adapted for use, which aided in project implementation.

Research support activities

Toxic exposure survey

As environmental chemicals were the primary focus of the three described projects, another study was needed to assess how exposure to toxic chemicals takes place and determine what messages are needed to inform, initiate change and reduce risk. In 2011, a small contract was secured from Health Canada to survey five First Nations communities. The aim was to determine which toxic chemicals are present and assess community-based knowledge and practices concerning the handling, use, and disposal of these chemicals. The results obtained would then be used in designing intervention strategies, as well as for input into Canada's Chemicals Management Plan (CMP). AFN sits on the CMP Stakeholders Advisory Council and represents First Nations across Canada (Government of Canada, 2011). The survey included an assessment of the use and storage of pesticides, herbicides, solvents, and fuels, and the potential for contact with food, water, and indoor air.

While the number of communities involved in the survey was small, the information obtained was sufficiently detailed to develop a Canada-wide First Nations mail-out survey. The results of this survey led to the development of a set of chemical fact sheets intended to educate community members about the nature of toxic chemicals, how they affect health, and how best to reduce the risk of exposure.

First Nations Environmental Health Innovation Network

When FNFNES was being implemented, AFN's ESU recognized that successful research in First Nations communities necessitates building trust, nurturing relationships, guaranteeing ownership and control over the data, and producing culturally relevant and useful information (Israel, Schulz, Parker, & Becker, 1998; Jack, Brooks, Furgal, & Dobbins, 2010; Macaulay et al., 1999). In 2010, AFN took the lead in a Health Canada funded project called the First Nations Environmental Health Innovation Network (FNEHIN), a web-based initiative that sought to partner communities with researchers who have had a positive working relationship with First Nations communities (AFN, 2010). AFN believed that an effective partnership is when First Nations communities are encouraged to become involved in the research process from the outset and participate in project development and implementation (Cochran et al., 2008; Israel et al., 1998). This sharing that FNEHIN promotes was illustrated by FNFNES, FNIAS, and FNBI (see: http://www.fnehin.ca/).

Report-back mechanisms

An important aspect of these projects was the method used for reporting deficiencies. During the course of fieldwork, if any analysis indicated an exceedance of the Health Canada guidelines for a certain chemical, for example an elevated mercury level found in a hair sample, a letter was sent to the participant informing him or her of the findings and what they meant. If appropriate, advice on how to reduce exposure, or referral to a medical authority was provided. Following notification, in keeping with the project's confidentiality protocol, any information connecting a participant to a result was destroyed.

> If an exceedance was detected in a tap water sample, the home was re-sampled (Health Canada, 2010a). If confirmed, letters were sent to the Chief, Council and the householder indicating the significance of the findings and suggesting steps to reduce exposure until the source of the problem is identified. The Environmental Health Officer (EHO) responsible for the community was also advised of the findings so that he or she could assess the situation and assist with corrective action.

In all three projects, SOPs required that each participant community review and approve all reports prior to official release. This process began at a community meeting where the results were presented by a Principal Investigator (PI). Having a PI present the data promoted confidence in the results, stimulated discussion of possible corrective action, and elicited suggestions for changes in the format for use in the final report.

After finalizing the community reports, the results were aggregated into a regional report and formally presented to First Nations' regional leadership, usually at an annual gathering. The regional reports provided an overview of findings summarized by ecozone. The same report-back process was repeated annually, region by region.

It is anticipated that at the completion of FNFNES, a national report will be written that will summarize all findings and provide recommendations for national programs to address common issues and correct environmental deficiencies. Recommendations will be based on tried and tested community-based experiences with risk reduction activities.

Results

To date, the FNFNES has surveyed 48 of the planned 100 communities: 21 First Nations in British Columbia (BC), 9 in Manitoba (MB), and 18 in Ontario. It is anticipated that by the close of 2016 the results will be available for 10 communities in Alberta. Atlantic Canada, Saskatchewan and Quebec are in various stages of implementation.

In both BC and MB regions, food security was a concern. Dietary and lifestyle issues contributed to high rates of obesity, diabetes, and heart disease. However, anecdotal evidence suggested that project findings stimulated a resurgence of hunting and fishing activities, household and community gardens, and other projects intended to address nutrition and food security issues.

Chemical contaminants were found in most traditional foods sampled, but at levels below what is considered a public health concern. Evidence of pharmaceuticals was found in some surface water samples, but at trace levels; and, hair sample analyses revealed that mercury is not a problem in those communities thus far surveyed. As for drinking water, in one community the project confirmed exceedances of Aluminum (Al), and in another, lead (Pb). In both communities, the Environmental Health Officer and Chief

and Council were informed as soon as these exceedances were detected and action was taken to correct these problems.

Detailed results for BC, MB, and Ontario regions have been published and can be found on the FNFNES website (Chan et al., 2011, 2012, 2014).

The FNBI data have been analyzed and a report produced (AFN, 2013). As with FNFNES, if exceedances were detected, the person from whom the sample was collected was immediately notified and advised of the results. If necessary, arrangements were made with health authorities for medical follow-up, and investigations were conducted to determine the possible routes of exposure so that recommendations could be provided and corrective action taken.

The FNIAS has provided important information to First Nations regarding indoor air quality (IAQ). In the community surveyed, IAQ had been considered a problem. Elevated levels of particulate matter ($PM_{2.5}$) found in most of the homes participating in the study confirmed this assumption. Although air filters helped to reduce particulate matter, heavy tobacco use, poorly ventilated housing, and in some cases overcrowded conditions helped to explain the high rates of lung ailments observed in this and other similar First Nations communities (Weichenthal et al., 2013).

To communicate FNIAS's findings, each selected household received both oral and written reports. Participant reports included a fact sheet and household test results in a graphic presentation so that participants could easily compare their results with that of other households in the study as well as with those of the general Canadian population, as determined from other studies (see Figure 2). An oral presentation to the community provided attendees with an opportunity to ask questions and for researchers to explain options to reduce exposure to airborne contaminants and improve IAQ.

This project indicated that further research is needed on IAQ, particularly its relationship to improved ventilation, housing design, and seasonality.

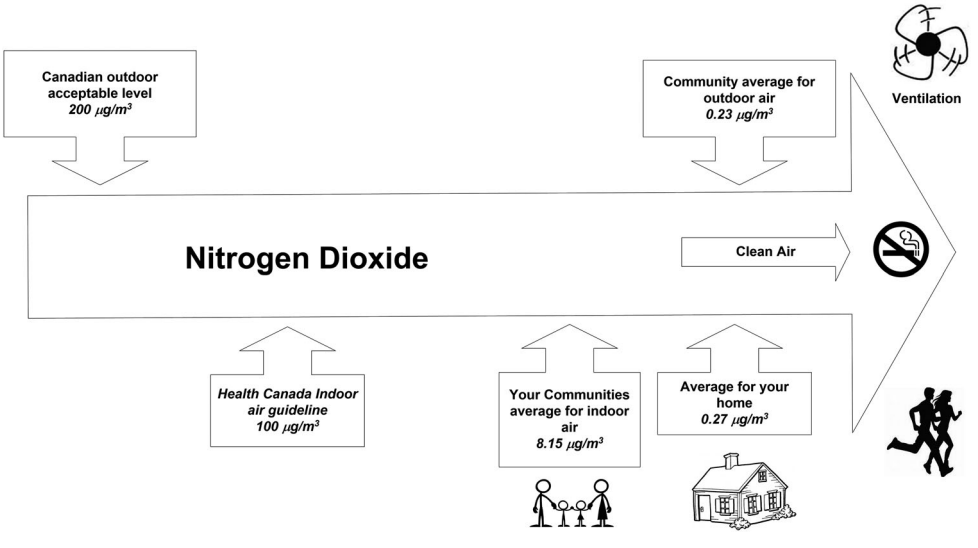

Figure 2. Research results for nitrogen dioxide as presented in community reports: the FNIAS.

Discussion

AFN considered all three projects important, not only in terms of the results obtained, but also in the manner by which they were implemented. These projects not only provided results that First Nations could relate to, but also showed that urgent changes are needed in the health policy to address First Nations' environmental health concerns and reverse the trend of increasing chronic illnesses observed on First Nations reserves. It is clear that Universities, regional health authorities, federal and provincial governments, and First Nations need to investigate new models for cooperation that involve communities in productive research partnerships (Israel et al., 1998; Macaulay et al., 1999). However, it is also clear that to effect change, research needs to be beneficial, answer a community need for information, and provide data in a manner that is well understood and considered useful for follow-up studies and/or the design of intervention programs (Israel et al., 1998).

In all three studies AFN had been instrumental in assuring ownership, control, access, and possession (OCAP^{TM}) of data (Schnarch, 2004). By building an atmosphere of trust, treating communities as equal partners, and developing research capacity at the local level, these projects showed that communities are more than willing to participate in planning and implementing projects that address local needs (Christopher, Watts, McCormick, & Young, 2008).

It should be noted that First Nations are unique. If change is to take place, communities must be convinced and agree on actions to initiate such change. This requires the integration of both traditional knowledge and western knowledge-based systems (Friendship & Furgal, 2012; Jack et al., 2010). Combining these sometimes opposing views in a way that is beneficial to the project requires cultural sensitivity and an acceptance that both knowledge systems have equal value (Cochran et al., 2008; Jack et al., 2010).

The AFN's ESU played a unique role in these projects by being involved in their design and implementation. Also, being a mediator/translator of the two knowledge systems ensured fairness, respect for protocols, as well as appropriate communication of results. This role also aided community acceptance, understanding of results, and initiation of follow-up activities.

As a national organization, AFN represents First Nations communities on rights and political issues. Assuming that arguments for impacting government policy are stronger when they include research results that are representative of First Nations as a whole, involvement in research provides analysts with powerful experiential tools for impacting government policy. Information collected firsthand is difficult to refute. Since taking this approach, AFN's credibility among First Nations and Government of Canada departments has improved. Moreover, as many scientific studies do not include outreach in their methodology, AFN's ESU has taken the information obtained to the next level by assisting communities in developing intervention strategies suited to their needs.

Finally, this network of three interconnected research projects formed the ESU's "Environmental Health cluster", one of three program clusters (see Figure 3).

This organizational structure made it possible to easily transfer the lessons learned from one project or program to another by sharing information and expertise in a team approach not only between clusters but also with other AFN Secretariats. For example, although FNIAS provided valuable information to First Nations on IAQ, there were

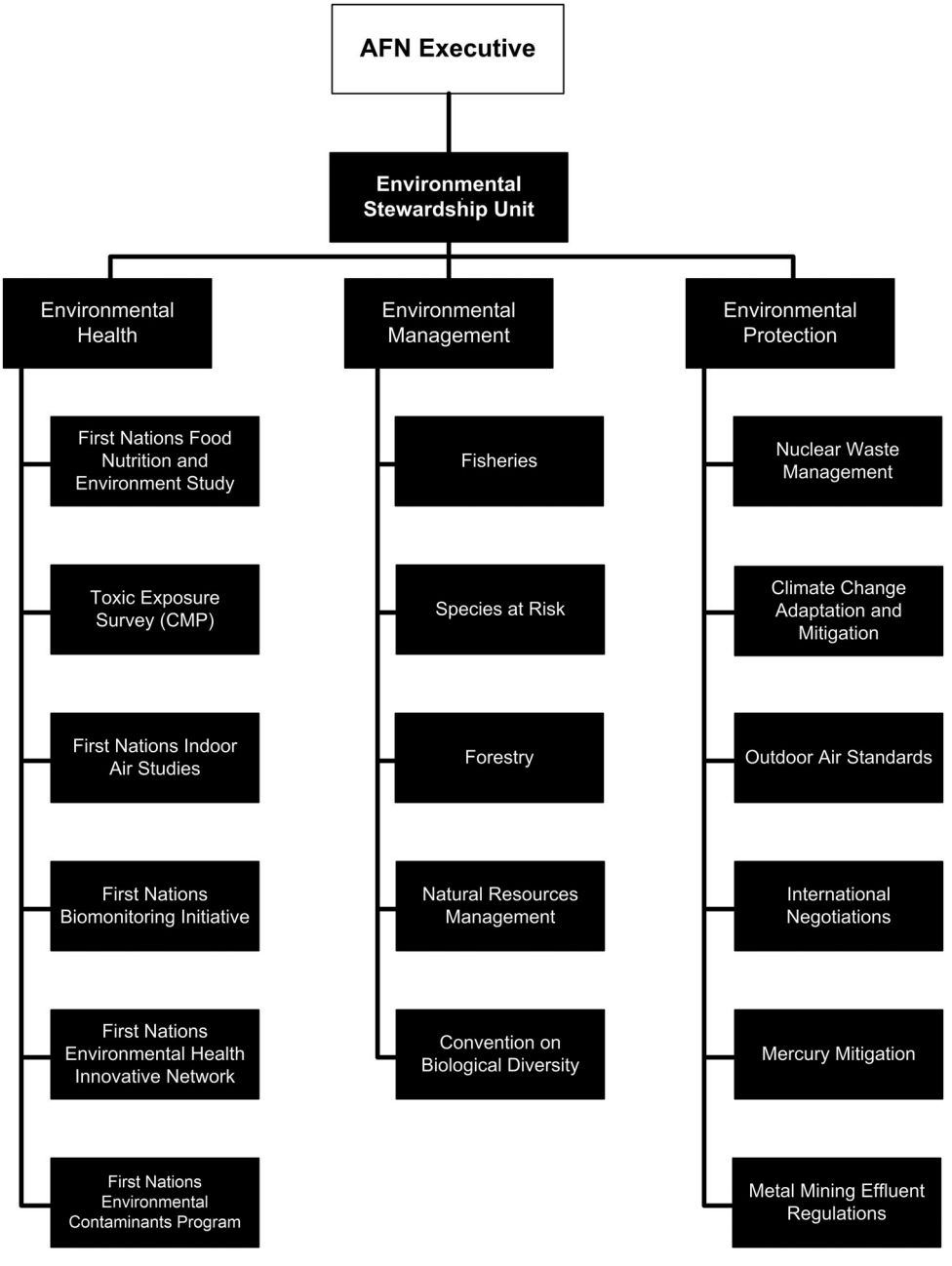

Figure 3. The organizational structure of AFN's ESU as of March 2012.

insufficient data to assess the potential cause and effect and advocate for appropriate corrective action. Also, the study was conducted in only one community, making it difficult to extrapolate this information to other First Nations communities. Therefore, the ESU has been pursuing new partnerships and external funding opportunities to expand the project to other communities and broaden its scope to include other pollutants, such as smoke from wood-burning stoves and off-gassing from building materials. The affects of

improved housing design and seasonality on IAQ also need to be studied. As a result, a community in Ontario currently involved in a project under the direction of AFN's Housing and Infrastructure Secretariat is being considered as a partner for a follow-up study. This project, called the "Holmes Group Project", was designed to upgrade/retrofit existing housing to a new minimum standard and construct new housing units considered to be healthier for habitation than the existing buildings (AFN, 2012).[3] Implementing an indoor air study in this community not only will provide valuable data on IAQ, but will also help support the work of this demonstration housing project, which is expected to be replicated across Canada.

Finally, AFN reports on all research being undertaken to First Nations' leadership at general assemblies, meetings, and other gatherings. Progress reporting ensures transparency, which has resulted in positive feedback and support from First Nations' leadership. It also provides an opportunity to inform community leaders about what is being done to correct environmental deficiencies so that these initiatives can be replicated.

Future directions

A major determinant of health is a healthy living environment. These First Nations studies suggest that more environmental health research is needed and that future projects should include more emphasis on community participation and more in-depth discussion of strategies for utilizing research results. This requires a communications strategy built on trust so that culturally sensitive information, important for effective dissemination to First Nations communities, AFN regions, and research teams doing similar work can build upon the work that has already been done. Also, increased support is required to allow First Nations to adequately investigate cause and effect (independently, or in partnership with academia). Guidance documents on how to use research results to raise awareness and provide information in a form that improves understanding and stimulates effective and timely decision-making are also needed.

Finally, seeking opportunities to build local capacity to independently conduct and direct research initiatives as well as analyze results in a manner that is meaningful to First Nations needs more emphasis. Research is a powerful tool for initiating change if approached in a manner that is inclusive.

Conclusions

First Nations communities know that their living conditions and health status are inequitable when compared to that of the general Canadian population. These inequalities are especially apparent when it comes to housing, diet, exposure to environmental contaminants, and related health outcomes. With financial assistance from Health Canada, the AFN was ideally placed to participate in the projects described herein. The lessons learned from implementing FNFNES provided opportunities for AFN to develop other initiatives and improve credibility with government sponsors and academic partners. Also, by replicating projects, research methods were strengthened, limited resources were optimized, and results were validated. All three projects provided the information needed to assess the nature and extent of exposure to environmental contaminants from multiple sources that could not have been obtained from one project alone. The

resultant data have provided information to policy analysts for advocating change in government policy. The preliminary activities originating from the results of these projects indicate that participatory methods promote self-reliance and decision-making at the local level, which is a major step toward addressing the issues and improving community health.

This article describes a communications strategy meant to improve environmental health at the community level. This strategy was developed from expressions of need and was initiated during project implementation as a means to optimize limited resources. The long-term impact of this approach is still unknown and will require evaluation. Nevertheless, it was evident that when conducting these projects, the research results must be translated into action plans soon after project completion or they will not be of value to the intended beneficiaries. Participation is more than seeking volunteers, awareness is more than informed consent, and initiating community action is more than holding a meeting; it is a project within a project requiring expertise and added resources. Unfortunately, true participation is an activity most academic research initiatives are reluctant or unable to take on. As a result, establishing viable partnerships with those that are equipped to become involved with the community is recommended as a necessary alternative. We therefore suggest that as a matter of ethics, all community-based projects partner with the stakeholders and include a communications component, not only to explain the project in its cultural context, but also to promote collaboration and explore appropriate ways to carry on the work after the project has terminated.

Finally, if research is being proposed to identify environment health issues and improve the living conditions of vulnerable populations, it must focus on the cause and effect. Although raising awareness about cause and effect is important, it should not be the only outcome. Results must be interpreted and options for corrective actions discussed. Furthermore, PIs should commit to playing a role in guiding any planning exercises that may result from these discussions as well as help secure the resources needed to initiate such an action. If not, the research results will serve only academic interests, and the reports describing these results will likely lay on someone's shelf to gather dust.

Notes

1. Canada's Species at Risk Act (SARA), which was enacted in law on 5 June 2003, proclaimed that the roles of Aboriginal peoples of Canada in the conservation of wildlife in Canada are essential and that "the traditional knowledge of the Aboriginal peoples of Canada should be considered in the assessment of which species may be at risk and in developing and implementing recovery measures." The National Aboriginal Council on Species at Risk (NACOSAR) was established under section 8.1 of the SARA. The Council provides an opportunity to advance Aboriginal perspectives on species at risk issues across the country and provides advice to the federal Minister of Environment on the administration of SARA. Council members represent the Aboriginal Peoples of Canada with representatives from each of the national Aboriginal organizations, The Assembly of First Nations, the Métis National Council, and the Inuit Tapiriit Kanatami. Further information about NACOSAR and its activities can be found at the following website: http://www.nacosar-canep.ca/en/#&panel1-1.
2. This project was originally affiliated with The University of Northern British Columbia. However, in 2012 the Principal Investigator and Project Manager transferred to the University of Ottawa, which is now the coordinating institution for this project.
3. The Housing Unit at the AFN has been involved in the development of the National Strategy to Address Mould and Indoor Air Quality. This strategy has been a collaborative effort by the

Assembly of First Nations, Indian and Northern Affairs Canada (INAC), Canadian Mortgage and Housing Canada (CMHC), and Health Canada to determine a First Nation-driven solution that can be supported by all parties. Also, AFN's Housing unit is involved in a project with the "Holmes Group" called the Atikameksheng Anisnawbek Pilot Project, which is described on the AFN website at: http://www.afn.ca/index.php/en/policy-areas/housing.

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