

Climate change and food security in regional Inuit centers

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Abstract

Food insecurity is a chronic problem affecting many Inuit communities and is likely to predispose Inuit food systems to the negative effects of climate change. Using in-depth case studies, this project will identify and characterize the vulnerability of food systems in four regional Inuit centers (RIC) (Iqaluit, Arviat, Inuvik and Kuujuuak) to climate change as a basis for identifying adaptation entry points. Thus far, the majority of work on this issue has focused on more 'traditional' or isolated northern communities thought to have a larger dependence on country/traditional food items. Largely unexamined, but critically important in the public health context, is the vulnerability of RICs, which is a major research gap given their rapid economic and population growth and increasing size of their food insecure population. The work will specifically focus on the food security of at-risk populations within RICs in a changing climate, defined to include individuals who use community food programs on a regular basis and who by definition experience chronic food insecurity, and also other groups identified as being potentially vulnerable in the scholarship (e.g. females, public housing residents). Limited research to-date has explicitly examined the vulnerability of high-risk populations to climate change in a northern Canadian context. To this end, the objectives of this project are structured around 2 phases. Phase 1 aims to: i). document and describe the nature of food insecurity among at-risk populations in RICs, ii). characterize the environmental, biological and socio-economic determinants of their food insecurity; iii). document coping strategies to manage food insecurity, and iv). examine the pathways through which climate change might affect food insecurity for at-risk peoples in RICs. Phase 2 is focused on policy linkages and aims to identify opportunities and priorities for adaptation intervention to enhance food security among high risk populations in the context of rapid current and future change, working closely with decision makers at multiple levels. The project is working closely with community members, has established partnerships with a number of regional and community organizations, is linking research to policy making at multiple levels, and contributing towards an

enhanced understanding of climate vulnerability in all Inuit regions of Canada.

Key Messages

- Food security is a major policy issue in the north. Interviews with decision makers indicate that the next few years are crucial for linking food security research to policy. This project has been identified as essential herein, the work has contributed to the Nunavut anti-poverty strategy, and results from our work will help inform the Food Security Symposium to be held in Iqaluit in January 2013 and have already been profiled in the IRIS reports.
- Phase 1 of our research is almost complete and has involved >200 in-depth interviews and over 20 focus groups to examine the status, characteristics and determinants of food insecurity among high risk populations in RICs. 2012/13 involved extensive fieldwork in all ArcticNet IRIS regions and collaboration with decision makers at multiple levels.
- Phase 1 work focusing on CFP usage in Iqaluit was published in BMC Public Health (Ford et al., 2012) and Rural and Remote Health (Lardeau et al., 2011), and is profiled in last year's annual report. Phase 1 research focusing on food security of public housing residents in Iqaluit is currently in review at Global Env. Change (Statham et al. in review) and used the extreme sea ice year of 2011/12 to examine links between climatic risks and food security among those with limited household income.
- Phase 1 results from Inuvik (Ford et al., in review, BMC Public Health) indicate that users of CFPs are more likely to report Aboriginal identity, not currently employed, housing insecure, female, lack a high school education, and are middle aged (35-64). Participants are primarily chronic users, and depend on CFPs for regular food access. The work indicates the presence of a chronically food insecure 'underclass' who have

not benefited from the economic development and job opportunities offered in larger regional centers of the Canadian Arctic, and for whom traditional kinship-based food sharing networks have been unable to fully meet their needs. While CFPs do not address the underlying causes of food insecurity, they provide an important stop-gap for communities undergoing rapid change, and need greater focus in food policy herein, consistent with the Iqaluit findings.

- Phase 1 research from Arviat (Beaumier et al., in review, BMC Public Health), has examined gendered dimensions of food security in a changing climate. Here, climate change was not identified to be currently affecting female food security, with socio-economic-cultural factors primary determinants of food insecurity. The nature of the traditional food system based on harvesting land mammals was found to reduce sensitivity to changing sea ice conditions which have been problematic in other Inuit communities. However, dependence on a limited number of animals for diet (primarily caribou, arctic char) increases sensitivity to potential future disruptions caused by climate change to these species and reduces response diversity as a coping mechanism.
- Phase 1 research in Kuujuaq has identified and evaluated key food support mechanisms (those programs supporting the availability of and individuals' access to good, quality, nutritious food). The project has worked closely herein with program managers and the Nunavik Nutrition and Health Committee. Ten food programs have been evaluated, and all performed well, although none were found to supply country foods. Five have yet to be reviewed. The work is ongoing and will complete phase 1 research in 2013/14.
- 15 publications (11 accepted / published; 4 submitted) in 2012/13; 2 MA theses completed; numerous presentations in national and international venues.
- ArcticNet research and collaborations further built upon through other projects.

Objectives

- Document and describe the nature of food insecurity among at-risk populations in the 4 regional Inuit centers, including but not limited to, users of community food programs (CFPs), public housing residents, low income hunters, and Inuit females.
- Characterize the physical, biological and socio-economic determinants of food insecurity: The role of climate risks and current climate change will be assessed drawing upon insights of at-risk populations and stakeholders documented in interviews and focus groups. Analysis of instrumental data (e.g. from ice charts, weather stations) will help characterize the physical nature of climatic risks affecting the food system for at-risk populations in RICs.
- Document adaptive mechanisms being used to manage food insecurity, their determinants, and variation between and within the case study communities.
- Examine the pathways through which climate change might affect food insecurity. Potential future changes in climate stresses that might impact the food system for at-risk populations in RICs will be identified based on an understanding of how climate currently affects their food security.
- Identify opportunities and priorities for adaptation intervention in the context of rapid current and future change. This objective will leverage the work conducted in the case study communities and also build upon a comparative analysis and synthesis of key trends and determinants of vulnerability to food insecurity among at-risk populations across the 4 communities.

Introduction

Food insecurity has been identified as a major challenge facing indigenous communities across

Arctic Canada, where food systems are comprised of both locally sourced traditional foods and store foods (Egeland et al., 2010a; Egeland et al., 2011; Egeland et al., 2010b; Kuhnlein and Receveur, 2007; Kuhnlein et al., 2008; Lambden et al., 2006). For some, the difficulty of accessing sufficient, safe, and nutritious food is a chronic problem, particularly those who do not have an active hunter in the household, have limited access to sharing networks through which traditional foods are distributed, live below the poverty line, and do not have access to permanent shelter (Wesche and Chan, 2010). Historically household and community food sharing networks supplied food to the most vulnerable community members, but in the larger rapidly growing settlements such sharing networks are coming under increased stress, a function of demographics, predominance of livelihoods based on the waged economy, acculturation stresses and colonial legacy, in-migration, and transiency in habitation (Lardeau et al., 2011; Morin et al., 2010; Searles, 2010). Moreover, the larger settlements, while increasingly prosperous, have significant pockets of inequality, characterized by high and persistent unemployment, poverty, and house overcrowding (Knotsch and Kinnon, 2011). For this 'underclass,' food insecurity is typically chronic and manifest in an inability to access traditional or store foods (Lardeau et al., 2011), potentially creating considerable vulnerability to climate change (Ford et al., 2010, 2012).

The food systems scholarship has expanded rapidly over the last decade, and Ford and Beaumier (2011) discern five major research domains. Firstly, there is a long history of food system studies in Arctic communities in anthropology, with research focusing on the role of kinship and food sharing in traditional and contemporary Inuit society. Secondly, the 1990s witnessed a proliferation of biomedical studies with recognition of threat posed by contaminants in traditional foods. This work has documented the prevalence of contaminants in traditional foods, examined associated health implications, and investigated how concerns over contaminants have affected food consumption. Thirdly, a significant body of research has focused on quantitatively assessing the adequacy of nutrient intakes within and across communities and regions (e.g. 24 hour

dietary recall, quantification of nutrient intake). Fourthly, an emerging focus in the Arctic literature, are studies that seek to quantify the prevalence of food insecurity using modified versions of the Radimer/Cornell food questionnaire, examining statistical relationships between food insecurity and respondent characteristics. Finally, there is an emerging literature examining the implications of climate change for Inuit food systems, mostly involving in depth case studies to document impacts and examine vulnerabilities.

Existing research provides a baseline understanding of specific components of food insecurity: anthropological research has helped to unravel the complexities of Inuit sharing and how this determines food access and availability; we have an understanding of the risks posed by contaminants; the nutrition transition is well described; and the magnitude of food insecurity documented. However, despite this progress, there is a shortage of studies characterizing how food security in contemporary Inuit settlements is being affected by the complex interaction of stresses operating over multiple spatial-temporal scales, especially in Regional Inuit Centres (RICs) with their rapidly growing populations. In particular, research to-date has largely examined only specific components of food security (i.e. food quality or food access or food availability), yet food security is a combined property of these components which often interact in complex ways (White et al. 2007b, Ericksen 2008a, Ericksen 2008b, Loring & Gerlach 2009). Furthermore, studies have focused mostly on the traditional food component of the Inuit food system, have typically assessed the role played by individual and localized stresses, with limited research examining how social, cultural, economic, political and biophysical factors and change operating over multiple scales interact with specific places to affect food systems and security (Furgal 2008, Power 2008, Richmond & Ross 2008, Ford 2009). Finally, while high risk groups have been identified in the scholarship, few if any studies have explicitly focused on them, particularly in a climate change context (Ford et al., 2012).

These research gaps – further identified by team member in recently complete systematic reviews (Furgal et

al., 2010, Ford, 2012; Ford et al 2012) – provide the rationale for this project which focuses specifically on the complexity of factors affecting the food security of high risk groups in RICs in light of a rapidly changing climate. The project brings together a diversity of researchers and decision maker collaborators from across the IRIS regions, and is being guided by a consistent approach and methodology permitting a comparative analysis and synthesis of key trends and determinants of vulnerability to food insecurity among at-risk populations. Key themes being explored within this overarching objective include projects targeted at users of community food programs, public housing residents, and Inuit females. Phase 1 research is focused on developing a baseline scientific understanding of food security among high risk groups, while phase 2 will explore opportunities for policy intervention to enhance adaptability.

Activities

1. Iqaluit case study

Scientific publications

- Ford J., Lardeau MP, Vanderbilt W. (2012). The characteristics and experience of community food program users in arctic Canada: a case study from Iqaluit, Nunavut. *BMC Public Health*; 12(1): 464.
- Statham, S. Ford, J. et al. (in review). Anomalous climatic conditions during winter 2010/11 and vulnerability of the traditional Inuit food system in Iqaluit, Nunavut. *Global Env Change*. Submitted MA thesis.
- Statham, S. (2012). Climate change and food security in regional Inuit centers. MA thesis submitted to the dept. of geography, McGill University (supervisor: Dr James Ford).

Presentations

- Lardeau (2012). Responses to Food Insecurity Experiences of users of community based programs in Iqaluit, Nunavut. Oral presentation at IPY 2012 Conference in Montreal:

- Lardeau (2012). Invitation to present the results at The Future of Digital Stories and Health Promotion Planning Meeting in Nanaimo, BC, June 18-19th, focusing on the Photovoice methodology used in our research in Iqaluit, Arviat and Inuvik.
- Lardeau (2012). Invitation to present the results during a one week intensive course on food security as part of the new Micro-Programmes in Veterinary Public Health of the University of Montréal.

Fieldwork

Field trip in February 2012 by Bradley Hiebert, (M.Sc. student, Health Promotion Stream, School of Kinesiology & Health Studies at Queen's University and supervised by Elaine Power, Ph.D) to prepare the 2013 phase of the project which will involve the development of a theoretically informed health promotion intervention and/or evaluation, working closely with the Territorial Nutritionist for the Baffin area of Nunavut, Jennifer Wakegijig. Additionally, in fall 2012 a large survey was conducted in Iqaluit with >500 respondents with food security a key foci (alongside gastrointestinal illness). This survey dovetails into this ArcticNet project and will provide important information in our understanding of the food challenges faced by high risk community members, and was conducted as part of the IHACC project led by Dr Ford.

2. Arviat case study

Scientific publication

- Beaumier, M. Ford, J. et al (in review). What role does climate change play in affecting the food security of Inuit women in the Canadian North: A case study from Arviat, Nunavut. *BMC Public Health*.

Submitted MA thesis

- Beaumier, M. (2012). Vulnerability of Inuit women's food system to climate change in the context of multiple socio-economic stresses

- a case study of Arviat, Nunavut. MA thesis submitted to the dept. of geography, McGill University (supervisor: Dr James Ford).

Presentations

- Beaumier, M (2012). Vulnerability of Inuit women's food system to climate change in the context of multiple socio-economic stresses - a case study of Arviat, Nunavut. Presentation of the results at the IPY 2012 Conference in Montreal, (poster). 1st place winner of Outstanding Poster Award - category: Polar changes: health, society, culture and resources.

3. *Kuujuuaq case study*

Presentations

- Furgal, C., Rajdev, V. and Dickson, D. A Systematic Review of Risk Communication Literature on Contaminants and Health in the Circumpolar North. Poster presentation at ArcticNet 2012, Vancouver, BC.
- McTavish, K., Furgal, C., Popp, S., Rajdev, V. and Jameson, K. (December, 2012). Learning Guides as Knowledge Translation tools for Food Security in Inuit Communities. Poster presentation at ArcticNet 2012, Vancouver, BC.
- Rajdev, V., Furgal, C., Ford, J. and Lardeau, M-P. in cooperation with the Nunavik Nutrition and Health Committee. (April, 2012). Identification of Knowledge and Program Gaps to Support Food Security in Nunavik. Poster presentation at International Polar Year Conference 2012, Montreal, QC.
- McTavish, K., Furgal, C., Popp, S., Rajdev, V. and Jameson, K. (April, 2012). Learning Guides as Knowledge Translation tools for Food Security in Inuit Communities. Poster presentation at International Polar Year Conference 2012, Montreal, QC.

- Furgal, C. and Rajdev, V. (September, 2011). Research to Support Food Security and Obesity Interventions in Nunatsiavut Communities. Presentation to Food Security Network of Newfoundland and Labrador, Happy Valley – Goose Bay, NL.
- Furgal, C. and Rajdev, V. (March, 2011). A Review of Food Support Mechanisms in Nunavik: Contributions to supporting household food security for all. Presentation to Nunavik Nutrition and Health Committee, Kuujuuaq, Nunavik, QC.

Government reports

- Furgal, C., Rajdev, V., Hamilton, S. and Meakin, S. The Status of Knowledge on Food (In) Security in Nunavut: A Systematic Literature Review and Analysis. Prepared for Department of Health and Social Services, Government of Nunavut, Iqaluit, Nunavut.
- Furgal, C., Hamilton, S., Meakin, S. and Rajdev, V., Policy Options and Recommendations for Addressing Food (In)security in Nunavut: Review and analysis of the literature - Technical Document. Prepared for Department of Health and Social Services, Government of Nunavut, Iqaluit, Nunavut.
- Furgal, C., Hamilton, S., Meakin, S. and Rajdev, V., Policy Options and Recommendations for Addressing Food (In)security in Nunavut: Synthesis Document. Prepared for Department of Health and Social Services, Government of Nunavut, Iqaluit, Nunavut.

Fieldwork

Semi-directive interviews were conducted in Kuujuuaq with managers (n=7) of existing food support mechanisms (n=10) identified by key informants in the region and also through a snowball sampling technique with interview participants. Interviews focused on the existing food programs' strengths and

challenges, years of operation, location of operation, goals or mandate, target population, source of funding, needed improvements and the capacity/size of program. Supplementary documentation was gathered and reviewed on these topics related to individual programs. Individually and collectively, the programs were reviewed for their treatment of the critical components of food security (availability, accessibility and quality) as identified by Furgal and Rajdev. Target key programs were identified for evaluation / review with food support program managers and the Nunavik Nutrition and Health Committee and evaluation of program effectiveness is now taking place, looking at the contribution of specific programs to the status of household food security. This is also taking place through an analysis of the Inuit Health Survey in Nunavik, to look at the relationship between food security status and access to foods / use of food support mechanisms.

4- Inuvik case study

Scientific publication

- Ford, J., Lardeau, MP., Kurszewski, D., Blackett, H., Chatwood, S. (in review) Community food program use in Inuvik, Northwest Territories BMC Public Health.

Other publication

- Canadian Society for Circumpolar Health, Gazetteer, Winter/Spring 2012. Inuvik Photovoice Project

Fieldwork

Field work in July 2012 to complete first phase of the research in Inuvik and to review the latest findings with community research partners. Specifically in-depth interviews with key informants were conducted (managers of community food programs and policy makers), and data was collected on usership of community food programs.

5. Overarching

Scientific publications

- Ford, J. (2012). Indigenous health and climate change. *American Journal of Public Health* 102 (7), 1260-1266.
- Chatwood S, Bjerregaard P, Young K. Global Health – A Circumpolar Perspective. *American Journal for Public Health*. 2012 Jul;102(7):1246-9.
- Pearce, T., Ford, J et al (2012). Climate change adaptation planning in remote, resource-dependent communities: an Arctic example. *Regional Environmental Change*, 12, (4) 825-837.

Presentations

- Ford, J. and Statham, S. (2012). Food Security. ArcticNet Eastern Arctic Regional Science Meeting. Iqaluit, November 2012.
- Ford, J. (2012). What we know (and don't know) about climate change and Indigenous health. Invited talk at CIHR's Institute of Aboriginal Peoples Health, May 1st 2012.

Results

In this section we breakdown the results on a community basis and profile the findings of specific sub-projects undertaken by team members where results are available. We only profile here findings developed during 2012/13 research; previous results are reported separately in annual reports from earlier years.

Community food program use in Iqaluit, NU

This sub-project identified and characterized the utilization of community food programs (CFPS) in Iqaluit, Nunavut drawing upon open ended interviews and a fixed-choice survey on a census (n=94) of users

of the food bank, soup kitchen, and friendship centre over a 1 month period, along with key informant interviews. Users of CFPs were found to be more likely to be Inuit, be unemployed, and have not completed high school compared to the general Iqaluit population, while also reporting high dependence on social assistance, low household income, and an absence of hunters in the household. The inability of users to obtain sufficient food must be understood in the context of socio-economic transformations that have affected Inuit society over the last half century as former semi-nomadic hunting groups were resettled into permanent settlements. The resulting livelihood changes profoundly affected how food is produced, processed, distributed, and consumed, and the socio-cultural relationships surrounding such activities. Consequences have included the rising importance of material resources for food access, the weakening of social safety mechanisms through which more vulnerable community members would have traditionally been supported, and acculturative stress. Addressing these broader challenges is essential for food policy, yet CFPs also have an essential role in providing for those who would otherwise have limited food access.

Food security among public housing residents in Iqaluit during climatic extremes in 2010/11

This sub-project examined how climatic extremes during winter 2010/11 affected the traditional food system in Iqaluit, Nunavut, focusing on public housing residents. This winter was anomalous throughout the Canadian Arctic, which manifested locally via warmer temperatures and decreased ice coverage. Drawing upon in-depth interviews with hunters (n=25), a fixed question survey with public housing residents (n=100), as well as analysis of remotely sensed sea-ice charts and temperature data from the Iqaluit weather station, the work identifies and characterizes the extreme climatic conditions experienced during winter 2010/11, their subsequent effects on Iqaluit's traditional food system, and coping strategies used for dealing with food-related stresses. Results show increased environmental stress to the traditional food system

compared to previous years. Ice freeze up occurred 59 days later than the average for the 1982-2010 period, while mean annual temperatures were 4.9C higher than the climatological mean, which negatively impacted hunters' harvests and residents' food supplies. Coping strategies alleviated some stresses, but adaptability was limited for financially insecure households reliant on income support. The study shows that when challenging socioeconomic conditions, such as those associated with public housing, are coupled with significant environmental stress, such as experienced during winter 2010/11, the vulnerability of the traditional food system is exacerbated. We suggest that winter 2010/11 can be used as an analogue for exploring future food system vulnerabilities, with climate models projecting similar conditions in the coming decades.

Climate change and food security among Inuit females in Arviat, NU

This sub-project employed a community based participatory research approach involving semi-structured interviews with Inuit women (n=42), 10 focus groups (n=40), key informant interviews (n=8), and participant observation, to identify and characterize the determinants of food security among Inuit females in the community of Arviat, and examine the role played by climate and climate change. Climate change was not identified to be currently affecting female food security, with socio-economic-cultural factors primary determinants of food insecurity. The nature of the traditional food system based on harvesting land mammals was found to reduce sensitivity to changing sea ice conditions which have been problematic in other Inuit communities. However, dependence on a limited number of animals for diet (primarily caribou, arctic char) increases sensitivity to potential future disruptions caused by climate change to these species and reduces response diversity as a coping mechanism.

Community food program use in Inuvik, NWT

This sub-project identified and characterized who

is using community food programs (CFP) and why in Inuvik, NWT, examining the experiences of users, comparing the results with a similar study conducted in Iqaluit to begin to develop an Arctic-wide understanding of CFP use. The work used Photovoice workshops, a modified USDA food security survey and open ended interviews with CFP users in Inuvik, documenting CFP users to be more likely to be housing insecure, female, middle aged (35-64), unemployed, Aboriginal, and lacking a high school education. Participants are primarily chronic users, and depend on CFPs for regular food access. The work indicates the presence of chronically food insecure groups who have not benefited from the economic development and job opportunities offered in larger regional centers of the Canadian Arctic, and for whom traditional kinship-based food sharing networks have been unable to fully meet their dietary needs. While CFPs do not address the underlying causes of food insecurity, they provide an important service for communities undergoing rapid change, and need greater focus in food policy herein.

Community food support mechanisms in Kuujuaq

A total of 15 currently operating food support mechanisms were identified of which 10 have been reviewed and analyzed to date. Some initiatives designed to increase cultural or commercial hunts in the region are potentially important contributors to this network of programs supporting food security. No one program however, addresses all aspects of food security for its target population but rather programs are oriented on addressing specific pressures on food security. All programs appear to be meeting their specified goals, although few focus on addressing food security issues through the provision of country foods, while most are oriented at provision of access to nutritious store food items. Reporting to the Nunavik Nutrition and Health Committee on these results continued and consultation was conducted to identify key support programs on which to do focused program evaluation. In 2012-13, community freezers and food

stamp programs were identified as target programs to review in greater detail in terms of their support for food security and this review has now begun with the development of evaluation protocol and acquisition of the Nunavik Inuit Health Survey data for analysis of relationship between food security status (as measured in Nunavik) direct and indirect indications of access to specific food programs. Community freezers in Kuujuaq and other Nunavik communities are being examined for their relationship with household food security status and qualitatively for their contribution to access to country foods in the region via an analysis of the Inuit Health Survey data.

Discussion

In this section, we discuss some of the findings emerging from the various subprojects.

Community food program usage: emergent findings from Inuvik and Iqaluit

The results of the two subprojects focusing on community food program usage in Iqaluit and Inuvik – interesting in their own right – are most interesting and insightful when compared and can help us begin to sketch out a broad profile of who is using CFPs in the North, how often, why, and how this use is changing over time, along with identifying community specific characteristics. Both Iqaluit and Inuvik are gateway communities to the regions in which they are located, provide important administrative functions, have large Aboriginal populations (~60% in both locations), combine a waged economy with elements of traditional livelihoods, and are undergoing rapid changes in livelihoods and economy linked to resource development and integration into national / global economies. They also differ in terms of population size, Aboriginal groups represented, and characteristics of the local environment. Comparing the results from both communities, six findings are of particular interest.

Firstly, chronic use of CFPs was widely reported by participants in both Iqaluit and Inuvik, the majority of who report using at least one of the food programs once a month or more. For many, CFPs are the only reliable source of food, with users housing insecure and lacking regular employment. These characteristics are broadly consistent with CFP users in southern Canada, although in Inuvik and Iqaluit the clientele tends to be middle aged, have less education, and are primarily Aboriginal (Starkey et al., 1998). It is noteworthy that in both communities very few people ≥ 65 years of age were observed using the CFPs. This is consistent with qualitative research on Arctic food systems, with supplying elders with food, particularly TF, highly valued (Collings et al., 1998; Ford, 2009b; Ford and Beaumier, 2011). The predominance of middle-aged users, particularly those in their 50s, could also be linked to the past experience of residential schools and associated trauma in this age group (Richmond and Ross, 2009), while food programs targeting the general population typically focuses on children (e.g. breakfast programs) and pregnant women (e.g. Canada Prenatal Nutrition Program), and often overlook those who are middle aged.

Secondly, users frequently linked challenges they faced in obtaining sufficient food to addictive behavior and an inability to hold down a job – an observation made in other food security studies in northern communities (Beaumier and Ford, 2010; Lardeau et al., 2011; Power, 2008). In Inuvik, like Iqaluit, the primary Aboriginal clientele of CFPs have witnessed significant acculturative stresses over the past half century associated with relocation from smaller settlements and semi-permanent hunting camps beginning in the mid-1950s, collapse of livelihoods dependent on the fur trade, environmental dispossession, and associated and often forced cultural assimilation (e.g. through residential schools). Such context frames many challenges facing Canada's northern Aboriginal populations and are described in detail elsewhere (Damas, 2002; Richmond, 2009; Richmond and Ross, 2008, 2009; Smylie et al., 2006; Smylie and Anderson, 2006; Tester, 2009). While we

didn't investigate issues of abuse, criminal history, addiction and their socio-cultural context in-depth due to the sensitive nature of these questions and preliminary nature of the research, our observations and key informant interviews indicate these challenges to widely experienced among CFP users, and emphasizes the need for food policy to be more broadly integrated into wellness initiatives.

Thirdly, while the role of traditional foods differentiates the experience of northern CFP users from those in southern Canada, for many participants in Inuvik and Iqaluit such foods were inconsistently and unpredictably available, and not typically procured by users themselves but sourced from sharing networks. Approximately two thirds of CFP users in both communities reported having access to sharing networks for traditional foods (TFs), yet it was frequently noted that TF access was irregular, infrequent, and in many cases becoming more challenging as the number of full-time hunters decreases, costs of hunting increase, and with disruption caused by climate change. Even participants with a hunter in the household were not more likely to report having greater access to TF, likely a function of cost constraints which make hunting difficult for those without access to financial resources. As such, the experience of CFP users differs from that of northern populations in general, where Huet et al (Huet et al., 2012), reporting on results from the Inuit Health Survey, find that the presence of a hunter in the household acts as a significant buffer to food insecurity.

Fourthly, participants in both communities reported utilizing a similar bundle of coping mechanisms to deal with the challenge of obtaining sufficient food. Over 40% of participants in both communities reported selling household items to access food, and over half of respondents in Iqaluit reported sending household members to eat elsewhere when food was hard to obtain (compared to 28% in Inuvik).

Fifthly, in both communities, CFPs are widely depended upon by users and act as essential services,

particularly in-light of the rapid transitions in food systems being experienced in the larger Canadian Arctic communities which are stressing the traditional and store food components of the food system (Ford, 2009b; Ford and Beaumier, 2011; Ford and Berrang-Ford, 2009; Hopping et al., 2010a; Hopping et al., 2010b). CFPs have emerged over the last decade in response to these challenges, and are a recent development in the North, where historically those in-need were supported through household and family kinship networks in smaller more homogeneous communities than today. Users are therefore highly vulnerable to disruptions to CFP operations. For instance, the Inuvik food bank was vandalized in early September 2012, only re-opening in October, and significantly limited options for those without regular food access.

Finally, the characteristics of CFP clientele also differ in key respects. Users in Iqaluit reported more frequent and severe experiences of food insecurity. This likely reflects the higher degree of unemployment among Iqaluit participants and higher costs of living in the community, with other studies reporting greater prevalence of food insecurity and other indicators of socio-economic hardship in Nunavut compared to other northern regions (Egeland, 2011; Findlay and Janz, 2012; Minich et al., 2011; Rosol et al., 2011). It is noteworthy however, that homelessness was more frequently noted among Inuvik participants.

These findings have particular relevance in-light of increased attention to food policy in the Arctic, and especially given the recent report of the United Nations Special Rapporteur on the Right to Food who noted the need for Canada to develop a national Right to Food strategy after his visit to the North in May 2012 (De Shutter, 2012). A number of initiatives seek to address food insecurity including the recently revamped food mail program (Nutrition North), which provides a retail subsidy that has received much attention since implementation in the last year and required adjustments in the early implementation. Adjustments in recent months demonstrate the complexities of implementing policy to support food security in remote northern communities, and need for ongoing and proactive policy

research in this area. The other policy areas of interest are those not specifically food related, but have direct impacts on food availability, specifically policy related to wildlife management, such as bans and restrictions to caribou hunting. Wildlife management and policy in the Northwest Territories is developed under co-management boards, a proactive model that recognizes the jurisdiction of land claim and self-government agreements in the Northwest Territories. CFPs have been largely invisible in policy debate on food security across the North, yet their chronic use suggests that they are more than just a stop-gap measure, providing an essential community service for vulnerable populations. While the rapid economic development being experienced in northern Canada associated with resource development may help alleviate some of the negative socio-economic conditions underlying an inability to access food, the food security challenge goes beyond financial constraints, linked to acculturative stress, historical trauma, and changing socio-cultural systems. CFP users are among the most affected by these broader stresses, and least positioned to benefit from new economic openings, with a need for broad-level policies focusing on overall-health and well-being, and targeting the root causes of vulnerability. CFPs don't address these root causes, although they do provide social networks and sense of well-being for users, and can form part of broader programming.

The importance of TFs has been widely promoted in northern food policy, offering a nutritionally and culturally important source of food. Research, for instance, indicates better overall health and lower food insecurity among those with high TF consumption (Egeland et al., 2011b; Huet et al., 2012; Rosol et al., 2011). Yet while CFP users value TFs and recognize their importance, access is limited. As respondents noted in the study here and Iqaluit, health messages focusing on TF consumption are of little value to those who do not have access to these food and are at times a source of frustration. Therefore, efforts to provide TF through CFPs was frequently noted by participants to be important, along with training for younger generations on how to work with traditional foods.

As was learned during this study, CFPs that do not receive government funding must look to other sources to support their services. The food bank is almost entirely funded through bingo games in the community, which were identified during the Photovoice discussions as being a means through which community members spend their money and become vulnerable to food insecurity. The cycle of poverty continues for these community members and questions the use of such initiatives as a means of supporting CFPs.

Food security among public housing residents in Iqaluit during climatic extremes in 2011/12

This sub-project shows that Iqaluit's traditional food system is sensitive to extreme climatic conditions. However, while the biophysical environment is an important determinant of food security, the implications of the 2010/11 extremes depended as much on socio-economic factors as the nature of the climatic-related stressors, and reflected in the fact that not all hunters or public housing residents were equally affected. Poverty, in particular, and social issues that accompany it including unemployment, mental health issues, addiction, and homelessness, were widely reported to be factor constraining the ability to manage challenges to food access and availability in winter 2010/11. The most commonly used measure of poverty is participation in the income support program (Nunavut Roundtable for Poverty Reduction, 2011), and using this definition 35% of public housing residents are impoverished. Although Iqaluit is increasingly prosperous as the capital of one of Canada's fastest expanding regions, there is pronounced inequality in income, employment opportunities, and health outcomes (Canada, 2011; Ford et al., in review; Searles, 2010).

The future of the traditional food system in Iqaluit remains unclear. Currently, Iqaluit's traditional food system is unique compared to that of smaller Arctic communities with a larger proportion of non-Inuit living in the community, relatively fewer people reliant on country food, and a large percentage of new arrivals living in poverty. Additionally, the trend of

increasing preference toward store food may cause the reliance on country food to further decrease. This shift away from traditional foods will have varying effects on the vulnerability of the traditional food system. In one sense, decreased demand would allow those who do engage in the traditional food system to obtain more country food. On the other hand, decreased participation in the traditional food system would contribute to its deterioration. Iqaluit is also more conducive to sending country food to and receiving country food from other communities due to its well-developed transportation network as a hub for Nunavut and links to the south. As such, it is becoming rapidly integrated into a territorial-wide network of both inter-community sharing (via cargo shipping) and inter-community purchasing (via social media). Iqaluit's rapidly increasing population will also place localized pressure on wildlife. Therefore, it is likely that country food obtained from non-local sources will become increasingly incorporated into Iqaluit's traditional food system. If the traditional food system becomes increasingly interconnected, its vulnerability will become more complex as well, moderated by a decrease in pressures on local wildlife and hunters, but it may increase due to reliance on outsourced supplies.

When examining winter 2010/11, food system vulnerability was not as pronounced as we anticipated when beginning the study, although issues of food security amongst public housing residents were still significant. While exposure was extreme, adaptive capacity was displayed by hunters for dealing with environmental stresses and residents for dealing with food-related stresses. Many of the coping mechanisms used were not unique to winter 2010/11, although the augmented stress to the traditional food system likely contributed to the increased use of them. It is hoped that the experience of this extreme climatic event may provide some adaptive knowledge for the future, developing experience with stress which has been identified as an important component of adaptive capacity in multiple contexts (Berkes and Jolly, 2002; Berrang-Ford et al., 2011; Davidson-Hunt and Berkes, 2003; Fazey et al., 2007; Penning-Rowsell et al., 2006; Sayles and Mulrennan, 2010). It can also be argued that broader socioeconomic conditions were more

pressing than environmental conditions in terms of food security determinants amongst those living in public housing. Overall, extreme climatic conditions indeed exacerbated the vulnerability of the traditional food system, but this was primarily due to its coupling with broader socioeconomic conditions.

As a continuation of climatic change is predicted for the future and associated environmental stresses are expected to have an increasingly prevalent impact on the traditional food system. Winter 2010/11 provided valuable insight as to how future climatic conditions might influence food security in Iqaluit, with conditions similar to those projected mid-century (Dumas et al., 2006). While the adaptive capacity of Inuit should not be underestimated, the underlying socioeconomic determinants of food security must be addressed as the rapidly changing environment exacerbates this already stressed traditional food system. This paper provides a snapshot of the vulnerability and adaptability of Iqaluit's traditional food system to climatic extremes during winter 2010/11. The work is not intended to be a representative baseline of food security in general, as this year was climatically anomalous. Instead, it provides a lens for exploring food system vulnerability and its determinants in the context of an extreme year, recognizing that these environmental influences may become increasingly common with future climate change.

Climate change and food security among Inuit females in Arviat, NU

This subproject was initiated with the community of Arviat to examine the current implications of climate change on the female food system. What emerged however was the predominance of multiple human and historical factors in affecting food security, with women single parents being particularly at risk of being food insecure. Other studies looking at the vulnerability of Arctic food system's to climate change have also noted the importance of non-climatic factors in determining female food insecurity (Ford 2009, Goldar and Ford 2010, Beaumier and Ford 2010). Yet,

given the rapid changes in climate observed in Arviat and indeed the Canadian Arctic more generally, this was surprising and contrasts with findings from other small Inuit communities in the North (Chan et al., 2006; Wesche and Chan, 2010; Ford and Beaumier, 2010; others too)(Beaumier and Ford, 2010; Ford and Beaumier, 2011; Nancarrow and Chan, 2010; Pufall et al., 2011).

The research suggests that the Arviat food system is not currently as sensitive as other Inuit communities to climatic risks due to the nature of harvesting activities (i.e. primarily land-based). Inuit living in Arviat originate from different groups of Inuit, the majority of who were inland people named Caribou Eskimo by the Fifth Thule Expedition (1921-1924), who were highly reliant on caribou (Arima, 1984; Birket-Smith, 1976; Rasmussen, 1926). Seals were only harvested during spring and summer by about one quarter of Caribou Inuit (Birket-Smith, 1976). Still today, the majority of harvesting is secured by land and freshwater species – caribou and char being the main animals hunted (Priest and Usher, 2004). Arviarmiut do not regularly use the ice as a hunting platform and are therefore not as sensitive to changes in sea ice as the majority of Inuit communities of Nunavut, where the hunting activities of many communities have been disrupted and where the climate change signal has been most pronounced (Ford et al., In Press; Ford et al., In press; Ford, 2009a; Laidler, 2006; Laidler et al., 2009). Notwithstanding, the limited diversity of animals consumed by women in Arviat, increases sensitivity to disruptions in these species. Young women in particular, who have not developed the taste for a variety of country foods, rely heavily on caribou and arctic char as a country food source, and if these species were to be disrupted by climate change, their capacity to adapt through species switching would be limited; an important coping mechanisms during times of stress observed in other communities (Ford et al., 2010).

The current global vulnerability of *Rangifer tarandus* to climate warming and landscape change (Vors and Boyce, 2009) and population decline of caribou herds surrounding the Qamanirjuaq herd (Gill, 2010; Russell,

2010) suggest that the herd harvested by Arviarmiut may not be exempt from the effects of climate change in the future. This study shows that when caribou is not available, most women increase their consumption of store food items of lower nutritional value. Choice of food alternatives is influenced by several socio-economic and historical factors previously described and the access to adaption strategy is not equal among all women, with single women parents being economically disadvantaged. The cost of switching to store foods may be high for some families as the replacement of country food with store food have been shown to negatively impact household economic sustainability (Myers et al., 2005) and overall health (Egeland et al., 2011a; Johnson et al., 2009; Kuhnlein et al., 2004). The community has initiated the Kitchen Cooking Program to improve women's capacity to use different kinds of country foods readily available around the community, such as fox and hare, to cook modern and traditional meals. The program was successful with considerable improvement in the diet of women participants and their families but was terminated due to lack of funding.

Community food programs in Kuujjuaq

Collectively, there are gaps among the network of programs in addressing issues to ensure access to a diversity of foods, ensuring political and social accessibility and biological and cultural safety of foods available. The majority of food support mechanisms in operation today use store food access as the means through which to address food insecurity issues in the population. Income plays a significant role in getting access to enough nutritional food in Nunavik, based on the existence of programs' focus to address this issue. Greater information must be gathered to evaluate the success of any one program in adequately addressing it's goals and its' contribution to the larger picture of food security in the region as user's perspectives and objective metrics of program success were not included in this analysis. Methods for the evaluation of food support programs (including an analysis of the contribution of community freezers in Nunavik to household food security status is now being developed

and conducted in 2013-14) are being developed and implemented to look at the associations between accessing support mechanisms and household food security status for use in Kuujjuaq and transferable to other communities.

Conclusion

The issue of food security is now firmly on the policy agenda across Canada's Inuit regions, and decision makers have identified the importance and need for research to help inform policy. This ArcticNet project is working closely with Regional Inuit Centres (RICs), decision makers at multiple levels, and scientists to examine the food security challenges faced by segments of the populations believed to be at highest risk, yet neglected in previous research. The first phase of this work has focused on identifying and characterizing the nature of food insecurity among at-risk populations in RICs, determining factors, and coping mechanisms. Through sub-projects conducted in 4 communities straddling the IRIS regions – and working with users of community food programs, public housing residents, and Inuit females – we have begun to develop a rigorous knowledge base integrating insights from Inuit Knowledge, and the social, physical and health sciences. This is evident in 15 publications, 2 master's theses, and graduated master's students who are now in decision making roles (e.g. Sara Statham is now food security coordinator for Nunavut, Maude Beaumier is a consultant at Genivar). Perhaps a greater indication of success however, is the use of our work by decision makers at multiple levels: the Iqaluit research for instance, has already contributed to the Nunavut anti-poverty strategy and results from our work are helping to inform the Food Security Symposium to be held in Iqaluit in January 2013, the Kuujjuaq work has informed the Nunavik Nutrition and Health Committee on food programming offered in the region, while team members have led training sessions on the community based participatory research process employed in the project to audiences across Canada. Next steps in 2013/14 will include working towards

completing the research components of phase 1, and further developing the comparative analysis between communities initiated in 2012/13. We will also move towards phase 2 of the project, examining opportunities and priorities for adaptation intervention to enhance food security among high risk populations in RICs in the context of rapid current and future change, working closely with decision makers at multiple levels.

Publications

(All ArcticNet refereed publications are available on the ASTIS website (<http://www.aina.ucalgary.ca/arcticnet/>)).

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