Understanding the role of environment for Indigenous health:

A case study of sea ice as a place of health and risk in the Inuit community of Nain, Nunatsiavut

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ABSTRACT

Understanding the role of environment for Indigenous health: A case study of sea ice as a place of health and risk in the Inuit community of Nain, Nunatsiavut

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Inuit health and the environment are intimately connected, but gaps in our knowledge of how the environment acts as a complex determinant and place of health remain. Addressing these gaps is urgent as environmental change is already influencing environment-health interactions. This thesis uses a collaborative case study in the community of Nain, Nunatsiavut to explore the relationship between sea ice and health. Focus groups, search and rescue document review, interviews, and participant observation were conducted between July 2010 and May 2011. Results demonstrate ways that the environment acts as a determinant of physical (injury/trauma) and mental/social/cultural health; intersections between environment and other determinants of health; role of place-meanings and environmental risk perspectives in shaping exposures and risk management strategies; and the influence of current environmental changes on health. These results deepen our understanding of the relationship between environment, place, risk, and health in an Indigenous context.

ACKNOWLEDGEMENTS

This thesis is dedicated to all Inuit who move on the sea ice, following the routes and going to the places of generations past. May the sea ice continue to mean health and freedom for generations to come.

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LIST OF ABBREVIATIONS

AANDC	Aboriginal Affairs and Northern Development Canada (formerly INAC)
ACIA	Arctic Climate Impact Assessment
ACPH	Federal, Provincial, and Territorial Advisory Committee on Population Health
CCG	Canadian Coast Guard
CCGA	Canadian Coast Guard Auxiliary
CF	Canadian Forces
CIHR	Canadian Institutes of Health Research
DFO	Fisheries and Oceans Canada
DND	Department of National Defence
DHSD	Nunatsiavut Government Department of Health and Social Development
DLNR	Nunatsiavut Government Department of Lands and Natural Resources
GNWT	Government of Northwest Territories
GPS	Global Positioning System
ICC	Inuit Circumpolar Council
ICC-C	Inuit Circumpolar Council – Canada
INAC	Indian and Northern Affairs Canada
IPCC	Intergovernmental Panel on Climate Change
ITK	Inuit Tapiriit Kanatami
JRCC	Joint Rescue Coordination Centre(s)
LIA	Labrador Inuit Association (precursor to NG)
LILCA	Labrador Inuit Land Claim Agreement
LISA	Labrador Inuit Settlement Area
NAHO	National Aboriginal Health Organization
NCP	Northern Contaminants Program
NG	Nunatsiavut Government
NGRAC	Nunatsiavut Government Research Advisory Committee
NGSAR	Nain Ground Search and Rescue
NSERC	Natural Sciences and Engineering Research Council of Canada
NWT	Northwest Territories
PHAC	Public Health Agency of Canada
POP	Persistent Organic Pollutant
RCAP	Royal Commission on Aboriginal Peoples
RCMP	Royal Canadian Mounted Police
REB	Trent University Research Ethics Board
SAR	Search and rescue
SSHRC	Social Sciences and Humanities Research Council of Canada
WHO	World Health Organization

1 INTRODUCTION

1.1 Overview of project purpose

> Right now my health is not good, because the sea ice is taking too long...And now it's November and hopefully the sea ice will come next month and that makes it much more easier for me to live...I can't wait to go on to sea ice and take off. It's freedom, it's freedom, it's my life, it makes me – it makes me to be alive. I know that if I don't go on the sea ice, and the ice is there, it would be stupid, it would make me crazy, it would – I would die, I honestly would die. It's my way of breathing, just knowing that I'm going to be going off on the land...(MD)

As captured in the emphatic words of one participant from this study, sea ice is key element of the environment for Inuit, making critical contributions to nutrition, mental/social/cultural health, and livelihoods (Furgal and Seguin, 2006; Tremblay et al., 2006; Van Oostdam et al., 2005). The significant health implications of modification of the Arctic environment by climate change (Anisimov et al., 2007; Berner et al., 2005; Furgal, 2008), and already disproportionately high unintentional injury and trauma rates in Canadian Arctic communities (ITK, 2010), have created an urgency around investigating health influences of Inuit sea ice use. Propelled by these health needs and community interest in addressing them, the main objective of this community-based participatory thesis is to examine the relationship between individual and community health and sea ice use for Inuit and Kablunângajuit[1] in the community of Nain in northern Labrador, Canada (Fig. 1.1), and the implications of this relationship. This thesis is not just about sea ice itself, however; as an important element of the environment for Inuit, sea ice forms the context for an exploration of the complex and nuanced relationships between Indigenous health, risk, and place, which is the core contribution of this thesis.

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[1] Settlers or individuals of mixed settler-Inuit descent; translation from Inuttitut is "resembling a white person" (Natcher et al., 2012: 3)
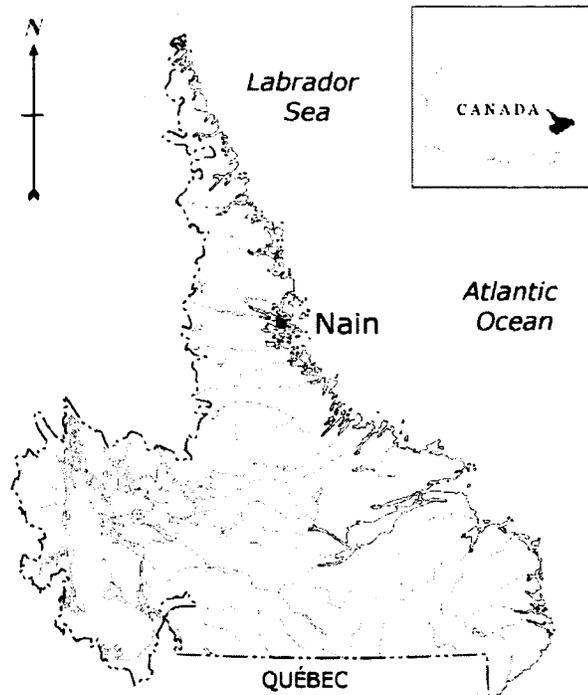
Figure 1.1. Location of Nain in Labrador, Canada (adapted from Natural Resources Canada, 2002)

1.2 Research question and objectives

This thesis explored the central questions: i) what is the relationship between using sea ice and health in the Inuit community of Nain; and ii) what are the implications of this relationship?

To address these main questions, I identified five objectives to guide this inquiry:

1. Examine the role of environmental and other factors in search and rescue incidents;

2. Explore perspectives of sea ice users on the influences of using sea ice on health;

3. Investigate determinants of differing experiences of and perspectives on health benefits and impacts related to sea ice use;

4. Explore risk perspectives of sea ice users related to sea ice travel;

5. Explore the factors influencing risk-benefit management for safe sea ice use.

Ethics approval for this community-based research was granted by Trent University's Research Ethics Board on June 29, 2010 (Appendix 11.1), and by Nunatsiavut Government Research Advisory Committee on July 14, 2010 (Appendix 11.2). The Nunatsiavut Government Division of Environment in the Department of Lands and Natural Resources endorsed this project and was a project partner (Appendix 11.3), and Nain Ground Search and Rescue was also a collaborator, as part of the community-based and participatory approach of this thesis.

1.3 Contextualizing the exploration of Indigenous health-environment connections

Investigating the relationship between humans and the environment has occupied scholars in myriad disciplines – philosophy, anthropology, geography, environmental sociology, political economy, and political ecology among them – for decades. As exploitation of resources has pushed society up against environmental limits in the last half-century and precipitated differential impacts for different groups, in different places, scholarly interest in human-environment relationships has intensified and produced a diversity of approaches to investigating these relationships (Cudworth, 2003). These investigations form the theoretical context for research on the links between health and environment. Conventional health thinking within epidemiology in the last century employed a biomedical model of disease, and postmodern and structural critiques precipitated the transformation of this approach into one that considers how social, economic, environmental, and personal factors interact to produce health or illness

(Carson et al., 2007). Today, social epidemiology and social determinants of health approaches demonstrate the importance of societal conditions and processes for health (Krieger, 2001a). These same critiques also transformed other disciplines concerned with health-environment relationships. For instance, health geography evolved from focusing predominantly on the spatial distribution of disease to employing a socio-ecological model of health (Mohan, 2000; Rosenberg and Wilson, 2005). Work within this sub-discipline has established the importance of 'place' to health as a zone of meaning constructed through the interactions between people and the social, cultural, and physical environments (Mohan, 2000; Rosenberg and Wilson, 2005). Underlying these disciplinary developments, and foundational to this study, is the premise that 'health' and 'environment' are not universal or neutral categories – they are mediated through the material and constructed, interpreted, and idealized in a variety of ways (Adelson, 2000; Blaikie, 1996; Escobar, 1996; Latour, 1999).

The recognition of the contested and value-laden constructions of environment and health, together with the recognition of the importance of environment to health, are critical starting points for understanding Indigenous health-environment relationships, specifically. As with other populations, health and environment relationships are culturally-embedded and historically-situated for Indigenous peoples. However, the meanings of the categories of health and environment differ from other populations because of the roots of these relationships in Indigenous epistemologies (Parlee et al., 2007; Wilson, 2003). As outlined in the Report of the Royal Commission on Aboriginal Peoples (RCAP) (1999), health and wellbeing for Indigenous or Aboriginal peoples in Canada – comprising of First Nations, Inuit, and Métis peoples – are contingent on

maintaining balanced and reciprocal relationships between all elements of the natural world. However, each of these Aboriginal groups is distinct, with its own culture, history, and worldview, and therefore view of health. First Nations are members of the cultural group recognized as 'Indian' by the government of Canada; Inuit are Aboriginal people of Arctic Canada; and Métis are people of mixed European and First Nations ancestry who form a cultural group distinct from other Aboriginal or non-Aboriginal peoples (AANDC, 2010). Scholars of First Nations epistemologies and American Indian (equivalent of First Nations in U.S.) epistemologies have described how sustenance, identity, and community all begin with a relationship with the land (Akiwenzie-Damm, 1996; Haudenosaunee Environmental Task Force, 1999). Deloria (1999) explains that, "Indians do not talk about nature as some kind of concept 'out there'...They do not embrace all trees or love all rivers and mountains. What is important is the relationship you have with a particular tree or a particular mountain" (223). In this way, orientation to a place is the basis for understanding relatedness in a First Nations context (Cajete, 1999).

The strong link between health and environment for Inuit has also been identified in numerous writings (Freeman, 1976; Krupnik et al., 2010; Richmond and Ross, 2009; Pelly, 2001; Pufall et al., 2011), but there is not the same written body of work on Inuit conceptions of health as there is for First Nations in Canada. The Inuit Centre (Inuit Tuttarvingat) of the National Aboriginal Health Organization (NAHO) describes how the health of Inuit is linked to the health of the environment in which they live, because of the close connection Inuit have with the land and dependence on land-based resources for food and shelter (NAHO, 2011). Some scholars have investigated the relationship

between hunting and consuming wild foods, cultural identity, and wellbeing for Inuit (Borré, 1991; Condon et al., 1995; Pufall et al., 2011; Searles, 2002). Overall, however, the minimal work on understanding the conceptions of health and environment for Inuit as a basis for investigating health-environment interactions forms a major gap in the literature. Developing a nuanced understanding of the connections between health and environment in an Inuit context makes an important contribution to the Indigenous environmental health literature and literature on the environment as a determinant and place of health. Adding urgency to the investigation of Inuit health-environment connections is the context of climate change and modification of the environment on which Inuit depend.

1.4 Investigating sea ice as a case example of Inuit health-environment relationships

Sea ice forms a nexus for myriad intersectional process, as recent environmental changes are affecting Inuit sea ice use with possible health implications, and social, political, and economic processes have also influenced Inuit communities and their relationships with the local environment. The context of these changes is that sea ice forms a critical element of the Arctic environment for Inuit, as networks of sea ice routes allow Inuit to access wildlife species, which are important to Inuit diets and livelihoods (Riewe, 1991; Furgal and Seguin, 2006; Van Oostdam et al., 2005), and sea ice is used for travel to and through places that are imbued with cultural and emotional significance (Aporta, 2004, 2009; Henshaw, 2006).

At the same time, negative physical health impacts can be sustained through experiences such as cold exposure or falling through the ice (Berner et al., 2005; Furgal,

2008). The current public health context of injuries from sea ice travel is that mortality and morbidity rates from unintentional injuries are disproportionately high in Inuit regions. From 1999 to 2003, the age-standardized mortality rate from unintentional injuries was 4.3 times higher among Inuit residing in Inuit Nunangat[2] than Canada as a whole (ITK, 2010). As an understanding of injury epidemiology for Inuit populations in Canada is limited (GNWT, 2004; Légaré, 2007; Young, 2003), the role of land-based activities in contributing to these injuries is not well understood. However, reducing unintentional injuries and drownings related to poor ice conditions has been identified as an important strategy for addressing the disparity in injury rates between Inuit and non-Inuit Canadians (GNWT, 2007; Pauktuutit Inuit Women of Canada, 2010).

Processes of colonization and assimilation have had innumerable impacts on Inuit-environment relationships, including the use of sea ice. Processes of colonization and assimilation have impacted all traditional Inuit ways of living and knowing, including where and how people inhabit places, social networks, non-monetary economic systems and modes of production, educational systems, medical and healing practices, and Inuktitut language use (Pearce et al., 2011; Richmond and Ross, 2009; Tester and McNicoll, 2006; Thibeault, 2002; Timpson, 2009). Among these impacts are disruptions in the intergenerational transfer of travel knowledge and changes to access to and use of the sea ice environment (Ford et al., 2006b, 2009; Pearce et al., 2011). Processes of self-determination and self-government also support cultural revitalization and the adaptation or subversion of Western structures and constructs to benefit Inuit sea ice use, through initiatives such as hunter support programs and land-skills training camps, and innovative

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[2] Inuit lands in Canada comprising of the Inuit land claim regions of Nunavik, Nunatsiavut, Nunavut, and the Inuvialuit Settlement Region

use of new technologies and mapping applications (Aporta et al., 2005; Gearheard et al., 2011; Gombay, 2009; Takano, 2005). Despite these strengths and adaptations by Inuit, processes of colonization and assimilation have contributed to poor health outcomes among Inuit in Canada resulting in egregious health disparities between Inuit and non-Inuit populations (ITK, 2007; Waldram et al., 2006), which are connected to the high injury rates described above. These processes form a context of social change that differential health outcomes need to be considered within, and also form the context for a more recent phenomena influencing Inuit sea ice use; that of climatic change.

Changes in the environment itself due to global climate change are having influences on Inuit sea ice use, with possible health implications. A substantive body of literature has documented changing sea ice conditions in the Canadian Arctic. These include such changes as shifts in annual freeze and thaw timing, the extent of sea ice cover, and ice strength and stability (ACIA, 2005; Gearheard et al., 2006; IPCC, 2007; Nickels et al., 2006; Tremblay et al., 2006). Communities across the Canadian Arctic have been reporting that these changes are leading to increasing unintentional injuries and stress, and impacting their ability to predict conditions (Ford et al., 2008a, 2009; Furgal et al., 2002; Gearheard, 2006; Nickels et al., 2006). Changes in ice conditions have also been documented to affect the availability of and access to wild food resources, with implications for nutrition as well as socio-cultural health (Ford, 2008; Ford et al., 2006b; Furgal, 2008; Furgal et al., 2002; Nickels et al., 2006). At the same time, health impacts from climate change are not uniform across or within Inuit communities, as localized changes in environmental conditions can interact with other determinants of health and land use practices of individuals and produce a range of differentiated health outcomes

(Furgal, 2008). This complexity is a concern in that changing environmental conditions could affect who is able to access benefits and who experiences higher health impacts from travel on sea ice, as well as the extent and form of the impacts and benefits. In this way, environmental change can potentially exacerbate existing health disparities within communities.

1.5 Gaps in the literature

In the literature on Inuit health and sea ice use, the most critical limitation is at the realm of theory. The majority of recent literature on Inuit-sea ice interactions has investigated Inuit vulnerability or resilience to sea ice hazards in the context of climate change (Berkes and Jolly, 2002; DeSantis, 2008; Ford et al., 2008a, 2009; Laidler et al., 2009; Nichols et al., 2004). Such research has made important contributions to understanding human impacts of changes in sea ice. However, the predominance of a narrow range of theoretical orientations (i.e., climate change vulnerability approaches) through which Inuit-sea ice relationships have been explored means that our understanding of this relationship and its implications is limited. Specifically, a dominant focus on vulnerability to climate change as the context for exploring the relationship between Inuit and sea ice, and Inuit and their environment in general, means that few studies have investigated the health benefits of sea ice use, exhibited a sensitivity to sea ice as a place of health (Cunsolo Willox et al., 2012), investigated environmental risk perspectives related to sea ice use (Laidler et al., 2009), or investigated determinants of health influences and risk management responses related to sea ice travel (Pearce et al., 2011). This theoretical gap contributes to four substantive gaps in our knowledge of Inuit and sea ice relationships.

First, there is a need to investigate health impacts and benefits from sea ice use. While we know that sea ice use can affect physical health through unintentional injury and trauma (Furgal, 2008), and that unintentional injury and trauma rates are disproportionately high in Inuit regions (ITK, 2010), we do not have a clear understanding of the epidemiology of land-based injury and trauma (GNWT, 2004; Légaré, 2007; Young, 2003). In addition, there is a need to investigate health benefits of sea ice use. While the use of sea ice to access food resources that are critical for nutrition and mental/social/cultural health has been documented (Ford, 2008; Furgal and Seguin, 2006; Van Oostdam et al., 2005), sparse literature has investigated other health benefits of sea ice use (Condon et al., 1995), or considered both health impacts and benefits to create a holistic understanding of how this element of the environment influences health.

Second, there has been little investigation of the intersections between the environment as a determinant of health influences and other determinants of health, particularly social determinants. For instance, a consideration of gender is missing from many studies investigating vulnerability to climate change in relation to sea ice travel (Ford et al., 2006ab. 2008b, 2009; Furgal and Seguin, 2006). As Dowsley et al. (2010) and Kukarenko (2011) have argued, influences of changes in the environment on human-environment interactions as well as social relations cannot be fully understood without a consideration of gender as a construct and structure that shapes these relations. The role of other social determinants on health influences of environmental exposure for Inuit, such as income and education, as well as biological factors, have also largely been overlooked, apart from a related study by Pearce et al. (2011) of land skills transmission among Inuit men according to age range. The gap in our understanding of the

determinants of health benefits and impacts also extends to investigations of vulnerability and adaptation to sea ice and other environmental change. Most literature on human dimensions of climate change in Inuit contexts has focused on the community or regional level (Berner et al., 2005; Ford et al., 2008ab, 2009, 2010ab; Furgal, 2008; Furgal and Seguin, 2006; Laidler et al., 2009; Nickels et al., 2006; Pearce et al., 2009). As such, key questions remain about the determinants of adaptive capacity for different individuals related to the use of local sea ice environment in the context of changing conditions. This gap in the literature is important to address through incorporating an analysis of how social factors or determinants, such as gender, education, and social support networks, shape health experiences and perspectives as well as strategies for managing health risk and benefit experiences.

Third, few studies on Inuit-sea ice relationships in the context of climate change have explored place-meanings – related to both health benefit and risk perspectives – for Inuit in relation to sea ice (Aporta, 2004, 2009; Cunsolo Willox et al., 2012). This is due, at least in part, to climate change vulnerability scholarship being rooted in natural hazards research (Ford and Smit, 2004; McLaughlin and Dietz, 2008). This shapes the predominant conception in this scholarship of the environmental agent in question – in this case, sea ice – as a biophysical hazard. In its nascent years, most climate change vulnerability research used a biophysical model of vulnerability; now, this field also considers how social determinants of vulnerability, such as the sensitivity of populations and their adaptive capacity, intersect with physical hazards (Anisimov et al., 2007; Ford and Smit, 2004). Nonetheless, there has not been very much consideration within this body of literature of the ways in which environmental risks or places are constructed by

those who interface with them, and the ways that other social constructs mediate or shape these constructions. Other bodies of literature have long considered the environment differently; for instance, environmental sociology and risk perception scholarship views the environment as both a physically-mediated and socially-constructed reality (Freudenburg, et al., 1995; Irwin, 2001; Wildavsky and Dake, 1990), while health geography considers it as the context for the intersections of cultural, political, social, and economic influences on health (Kearns and Collins, 2010; Kearns and Moon, 2002; Rosenberg and Wilson, 2005). Within environmental sociology and risk literature, there is recognition of how the socially embedded nature of risk means that other social constructs – such as culture and gender – influence risk perspectives and also need to be considered to understand different risk perspectives within a population (Dake, 1992; Gustafson, 1998; Jardine et al., 2009; Masuda and Garvin, 2006). Few studies have investigated how environmental risks, including risks related to travel on sea ice, are conceptualized by Inuit (Giles et al., 2010; Jardine et al., 2009; Tyrell, 2006). Health geography, conversely, has focused on the importance of place to health and has made an ongoing theoretical project of enhancing the understanding of place as a context for the intersections of cultural, political, social and economic influences on health (Kearns and Moon, 2002; Wilson 2003). There are few studies that explicitly explore the relationship between place and health or healthcare for Inuit (Cunsolo Willox et al., 2012; Giles et al., 2010; Jardine et al., 2009). Thus, way the environment is constructed and investigated primarily as an objective biophysical hazard in Inuit environmental health and sea ice literature has created key gaps in our understanding of the meanings and intersections between place, risk, culture, and health.

Fourth, creating an increased urgency around investigating all of the above issues and gaps – health impacts and benefits, determinants of health influences and management strategies, and meanings of place and risk – is the role of climate change. As Furgal (2008) explains, as the environment is recognized as an important determinant of health, modification of the environment associated with climate change may therefore have significant health influences. The author notes, however, that research on climate change and health impacts in the Canadian Arctic and other circumpolar Arctic regions is still in its infancy. While we have some basic knowledge of health impacts and adaptations to environmental change in the North, there are a number of key knowledge gaps. The impact of changing sea ice conditions on travel safety has been identified as a priority for future research (Ford et al., 2009; Furgal, 2008; Furgal et al., 2002), but few studies have explored this issue (Breton-Honeyman and Furgal, 2008; Johansson and Manseau, 2012). Underlying our knowledge gap of the role of the environment and environmental change for unintentional injury and trauma is a lack of cause-specific data for these health outcomes (Furgal, 2008). There is also a major gap in our knowledge of the relationship between environmental change, and psychosocial, mental, and cultural health (Furgal, 2008). Chapin et al. (2005) identified the decline in cultural ties to subsistence activities among Arctic Indigenous populations as the most important cause of declines in health and wellbeing among these populations, which indicates potential negative future implications of climate change on health and wellbeing. Cunsolo Willox et al. (2012) found that disruptions to traditional land use practices brought about by climate change were associated with distress among Inuit in Rigolet, Nunatsiavut, which can be understood in the context of loss of place attachment and impacts on place-based

identities. The authors argue for the inclusion of place attachment as an indicator of health and wellbeing in climate change adaptation research, as this aspect of health and environment relationships has been overlooked in Inuit adaptation research to date. Further, while there has been a rise in research on adaptation to climate change in Inuit communities (Ford et al. 2006b, 2007, 2008b, 2009, 2010ab; Furgal and Seguin, 2006; Laidler et al., 2009; Nickels et al., 2006; Pearce et al. 2009), including related to sea ice use, our understanding of climate change vulnerability and processes of individual and collective adaptation remains quite basic (Ford and Pearce, 2012). Other important gaps in our knowledge of climate and environmental change impacts on health relate to improving our understanding of other determinants that influence health and how environment and other factors intersect in shaping health outcomes (Furgal, 2008). In sum, a number of major gaps remain regarding our understanding of direct and indirect influences of changing environmental conditions on diverse aspects of Inuit environmental health; the factors that mediate the influence of environmental change on health influences from environmental use; and the determinants of individual and collective management of and adaptation to environmental risks related to changing conditions.

1.6 The need for an investigation of Inuit health, place, and risk

There is clearly a need to investigate Inuit-environment relationships using an interdisciplinary health approach to address the diverse but related knowledge gaps outlined in Section 1.5. This study employs World Health Organization's (WHO) broad and foundational definition of health as "a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity" (1946/2007: 1), while also

using an emergent approach to illuminate Inuit understandings of health related to environmental use. Employing health as a framework for investigating Inuit-sea ice relationships can create theoretical space to investigate impacts and benefits stemming from environment interactions; consider cultural conceptions or meanings of health, risk, and place; investigate differences in health experiences and risk management strategies between individuals based on other determinants of health; and improve our understanding of how environmental changes are influencing health related to sea ice use. Drawing on population health approaches and social epidemiology, health geography, and environmental risk literature can illuminate aspects or the context of this relationship in ways that have been less represented in the literature to date, as reviewed in Section 1.5, and also in ways that reflect definitions and perspectives of northerners.

There are two primary reasons why developing a better understanding of the relationship between sea ice and Inuit health is important. First, gaining this understanding is critical for assessing how social and environmental changes are influencing and may continue to influence Inuit environmental health, including how they may exacerbate existing health disparities. It is also essential to promote positive health benefits and minimize negative health impacts associated with sea ice use, such as injury and trauma, from a public health perspective. The need for this understanding to inform positive action was an important part of the motivation of Inuit regional and community collaborators to partner on this study. Further, the potential for tangible community benefits in the form of policies and programs that strengthen health benefits from sea ice travel and minimize health impacts for residents in Nain and other Nunatsiavut and Inuit communities was a major impetus for the focus of this thesis.

Second, studying Inuit health-sea ice relationships forms a valuable case example of Indigenous health-environment relationships in an area where the literature is sparse. While the environment is an important determinant of health for all people (Lalonde, 1974; PHAC, 2003; WHO, 1986), it is a particularly critical determinant of health for Indigenous populations, as environment and health connections are informed by culturally-specific Indigenous epistemologies and ongoing connections to traditional lands (WHO, 2007). As noted in Section 1.2, minimal literature on Inuit-environment relationships within the Indigenous environmental health literature represents a major gap our knowledge, as the cultural specificity and place-based nature of these relationships means Inuit-environment relationships will be unique compared to other Indigenous cultural groups. By exploring culturally-embedded understandings of environment and health and the unique and dynamic social and environmental context in Nunatsiavut, this thesis can improve our understanding of the nuanced relationship between place and health and help contribute to the diversification of the literature on human health and environment relationships.

1.7 Presentation of thesis

The purpose of Chapter 2, the Review of Literature, is to situating this study in the existing literature. In that chapter I review 1) hazards, risk, and vulnerability approaches; 2) social determinants of health and population health approaches; and 3) health geography as three broad approaches to understanding human health-environment interactions, and identify their relevance to this investigation of Inuit health and sea ice.

Chapter 3, Research Design, Methodology, and Methods, presents the mixed methods strategy, community-based participatory research framework, and the case study

approach that guided the design of this study. I also present more detailed information on the case study community of Nain, and review data collection and analysis methods and strategies for ensuring validity and reliability of findings.

Chapter 4, Investigating Land-based Injury and Trauma in the Canadian North, is the first of five results chapters that are presented in manuscript format. Chapter 4 addresses the first objective of examining the role of environmental and other factors in search and rescue incidents, and demonstrates that environmental influences are associated with increased physical health risk in Nain, particularly during the winter season, and that age and gender are risk factors for land-based incidents.

Chapter 5, Exploring the Environment as a Determinant and Place of Indigenous Health, investigates the perspectives of Inuit and Kablunângajuit sea ice users on the relationship between using of sea ice and health by drawing on social epidemiology and health geography approaches. This chapter demonstrates the health impacts and benefits to a diverse range of aspects of health related to environmental use and exposure by focusing on one key element of the environment. It also demonstrates place-meanings that emerge from this interaction and make a difference to health. Implications of climatic and environmental change on these health-environment relationships are also identified and discussed.

Chapter 6, Role of Individual and Community Health Determinants in Mediating Health Influences of Environmental Exposure in an Inuit Community, investigates the determinants of differing experiences and perspectives of health benefits and impacts related to sea ice use. This chapter provides evidence for the associations between a range of individual factors (such as gender, age, employment, education, and culture) and

positive and negative health experiences related to sea ice use, as well as the role of broader or distal determinants (such as colonization and assimilation, and attendant socio-cultural change) on Inuit health-environment interactions.

Chapter 7, When the Ice is Bad: Investigating Risk Perspectives of Inuit Sea Ice Users in the Context of Climate Change, explores risk perspectives of sea ice users related to sea ice travel. This chapter demonstrates differences between factors that sea ice users in Nain identify as contributing to a good/safe or difficult/unsafe trip in general, as well as differences between key factors based on gender and knowledge/experience. Together, these results demonstrate the physical and social basis of environmental risks.

Chapter 8, Environmental Health Risk Management: Negotiating Climate Change and Health Impacts of Sea Ice Use in an Inuit Community, explores factors influencing risk-benefit management for safe sea ice use as a lens for investigating climate change adaptation during land-based activities. This chapter reports the strategies that sea ice users employ to manage health risks and benefits during their environmental activities and differences between groups, primarily based on experience/knowledge. It also reports differences in adaptation strategies used by different groups of sea ice users.

Chapter 9, the Discussion, addresses implications of this thesis for our understanding of Indigenous environmental health by discussing themes that cut across all of the results. It also reflects on the methods and discusses their strengths and limitations in practice. I conclude by discussing potential avenues for future research.

2 REVIEW OF LITERATURE ON HUMAN-ENVIRONMENT INTERACTIONS

To situate this study within the existing literature, I will be reviewing three main approaches for investigating human-environment interactions that are relevant to understanding Inuit health in the context of sea ice use. First, I will summarize frameworks for conceptualizing vulnerability and environmental risk, originating from the hazards literature and biophysical vulnerability approach, and progressing to various models of vulnerability that consider social, political, and economic factors. I will also outline the scope and limitations of current environmental hazards literature relevant to Inuit contexts in Canada, which is predominantly climate change vulnerability literature, and identify relevant literature related to the construction of environmental risk. Next, I will review and critique approaches to conceptualizing and investigating health, beginning from the biomedical model and tracing the emergence social epidemiology, the social determinants of health, and the population health approach. I will also review the landscape of health research in Inuit contexts, and identify the importance of drawing on these health disciplines to understand Inuit-sea ice relationships. Lastly, I will introduce health geography by tracing its development and outlining significant trends and themes within this discipline, as integrating a sensitivity to 'place' as a context that is important to health is a key contribution of this thesis. I will briefly highlight the scope and gaps of research in this field being conducted in Inuit contexts in the Canadian Arctic today.

Tracing the historical development of each of these traditions will illuminate underlying conceptions of health and environment embedded in each tradition, which is important for evaluating the strengths and weaknesses for applying theoretical components from these traditions to the investigation of Inuit-environment interactions. I

will conclude by summarizing the theoretical strands I pulled together from the literature reviewed on risk, health, and place to inform the theoretical approach(es) for this study. While I used risk literature to examine perspectives of environmental hazards, the two main bodies of theory I used to investigate the relationship between Inuit health and environment and its implications are social determinants of health and health geography approaches. In the summary and discussion of this chapter (Section 2.4), I will outline the reasons for these choices.

2.1 Hazards, risk, and vulnerability approaches

From the biophysical approach to the development of social models of vulnerability

The biophysical approach to vulnerability is the dominant approach in natural hazards research and has formed a majority of the work on human impacts from climate change (Ford and Smit, 2004). The emphasis of the biophysical approach to vulnerability is the characterization of the hazard; the impact of the hazard on human populations is extrapolated directly or indirectly based on characteristics of the hazard, such as its timing, duration, frequency, and magnitude (McLaughlin and Dietz, 2008). In the biophysical vulnerability approach, 'vulnerability' denotes the relationship between the characteristics of the hazard and the level of damage that is associated with it (Füssel, 2007). According to Füssel (2007), this approach is also termed the risk-hazard approach in technical engineering work on disasters, the exposure-effect or dose-response relationship in epidemiology, the hazard-loss relationship in natural hazards research and the damage function in microeconomics. This is a largely deterministic view, where nature causes hazards, hazards are located outside of social systems, and human influences on modifying that event or its impacts are disregarded (McLaughlin and Dietz,

2008). As such, vulnerability is considered to be largely the result of being in a location where the risk of being exposed to a hazard is high (Ford and Smit, 2004; McLaughlin and Dietz, 2008). As McLaughlin and Dietz (2008) explain, by focusing almost exclusively on the nature of the hazard, this perspective ignores the social, political, and economic factors that contribute to risk, and removes any agency on the part of those individuals that are experiencing exposure to hazards.

In response to these criticisms, vulnerability research has evolved to integrate social and economic factors as determinants of vulnerability, drawing on and emerging from a variety of disciplines. For instance, political economy approaches to assessing vulnerability focus on the economic structures that shape social relations as the determinants of vulnerability, with one of the earlier theoretical perspectives within this tradition being Marx's conceptualization of vulnerability as intrinsically linked to class. Other works in this literature bring in the concepts of marginalization, inequality, poverty, entitlement and access to resources, and the role of social networks (Adger and Kelly, 1999; Ford and Smit, 2004; Kelly and Adger, 2000). Adger and Kelly (1999) specifically focus on social vulnerability to climate change—that is, the ability of individuals, groups, or communities, through their 'entitlement' to the use of resources, to cope with or adapt to external stresses that affect their livelihoods and wellbeing. Adger and Kelly's (1999) concept of 'entitlements' builds on Sen's (1990) key work related to famine and vulnerability to food insecurity, where the author describes entitlement as the resources an individual can command based on the rights and opportunities available to them. This concept provides a way to assess poverty and wellbeing that extends beyond income and addresses the role of economic, social, and institutional structures in

facilitating or inhibiting access to resources. Further, Adger and Kelly (1999) argued that adaptation is comprised of both social learning – the composite of individual adaptation responses, which is nonetheless constrained by social inequalities in access to entitlements – and policy learning – the process of adaptation by institutions to external change while reinforcing their own objectives. As vulnerability is socially differentiated, it can move in opposite directions at the individual and collective levels, and the adaptation responses of institutions may actually be maladaptive for individuals in some cases.

Constructivist approaches have reoriented biophysical approaches to vulnerability to emphasize the role that culture plays in shaping definitions and experiences of risk (McLaughlin and Dietz, 2008). Applying this perspective to natural hazards research, hazards are not seen as objectively 'out there'; they are constructed by an interaction of social, technological, and natural processes (Oliver-Smith, 1999). The 'hazard' is not intrinsically hazardous; it is a natural element that only takes on meaning as a hazard – that is, a harmful agent – relative to the adaptability of a social group or community that it interacts with (Oliver-Smith, 1999). Further, perceptions and experiences of risk are mediated by socially constructed categories such as race, class, and gender (McLaughlin and Dietz, 2008). Therefore, even though individuals may be confronted with seemingly identical risks, they may experience differential vulnerability and opportunities for adaptation.

Political ecology approaches for understanding vulnerability employ many of the same conceptual emphases as political economy approaches, such as recognition of the importance of political and economic power in producing vulnerability, but also consider

the environment as an independent variable (McLaughlin and Dietz, 2008). These approaches have traditionally considered the dialectic between environment and economy to understand the causes and impacts of environmental degradation (Forsyth, 2003). However, in recent years, political ecology scholarship has evolved to include a consideration of how knowledge claims about nature, science, uncertainty, and risk are produced and represented, as well as themes of governance, resistance, and justice (Watts and Peet, 2004). Pelling (1999) defines vulnerability within the traditional of political ecology as being comprised of exposure, resilience, and resistance, where these facets of vulnerability are produced by political, economic, and social structures and the capacity of individuals to assert access to rights and resources.

The resilience approach, which is related to theories of complex adaptive systems, is characterized by the assessment of the capacity of a system to retain core structure and function in the face of disturbance and to reorganize and adapt to changing conditions (Berkes and Jolly, 2002). This approach originated in the field of ecosystem dynamics, and was first proposed by Holling (1973). This approach attempts to provide a holistic, comprehensive understanding of vulnerability by removing the divide between social and physical systems, and providing an 'all-hazards' approach (Berkes, 2007). Also, like political economy and constructivist approaches, the emphasis here is not on the nature of the hazard itself. Employing a system-centred instead of an actor-centred view means that the focus of resilience research is on the multiple ways a system may respond to a hazard at multiple scales, by absorbing the perturbation, adapting to it, or reorganizing following impact (Berkes, 2007). This is a dynamic understanding of systems, emphasizing reorganization and renewal and the capacity of systems to deal with uncertainty and

change (Nelson et al., 2001). Berkes (2007) has identified four factors that contribute to enhancing resilience: 1) learning to manage uncertainty; 2) fostering diversity in various spheres to create options for avoiding or mitigating risks; 3) increasing knowledge for problem-solving, especially learning from past experiences; and 4) strengthening institutions and creating self-organization opportunities.

Similar to the resilience approach, integrated socio-biophysical vulnerability and adaptation approaches comprise a diverse field involving the integration of biophysical and social causes of vulnerability. Turner et al. (2003) argued for a coupled human-environment systems approach to understanding vulnerability, where vulnerability and sustainability are both contingent on the level of synergy between human and biophysical systems. They suggested that a coupled vulnerability analysis must consider multiple interacting stressors, how the system experiences these stressors, sensitivity to exposure, resilience or the capacity to cope and respond, the ability of the system to reorganize and adapt, and nested scales/scalar dynamics. Based in the hazards geography field, Cutter (1996) proposed a 'hazards of place' approach, where vulnerability is understood as both a biophysical risk and a social response located within (and impacting) a particular social or geographic space. This perspective allows for a multihazards approach that considers the nature of the hazard(s), various social, political and economic contexts, and diverse methodological approaches. Ford and Smit (2004) outlined a model of community vulnerability to climate change where vulnerability is a positive function of community exposure to climate change, and an inverse function of its adaptive capacity to deal with this change. Integrated socio-biophysical vulnerability and adaptation approaches have recently become mainstreamed in climate change human impacts research (Ford et al.,

2010b). This is captured in the Intergovernmental Panel on Climate Change (IPCC) definition of vulnerability in the Fourth Assessment Report, in which vulnerability is described as "a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, its sensitivity, and its adaptive capacity" (Parry et al., 2007: 883). While socio-biophysical vulnerability approaches have made critical contributions to climate change impacts research, the lack of constructivist, political ecology, and political economy approaches to examining climate change impacts, vulnerability, and adaptation for Inuit contributes to a major gap in our knowledge, particularly as risk is culturally-embedded and socially constructed, while being mediated by physical realities (Freudenburg, et al., 1995; Irwin, 2001; Wildavsky and Dake, 1990).

Scope and limitations of climate change vulnerability and environmental hazards
*   research in northern Canada*

A large volume of the research that is currently being generated on Inuit vulnerability to climate change in relation to sea ice hazards specifically uses Ford and Smit's (2004) framework for assessing vulnerability (DeSantis, 2008; Ford et al., 2006ab, 2007, 2008ab, 2009, 2010ab; Laidler et al., 2009). Another body of work uses the resilience approach to assessing the impact of climate change on sea ice and community resilience (Berkes and Jolly, 2002; Nichols et al., 2004). Few papers investigating Inuit vulnerability to climate change have employed constructivist approaches (Bravo, 2009), or the traditions of political economy or political ecology (Leduc, 2006). However, other work has investigated Inuit perspectives and knowledge of sea ice in the context of climate change, particularly in relation or in complement to scientific instrumental data (Gearheard et al., 2006; George et al., 2004; Laidler, 2006; Meier et al., 2006). For instance, Meier et al. (2006) brought together Inuit perspectives on changing sea ice

cover in Baffin Bay and passive microwave imagery, Gearheard et al. (2006) compared observations, uses, and adaptations to sea ice environments in communities in Alaska and Nunavut, George et al. (2004) described observations of changing shorefast ice dynamics and adaptations in an Alaskan Iñupiat community, and Laidler (2006) explored the links between sea ice and climate change from Inuit and scientific perspectives.

Despite the critical and substantive contributions that the socio-biophysical vulnerability approach has made to understanding complex human impacts of climate change (ACIA, 2005; IPCC, 2007), there are still a number of limitations when applied to gaining an understanding of Indigenous-environment relationships in the broader context of climate change. First, in applying a vulnerability framework to Inuit use of sea ice, it can be surmised that if people stopped travelling on sea ice, vulnerability would be reduced to zero because exposure has been eliminated, which also means that sensitivity becomes negligible and adaptive capacity is unnecessary. As it can be inferred that this is not a reasonable or desirable option for most Inuit, this example illustrates the lack of capacity of this model to integrate an understanding of the benefits that would be lost if exposure is reduced – or indeed, recognize that 'exposure' does not have to be a negative experience, and that for many Inuit, being on the sea ice is not considered as such (ICC-C, 2008). This conceptual problem is based in socio-biophysical vulnerability approaches having significant roots in the natural hazards research tradition, from which the biophysical vulnerability approach emerged. As such, the environmental agent under consideration is necessarily a hazard in this scholarship, and there is no conceptual space to consider the benefits of environmental exposure. Further, the normative project that underlies the employment of a vulnerability approach is an orientation towards a negative

goal – the reduction of vulnerability, where vulnerability is defined and operationalized by the research and policy communities – as opposed to a positive goal, such as strengthening health and wellbeing, where there is greater potential for including or employing community definitions or perspectives.

Second, there has been little attention paid in the Inuit-sea ice vulnerability literature to how environmental risks, and sea ice risks in particular, are conceptualized by Inuit, individually and collectively, including how gender, culture, and other social structures influence the ways that risks are perceived and constructed. Further, while the existing literature recognizes and is motivated by the importance of sea ice to Inuit, few authors have explored place-meanings for Inuit in relation to sea ice (Cunsolo Willox et al., 2012). As noted above, the socio-biophysical vulnerability literature focuses on environmental phenomena that it deems hazards. Within this body of work, there is little explicit reflexivity regarding ways that the constructions of vulnerability, adaptation, risk, or hazard are embedded in Western epistemic traditions with attendant assumptions, and the ways that climate change narratives may construct northern communities as at-risk or victims – like the Arctic environment – of climate and global political relations (Bravo, 2009; Martello, 2008). In this way, narratives of climate change risk can pose a risk to communities themselves, although they are also being employed by Arctic Indigenous peoples as an opportunity for increased visibility and political voice (Martello, 2008).

Third, the underlying issue here is that the environment is not simply a material or biophysical reality, but is also a social one. As Freudenburg et al. (1995) described early in the development of environmental sociology, biophysical and social dimensions of human experience are mutually contingent, with each influencing the other and shaping

how the physical is socially defined. Environmental risk is also a social construct,

mediated by the physical, and the social embeddedness of risk means that other social

constructs – such as culture and gender – influence how risk is constructed (Dake, 1992;

Gustafson, 1998; Jardine et al., 2009; Masuda and Garvin, 2006). Further, the

environments that people inhabit are more than locations, but places in which physical,

cultural, political, social, economic influences intersect, with both implications for health

(Kearns and Moon, 2002; Wilson 2003) and understandings of risk (Jardine et al., 2009;

Masuda and Garvin, 2006). Places are important to shaping identities and the sense of

who we are relative to our place in the world (Eyles and Williams, 2008). As such, Inuit

perspectives on risks related to travel on sea ice are place-based, culturally and socially-

embedded, and mediated by the physical environment itself.

2.2   Social determinants of health and population health approaches

Biomedical model, and social epidemiology, and the social determinants of health

Research in the late 19th century in Europe on infectious disease and pathways of

transmission laid the foundations for the rise to prominence of the biomedical model of

disease (Carson et al., 2007). The context for this development was the rapid

industrialization of Europe, which affected patterns of disease outbreak and concerns

about disease management. The focus of medicine was on the 'specific aetiology' of

disease, or the necessary and sufficient causal pathway for particular diseases, based on

the discovery and isolation of microorganisms and the vectors by which they spread.

While this work was key to the development of the biomedical model of disease,

Cartesian dualistic separation of the mind and body was foundational to the model, which

conceived of the body as a machine (Engel, 1977). In this approach, parts of the body can

be isolated and treated, which led to a focus on increasingly smaller units of analysis and

experimentation on the efficacy of different interventions, comprising an approach to the

reduction of illness based on understanding and intervening in biological processes

(Carson et al., 2007). Thus, according to the biomedical model, health is simply the

absence of disease.

The development of social and socio-ecological models of health gained

prominence in association with humanist and structural critiques of the biomedical model

and the rise of social epidemiology in Britain in the 1940s (Carson et al., 2007). Broadly,

'social determinants of health' refers to the features of societal conditions that affect

health and the processes by which they affect health, with the recognition that these

features and processes are historically contingent, non-deterministic, and potentially

alterable with appropriate action (Krieger 2001a, 2001b). Social epidemiology

distinguished itself from epidemiology by explicitly investigating the social determinants

health (Krieger 2001a, 2001b). The change in thinking about health from a biomedical

model of disease to a consideration and incorporation of social determinants was first

reflected in the establishment of the WHO definition of health as "a state of complete

physical, mental and social wellbeing and not merely the absence of disease or infirmity"

(1946/2007: 1), but the rise in interest in the social determinants of health did not take

hold until the 1970s (Carson et al., 2007). Among the most influential research

contributions were the Whitehall studies (Marmot et al., 1984, 1991), which comprised of

a three-decade long examination of the health of civil servants in Britain beginning in

1967 that demonstrated the impact of occupational status on health. This work showed

that among civil servants who all had stable jobs and lived in relatively affluent areas,

those with the highest occupational class experienced the best health, while those in the lowest occupational class had a greater likelihood of experiencing a range of diseases and suffering premature death from illness or injury. Results also demonstrated that these inequities in health progressed along a gradient according to the where in the hierarchy the worker was positioned.

While social epidemiology literature has demonstrated a strong correlation between social conditions and health, the theoretical links between social conditions and health have been conceptualized in a number of different ways. These diverse approaches can be roughly divided into three broad categories: materialist/structuralist, psychosocial, and multilevel/ecosocial (Carson, 2007; Raphael, 2004). According to Raphael (2004) and Carson et al. (2007), materialist, structuralist, and neo-materialist approaches primarily use a political economy approach to theorize how the structures of society shape the material conditions of life, which is emphasized as the key determinant affecting health. Theorizing the connection between material conditions and health can be traced to Engels (1845/1987), who demonstrated how health outcomes of the working class in England were correlated with the material conditions of their life – poverty and poor housing, diet, and sanitation – and the stress of their living conditions. Material conditions are viewed as influencing health by: 1) determining the quality of individual development and social interaction by influencing the likelihood of physical, developmental, educational, and social problems; 2) leading to differences in experiences of psychosocial stress; and 3) leading to the adoption of health threatening behaviours as a response to stress and material deprivation (Carson et al., 2007; Raphael, 2004). Raphael (2004) and Carson et al. (2007) described how neo-materialist approaches share

this view, but also consider how social inequities in health are related to how income and other resources are distributed in any given population. Priorities of capital accumulation and its support and enforcement by the state allow some to get or stay wealthy while others are poor, and this creates disparities in wealth distribution, which in turn creates inequities in health. These are then exacerbated by state policies that perpetuate or enforce economic and social privilege, by actions such as lowering investment in public infrastructure and social supports or repealing labour and environmental laws (Krieger, 2001b). Thus, neo-materialist explanations are also critical of the ways in which social capital is generally theorized as a protective factor against ill health, while the influences of history, class, patriarchy, and racism on social capital are neglected and the inequities they create seem to be tolerated (Carson et al., 2007). Krieger (2001b) does not differentiate between materialist and neo-materialist approaches, and instead identifies this general approach as the 'social production of disease' and/or the 'political economy of health,' describing how it focuses on the structural (i.e., economic and political) determinants of health (as opposed to the social determinants of health). Under the rubric of this approach, analyses of how social inequalities that involve race/ethnicity, gender, and sexuality intersect with socioeconomic position (e.g., class and prestige) and influence health have also been explored (Krieger, 2001b).

Psychosocial approaches link vulnerability to disease to exposure to stress, both physical and psychological, and assert that it is not gross inequality that leads to ill-health, but the perception of inequality or standing in the social hierarchy (Carson et al., 2007; Krieger, 2001b). The roots of psychosocial approaches can be traced to Durkheim (1893/1964), whose work focused on the impact of industrialization on social

relationships, and specifically on social control, psychological support, and systems of meaning. According to psychosocial approaches, mechanisms for ill-health are the following: 1) at the individual level, the perception of inequality and experience of being in a social hierarchy leads to psychosocial stress (i.e., feelings of shame or envy), which affects health and can lead to health-threatening coping behaviours; and 2) at the community level, hierarchy weakens social cohesion, which reduces economic, cultural, symbolic, and particularly social capital, all of which are viewed as having an influence on health (Carson et al., 2007; Raphael, 2004). The implication of this approach is that the focus for reducing disease should be to improve and strengthen social supports, which can act as a buffer for the effects of dominance hierarchies, social disorganization, rapid social change, social isolation, and bereavement, as opposed to reducing exposure to stressors (Krieger, 2001b). Key theorists on the links between social support and health include Bowlby (1969/1982, 1973, 1980), who established the importance of secure attachments in early life to later relationships, and Barnes (1954) and Bott (1957), who developed the concept of 'social networks' to describe ties that cut across kin groups or geographic proximity and shape resources that individuals can access. More recently, theorists have built on these works to establish how social and structural conditions shape social networks, which provide opportunities for psychosocial mechanisms (such as social support, influence, engagement, and capital) to impact health through behavioural, psychological, and physiologic pathways (Berkman and Glass, 2000). Social networks can have positive, regulating, or undermining influences on individuals within the network and their health (Heaney and Israel, 2008). Social support is one potential function of relationships; social support refers to aspects of relationships that are health

promoting or stress buffering, and intended by the provider of the support to have a positive influence through the provision of emotional support, tangible aid, information, or constructive feedback (House, 1981, 1988; Heaney and Israel, 2008).

Finally, ecosocial and multilevel dynamic theories are newer developments in social epidemiology. Ecosocial theory specifically seeks to systematically integrate social and biological determinants of health to create a historical and ecological perspective on how disease is distributed and how social inequalities in health are produced (Krieger, 2001a). Krieger (2001a: 694) explained that "ecosocial theory uses a visual fractal metaphor of an evolving bush of life intertwined with the scaffolding of society that different core social groups daily reinforce or seek to alter...[which invites] consideration of how population health is generated by social conditions necessarily engaging with biological processes at every spatiotemporal scale." According to Turrell and Mathers (2000), there are three levels of health influences: 1) upstream/macro factors (government policies, determinants of health); 2) midstream/meso factors (health care, psychosocial factors, social networks, health behaviours); and 3) downstream/micro factors (biological and physiological processes). Other authors have used distal and proximate as descriptors to demonstrate the different levels of factors that influence health (Carson et al., 2007). Overall, social epidemiology extends notions of the factors and conditions that shape health beyond biophysical ones, which is critical developing an understanding of Indigenous health outcomes (e.g., King et al., 2009).

Population health framework

Population health is an approach to investigating disparities in health and disease outcomes for different social groupings (Labonte et al., 2005). In Canada, one of the key

markers of the development and application of the social determinants of health approach

was the *New Perspectives on the Health of Canadians Report* of 1974, known as the

'Lalonde Report' (Lalonde, 1974), which outlined the key factors that determine health

status as lifestyle, environment, human behaviour, and biology. The Lalonde Report was

one of the earlier health documents to identify factors beyond the health care system that

contribute to health, but it was also criticized for failing to address the role of social

conditions (Wilson and Rosenberg, 2002). Twelve years later, the First International

Conference on Health Promotion hosted in Canada yielded the *Ottawa Charter for*

Health Promotion ('Ottawa Charter') (WHO, 1986), which identified peace, shelter,

education, food, income, a stable ecosystem, sustainable resources, social justice, and

equity as the prerequisites for health. Smylie et al. (2009) discussed how the Ottawa

Charter has embedded in it themes of empowerment, community development, and action

on the determinants of health. Another outcome of the conference was the 1986 report

Achieving Health for All: A Framework for Health Promotion (Epp, 1986), known as the

'Epp Report,' which identified three main challenges in promoting health for all

Canadians: 1) reducing inequities in health, 2) increasing disease prevention, and 3)

enhancing coping capacity for those with illness. In the 1990s, the

Federal/Provincial/Territorial Advisory Committee on Population Health (ACPH)

produced two reports that provide a framework for population health in Canada (ACPH

1994, 1996). These documents have shaped the current population health framework in

Canada, which identifies twelve determinants of health, some of which are social

determinants (Table 2.1) [Public Health Agency of Canada (PHAC), 2003, 2011].

Table 2.1. Population health framework in Canada (PHAC, 2003)

Determinants of health
• Income and social status
• Social support networks
• Education
• Employment/working conditions
• Social environments
• Physical environments
• Personal health practices and coping skills
• Healthy child development
• Biology and genetic endowment
• Health services
• Gender
• Culture

While the population health framework aims to facilitate action on a variety of determinants that are linked to inequities in health, it has also been criticized for failing to theorize the political and economic context that gives rise to the social stratification and economic structures that then translate into inequitable health outcomes (Labonte et al., 2005). Labonte et al. (2005) argued that population health approaches fail to theorize the social processes that underlie social determinants, in part because of an overreliance on positivist methods to the exclusion of theory. To address these limitations, some population health researchers have advocated for a critical population health approach, which considers the social and environmental determinants and structures that shape community health, and also explores the drivers of these determinants (Labonte et al., 2005; Richmond and Ross, 2009). As Labonte et al. (2005) described, the goals of critical population health research are to understand and reconstruct social, ideological, political,

and economic relations that create inequitable health outcomes, with the goal of improving overall health and equity in the distribution of health outcomes. To address these goals, the critical population health approach proposes theoretical, community, and policy engagement.

Additionally, while social and physical environments are recognized as determinants of health within population health and social epidemiology, the way these approaches conceptualize the environment is not without criticism (Cutchin, 2007; Masuda et al., 2010). Cutchin (2007) argued that social epidemiology undertheorizes the environment as a place by considering it solely in spatial terms; overemphasizes generalizable research on health-environment connections, as opposed to valuing the specificity of finding to place; and predominantly considers culture in terms of ethic or racialized difference in relation to socio-economic status, thus neglecting to explore how culture shapes values including perspectives on health and wellbeing. Cutchin (2007) argued that geographic thinking needs to be incorporated into social epidemiology and public health to address these limitations. Given that the importance of the environment as a determinant of health is well established in population health approaches, population health frameworks can make an important contribution to understanding Inuit-environment relationships. Nonetheless, the concerns that Cutchin (2007) outlined are especially salient in the context of Indigenous health-environment connections, given that health and environment are socially constructed, culturally-mediated and historically-situated (Adelson, 2000; Demeritt, 2002), and that Indigenous populations have unique historical, cultural, and social contexts and connections with their environment (WHO, 2007).

Scope and limitations of health research in Inuit contexts in Canada

In the realm of health research involving Aboriginal populations in Canada, Inuit are more studied relative to their population than other groups (Young, 2003). Within Inuit health literature, there is a diversity of topics explored and approaches used, with a number of key gaps remaining despite the high level of Inuit health research overall. Below, I will highlight existing Inuit health research and research gaps relevant to the case of Inuit-sea ice relationships, on the topics of physical health risk and unintentional injuries; physical and mental/social/cultural influences of wild food; mental, social, and cultural health research in general; Inuit conceptualizations of health; and social determinants of health research and Inuit-specific determinants of health.

On the theme of physical health risk from injury and trauma, epidemiology literature demonstrates that mortality rates from unintentional injuries are disproportionately high in Inuit regions. From 1999 to 2003, the age-standardized mortality rate from unintentional injuries was 4.3 times higher in Inuit Nunangat (Inuit lands in Canada that encompass the four Inuit land claim regions) than Canada as a whole (ITK, 2010). According to a report from the Government of Northwest Territories (GNWT), injuries accounted for 23% of all deaths among residents between 1990 and 1999 (GNWT, 2004). Further, the injury hospitalization rate for NWT residents was 2.3 times higher than the age-adjusted Canadian rate, and injury mortality and hospitalization rates were over two times higher for Inuit and Dene than other NWT residents. Statistics that differentiated between injuries on the land and in the community were not collected. However, GNWT did report that injuries involving snowmobiles, off-road vehicles, and aircraft accounted for 6% of deaths, while drowning accounted for 11% of deaths.

The 2004 Nunavik Inuit Health Survey reported that only 4% of residents surveyed reported injuries that limited regular activities in the 12-month period preceeding the survey, but also identified possible issues of underreporting (Légaré, 2007). These injuries involved sports activities (26%), ATVs (22%), snowmobiles (13%), and falls (14%); however, as with the report from GNWT (2004), injuries sustained on the land were not differentiated from other injuries. Reducing unintentional injuries and drownings related to poor ice conditions has been identified as an important strategy for addressing the disparity in injury rates between Inuit and non-Inuit Canadians (GNWT, 2007; Pauktuutit Inuit Women of Canada, 2010). However, the lack of data on land-based injury (e.g., GNWT, 2004; Légaré, 2007) contributes to a substantial gap in our knowledge of the relationship between environmental factors and unintentional injury and trauma. Adding urgency to this public health issue are scientific reports that environmental changes may exacerbate injury rates in northern communities (Furgal 2008; Furgal et al., 2002), and reports from northern communities across the Canadian Arctic that changes in ice and weather conditions are already leading to increasing unintentional injuries (Ford et al., 2008a, 2009; Furgal et al., 2002; Gearheard, 2006; Nickels et al., 2006).

More broadly, the level of research on injuries in Aboriginal communities in Canada is not proportional to the level of mortality and morbidity caused by injuries. For instance, Waldram et al. (2006) reported that injuries accounted for about one-quarter of all First Nations deaths compared to one-tenth of deaths for Canadians as a whole in 2000, while ITK (2010) reported that unintentional injuries were 4.3 times higher in Inuit regions than in Canada as a whole from 1999 to 2003, as previously noted. Nonetheless,

Young (2003) reported that only 3% of papers on Aboriginal health in Canada from 1992 to 2001 addressed injuries, with most of these relating to suicide. As such, there is a need to improve our knowledge of the causes of injury and trauma in Aboriginal and Inuit communities. Specifically, there are critical knowledge gaps regarding the relationship between environmental influences and unintentional injury, including the effects of modification of the environment related to climate change on unintentional injuries in the North.

On the theme of health influences of wild or 'country' foods, there is a substantial body of literature related to physical health (contaminant exposure, nutritient intake), as well as literature exploring the mental, social, and cultural aspects of country food consumption. Tait (2008) reported that 68% of Inuit adults harvested country foods in 2005, while Donaldson et al. (2010) reported that country foods ranged from just under 5% to 89% of estimated dietary energy intake in the Canadian Arctic based on eight studies, demonstrating the significant reliance on country foods in North for sustenance.

Key literature on physical health influences of wild foods has been generated through the Canadian Northern Contaminants Program (NCP), created in 1991 to investigate and address potential human health risks from the consumption of wild foods, including persistent organic pollutants (POPs) and heavy metals (Donaldson et al., 2010). This group of literature includes reports from phase one (Gilman et al., 1997; Van Oostdam et al., 1999), phase two (Van Oostdam et al., 2003, 2005) and phase three (Donaldson et al., 2010) of NCP. Concern about contaminants in wild foods is based in the key role of wild foods for Inuit diets, and the role of wild foods as significant vector of exposure to environmental contaminants for Inuit. Donaldson et al. (2010) reported

that the exposure of Inuit to organochlorines and heavy metals has tended to be higher than many other populations in Canada, and even today, Inuit continue to have the highest levels of nearly all POPs and metals among ethnic groups in the North. However, the authors also reported that studies are showing declines in almost all contaminants in maternal blood over the last decade. Research has also been conducted into the nutritional benefits of wild foods, to create a more holistic and comprehensive understanding of the role of wild food consumption for physical health. Donaldson et al. (2010) report that higher country food consumption is associated with increased intake of protein, vitamins D and E, riboflavin, vitamin B6, iron, zinc, copper, magnesium, manganese, and potassium. This nutritional content is particularly important given the high cost of store-bought food in the Arctic (AANDC, 2008).

Gathering or hunting, processing, and consumption of wild foods is also associated with mental, social, and cultural health benefits for Inuit (Furgal and Seguin 2006; Nickels et al. 2006). For example, Searles (2002) explored how pathways of food sharing and exchange as well as daily practices related to food procurement, preparation, and consumption are activities of meaning-making in which Inuit express their collective identity. Employing an ethnographic approach, Borré (1991) showed that Inuit food choices, specifically related to eating seal, were grounded in perspectives regarding the codependence of animals and humans; the need to link body and soul through social actions, which can be brought about by eating country foods; the importance of seal blood for physical health, because of its capacity to rejuvenating human blood; and the link between hunting and consuming wild foods, and Inuit identity. In a case study in Nain, Nunatsiavut, Pufall et al. (2011) reported that residents perceived country food to

contribute to good physical, mental, and spiritual health; cultural identity, and connections to community, ancestors, and the land.

Besides physical, mental, social, and cultural health, country food consumption also has economic implications for individuals and households. According to Aboriginal Affairs and Northern Development Canada (AANDC), the cost of the Revised Northern Food Basket – consisting of nutritious food for a family of four for one week – costs between $360 and $450 in most isolated communities, compared with $200 to $250 for the same basket in southern Canada (AANDC, 2008). In this context of expensive market foods, country foods provide a more affordable way to access nutrious food resources. For example, ITK (2012) estimated that the cost of replacing seal meat as a food staple in Nunavut would exceed $5 million annually. At the same time, harvesting country food requires time and financial resources, and lack of these resources as well as various social factors can constrain capacity to access country foods (Chan et al., 2006; Condon et al., 1995).

Research has demonstrated that environmental changes pose a serious challenge for country food security in the North (Ford, 2008; Furgal, 2008; Furgal and Seguin, 2006). Environmental change influences human access to wildlife, animal availability, and the safety and quality of wild food resources (Furgal, 2008; Furgal et al., 2002; Furgal and Seguin, 2006). For example, changes in the distribution, duration, and stability of ice coverage are leading to decreasing access to wildlife (Furgal et al., 2002; Nickels et al., 2006). Further, changes in temperatures are likely to influence the uptake, transport and deposition of some of the contaminants in the Arctic, with physical health consequences (Furgal, 2008). These changes then can indirectly impact Inuit health in a

variety of ways, considering the importance of wildlife for nutrition, mental health, cultural continuity and identity, and livelihoods. Nonetheless, there are still gaps in our knowledge of the status of country food security in some regions of the north and the factors that affect it (Furgal, 2008), as well as the negative health consequences of reduced consumption of country food due to a number of factors, including environmental ones (Donaldson et al., 2010).

A wide range of literature involving themes of Inuit mental, social, and cultural health exists. As suicide in Inuit regions is over eleven times higher than in Canada as a whole (ITK, 2010), suicide is critical public health issue. Thus, a substantial part of the Inuit mental health literature investigates rates, risk factors, socio-cultural constructions, and health promotion efforts related to suicide (Boothroyd et al., 2001; Kirmayer et al., 2000, 2003; Tester and McNicoll, 2004). There has also been some research investigating Inuit concepts of mental health and mental illness to inform suicide prevention efforts. For example, Kral et al. (2011) found that wellbeing for Inuit centres on the family, communication, and traditional Inuit cultural knowledge. Kirmayer et al. (2009) report that according to Inuit participants, the causes of mental health problems can be classified into four general categories: 1) physical or organic effects of human behaviour, the environment, or genetic inheritance; 2) emotional or psychological factors related to childrearing, interpersonal relationships, and mental functioning; 3) spirit possession; and 4) the impact of rapid social and cultural change. The authors employed ethnopsychological approaches to explore Inuit cultural knowledge related to these four themes.

Few papers explore the role of social support for Inuit health; among them is a study by Richmond (2009) investigating factors associated with differing reports of access to social support by Inuit, and a study by Richmond and Ross (2008) exploring relationships between social support, material circumstances, and health. Richmond and Ross (2008) demonstrated that social structures are important for Inuit health in that they contribute to the sense of belonging. However, the authors also found that highly dense social networks can also exert pressure to engage in health-damaging behaviours, and that individuals can become trapped in these health-damaging social relationships if they have poor material circumstances. Themes related to Inuit cultural health have been explored in various bodies of literature, related to the the relationships between culture and harvesting and consuming wild foods (e.g., Borré, 1991; Pufall et al., 2011; Searles, 2002); culture, socio-cultural change, and mental health/illness (Kirmayer et al., 2003, 2009; Kral et al., 2011); and cultural relationships with the environment as a source and determinant of health broadly (Richmond and Ross, 2009), among others.

The role of environmental change for the mental, social, and cultural health of Inuit is receiving increasing concern, but some significant gaps in our knowledge remain (Furgal, 2008). Chapin et al. (2005) identified declines in culturally-based subsistence activities as the most significant cause of declines in health and wellbeing among Arctic Indigenous populations, indicating that environmental changes that constrain access to and the safety of harvesting and other land-based activities may lead to further declines in mental and socio-cultural health. Indeed, Cunsolo Willox et al. (2012) found that disruptions to traditional land use practices due to environmental change affected mental and emotional health by contributing to distress among Inuit participants.

Further, while there is a growing body of literature that has explored concepts of health for First Nations in Canada and American Indian nations in the United States (U.S.), there is not the same written body of work on Inuit conceptions of health. Scholars of First Nations epistemologies have described that health and wellbeing of the total person – including mind, body, spirit and heart – are contingent on maintaining balanced and reciprocal relationships between all elements of Creation, which includes human and non-human relations (Dumont, 2005; McGregor, 2004; RCAP, 1999). In this view, the environment is animate; sustenance, identity, and community all begin with a relationship with the land (Akiwenzie-Damm, 1996); and "orientation to a place is essential to grasp what it means to be related" (Cajete, 1999: 7).

The strong link between health and environment for Inuit has also been identified in numerous writings (Freeman, 1976; Krupnik et al., 2010; Richmond and Ross, 2009; Pelly, 2001; Pufall et al., 2011), particularly in relation to the relationship between hunting and consuming wild foods, cultural identity, and wellbeing (Borré, 1991; Condon et al., 1995; Searles, 2002; Pufall et al., 2011). Nonetheless, few papers explore Inuit understandings of health or conceptualize the relationship between Inuit and the land based on Inuit ways of knowing. In the introduction to a volume interviewing Inuit Elders on their perspectives of traditional health, Laugrand and Therrien (1999) described that for Inuit, health is based in a harmonious order in which the mind and body are linked to the physical, animal, and social environments in which a person is embedded. In a study exploring Inuit understandings of happiness and wellbeing as a basis for suicide prevention, Kral et al. (2011) determined that three themes central to wellbeing for Inuit are: the family; talking/communication; and traditional Inuit cultural values and practices,

such as knowledge of going on the land, hunting, and consuming country or wild foods. The Inuit Centre (Inuit Tuttarvingat) at the National Aboriginal Health Organization (NAHO) described how Inuit health is linked to the health of the environment in which they live, because of the close connection Inuit have with the land and dependence on land-based resources for food and shelter (NAHO, 2011). While there are some similarities between these descriptions and the perspectives of First Nations and American Indian peoples, given how limited the literature is on dimensions of Inuit health and environment relationships, it is difficult to assess how much of the predominantly First Nations and American Indian scholarship on these topics in Canada and the U.S., respectively, is applicable to Inuit in terms of conceptualizations of health and environment.

There are other issues in the representation of Indigenous health conceptions in an academic setting. For instance, Smylie and Anderson (2006) described the difficulty of translating the term 'health measurement' into Cree for a study, and describe how a Métis Elder they were working with told them that there is no term in Cree for this, and although there is a word for measurement, it is used to describe an amount of wood cut or size of a fish catch. This sentiment highlights the seemingly fundamental mismatch between the quantification of health status and how health is characterized in Indigenous languages, in which worldview is embedded. This issue with translating between epistemologies has had an impact on the development of culturally-specific Inuit and Indigenous health models and appropriate indicators. Daniel at al. (2009) argued that the lack of culturally-relevant Indigenous health indicators is largely because researcher-driven health research efforts have not provided enough opportunities for Indigenous

stakeholders and communities to contribute to research planning and processes. Further, autonomy in Inuit and other Canadian Indigenous communities for health research and healthcare provision has been undermined through historical processes, and while this capacity and autonomy over health care provision is now growing, more development is needed in these areas (Waldram et al., 2006).

Richmond and Ross (2009) explained that in the context of Indigenous health, many determinants are rooted in unequal power relations and legacies of colonization, and that these determinants are unexplainable outside of an understanding of the context of varied processes of colonization and assimilation and their impacts on Indigenous peoples in Canada, as well as responses and actions related to cultural revitalization, sovereignty and self-determination. NAHO (2007) described how because of contextual factors, such as geography and access to basic health services; historical and contemporary realities that First Nations, Inuit, and Métis peoples face in Canada; as well as culturally-specific conceptions of health, broader determinants of health that must be considered together with the social determinants of health for Indigenous peoples (Table 2.2). Other literature that identifies determinants of health specific to Inuit in Canada includes a discussion paper authored by Inuit Tapiriit Kanatami (ITK) (2007), the national Inuit organization, which outlined the social determinants of Inuit health, and a study by Richmond and Ross (2009) identifying main determinants of Inuit and First Nations health based on perspectives of Community Health Representatives (Table 2.2). In a paper that examined the underlying causes Indigenous health disparities, King et al. (2009) argued that the causes of poorer health outcomes among Indigenous populations cannot solely be explained by usual population health or social determinants of health

frameworks. The authors explained how Indigenous health disadvantage, while influenced by general health determinants, is shaped by Indigenous-specific factors including colonisation, globalisation, migration, cultural loss, language loss, and loss of connection to the land. The factors identified by King et al. (2009) correspond to those identified by NAHO (2007) and ITK (2007), while the factors identified by Richmond and Ross (2009) correspond more to the Indigenous definitions of health as identified, for example, by RCAP (1999) as described earlier in this section. All of these authors identify Indigenous-specific determinants that substantially extend or refocus the determinants of health recognized by the Canadian government (PHAC, 2003).

Table 2.2. Broader or additional determinants of health identified in the literature for Inuit populations in Canada

Broader determinants of health for Indigenous peoples in Canada (NAHO, 2007)	*Social determinants of Inuit health (ITK, 2007)*	*Determinants of health for First Nations and Inuit (Richmond and Ross, 2009)*
• Colonization • Globalization • Migration • Cultural continuity • Access (related to remoteness and barriers) • Territory • Poverty • Self-determination	• Acculturation • Productivity (work in the wage and traditional economy) • Income distribution • Housing • Education • Food security and nutrition • Health care services • Quality of early life • Addictions • Social safety nets • Environment	• Balance (equitable maintenance of the mental, physical, emotional and spiritual elements of a person) • Life control • Education • Material resources • Social resources • Environmental/cultural connections

More broadly, despite the rise of theorizing around the social conditions of health over the 20th century (Carson et al., 2007), most health research continues to be

epidemiological (Havelka et al., 2009). According to Krieger (2001b), of the over

432,000 articles indexed in Medline from 1966 to 2000 by the word 'epidemiology,' only

4% also used the word 'social.' This asymmetrical divide also extends to Indigenous

health research in Canada. Wilson and Rosenberg (2002) asserted the First Nations health

research in Canada can be divided into two broad categories of literature. The first is

primarily epidemiologic, uses quantitative methods, and focuses on health and disease in

the context of the determinants of health, while the second tries to incorporate culture into

analyses of health, uses qualitative methods, and encompasses a plurality of approaches.

In a review of research publications on Aboriginal health in Canada covering 1992 to

2001, Young (2003) found that there was a disproportional focus on genetics and

contaminants relative to social determinants of health in Canadian Aboriginal health

research, and gender was only discussed in 11% of papers. In a review of the literature on

Inuit women's health in Nunavut, Healey and Meadows (2007) found less than 50 articles

from the last two decades on women's health issues among the circumpolar Inuit

population, most of which related to women's biology and reproduction and described

health through a biomedical lens. The authors discussed how the current state of Inuit

health research in Canada is disease-centred, with a focus on differences between

Indigenous and non-Indigenous people. They described how this clusters important

geographical and historical influences, and were critical of how most research on Inuit

health focuses on the relationship between inequities in health and culture, disease, and

risk while neglecting a consideration of gender, social and physical environments, and

other determinants. In a review of trends in the health risk literature pertaining to

Aboriginal populations in Canada, Furgal et al. (2010) identified exponential growth of

literature related to Aboriginal health risk over time since the 1990s related to the growth and coalescing of Aboriginal health and environment research itself. The authors noted that while the proliferation of research using risk as a health lens may lead to targeted interventions and programs, it may also change the ways in which Aboriginal health is understood and represented because of the relative lack of attention on positive health promotion and protective factors. Few studies have explored the social determinants of Inuit health; among them is Richmond's (2009) study of the relationship between social support and health outcomes for Inuit, and Richmond and Ross' (2008) study of Inuit and First Nations Community Health Representative perspectives on the relationship between social support, material circumstances, and health behaviours. Thus, substantial gaps remain in the application of social determinants of health approaches for Indigenous and Inuit health research, and the development and application of Indigenous and Inuit-specific population health approaches.

Therefore, it appears that while the current scope of Inuit health research is wide-ranging and addresses numerous important areas of health, a number of key gaps in our knowledge of Inuit health remain. To address these gaps, we need to improve our understanding of the relationship between unintentional injuries, environmental factors, and environmental change; mental/social/cultural health implications of environmental change; the social determinants of Inuit health; and Inuit conceptions of health.

2.3 Health geography approaches

Medical geography and the rise of health geography

Similar critiques of the biomedical model of disease that influenced and gave rise to social epidemiology have shaped health geography (Kearns and Moon, 2002). This sub-

discipline evolved from conventional medical geography, which considered health, illness, and healthcare through a lens of spatial location, to a broader geography of health which is informed by a socio-ecological model of health and considers the dynamic interactions between a population and its social, cultural, and physical environment (Mohan, 2000; Rosenberg and Wilson, 2005). More specifically, what is now referred to as 'health geography' has shifted from conventional medical geography by: 1) using or incorporating qualitative methods and revaluing subjective experiences to better understand the difference that place makes to health; 2) using theory to make sense of the links between health and place; 3) incorporating a critical view of inequalities in health and the upstream political and economic structures and relations that shape them; 4) investigating the range of services beyond primary care services that individuals and communities access, such as informal services in the voluntary sector, and how these services interact; and 5) recognizing the body as a social construct through theorization on disability and 'deviant' bodies (Mohan, 2000; Kearns and Moon, 2002; Cutchin, 2007).

Health geography exhibits a sensitivity to place as a socially constructed phenomenon, a context, and as Wilson (2003: 84) suggested, a "zone of experience and meaning" that makes a difference to health. Thus, health geography has explored the experience of literal place as well as experiences of place-in-the-world, sense-of-place and displacement (Hay, 1998; Kearns, 1993), as well as theorized on the intersections of cultural, political, economic, and symbolic factors represented by the notion of 'landscapes,' from earlier work on landscapes of despair (Dear and Wolch, 1987), restructuring (Barnett and Kearns, 1992), and consumption (Gesler and Kearns, 2002), to

more recent research on therapeutic landscapes (Williams, 2007), landscapes of care (Milligan and Wiles, 2010), landscapes of justice (Mitchell, 2003), and scarred landscapes (Collier and Scott, 2009). The relationships between place, health, care-giving, and care-receiving have also become a focus of attention, particularly related to the relationship between formal and informal or voluntary care and places of care (Milligan et al., 2007).

Gesler (1991) originally introduced the concept of therapeutic landscapes as significant places that have an association with physical, mental, or spiritual healing. While work on therapeutic landscapes has evolved and grown (Williams, 2007), the concept of therapeutic landscapes has also been criticized for focusing on particular or special places associated with Eurocentric and classist understandings of healing (e.g., spas), instead of looking at everyday places and the way that therapeutic landscapes are culturally-specific and historically-situated (Wilson, 2003). Wilson (2003) extended the concept of therapeutic landscapes to the daily connection between place and health in First Nations communities by theorizing them as more than symbolic or physical sites of healing, but cultural and spiritual ones as well.

Because notions such as place and the body are focal points in health geography and considered in light of cultural, social, political, and economic influences and through the use of theory and empirical studies, a great deal of space is created for interaction and exchange with other disciplines, such as such as medical and cultural anthropology, disability studies, political ecology, political economy, and feminist scholarship (Adelson, 2000; Cutchin, 2007; Feld and Basso, 1996; Rosenberg and Wilson, 2005). One of the ways that power is theorized within the place/health nexus in health

geography has been in the political ecology of health. The political ecology of health

perspective uses a political economy approach to understand how political and economic

forces and structures shape the 'natural' environment and produce "geographies of

environmental and social distress" (Pelling 1999: 259). This approach is increasingly

incorporating an analysis of the way that the natural environment shapes social relations,

and it has also been argued that it should include an analysis of how human health and

culture shape interactions with the environment (Cutchin, 2007). Feminist scholars within

health geography have also theorized about the role of gender shaping health, access to

health care, and the 'embodiment' of health and illness, which refers to how people

biologically incorporate the material and social world that they live in over the course of

their lifetimes (Krieger 2001a; Rosenberg and Wilson 2005). Dis/ability scholarship has

theorized ways that bodies and abilities are socially constructed, and has critiqued ableist

perspectives underlying much of medical geography literature, while other critical

approaches have theorized about the way that 'race'/ethnicity and sexuality have been

constructed in the medical geography literature (Rosenberg and Wilson, 2005).

There is still a focus within health geography on spatial and ecological

perspectives on disease and health care services, which has been traditionally associated

with medical geography. Rosenberg and Wilson (2005) described how work in this

stream is also moving in new directions. First, multilevel GIS modeling and spatial

autocorrelation techniques are allowing for a more advanced and nuanced view of the

spatial distribution of disease at various scales. Second, there is an increasing interest in

links between medical geography and public policy, such as investigating the impact of

policies on health care access and delivery in different regional settings. Third, there is a

growing interest in the relationship between the environment and health, much of it incorporating a critical public policy analysis.

The place-specificity of health explorations in health geography can make a valuable lens for investigating Indigenous health, as the relationship to a given environment is a critical part of health and wellbeing for Indigenous peoples. Further, health geography recognizes the way that place-experiences and meanings are culturally-embedded and socially-constructed, and values the subjective experiences of people in exploring these themes, which means it can make a valuable contribution to exploring culturally-specific relationships between Indigenous peoples and their lands.

Scope and limitations of place-based research in Inuit contexts in Canada

The interdisciplinary tendency within geography has led to a number of important contributions within anthropology on understanding place in an Indigenous context (Adelson, 2000; Basso, 1996; Wilson, 2003) as well as an Inuit context (Aporta, 2004, 2009). Some studies have examined the relationship between location and health in the Canadian North. This has been done on a larger or regional scale – for example, Veugelers et al. (2001) examined the differences in life expectancy between residents of the Northwest Territories (NWT) and the rest of Canada. On a more localized scale, Harper et al. (2011) investigated the associations between weather, water quality, and occurrence of gastrointestinal illness in two communities in Nunatsiavut. Fewer studies have examined relationships between healthcare and location in the Canadian Arctic. Hanrahan (2002) explored needs of Inuit and Innu patients travelling to urban health settings for care in Newfoundland and Labrador, and Van Wagner et al. (2007) examined a collaborative care model for midwifery services in Nunavik.

Despite the existence of some research that shows the importance of location to health and healthcare in northern or Inuit contexts, there are almost no studies that explicitly explore the relationship between place and Inuit health. In one of few papers exploring health geography concepts in an Inuit context, Jardine et al. (2009) investigated gender influences on place-based understandings of health risk in northern communities. More recently, Cunsolo Willox et al. (2012) found that disruptions to traditional land use practices brought about by climate change have caused distress among Inuit in the Nunatsiavut community of Rigolet, which can be understood in the context of loss of place attachment and impacts on place-based identities. The authors argued for the need to recognize place-attachment as a vital indicator of health and wellbeing, and the need to incorporate a consideration of place into investigations of climate change health impacts and adaptation research and planning. As geographic thinking has been incorporated into explorations of health for other Indigenous populations (e.g., Panelli and Tipa, 2007; Wilson, 2003), there is potential for health geography to make a substantive contribution to expanding our understanding of Inuit health. As such, the greatest gap in the literature on Inuit health is the absence of research that emphasizes the importance of place-based approaches.

2.4 Summary and discussion

This review of current research on health and environment themes in Inuit contexts research reveals the predominance of research where elements of the environment are only considered in relation to Inuit if they fit into the category of hazards, and where the negative impacts of exposure on Inuit are investigated in ways that are primarily epidemiologic and risk-based. This trend in the climate change and

health literature has created a substantial gap in regards to understanding how diverse aspects of Inuit health are influenced by interacting with elements of the environment. In the socio-biophysical vulnerability literature related to climate change, the underlying model used does not have the theoretical capacity to capture the experiences and perceptions of Inuit as they relate to the benefits of environmental exposure, because of its exclusive focus on hazards. This conceptual limitation both explains the imbalance in the climate change vulnerability literature with regards to how Inuit-environment relationships are conceptualized and investigated, but also means that this same body of theory as it stands cannot address these gaps. Theorizations of environmental risk in the environmental sociology literature have evolved to incorporate understandings of the way that the environment is a social reality and environmental risk a social construct, and how culture, gender, and other lenses or structures shape risk perspectives. This stream of risk theory can address a part of the gap contributed to by the focus on hazards in the current Inuit-environment relationships literature; that is, it can be used to privilege Inuit perspectives on the environment because the categories of hazard or risk are not taken for granted. Risk perspectives literature has developed the tools to investigate and interrogate the discourses, social structures, and environmental factors that contribute to how risks and hazards are perceived and represented. Because of this capacity, I employed risk literature in this thesis that considers the environment as both a physically-mediated and socially-constructed reality to investigate perspectives of sea ice users in relation to environmental elements. The recognition of the potential role of gender and other lenses or factors informed the stratification of participants into groups to investigate different perspectives (Section 3.3.4), and the recognition of the importance of culture in shaping

risk perspectives led to an investigation of not only those factors participants perceived as difficult or unsafe, but also safe and positive, to illuminate the intersections and overlaps between these broad categories.

While risk literature can be used to investigate categories of risk and not-risk, this is not the same as investigating benefits of environmental exposure. Because the environment has been recognized as a determinant of health in the population health literature for a long time, population health approaches are well suited to investigating impacts and benefits from environmental exposure. The diversity of theoretical traditions and literature streams within social epidemiology and population health also means that whatever literature is most appropriate and applicable for a given study can be employed. However, despite this theoretical diversity, the majority of health research in the North is epidemiologic and health risk-based, as I have discussed in this chapter. Unlike the conceptual limitation in the social-biophysical vulnerability literature, there exists within social epidemiology and population health approaches the theoretical basis for exploring impacts and benefits of the environment as a determinant of health along with other social determinants. For this reason, I drew on these as key bodies of literature for this study.

However, as Cutchin (2007) argues, social epidemiology undertheorizes how environment as a place influences health. This is a central project in health geography, with its emphasis on place as a nexus where culture, social structures, and environmental features meet, and its consideration of the meanings created at this nexus and their influences. Despite this strength, health geography literature focusing on Inuit health and place is almost non-existent. The potential within this body of literature for investigating

what place means to health in a way that extends beyond the biophysical environment or location, and that considers culture, gender, and other social structures, is a complementary strength to social epidemiology. Thus, I also drew on health geography in this thesis. In the chapters that follow, I describe how I employed these approaches to explore how environment-health interactions give rise to health meanings that are embedded in a local cultural and historical context of environment use; how environment interactions influence health directly and also influence social structures and institutions (including care institutions), with implications for health; and how changes in the environment and social structures affects place-meanings, environmental interactions, and health. While health geography and social epidemiology/social determinants of health and population health approaches are key elements of my theoretical approach, risk literature is an third theoretical strand that I draw on, thus creating a dialectic between health, place/environment and risk.

3 RESEARCH DESIGN, METHODOLOGY, AND METHODS

In this chapter, I will present, explain, and justify the mixed methods project design, case study approach, and selection of the community of Nain in Nunatsiavut as the case study location for this thesis, as well as introduce the community of Nain by reviewing key geographical, historical, cultural, socio-demographic, and environmental data for the community. I will also introduce and explain how I employed a community-based participatory research (CBPR) framework in this thesis. In my review of methods, I will describe how and why I employed focus groups, semi-directed interviews, key consultant interviews, document review, and participant observation. I will also outline how I analyzed the data collected and the strategies I employed to ensure validity and reliability throughout the research process. To conclude, I will discuss the community-researcher relationship by reviewing ethical approval processes at Trent University and in Nunatsiavut, my approaches to addressing researcher bias, and the application of the CBPR framework in this research.

3.1 Research design and approach

3.1.1 Qualitative-mixed methods strategy

To address my central question investigating the relationship between using sea ice and health for residents of Nain, I employed a mixed methods strategy (Creswell, 2009) with an emphasis on qualitative methods. I employed a mixed methods approach to allow for the inclusion of multiple perspectives and interpretive approaches, to remain flexible in the context of conducting community-based research, and to draw on the strengths and minimize the weaknesses of qualitative and quantitative methods (Creswell, 2009; Johnson and Onwuegbuzie, 2004; Mertens, 2007). Mixed methods research

protocols have been well-established in health research (Baheiraei et al., 2011; Mendlinger and Cwikel, 2008) and have been used in Indigenous health contexts (Mill et al., 2008). I emphasized qualitative methods within this design as the study was exploring social constructions and narratives of environmental risk and health in a cross-cultural research context, and qualitative research is well suited to exploring how social meanings are constructed in context; stressing the multiple subjective realities of the researcher and participants and the value-laden nature of research; and allowing for an inductive, iterative research process with an emergent design that is responsive to new understandings gained during the research process (Creswell, 2007; Denzin and Lincoln, 2000). Qualitative methods have also been used to investigate Inuit health (Bird et al., 2008; Collings, 2001; Richmond and Ross, 2008) and human aspects of Inuit-environment interactions that are not explicitly health-related (Berkes and Jolly, 2002; Ford et al., 2008ab).

I employed a sequential, exploratory, and transformative mixed methods design for the study (Creswell, 2007) (Fig. 3.1). Data collection began with an exploratory qualitative data collection phase, which informed qualitative and quantitative document analysis, and which together informed another qualitative data collection phase, as illustrated in Fig. 3.1. Participant observation was ongoing during field work in Nain and informed data collection and analysis throughout. For my theoretical approach, I drew primarily on health geography and social epidemiology (see Chapter 2).

THEORETICAL APPROACH
Social epidemiology + Health geography

QUALITATIVE +
QUANTITATIVE
Document analysis

QUALITATIVE

Focus groups
Key consultant interviews

QUALITATIVE

Semi-directed interviews
Key consultant interviews

QUALITATIVE Participant observation
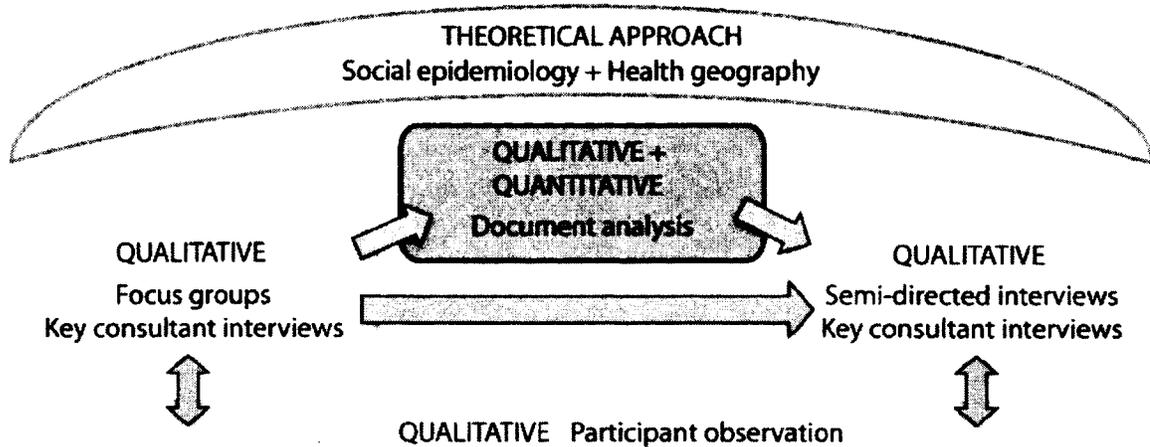
Figure 3.1. Diagram of relationships between research methods

3.1.2 Case study approach

I employed a case study approach as my strategy of inquiry. Creswell (2007)

explains that case study research can be a strategy of inquiry, a methodology, a type of

design, an object of inquiry, or a product of study. I employed the case study approach as

a type of research design because it can encompass a variety of methods and sources,

create an in-depth understanding of a system where the circumstances and context are not

easily disentangled, and allow for the consideration of the voices of individuals and

groups as well as the interaction between groups (Stake, 2005; Tellis, 2007). I used an

instrumental case study approach (Stake, 2005) to provide insight into issues of Inuit

environmental health and sea ice hazards and risks, and I focused it on one case (the

community of Nain) to facilitate conducting in-depth place-based research, develop

relationships, and better understand the local context. The case study approach has been

widely used in climate change vulnerability research (Berkes and Jolly, 2002; Ford et al.

2006ab, 2008ab, 2009; George et al. 2004). Case study research has also been used to

investigate Indigenous health and wellbeing in relation to place, as exemplified by

Richmond et al. (2005) in a research on the political ecology of health and perceptions of the links between health and environment among 'Namgis First Nation, and Jardine et al. (2009) in a study of the relationship between health risk perspectives, gender, and place in Dene and Inuit communities.

One of the strengths of employing the case study approach is that it is flexible, allowing for multiple sources of data to be used to describe diverse aspects of the case (Creswell, 2007). Case study research also allows for the inclusion of observations and descriptions of the context in which the case takes place (Creswell, 2007). Selecting this approach allowed the complexity of issues surrounding Inuit environmental health to be explored, and contextual issues that participants deemed important to be included. A limitation of employing the case study approach is that it can be challenging to demarcate the parameters of the case if there are multiple activities, sites, and individuals involved (Creswell, 2007).

3.2 Case description and selection and community-researcher relationships

3.2.1 Nain, Nunatsiavut (Canada)

The community of Nain is the northernmost community on the east coast of Labrador (N56°55, W61°68), in the Labrador Inuit Settlement Area (LISA) of Nunatsiavut (Fig. 3.2). The population of the town is 1,035, of which 950 people identify as Aboriginal (Statistics Canada, 2007b). Nain is a fly-in community, accessible by air year round and by boat in the summer. The climate is classified as sub-arctic, and the town is located on an inlet on the Atlantic Ocean protected by islands and surrounded by hilly, rocky terrain. Harvesting wild foods continues to be an important part of daily

living in Nain. In 2000, over three-quarters of adults harvested wild food in Nunatsiavut

(ITK, 2008). Many residents of Nain also rely on wooding to collect fuel to heat their

homes.
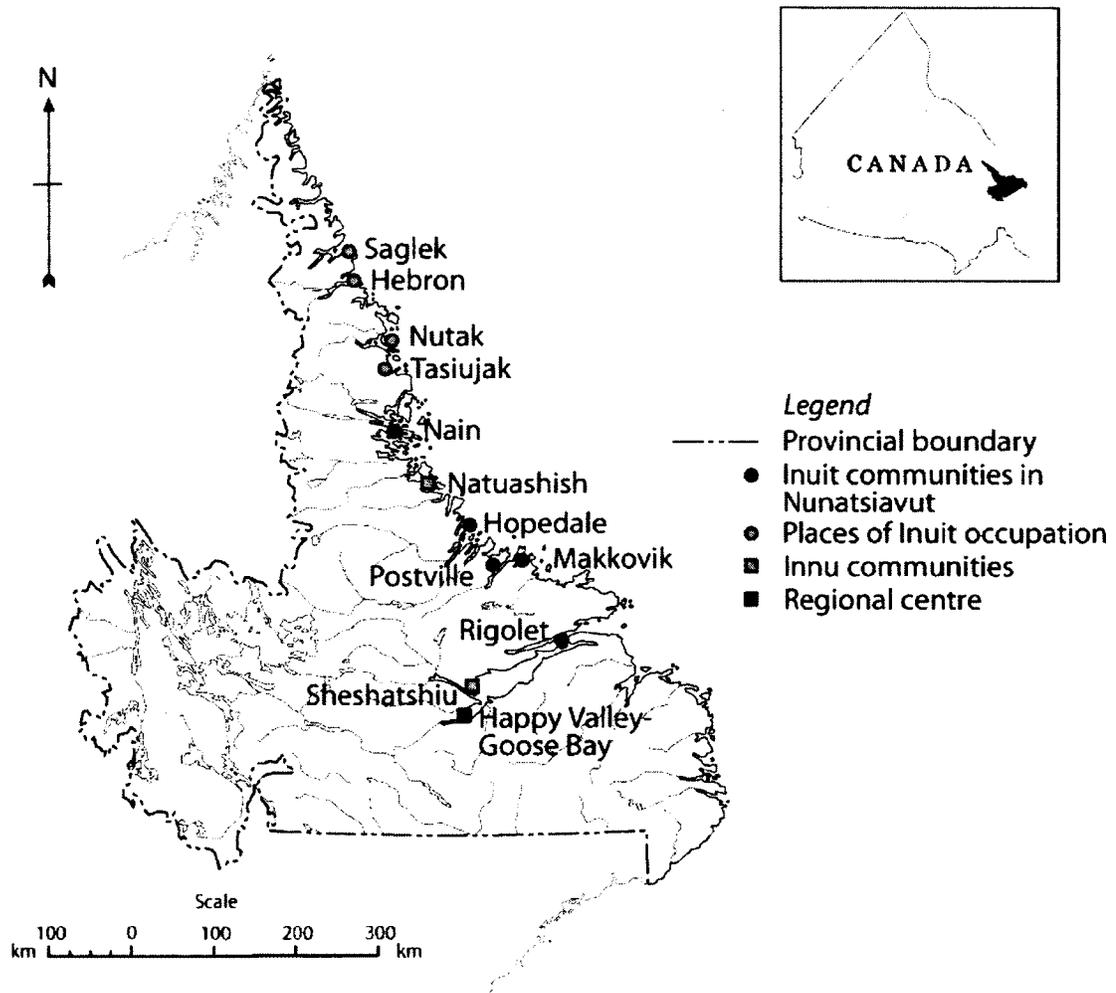
Figure 3.2. Location of Nain in relation to coastal communities and places of Inuit occupation or former settlement in Labrador, Canada (adapted from Natural Resources Canada, 2002 and Torngâsok Cultural Centre, 2010)

While Inuit have been living on the Labrador coast since time immemorial, the

site of the current community was officially established by Moravian missionaries in

1771 (LIA, 1977). The closing of the more northerly missions and community stores in

Nutak in 1956 and Hebron in 1959 and forced resettlement of families to Nain and other

communities along the coast were the most recent and traumatic relocations in the region,

causing socio-cultural disruption and emotional wounds that are still being felt today

(Government of Newfoundland and Labrador, 2005; LIA, 1977).

The Nunatsiavut Government (NG) was formed in 2005, a result of a land claim

filed in 1977 by the Labrador Inuit Association (LIA) (NG, 2009). The NG is a regional

Inuit government that operates within the province of Newfoundland and Labrador. The

NG governs Inuit lands and represents five Inuit communities along the Labrador coast,

including Nain. Settler and Inuit cultures have historically been distinct, but the long

history of settlers in Labrador and adoption of Inuit ways of life over time means that

Kablunângajuit and Labrador Inuit are both are beneficiaries under the Labrador Inuit

Land Claims Agreement (LILCA) and considered equal residents in LISA (LILCA, 2005;

RCAP, 1996). The settlement of the LILCA coincided with the start of nickel-copper-

cobalt mining by Vale Newfoundland and Labrador[3] 35 km southwest of Nain, near

Anaktalâk Bay. There is some winter shipping to the mine across the sea ice (Vale

Newfoundland and Labrador, 2012).

Socio-demographic characteristics for Nain, including median age, education,

employment and income levels, are listed in Table 3.1. Inuttitut use in Nunatsiavut, the

dialect of Inuktitut spoken by Inuit in Labrador, is less strong than Inuktitut use in some

other Inuit regions in Canada. Twenty seven percent of residents of Nunatsiavut are

reported to be able to converse in Inuttitut, compared with 99% in Nunavik and 91% in

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[3] Formerly the Voisey's Bay Nickel Company, operated by Vale-Inco.

Nunavut; only 7% of people in Nunatsiavut report that Inuttitut is the language most

often spoken at home (Andersen and Johns, 2005; ITK, 2008).

Table 3.1. Socio-demographic characteristics for Nain based on the 2006 Census of Population (Statistics Canada, 2007a)

Socio-demographic characteristics	Total
Total population	1035
Median age	26
Population over 15	755 (73%)
Education*	
No certificate, diploma or degree	395 (53%)
High school certificate or equivalent	125 (17%)
College, trade school or university completed	230 (30%)
Employment*	
Labour force participation rate	430 (57%)
Employment rate	310 (72%)
Unemployment rate	120 (28%)
Income*	
Median individual earnings	$17,280
Median gross income for families	$45,952

*For those over 15

Climate data indicates an upward trend in the mean annual temperature in Nain

based on data from 1985 to 2010 (Environment Canada, 2012) (Fig. 3.3). Further, while

all sea ice regions in Canada have shown a decline in summer sea ice coverage from 1968

to 2010, the largest rate of decline was in the northern Labrador Sea along the coast of

Nunatsiavut, where sea ice shrank by 73% (1,536 km^2 or 17% per decade) (Henry, 2011).
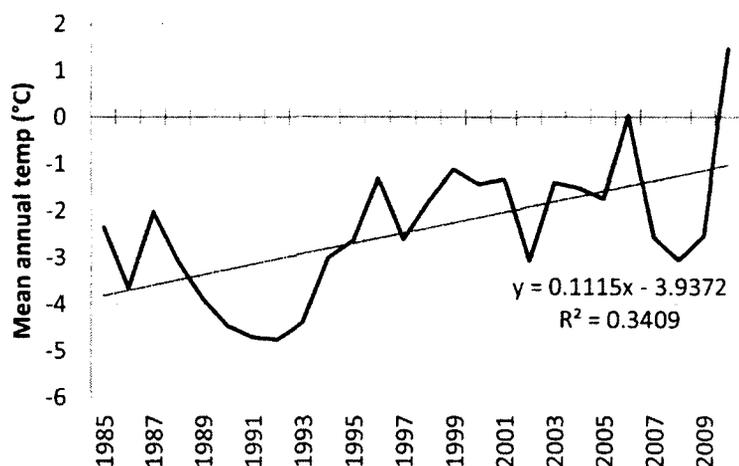
Figure 3.3. Mean annual temperature in Nain from 1985 to 2010 (Environment Canada, 2012)

3.2.2 Community-based participatory research framework

Indigenous communities and scholars have expressed the desire for research to

contribute to the goals of self-determination and control over self-representation, and for

inquiry to be ethical, healing, transformative, and participatory in both the methods and

ends (Denzin et al., 2008; Smith, 2000). As a non-Indigenous researcher not from the

North, community engagement is a strategy I used to help ensure that the project

addressed community needs and goals. Specifically, this thesis is informed by the CBPR

framework outlined by Fletcher (2003). According to Fletcher (2003), CBPR is a

philosophy and method that recognizes the political nature of inquiry; seeks to build

relationships between diverse communities and knowledges, while acknowledging

inequities between people and places; and seeks to use knowledge to forward community

goals (Table 3.2).

Table 3.2. Principles of CBPR related to working with Aboriginal communities (Fletcher, 2003: 37–38)

CBPR principles
1. Acknowledge and address the imbalance of power between Aboriginal communities; the state and its institutions; and universities and researchers;
2. Focus research onto issues of import to community members;
3. Accept the diversity of ways of seeing and understanding the world as positive;
4. Foster the development of local autonomy within the community and beyond;
5. Develop capacities within the community that contribute towards self-sufficiency and self-determination;
6. Engage community members as equal stakeholders in the research process;
7. Encourage equitable and sustainable development through research;
8. Approach research as an opportunity to provide public education about research in general and the issue at hand;
9. Respect the ethical guidelines established by organizations that represent the interests of Aboriginal peoples.

The use of the CBPR approach in the design, implementation, and dissemination of this research is discussed in Section 3.6.3.

3.3 Data collection methods

Data collection within this case study consisted of focus groups with expert sea ice users and an unstructured follow-up interview with an expert sea ice user, document review of SAR records and data, semi-directed interviews with community members, interviews with key SAR consultants, and participant observation. Table 3.3 reviews the relationships between each data collection method used and elements of the research question that the method addressed, illustrating the role and importance of each method to the study.

Table 3.3. Relationships between research question elements and methods/data sources

Research question elements	Data Methods/Sources			
	Focus groups	Document review	Semi-directed & key consultant interviews	Participant observation
1. Examine the role of environmental and other factors in SAR incidents				
• Number of incidents monthly and annually		+ + +	+	
• Social and environmental factors associated with incidents		+ + +	+ +	
• Physical health impacts of incidents		+ + +	+ +	
2. Explore perspectives of sea ice users on the influences of using sea ice on health				
• Perspectives on concepts and context related to sea ice use and health	+ + +		+ +	+
• Perceived health impacts (injury, trauma, stress) and benefits from use of sea ice	+ +		+ + +	+
3. Investigate determinants of differing experiences of and perspectives on health benefits and impacts related to sea ice use				
• Determinants of health impacts and benefits from sea ice use	+	+	+ + +	+
4. Explore risk perspectives of sea ice users related to sea ice travel				
• Identification of key environmental (ice, weather) conditions that are perceived to contribute to or minimize health risk	+ + +		+ + +	+
• Identification of social/other factors that are perceived to contribute to or minimize health risk	+ + +		+ + +	+
5. Explore the factors influencing risk-benefit management for safe sea ice use				
• Roles of SAR and social supports in mitigating negative health impacts from sea ice travel			+ + +	+
• Perspectives on travel safety promotion	+ + +		+ + +	

Legend: no marker, no direct questions on topic posed, negligible data; + no direct questions posed, peripheral data; + + direct questions posed, some data; + + + direct questions posed, in-depth data

3.3.1 Focus groups with expert sea ice users

Focus groups (Morgan, 1997) are a standard method used in qualitative research because they provide concentrated data on the topic of research interest, and the interactions between participants can provide valuable information and insights about their motivations and experiences. Focus groups have been used in other studies on health and environment in an Inuit context to bring small groups of experts together (Furgal et al., 2002; Laidler and Elee, 2008; McShane et al. 2006; Pearce et al., 2009). I conducted two focus groups in July 2010 with Inuit and Kablunângajuit expert sea ice users to explore how sea ice users in Nain view the relationship between travelling on sea ice and health (Table 3.3). I employed the focus group method to allow for interaction between participants and allow a consensus to develop (where possible) so that my role as the researcher in resolving conflicting pieces of information would be reduced, consequently reducing the biases I may have introduced in this process when attempting to explore group representations of Inuit health-sea ice relationships (Huntington, 1998). Exploring concepts related to health and environment through a discussion with community members also shaped and provided data with which to ground-truth latter parts of the study. Male and female focus groups were conducted separately to increase participant comfort in sharing information in the focus group. Further, male and female groups were conducted separately in recognition of the potential influence of gender on experiences and perceptions of health and use of sea ice, and the dearth of northern Indigenous health or climate change vulnerability research that considers the role of gender and the perspectives of women (Healey and Meadows, 2007; Jardine et al., 2009; Owens, 2005). Drawbacks of employing the focus group method include the potential for unequal

participation by group members due to pre-existing interpersonal dynamics, deference to others, shyness, or other factors; participants conforming to dominant views within the group; and participants expressing more polarized opinions than they would otherwise (Morgan, 1997). As noted, organizing separate male and female focus groups was a strategy used to help ensure that participants would feel comfortable sharing information and combat the potential for deference to those who were more experienced based on gendered lines. A local research assistant that recruited and knew all of the participants helped aid with facilitation of the focus groups. Part of the intention of employing co-facilitation was to increase participant comfort, help facilitate communication between myself and the group, and help moderate any challenging or asymmetrical group dynamics.

To ensure rigour in selecting local experts (Davis and Wagner, 2003), participants were recruited through a multi-step peer-recommendation process. Two local research assistants each generated a list of individuals who they identified as being knowledgeable about which community members were sea ice travel experts, and two staff members of the NG Division of the Environment together generated a third such list. The use of local research assistants was also part of the CBPR approach (see Section 3.6.3). The lists were cross-referenced for overlap, and from them three individuals were selected. These individuals each generated a list of up to ten women and ten men that they identified as being: 1) long time residents of Nain (20 years or more); 2) frequent sea ice users and experts on the local environment as recognized by others; and 3) beneficiaries of the LILCA. Individuals with two or more mentions were prioritized for recruitment, and recruitment was carried out by the local research assistants by phone or in person.

Individuals with two or more mentions comprised at least half of each focus group, and the remaining participants had one mention and the recommendation of the research assistants.

With the participants' informed consent (Appendices 11.4 and 11.5), the male focus group had five participants, including one Elder, and was conducted in English with sequential interpretation-translation into Inuttitut. The female focus group had four participants and was conducted in English. The focus groups were held in a meeting room at the NG and lasted two to three hours in duration. A focus group guide was used to direct the discussion (Appendix 11.6). Additionally, I conducted one follow-up unstructured interview (Bernard, 2000; Corbin and Morse, 2003) with an Elder from the male focus group to discuss concepts of health related to travel on sea ice embedded in Inuttitut language. The unstructured interview lasted one hour and was conducted in the participant's home with the aid of sequential interpretation-translation. All focus group participants completed a socio-economic and land-use practices survey (Appendix 11.7) (Table 3.4). Focus groups and the unstructured interview were recorded by digital voice recorder and notetaking, and compensation for participants' time was provided.

Table 3.4. Summary of socio-demographic information and land-use practices of participants

	Focus groups with expert travellers (n=2)	Interviews with community members (n=22)
Gender	• Female, n=4 • Male, n=5	• Female, n=11; • Male, n=11
Age	• Mean 48 (range 32–70)	• Mean 44 (range 21–65)
Sea ice travel experience	• Peer-recognized as expert sea ice users, n=9	• Very experienced, n=14; • Moderately experienced, n=8
Frequency of hunting/fishing	• Frequent, n=8; • Infrequent, n=1	• Frequent, n=12; • Infrequent, n=10
Frequency of wooding	• N/A	• Frequent, n=6; • Infrequent, n=13; • No response, n=3
Employment status	• Full-time, n=3; • Part-time, seasonal, other (PSO), n=6	• Full-time, n=12; • PSO, n=8 • No response, n=2
Highest level of institutional education	• College/trade school or university (partial or completed), n=4 • Secondary (completed), n=2 • Elementary or secondary (partial), n=3	• College/trade school or university (partial or completed), n=12 • Secondary (completed), n=6 • Elementary or secondary (partial), n=3 • No response, n=1
Inuttitut speaking ability	• Speakers, n=9	• Speakers, n=11 • Non-speakers, n=10 • No response, n=1

Legend:

Very experienced travellers = individuals with > 20 years of experience travelling on sea ice; *moderately experienced* = individuals with < 20 years of experience

Frequent hunters/fishers/wooders = individuals who perform these activities 4 or more days/week during ice season; *infrequent* = 1-3 days per week or less during ice season

Full-time = regular full-time employment or greater; *part-time, seasonal, other (PSO)* = part-time regular, full-time or part-time seasonal, income support, occasional work, and unpaid work

Speakers = fluent to some Inuttitut speaking ability; *non-speakers* = little to no Inuttitut speaking ability

3.3.2 Key consultant interviews with SAR representatives

Key consultants (Creswell, 2007; Peoples and Bailey, 2009) are individuals who are knowledgeable about particular subjects in based on their positionality and role in a group, who are accessible, and also who may provide access to the social network(s) they are part of. Consistent with the CBPR framework, I am using the term 'key consultant,' which is gaining prominence in cultural anthropology (Haviland et al., 2011; Peoples and Bailey, 2009), instead of the more commonly used term 'key informant' (Creswell, 2007) to recognize the expertise of these participants, and because of the asymmetrical researcher-participant power dynamic I associate with the term 'informant'. Key consultants have been used extensively in northern research (Laidler et al., 2009; McShane et al., 2006; Smylie et al., 2009). I conducted semi-directed key consultant interviews with two Nain Ground Search and Rescue (NGSAR) members in current and former positions of leadership in July and November 2010, and a Royal Canadian Mounted Police (RCMP) officer and staff member in the Nain detachment in November 2010. The purpose of these key consultant interviews was to provide a longer term view of: characteristics of SAR events, including frequency of incidents, environmental conditions, and contributing factors of the incidents over time; contextual information about SAR in the region, including information on the role and history of NGSAR and relationships between institutions involved in SAR; and perspectives on how to maintain and strengthen safety for residents that travel on sea ice (Table 3.3).

Key consultants were selected purposefully using a snowball method (Creswell, 2007) and recruited by the lead researcher over the phone or in person. With the participants' informed consent (Appendices 11.3 and 11.4), the interviews were approximately one hour long, and were conducted in the participant's home, place of

work, or the NG. Interviews were recorded by digital audio recorder if consented to and notetaking, and compensation was provided. A semi-directed interview guide was employed (Appendix 11.8).

In addition, three meetings were held with NGSAR members in November 2010, March 2011 and May 2011 to share study progress, share results from the document review of SAR records, and obtain feedback and assistance in interpreting results and identifying key factors or interactions between factors to examine in the SAR data. This collaboration and dialogue was also part of the CBPR approach (Section 3.6.3).

3.3.3 Document review of SAR records

Document review (Yin, 2009) is often used in case studies to corroborate and augment data from other sources. One of the benefits of document review is that it is unobtrusive, because it relies on existing data. This method has been often used in research in Inuit contexts, where researchers have employed historical documents (Aporta, 2009; Tester and McNicoll, 2006, 2008), newspaper articles and public documents (Martello, 2008; Smylie et al., 2009), diaries (Tester and McNicoll, 2006), and clinical records (Harper et al., 2011). In this thesis, document review was employed to provide an additional stream of evidence regarding 'trouble' events on the sea ice that could augment interview and focus group data (Table 3.3).

I requested and received access to NGSAR search and rescue records, meeting minutes and notes in July, 2010 from the NGSAR Commander. In reviewing the data, I identified cases spanning 1995 to 2006 inclusive. I held a meeting in November 2011 with four members of NGSAR whom I identified as top frequent searchers on the team according to records, to help fill in gaps in the case files and map the incidents. This

process reduced the number of cases by filtering out cases not involving Nain resients, filtering out false alarms – that is, cases where someone was suspected of being lost or missing but was found to be in town before a search commenced – and merging multiple records for the same case. Some additional case data were provided in March 2011, increasing the time span covered by cases to 1995 to 2007. I extracted names of individuals who had been assisted in NGSAR events from the case files and a former NGSAR member helped identify the current age of those individuals within 5 year increments.

I filed a request under the Access to Information Act with the RCMP in October 2010 seeking access to Missing Persons Occurrence Reports for searches, rescues, or recoveries carried out or authorized by the Nain detachment of the RCMP; occurring outside the town limits of Nain, and occurring between November 1 to June 15 for the years 2005 to 2010. Records before 2005 were not available. According to RCMP staff, this was because the RCMP in Nain had changed computer systems and no longer had access to older records. I received the case files in December 2010.

I received access to federal search and rescue data for Labrador inland (search area 060) and Labrador offshore (search area 009) from 1995 to 2010 from Fisheries and Oceans Canada (DFO) in January 2010. DFO manages federal SAR data on behalf of the Joint Rescue Coordination Centres (JRCC). Personal or identifying information had been removed from the data set. I identified the area of interest or range used for travel and hunting surrounding Nain with the help of NGSAR members. This area is bounded by the western Labrador border, the southern border of Torngat Mountains National Park (which has a separate SAR system under Parks Canada) and across the 58°42' N parallel at

Saglek fjord, along the outer islands of the coast, and across the 56°N parallel just north

of Natuashish (Fig. 3.4). All commerical fishing and marine transportation cases and

medical evacuations from Nain were excluded after consultation with an NGSAR

member. The resulting data set from all sources included 83 cases spanning the years

1995 to 2010.
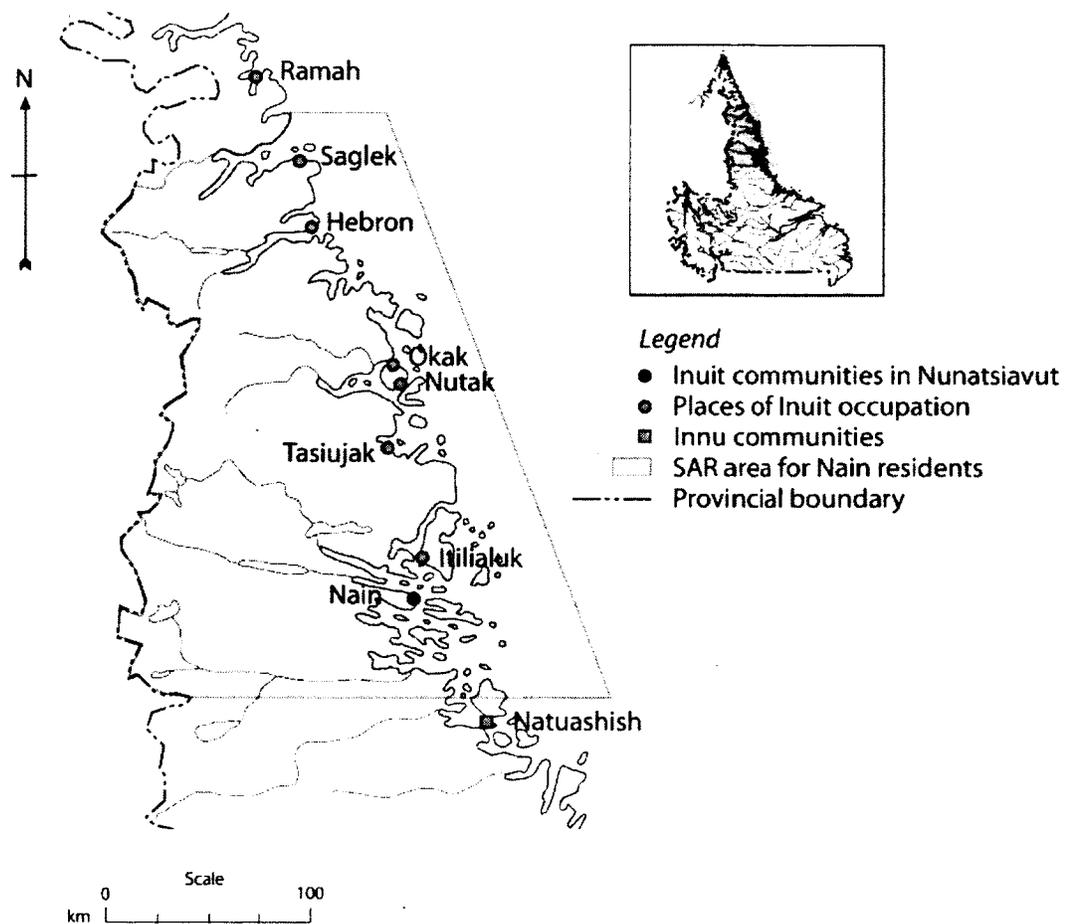
Figure 3.4. Map of maximum SAR area for Nain residents (adapted from Natural Resources Canada, 2002 and Torngâsok Cultural Centre, 2010)

3.3.4 Semi-directed interviews with community members

Semi-directed interviews (Huntington, 1998) are a standard ethnographic method

that has been often used in northern research with Inuit (Laidler and Elee, 2007; Laidler

and Ikummaq, 2008; Laidler et al., 2008; Nichols et al., 2004; Tremblay et al., 2006). For

instance, Huntington (1998) described the process of documenting traditional ecological

knowledge (TEK) related to beluga whales in Alaska using semi-directed interviews.

Huntington (1998) concluded that the semi-directed interview can be a powerful method

for documenting TEK because it allows participants to make connections not anticipated

by the researcher, which makes it more suitable for a cross-cultural context, while

allowing the researcher and the participants to both sufficiently direct the discussion to

thoroughly cover a wide-range of topics. Huntington (1998) explained that if no fixed

questionnaire is employed and the direction and scope of the interview are guided by the

interests and associations made by the participant, then semi-directed interviews will be

limited in answering questions identified in advance by the researcher. However, the

author noted that this limitation can be addressed by asking specific but open-ended

questions, which still allows for the unanticipated insights that are generated from

flexibility in the direction and scope of the discussion.

I conducted 22 semi-directed interviews in November 2010 with residents of Nain

that use sea ice for travel and hunting to provide an in-depth understanding of

experiences of health impacts and benefits from travelling on sea ice (Table 3.3).

Findings from the focus groups and document review informed questions posed during

the interviews with community members (Appendix 11.9). To ensure that a wide range of

different risk perspectives and health experiences were represented, I used a non-

proportional quota sampling method (Miles and Huberman, 1994; Trochim, n.d.). Non-

proportional quota sampling is a process in which a minimum number of participants to

be sampled in each group of individuals is specified, so that even small groups or less

common perspectives in the population are represented (Miles and Huberman, 1994;

Trochim, n.d.). The sampling grid I constructed was based on the following criteria:

gender, SAR status (whether the person had received SAR assistance or not), and years of

experience travelling on sea ice (more or less than 20 years) (Table 3.5). The rationale for

using gender as a criterion was the potential influence of gender on risk perspectives

(Gustafson, 1998; Jardine et al., 2009) and environmental knowledge and interactions

(Dowsley et al., 2010; Kukarenko, 2011). SAR status was used as a criterion, as having

received SAR assistance is likely an indicator of past environmental hazard exposure.

Such an experience could influence the perception of risk associated with sea ice travel;

for instance, heightening risk perception by making the risk more known and imaginable,

according to the availability heuristic (Tversky and Kahneman, 1973), or creating

negative associations based on past experiences, according to the affect heuristic (Slovic

et al., 2004). As such, I employed SAR status as a criterion to select participants to help

ensure that a range of risk perspectives were represented in the sample group and

complexities of factors that shape risk perspectives, such as past experiences with sea ice

hazards, could be explored. The number of years of experience travelling on the sea ice

was identified as an indicator of exposure to sea ice hazards and accumulated sea ice

travel skills, or knowledge of risk-benefit management strategies related to safe sea ice

travel. From a psychological perspective, the knowledge can influence environmental risk

perception based on habituation to risks (Lima, 2004), emotional responses based in past

experiences (Wang et al., 2012), and perspectives on ones' coping potential and

controllability of the risk (Scherer, 1999). From a perspective based in a cultural theory

of risk, place-meanings emergent from a relationship to place are based in and contribute

to cultural biases and risk perspectives (Masuda and Garvin, 2006). As such, the extent of the relationship to place (for instance, temporally) can influence risk perspectives.

The sampling grid created eight categories, and I aimed to recruit three participants per category. Four members of NGSAR who were identified as active searchers on the team independently generated a list of up to ten people per category. After pooling the lists and removing duplicates, I selected participants within each group randomly to recruit for participation in interviews. Before local research assistants began interview recruitment in phone and in person, I conducted two pilot interviews with individuals randomly selected from the lists to pre-test questions and make interview guide adjustments. There was a recognition that participants may not employ or identify with terms that tend to be used in academic discourse, such as risk(y) or hazard(ous), to describe how they view certain travel conditions. As such, I adjusted wording and asked questions using a variety of terms that would be more accessible and translate into the local context[4] (Appendix 11.9).

I was not able to recruit participants for two of the categories, as there were very few potential individuals and they were unavailable (e.g., out of town for extended periods of time) or uninterested in participating in the study. Final categorization of participants in the grid (Table 3.5) is based on self-identification by the participants as confirmed in interviews. With the participants' informed consent (Appendices 11.4 and 11.5), interviews ranged from 30 minutes to two hours, and were conducted at the NG or in the participants' home. Two interviews were conducted with Inuttitut-English

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[4] For positive factors, participants were asked to describe occasions when they had a trip that was good, comfortable, or enjoyable. For negative factors, participants were asked questions about trips or conditions that they thought were challenging, difficult, scary, dangerous, rough, or risky; places they felt uncomfortable going; and occasions where they were worried or got into trouble.

interpretation-translation. A map of the Nain area was provided as a visual tool for all

interviews. A survey following the format used for the focus groups was completed by

participants (Table 3.4; Appendix 11.10). Interviews were recorded by digital audio

recorder (if consent was provided) and notetaking, and compensation for participants'

time was provided.

Table 3.5. Number of community members interviewed according to quota sampling grid
and code assigned to each group (in brackets)

	Not assisted by SAR		Assisted by SAR	
	Male	Female	Male	Female
Moderately experienced*	4 (MM)	4 (FM)	0	0
Very experienced†	3 (MN)	3 (FN)	4 (MA)	4 (FA)

* > 20 years of sea ice travel experience
† < 20 years of travel experience

3.3.5 Participant observation

Participant observation (Creswell, 2007; Yin, 2009) is a method used to directly

observe and participate in events and practices, gain a richer understanding of the local

context, and gain insights into behaviours an motivations. This method has been used in

numerous ethnographies and case studies in the North on themes of the Inuit environment

use or health (Aporta, 2004; Henshaw 2006; Laidler et al. 2009; Tyrrell, 2006). I

employed participant observation to build interpersonal relationships, improve my

understanding of sea ice travel practices and share knowledge about sea ice travel on site,

and gain contextual knowledge (Creswell, 2007) (Table 3.3). Participants in focus groups

and interviews emphasized the importance of going out on the sea ice so I could better

understand the experiences they were trying to convey with words. They explained that

they learned through experience, and that this way was the best strategy for gaining an

understanding of this topic. Responding to these suggestions by going on sea ice trips

was also the CBPR approach related to respecting and engaging with different knowledges. I was fortunate to be taken on four sea ice trips in March and May, 2011, consisting of two single-day trips to Itilialuk, which is about 20 km straight north of Nain, and two multi-day trips to Tasiujak, which is about 70 km north of Nain (both are a much longer distance from Nain following sea ice routes) (Fig. 3.4). I recorded observations from and reflections on these trips and other events and interactions in the community.

3.4 Analysis

I transcribed focus group and key consultant interviews, while interviews with community members were transcribed by a private transcription firm. After transcription was complete, I reviewed the transcripts for reliability and accuracy of transcription. The Inuttitut portions of the male focus group and unstructured interview were transcribed into Inuttitut, and the accuracy of the original interpretation-translation was verified by a different interpreter-translator. Focus group and key consultant interview transcripts were returned to participants in November 2010 and transcripts from interviews with community members were returned in March and May 2011. Opportunities were provided for participants to check their accuracy and add or delete text from the transcript. Returning transcripts to participants was also part of my use of a CBPR approach (Section 3.6.3).

Transcripts were entered into the qualitative software package QSR NVivo 8. Focus groups, semi-directed interviews with community members, and key SAR consultant interviews were then analyzed in this qualitative software program using thematic content analysis (Berg, 2001; Esterberg, 2002), while participant observation

notes were memoed and reviewed manually. Codes for thematic content analysis were initially constructed based on emergent themes. An intercoder reliability check on the coding structure (Bernard and Ryan, 2010) was conducted; as a result, the coding structure was revised to better reflect the thematic content of the questions posed. Further sub-groupings were created based on common themes in responses. At this stage, intercoder variability for application of codes (Bernard and Ryan, 2010) was checked with an independent coder and agreement between the two coders was found to be over 80% for all but one code, resulting in further adjustments in code construct and application. Thematic content analysis of the interviews with community members and key consultants followed the approach for the focus groups.

As NGSAR and RCMP records were recorded in narrative format, the records were summarized and transformed into a quantitative database in Microsoft Excel. Records were cross-checked according to dates, and overlap was identified for two NGSAR and RCMP cases, two NGSAR and DFO cases, and two RCMP and DFO cases. Descriptive analysis was conducted on these data.

Member checking was performed to enhance validity and improve analysis (Creswell, 2007; Onwuegbuzie and Leech, 2006). I held three focus group report-back and validity check meetings in March and May, 2011, and one interview report-back and validity check meeting in May, 2011 in Nain. These meetings were also part of the CBPR approach (Section 3.6.3). The coding structures for the focus group and interview analyses created the basis for summary documents that I used to present and verify constructs with participants (Appendices 11.10 and 11.11). Participants who attended relayed general agreement with the ways that the content of the focus groups and

interviews was summarized and represented, but all attendees also made corrections and edits or added new data. Notes were taken during the validity check meetings. Additional data was coded, and feedback was used to make minor adjustments and corrections to the coding scheme and application of codes in some instances.

After this process was complete, I conducted further analysis on the focus group and semi-directed interview data. I used a cross-tabulation process to investigate associations between participant attributes (identified using socio-economic survey data and interview responses) and health influences from going off on the sea ice. Differences in reporting on health themes between groups were assessed as being 'significant' and are reported if there was a 20% or greater proportional difference in response frequencies (e.g., for the factor of age, a difference of 20% or more on a theme between participants above and below the median age is reported). This process was used for all attributes except gender and education. For gender, the measure of 'significance' was a difference of three or more cases/individuals reporting on that theme. For education, I did not employ a quantitative measure to determine what constituted a 'significant' difference, because there were more than two potential responses to compare. Responses were also analyzed for differences in themes, with specific attention paid to those themes which had been identified as having quantitatively large and potentially meaningful differences.

3.5 Validation strategies

The concept of and standards for strengthening reliability and validity in qualitative research have been much debated. Kvale (1994) outlined validity as a process of investigating, checking, questioning, and theorizing, and Morse (2002) noted that these validating processes are central for ensuring rigour for any kind of inquiry – whether

qualitative or quantitative. Creswell (2007) described qualitative validity as the accuracy of findings from the standpoint of the researcher, participant, or audience, and qualitative reliability as consistency in the researcher's approach. Lincoln and Guba (1985) set out four evaluation criteria for qualitative research: 1) credibility, or the degree to which the description of a human experience authentically represents that experience; 2) transferability, or the degree to which findings can be understood in contexts outside the study; 3) dependability, or the consistency with which constructs are used to describe the same phenomena over time and space; and 4) confirmability, or the degree to which the findings are informed by the study participants and inquiry, and not the biases or perspectives of the inquirer. Baxter and Eyles (1997) described these criteria as analogous to the standards of validity, generalizability, reliability, and objectivity used traditionally in quantitative research. Onwuegbuzie and Leech (2006) described validity in qualitative research as being comprised of internal credibility or internal replication, encompassing truth value, applicability, consistency, neutrality, dependability and/or credibility of interpretations and conclusions; and external credibility, meaning the confirmability and transferability of findings. To ensure rigour throughout the research process, I employed a number of validation strategies (Table 3.6) and strategies for ensuring reliability (Table 3.7), some of which are also strengths of and reflected in the use of a CBPR approach (Section 3.6.3).

Table 3.6. Summary of validation strategies used (Creswell, 2007; Onwuegbuzie and Leech, 2006)

Validation strategies	*Ways strategy was employed*
Prolonged engagement	• Conducted a one-week consultative trip and spent 3 months cumulatively collecting data in the field spread out over the course of a year.
Triangulation	• Employed data triangulation by using multiple qualitative methods. • Employed triangulation of methods by using mixed methods. • Employed investigator triangulation related to the intercoder validity and reliability check of coding constructs and their application. • Employed theory triangulation by drawing on a number of theoretical perspectives.
Member checking	• Conducted several report-back and validity check meetings with participants from the focus groups and community member interviews to share and verify interpretations of the main themes that emerged and make adjustments based on feedback. • Conducted three formal and some informal meetings with NGSAR members where I obtained feedback on findings from the document review, which aided in the interpretation of the data.
Checking for representativeness	• Used a multi-step peer-recommendation process to recruit expert travellers for the focus groups to ensure that those participants selected would be recognized as experts by their peers. • Used non-proportional quota sampling method for the interviews with community members to ensure representation of different perspective and randomized selection of participants from quota lists to minimize selection biases.
Peer debriefing	• Ongoing through the supervisory role of my Thesis Committee.
Effect sizes	• Adopted a standardized convention for the number of counts which would qualify as few, some, many, etc., and used them in the reporting of findings where appropriate.

Validation strategies	Ways strategy was employed
Rich and thick description	• Used detailed, thick description when possible.
Clarifying researcher bias and checking for researcher effects	• Engaged in an explicit self-reflexive process throughout the research via journaling and other means. • Conducted interviews in locations that participants preferred, worked with local research assistants, and attempted to be clear and honest to help ensure that participants were comfortable.
Checking the meaning of outliers	• In staying close to content of interviews and focus groups, I have attempted to include discrepant information, including perspectives that do not correspond to the main themes as I have interpreted them.

Table 3.7. Summary of reliability strategies used (Creswell, 2007; Davis and Wagner, 1997)

Reliability strategies	Ways strategy was employed
Accuracy of transcripts	• Interviews and focus groups were digitally recorded if participants consented to this. • I reviewed transcripts at least twice. • Transcripts were returned to participants to check them for accuracy, and corrections and changes were made by some participants. • Inuttitut portions of recordings for the focus group and unstructured interview were transcribed into Inuttitut for review by that participant, and the accuracy of the original translation was also verified by the transcriber, who was a different person than the original interpreter-translator.
Check for drift in coding	• Constructed low-inference codes and wrote detailed definitions of codes. • Constantly compared data with the codes to ensure consistency. • Conducted an intercoder reliability check on the clarity of and consistency in application of the codes, which had a high agreement rate but also resulted in some code revision.
Peer debriefing	• Ongoing through the supervisory role of my Thesis Committee.

3.6 Community-researcher relationship: Ethics, positioning the researcher, and use of CBPR

3.6.1 Research ethics approval processes

Ethics approval for this research was granted by Trent University's Research Ethics Board (REB) on June 29, 2010 (Appendix 11.1), and by the Nunatsiavut Government Research Advisory Committee (NGRAC) on July 14, 2010 (Appendix 11.2).

The Trent University research ethics review process involved articulating the research purpose; methods, including recruitment and compensation of participants and the informed consent process; risks to participants; and benefits for participants and society. Interview and focus group guides, information sheets for participants, and informed consent forms were also reviewed.

The benefits of this research that were identified for Nain and Nunatsiavut centred on improving the understanding of key ways in which sea ice use affects individual and community health, and helping to ensure the translation of this knowledge into action through collaboration. Community engagement throughout the project was employed to help ensure that the study was relevant to community concerns and questions. As part of this strategy, close collaboration with the NG and NGSAR was used to ensure that the research was conducted ethically according to community needs and standards and that the knowledge generated would be relevant to local decision-makers and sea ice user so as to potentially inform search and rescue and health promotion practices and policies in Nain and other Nunatsiavut communities. Benefits for participants related to contributing directly to this initiative to understand and improve community health and safety, and

receiving compensation. Benefits for knowledge in general are outlined in Chapters 1 and 2.

Some minor psychological risks for participants were also identified. Those that were identified as having needed SAR assistance could have felt embarrassed about their own actions in contributing to their need for assistance, and participants could also have felt upset if the topic of the study stimulated memories of traumatic experiences on the sea ice, for instance involving injury or the loss of life. I minimized these risks by making it clear at the outset of each interview and focus group that participants could choose to skip any question they did not feel comfortable answering, so that participants would only disclose information with full consent and comfort. Participants were also informed at the outset that they could withdraw from the interview at any time without prejudice. If any participants had withdrawn, they would have still received compensation. Data shared in interviews and focus groups was kept confidential and participants were identified in publications and documents by name or initials only if they so chose after reviewing and approving how their quote would be presented. As Nain is a small community where information about incidents on the sea ice is regularly shared, participants were exposed to no greater risk than they may experience in everyday life. I followed regional standards to compensate participants for their time with financial payment. Compensation was only provided to participants after their interview or focus group was complete, and was not used in the process of recruitment.

Informed consent was obtained by providing a brief verbal explanation of the interview process and informed consent process, and allowing the participant to read the Letter of Information and Informed Consent Form (Appendices 11.4 and 11.5)

independently before making the choice to sign. All versions of the forms were available in Inuttitut and translation-interpretation was provided during the focus group or interviews if requested by participants.

With regards to privacy and confidentiality, no names have been or will be released in association with any data without explicit consent. Some quotes from the interviews and focus groups were selected for use in this thesis and associated future publications. To signify the individual contribution and ownership of that data and knowledge by participants, the opportunity for participants to be credited with quotes was incorporated into the consent process and final quote approval process. The Informed Consent Form allowed participants to choose to have no direct quotes used and to remain anonymous; to have direct quotes used and to remain anonymous; or to have direct quotes used and for them to be attributed to the participant. In all cases where quotes were used, participants also had the opportunity to review the quote and the context of its use. Participants were provided with the options of not approve use of the quote; approving use of the quote after editing it; or approving use of the quote 'as is.' Participants were also able to make a final decision as to whether their quote should be attributed to their name, initials, or 'Anonymous.'

The Nunatsiavut Government research review process focused on the research purpose; methods and location of research activities; the benefit to communities and the region; community and NG involvement in the research; plans for results dissemination with participants, communities, and the NG; use of Inuit knowledge; and ownership of and access to data. Much of the information requested by the NGRAC in the NG research approval process overlapped to some extent with information provided in the Trent REB

process. Some differences included focusing on benefits for the local community; plans

for community engagement and involvement in the research; and use of Inuit knowledge.

One issue was the requirement of the NGRAC that the raw data be stored in the

community. However, under Trent University REB guidelines, I was not permitted to

allow the data to be stored anywhere but with myself unless the conditions provided by

the other site were agreed to be secure, and participants had consented to having their

data archived and accessible to others. This position is informed by the Tri-Council

policy on ethical research involving humans (CIHR et al., 2010). Consultation with the

NG indicated that at the time, they did not have the capacity to archive raw data or

policies on access and secondary use of that data. However, this issue can be revisited

with the REB and with participants if the NG develops this capacity in the near future.

3.6.2 Positionality and research biases

As a Euro-Canadian woman with several years of experience working in northern

research and with little lived experience of the North, an awareness of my positionality

and researcher biases were critical parts of the research process for me. This awareness

emerged from a need to safeguard the validity and reliability of the research based on my

position as the research-instrument. Moreover, I am cognizant of the predominantly

negative history of research in Indigenous contexts globally (Smith, 2000), including

with Inuit, related to the power dynamics in research replicating and supporting colonial

power dynamics. I wanted to approach the research process from an anti-racist and anti-

colonial position, and was aware that a lack of awareness of my white/class privilege

would mean that I could inadvertently replicate these dynamics. As such, I entered into

this research process with a strong bias around wanting to conduct research that was

practical and addressed community needs, while being rigorous so as to make an effective scholarly contribution. My positionality, personal relationship to place, and academic training lend themselves to a number of biases, including risk and health perspectives that are likely quite different from sea ice users who participated in this study.

My approach to addressing these biases was threefold. First, I used a number of strategies to ensure validity and reliability in the research process, which would minimize the effect of these biases on the research outcomes (Table 3.6 and 3.7). Second, I employed the CBPR framework (Section 3.6.3) to facilitate and support community engagement and beneficial research outcomes at the community level (Section 3.2.2). I did this so that I would be responding to community needs and desires directly instead of my imaginings of community needs, to gain a better understanding of the local context through my own engagement in relationships, and to engage in mutual learning and research capacity-building. Third, I tried to be self-reflexive in all my interactions. Self-reflection and awareness regarding my biases were critical to be able to understand and address their potential influence in the research process and outcomes.

3.6.3   Use of the CBPR approach

As described in Sections 3.2.2 and 3.6.2, the CBPR approach as outlined by Fletcher (2003) informed this research. The details of how this approach informed the design, implementation, and dissemination of this thesis are outlined below.

3.6.3.1   CBPR in the research design

The CBPR approach was employed in the design of this research by fostering relationships with community members and organizations before the research began, and

developing research goals that were of mutual interest. My first trip to Nain took place in April 2009, where I assisted with the installation of two sea ice monitoring stations as part of a community-based sea ice monitoring programme in Nunatsiavut and in Nunavik, an Inuit land claims region in northern Québec. As part of this work, I developed relationships with the NG and Sikumiut, an Inuit environmental management firm in Nain, and we began discussing issues and concerns around sea ice safety in the community. In December 2009, I joined preliminary discussions between my supervisor and a key member of the NG Division of Environment in the Department of Lands and Natural Resources (DLNR) about conducting research on sea ice travel safety in the region, and started developing a thesis proposal on this topic. Given the interest in research on sea ice safety expressed by some key individuals in the region, I travelled to Nunatsiavut in February 2010 to conduct consultation meetings on the research question and design. I met with the NG Department of Health and Social Development (DHSD) in Goose Bay, and staff members expressed strong support for research on perception of injury risk on sea ice, as well as interest in exploring the mental health impacts of sea ice hazards in the context of social impacts of climate change. I was unable to travel to coastal communities in Nunatsiavut during this trip because of prolonged weather issues, but continued to engage in dialogue on the thesis proposal with the NG Division of the Environment remotely. Based on a history of related work, identification of sea ice travel safety in the context of climate change as a key research gap in the region, and concern about record lows in sea ice thickness and extent in the winter of 2009/2010, the Division of Environment decided to endorse and become a collaborator on the project (Appendix 11.3). Further, I started developing a relationship with NGSAR, a volunteer group made

up primarily of local hunters and sea ice users that provides assistance to travellers in the winter season. NGSAR expressed interest in supporting the study by sharing incident records and other information.

The selection of the community of Nain as the case study community was informed by several factors. The first two reasons were support from the NG and NGSAR, which are a key part of the employment of a CBPR approach. The third reason was that hunting and travelling on the sea ice in Nain are important activities that make critical contributions to livelihoods and wellbeing (Furgal et al., 2002; Furgal and Seguin, 2006). Fourth, residents of Nain have expressed concerns related to changing climatic and sea ice conditions (Furgal et al., 2002), as well as winter shipping impacts on sea ice integrity and access to trails (Davies, 2007). Vale Newfound and Labrador ships mine ore through the sea ice to and from Voisey's Bay in the winter (35 km south of Nain). A Shipping Agreement limits the number of trips and demarcates no shipping periods during ice formation and ice melt[5]; however, some concerns in the community about the effects of winter shipping on travel safety remain to date (Davies, 2007). Fifth, local facilities and expertise meant that logistical challenges were less pronounced than in other communities on the coast and could support the conduct of a more community-focused and engaged study in the time available.

3.6.3.2 CBPR in the research implementation

Implementation of the CBPR framework included seeking and receiving ethical approval from the regional research advisory board; collaborating with the NG on the development and implementation of methods; contributing to employment opportunities

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[5] The winter shipping period is January 22 to April 6, during which only four trips are permitted, and no shipping periods are Dec. 7 to Jan. 21 and Apr. 7 to May 21 (Vale Newfoundland and Labrador, 2012).

and building local research capacity by using and developing the skills of local research assistants; working closely with NGSAR; returning data and results to participants first; and informing residents and organizations about the research during the research process.

The Nunatsiavut Government Research Advisory Committee (NGRAC) approved my application for conducting research on July 14, 2010, and made suggestions and edits to the focus group methods to ensure that the methods were minimally intrusive and culturally-appropriate. The key NG collaborator for this research – Tom Sheldon, Director of Environment – and other members of his department provided critical guidance and mentorship regarding how to appropriately communicate with local organizations and residents about the research before and during the research process. They also provided guidance on how to implement methods so that they met community goals and needs regarding being involved in research and having research conducted ethically according to community standards, but also not overwhelm or overtax limited community capacity and resources. The NG also provided in-kind logistical support, which aided in the effective implementation of the research, and accommodations in the community, which allowed me to stay in the community for longer periods of time during my field work. This helped meet the desires of community members in Nain for longer periods of engagement and relationship building in the community itself by researchers (NG, 2010).

Through other research collaborations that facilitated the sharing of funds and resources, like this one, the NG was able to hire two local research assistants – Sarah Karpik and Shannon Webb – in the community. This development helped meet one of the community needs around research in the region, which is to create local employment

opportunities and build a positive research legacy through capacity building (NG, 2010). The research assistants carried out the recruitment of participants for the focus groups and interviews with community members, reviewed and provided feedback on the focus group and interview guide and informed consent process, and assisted with facilitating the focus groups. This support helped implement the methods in ways that were comfortable and appropriate for community members, by having local people interface and facilitate communication between me and residents. I also provided training on the research process and engaged with the research assistants as team members to help facilitate local research capacity building. As part of this capacity building, I co-presented a poster at the ArcticNet conference in December 2010 with Sarah Karpik, one of the research assistants I worked most closely with. This process involved extending research training to the writing and presentation of results, and working collaboratively to present results to an academic audience. Some recruitment and quote approval work was also carried out by Sikumiut, which channelled some funds to the local firm and into the local economy.

I also maintained a relationship with NGSAR throughout the research process, including through the conducting of informal meetings and discussions; conducting key consultant interviews; meeting with NGSAR members to verify and supplement SAR incident case file data; and conducting two report-back and analysis verification meetings in March and May, 2011. This collaboration also resulted in support that I was able to provide the organization, by organizing case files and other SAR documents that were previously unfiled. Work on the SAR case files sparked interest in NGSAR in reorganizing and reprioritizing their data collection.

Data and results were returned to participants first before being disseminated in wider community or to academic audiences. First, transcripts were returned to participants and opportunities were provided for participant to make edits, deletions, and additions, which also functioned as an accuracy or reliability check (see Section 3.4). Second, three meetings were held with focus group participants and one meeting was held with semi-directed interview participants in March and May 2011 to return results, which also served as member checking by verifying the validity of constructs (see Section 3.4). Bilingual summary documents based on the coding structure and themes were provided to participants (Appendices 11.11 and 11.12), and the meetings resulted in edits and the addition of new data. Third, raw and analyzed SAR case file data was returned to NGSAR.

Informing residents and community members about the research and creating opportunities for feedback and involvement were important parts of the implementation of the CBPR approach. Communication with the wider community about this research before and during data collection was undertaken through meetings with the AngajukKâk (Mayor) of Nain Inuit Community Government, members of the Nain detachment of the RCMP, NGSAR members, the head nurse of the Labrador-Grenfell Community Health Centre, Sikumiut Environmental Management, and NG DLNR and DHSD staff in Nain and Goose Bay. I also created and posted bilingual posters about the research in July, 2010 (Appendix 11.13) and participated in two radio interviews with the regional community radio broadcast (OKâlaKatiget Society community radio) in July and November, 2011.

3.6.3.3 CBPR in the dissemination of results

In addition to notifying community members and local organizations about this study and ongoing collaboration and meetings with the NG and NGSAR, specific initiatives for effective knowledge translation (Smylie et al., 2009) were pursued. In June, 2012, the first stage of dissemination of results and collection of feedback on strategies for effective dissemination was conducted. First, a bilingual community information session was co-hosted by the Nunatsiavut Government and open to the general public. Results from four research projects related to the environment that the NG Division of the Environment had endorsed and collaborated on were presented, including this study. Other elements of the event included an update on a community freezer program that was informed by the results of one of the projects, and two short films related to life in Nunatsiavut. Feedback from participants was collected to inform the form and substance of final results dissemination strategies in the community. The information session was advertised using posters and a public service announcement on OKâlaKatiget radio. Second, a bilingual interview was conducted on OKâlaKatiget radio, during which research results were highlighted.

Third, meetings were held with the NG Division of Environment and NGSAR to present more detailed results, obtain feedback on the form and substance of results dissemination, and discuss plans and strategies for the translation of research to action by incorporating the results into existing policy and programmes or creating new initiatives. A similar meeting with DHSD was unable to be held in person because of weather issues, but will be organized in the future. Fourth, a short results summary document or fact sheet was created to share results with information session participants and residents in an accessible written form (Appendix 11.14). These fact sheets were distributed at the info

session and in meetings, and were made available at the NG and the Research Centre.

Feedback collected from participants and stakeholders through these knowledge

translation initiatives will be used to inform final dissemination strategies.

Community partners have also edited and coauthored all presentations and posters

presented at conferences. Drafts of all presentations and posters were sent to Tom

Sheldon as the community partner in the NG for edits and comments, and he has been a

co-author on all posters and presentations to date. A conference poster was also provided

to the NG to display in the research centre in Nain. Participants have had the opportunity

to edit and approve any quotes used in this thesis and in future publications (Section

3.6.1). Two non-academic articles have also been published in a North-focused issue of

an art, culture, and politics magazine to disseminate reflections from the research process

and some results to a wider audience (Durkalec, 2012; Ittulak, 2012). The former article

outlines my reflections on conducting research in Nunatsiavut as a non-Inuit researcher,

and the latter article shares Elder Lucas Ittulak's stories of travelling on the ice and land

based on interviews conducted as part of this thesis. Lucas Ittulak edited and approved

the article, which was based on excerpts from the unstructured interview. Community

partners at the NG were given an opportunity to provide feedback on the articles before

publication, and copies of the magazine were distributed in the community.

3.7 Organization and presentation of findings

The thesis findings are presented in five chapters, each of which constitutes an

independent manuscript. Each chapter addresses a research objective (Table 3.8), and

together, these objectives address the main research question: What is the relationship

between travel on sea ice and individual and community health in the Inuit community of

Nain, Nunatsiavut, and what are the implications of this relationship? At the beginning of

each chapter, the research objective that will be addressed by the proceeding paper is

introduced. The personal pronoun used in the body of the papers is first-person plural

(we).

Table 3.8. Organization of thesis in relation to research objectives

Chapter	Title	Research Objective	Target Journal
4	Investigating land-based injury and trauma in the Canadian North	Examine the role of environmental and other factors in search and rescue incidents	*Canadian Journal of Public Health*
5	Exploring the environment as a determinant and place of Indigenous health	Explore perspectives of sea ice users on the influences of using sea ice on health	*Social Science & Medicine*
6	Role of individual and community health determinants in mediating health influences of environmental exposure in an Inuit community	Investigate determinants of differing experiences and perspectives of health benefits and impacts related to sea ice use	*Environmental Health Perspectives*
7	When the ice is bad: Investigating risk perspectives of Inuit sea ice users in the context of a changing climate	Explore risk perspectives of sea ice users related to sea ice travel	*Global Environmental Change*
8	Environmental health risk management in an Inuit community: Negotiating climate change and health influences of sea ice use	Explore the factors influencing risk-benefit management for safe sea ice use	*Polar Record*

4 INVESTIGATING LAND-BASED INJURY AND TRAUMA IN THE CANADIAN NORTH

This chapter consists of a paper that addresses Objective 1 of the thesis, which is to examine the role of environmental and other factors in search and rescue incidents. This chapter uses search and rescue data to explore the role of environmental and other factors (e.g., age, gender) for physical health impacts (injury/trauma) from land-based travel, particularly during the winter season when residents can travel by sea ice. It is written in manuscript format for submission to *Canadian Journal of Public Health*, with co-authors C. Fugal and M.W. Skinner.

4.1 Introduction

Concerns about search and rescue (SAR) effectiveness and capacity for land-based activities in the North have been recently brought to the forefront in some Canadian Arctic communities, after the tragic death in 2012 of a fourteen-year on the sea ice near the community of Makkovik in the Inuit region of Nunatsiavut, on the northern coast of Labrador (Guerriero, 2012; "Labrador," 2012). While many questions remain unanswered in this case, this preventable death illustrates the unintentional injury and trauma that can sustained during sea ice travel. For much of the year, Inuit in Canada's Arctic use a network of sea ice routes to access wildlife species that are critical to diets and livelihoods (Furgal and Seguin, 2006; Van Oostdam et al., 2005) and places that are imbued with cultural meaning (Aporta, 2004, 2009; Henshaw, 2006). These uses and meanings translate into sea ice being beneficial for health and wellbeing (ICC-C, 2008). However, negative physical health impacts can be sustained through experiences such as cold exposure or falling through the ice (Berner et al., 2005; Furgal, 2008).

The public health context of concerns around land-based safety is that mortality rates from unintentional injuries are already disproportionately high in Inuit regions: from 1999 to 2003, the age-standardized mortality rate from unintentional injuries was 4.3 times higher in Inuit Nunangat (Inuit lands in Canada that encompass the four Inuit land claim regions) than Canada as a whole (ITK, 2010). Reducing unintentional injuries and drownings related to poor ice conditions has been identified as an important strategy for addressing the disparity in injury rates between Inuit and non-Inuit Canadians (GNWT, 2007; Pauktuutit Inuit Women of Canada, 2010). However, injury epidemiology data for Aboriginal populations in Canada, including for Inuit, is still limited (GNWT, 2004; Légaré, 2007; Young, 2003). As such, we still have a very limited understanding of the relationship between environmental influences and injury and trauma in northern communities.

Investigating this relationship has become more urgent, as Inuit communities have recently been reporting concerns about increasing accidents and anxiety associated with changing ice and weather conditions and their ability to predict safety of environmental conditions prior to travel or hunting (Ford et al., 2008a, 2009; Furgal et al., 2002; Gearheard, 2006; Nickels et al., 2006). Changes in sea ice strength and extent and the timing of freeze-up and break-up in the Arctic have been well documented (ACIA, 2005; IPCC, 2007; Nickels et al., 2006). While all sea ice regions in Canada have shown a decline in summer sea ice coverage from 1968 to 2010, the largest rate of decline was in the northern Labrador Sea along the coast of Nunatsiavut, where sea ice shrank by 73% in this time period (1,536 km^2 or 17% per decade) (Henry, 2011). Investigating the impact of changing sea ice conditions on travel safety has been identified as a priority for

future research (Ford et al., 2009; Furgal et al., 2002). However, a limited body of literature has explored this issue (Breton-Honeyman and Furgal, 2008; Johansson, 2008).

As unintentional injuries and trauma are already a major public health concern in northern communities (ITK, 2010) and environmental changes are predicted to exacerbate injury rates (Furgal 2008; Furgal et al., 2002), the dearth of literature in this area forms a significant gap in our understanding of the relationship between environmental influences and land-based injury and trauma. To explore this issue, this study investigated the role of environmental and other factors in search and rescue (SAR) incidents in Nain, Nunatsiavut in Labrador. We examined: 1) the frequency of incidents and changes in frequency over time; 2) social and environmental factors associated with or contributing to incidents; and 3) physical health impacts of incidents.

4.2 Research design and methods

4.2.1 Project design

We conducted case study (Stake, 2005) using a mixed methods approach (Creswell, 2007), with three sequential qualitative and quantitative stages of data collection and analysis. In this study we are reporting results predominantly from the quantitative stage focusing on search and rescue data analysis and interpretation. Ethics approval for this research was granted by Trent University's Research Ethics Board and the Nunatsiavut Government Research Advisory Committee.

4.2.2 Case selection and community-researcher relationship

The study was situated in the community of Nain, Nunatsiavut. The reasons for selecting this community as the case study location were as follows: 1) hunting and travelling on the sea ice in Nain are important activities that make critical contributions to

livelihoods and wellbeing (Furgal et al., 2002; Furgal and Seguin, 2006; Nickels et al., 2006); 2) residents of Nain have expressed concerns related to changing climatic and sea ice conditions (Davies, 2007; Furgal et al., 2002); 3) there was interest in collaboration by the Division of Environment in the Nunatsiavut Government (NG) based on a history of related work and interest in investigating sea ice travel safety in the context of climate change in the region, and Nain Ground Search and Rescue (NGSAR).

4.2.3 The case study: Nain, Nunatsiavut

The community of Nain is the northernmost community on the east coast of Labrador (N56°55, W61°68), in the Labrador Inuit Settlement Area of Nunatsiavut (Fig. Fig. 4.1). According to the 2006 Census of Population, the population of the town was 1,034, of which 950 people identified as Aboriginal (Statistics Canada, 2007b). Nain is a fly-in community located on an inlet on the Atlantic Ocean protected by islands and surrounded by hilly terrain. The climate of the area is classified as sub-arctic and environmental activities are important for tradition, culture, livelihoods, and health for its residents. For instance, in Nunatsiavut, over three-quarters of adults harvested wild foods in 2000 (ITK, 2008). Climate data indicates an upward trend in the mean annual temperature in Nain from 1985 to 2010 (Fig. 3.3).
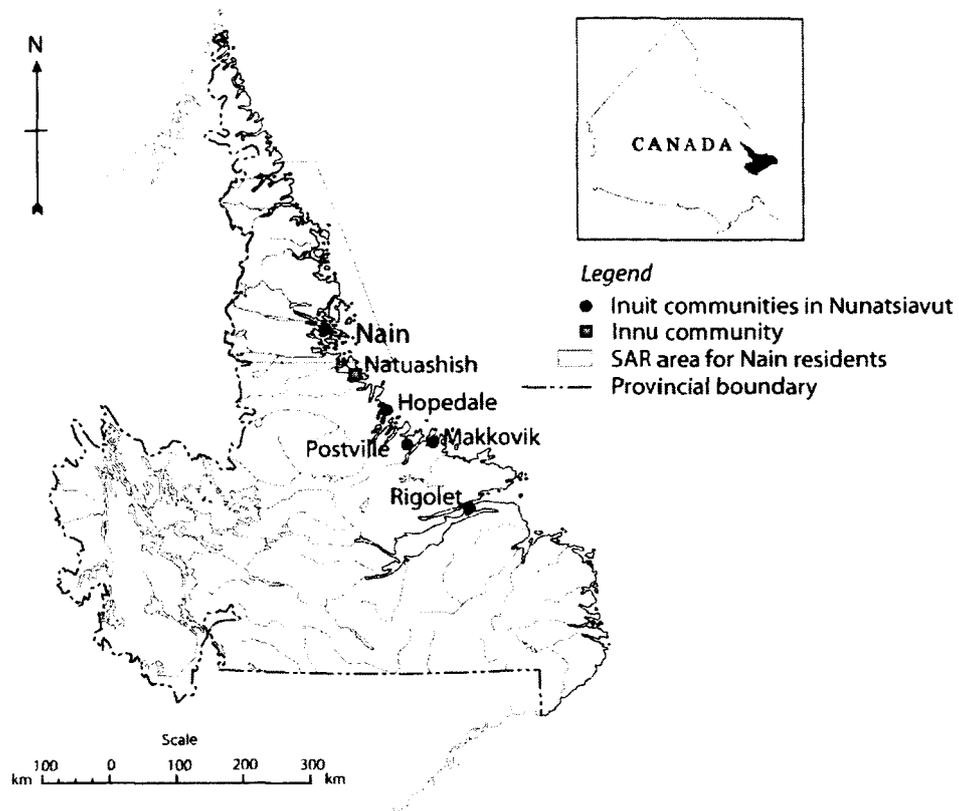
Figure 4.1. Location of Nain and other Nunatsiavut communities in Labrador, Canada, and the maximum SAR area for Nain residents (adapted from Natural Resources Canada, 2002 and Torngâsok Cultural Centre, 2010)

4.2.4 Data collection and analysis

Before data collection was initiated, we made a preliminary one-week trip to

Nunatsiavut in February 2010 to focus and plan the study and build relationships with

community and regional government representatives. We then conducted semi-directed

key consultant interviews (Haviland et al., 2011; Peoples and Bailey, 2009) with two

NGSAR members in current and former positions of leadership in July and November

2010 and two Royal Canadian Mounted Police (RCMP) members in the Nain detachment

in November 2010. Participants were selected using a snowball method (Creswell, 2007).

Interviews were recorded by digital audio recorder or notetaking and compensation was

provided to participants. Additionally, three meetings were held with NGSAR members in November 2010, March 2011, and May 2011 to share study progress and obtain feedback. Key consultant interviews were transcribed by the lead author and analyzed using thematic content analysis (Berg, 2001; Esterberg, 2002) using QSR International's NVivo 8 software. Transcripts were returned to participants in November 2010 to allow for verification of their accuracy.

Document review of search and rescue records from three sources was conducted (Yin, 2009). We were provided access to NGSAR records, meeting minutes, and notes by the team in July, 2010. Fifty-two cases were initially identified spanning 1995 to 2006 inclusive. We summarized and transformed NGSAR and RCMP records into quantitative data for each case for analysis in Microsoft Excel. NGSAR members assisted with data cleaning by filtering out false alarms and cases external to the community, merging identical cases, and finding additional case records, yielding a total of 40 cases from 1995 to 2007. According to NGSAR members, this represents 50 to 75% of incidents in this time period. The names of 76 individuals assisted during that time were extracted from the case files and a former NGSAR member helped identify the current age and place individuals into gender and age categories for case characterization and analysis.

A request under the Access to Information Act was filed with the RCMP in October 2010 seeking access to missing persons occurrence reports for searches, rescues, or recoveries carried out or authorized by the RCMP; occurring outside the town limits of Nain; and occurring between November 1 to June 15 for the years 2005 to 2010. Reports from before 2005 were deleted by the RCMP and were no longer accessible. Files for 11 cases were received in December 2010.

We received federal search and rescue data for Labrador inland (search area 060)

and Labrador offshore (search area 009) from 1995 to 2009 from the federal Fisheries

and Oceans Canada (DFO) in January 2010. DFO manages federal SAR data. In total

there were 116 cases for Labrador inland and 406 cases for Labrador offshore from 1995

to 2009, excluding false alarms and aeronautical incidents. Identifying information had

been removed from all case data. The area of interest was identified with the help of

NGSAR members, and 85 cases were identified for the Nain area bounded by the western

Labrador border, the southern border of Torngat Mountains National Park north of Nain,

along the outer islands of the coast, and the 56°N parallel just north of the community of

Natuashish (Fig. 4.1). Twenty-four commerical fishing and marine transportation cases

and 27 medical evacuations from Nain were excluded, yielding 38 cases total for 1995 to

2009.

Data from the three sources were merged into a single database and cross-checked

for overlap. For simplification, analysis of cases in both NGSAR and RCMP sources are

attributed to NGSAR, and cases in NGSAR or RCMP and DFO sources are attributed to

NGSAR or RCMP, respectively.

4.3 Results

4.3.1 The context of search and rescue in Nain

As reported by NGSAR and RCMP consultants, the volunteer-based Nain search

and rescue team (NGSAR) is the main group that carries out search and rescue operations

in the Nain area and is mainly active during the winter season. The group began in the

early 1990s in response to tragic incidents on the land and the desire to improve search

and rescue response time and effectiveness. The RCMP in Nain helps coordinate and

sanctions searches and allows for the provision of resources to NGSAR based on the

provincial Emergency Measures Act.

For searches on the land and ice that are challenging because of weather, or those

which cannot be successfully resolved locally, the RCMP will contact the federal Joint

Rescue Coordination Centre (JRCC) in Halifax, Nova Scotia – one of three federal SAR

centres in Canada jointly operated by the Department of National Defence (DND) and the

Canadian Coast Guard (CCG) (Canadian Forces Canada Command, 2009). If the JRCC

determines that the situation meets their criteria, they may mobilize their own air support

resources.

4.3.2 Search and rescue trends

SAR data retained for analysis in this study included 49 cases representing 113

individuals handled locally in the Nain area between 1995 and 2010. Of these, 40 cases

were identified in NGSAR records, including two cases which also appeared in RCMP

records, and nine cases were identified in RCMP records only. DFO records indicated

that an additional 34 federal cases representing 105 individuals took place between 1995

and 2009 in the same area (two cases overlapped with NGSAR records and two with

RCMP records). Taken together, the data show 83 cases representing 218 individuals

occurring in the Nain area between 1995 and 2010. When viewing the number of cases or

the number of individuals assisted per year over time (Fig. 4.3), no clear temporal pattern

is evident.
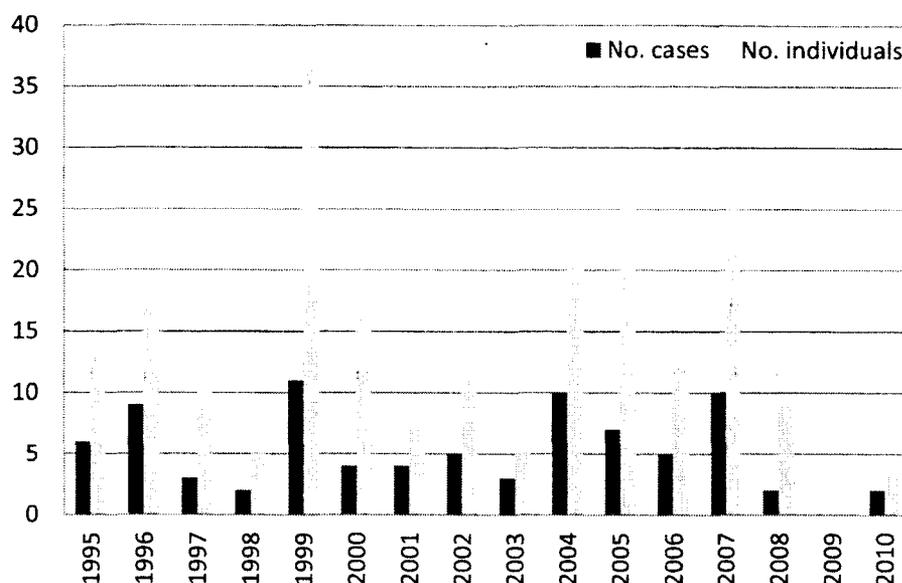
Figure 4.2. Number of Nain cases and individuals assisted per year based on NGSAR, RCMP, and DFO sources

The reason for SAR initialization was reported for 45 (54%) cases, all from

NGSAR and RCMP sources. A report that a traveller was overdue was the most frequent

mode of SAR initialization, as it was the reason for SAR initialization in 78% of cases

where the reason was known. In a minority of cases, SAR was initiated because of

notification by the travellers themselves by satellite phone or notification by another

traveller. The activity of the individuals in distress was unknown in over 43% of total

cases; for the remainder, the activities that were identified the most frequently (30% of

cases each) were hunting and wooding (collecting wood for fuel). RCMP consultants

reported that most searches are initiated at night after people have been reported overdue

by their families, but usually the search will not commence until the morning. An

NGSAR consultant reported that most searches take place on the weekend because of

higher frequency of travel by people on weekends, either because they or their travel

companions work during the week.

Gender was identified for 82 (38%) individuals, primarily from NGSAR records. For these cases, 71 (87%) of the individuals assisted were male, 11 were female. The ages of 67 (31%) individuals assisted were identified, predominantly from NGSAR records, and for those individuals, over half (52%) were 21 to 40 at the time they were assisted. There were no clear patterns in changes in ages of people receiving assistance over time. According to the NGSAR consultant, there is no trend in profile for the people required assistance except that they are typically male, which is corroborated by SAR data. He reported that often travellers in their twenties will use Global Positions Systems (GPSs) and travel in groups so can help each other in case of challenges, while the people they assist tend to be middle-aged male travellers who have gone hunting by themselves and have broken down or encountered other obstacles. However, this is not clearly reflected in the data, where the frequency of individuals in need of help was 32% lower for those over 40 compared with the under 40 group.

Some indicator of health status was included in 24 cases (29%) involving 62 people, all from NGSAR or RCMP records. Those receiving assistance were described as "fine" or "okay" in 13 cases involving 41 people, and as experiencing an impact on their physical health in the remaining cases (34% of cases where health status was known), with all of these incidents occurring during the ice season. Individuals were tired because of extreme exertion from walking long distances in two cases with three people and hungry in two cases with four people. Six cases involving 12 people described those being assisted as being exposed to extreme or prolonged cold. While the details in the records regarding the impact of cold exposure were vague, three people were described as cold; one person as having nearly frozen feet; seven people as almost freezing, including

one person that was described as "blue, black, and yellow"; and one had perished from

cold exposure. In the remaining case, two individuals perished by drowning after falling

through the ice. There were no trends in frequencies of health impacts over time.

The majority of cases from DFO records took place between June and October, as

65% of cases from DFO records were boating-related (Fig. 4.3). However, 96% of the

incidents handled on a local level by NGSAR and the RCMP took place from November

to May, during the time of year when residents typically travel by ice, and with 53% of

cases taking place in February and March. These data corroborate information from key

consultants, who reported that most searches take place in winter, from January to March

in particular.
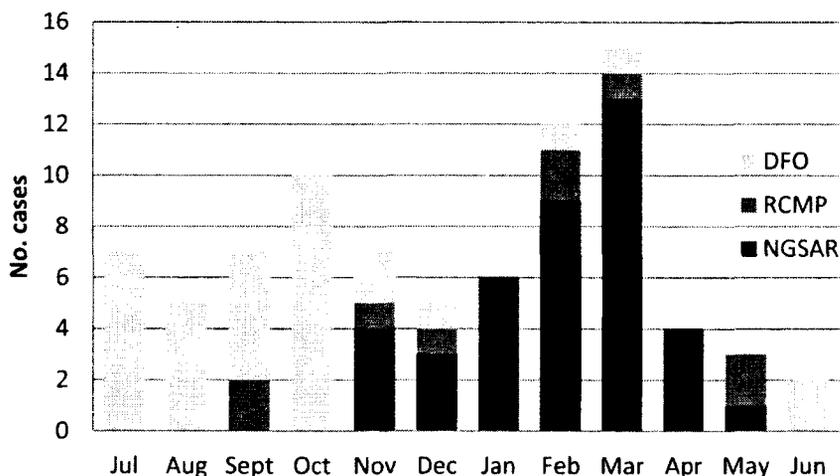
Figure 4.3. Number of Nain search and rescue cases per month based on NGSAR, RCMP, and DFO sources

Weather and ice conditions were the single most frequent contributing factor for

cases. Weather and ice conditions were a contributing factor for 58% of cases in NGSAR

records, 100% of cases in RCMP records, and 24% of cases from DFO records (Fig. 4.4).

However, no trends are apparent in terms of the reported cause or contributing factors to

the need for a SAR effort over the time span of the records regardless of the record

source. Further, there are no trends over time in the number of cases during the critical

sea ice travel season (Fig. 4.5). NGSAR consultants reported that most searches are on

the sea ice, as that is the main route of travel and that causes of most searches tend to be

blizzard conditions, running out of gas, or snowmobile breakdown. At a meeting,

NGSAR members explained that there are typically many snow storms in March which

account for many cases, and that as the weather becomes milder in spring, snowmobile

engines tend to overheat and this may contribute to mechanical breakdowns. Further, it

was reported that a typically higher occurrence of fog at this time of year than in other

seasons may cause navigational error. This observation complements results that show

where weather or ice conditions were a factor, mechanical failure was also a contributing

factor 25% of the time, more than any other secondary factor.
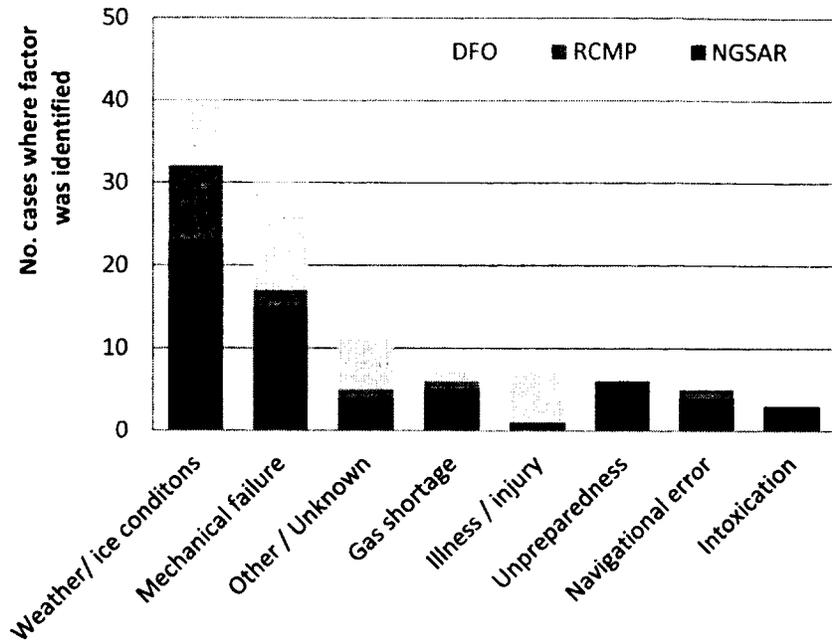
Figure 4.4. Contributing factors for Nain search and rescues based on NGSAR, RCMP, and DFO sources
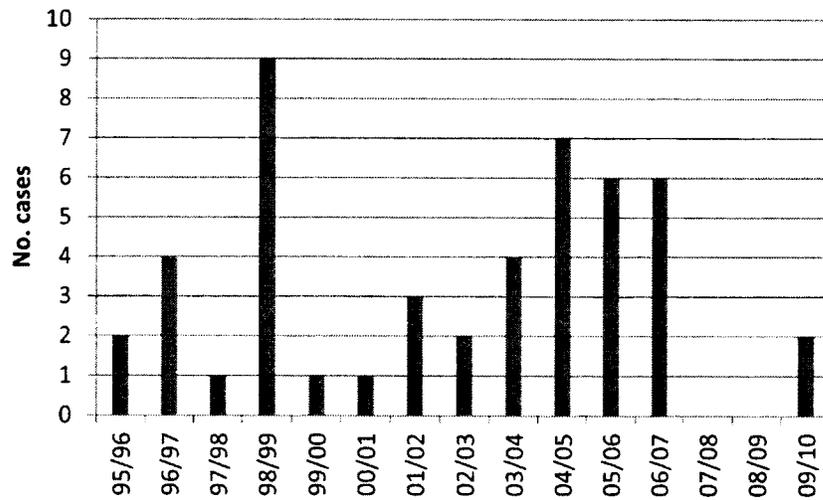
Figure 4.5. Number of Nain cases per critical ice travel season (November to May inclusive) based on NGSAR, RCMP, and DFO sources

4.4 Discussion

This study analyzed SAR incident and injury data spanning 1995 to 2010 for the Nain area in Nunatsiavut, northern Labrador. SAR data show 83 cases involving 218

individuals, representing just over 5 cases annually from 1995 to 2010. These data

represent an estimated average annual incidence rate of 19 individuals per 1000, a rate

derived by using Nain Aboriginal population data and harvesting participation data for

Nunatsiavut from the 2006 Aboriginal Peoples' Survey to estimate the total Aboriginal

population in Nain eligible for SAR incident involvement (Table 4.1) (Statistics Canada,

2007b, 2008). Data showed that weather and ice conditions were the single most frequent

contributing factor for cases, and that nearly all cases managed locally by NGSAR or the

RCMP took place during the ice season. These results indicate that environmental

influences are critical factors contributing to health risk in Inuit communities, and that

land-based health risk is associated with the use of sea ice in the winter months in

particular. Given the limited nature of data on injury epidemiology for Inuit (GNWT,

2004; Légaré, 2007; Young, 2003), very little is understood about environmental

influences on injury and trauma in northern communities. In the Nunavik Inuit Health

Survey, 13% of injuries reported resulted from snowmobile use (Légaré, 2007). However,

we do not have cause-specific injury data for Nunatsiavut, as no questions on injuries

were asked in the Inuit Health Survey in Nunatsiavut (M. Wood, personal

communication, Dec. 17, 2009). Given the disproportionately high rates of unintentional

injuries in among Inuit (ITK, 2010), these results create a strong basis for conducting

further investigation into the relationship between environmental influences and

unintentional injury in northern communities.

Table 4.1. Total number of individuals in SAR cases and average annual incidence rate for SAR involvement of individuals from 1995 to 2010 for the Aboriginal population in Nain by gender and age

Group	Gross number of individuals	Estimated avg. annual incidence rate per 1000*
Gender		
Females	11	2
Males	71	12
Age		
15–25	12	6
26–35	24	14
36–45	12	7
46–55	7	5
56 and over	10	8
Total	218	19

*Estimated eligible population for SAR involvement based on total Aboriginal population in Nain in 2006 (Statistics Canada, 2007b) and the percentage of the adult population in Nunatsiavut that harvested country foods in 2005 based on gender and age (Statistics Canada, 2008). Age ranges are estimated, as Statistics Canada data age ranges differ by one year from ranges for SAR assisted individuals.

Results do not indicate trends over time in the number of cases or the number of individuals assisted per year from 1995 to 2010, trends in the number of cases during the ice season over time, or trends in the percentage of cases where ice and weather were a contributing factor over time. These results may indicate that 1) changes in weather and ice conditions have not had a significant impact on land-based incidents; 2) SAR data – as a method of surveillance – is not sufficiently sensitive to detect impacts from changing environmental conditions on experiences of injury and trauma reported in communities thus far, or 3) environmental and social or other factors are offsetting each other, such that clear trends in SAR events projected and perceived by community residents in association with changing environmental factors are not discernable. Based on the perception and reports of increasing accidents related to changing ice and weather conditions in Inuit communities (Ford et al., 2008a; 2009; Furgal et al., 2002; Gearheard,

2006; Nickels et al., 2006), we suggest that the latter two interpretations are more likely to be accurate. This raises important questions about the underreporting of incidents of injury and trauma related to changes in ice and weather conditions, and the role of other factors that may be influencing land-based safety or search and rescue practices.

Our results also show that 34% of individuals, or 21 people, sustained minor to severe health impacts during winter travel in cases where health status was indicated, including three deaths. This rate of physical impact is concerning, particularly because these data represent only a portion of impacts sustained between 1995 and 2010 by Nain residents when travelling on the ice and land. First, this is related to inconsistent recording of health status in NGSAR and RCMP records and limited health information (mortality rates only) in DFO records, resulting in the underreporting of morbidity. Second, our data set does not capture all SAR incidents between 1995 and 2010 as 1) the NGSAR data set represents only 50–75% of incidents in which NGSAR assisted; 2) RCMP data is missing before 2005; and 3) the RCMP categorizes all SAR incidents as Missing Persons, and because of this method of categorization, relevant cases may have been omitted in the Access to Information data release. However, there may also be an overrepresentation of cases from DFO records, as limited case details meant that we could not ensure that only cases involving Nain residents were included in our dataset. Third, many incidents on the land and ice in Nain are managed without SAR assistance. Key consultants reported that the vast majority of incidents on the land and ice are managed by travellers independently or with support from friends and family from the community. Given these issues of underreporting, we argue that these data represent a small portion of the injury and trauma sustained by Inuit in Nain related to travel on sea

ice, and that the potential future influence of changing environmental conditions on injury and trauma remains poorly understood.

Results of this study also indicate that age and gender are important risk factors for SAR incidents, which corresponds to injury mortality and morbidity risk factors for drownings and off-road vehicle collisions in the NWT (GNWT, 2004). The Nunavik Inuit Health Survey also reported that men are significantly more at risk for injury than women based on self-reported data (Légaré, 2007). In our study, male travellers were six times more likely to need SAR assistance than female travellers, and the estimated annual incidence rate also demonstrates a six times higher likelihood of SAR-involvement by males (Table 4.1). These results indicate gendered travel and hunting practices in Nain that translate into differential health risk experiences. Further, over half of individuals in cases from NGSAR and RCMP records where age was identified were 21 to 40. The age group of 26 to 35 also had the highest estimated annual incidence rate (Table 4.1). Intoxication was the least common factor associated with SAR incidents, being identified as a contributing factor in only 3 cases. This result is not corroborated by other health risk research for northern communities, as intoxication was identified as one of the most important risk factors for injury in the NWT (GNWT, 2004). Alcohol was a contributing factor in 23% of traffic crash-related injuries between 1991 and 2001 in NWT (GNWT, 2002), and 58% of NWT residents surveyed identified alcohol as the main reason for injury in their communities (GNWT, 1999). In Nunavik, 32% of ATV or snowmobile drivers over 15 surveyed reported having driven under the influence of drugs or alcohol in the year prior to the survey (Légaré, 2007). However, participant observation conducted during this study, and which we have not reported on here, indicates that there

may be place-based differences in alcohol consumption patterns related to vehicle use in town compared with travelling on the ice. This potential explanation indicates the need to consider how place influences the role of risk factors for injury and trauma more in-depth.

We acknowledge a number of limitations, many of which relate to gaps in each data set and which we have noted in detail above. These gaps contribute to there likely being more SAR cases and incidents of land-based injury and trauma during the time period covered by this study than we have been able to identify. The decision to use descriptive analysis means that we have not established statistical significance of results. The lack of data on land-use participation according to age and gender in Nain and the necessity of relying on regional data to estimate incidence rates is also a limitation. Nonetheless, this study makes an important contribution in an area of growing health concern where existing research is sparse.

4.5 Concluding comments

This study shows that environmental influences are associated with increased physical health risk in Inuit communities, particularly during the winter season when northerners typically travel on sea ice. We have also identified the importance of considering the role of gender and age as risk factors for land-based injury and trauma. However, our study has also identified issues of underreporting of land-based injury and trauma and the inadequacy of current injury surveillance systems. This is compounded by the lack of existing injury epidemiology research on the influence of environmental factors on land-based injury and trauma for Inuit and other Aboriginal populations in Canada. In light of already disproportionately high injury rates in Inuit regions and

concerns about increases in injuries due to rapidly changing ice and weather conditions,

we see an urgent need to expand and improve monitoring of incidents on the ice and

related health impacts to capture injury rates and changes over time.

5 EXPLORING THE ENVIRONMENT AS A DETERMINANT AND PLACE OF INDIGENOUS HEALTH

This chapter consists of a paper that addresses Objective 2, which is to investigate the perspectives of Inuit and Kablunângajuit sea ice users on the relationship between using sea ice and health. It integrates population health and social epidemiology approaches with health geography to understand how interaction with one element of the natural environment influences health in complex positive and negative ways, and how the meanings of that 'place' make a difference to health. Thus, this chapter explores impacts and benefits from sea ice use related to physical, mental, social, cultural, and economic/material health and wellbeing, as well as emergent themes around place. It is written in manuscript format for submission to *Social Science & Medicine*, with co-authors C. Fugal and M.W. Skinner.

5.1 Introduction

While the environment is a key determinant of health for all people, it is a particularly important determinant of health for Indigenous populations, as environment and health connections are informed by culturally-specific Indigenous epistemologies and ongoing connections to traditional lands (WHO, 2007). A growing body of literature has explored the unique connection between Indigenous peoples and the environment, describing how, broadly speaking, health and wellbeing for Indigenous peoples are contingent on maintaining balanced and reciprocal relationships between all elements of the natural world (Cajete, 1999; Colomeda, 1999; Haudenosaunee Environmental Task Force, 1999; McGregor 2004; Nettleton, 2007; RCAP, 1996; Richmond and Ross, 2009; Waldram et al., 2006). For instance, Nettleton et al. (2007) explored Indigenous

perspectives on health and environment in communities in Cambodia, Laos, Guatemala, Namibia, and Burma, and found that Indigenous respondents in these diverse locales viewed their health as dependent on the wellbeing of their community and environment. Kingsley et al. (2009) identified a strong link between caring for country, or traditional land, and the health and wellbeing of Indigenous communities in south-eastern Australia. Panelli and Tipa (2007) identified the strong connection between environment and health for Maori based in Maori culture and worldview, and argued for the importance of expanding and enriching current articulations of health and wellbeing by exploring its cultural and place-based dimensions. Despite these contributions, there are still gaps in our understanding of how Indigenous peoples view the influence of the environment on health due to the cultural specificity and place-based nature of these relationships. For example, few scholars have examined Inuit perspectives on health in relation to the environment (Cunsolo Willox et al., 2012; Nickels et al., 2006; Pufall et al., 2011; Richmond and Ross, 2009), leading to an underrepresentation of Inuit perspectives in the literature on Indigenous health and environment connections. Enriching our understanding of the diversity of ways that the environment acts as a determinant of Indigenous health, and the culturally-embedded and place-based nature of health perspectives and experiences, is valuable and can expand our understanding of the connections between health, place, and culture more generally. Further, place-based and culturally-specific knowledge can be transformed into action to promote environmental health at the local level.

This paper examines the role of environment for Indigenous health by investigating the relationship between one key element of the environment and diverse

aspects of health in an Inuit community in northern Canada. Sea ice is a key element of the environment for Inuit, making critical contributions to health and livelihoods (Furgal and Seguin, 2006; Van Oostdam et al., 2006). The significant health implications of modification of the Arctic environment by climate change (Anisimov et al., 2007; Berner et al., 2005; Furgal, 2008), and already disproportionately high unintentional injury and trauma rates in Canadian Arctic communities (ITK, 2010), have created an urgency around investigating health influences of Inuit sea ice use. Propelled by these health needs, we conducted a community-based participatory research (CBPR) project to examine how Inuit and Kablunângajuit sea ice users in the community of Nain in the Labrador Inuit Settlement Area of Nunatsiavut in Labrador, Canada view the influence of using sea ice on health. We conducted a case study (Stake, 2005) with a sequential mixed methods design (Creswell, 2009). Our theoretical approach draws on population health and health geography. In this paper, we report results from the qualitative stages of our study, involving two focus groups with expert sea ice users and 22 individual interviews with a range of sea ice users. The project involved university-community research collaborations with the Nunatsiavut Government (NG) Division of Environment, the semi-autonomous government body in Nunatsiavut, and Nain Ground Search and Rescue (NGSAR), a volunteer-based search and rescue team made up primarily of hunters who are also residents of Nain.

This project originated with the concern in Canadian Arctic communities regarding increasing unintentional injuries and trauma ("accidents") and anxiety associated with changing ice and weather conditions, including reports from the community of Nain (Ford et al., 2008a, 2009; Furgal et al., 2002; Gearheard, 2006;

Nickels et al., 2006). Sea ice safety was identified as a priority research area in the

region, particularly after unusually mild winter conditions in 2009/201010 and the

impacts on residents of Nain and other communities along the Nunatsiavut coast. An

ongoing collaboration between the second author and the NG, coupled with interest in

collaboration by NGSAR, led to the collaboration on this project.

5.1.1   The context of Inuit sea ice use in Arctic Canada

Literature has identified a strong relationship between Inuit and components of the

Arctic environment in which they live (Freeman, 1976; Krupnik et al., 2010; Pelly, 2001;

Pufall et al., 2011; Richmond and Ross, 2009). Laugrand and Therrien (1999) described

that for Inuit, health is based in a harmonious order in which the mind and body are

linked to the physical, animal, and social environments in which a person is embedded.

According to Inuit Tuttarvingat, the Inuit centre of the National Aboriginal Health

Organization (NAHO), Inuit health is linked to the health of the environment in which

they live, because of the close connection Inuit have with the land and dependence on

land-based resources for food and shelter (NAHO, 2011). Sea ice is a critical element of

the Arctic environment for Inuit, as for much of the year it forms an extension of the land

that allows Inuit to move freely across their homeland (ICC-C, 2008). Networks of trails

on or crossing sea ice allow Inuit to access wildlife species, which are important for food

resources and livelihoods (Furgal and Seguin, 2006; Van Oostdam et al., 2005), and sea

ice is used for accessing places that are imbued with cultural and emotional significance

from personal and historical connections (Aporta, 2004, 2009; Henshaw, 2006). Despite

the strong cultural link between Inuit and their territories and dependence on land-based

resources for health and livelihoods, few studies have investigated the relationship

between health and place specifically among Inuit (Blakney, 2009; Cunsolo Willox et al., 2012; Jardine et al., 2009).

In addition to positive health influences, the variable and challenging Arctic environment means travel on sea ice can also bring about negative physical health impacts from experiences such as cold exposure or falling through the ice (Berner et al., 2005; Furgal, 2008). As injury epidemiology data for Aboriginal populations in Canada, including for Inuit, is limited (GNWT, 2004; Légaré, 2007; Young, 2003), the relationship between environmental exposure and injury and trauma in Inuit communities is still poorly understood. This knowledge gap is significant as mortality rates from unintentional injuries are disproportionately high in Canadian Inuit regions: from 1999 to 2003, the age-standardized mortality rate from unintentional injuries was 4.3 times higher in Inuit Nunangat (Inuit lands) than Canada as a whole (ITK, 2010). Reducing unintentional injuries and drownings related to poor ice conditions has been identified as an important strategy for addressing the disparity in injury and mortality rates between Inuit and non-Inuit Canadians (GNWT, 2007; Pauktuutit Inuit Women of Canada, 2010).

Investigating the relationship between environment and health for Inuit in the context of sea ice use has become more urgent, as Inuit-environment relationships are currently being influenced by modifications to the environment by climate change and variability (ACIA, 2005; Furgal, 2008; IPCC, 2007). Communities in the Canadian Arctic have been reporting concerns about increasing injuries, trauma, and anxiety associated with changing ice and weather conditions and impacts on their ability to predict conditions (Ford et al., 2008a, 2009; Furgal et al., 2002; Gearheard, 2006; Nickels et al., 2006). While all regions with sea ice cover in Canada's North have shown a decline

in summer sea ice coverage from 1968 to 2010, the largest rate of decline was in the northern Labrador Sea along the coast of Nunatsiavut, where sea ice shrank by 73% in this time span (1,536 km^2 or 17% per decade) (Henry, 2011). Observations of changing sea ice conditions in the Canadian Arctic and Inuit vulnerability or resilience to changing sea ice conditions have been documented in a growing body of literature (Anisimov et al., 2007; Berkes and Jolly, 2002; Berner et al., 2005; Ford et al., 2009; Laidler et al., 2009; Nichols et al., 2004; Nickels et al., 2006). Recent literature investigating human health impacts from climate change for Inuit populations has identified the potential for environmental changes to exacerbate existing physical health impacts from environmental exposure, such as cold-related morbidity and mortality and unintentional injuries and trauma (Anisimov et al., 2007; Berner et al., 2005; Furgal, 2008; Furgal et al., 2002). However, as Furgal (2008) notes, few studies have investigated the impacts of changing environmental conditions on mental, emotional, and cultural health for Inuit. Consolo Willox et al. (2012) explored how changing local landscapes and subsequent disruption of land use practices due to climate change is having negative impacts on mental and emotional health for residents of Rigolet in Nunatsiavut, Canada, with implications for sense of place and place attachment. The authors argued for the need to incorporate a consideration of place into investigations of climate change impacts and adaptations. We agree, but would argue that even more fundamentally, the way in which place-meanings and health perspectives shape and are informed by use of the environment among Inuit, as well as the positive and negative influences of environmental exposure on diverse aspects of health, still remain poorly understood and need to be investigated.

5.1.2 Theoretical approach: Weaving together population health and health geography approaches

Our theoretical approach draws on population health and health geography approaches to understanding the relationship between environment and health. Population health is an approach to investigating disparities in health and disease outcomes for different social groupings (Labonte et al., 2005), and which draws on epidemiology and social epidemiology. Population health literature and practice have been key to establishing the importance of the environment as a determinant of health (ACPH, 1994, 1996; Lalonde, 1974). Physical environments are identified as a determinant of health in the population health framework in Canada, along with eleven other determinants (PHAC, 2003). Given that the importance of the environment to health has been well established in epidemiological and social epidemiological literature and public health policy, we are applying this wealth of knowledge to illuminate health and environment connections in the context of our case study.

Nonetheless, the way in which environment is conceptualized and operationalized in social epidemiology and population health approaches is not without criticism (Cutchin, 2007; Masuda et al., 2010). Cutchin (2007) argued that social epidemiology undertheorizes the environment as 'place' by considering it solely in spatial terms; overemphasizes generalizable research on health-environment connections, as opposed to valuing the specificity of finding to place; and predominantly considers culture in terms of ethic or racialized difference in relation to socio-economic status, thus neglecting to explore how culture shapes values including perspectives on health and wellbeing. He forwarded the argument that geographic thinking needs to be incorporated into social epidemiology and public health to address these limitations. We suggest that these

concerns are especially salient in the context of Indigenous health-environment connections, given that health and environment are socially constructed, culturally-mediated, and historically-situated (Adelson, 2000; Demeritt, 2002), and that Indigenous populations have unique historical, cultural, and social contexts and connections with their environment (WHO, 2007).

We drew on recent developments in health geography to integrate a consideration of place and the way culture shapes health-environment interactions into our investigation of Inuit health-environment relationships. Health geography literature focuses on the importance of place to health and has made an ongoing theoretical project of illuminating an understanding of place as a context for the intersections of cultural, political, social, and economic influences on health (Kearns and Collins, 2010; Kearns and Moon, 2002). Work in this field has explored the experience of literal place as well as experiences of 'place-in-the-world' and 'sense of place' (Kearns, 1993; Hay, 1998), and theorized the intersections of cultural, political, economic and symbolic factors represented by the notion of 'landscapes' (e.g., therapeutic landscapes) (Gesler and Kearns, 2002; Kearns and Moon, 2002; Williams, 2007). In our view, integrating key developments from health geography – that is, the notion of place, a concern for wellness or wellbeing, and a concern for the role of culture in how particular sites influence health – into a determinants of health approach and population health framework creates a flexible theoretical space for understanding and interpreting place-specific health perspectives and experiences. Indeed, we found that such a flexible theoretical approach was necessary to accommodate the full range of perspectives that emerged in this study. We integrated these theoretical approaches by creating a model of health influences from environmental

use and exposure, and the role of meanings of place that arise from these experiences, based on our findings (Fig. 5.1). This model is presented in the Discussion.

5.2 Methods

5.2.1 Community-based participatory research design

We employed a case study approach (Stake, 2005) with a sequential mixed methods design (Creswell, 2009) that emphasized community collaboration at all stages of the research and practical research outcomes that could translate into action at the community level. Our approach was informed by the CBPR framework outlined by Fletcher (2003), and numerous writings from Indigenous scholars in particular on the need for research in their communities to be ethical, transformative, and participatory in its means and ends (Denzin et al., 2008; Smith, 1999; Wilson, 2008). Other scholars have also identified the need for increased community-based research approaches in social science health research (Wilson and Young, 2012) and in research on human dimensions of environmental change (Ford and Pearce, 2012). As non-Indigenous researchers, we used community engagement as a strategy to help ensure that the project addressed community needs and goals, and prioritized self-reflexivity.

In this paper, we are reporting results specific to the qualitative stages of the study, involving focus groups and interviews that explored the perspectives of sea ice users regarding the influences of sea ice use on health. Ethics approval for this research was granted by Trent University's Research Ethics Board and the Nunatsiavut Government Research Advisory Committee. In all cases, participants provided their informed consent, including for the publication of their identities, words, and ideas.

5.2.2 The case study: Nain, Nunatsiavut, Canada

The community of Nain is the northernmost community on the east coast of Labrador (N56°55, W61°68), in the Labrador Inuit Settlement Area of Nunatsiavut (Fig. 1.1). While Inuit had been living on the Labrador coast since time immemorial, the site of the current community was officially established by Moravian missionaries in 1771 (LIA, 1977). In 2006 the population was 1,034, of which 950 people identified as Aboriginal (Statistics Canada, 2007b). Nain is a fly-in community located on an inlet on the Atlantic Ocean protected by islands and surrounded by hilly and rocky terrain. The climate is classified as sub-arctic, and land-based activities are important for tradition, livelihoods, and health of residents. For instance, in Nunatsiavut, over three-quarters of adults harvested wild foods from the environment for sustenance in 2000 (ITK, 2008). South of Nain, Vale Newfoundland and Labrador operates a nickel-copper-cobalt mine, to which there is some winter shipping across the sea ice (Vale Newfoundland and Labrador, 2012).

5.2.3 Data collection

Before data collection was initiated, a preliminary trip to Nunatsiavut was made in February 2010 to consult on the study plan and build relationships with residents and government representatives. In July 2010 we conducted two focus groups (Morgan, 1997) with nine Inuit and Kablunângajuit expert sea ice users to explore perspectives on what sea ice use means to health. To ensure rigor and control for any sampling bias in selecting local experts (Davis and Wagner, 2003), we recruited participants through a multi-step peer-recommendation process. Research assistants and NG collaborators generated lists of individuals who would be able to identify sea ice expert users in the community. After

cross-referencing, three individuals were selected that identified people that were: 1) Nain residents for 20 years or more; 2) frequent sea ice users and experts on the local environment as recognized by others; and 3) beneficiaries of the Labrador Inuit Land Claims Agreement (LILCA). Individuals with more than one mention were prioritized for recruitment, carried out by local research assistants. The male focus group had five participants, including one Elder, and was conducted in English with sequential interpretation-translation into Inuttitut. The female focus group had four participants and was conducted in English. In addition, we conducted one unstructured interview (Bernard, 2000; Corbin and Morse, 2003) with an Elder from the male focus group as a follow-up to explore health terms and concepts in Inuttitut in the context of using sea ice.

We then conducted 22 semi-directed interviews (Huntington, 1998) with community members in Nain in November 2010 that use sea ice for travel and hunting to explore a range of perspectives on health benefits and impacts of sea ice use. We used a non-proportional quota sampling method (Miles and Huberman, 1994) to ensure representation of different risk and health perspectives based on the following criteria: gender; search and rescue status (whether the person had received assistance or not, which was selected as an indicator of exposure to sea ice travel hazards and formal assistance); and years of experience travelling on sea ice (more or less than 20 years, which was chosen as a threshold to indicate longer-term exposure to the sea ice environment and accumulated travel knowledge). NGSAR searchers independently generated lists for each category. After pooling lists and removing duplicates, participants were selected from each list randomly and recruited by local research assistants. Grid placement was updated based on verification and self-identification by participants. Two

interviews were conducted with interpretation-translation into Inuttitut. We were unable to recruit participants successfully for two of the categories, as there were very few potential individuals and they were unavailable or uninterested in participating (Table 3.5).

Focus groups and interviews were recorded by digital audio recorder (when consent was given) and notetaking, and compensation was provided. We also employed participant observation (Creswell, 2007) to build interpersonal relationships and improve our understanding of sea ice travel experiences and practices. The lead author participated in four single and multi-day trips on the sea ice in March and May, 2011 in the Nain area and recorded reflections and observations from these trips and other events and interactions.

5.2.4 Analysis

Focus groups were transcribed by the lead author. The Inuttitut portions of the recording with male participants were transcribed into Inuttitut by a different interpreter-translator who verified the verified the accuracy of the original translation. Interviews with community members were transcribed by a private transcription firm, and all transcripts were reviewed by the lead author for accuracy and reliability (Creswell, 2007; Davis and Wagner, 1997). Focus groups and interviews were analyzed using thematic content analysis (Berg, 2001; Esterberg, 2002) using QSR International's NVivo 8 software. An intercoder reliability check (Bernard and Ryan, 2010) on the coding structure, clarity of the codes, and code application was conducted. Agreement in code application was over 80% for all but one code, resulting in adjustments in code constructs and application. The presentation of the findings according to health sub-themes is based

on part of this coding structure. Participant observation notes were memoed and coded manually.

Member checking (Onwuegbuzie and Leech, 2006) was employed by conducting three meetings with focus group participants and one meeting with semi-directed interview participants in March and May, 2011 to review the validity of constructs and interpretations. Participants who attended relayed general agreement with representations of the focus groups and interviews, but all attendees also made corrections or added new data. Notes taken during the meetings were coded, and feedback was used to make adjustments and improve analysis. Participants also edited and approved the use of selected quotes and chose to be identified by their name or initials, or remain anonymous.

5.3 Results

Expert travellers and nearly all[6] community members described a strong positive link between travelling on sea ice and their health (Table 5.1). Forms of health and wellbeing that participants reported as being influenced by using sea ice included mental and emotional, physical, economic/material, cultural, and social. Further, expert travellers and nearly all community members reported on the importance of hunting and just being on the ice to their health overall, without necessarily specifying the form of health that is influenced by these activities. To differentiate these reports from those which reported on specific forms of health influenced by sea ice use, we have grouped them under the theme "emerging place themes", because of the emphasis on the meanings and uses of sea ice as a 'place' by participants.

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[6] Expert traveller results are presented as presence/absence for the male (MET) and female (FET) group. The scale for representation of community members (n = 22) reporting on various themes is: few, 1-20%; some, 20-40%; many, 40-60%, most, 60-80%, nearly all, 80-100%.

Table 5.1. Summary of references for expert travellers and representation of community members reporting on different forms of health and emerging themes related to place uses and experiences

	References by expert travellers*	*Representation of community members*
Forms of health		
Mental / emotional	Some – primarily benefits, some impacts	All – primarily benefits, some impacts
Physical	Some – primarily impacts, few benefits	Nearly all – primarily impacts, some benefits
Economic / material	Few – some benefits, some impacts	Most – primarily benefits, some impacts
Social	Few – all benefits	Many – all benefits
Cultural	Few – all benefits	Some – all benefits
Emerging place themes		
Experiences of (being on) the sea ice as place	Many – all benefits	Nearly all – all benefits
Sea ice as a platform for hunting	Few – all benefits	Nearly all – all benefits

*Scale for expert traveller references (n = 88) and community member representation (n = 22): few, 1-20%; some, 20-40%; many, 40-60%, most, 60-80%, nearly all, 80-100%

Many community members interviewed said that they had never had an experience where "going off" on the ice had been bad for them or bad for their health. A few community members responded that travelling on the ice had been bad for them when it was stressful because of certain ice conditions or because there were impacts on their body from falling through the ice or trying to avoid falling through. However, a few community members struggled with how we framed the question of whether travel on sea ice had ever been bad for their health. They explained that even though they had experiences with negative health impacts from travel on sea ice, that was less significant to them than the health benefits, and further, they saw difficulty and hardship on the land as simply part of the experience of being on the land:

> It's just living for us, we love it. We love the bad weather and we love the fine weather and we love the danger. We love the bad ice, we love the bad land and good land. Otherwise we wouldn't go through all that. Just stay at home in Nain and not do it, and not go out. You got to – in order to love the land, you got to

accept the bad things that comes with it. The danger, the bad stuff. It can't always be good. If it was, too good to be true. (MD)

Further, FET and a few community members also described what it would mean for their health if they could not go on the ice or if there was no ice in the future. Participants described how they would "have no health", feel like they "can't breathe", "get sick", "be bored", "get old and sick faster", "be very sad", "be lost", "go crazy"; that their "appetite and my mind would go"; or that they could see themselves "getting really depressed and not wanting to live."

5.1.1 Physical health

Of the reports by community members on physical health influences from using sea ice, most references related to negative impacts, which were reported by nearly all community members (Table 5.2). Reports by expert travellers on physical health were also nearly all related to physical impacts. Some community members also described positive physical health benefits.

Table 5.2. Physical influences from using sea ice reported by expert travellers and community members

Physical influences	References by expert travellers*	Representation of community members	Details of description
Strain, tiredness or discomfort from physical exertion during travelling	Some	Most	• Travel being "rough" on participants' bodies due to ice/snow conditions (rough ice, slush, deep snow), weather (precipitation, high winds) and travel practices (long travel days)
Discomfort or hypothermia from falling through the ice	Some Some	Few Few	• Discomfort or hypothermia from personally falling through the ice • Incidents where others had fallen through the ice, including twelve drownings that included two people falling through the sea ice in spring at night at Itilialuk in 2006 and perishing ('Itilialuk tragedy')
Injuries from unintentional impacts	Few	Few	• Injuries participants or others sustained from unintentional impacts while travelling on sea ice (hitting rough ice and flipping) or land (falling related to poor visibility), including three hospitalizations and one death
Impacts from cold exposure	–	Some	• Impacts participants or others had experienced due to cold exposure, such as discomfort, frostbite, or hypothermia, including one death
Physical activity	– Few	Some Few	• Health benefits related to being physically active • "Good" feeling for the body from travelling on the sea ice

*Scale for expert traveller references (n=34) and community members (n=22): few, 1-20%; some, 20-40%; many, 40-60%, most, 60-80%, nearly all, 80-100%

Expert travellers and some community members reported that changing sea and freshwater ice and weather conditions have impacted their physical health or the physical health of others. Expert travellers and some community members reported changes in the quality and strength of the sea ice and impacts on their safe navigation, and two participants described these changes as the reason for having fallen through the ice in the recent past. Certain ice formations, such as pressure ridges, were along routes in the winter of 2009 to 2010 where they had never been seen before, and caused very deep puddles of water that at least one group of travellers fell into. A male expert traveller and Elder described how the ice at Itilialuk[7] where he used to go wooding used to be thick, but in recent years it has been unstable and unsafe, and changes in the ice led to two people perished there after falling through the ice in the spring ('Itilialuk tragedy'). He also described breaking through the sea ice in another place that he thought was safe, but where the ice is no longer thick. A community member described how increasingly unpredictable weather can result in getting wet and potentially freezing.

5.3.1 Mental and emotional health

Expert travellers and all community members reported on mental and emotional influences from sea ice travel. Of community members reporting on this theme, many reported benefits for mental and emotional health from travel on sea ice. Participants reported that going off on sea ice is "good for your spirit", makes your "soul feel better", lets you "be freely who [you are]", helps you "become strong and stable", "clears your mind", "is relaxing", provides "relief from all the stressors", "calms your nerves", lets you "be at peace"; that it makes you feel "rejuvenated" and "refreshed"; and that it

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[7] All terms in Inuttitut will be printed in italics, while place names in Inuttitut will be printed in roman type.

"makes you feel alive". One community member explained that it provides motivation and a sense of purpose. As another community member explained:

> I think it does a lot for my health because it means I can get away from the everyday things that's going on here in Nain, get away by myself and meditate or do whatever, what you do. When you're going out on a snow machine, your mind is not worried about what's happening in town or who's going to kill themselves or who's going to be working next fall. There's no phone and there's nobody bugging you about this and that. You're just out having a nice day out on the land (HB).

Many community members reported that they had never been worried about their safety on the ice. However, nearly half of these same participants also reported past experiences where they were scared or unnerved while traveling on sea ice.

Overall, expert travellers and many community members expressed stress or emotional impacts from personal sea ice use or the travel of others. A few reported that they had sometimes caused others to worry when they had been off themselves, or that they had at times worried about the safety of family members who had gone off. MET and a few community members also reported emotional or mental health impacts from losing family or community members through the ice. One community member deeply affected by the Itilialuk tragedy (see 5.3.1) characterized the relationship between his health and travel on sea ice as one of loss. He was the only participant of all groups to characterize this relationship exclusively in a negative way. After this incident, he sold his skidoo and had rarely travelled on the sea ice since. Another individual involved in the recovery of one of the bodies described that it was the hardest thing he had ever experienced, but also described how the spiritual aspect of being on the land can help heal emotional wounds from the loss of people on the land and ice.

A portion of the aforementioned experiences of stress from being worried or scared about conditions related specifically to recent changes in ice conditions. MET and

a community member reported feelings of nervousness, confusion, or lack of confidence related to changes in their ability to predict ice and weather conditions, because the conditions themselves have become more unpredictable. FET and a few community members also reported feelings of disappointment, unhappiness and lack of motivation stemming from restricted travel ability because of reductions in ice strength, extent, and duration during recent years, particularly during the unusually mild winter conditions of 2009 to 2010.

5.3.2 Social wellbeing

Expert travellers and many community members reported that going off on the sea ice increases desirable social connections with friends and family. MET and a few community members also gave examples of trips that were good for them where they described bonding time with friends or family members. For example, one community member explained that there were many memorable occasions when he was out on the sea ice when the wildlife was plentiful, but the most special occasion was when he had all of children with him on one spring trip. One community member also described how travel on the sea ice allows people to visit family in other communities. Another community member described how he feels good when travelling with his grandsons because of the stories and experiences he is then able to share with them.

A few community members reported that going off decreases social connections that are not desired, discussing how going on the sea ice allows them to remove themselves from exposure to social stress factors in the town of Nain, or simply have time alone.

> I think it's good for your health because you can go off and get away from Nain –
> there's so much drinking going on in Labrador, in Nain now anyway. So

> sometimes it's good to get away from it and to feel the nature work on you. (Anonymous)

One community member described how changing sea ice conditions could affect his access to his cabin and ability to spend time with his grandchildren on the land.

5.3.3 Economic / material wellbeing

Many community members and expert travellers reported material or economic benefits from using sea ice, and of these reports, the majority related to how using the sea ice for hunting improves people's food supply with healthy wild foods. MET and a few community members reported that going off on sea ice also provides them with access to firewood which they or their families use for fuel. One community member described the cost savings of travel between communities to visit family by snowmobile. A few community members described how they or family members used to make a living from selling furs, but that the political economy of hunting has changed dramatically over the past several decades, thus changing land use patterns:

> People were able to make money trapping and sealing. And that can't be an economic activity anymore, and it costs a lot more nowadays just to go out on the land. I mean, I'd probably go to England just as cheaply for a week as it would cost me to go up to the cabin for a week. But going up to the cabin is far more important. (William Andersen)

A few community members and MET also described the significant expense of travelling on the ice, including the cost of gas, lubricant, food, bullets, and the base costs of snowmobile purchase and maintenance.

FET and a few community members also reported material impacts from changes in sea ice conditions. Specifically, they spoke of being restricted from harvesting food to feed their families because of changing duration and extent of access to sea ice routes and increased instances of community members losing their snowmobiles through the ice.

5.3.4 Cultural wellbeing

Influences from going out on the sea ice on cultural wellbeing (connections to identity, history, traditions, and ancestors) were reported by expert travellers and some community members. FET and a few community members discussed how travelling on the sea ice is their way of life – that it *is* living – and that it is important to them because that is how they were raised. Some of the participants also described a strong positive relationship between going off on sea ice, eating wild foods, and their cultural identity and way of life. A few community members and FET reported how different places connect them to traditions and history:

> There's a lot of history in all the areas and everywhere you go you have a different sense of some things and just awareness of certain things. It's just good to reconnect with those areas...Connect to different things, like historical, connections with family, with community, with people, with whatever, events. (EW)

Expert travellers and a few community members discussed how changing environmental conditions have impacted or could impact their culture. Participants discussed both access to hunting grounds via routes on sea ice and access to travel on sea ice itself as important. One FET described how if she couldn't go out on the ice, she would be losing part of her culture and "wouldn't feel good as an Inuk".

5.3.5 Emerging place themes

5.3.5.1 Sea ice as a key platform for hunting and fishing

Expert travellers and nearly all community members reported the importance of hunting as a key activity facilitated by using sea ice. Some community members explained that travel by sea ice is the only way that they can get to their traditional

hunting grounds to access animals. Many community members and expert travellers also reported holistic health benefits from their practices of harvesting and eating wild foods:

> I think if we got good sea ice we can go and get the proper wild what we likes, like fish, you can go fishing, or caribou hunting, go seal hunting, get partridges, get your geese, your ducks, your eggs. For me, I loves that food, and it's really healthy... I likes going out getting them, and it's healthy, and it's also good for your body and your spirit, like, you feels good about going out on the land and being able to do that. And you gets good ol' healthy food from it. (ERM)

Expert travellers and a few community members reported impacts from changing environmental conditions on access to wild foods because of reduced ability to use sea ice routes to access places. FET and a few community members also reported concerns about winter shipping impacts either directly on animals that they hunt, or their ability to hunt animals because of impacts on access to places because of winter shipping, particularly in the context of environmental change as the ship track created from winter shipping to the nearby mine did not refreeze safely in 2010 because of mild conditions.

5.3.5.2   Experience of place: being on the land and ice

Expert travellers and most community members described the importance of just being on the land to their health in ways that were integrated and holistic. Expert travellers and some community members described how going off on sea ice is "medicine", a "better way of living", and something that is "good" for them or "feels good"; described the land as a place they "love" and "live for"; and explained how "just being on the land is healthy".

However, when asked what sea ice meant to health, the most frequent response from expert travellers and community members was freedom. Specifically, many expert travellers and community members reported that sea ice allows them: 1) freedom of movement, because it forms a network of highways that allows them to access all the

places they want to travel; 2) freedom of decision-making and autonomy for determining

their activities and movements, including the freedom to be themselves; and 3) freedom

from the pressures, routines and social issues in town.

> I feel that I'm able to be freely who I am when I'm out there...You know, it's just slower out there. Even though it's bad weather, it still feels good, to just be out on the land. It's just home. Just free to eat anytime you want, you can just sleep, get up when you're rested. Don't have plans, you have no phone to answer, no computer to go to...It's just the high mountains and snow. You are free to turn anywhere you want to. You're just so free. (MD)

Further, informal discussions and participant observation during trips on the sea

ice indicated that for a few, their places on the land are where they and their families have

traditionally not been within as easy reach of Eurocentric institutions and policies. As

such, when they are in these places, they are also freer from the legacies of colonization

and its impacts. For example, a female travel expert described how when she is returning

to town from the North, she hates a certain place along the route because it marks that she

will soon be back in Nain and in the world it represents, one which she later informally

described as being one where Inuit lives are not equally valued to white peoples' lives,

and outside authorities control Inuit. On the other hand, she described the same place as

one that she loves when she is on her way North, describing the freedom that she

associates with being there.

While some community members said that anywhere on the land is good for

them, many community members and expert travellers described specific places that they

preferred for improving their sense of wellbeing, such as places where their cabins are

located, where they were born, where they have family memories, where there is

beautiful scenery, or where certain animals can be found, with some saying that they just

enjoy the ride. A few community members who were born on the land described places

on the land or the land itself as home.

A few community members described how having the knowledge and capacity to

survive on the land makes them feel good or brings them a sense of wellbeing, and expert

travellers also described how being on the sea ice – even in challenging situations such as

hunting on moving ice pans or navigating in thick fog – are "good for you" if you know

what you are doing. A male expert traveller and Elder, Lucas Ittulak, described how he

gets a sense of wellbeing on the sea ice compared to being in the community, which

comes from knowing that he has the expert knowledge to survive on the land and the ice.

He described this knowledge-in-action as *ippigusutsianik*[8], which translates to being

aware and conscious of your surroundings, being of sound mind, having knowledge of

what could happen, and being prepared for what may occur. He described how

knowledge is necessary for ensuring that sea ice travel and other land based activities

have a positive influence on health and wellbeing, not just in preventing impacts but

promoting benefits, and that knowledge is the key to accessing the freedom that can come

with travelling on the ice and land:

> There's a lot of freedom when you go out on the land, especially by yourself,
> without nobody telling you what to do or what not to do, especially if you know
> the land and you're on your own. You know the routes and which places to camp
> out in...That's one of the biggest part of freedom in a person's life, in an Inuk's
> life. As long as you know the land, if you've been gone for a few days all by your
> own, you know the land and you feel so free. (Lucas Ittulak)

As expert travellers reported, this relationship to the land all depends on the person; they

conveyed that if an individual did not grow up on the land learning how to survive, then

the land may not be a source of good health for them.

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[8] Sometimes written as *ikpiusuksiagasuannik*.

Expert travellers and nearly all community members described impacts of changing sea ice conditions on their ability to access places and the duration of their access, and a few participants also reported changes in the quality of their experience. For instance, Lucas Ittulak also reported that staying safe on the ice today is even difficult for an experienced hunter such as himself, and that changes in the sea ice mean that people can no longer move on it safely and freely:

> At that time when I was younger, the sea ice was safer, it was not in the condition that it is today. There's different ice conditions today compared to back when people were out on the land, moving freely, going anywhere where they wanted to go. But today it's different so the sea ice is not so good for the people anymore. (Lucas Ittulak)

Expert travellers and many community members reported that they could not access some places because the ice was not thick enough. In the winter of 2009 to 2010, places that participants could not access included their cabins; hunting places to the north, south, and east; wooding places; significant cultural places further north; and the *sinâ* (sea ice edge), while a few did not travel on the sea ice at all. Many community members also described changes in the sea ice freeze-up period in the fall from December to January and the breakup period in the spring from mid-to-late June to May, which has shortened the duration that they can use the sea ice. One community member described how she managed to get to one of her cabins once in February 2010, but didn't like the trip because the sea ice was very watery, and concluding that she regretted going. A community member reported climate change impacts on Inuit knowledge, described how Inuit used to be able to predict ice and weather conditions because "that was their place," but changing conditions mean that predictions are now often inaccurate, a sentiment reported by a few other expert travellers and community members.

5.4 Discussion

This study investigated the complex and nuanced relationship between health and place and the role of environment for Indigenous health. Through a case study of how residents of an Inuit community use and view one element of the environment in relation to their health, we have demonstrated the complexity of this relationship and the importance of considering health benefits and impacts on a range of forms of health to develop a more complete understanding of how the environment acts as a determinant of health. Our results demonstrate the importance and strong positive health influence of using sea ice for Inuit and Kablunângajuit in Nain. The majority of influences that expert travellers and community members reported from using sea ice were positive health benefits spanning mental/emotional health, economic/material wellbeing, social wellbeing, cultural wellbeing, and physical wellbeing (Table 5.1). A minority of influences reported were negative health impacts, primarily related to physical health, and to a lesser extent related to mental/emotional health and economic wellbeing. Further, many participants who reported some health impacts either did not view their past experiences on the ice as "bad" for their health or they viewed these experiences as simply part of being on the ice and land. In our interpretation, these reports are tied impacts being outweighed by positive health experiences relating primarily to non-physical aspects of health.

These findings demonstrate that Inuit health perspectives are culturally-embedded and place-based. While some Aboriginal health literature has investigated health risks and benefits from environmental exposure (e.g., Van Oostdam et al., 2005), reviews of Indigenous health research in Canada have identified the predominant use of a

biomedical lens and health risk framework, and the relative lack of attention on social determinants of health, protective factors, and aspects of health extending beyond the physical (Furgal et al., 2010; Healey and Meadows, 2007; Young, 2003). Further, while culture has been well established as influencing perspectives on health and health risk (Kearns and Moon, 2002; Masuda and Garvin, 2006; Wilson 2003), few studies have investigated an Inuit cultural conception of health (Kral et al., 2011; NAHO, 2008; Richmond, 2009; Richmond and Ross, 2009). By investigating Inuit health meanings and perspectives related to environmental use, this paper contributes to the limited literature on Inuit understandings of health. It also demonstrates the critical importance of investigating positive and negative influences from environmental exposure for various aspects of Indigenous health, not solely physical health. While few participants reported on aspects of their cultural health directly, the full-range of perspectives reported – when taken together – illustrate a cultural health model that is holistic and place-based.

Many of the highest response rates from sea ice users were on themes that were not readily categorizable into conventional health categories based on population health frameworks, but could be understood in a broader framework that incorporated place-meanings. To encompass these perspectives, our theoretical approach drew on both population health and health geography approaches. We have represented these complex health influences from environmental use in the conceptual diagram below (Fig. 5.1).
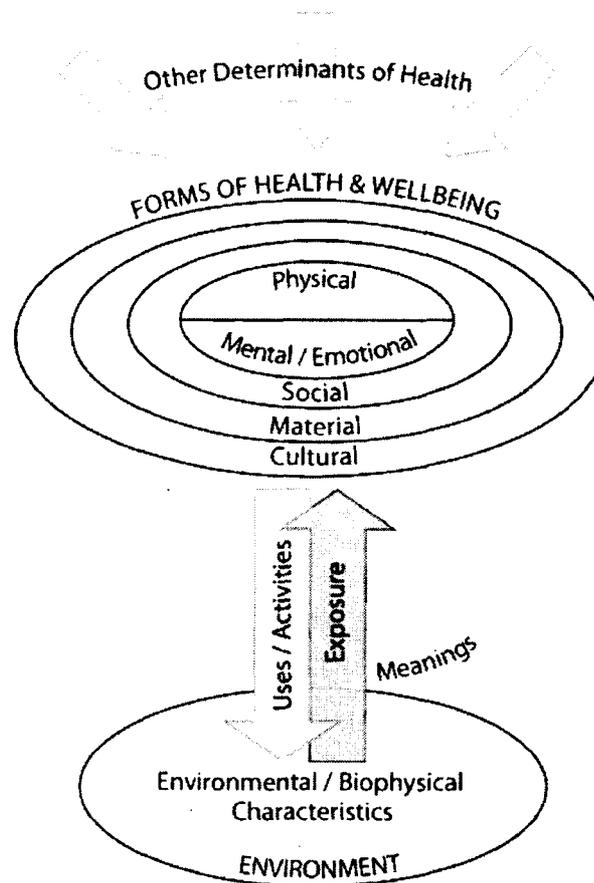
Figure 5.1. Conceptual diagram of the influence the environment on health

This model of environment-health interaction based on health influences from sea ice use draws on determinants of health and population health approaches by illustrating how environmental uses or activities result in environmental exposure, which influences health in positive and negative ways. For example, the model captures the negative health influence on physical health that can be brought about by interaction with different physical elements of the environment (such as slush or extremely cold temperatures) (Section 5.3.1), and positive health influences on mental and emotional health also brought about through environmental exposure (Section 5.3.2). This model also incorporates health geography concepts by broadening health to include various aspects

of wellbeing that extend out from individual health aspects, and include social, material, and cultural wellbeing. It also illustrates how the use of the environment and attendant environmental exposure is embedded in and gives rise to meanings that influence how environmental exposure and environmental health influences are understood – that is, these interactions between health and environment are located in and give rise to place-meanings. The conceptual model of the relationship between environmental use and exposure and health (Fig. 5.1), based on this case study, represents a contribution to the literature on frameworks for understanding environmental health (Dahlgren and Whitehead, 1991; Lalonde, 1974; Knol et al., 2010) that demonstrates how an appreciation of place can be integrated into a determinants of health approach. By drawing on concepts from these bodies of health literature, we have been able to develop a more complete understanding of environment-health interactions and the factors that influence health decision-making. Based on the use of concepts that are well-established in the literature and the applicability of this model to describe a specific environment-Indigenous health relationship, we suggest that this model can be transferable to and valuable in improving our understanding of health-environment relationships in other contexts.

Reports by expert travellers and community members on the influences of using sea ice as a platform for hunting, and secondly, experiencing being on the sea ice (what we have together termed 'emerging place themes') – were exclusively positive. Nearly all community members and expert travellers reported the importance of hunting as a key activity that is facilitated by using the sea ice, and that both the wild food that they capture and the act of hunting on the ice are sources of good health. Some literature has

explored the link between health and wellbeing, cultural identity, and the hunting and consumption of wild food resources (Borré, 1991; Condon et al., 1995; Pufall et al., 2011; Searles, 2002). Our findings corroborate this existing research on the importance of harvesting and eating wild foods to Inuit health, and demonstrate how these health experiences are place-based.

Most community members and expert travellers reported the holistic health benefits of being on the sea ice, related to place-meanings they associated with sea ice. These included freedom of movement and autonomy, and to a lesser extent freedom from the social pressures in town. Referring to our conceptual diagram of the relationship between environment and health (Fig. 5.1), freedom is an important place-meaning brought about by how people interact with sea ice as an element of the environment, and which informs why people use sea ice. The importance of being on and travelling on the sea ice, and using the sea ice for hunting for participants demonstrates the importance of viewing not only the products of environment interactions on health (impacts and benefits), but processes of interaction and meanings that inform health decision-making. There is some research that shows the importance of location to health in the North at various scales (e.g., Harper et al., 2011; Veugelers et al., 2001), and the interdisciplinary tendency within geography has led to some contributions within anthropology on understanding place in an Inuit context (Aporta, 2004, 2009). However, there are very few studies that explicitly explore the relationship between place and health for Inuit (Cunsolo Willox et al., 2012; Jardine et al., 2009). As such, one of the greatest gaps in the literature on Inuit health is the absence of research that emphasizes the importance of

place-based approaches. By investigating place uses and meanings, this study makes an important contribution to the Inuit health and Indigenous health literature.

Some participants reported that changing environmental conditions are already contributing to increased negative health impacts on physical health and mental and emotional health, with the potential for these impacts to increase over time as conditions continue to change. These results corroborate existing literature on current or future impacts of changing conditions on health related to sea ice travel, including increases in unintentional impacts and injuries and increased stress related to the unpredictability of conditions (Furgal, 2008; Furgal et al., 2002; Nickels et al., 2006). However, we would argue that the most substantive influences from changes in environmental conditions on sea ice-Inuit health relationships is and will continue to be loss of health benefits spanning a range of forms of health and wellbeing, and place experiences related to the freedom of being on the sea ice and using ice to hunt for wild foods. Other research has also noted these detrimental effects on health, including material losses from decreases in harvesting wild foods (Ford et al., 2006a; Nickels et al., 2006) and impacts on social cohesion and the intergenerational transfer of knowledge from the disruption to hunting lifestyles (Ford et al., 2006b; Furgal et al., 2002; Nickels, 2006; Pearce et al., 2011). Studies have also investigated impacts on food security in Inuit communities related to changing ice and weather conditions (Ford, 2008; Ford and Berrang-Ford, 2009; Furgal et al., 2002; Nickels et al., 2006). Curtis et al. (2005) and Berner et al. (2005) identify a relationship between climate change, acculturation, and psychosocial stress, but as Furgal (2008) notes, few studies have investigated the impacts of changing environmental conditions on mental, emotional, and cultural health for Inuit.

Changing conditions are impacting the extent and duration of access to sea ice routes, as well as access to particular places because of changes in ice extent, strength, and predictability. As evidenced by our study, not only does this impact health by exacerbating negative health impacts and reducing positive health benefits, changes in access and the accuracy of sea ice travel knowledge affect the ability of Inuit and Kablunângajuit to be on the ice, which transforms place-meanings themselves. These changes are transforming sea ice for Inuit from a place that is "theirs," a place which means freedom and is an important source of health, to a place that is less accessible, less known, and, in some places and times of year, is literally disappearing. Cunsolo Willox et al. (2012) also found that changes to land use practices brought about by climate change have caused distress among some Inuit, which can be understood in the context of loss of place attachment. Based on this evidence, we would argue that climate change is an agent of environmental dispossession for Inuit and Kablunângajuit, contributing to a particularly egregious case of environmental health injustice (Masuda et al., 2010), as the sources of climate change can be traced to regions and populations far from the North (Watt-Cloutier, 2004). Others have articulated the ways in which climate change contributes to environmental injustice for Arctic Indigenous peoples (ICC, 2005; Trainor et al., 2007). As Indigenous communities are already experiencing environmental dispossession and its negative health impacts brought about by colonialism (King et al., 2009; Richmond and Ross, 2009), this new iteration of dispossession as documented in this study has the potential to compound negative health impacts of the environmental dispossession already being experienced in Indigenous communities. Our findings make it clear that an incorporation of an understanding of place is critical to capture the full

influences of environmental use and exposure on Indigenous health, as well as the influences of climatic change on Indigenous health.

We acknowledge that by conducting such a broad exploration of how different elements of health are influenced by the environment, some of the richness and detail in any one of the health themes may not be communicated to the extent that participants communicated these themes to us. We have not in this paper investigated how impacts, benefits, and place-meanings may vary depending on the person, but we do address this topic in Chapter 6. We have also not focused on how human activities shape and change the environment, and how these engagements shape health in turn. While we describe Inuit conceptions of health and environment, our conceptual framework draws on existing health literature and is not grounded in an Inuit worldview.

These findings make an important contribution to the Indigenous environmental health literature, but also make clear that a number of research gaps still need to be filled. There is a need for more Inuit health research and climate change impacts research that uses place-based approaches. There is also a need for Inuit health research that focuses on Inuit conceptions of health. In both of these broad areas, the literature is extremely sparse. More generally, we have demonstrated how health geography concepts can be successfully incorporated into determinants of health and population health approaches, which makes a strong case for future integration of these approaches. In this vein, validation of our conceptual model of environmental influences on health, in other Indigenous and non-Indigenous contexts, is the next step to be able to apply this model to organize our understanding of what environment means to health in other contexts.

5.5 Concluding comments

This paper has investigated a case study of Inuit health and sea ice use to expand our understanding of the role of the environment as a determinant and place of Indigenous health. This study has illustrated the importance of an element of the environment to wide range of aspects of Inuit health and wellbeing (physical, mental/emotional, social, material, cultural), and demonstrated how Inuit health perspectives are culturally-embedded and place-based. By exploring 'place' meanings of sea ice use in relation to health, we have also shown that environmental change is not only contributing to increased negative health impacts, but also loss of health benefits related to environmental dispossession. The key importance of place-meanings to holistic health experiences of participants, and broad range of health aspects that are influenced by environmental exposure, demonstrate the need and utility of employing broad definitions of health and incorporating health geography concepts of 'place' into population health approaches to develop a more complete understanding of the role of environment in Indigenous health. Nonetheless, more work is needed to address the substantive gap in the literature on Inuit heath that emphasizes place-based approaches.

6 ROLE OF INDIVIDUAL AND COMMUNITY HEALTH DETERMINANTS IN MEDIATING HEALTH INFLUENCES OF ENVIRONMENTAL EXPOSURE IN AN INUIT COMMUNITY

This chapter consists of a paper that addresses Objective 3. Specifically, it investigates the determinants of differing experiences and perspectives of health benefits and impacts related to sea ice use, related to physical, mental/emotional, social, material, and cultural health and wellbeing, as well as themes related to place. It is written in manuscript format for submission to *Environmental Health Perspectives*, with co-authors C. Fugal and M.W. Skinner.

6.1 Introduction

The environment has long been recognized as a key determinant of human health (ACPH, 1994, 1996; Lalonde, 1974; WHO, 1986). In addition to the physical environment, there are a number of other determinants of health, spanning personal health practices; biology and genetic endowment; health care; and social determinants, such as income and social status, social support networks, social environments, employment, culture, and gender (ACPH, 1994, 1996). Research has been conducted on myriad interactions between these determinants and their implications for health – for instance, how socioeconomic status intersects with race/ethnicity to influence health outcomes and disparities (Dowd et al., 2009; Clarke et al., 2008; Masseria et al., 2010), and how gender intersects with other determinants to influence health (Chun et al., 2008; Davidson et al., 2006; Denton et al., 2004). Despite recognition of the importance of interactions between determinants of health outcomes and research on a variety of these interactions, there are still gaps in our understanding of how other determinants,

particularly social determinants, shape the health influences of environmental exposure. Most epidemiological research to date on these topics focuses on the impacts of exposure to environmental hazards on different subpopulations (e.g., Chakraborty et al., 2009; Donaldson et al., 2010; Newby and Howard, 2005; Wigle et al., 2008). Few epidemiological studies have investigated positive health benefits of environmental exposure (Mitchell and Popham, 2008; Van Oostdam et al., 2005). While the links between health benefits and the environment have been investigated within health geography (Kearns and Collins, 2010; Kearns and Moon, 2002), many of the concepts and approaches related to investigating the influence of the environment as a 'place' that matters to health have had limited integration into epidemiology and social epidemiology research (Cutchin, 2007). As such, significant gaps in our understanding of factors that influence the health impacts and benefits of environmental use and exposure remain.

The environment is a particularly critical determinant for Indigenous health, due to ongoing close connections to traditional lands and cultural understandings of the reciprocal relationship between humans and the environment (Cajete, 1999; Colomeda, 1999; Haudenosaunee Environmental Task Force, 1999; McGregor 2004; Nettleton, 2007; Richmond and Ross, 2009; WHO, 2007). While some scholars have focused on the holistic health benefits of environmental use for Indigenous populations (Kingsley et al., 2009; Nettleton et al., 2007; Panelli and Tipa, 2007), others have focused on impacts of environmental hazards on Indigenous health or vulnerability (Ford et al., 2008a; Mercer et al. 2007). Diversity within Indigenous communities, as with other populations, means that impacts and benefits from environmental exposure will not be uniform. There is a need to bring together an analysis of health impacts and benefits of environmental

exposure for Indigenous populations – for whom the environment is a critical determinant of health – and investigate what factors determine the distribution of impacts and benefits.

This paper examines the determinants of health impacts and benefits stemming from Indigenous environmental use and exposure via a case study of sea ice use in an Inuit community in northern Canada. Sea ice is a critical environmental element for Inuit, with complex health implications. Travel on sea ice allows access to wild food sources, which are critical to health and livelihoods (Furgal and Seguin, 2006: Van Oostdam et al., 2005). Sea ice use can also result in injury and trauma (Chapter 4, 5). As unintentional injury and trauma rates are disproportionately high in Canadian Inuit communities (ITK, 2010), and are predicted to be exacerbated by significant modification of the environment by climate change (Anisimov et al., 2007; Berner et al., 2005; Furgal, 2008; Furgal and Prowse, 2008), there is an urgent need to examine determinants of health impacts and benefits of sea ice use in Inuit communities.

In response to these knowledge gaps around determinants of differential health influences of Indigenous environmental use and exposure generally, and Inuit sea ice use specifically, we conducted a community-based participatory research (CBPR) project to investigate factors associated with differing health experiences from sea ice use for residents of the community of Nain in the region of Nunatsiavut in Labrador, Canada (Fig. 5.1). We used a case study approach (Stake, 2005) and mixed methods design (Creswell, 2009). Following a review of literature on Inuit sea ice use in Arctic Canada, we report results from the qualitative stages of our study encompassing two focus groups with expert sea ice users and 22 interviews with a range of residents who use sea ice. The

study involved university-community research collaborations with the Division of

Environment in the Nunatsiavut Government (NG), the government body that resulted

from the settlement of the Labrador Inuit land claim, and Nain Ground Search and

Rescue (NGSAR), a volunteer-based search and rescue team made up primarily of

hunters in Nain. The study originated with concerns in Nain and in other northern

communities regarding increasing accidents and anxiety during sea ice travel (Ford et al.,

2008a, 2009; Furgal et al., 2002; Gearheard, 2006; Nickels et al., 2006). A history of

collaboration between the second author and the NG, coupled with identification of sea

ice safety as a priority research area in the region by the NG, led to the collaboration on

this project.

6.1.1   Inuit sea ice use in Arctic Canada

Inuit have a close connection to the land through their hunting and harvesting-

based culture, and consequently the health of Inuit is linked intimately to the health of the

environment in which they live (Freeman, 1976; Krupnik et al., 2010; NAHO, 2011;

Pelly, 2001; Pufall et al., 2011; Richmond and Ross, 2009). Sea ice forms an extension of

the land in Arctic for a large part of the year, and Inuit travel on sea ice to access food

resources that are critical for nutrition, cultural wellbeing and identity, and livelihoods

(Furgal and Seguin, 2006; Pufall et al., 2011; Van Oostdam et al., 2005). Places accessed

via sea ice and sea ice routes themselves have cultural and emotional significance,

connecting travellers to their ancestors (Aporta, 2004, 2009; Henshaw, 2006) and, as

noted in Chapter 5, experiences of freedom and autonomy while using sea ice contribute

to mental and emotional health. Along with these benefits, travel on sea ice can result in a

number of health impacts, including physical impacts from exposure to environmental

conditions and stress (Chapter 5). While unintentional injury and trauma a major cause of

morbidity and mortality for Inuit and other northern Aboriginal groups, we understand

little about how the environment influences injury and trauma for these populations

(GNWT, 2004; ITK, 2010, Légaré, 2007; Young, 2003). According to Chapter 4, the

estimated average annual incidence rate for search and rescue (SAR) involvement during

land-based travel was 19 of 1000 based on SAR data from 1995 to 2010, and 96% of

cases managed locally (not escalated to the federal/military SAR level) took place during

the critical winter period when residents typically travel by sea ice. However, as

described in Chapter 4, we still do not know the full extent of land-based injury and

trauma, with these data representing what is likely the 'tip of the iceberg.' Reducing

unintentional injuries and drownings related to poor ice conditions has been identified as

an important strategy for addressing the disparity in injury and mortality rates between

Inuit and non-Inuit Canadians (GNWT, 2007; Pauktuutit Inuit Women of Canada, 2010).

Given this identification of the importance of environmental exposure for injury and

trauma for northern populations, the knowledge gaps on the role of the environment for

injury and trauma urgently need to be addressed. Contributing to this urgency is the

impact of climate change.

The impact of climate change on Arctic environments is already having impacts

on Inuit health (ACIA, 2005; Furgal, 2008; Furgal and Prowse, 2008). Increased

unintentional impacts and injuries as a consequence of changing ice and weather

conditions have been predicted as an important health impact of climate change (Furgal et

al., 2002; Furgal and Prowse, 2008; Gearheard, 2006). Further, there is concern in Inuit

communities across the Canadian Arctic about increasing rates of unintentional impacts

and injuries because of changing conditions (Johansson and Manseau, 2012; Ford et al., 2008a, 2009, 2010b). Health impacts from climate change are not uniform across or within Inuit communities, as localized changes in environmental conditions interact with other determinants of health and land use practices of individuals, producing a range of differentiated health outcomes (Furgal, 2008). However, there is a gap in knowledge around how different determinants may affect travel health influences and perspectives. For instance, Dowsley et al. (2010) and Kukarenko (2011) have argued that a consideration of gender has been omitted from many studies investigating vulnerability to climate change in relation to sea ice travel, and that the influences of changes in the environment on human-environment interactions as well as social relations cannot be fully understood without a consideration of gender as a construct and structure that shapes these relations. The role of other determinants such as income, education, and biological factors, in mediating the health impacts of environmental exposure on Inuit, have also largely been overlooked, apart from a related study of land skills transmission among Inuit men by Pearce et al. (2011). As such, there is a need to identify determinants of impacts and benefits from sea ice use for Inuit, particularly in the context of public health concern regarding disproportionately high levels of unintentional injury and trauma, and the health implications of climate change. By investigating this critical environmental health issue for Inuit, we can also improve our understanding of how personal, social, and environmental determinants interact to influence Indigenous health.

6.2 Methods

6.2.1 Community-based participatory research design

To examine determinants of differing experiences of health benefits and impacts related to environmental use, we employed an instrumental case study approach (Stake, 2005) with a mixed methods design (Creswell, 2009) that emphasized community collaboration at all stages of the research, including in the development of the research questions and study design, implementation of methods, and the dissemination of findings. Our collaborative approach was informed by the CBPR framework outlined by Fletcher (2003); a process of visioning and planning taking place in Nunatsiavut to harness the potential of research to create positive and lasting impacts in the region (NG, 2010); and numerous writings by Indigenous scholars in particular regarding the need for research in their communities to be ethical, transformative, and particularly in the process and product (Denzin et al., 2008; Smith, 1999; Wilson, 2008). As non-Indigenous researchers, we used community engagement as a strategy to help orient the study to community needs and goals throughout the research.

We are reporting results specific to the qualitative stages of this research project, by exploring associations between demographic characteristics of participants and reported impacts and benefits from their use of sea ice. Ethics approval for this research was granted by Trent University's Research Ethics Board and from the Nunatsiavut Government Research Advisory Committee. All participants provided their informed consent, including for the publication of their ideas, quotes, and identities. For more details on the design and methods, refer to Chapter 5.

6.2.2 The case study of Nain, Nunatsiavut

Nain is the northernmost community on the east coast of Labrador (N56°55,

W61°68), in the Inuit the Labrador Inuit Settlement Area of Nunatsiavut (LIA, 1977)

(Fig. 1.1). The site of the current community was officially established by Moravian

missionaries in 1771. Nain is located on an inlet on the Atlantic Ocean in a climate area

classified as sub-arctic. The population of Nain was 1,034 according to the 2006 Census,

of which 92% of people identified as Aboriginal (Statistics Canada, 2007b). The

community can only be accessed by plane or boat.

Environmental activities are important for tradition, culture, livelihood, and health

in Nain. For instance, in 2000, over three-quarters of adults in Nunatsiavut harvested wild

foods, and wild foods made up half or more of all meat and fish consumed in the majority

of households (ITK, 2008). Many residents of Nain also rely on wooding to collect fuel to

heat their homes. Socio-demographic characteristics for Nain, including median age,

education, employment and income levels, are listed in Table 3.1. Inuttitut use in

Nunatsiavut, the dialect of Inuktitut spoken by Inuit in Labrador, is less strong than

Inuktitut use in some other Inuit regions in Canada. Twenty-seven percent of residents of

Nunatsiavut are reported to be able to converse in Inuttitut, compared with 99% in

Nunavik and 91% in Nunavut; only 7% of people in Nunatsiavut report that is Inuttitut

the language most often spoken at home (Andersen and Johns, 2005; ITK, 2008).

6.2.3 Data collection methods

We conducted two focus groups in July 2010 with Inuit and Kablunângajuit

expert sea ice users to explore how sea ice users in Nain view the relationship between

travelling on sea ice and health. The male group had five participants, including one

Elder, and was conducted in English with sequential interpretation-translation into Inuttitut. The female group had four participants and was conducted in English. Additionally, we conducted one follow-up unstructured interview (Bernard, 2000; Corbin and Morse, 2003) with the Elder from the men's focus group to discuss concepts of health and Inuttitut terminology. We recruited participants through a multi-step peer-recommendation process as described in Chapter 5. All focus group participants also completed a socio-economic and land-use practices survey to analyze for associations between participant attributes and topics reported (Table 6.2).

We conducted 22 semi-directed interviews (Huntington, 1998) in November 2010 with residents of Nain that use sea ice for travel and hunting to provide and in-depth understanding of experiences of health impacts and benefits from using sea ice. We used a non-proportional quota sampling method (Miles and Huberman, 1994) according to the following criteria: gender, search and rescue status (whether the person had received assistance or not), and years of experience travelling on sea ice (more or less than 20 years). Participants were selected randomly from lists generated by Nain Ground Search and Rescue for each category in the selection grid. We were not able to recruit participants successfully for two of the categories (less than 20 years of travel experience, assisted by SAR, and male or female) as the pool of potential participants was very small and none were available. Participants completed as socio-demographic survey following the survey format used with focus group participants to analyze for associations with participant attributes and topics reported (see Table 3.4).

We employed participant observation to build interpersonal relationships, improve our understanding of sea ice travel practices and share knowledge about sea ice travel on

site, and gain a richer understanding of the local context (Creswell, 2007). The first

author (AD) participated in four single and multi-day trips on the sea ice in March and

May 2011, and recorded reflections and observations.

6.2.4 Analysis

Focus groups were audio recorded and transcribed by the lead author. The

Inuttitut portions of recordings with male participants were transcribed into Inuttitut by a

different interpreter/translator, who verified the accuracy of the original translation. The

semi-directed interviews were transcribed by a private firm and reviewed by the lead

author. Transcripts were returned to participants and opportunities were provided to

check their accuracy. Focus groups and semi-directed interviews were analyzed using

thematic content analysis (Berg, 2001; Esterberg, 2002) using QSR International's NVivo

8 software and checked for intercoder reliability, as detailed in Chapter 5. Associations

between participant attributes and health influences from going off on the sea ice in the

focus group and interview data were explored using a cross-tabulation process.

Differences in reporting on health themes between groups were assessed as being

'significant' and are reported if there was a 20% or greater proportional difference in

response frequencies (e.g., for age, a difference of 20% or more on a theme between

participants above and below the median age is reported). This process was used for all

attributes except gender and education. For gender, the measure of 'significance' was a

difference of three or more cases/individuals reporting on a theme. For education, we did

not employ a quantitative measure to determine 'significance' because there were more

than two potential responses to compare. Responses were also analyzed qualitatively for

differences in reporting on themes based on attributes. Participant observation notes were memoed and reviewed manually.

Member checking was conducted with participants to validate analysis interpretation (Onwuegbuzie and Leech, 2006), and also function as part of the report-back and communication that is part of a CBPR approach. Participants who attended relayed general agreement, but also added to or edited findings. General feedback was used to make minor adjustments and improve analysis. Participants also edited and approved the use of selected quotes and chose to be identified by their name or initials, to remain anonymous.

6.3 Results

The results are presented in two parts. First, we report associations between personal, social, and environmental factors and influences of sea ice use on health, according to the following factors: gender, age, sea ice travel experience, frequency of hunting/fishing and wooding activities, employment status, institutional education level, and Inuttitut speaking ability. All associations that were significant according to our methods are indicated in Tables 6.1 and 6.2, and key associations are highlighted in the proceeding text. Second, we report on the emerging theme of social change and influences on health at the community level.

6.3.1 Determinants of individual health influences of sea ice use

Health influences associated with sea ice travel commonly differed among participants based on gender, age, frequency of hunting or fishing, years of sea ice travel experience, and employment status (Table 6.1 and 6.2). Factors that were associated with fewer differences in groups' perspectives on the health influences of sea ice travel were

frequency of wooding, formal education, and Inuttitut speaking ability (Tables 6.1 and

6.2). Tables 6.1 and 6.2 outline the influences of these eight factors on reporting for

health benefits and impacts of sea ice use, by identifying the group with higher

proportional reporting on various health themes for each factor. For example, a higher

proportion of male than female expert travellers and community members reported the

high cost of fuel and equipment for travelling on the sea ice, so this difference is reported

in Table 6.2 as male participants reporting proportionally more on material impacts.

Table 6.1. Influence of social and environmental factors on reporting of health benefits from sea ice use

Factors	Group with higher proportional reporting on health benefits
Gender	Male • Material benefits for food supply (C), firewood (E,C), cost savings for inter-community travel (E,C) • Physical benefits of exercise (C) Female • Physical benefits for body in general (E) • Mental/emotional benefits for stress-relief, "good for the soul" (C) • Hunting and eating wild foods as key activity (E, C) • Experience of sea ice as place of freedom (C)
Age	Older • Social benefits for increasing desirable social connections and decreasing exposure to undesirable social connections and social stress factors (C) • Physical benefits of exercise (C) • Hunting and eating wild foods as key activity (C) • Material benefits from past commercial trapping (C) • Cultural connections to Inuit traditions and way of life (only C over 40)
Employment status	Full-time • Material benefits (C) • Mental/emotional benefits from being out of town; also related to "place" meanings (C) Part-time, seasonal, other (PSO) • Social benefits from increasing desired social connections (C) • Cultural connections to Inuit traditions and way of life (C) • Hunting and eating wild foods as key activity (C)
Institutional education	Secondary or post-secondary education • Physical health benefits (C) • Material benefits (food supply) (C)
Sea ice travel experience	Very experienced • Cultural connections to Inuit traditions and way of life (E, C) • Hunting as key activity (E) • Social benefits from decreasing undesired social connections (C) Moderately experienced • Material benefits (food supply) (C) • Importance of hunting and eating wild food to health (C)

Factors	*Group with higher proportional reporting on health benefits*
Frequency of hunting / fishing	Frequent • Mental/emotional benefits (C) • Experience of sea ice as a place participants "love" and impacts from environmental change on access to places (C) • Cultural connections to Inuit traditions and way of life (C) Infrequent • Material benefits (food supply) (C)
Frequency of wooding	Frequent • Material benefits (firewood) (C) • Cultural connections to Inuit traditions and way of life (C) Infrequent • Physical benefits for body (C)
Inuttitut speaking ability	Speakers • Cultural connections to Inuit traditions and way of life (C, E) Non-speakers • Material benefits (food supply) (C)

Legend:

C = community members; E = expert travellers

Older = individuals > median age of 49; *younger* = individuals < median age of 49

Very experienced travellers = individuals with > 20 years of experience travelling on sea ice; *moderately experienced* = individuals with < 20 years of experience

Frequent hunters/fishers/wooders = individuals who perform these activities 4 or more days/week during ice season; *infrequent* = 1–3 days per week or less during ice season

Full-time = regular full-time employment or greater; *part-time, seasonal, other (PSO)* = part-time regular, full-time or part-time seasonal, income support, occasional work, and unpaid work

Speakers = fluent to some Inuttitut speaking ability; *non-speakers* = little to no Inuttitut speaking ability

Table 6.2. Influence of social and environmental factors on reporting of health impacts from sea ice use

Factors	*Group with higher proportional reporting on health impacts*
Gender	Male • Material cost of fuel and equipment (E,C) • Physical exertion from poor travel conditions (E,C) Female • Scared/nervous and disappointed because of changing conditions (mental/emotional impacts) (C)
Age	Older • Physical impacts (discomfort, hypothermia) intensified by pre-existing health conditions and age (C) • Material costs (C)
Employment status	Full-time • Scared, nervous, or stressed about conditions and worried about safety in the past (C) PSO • Material costs (C) • Physical impacts (discomfort, frostbite) (C)
Institutional education	Secondary or post-secondary education • Physical impacts (C)
Sea ice travel experience	Very experienced • Material costs (E, C) • Physical impacts (discomfort, hypothermia); however, some explained that they don't experience cold or exertion as uncomfortable (E, C)
Frequency of hunting / fishing	Frequent • Material costs (C) Infrequent • Stress/worry about safety (C)
Frequency of wooding	Frequent • Physical impacts (unintentional injuries) (C) Infrequent • Material costs (C)
Inuttitut speaking ability	N/A

See Legend for Table 6.1

Gender

Gender was associated with differing influences of sea ice use on material, physical, and mental/emotional health and wellbeing. A greater proportion of male compared to female participants reported on material benefits from sea ice travel, including benefits for food supply, firewood for heat, and cost savings from travelling on sea ice instead of by plane to other communities, as well as material costs of equipment and supplies. A male travel expert commented during the verification meeting that a weekend sea ice trip that three families went on with a member of the research team to Tasiujak, about 5 to 7 hrs snowmobile drive north of Nain, probably cost the male leader of the trip $2,000, including food, gas and lubricant for five skidoos, and bullets. Community collaborators at the Inuit consulting firm Sikumiut Environmental Management (personal communication, July 24, 2012) estimated that a day trip for two people on two skidoos would total $235, and a two or three day trip for one family on two skidoos would cost approximately $620, which indicates that the estimate from the male expert traveller is on the higher end of the correct range. The physical activity and exercise benefits of going off on the sea ice were emphasized by male community members, who described how wooding, hunting on foot, walking around to get warm, and digging a snowmobile out when it gets stuck increase their physical activity, which makes them feel good even if they get sore. More female than male community members reported mental/emotional health benefits from going off on sea ice, including travel on sea ice being "relaxing," "rejuvenating," and "good for the soul," and did so in more detail than male community members.

Age

Age was associated with a number of differences in health influences, with a greater proportion of older participants reporting physical health impacts and benefits, and benefits for social and cultural wellbeing. The majority of community members who reported that going off on the sea ice increases their desirable social connections with family and friends were older, and all community members who reported that going off is good for their health because it decreases undesirable social connections were older. These participants described how going off allows them to be alone, have increased autonomy over their decisions instead of being told what to do, and reduces their exposure to social stress in Nain, related to things such as alcohol use. The majority of community members who reported physical activity benefits were older. At the same time, only older community members reported influences of pre-existing health conditions on their experiences of being out on the ice. As a community member explained:

> Yeah, well in the wintertime, it's starting to get harder and harder for me, I guess, as I'm getting older. A day's travel on skidoo now, especially if the ice is not smooth, that almost wipes me out! I'm finished for the night when I get back. But if the ice is smooth, it's not too bad but if you get a winter where there's a lot of wind, then the ice is usually pretty rough and that can be hard on your back, especially when you travel a long ways. (Henry Lyall)

Years of sea ice travel experience

The level of experience travelling on sea ice was associated with different influences from sea ice use on material and physical wellbeing. A greater proportion of community members who were moderately experienced travellers reported material benefits from travelling on the ice, particularly related to food supply, while only expert travellers and very experienced community members reported material impacts. While

there was no difference in the proportion of moderately and very experienced travellers who reported on physical impacts from sea ice use, a few very experienced community members discussed how being cold does not equate to being uncomfortable, or that they are comfortable even if they are experiencing physical exertion:

> Well, when I go up north and when I go off I'm comfortable, no matter how bad the weather is, no matter what situation I am in... I'm comfortable knowing that I'm going to the land. If I could just, if I'm to die right there, I'll die happy. There is no such thing as uncomfortable for me up north as long as I'm there...Yes, there's times when I'm cold, there's times that I'm wet and tired and all that, but to me that's nothing. As long as I know I'm there and I'm comfortable with my life. (MD)

Connections to traditions and Inuit ways of life were reported primarily by very experienced community members and expert travellers.

Frequency of hunting/fishing

Frequency of hunting was associated with differences in mental/emotional and material health and wellbeing influences of sea ice use. A higher proportion of frequent than infrequent hunters described benefits for their emotional and mental health from going off on the sea ice. A higher proportion of frequent hunters reported that they had not been worried about their safety in the past while travelling on the ice, while a higher proportion of infrequent hunters reported that they had experienced such worries. With regard to material wellbeing, a higher proportion of infrequent hunters reported material benefits from going off on the ice, particularly for their food supply. Conversely, a greater proportion of frequent hunters reported material impacts from the costs of going off on the sea ice. A greater proportion of frequent hunters also discussed positive influences on cultural wellbeing and way of life.

Employment status

Employment status was associated with differences for mental/emotional and material health and wellbeing. A greater proportion of community members who worked full-time reported being of out town as good for their health, and some indicated that this is related to taking a break from the daily demands and routines of which employment is a part:

> It's just bad coming back to Nain! Just feels good to be away, free and fresh air. When you're back, the routine starts all over again. (SW)

A greater proportion of community members working full-time also reported experiences where they were scared, nervous or stressed about conditions, and reported that they had been worried about their safety in the past. While a greater proportion of interview participants who worked full-time reported material benefits from going off, a greater proportion of participants who with part-time, seasonal, or other (PSO) work reported material impacts because of high costs of travel. In a verification meeting with male expert travellers, one of the participants explained the importance of being able to earn an income to be able to afford to go off:

> It's expensive, really expensive. You go to put your head straight forward, if you like travelling on the land like us. Money-wise, money-wise anyway... You can't just do it, you can't just go. You got to have money to go, pay for gas and bullets, and skidoo parts and all that. (HH)

Institutional education

Institutional education was associated with differing influences of sea ice use on physical and material health. Community members without a secondary school diploma, all of whom had completed some grade school but had no secondary school education, reported almost no physical health impacts or benefits from going off on sea ice. By contrast, the majority of community members with higher institutional education reported

various physical impacts from sea ice use, as well as some physical health benefits. Community members without a secondary school diploma also did not report any material benefits from going off on sea ice, while community members that had completed secondary school or higher certification described a variety of material benefits, particularly related to food supply.

Inuttitut-speaking ability

The ability to speak Inuttitut was associated with differences in reporting on cultural and material wellbeing in relation to sea ice use. A greater proportion of Inuttitut language speakers described connections between going off on the sea ice and Inuit traditions and way of life compared to non-speakers, describing how they love going off because that's how they grew up, how they want to live and survive in a traditional way, and how sea ice use connects them to their Inuit identity. An expert traveller and language speaker described how emotion and meaning of "who Inuit are" is embedded in Inuttitut language, so when stories are told in Inuttitut, this connects people to their ancestors. A higher proportion of non-speakers of Inuttitut reported material benefits from travelling on sea ice, predominantly related to food supply.

Frequency of wooding

Frequency of wooding was associated with few differences in health reporting, primarily for physical and material health and wellbeing. A higher proportion of frequent wooders reported benefits from firewood for fuel and material impacts from the costs of going off on the sea ice. A higher proportion of infrequent wooders reported that travel on the sea ice has physical benefits for their body.

In sum, all of the personal, social, and environmental determinants investigated

exhibited associations with differing experiences of health impacts and benefits from sea ice use.

6.3.2 Determinants of community health influences of sea ice use: socio-cultural change and the "white-ways world"

Although not directly asked about the impact of socio-cultural change on the relationship between sea ice and health, this was an emerging theme for expert sea ice users and community members, and was also observed via participant observation. Changing land use practices among young people with implications for their health and safety on the land was discussed extensively by male expert travellers, and reported by nearly half of community members. For instance, one community member stated:

> Well, I'm definitely concerned, especially about the younger people because a lot of them now haven't grown up the way that the older people did. They're not used to the ice conditions and some of them now got the fast skidoos, and I think they think they're invulnerable...they really don't hunt and fish like we did. They're watching TV and playing video games and whatever else they're doing, but I am concerned about them. And they go off in the spring as well when people are goose hunting and that's late into the spring, they're going out on the ice that's not safe. I am worried. (Henry Lyall)

Some community members linked their perspectives on the land use practices and in some cases lack of interest in going off on the land among young people to institutional educational obligations, while others identified the relationship of these changes to the rise of a material-focused culture:

> When we were younger, we had nothing what the young people have today...so we had more interesting ways to pass our time away, and do anything that was needed to be done. Today, the young people have everything that they are so stuck with I suppose...They have things that we never had, so it was easier for us to learn to live off the land, compared to the young people today. They have modern things that they are more comfortable with than being out on the land the way that we grew up. (Lucas Ittulak)

In a community information session on this study, a participant identified changes in land

use practices and land-based knowledge as relating to the influences of "living in a white-ways world."

Based on participant observation, these issues of socio-cultural change and the influence of a "white-ways world" are not limited to young people, and neither are they limited to health on the land. In a verification meeting with female expert travellers, a participant explained that looking at health and safety on the land and ice is missing the broader underlying issues in the community. To paraphrase, she said that young people do not know who they are because adults do not have the power to show them; that young people are dying because they do not know how to live. She explained that Inuit need to get their power back, get their Inuttitut language back, and govern themselves first, and then they will be able to teach their grandchildren how to live, with the implication that improved health and safety on the ice will follow. One community member explained how people in the community use and engage with the land is changing, but also how being on the land and using Inuit knowledge to survive and live well on the land is itself a process of reclaiming and affirming Inuit culture and traditional ways of life:

> Sometimes I just be out on the land and think of what happened back then and how we lived and how we live today...People were saying that language is getting gone, culture, tradition, and when I was out on the land doing that then it is not lost. I was still doing it, and I'm still doing it, and we are still doing it. It is not completely lost. (MD)

Overall, the issue of socio-cultural change related to the processes of colonization, assimilation, and self-determination was an emerging theme across data sources related to changes in sea ice use knowledge and practices and health at the community-level.

6.4 Discussion

The findings reported above contribute to the literature on interactions between determinants of Indigenous health by revealing how health influences of environmental exposure to a critical element of the environment in an Inuit community are informed by other health determinants. We conducted the study by examining associations between social and personal factors and land-use practices and health influences of sea ice use for residents of the community of Nain.

We found that every factor investigated was associated with differences in reporting of health impacts and benefits from sea ice use. Specifically, there were notable differences in reporting frequencies and themes in terms of health impacts and benefits of sea ice use amongst participants based on gender, age, sea ice travel experience, frequency of hunting or fishing, employment status, and to a lesser extent, institutional education, frequency of wooding, and ability to speak Inuttitut. These results demonstrate that gender, employment, institutional education, Inuttitut speaking ability (which is related to culture), and age (which is related to biology and genetic endowment) – factors which all correspond to determinants of health in Canada – mediate the health influences of the environment, another key determinant of health (PHAC, 2003). Further, the former four factors are social determinants of health, demonstrating the significance of social determinants for environmental health. For example, gender mediated influences from sea ice use on material wellbeing, as a greater proportion of male participants reported on material benefits and impacts than female participants, while female participants reported more than males on mental and emotional health benefits from using sea ice. These results demonstrate gendered health experiences from environmental exposure,

corroborating research by Dowsley et al. (2010) and Kukarenko (2011) that indicated that the influence of gender on environmental use and its health implications in Arctic communities is significant and needs to be explored. Inuttitut fluency was associated with higher proportional reporting of positive health benefits for cultural wellbeing through connection to Inuit traditions, ancestors, and culturally-important places on the land. This finding is consistent with other literature that has shown Indigenous language to be a marker of cultural continuity (Daniels-Fiss, 2008; Nicholas, 2009), and cultural continuity to be key to Indigenous health (Chandler and Lalonde, 1998; Reading and Wien, 2009; Richmond and Ross, 2009), and adds to our understanding of the links between language, culture, place, and Indigenous health. Education and employment also had an influence on reported health experiences. For instance, full-time work was more highly associated with dual mental health influences of improving mental/emotional wellbeing related to being out of town, and anxiety related to nervousness and worry about the safety of ice conditions. Employment status also directly mediated perceptions and experiences of access to material benefits versus material costs that resulted from sea ice use. There are few detailed investigations of health influences of material circumstances and socio-economic status in Indigenous populations (Booth and Carroll, 2009; Richmond and Ross, 2008; Shepherd et al. 2012). The gaps in knowledge on the roles of these determinants mean that the results of this study make a new contribution to our understanding of how these factors influence Inuit environmental health. Overall, these results demonstrate the importance of social determinants of health in particular to the distribution of health impacts and benefits from environmental use and exposure for Inuit.

Sea ice travel experience and frequency of hunting, fishing, or wooding activities were also associated with differences in reported health experiences related to sea ice use. This result is partially based in these factors all being indicators of environmental exposure. However, they are also indicators of environmental knowledge and engagement, and as such, are not only associated with negative health impacts, but positive health benefits. For example, frequent hunters had greater proportionate reporting on mental and emotional health benefits from sea ice use than infrequent hunters, and the majority of frequent hunters reported that they had not experienced worries about their safety in the past. By contrast, the majority of infrequent hunters reported that they had experienced such worries. These results contribute to a more complex understanding of the health influences of environmental use for Indigenous populations, by demonstrating that 'exposure' does not just mean exposure to hazards that can impact health, but also benefits accessed through knowledge and use of the environment. Other recent health scholarship in Inuit contexts has also sought to document risks and benefits of environmental exposure, but this work has to date been primarily focused on health influences of wild food consumption (Donaldson et al., 2010; Schuster et al., 2011; Van Oostdam et al., 2005). This study makes a new contribution to the literature by identifying the associations between different indicators of environmental exposure and engagement, and health influences.

These results also demonstrate the importance of considering both individual and community health to develop a more complete understanding of health-environment interactions, particularly in the context of Inuit and Indigenous health. Emerging themes around socio-cultural change and influences on sea ice travel practices and knowledge

did not speak directly to differential health impacts and benefits at the individual level, but indicated broad, systemic processes that have an influence on environmental health at the community level. This result corroborates recent developments around Inuit and Indigenous-specific determinants of health, which aim to include contextual factors and historical legacies for these communities, as well as culturally-specific conceptions of health (ITK, 2007; NAHO, 2007; Reading and Wien, 2009; Richmond and Ross, 2009). While acknowledging the importance of the official determinants of human health as recognized in Canada, these authors argue for the inclusion of distal, broader, or upstream determinants that capture unequal power relations and legacies of colonization to understand the reasons for gross inequality in health outcomes between Indigenous and non-Indigenous populations. These authors list these broader determinants variously as: colonialism, globalization, migration, acculturation, cultural continuity, self-determination, remoteness/access, territory, poverty, and racism and social exclusion. The emerging theme of socio-cultural change related to processes of colonization, assimilation, and self-determination, with implications for environmental health, adds to this growing body of research on the importance of considering Indigenous-specific determinants that capture the role of historical legacies and local context for health, and consider health both at the individual and at the community level.

Lastly, consideration of a number of health determinants at the individual level and in relation to community health for sea ice travel is particularly important in the context of changing ice and weather conditions. We have demonstrated that residents of Nain are currently experiencing differential health influences from sea ice travel based on various determinants of health. As ice and weather conditions continue to change (ACIA,

2005; IPCC, 2007), the benefits and impacts that residents experience from sea ice travel may also change and shift unevenly, potentially creating or exacerbating existing health inequalities within northern populations (Furgal, 2008). Given this context, these results make an important contribution to the evidence base that northern decision-makers can draw on regarding how to support individuals and communities to maximize health benefits and minimize impacts of travelling on the sea ice in the context of changing environmental conditions.

We acknowledge the limitation of conducting a mixed qualitative and quantitative analysis on qualitative case study data. As our sample size was not large, we were unable to conduct a statistical analysis of associations between variables and reported experiences. The nature of the data meant that we conducted an analysis of each factor separately, and not associations between factors, which does not account for how determinants of health are, at the individual level, descriptors of intersectional experiences and positionality. Also, we did not assess the role of all of the determinants of health in Canada, which may have excluded valuable knowledge on the role of some determinants, such as social support networks. Nonetheless, these findings make an important contribution to improving our understanding of the role of individual and community determinants of Indigenous health in shaping health experiences from environmental use and exposure.

6.5 Concluding comments

Likely in response to the predominance of risk-focused research in Indigenous health (Furgal, 2010), some scholars have focused exclusively on the benefits of environmental exposure and use for Indigenous peoples (Kingsley et al., 2009; Nettleton

et al., 2007; Panelli and Tipa, 2007). This divergence has left a gap in the literature on Indigenous environmental health regarding understanding the complexities of influences from environmental use and exposure for Indigenous populations. Our findings demonstrate that environmental exposure has complex implications for Inuit health that are influenced by a variety of individual and community level determinants. We have demonstrated how social determinants – including gender, employment, education, and culture – as well as levels of environmental engagement inform the distribution of health impacts and benefits from environmental exposure and use for Inuit. We also contributed to the growing literature on broader or distal determinants of community health for Indigenous populations – namely, the influence of processes of colonization, assimilation, and self-determination, and attendant socio-cultural change, on Indigenous health. Our findings also demonstrate the value and need for more research on determinants of environmental health in Indigenous populations to elevate our understanding of the complexity of environmental influences on health.

7 WHEN THE ICE IS BAD: INVESTIGATING RISK PERSPECTIVES OF INUIT SEA ICE USERS IN THE CONTEXT OF A CHANGING CLIMATE

This chapter consists of a paper that addresses Objective 4 of the thesis, which is to explore risk perspectives of sea ice users related to sea ice travel. This chapter encompasses perspectives on risk and benefits from sea ice use that relate to physical health as well as mental/social/cultural health. It is written in manuscript format for submission to *Climatic Change*, with co-authors C. Fugal and M.W. Skinner.

7.1 Introduction

Changes in the duration, extent, and strength of sea ice are amongst the most dramatic climate-related environmental changes taking place in polar regions today (ACIA, 2005; IPCC, 2007; Maslowski et al., 2012; Stroeve et al., 2012). We have a growing understanding of many aspects of human impacts from these changes on Inuit populations in the Arctic (ACIA, 2005; Anisimov et al., 2007; Ford et al., 2008a; Furgal, 2008; Laidler et al., 2009; Nickels et al., 2006; Tremblay et al., 2006), for whom sea ice is a critical element of the environment for health and wellbeing (Furgal and Seguin, 2006; Riewe, 1999; Van Oostdam et al., 2005). Nonetheless, some important gaps remain. As the field of human dimensions of climate change is still in relative infancy (Ford and Pearce, 2012), we still only have a basic understanding of what aspects of climate and environmental change are important factors for human health risks and benefits. Expanding this knowledge is critical to improving our understanding of how climate change can influence health risks and benefits in positive and negative ways for Inuit populations who depend on sea ice travel.

Specifically, Furgal (2008) and Ford and Pearce (2012) suggest that we need to further investigate the characteristics and relative importance of key environmental and climate variables related to sea ice travel that contribute to individual-scale human physical health risk from climate change. A scarcity of literature on social and environmental factors that contribute to health benefits from sea ice use means that this is also an important knowledge gap. More broadly, the roots of scholarship on vulnerability to climate change in natural hazards research (Ford and Smit, 2004; McLaughlin and Dietz, 2008) shapes the predominant conception in this scholarship of the environmental agent in question – in this case, sea ice – as a hazard. However, other bodies of literature, notably in the fields of environmental sociology and risk perception, have long considered the environment differently, for instance, as both a physically-mediated and socially-constructed reality (e.g., Freudenburg, et al., 1995; Irwin, 2001; Wildavsky and Dake, 1990). To develop a nuanced understanding of the complexity of environmental and social factors that are tied to health risks and benefits for sea ice users, we need to broaden our consideration of sea ice risks by investigating the risk perspectives of sea ice users and the factors that shape them.

To address these issues, our paper presents findings from a community-based participatory research (CBPR) project that examined perspectives of sea ice users on social and environmental factors that contribute to health risk and benefit related to sea ice travel in Nain in the Inuit territory of Nunatsiavut, northern Labrador, Canada. Specifically, we investigated Nainimiut (Nain residents) perspectives on the factors that contribute to making a trip on the sea ice safe or good, or difficult or unsafe, and the influence of gender, sea ice experience, and past experiences of requiring search and

rescue assistance on these perspectives. We also explored perspectives on changes in sea ice travel safety today compared to in the past. We drew on literature in the fields of environmental risk perception, environmental sociology, and health geography to inform our approach to this investigation. We report results from the qualitative stages of a larger research project, involving two focus groups with expert sea ice users and 22 individual interviews with a range of sea ice users. The project involved university-community research collaborations with the Nunatsiavut Government (NG) Division of Environment, the semi-autonomous government body in Nunatsiavut, and Nain Ground Search and Rescue (NGSAR), a volunteer-based search and rescue team made up primarily of hunters who are also residents of Nain, Nunatsiavut.

This project originated with the concern in Canadian Arctic communities regarding increasing accidents and stress associated with changing ice and weather conditions and the impacts on the ability to predict safe travel conditions and local reports of resulting increases in accidents and injury on the land (Ford et al., 2008a, 2009; Furgal et al., 2002; Gearheard, 2006; Nickels et al., 2006). These same concerns were echoed by the Nunatsiavut Government and Nain residents, along with additional concerns about the added impacts of winter shipping on sea ice travel safety in that region (Davies, 2007; Furgal et al., 2002; Nickels et al., 2006). While declines in summer sea ice cover have been documented throughout Canada's North, the largest rate of decline from 1968 to 2010 was in the northern Labrador Sea along the coast of Nunatsiavut, where sea ice shrank by 73% in this time period (1,536 km^2 or 17% per decade) (Henry, 2011). An ongoing collaboration between the second author and the NG, coupled with the

identification of sea ice safety as a priority research area in the region by the NG, led to the collaboration on this project.

7.2 Climate change, sea ice, health, and risk

Concerns about the implications of environmental change in polar regions driven by anthropogenic climate change (ACIA, 2005; IPCC, 2007) have prompted a proliferation of research on the human dimensions of climate change in the Arctic (Anisimov et al., 2007; Berner et al., 2005; Furgal, 2008; Furgal and Seguin, 2006; Ford et al., 2008ab, 2009, 2010b; Laidler et al., 2009; Nickels et al., 2006; Pearce et al., 2009). We should be concerned about human impacts from changes in the sea ice environment in the Arctic, for three reasons. First, extensive changes in the sea ice strength, cover, and seasonal duration over the last several decades have been documented (ACIA, 2005; Anisimov et al., 2007; Maslowski et al., 2012; Stroeve et al., 2012). For instance, satellite records beginning in 1979 show a decreasing linear trend of -12.4% in sea ice cover in the Arctic per decade, with the lowest sea ice cover minimums occurring in the last several years, from 2007 to 2011 (Stroeve et al., 2012). Based on three-dimensional observations and modeling of Arctic sea ice change, there was a 44% relative decrease in September sea ice thickness in the Arctic from 1979 to 2002 (Maslowski et al., 2012). Observations by Inuit land-users of dramatic changes in sea ice characteristics have also been documented (ACIA, 2005; Ford et al., 2008a; Gearheard et al., 2006; Laidler et al., 2009; Nickels et al., 2006; Tremblay et al., 2006).

Second, sea ice is a critical element of the Arctic environment for Inuit health and wellbeing (ICC-C, 2008; Furgal et al., 2002; Tremblay et al., 2006). Sea ice travel routes provide Inuit with access to critical food resources (Furgal and Seguin, 2006; Van

Oostdam et al., 2005) and historically and culturally significant places (Aporta, 2004, 2009; Cunsolo Willox et al., 2012; Henshaw, 2006), which translate into sea ice having important connections to food security, livelihoods, cultural wellbeing, and mental health for Inuit. Not all health influences from sea ice are positive, however. Negative physical health impacts can be sustained from experiences such as cold exposure or falling through the ice (Berner et al., 2005; Furgal, 2008). Indeed, reducing unintentional injuries and drownings related to poor ice conditions has been identified as a health priority in Inuit Nunangat (the four Inuit land claim regions in Canada), related to the mortality rate from unintentional injuries being disproportionately high in the North (GNWT, 2007; Pauktuutit Inuit Women of Canada, 2010). From 1999 to 2003, the age-standardized mortality rate from unintentional injuries was 4.3 times higher in Inuit Nunangat than Canada as a whole (ITK, 2010). Changes in sea ice strength, extent, and duration, then, can have important implications for health and wellbeing of Inuit communities, including increasing unintentional injuries and trauma ('accidents') and anxiety or worry (Furgal et al., 2002; Furgal, 2008), impacts on access to and quality and quantity of wild food resources (Ford, 2008; Furgal, 2008), and implications for place-identity (Cunsolo Willox et al., 2012).

Third, environmental changes can interact with complex social factors in northern communities to magnify the health influences of climate change. Processes of colonization and assimilation have had innumerable impacts on Inuit-sea ice relationships, by impacting intergenerational transfer of travel knowledge and use and access to the sea ice environment through the introduction or strengthening of Western or Eurocentric economic, educational, technological, and cultural structures and processes

(Ford et al., 2006a; Laidler et al., 2009; Pearce et al., 2011). Processes of self-determination and self-government have also led to cultural revitalization and adaptation or subversion of these Western structures and constructs to benefit Inuit sea ice use, through initiatives such as hunter support programs and land-skills training camps, and innovative use of new technologies and mapping applications (Aporta et al., 2005; Gearheard et al., 2011; Gombay, 2009; Takano, 2005). As noted in Chapter 6, these community-level determinants can also interact with factors at the individual level to influence health risks and benefits from sea ice use.

While scholarship has made significant contributions to our understanding of implications of sea ice change on Inuit health, some important gaps remain. First, as Furgal (2008) and Ford and Pearce (2012) articulate, we still only have a general understanding of environmental and climate variables related to sea ice travel that are important to human physical health risk. The authors identify a need for research into documenting the characteristics and importance of specific environmental conditions that can contribute to health risk for northerners in the context of climate change, while integrating this understanding with social factors, to create a comprehensive understanding of human health implications of current and future sea ice change. A key reason for generating this knowledge is to strengthen links between climate and sea ice modellers and the human dimensions of climate change community, by determining what variables beyond sea ice thickness or freeze-up and break-up dates are important to measure and forecast, and at what temporal and geographic scales, in terms of human health influences from sea ice use.

Further, there remain substantive gaps in our understanding of factors that contribute to health benefits from sea ice use, and how these are and will be affected by climate change positively or negatively now and in the future. This significant gap relates to the focus on environmental hazards in the literature for Inuit vulnerability and adaptive capacity in the context of environmental change (e.g., Ford et al., 2009; Laidler et al., 2009). The socio-biophysical vulnerability approaches that are primarily used to assess the human impacts of climate change (Ford and Smit, 2004; IPCC, 2007) have some roots in the natural hazards research tradition (Ford and Smit, 2004; McLaughlin and Dietz, 2008), where the environmental agent under consideration is deemed a hazard, and there is no conceptual space to consider the benefits of environmental exposure. Further, the normative project that underlies the employment of a vulnerability approach is an orientation towards a negative goal – the reduction of vulnerability – as opposed to a positive goal, such as strengthening of benefit associated with health and wellbeing. Clearly, both reducing vulnerability and strengthening health from exposure to and use of the natural environment by northern populations are critical, particularly in the context of environmental change. To address these goals, we argue that we need to examine social and environmental factors that contribute to both health risk and benefit related to sea ice use from the perspectives of sea ice users.

Considering the theoretical limitations in the vulnerability literature that we have described above and the existing knowledge gaps in the area of sea ice use and health implications of climate change for Arctic populations, there is a need to draw on other bodies of literature to help inform an investigation into this subject that will yield new and needed information. The conceptualization and perception of environmental risk has

been a focus in numerous fields of study, including environmental sociology, social

anthropology, political science, and psychology (Keller et al., 2012; Löfstedt and 6,

2008). There is a long-standing recognition in research on environmental risk and risk

perception that environment is not simply a material or biophysical reality, but also a

social one (Freudenburg, et al., 1995; Irwin, 2001; Wildavsky and Dake, 1990). As

Freudenburg et al. (1995) described early in the development of environmental sociology,

biophysical and social dimensions of human experience are mutually contingent, with

each influencing the other and shaping how the physical is socially defined.

Environmental risk is also a social construct, mediated by the physical, and the social

embeddedness of risk means that other social constructs – such as culture and gender –

influence how risk is perceived and constructed (Gustafson, 1998; Irwin, 2001;

Wildavsky and Dake, 1990). Further, interactions with places themselves influence risk

perspectives (Jardine et al., 2009; Masuda and Garvin, 2006), as places form a nexus

where physical, cultural, political, social, and economic influences intersect (Kearns and

Collins, 2010; Kearns and Moon, 2002). As such, risk perspectives are place-based,

culturally and socially-embedded, and mediated by the physical environment. By

applying this understanding to a consideration of Inuit-sea ice interactions, we can

broaden our understanding of what sea ice risks mean for Inuit health and why.

7.3   Research design and methods

7.3.1   Community-based participatory research design

We employed an instrumental case study approach (Stake, 2005) and a sequential

mixed methods design (Creswell, 2009) that emphasized community collaboration at all

stages of the research and practical solutions for mutually defined research questions. Our

approach was informed by the CBPR framework outlined by Fletcher (2003), and

numerous writings from Indigenous scholars in particular on the need for research in their

communities to be ethical, transformative, and participatory in the means and ends

(Denzin et al., 2008; Smith, 1999; Wilson, 2008). As non-Indigenous researchers,

community engagement is a strategy we used to help ensure that the project addressed

community needs and goals.

In this paper, we are reporting results specific to the qualitative stages of the

research project, including focus groups and semi-directed interviews, which explored

risk perspectives of sea ice users. Ethical approval was granted by Trent University's

Research Ethics Board and the Nunatsiavut Government Research Advisory Committee,

and all participants provided their informed consent, including for the publication of their

identities, words and ideas. Methods employed will be reviewed here briefly, as a

detailed summary can be found in Chapter 5.

7.3.2 The case study: Nain, Nunatsiavut

The community of Nain is the northernmost community on the east coast of

Labrador (N56°55, W61°68), in the Labrador Inuit Settlement Area of Nunatsiavut (Fig.

1.1). The population was 1,034 according to the 2006 Census, of which 92% of people

identified as Aboriginal (Statistics Canada, 2007b). The climate is classified as sub-arctic,

and the town is located on an inlet on the Atlantic Ocean surrounded by hilly, rocky

terrain. The community is "fly-in" as there is no road access. Wild foods are an

important part of diets in the region and in the community. Over three-quarters of adults

in Nunatsiavut harvested wild foods and wild foods made up half or more of all meat and

fish consumed in 56% of households in 2000 (ITK, 2008).

7.3.3 Data collection and methods

Before field work was initiated, we made a preliminary trip to Nunatsiavut in February 2010 to help focus and plan the study and build relationships Two focus groups were conducted (Morgan, 1997) in July 2010 with nine Inuit and Kablunângajuit expert sea ice users to explore how sea ice users in Nain view the relationship between travelling on sea ice and health. The focus group with male expert travellers had five participants, including one Elder, and was conducted in English with sequential interpretation-translation into Inuttitut. The female expert traveller group had four participants and was conducted in English. We also conducted one follow-up unstructured interview (Bernard, 2000; Corbin and Morse, 2003) with the Elder from the male group to discuss concepts of health relating to sea ice use in Inuttitut. We selected participants using a multi-step peer-recommendation process as described in Chapter 5.

We conducted 22 semi-directed interviews (Huntington, 1998) in November 2010 with residents of Nain that use sea ice for travel and hunting to explore risk perspectives among different sea ice user groups. To select participants, we used a non-proportional quota sampling method (Miles and Huberman, 1994) according to the following criteria: gender, years of experience travelling on sea ice (more or less than 20 years), and search and rescue status (whether the person had received assistance or not), to generate a diversity of perspectives based on gender, environmental knowledge, and potentially negative environmental exposure (see Table 3.5). Acronyms use to identify participant socio-demographic groups according to these three criteria are identified in Table 3.5. These acronyms are used in the Results section to indicate user groups that reported on

different themes. Participants were selected randomly from each group in the selection grid. We were not able to successfully recruit participants for two of the categories, because there were very few potential candidates and they were unable to participate. We constructed the interview guide with consideration for accessibility and relevance to the local context, so used a variety of terms to denote 'risky' or 'hazardous'[9] that would be locally relevant, and conducted pilot interviews to pre-test the interview guide.

We also employed participant observation (Creswell, 2007) to build interpersonal relationships and improve our understanding of sea ice travel experiences and practices. The lead author participated in four single and multi-day trips on the sea ice in March and May, 2011 and recorded reflections and observations.

7.3.4 Analysis

Focus groups were transcribed by the lead author. The Inuttitut portions of the recording with male participants were transcribed into Inuttitut by a different interpreter-translator who verified the accuracy of the original translation. The semi-directed interviews were transcribed by a private firm and reviewed by the lead author. Focus groups and semi-directed interviews were analyzed using thematic content analysis (Berg, 2001; Esterberg, 2002) using QSR International's NVivo 8 software and checked for intercoder reliability, as detailed in Chapter 5. The presentation of the findings according to risk perspective subthemes is based on this emergent coding structure. Participant observation notes were memoed and coded manually.

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[9] For positive factors, participants were asked to describe occasions when they had a trip that was good, comfortable, or enjoyable. For negative factors, participants were asked questions about trips or conditions that they thought were challenging, difficult, scary, dangerous, rough, or risky; places they felt uncomfortable going; and occasions where they were worried or got into trouble.

Transcripts were returned to participants and opportunities were provided to check their accuracy and reliability (Creswell, 2007; Davis and Wagner, 1997). We also conducted member checking with focus group and interview participants to verify the validity of constructs and summaries (Creswell, 2007; Onwuegbuzie and Leech, 2006), which also functioned as part of the report-back and communication that is part of a CBPR approach. Participants who attended relayed general agreement with the summarization and interpretation of the data, but all attendees also made corrections or added new data. Notes taken during the meetings were coded, and feedback was used to make adjustments and improve analysis. Participants also edited and approved the use of selected quotes and chose to be identified by their name or initials, or remain anonymous. After listing the name attribution for quotes, the user group for the participant is listed (see Table 3.5).

7.4 Results

Factors that participants reported as contributing to good/safe or difficult/unsafe sea ice trips are reported first, followed by a more detailed review of key factors. We also identify which user groups of participants reported on each theme discussed and explore reporting differences between groups. We then describe reports of overlap and intersections between factors in positive and negative categories, and conclude by reporting on perceptions of changes in safety today compared to in the past. We employ the following convention to describe representation of responses by community members for different themes: few, 1–20%; some, 20–40%; many, 40–60%; most, 60–80%; nearly all, 80–100%.

Factors that expert travellers and community members reported most commonly

as contributing to trips on the sea ice being good or safe included individuals'

environmental knowledge or the knowledge of their travel companions or guides, and

access to support for managing challenges; sea and freshwater ice conditions that are

indicators of safe ice or influence ease of travel; and positive experiences of places

previously travelled to and the activities undertaken that are contingent on or facilitated

by being in those places (e.g., hunting) (Table 7.1). For factors that made trips difficult or

unsafe, participants primarily reported on specific sea ice and freshwater ice conditions

that make travel more difficult or dangerous; weather conditions; and lack of

environmental knowledge or access to the knowledge and support of others (Table 7.1).

Table 7.1. Summary of expert traveller references and representation of community members reporting on factors that contribute to a good/safe or difficult/unsafe sea ice trip

Factors and conditions	Makes a good or safe trip		Makes a difficult or unsafe trip	
	Expert travellers references	Community member representation	Expert travellers references	Community member representation
Responses*	n=76	n=22	n=134	n=22
Ice conditions	Some	Most	Nearly all	Nearly all
Knowledge and support	Many	Nearly all	Few	Most
Weather conditions	Few	Many	Few	Nearly all
Places travelled / experience of the environment	Some	Nearly all	Few	Some
Activities carried out	Few	Nearly all	Few	Some
Efficacy / reliability of transportation	Few	Few	Few	Many
Terrain / land conditions	–	Few	Few	Some

* Scale for responses: few, 1-20%; some, 20-40%; many, 40-60%; most, 60-80%; nearly all, 80-100%

7.4.1 Perspectives on factors that made a trip good or safe

Knowledge

When the question, "what makes you feel safe while you're travelling on the ice?"

was posed in the focus group with male expert travellers, one participant replied:

> It's your experience and your knowledge that you carry with you from when you're a child that you learn over the years, and you trust yourself. And if you trust yourself, then you use yourself as an example. We're alive, we're still here. (Ron Webb, male expert traveller)

This perspective – that knowledge is what makes people feel safe on the ice – was

reported by expert travellers and nearly all community members (all sample groups).

Specifically, expert travellers and community members reported that critical to their

safety on the ice is: 1) knowledge of sea and freshwater ice conditions and formations

that are indicators of safe and unsafe ice; 2) the ability to interpret indicators of weather

conditions; and 3) knowledge of the land and familiarity with places.

Expert travellers and a community member (FA) explained that they know

whether or not the ice is safe because they watch it over the course of a season and

accumulate location-specific and seasonal knowledge about what ice is safe or not. For

instance, by observing which locations take longer to freeze, participants explained that

they know which will be the first places to open up in the spring. Some community

members (MM, MN, FM, FN) described how they feel safe and comfortable travelling

through familiar places, from specific routes to large land-use areas. Participants also

described how other peoples' knowledge contributes to their safety. Female expert

travellers and many community members (all except FM) described how their safety

comes from the travel knowledge of their companions. As one participant (FA) described,

the conditions that she would consider scary or dangerous are different if she is alone or

with other people or a guide, and that once she is on the ice, she has no choice but to trust her guide's knowledge. Some community members (MN, FN) described how they feel comfortable travelling on early or mid-winter ice if it has been travelled by many people before them, as indicated by the tracks they have left behind.

Ice conditions

Expert travellers and most community members (all groups) reported on conditions of the ice that make a trip good for them related to: 1) the safety of the ice in terms of thickness and strength, and; 2) ease of travel along a route which may be on ice or land, known as "the going." Expert travellers (male and female) and a few community members (FN, FA) reported that when the going is poorer (e.g., slushy or uneven), travel is nonetheless good, if they know that the ice is safe. However, female expert travellers and some community members, primarily female (FL, FN, FA, MA) described travelling as more enjoyable when the going is good – that is, when the ice is smooth with soft snow. Expert travellers (male and female) and some community members (MM, MN, MA, FN, FA) described specific locations, types of ice, or times of year when or where ice is relatively safer. For instance, some participants described how sea ice in bays is relatively safer than sea ice beyond the outer islands, where ocean swells can cause quick break up. Also, sea ice itself was considered more trustworthy than freshwater ice by some participants, because it bends instead of breaking as freshwater ice does when it is thin.

Weather conditions

Female expert travellers and some community members (MN, FM, FN, FA) reported weather conditions that contribute to trips being safe and good for them,

reporting that they prefer sunny, clear, cold weather, but not extreme cold. A few of these participants described how these conditions not only contribute to good visibility and enjoyment of travel, but clear, cold weather contributes to the ice being safe and the going being good. However, a few female community members (FN, FA) and expert travellers also reported even when the weather is poorer, such as rain or fog, they nonetheless go off, explaining that they enjoy being out on the land even in bad weather as long as they are not in danger.

Experiences of places and activities carried out

Expert travellers and many community members (all groups) reported positive experiences of places and activities that are contingent on or facilitated by being in those places, such that places travelled and activities undertaken need to be considered together. For instance, a male expert traveller reported that an experience hunting for seals on moving ice pans with a family member in the spring was good for him, and another male expert traveller described positive sensations of being on the land, such as observing the beautiful scenery and smelling the fresh air, while travelling to from Nain to a community in Nunavik. As one community member stated:

> Good company, good place. I wouldn't ask for anything else in the world, just to be at that moment, just to be right there for that beautiful day with friends. (MD, FA)

Activities that expert travellers and many community members described as contributing to a good trip included successful harvesting activities; spending time with family or friends; and the act of travelling itself. Many participants reported specific places that they associated with a good trip: places that were familiar, scenic, associated with

positive memories, or favourable for hunting. Many also reported that just being on the land is good.

7.4.2   Perspectives on factors that make a trip difficult or unsafe

Ice conditions

The impact of ice conditions on trips was reported by nearly all community members (all groups) and constituted nearly all expert traveller references on factors that make trips difficult or unsafe (Tables 7.2 and 7.3). The range of conditions reported varying according to time, including time of day and period during the seasonal ice cycle, and location.

With regards differences in reporting of ice-related conditions by groups, expert travellers reported on a wider variety of ice conditions as dangerous or risky than community members (Tables 7.2 and 7.3). Further, a greater proportion of very experienced travellers reported certain dangers, such as travelling at the *sinâ* (ice edge), or navigating cracks in the sea ice. Apart from this difference, sea ice risks were described in similar ways by very experienced and moderately experienced travellers. SAR status was not associated with differences in reporting on ice-related hazards.

Gender was associated with some differences in reporting on ice risks. Female expert travellers used the words "scared" or "scary" in reference their experience of certain ice conditions 25 times in the focus group, while male counterparts in the focus group used these words twice. Amongst community members, some females and a few males used these adjectives, totalling 38 occurrences of scared or scary for females, and eight occurrences for males. However, many community members interviewed reported that they had never been worried about their safety, including some male and female

participants who reported having been scared or having encountered scary ice in the past. Expert travellers and a few community members (ML, FA) explained that worrying will not help them if they are in a difficult situation on the ice; that they have to stay calm and aware instead. After describing an extremely difficult and dangerous incident of falling through the ice during extreme cold, one expert traveller concluded:

> And to have that happen to you, you don't think you should be afraid, there's nothing to be scared of. You're just living through it, and come out safely from it. Some people might panic and be afraid of what's going to happen, but real hunters and travellers have to always be conscious, be aware of what could happen and be prepared for it. That way they survive. (Lucas Ittulak, male expert traveller)

Weather conditions

Weather conditions that make trips difficult or unsafe by impacting the ability to navigate and ease of travel were reported by expert travellers (male and female) and nearly all community members. These conditions included snowstorms and blizzard conditions, extreme cold, high winds, and fog. A few female expert travellers and community members (FN, FA) reported that even if the weather is poor, they enjoy going off and are not uncomfortable in snow, rain, or fog unless the ice is unsafe. Apart from this one difference where gender was associated with differences in reporting on weather conditions, there were no major differences in reporting of hazardous weather conditions between groups.

Table 7.2. Ice conditions associated with freezing or melting processes that participants reported as being difficult or unsafe

Condition*†	Description	Impacts reported	Expert travellers	Community members‡
Conditions related to freezing processes				
New ice (FW/S)	When ice first freezes over completely to allow for travel in fall/early winter; freshwater ice freezes first	Can fall through in places that are thin or where there are currents/tides	M	Many (all groups)
Bad ice from not freezing properly (FW/S)	Thin or weak ice from mild temperatures, particularly in winter of 2009-2010; impacts on ice strength throughout whole ice season	Can fall through; harder to "trust" ice	M, F	Many (all groups)
Sheer ice (S)	Slippery ice from partial melt and quick refreeze	Hard to steer on	F	Few (FM, FA)
Slob (S)	Snow drifting onto and sinking ice, causing absorption of water	Difficult to travel through; can get stuck	M, F	One (MA)
Pressure ridges (*piKKunnik*) (FW/S)	Ridges formed from ice bending because of not freezing over properly; usually on freshwater ice but some observed on sea ice in 2009-2010	Can fall into very deep pool formed by water coming up through ridge	M	One (FA)
Conditions related to melting processes				
Late spring ice (F/S)	Degrading ice or ice breakup; ice will begin melting from underneath rather than on top	Can fall through	M	Nearly all (all groups)

Condition*†	Description	Impacts reported	Expert travellers	Community members‡
Conditions related to melting processes (con't)				
Slush (FW/S)	Water from snow or ice melt mixed with snow	Slows down travel, difficult to travel on	M, F	Some (all groups except FA)
Air pocket (FW/S)	Two layers of ice with air or water in between	Can fall through top layer	M	Few (FM, FN)
Candley ice (*illaujak*) (FW)	Crumbly ice formation that looks like thin vertical icicles through which water drains; usually in freshwater ice but observed for sea ice in recent years	Very unstable, can fall through	M, F	–
Cracks in lake ice (FW)	Cracks in lake ice	Can fall through even if small crack	M	–

*FW = freshwater ice; S = sea ice.

† Names of conditions appear as reported by participants. In cases where local terminology was used, scientific terms appear after a forward slash. Inuttitut terminology listed in brackets where reported.

‡ Scale for expert travellers (n=2) is presence/absence, scale for representation of community members (n=22): few, 1-20%; some, 20-40%; many, 40-60%, most, 60-80%, nearly all, 80-100%

Table 7.3. Ice conditions formed or influenced by tides, currents, winds, precipitation, and winter shipping that participants reported as being difficult or unsafe

Condition	Description	Impacts reported	Expert travellers	Community members
Effects of tides, currents, and winds				
Rattles / polynas (S)	Areas of open or thin ice because of tides or currents and fast moving water	Can fall through	M, F	Many (all groups)
Ice breaking up at ice edge (*sinâ*) (S)	Extremely fast breakup of ice because of sea-on / swells on open ocean	Can fall through	M, F	Some (MN, FN, FA)
Rough or ridgey ice (S)	Wind creating hardened ridges or drifts on ice	Slows down travel, difficult to travel on	F	Some (MN, FM, FN)
Cracks in sea ice (S)	Cracks or leads in the sea ice controlled by tides; at *sinâ*, tides and winds can cause cracks to widen and ice pans to drift	Not necessarily an impediment in bays unless wide crack; at *sinâ*, ice can break from landfast ice along cracks and drift	M, F	Few (MM, FN)
Overlapping ridges (*âjugak*) (FW)	Cracks where ice has overlapped after refreezing, pushed up by tides; unusual but observed in 2009-2010	Can fall into pool formed by water that comes up from crack	F	One (MA)
Lake ice at river mouth (FW)	Thin ice from fast moving water at mouth of river feeding into lakes or ponds	Can fall through	M	–
Bellycaters / ballicaters (S)	Rocks frozen over near shore, with exposure and ice build-up related to tides	Can hit them and flip	–	One (MM)

Condition	Description	Impacts reported	Expert travellers	Community members
Effect of precipitation				
Snow covering ice conditions (FW/S)	Snow obscuring any ice conditions, particularly for new ice (snow also delays freezing) and spring ice	Snow makes it hard to judge ice conditions; can fall through or hit bumps	M, F	Some (MN, MA, FM)
Rain on ice (S)	Rain on top of ice; unusual but observed in 2009-2010; sea ice refroze but took on qualities of freshwater ice	Can makes travel difficult, cause mechanical failure; when refrozen, decreased salinity can make it difficult to judge	M, F	One (FM)
Deep snow (FW/S)	Deep snow from heavy snowfall or drifts from wind	Can get stuck, make travel difficult and slow	–	Few (MM, MN, FN)
Snow covering water (S)	Snow covering water (e.g., drifting from ice onto water, covering water between ice pans)	Can fall through if misjudge snow on water for ice	M	–
Other				
Ship track (S)	Track of broken ice formed by winter shipping	Can slow down or make travel difficult if refrozen as rough ice; can fall through if track not refrozen	M, F	Few (MM, FN)

See Legend for Table 7.2.

Terrain conditions

Terrain conditions on the land that make travel difficult were reported by female expert travellers and some community members (MM, MA, FN, FA), and included conditions such as steep and slippery hills. However, one female community member described how when travelling on skidoo over different kinds of terrain, any wrong turn could lead to injury:

> You go hill to hill and everything looks all the same, nothing but snow and you can't tell if it's a drop there or a hanging, what you would call it, you don't know what's on the other side. So flat, and then a 20, 30 foot drop – it's just bad accident. It could be as much as 2 feet, and still give you a bad accident. It could be a little small ice or rock like that because that, you could still have a big accident...It could happen in a second and it is just hard to describe, hard to explain. (MD, FA)

Overall, there were no trends in reporting on terrain conditions on land between groups.

Knowledge and support

Lack of knowledge of ice conditions, knowledge of places, and other travel skills was reported by expert travellers and many community members (all groups except FM) as leading to challenging and unsafe experiences in general, and many community members reported that it had resulted in such experiences for them at some point in the past. As a female expert traveller explained:

> I think you got to have some knowledge of where you're going, and know where the bad spots are, especially after it snowed or something, because if you don't know there's a rattle here and you're driving there, you'll go through the ice. (ERM, female expert traveller)

Female expert travellers and a few community members (FA) explained that ice or weather conditions that are safe or not safe depend on the knowledge and experience of travellers and their companions or guides; the same condition can be safe for one person who knows how to manage it and unsafe for another who does not have this knowledge.

Some community members (all groups except FA) and expert travellers described how because ice and weather conditions have changed, they can no longer accurately predict weather conditions or reliably interpret indicators of safe and unsafe ice, which some described as not being able to "trust" the ice and the weather. A few expert travellers and experienced community members described how lack of companions led to challenging situations on the ice for them in the past, such as getting stuck, while a male expert traveller reported that lack of sharing of knowledge about dangerous conditions between groups of travellers can lead to unsafe situations.

Experience of places and activities carried out

Expert travellers and a few experienced community members also reported that the lack of success of activities being carried out during trips also contributed to trips on the ice being difficult, such as not being able to locate animals or having to go far from the town to get wood. One female expert traveller and a few community members (MM, MN, FM, FN) described being uncomfortable in relation to the places travelled if they are not familiar with the place, if the ice tends to be more dangerous there, or if the place is associated with past negative experiences. A female expert traveller and a few female community members (FM, FA) also described not being able to enjoy the experience of being on the ice if the weather or going are poor.

7.4.3   Intersections between positive and negative factors

Experiences or perspectives on sea ice travel that participants reported did not all fit exclusively into the binaries of good/difficult or safe/unsafe. Expert travellers (male and female) and some participants (all groups except FM) described how trips can be good and difficult simultaneously. For example, some expert travellers and community

members explained that while the going can be slow or hard, they still consider the ice good if it is safe for them. A few participants gave examples of experiences where they had become stuck or when their skidoo broke down, and considered the experience a great learning opportunity for their children or a memorable trip because they used ingenuity to fix their vehicle – for example, using a shotgun to make holes in and bind together a broken ski. A few female community members (FA) and expert travellers described how they have gotten caught in bad weather and been cold and wet, but did not see this as uncomfortable or trouble because they knew how to make or find shelter, and further, these conditions are just a part of being on the land.

Additionally, a female expert traveller and a community member (MM) described trips that were unsafe at times but still good. For instance, a female expert traveller reported all of her caribou hunting trips being good in the past year, and then described how during one of these trips, she fell through the ice in a bay not far from Nain. She continued hunting after being pulled out by companions despite being wet and cold, and later had to sleep in a shelter because of bad weather. She recounted that while it was scary to fall through the ice, it was nonetheless fine because she received assistance and got caribou in the end. Another female expert traveller described being scared when a brook she and her brother were crossing started breaking underneath them, but described how at the time she also observed how "beautiful and clean" the bottom of the brook was, and even looked for fish. A community member (MM) described how his friends and others in the community will take risks on bad ice when there is an opportunity to hunt caribou.

7.4.4 Changes in safety

Expert travellers (male and female) discussed extensively how travel on the ice is more dangerous today than it used to be because of changes in ice and weather conditions, and attendant changes in their ability to predict weather conditions and interpret indicators of safe and unsafe ice. Female and male expert travellers discussed certain conditions on the sea ice that they had not seen before or had not previously seen in the locations, frequencies, or seasons that they now appear (such as *piKKunnik*, and *ãjugak*); changes in the timing and range of access to places because of changes in the extent, duration, and strength of sea ice; and changes in their ability to predict weather and ice conditions based on their traditional travel knowledge. One male expert traveller, an Elder, reported that sea ice was safer when he was younger, but today travel is very difficult even for an experienced hunter like himself, because conditions are very unpredictable and uncharacteristic. For example, he described how he and others have fallen through sea ice recently because places and times of year when the ice used to be safe are no longer safe.

Many community members (all groups) also reported that travel on sea ice was more dangerous today because of changes in ice conditions, and also in weather conditions.

> Ice conditions are getting poorer every time, and last year I didn't even have a chance to go anywhere out on the ice because I'd been hearing of a lot of skidoos go under the ice, through the ice.... I say it's not being safe at all to travel on ice conditions like that. (Harry Green, MA)

A few community members (MM, FN, FA) reported that they did not find travel on sea ice safer or more dangerous today than before, just different, while describing changes

that they observed in the ice and weather. A few community members (MM, MA) reported that the level of danger travelling on the ice is the same.

7.5 Discussion

Propelled by the urgency of climate change, this study investigated perspectives of sea ice users to explore the social and environmental factors that are tied to health risks and benefits of sea ice travel and use. By investigating the perspectives of a range of sea ice users regarding positive and negative factors affecting their land-based health and safety, we have identified new dimensions that have not yet been explored or have not been explored in detail in the current literature on vulnerability to climate change and sea ice hazards. These dimensions are related to three broad areas: perspectives on positive and negative factors shaping environmental risk and benefit experiences; differences in environmental risk perspectives between groups of environmental users; and perspectives on how sea ice travel safety is changing.

Our first broad category of results relates to the differences, similarities, and overlaps in factors that sea ice users viewed as contributing to a good/safe trip and difficult/unsafe trip. While participants reported on the same general themes for positive and negative factors, the prioritization of factors and level of detail and specificity was different. For factors that contributed to difficult/unsafe trips, ice conditions and weather conditions were reported by nearly all community members and constituted nearly all of the references made by expert travellers on negative factors. Details of ice conditions constituted the majority of reporting on factors that make trips difficult/unsafe by all participants, and participants detailed conditions that are dangerous related to freezing processes, melting processes, as well as effects of tides, currents, winds, precipitation,

and winter shipping. These detailed results corroborate existing research documenting Inuit knowledge of sea ice conditions (Ford et al. 2008a; Laidler and Elee, 2007; Laidler and Ikummaq, 2008; Laidler et al., 2008, 2009; Nichols et al., 2004), as well as add additional place-specific information related to local terminology and perspectives of Labrador Inuit. The results also include perspectives of sea ice users not typically interviewed and represented in research on Inuit knowledge of sea ice, because they may not consider themselves knowledgeable or 'experts'. These results on specific environmental conditions that are considered difficult or dangerous by a range of sea ice users can be used to help identify specific ice and weather indicators that are important to sea ice travel safety for Inuit, which can inform work on climate and sea ice modelling to make it more relevant to the geographic scale at which people use sea ice.

Factors that participants reported most frequently as contributing to a good or safe trip were knowledge and support, places travelled and experiences of those places, and activities undertaken. While knowledge was more frequently reported on for positive factors, and environmental conditions for negative factors, taken together, the relationship between environmental conditions and knowledge of those conditions was the foremost relationship influencing sea ice risks and benefits for participants. For instance, many community members and expert travellers described ice conditions that they considered dangerous, and at the same time asserted that they or others can travel on or through these conditions safely if they have the knowledge to do so. Further, a few female participants explained that ice or weather conditions that are safe or not safe depend on the knowledge and experience of travellers and their companions or guides. The importance of knowledge of ice and weather conditions and places for sea ice travel safety has been

discussed in other research (Ford et al. 2008a; Laidler et al., 2009; Nichols et al., 2004), and the role of support and knowledge sharing has also been noted (Laidler et al., 2009). However, the reports from participants regarding the role of knowledge and relationship to risk contributes to the literature by demonstrating that sea ice conditions are not universal hazards for travellers. While some conditions were viewed as having the potential to lead to more serious health impacts, such as new ice, or impede with travel more than others, such as slush, the risk associated with that condition was reported as contingent on the ability of travellers to manage that risk. This finding adds to the literature by broadening our understanding of sea ice hazards as both an environmental phenomenon and social artefact based on prior knowledge of and relationship to that environmental element. Results on the theme of place are also significant, because while some anthropological research on the relationship between Inuit and sea ice has been conducted (Aporta, 2004, 2009), very little research has been undertaken to date on the importance of sea ice as a place in the context of Inuit health (Cunsolo Willox et al., 2012). Our research has demonstrated the importance of various social and cultural activities to Nainimiut made possible by use of sea ice, and thus the contingency of these activities on places. It has also provided evidence for the importance of access to places and place experiences as contributing to health benefits from environmental use. These results demonstrate the importance of sea ice to health as more than a location where resources are accessed, but as a place of social and cultural connection and health benefits.

Not all reports fit exclusively into the categories of good/safe or difficult/unsafe. The intersections between positive and negative factors demonstrate that there is no

absolute binary here between positive and negative, or risk and benefit, as some perspectives on factors or conditions related to sea ice travel existed in the space between positive and negative, belonged in both, or belonged in neither. For instance, a few expert travellers and experienced community members explained that difficulties are all part of the experience of being on the land, and that to truly love the land, one has to "love the bad weather" and "love the bad ice", as well as the good. That the participants in our study travel on sea ice at all despite their recognition of the myriad dangerous conditions they may encounter underscores how risks and benefits of sea ice travel may exist simultaneously, and the relationship to and desire to be on the sea ice includes management or balancing of these disparate elements. In another example, some participants did not equate travelling on "scary" ice or being scared with being worried about their safety; indeed, many participants had reported that they had never been worried about their safety when travelling on the sea ice. These views may be rooted in Inuit cultural approaches to planning and prediction related to travel in a highly variable environment, as described by Bates (2007) and Briggs (1991). These results complicate existing work on Inuit vulnerability to sea ice hazards, by demonstrating a disjuncture between ice and weather hazards, which are conceived of in universalizing ways, and risk perspectives, which may be shaped by culture (Wildavsky and Dake, 1990) and relationships to places (Masuda and Garvin, 2006), among other factors. These results may indicate cultural influences on risk perspectives related to the reciprocal relationship between culture and place, although more research to improve our understanding of these links for Inuit is needed.

Secondly, risk perspectives varied amongst groups of participants. With regards to

knowledge of sea ice travel, expert travellers identified a wider range of conditions as dangerous compared to community members. Among community members, a greater proportion of those with more travel experience reported the dangers of travelling at the *sina*, and encountering cracks in the sea ice. These results indicate that greater sea ice travel experience informs and expands knowledge of dangerous ice conditions, which builds on the earlier results discussed that demonstrate that sea ice risks are both a physical and social reality, shaped by a prior relationship to and experience of environmental conditions. The psychometric model pioneered by Fischhoff et al. (1978) first described the relationship between risk perception and factors that included knowledge of the hazard by those exposed, its controllability, and its newness – where increased knowledge, controllability, and oldness contributed to a perception of lower risk. Others have found a familiarity or habituation effect for those people who are more exposed to certain kinds of hazards, thus lowering their perception of risk (Lima, 2004; Leiter, 2011). However, risk perception can also be heightened by knowledge and experience; the risk can become more known and imaginable according to the availability heuristic (Tversky and Kahneman, 1973), or associations can be created based on past experiences, according to the affect heuristic (Slovic et al., 2004). Our findings regarding the greater knowledge of environmental hazards of travellers who were more experienced, coupled with their continued environmental use, indicates that greater risk knowledge may be associated with a sense of risks being more controllable, such that people continue to choose to purse environmental activities where they are exposed to risks (Fischhoff et al., 1978). These findings can also be understood according to the affect heuristic, where positive associations related to environmental use for very

experienced and expert sea ice users may be outweighing the perception of risk, even as there is greater recognition of hazardous conditions (Slovic et al., 2004). The cultural and place dimensions of risk previously described are likely also playing an important role in mediating the relationship between knowledge/experience and risk perception. These findings add to our understanding of environmental risk perception and relationship to knowledge in an Inuit context, where the literature is quite sparse.

Gender was associated with differential ways participants discussed ice conditions or travel on ice conditions, with female expert travellers and community members employing the words "scared" or "scary" substantially more than male participants to describe ice conditions. This difference in risk communication indicates gendered risk perspectives related to travel on sea ice, or the influence of gendered communication styles in research settings. As Dowsley et al. (2010) describe, division of labour among Inuit before and during group sea ice trips tends to be gendered, with men typically driving skidoos or leading trips, and women preparing clothing and food supplies. We observed some instances where division of labour related to sea ice trips was gendered based on interest, knowledge, capacity, and habit; families worked as teams with different members taking on different elements of work to ensure a successful trip. Some female community members described how they have different responsibilities than their husbands or older male family members during travel, and fewer female than male community members described leading trips or travelling alone. This evidence of gendered travel practices indicates that our findings regarding differing risk communication language are likely tied to gendered risk perspectives, and not simply an artefact of the research process. Dowsley et al. (2010) and Kukarenko (2011) argued that

gender has been generally overlooked as a lens or construct that influences Inuit-sea ice relationships, or male perspectives have been elevated. Our findings illustrate that gender matters for Inuit risk perspectives of sea ice risks, as it does in the construction and perception of environmental health risk in general (Gustafson, 1998). More broadly, these findings demonstrate the importance of considering the role of gender in examinations of environmental risk perspectives among Inuit.

SAR status, or whether or not community members had been assisted by SAR in the past, was not associated with any differences in perspectives on factors that make trips on the sea ice safe or unsafe. SAR status was investigated based on the notion that a past experience while travelling that warranted the provision of external aid was an indicator of experience of sea ice hazard exposure. Such an experience could influence the perception of risk associated with sea ice travel – for instance, heightening risk perception by making the risk more known and imaginable, according to the availability heuristic (Tversky and Kahneman, 1973), or creating negative associations based on past experiences, according to the affect heuristic (Slovic et al., 2004). However, these findings indicate that SAR status may not be a useful indicator for investigating risk perspectives.

Thirdly, changes in safety today compared to the past were reported by nearly all participants, with expert travellers and many community members reporting that travel is more dangerous today because of changes in ice and weather conditions. Expert travellers and a few community members also described ways that changes in ice and weather conditions have impacted their knowledge of sea ice and ability to keep themselves safe, reporting that the ice and weather are more unpredictable, that it is difficult to ascertain if

the ice is safe or not based on their current knowledge, or that they can no longer "trust" the ice as they once did. These results illustrate the reverse side of the environment-knowledge relationship discussed previously. Modification of the environment because of climatic change means that knowledge of ice conditions and prediction of weather conditions is not as accurate as it once was, and changes in the timing and extent of sea ice also influence the amount of sea ice travel that is feasible, further impacting this relationship. A number studies have also documented concern in northern communities about sea ice travel being more dangerous because of changing ice and weather conditions, as well as impacts on the ability of sea ice users to predict conditions (Ford et al., 2008a, 2009; Furgal et al., 2002; Gearheard, 2006; Nickels et al., 2006). Our findings corroborate these results. Further, by exploring factors that are associated with health risks and benefits from sea ice travel and connections between factors, we have also expanded our knowledge of how changing conditions may interact with and affect other factors that increase or decrease risk and safety for individuals.

Limitations of our study include the absence of perspectives from people with moderate sea ice travel knowledge who have been assisted by search and rescue, because there were very few potential candidates and we were not able to recruit them successfully. We have also not employed the psychometric model (Fischhoff et al., 1978) to investigate how sea ice users rate different hazards based on characteristics such and new/old, voluntary/involuntary, etc., or explored the role of attitude or affect (Slovic et al., 2004) and belief (Lee et al., 2005) in-depth. These are all areas that could lend themselves to fruitful future research. Others have explored the ways that climate change narratives construct northern communities as at-risk or victims – like the Arctic

environment – of climate and global political relations (Bravo, 2009; Martello, 2008), and in this way, can pose a risk to communities themselves. Some have also explored how climate change risk narratives are also being employed by Arctic Indigenous peoples as an opportunity for increased visibility and political voice (Martello, 2008). This topic, although related to climate change and risk, is beyond the scope of our current research.

7.6 Concluding comments

By investigating risk perspectives of sea ice users, the qualitative results of our CBPR project reported herein expand the growing understanding of the social and environmental factors that contribute to health risks and benefits for northern populations dependent on sea ice, and the influences of climate change on these factors, and therefore on health. We demonstrated differences between factors that sea ice users in Nain view as contributing to good/safe and difficult/unsafe trips, detailing the importance of environmental conditions for negative factors; and knowledge and experiences and uses of places for positive factors. We have also shown differences in risk perspectives between groups based on gender and knowledge/experience. Together, these results demonstrate that sea ice risks are not universal; they are constituted by a combination of physical and social factors. Detailed information on specific environmental conditions deemed dangerous can be used to improve modelling of sea ice hazards at the local scale, at which it is an important influence for human health of ice users, and information on all factors that are related to health benefits and risks can be used to understand the cascading influences from environmental change on human health of sea ice users.

8 ENVIRONMENTAL HEALTH RISK MANAGEMENT IN AN INUIT COMMUNITY: NEGOTIATING CLIMATE CHANGE AND HEALTH INFLUENCES OF SEA ICE USE

This chapter consists of a paper that addresses Objective 5 of the thesis, which is to explore the factors influencing risk-benefit management for safe sea ice use. Underlying this paper is an understanding that sea ice use can influence physical and mental/social/cultural health in positive and negative ways. As such, this paper explores how sea ice users minimize health risks and maximize health benefits associated with sea ice travel; determinants of different risk-benefit management processes used by individuals; and influences of changing social and environmental factors on risk-benefit management processes. It is written in manuscript format for submission to *Polar Record*, with co-authors C. Fugal and M.W. Skinner.

8.1 Introduction

While human society has assessed and managed risks to health and survival for millennia, the concept of risk management as a process of mitigating risk to human health and ecosystems is relatively new, having been developed and officially implemented in institutions and organizations only in the last two to three decades (Jardine et al., 2003; Krewski et al., 2007; U.S. Presidential/Congressional Commission on Risk Assessment and Risk Management, 1997). Even more recently, the concepts of vulnerability and adaptation have been developed to assess the impacts and short and long-term coping capacity to climate change, an agent of health risk that is already formidable and growing (Ford and Smit, 2004; IPCC, 2007). While terminology used in these fields is distinct, both aim to identify, assess, and communicate complex risks deriving from the

intersection of social and environmental factors, and choose or support actions that can

reduce potential adverse health effects of these risks, now and in the future.

The human impact of anthropogenic climate change in the Arctic has received

considerable attention, related to the sensitivity of the cryosphere to changing

temperatures and the importance of the environment and the wildlife it sustains to the

people that inhabit this region (ACIA, 2005, IPCC, 2007). Dramatic environmental

changes, including increases in the magnitude and frequency of weather extremes,

decreases in ice distribution, stability, and coverage, and changes in snow quality have

serious implications for the health of Inuit communities (ACIA, 2005; Furgal, 2008;

Furgal et al., 2002; IPCC, 2007; Nickels et al., 2006; Tremblay et al., 2006), for which

the environment, and the sea ice environment in particular, is a source of health and

cultural continuity related to hunting and other land-based activities (Furgal, 2008; Furgal

et al., 2002; Furgal and Seguin, 2006). As with other societies with strong relationships to

the local environment, Inuit have been managing physical health risks in the challenging

and variable environment for millennia (Bates, 2007; Briggs, 1991; Freeman, 1976; LIA,

1977). However, the concern that the rate and magnitude of environmental changes may

exceed the adaptive capacity of some individuals or groups, with potentially negative

health consequences, has led to a proliferation of research on climate change vulnerability

and adaptive capacity in Inuit regions (Berner et al., 2005; Ford et al., 2008ab, 2009,

2010ab; Furgal, 2008; Furgal and Seguin, 2006; Laidler et al., 2009; Nickels et al., 2006;

Pearce et al., 2009; Tremblay et al., 2008). Despite these efforts, our understanding of

climate change vulnerability and processes of individual and collective adaptation remain

quite basic (Ford and Pearce, 2012).

As highlighted in the body of literature on vulnerability to climate change, environmental hazards in the Arctic environment pose physical health risks to those who use the environment for daily activities, and changes in environmental conditions are potentially increasing this risk. However, not all environmental exposures are associated with health impacts; there are also significant health benefits associated with environmental use in Inuit communities (NAHO, 2011; Pufall et al., 2011; Searles, 2002). Individuals perform a process of risk-benefit management as part of their day-to-day activities on the land to balance these health risks and benefits (Bates, 2007; Briggs, 1991). The focus on negative environmental impacts in investigations of vulnerability and adaptation to climate and environmental hazards has also received some criticism, related to the "academic" nature of these concepts relative to the daily lived experience of managing risks for hunters and land users (NTI, 2006: 2). The continuing concern in Inuit communities and regions regarding the human impacts of climate change, among them on environmental activities, drives the need to continue to improve our understanding of adaptation and adaptive capacity (ACIA, 2005; Nickels et al., 2006). However, this seeming tension around views of adaptation related to land-use points to the need to start from and ground this investigation in the risk-benefit management approaches used by Inuit.

Further, as most literature on human dimensions of climate change in Inuit contexts has focused on the community or regional level (Berner et al., 2005; Ford et al., 2008ab, 2009, 2010ab; Furgal, 2008; Furgal and Seguin, 2006; Laidler et al., 2009; Nickels et al., 2006; Pearce et al., 2009) key questions remain about the determinants of adaptive capacity for different individuals related to the use of local environments. As

such, there is a need to investigate how different individuals manage risks from environmental use and exposure, to illuminate how changing environmental conditions and other factors may influence their risk management practices. Information on differential responses to environmental risks is critical to inform decision-making on targeted adaptation programs that meet community and individual needs in the North.

To address this gap, our paper presents findings from a community-based participatory research (CBPR) project that examined risk-benefit management for safe sea ice travel in Nain in the Inuit territory of Nunatsiavut, northern Labrador, Canada. Specifically, we investigated 1) the elements of risk-benefit management for safe sea ice use; 2) determinants of different risk-benefit management processes for safe sea ice use; 3) influences of changing social and environmental factors on the risk-benefit management process for individuals. The study addresses the question: What are the factors influencing risk-benefit management for sea ice use for Nainimuit (Nain residents)? We report from qualitative stages of a larger research project, involving two focus groups with expert sea ice users, three interviews with search and rescue key consultants, and 22 interviews with a range of community members who use sea ice. The project involved university-community research collaborations with the Nunatsiavut Government (NG) Division of Environment, the semi-autonomous government body in Nunatsiavut, and Nain Ground Search and Rescue (NGSAR), a volunteer-based search and rescue team primarily made up of hunters.

The project originated with the concern in Nain and other Nunatsiavut communities, which echo those reported by communities across the Canadian Arctic, regarding increasing injury, trauma, and anxiety associated with changing ice and

weather conditions (Ford et al., 2008a, 2009; Furgal et al., 2002; Gearheard, 2006;

Nickels et al., 2006). An ongoing collaboration between the second author and the NG,

coupled with the identification of sea ice safety as a priority research area in the region by

the NG and interest in working together by NGSAR, led to the collaboration on this

project.

8.2 Climate change, sea ice, and health risk management

Observations of extensive and dramatic changes in the sea ice strength, cover, and

seasonal duration over the last several decades by Inuit communities have been

documented (ACIA, 2005; Ford et al., 2008a; Gearheard et al., 2006; Laidler et al., 2009;

Nickels et al., 2006; Tremblay et al., 2006), as have corresponding observations in the

scientific community (ACIA, 2005; Anisimov et al., 2007; Maslowski et al., 2012;

Stroeve et al., 2012). Decreases in ice distribution, stability, and duration of coverage

have been linked to health impacts for Inuit communities that depend on the sea ice

environment for wild food resources and livelihoods (Furgal et al., 2002; Tremblay et al.,

2006), and for whom sea ice use is connected to cultural identity and wellbeing (ICC-C,

2008; NAHO, 2011). These potential health impacts include increases in the frequency

and severity of unintentional injury and trauma ('accidents') while hunting and travelling

on the sea ice and psychosocial stress (Furgal et al., 2002; Furgal and Seguin, 2006;

Furgal, 2008). Inuit communities have also reported increasing accidents and anxiety

related to changing environmental conditions (Ford et al., 2008a, 2009; Furgal et al.,

2002; Gearheard, 2006; Nickels et al., 2006). These troubling reports form a substantive

public health concern, particularly as the mortality rate from unintentional injuries is

already disproportionately high among Inuit compared to the general Canadian

population (ITK, 2010). Reducing unintentional injuries and drownings related to poor ice conditions has been identified as a health priority in Inuit Nunangat (Inuit lands comprising of our Inuit settlement regions in Canada) (GNWT, 2007; Pauktuutit Inuit Women of Canada, 2010).

In response to increasing concern about health implications of changes in the sea ice environment in the Arctic and how they can be managed, research has been conducted on adaptation to changes in sea ice environments in Inuit communities. For instance, Ford et al. (2006; 2008ab; 2009), Furgal and Seguin (2006), Laidler et al. (2009), Nickels et al. (2006), and Pearce et al. (2009) have examined the vulnerability and adaptive capacity of a number of Canadian Inuit communities and regions related to climate change in general or specifically related to the implications of climate change for subsistence harvesting by sea ice. Ford et al. (2010b) summarized findings on sources of adaptive capacity in Inuit communities from a number of these publications, which we have interpreted as consisting of the following main elements: 1) traditional knowledge and land skills; 2) social and communication networks; 3) access to technology; 4) flexibility in resource use; 5) access to financial resources; and 6) institutional support. Using a case study of an Inuit community to investigate adaptive capacity and resilience to climate change in an Inuit community, Berkes and Jolly (2002) found that traditional strategies of harvesting flexibility, environmental knowledge and skills, sharing mechanisms and social networks, and intercommunity trade contribute to adaptive responses, in addition to new adaptive response options created by Inuit regional institutions and government agencies. While the authors employed a resilience lens as opposed to a vulnerability approach (Ford and

Smit, 2004) used by the other publications discussed, the findings echo the themes identified in these other papers.

The scholarship on adaptive capacity related to climate change influences on sea ice use has also identified a number of constraining factors that increase vulnerability or decrease adaptive capacity to the environmental effects of climate change in Inuit communities. Based on the summary by Ford et al. (2010b), we can identify the main constraining factors on adaptive capacity as: 1) erosion of land-based skills; 2) limited financial resources; 3) time constraints; 4) compromised social networks; 5) existing health burden; 6) limitations in institutional capacity; 7) limitations on resource use diversity and flexibility; and 8) community location. As Laidler et al. (2009), Ford et al. (2006b), and Pearce et al. (2011) discussed, some of these factors (1–6) are linked to the introduction or strengthening of Western or Eurocentric economic, educational, technological and cultural structures and processes in Inuit regions, and the cumulative impacts of these structures and processes on land-based knowledge use and transmission, traditional social network structures, and traditional economic and educational systems. For instance, erosion of land-based skills among young people has been linked to intergenerational segregation related to changing Inuktitut use and social norms, competing Eurocentric educational obligations and learning modes, and wage economy dependence (Laidler et al., 2009; Pearce et al., 2011). Similarly, processes of colonization and assimilation have had deep impacts on social networks and kinship in Inuit society, connected to the monetization of the traditional non-monetary economy and sharing practices, as well as intergenerational segregation, to which the legacy of residential schooling contributes (Ford et al., 2006b; Kral et al., 2011; Laidler et al., 2009).

While this scholarship has made critical contributions to our basic understanding of adaptation to climate change in northern communities, and specifically in the context of environmental activities that are key to health and livelihoods, some important gaps in this knowledge base remain. Specifically, as Ford and Pearce (2012) identified, limited research has been conducted on the determinants of adaptive capacity to manage climate change influences on environmental or subsistence activities. While perspectives of older or experienced sea ice users on the erosion of land-based knowledge of young people has been documented (Ford et al., 2006ab, 2008ab; Laidler et al., 2009), little research has been conducted on differences in adaptive capacity relating to age or experience levels, apart from an investigation by Pearce et al. (2011). Further, Dowsley et al. (2010) and Kukarenko (2011) argued that the influences of changes in the environment on human-environment interactions cannot be fully understood without a consideration of gender as a construct and structure that shapes these relations. The authors identified a gap in research on vulnerability and adaptive capacity to climatic changes in Inuit communities that considers the role of gender. There are also significant gaps in our understanding of the role of institutional support in promoting adaptive capacity related to sea ice use. Some investigation of the role of governmental programs (e.g., hunter support or land-based skills transmission programs) and policies (e.g., health and social welfare) for climate change adaptation has been conducted (Ford et al., 2010ab). However, as Ford and Pearce (2012) noted, major gaps remain in our understanding of how institutions or community-based organizations, such as search and rescue (SAR), influence how individuals in communities are adapting to changing conditions. Despite its connection to sea ice travel safety as a key emergency care provider and support system for sea ice

travellers, the role of SAR specifically has been overlooked, apart from some research by

Breton-Honeyman and Furgal (2008) and occasional mentions in other literature (e.g.,

Ford et al., 2006b, 2008b, 2010b; Pearce et al., 2011).

More broadly, the literature reviewed on vulnerability to climate change has

focused on the physical health risks that environmental hazards pose to land users, and

the increased health risks or vulnerabilities brought about by climatically-driven

environmental changes. However, there are also significant health benefits associated

with environmental use in Inuit communities (NAHO, 2011; Pufall et al., 2011; Searles,

2002). To balance these health risks and benefits, individuals perform a process of risk-

benefit management as part of their day-to-day activities on the land (Bates, 2007;

Briggs, 1991), which is the framework that individuals and communities use to adapt to

climate and other forms of environmental change during land-based activities. While

many communities across the Canadian Arctic are concerned about the impacts of

environmental change and individual and collective capacities to respond to them, the

concepts of vulnerability and adaptive capacity related to climate change are based in

epistemic traditions far from the daily lived experience and approach to balancing

environmental risks of Inuit hunters and land-users (Bravo, 2009; NTI, 2006). For

instance, Nunavut Tunngavik, the land claims organization in Nunavut, stated that:

> In many ways, adaptation is an academic concept to Inuit hunters who must, at
> every single outing on the land or the sea ice, base their behaviour on the
> conditions of the day. Adapting is not necessarily a conscious effort to respond to
> conditions now brought upon because of climate change; it is just something that
> you do. (NTI, 2006: 2)

This is not to discredit the importance of research on vulnerability and adaptation in the

Arctic, which has made critical contributions to our knowledge of diverse human impacts

and capacities to respond across regions (ACIA, 2005; IPCC, 2007), and which is underpinning health-supporting interventions (Ford et al., 2007, 2010b; Tremblay et al., 2006). Further, as reviewed by Ford et al. (2010b), many studies in this field have been community-based and as such reflect community perspectives not only in the research results, but in the design and implementation of research studies. However, given the seeming tension between the concepts vulnerability and adaptation to climate change specifically in Inuit communities and the understanding in Inuit communities that the centerpiece of Inuit culture and knowledge is and has always been adapting to a variable and challenging environment (Bates, 2007; Briggs, 1991; ICC-C, 2008; LIA, 1977), there is a need to investigate climate change adaptation and adaptive capacity through the lens of community perspectives on risk-benefit management for safe sea ice use.

These gaps create a significant need to investigate determinants of differing risk-benefit management processes for key environmental activities, such as sea ice use, in the context of environmental conditions changing and becoming more challenging. By conducting this investigation, we can better understand how different groups of people are and may continue to respond to increasingly unpredictable and uncharacteristic ice and weather conditions, which can strengthen the targeting of adaptation and support programs in northern regions.

8.3   Methods

8.3.1   Research design

We employed sequential mixed methods design and an instrumental case study approach (Stake, 2005) emphasizing community engagement at all levels of the research. Ethics approval for the research was granted by Trent University's Research Ethics Board

and the Nunatsiavut Government Research Advisory Committee, and all participants provided informed consent, including for publication of their identities, words, and ideas. In this paper, we are reporting results from qualitative stages of our study, including focus groups and interviews with sea ice users and search and rescue representatives. Methods, including the use of the CBPR approach, will be reviewed here briefly as a detailed summary can be found in Chapter 5.

8.3.2 The case study: Nain, Nunatsiavut

The community of Nain is the northernmost community on the east coast of Labrador (N56°55, W61°68), in the Labrador Inuit Settlement Area of Nunatsiavut (Fig. 1.1). The population was 1,034 in 2006, of which 92% of people identified as Aboriginal (Statistics Canada, 2007b). The climate is classified sub-arctic, and the town is located on an inlet on the Atlantic Ocean surrounded by hilly, rocky terrain. The community is "fly-in" as there is no road access. Travelling on the sea ice is an important land-based activity to residents of Nain (Furgal et al., 2002; Furgal and Seguin, 2006), related to the importance of wild foods for diets in the region (ITK, 2008). Winter shipping through the sea ice is carried out to and from a mine operated by Vale Newfoundland and Labrador, located southwest of Nain.

8.3.3 Data collection

Before data collection was initiated, the lead author conducted a preliminary trip to Nunatsiavut in February 2010 to consult on the study plan and build relationships. The research team conducted two focus groups (Morgan, 1997) in July 2010 with nine Inuit and Kablunângajuit expert sea ice users selected using a multi-step peer-recommendation process (Chapter 5). The focus group with male expert travellers had four participants,

including one Elder, and was conducted in English with sequential interpretation-translation into Inuttitut. The female expert traveller group had four participants and was conducted in English. We conducted one follow-up unstructured interview (Bernard, 2000; Corbin and Morse, 2003) with the Elder from the group with MET to discuss concepts of health relating to sea ice use in Inuttitut. All focus group participants also completed a socio-economic and land-use practices survey.

We conducted key consultant interviews (Haviland et al., 2011; Peoples and Bailey, 2009) in July and November 2010 with two Nain Ground Search and Rescue (NGSAR) members in current and former positions of leadership, and two Royal Canadian Mounted Police (RCMP) representatives from the Nain detachment. Participants were selected using a snowball method (Creswell, 2007). As collaborators, NGSAR members were met with several times formally and many times informally to share study progress and obtain feedback, which also provided contextual information about SAR in the region.

We conducted 22 semi-directed interviews (Huntington, 1998) in November 2010 with residents of Nain that use sea ice for travel and hunting to explore different perspectives on sea ice travel risk management. We employed a non-proportional quota sampling method (Miles and Huberman, 1994) according to the following criteria: gender, search and rescue status (whether the person had received any formal assistance or not), and years of experience travelling on sea ice (more or less than 20 years) (Table 3.5). Acronyms use to identify participant socio-demographic groups according to these three criteria are identified in Table 3.5. We used a random stratified sampling method to select participants (Baxter and Eyles, 1997). We were not able to successfully recruit

participants for two of the categories, because there were very few potential candidates and they were unable to participate. Participants also completed as socio-demographic survey following the survey format used with focus group participants.

We employed participant observation to build interpersonal relationships, improve our understanding of sea ice travel practices, and gain a richer understanding of the local context (Creswell, 2007). The lead author participated in four single and multi-day trips on the sea ice in March and May, 2011 and recorded reflections and observations.

8.3.4 Analysis

Focus groups were transcribed by the lead author and transcription into Inuttitut and verification of the original translation were conducted where appropriate. The semi-directed interviews were transcribed by a private firm and reviewed by the lead author. Focus groups and interviews were analyzed using thematic content analysis (Berg, 2001; Esterberg, 2002) using QSR International's NVivo 8 software and checked for intercoder reliability, as detailed in Chapter 5. Our presentation of findings is based on the emergent coding structure for themes on risk management. Participant observation notes were memoed and reviewed manually.

Transcripts were returned to participants and opportunities were provided to check their accuracy and reliability (Creswell, 2007; Davis and Wagner, 1997). We held four report-back and validity check meetings with expert travellers and semi-directed interview participants to verify constructs and summaries (Creswell, 2007; Onwuegbuzie and Leech, 2006), which was also part of the CBPR approach. Attending participants expressed general agreement with the representation of focus groups and interviews, but also edited and added to these representations. Notes from these meetings were coded and

used to make minor coding adjustments and improve analysis. Participants also edited

and approved the use of selected quotes and chose to be identified by their name or

initials, or remain anonymous. After listing the name attribution for quotes, the socio-

demographic group for the participant is listed (see Table 3.5).

8.4 Results

We present results in three sections. First, we report on the nature and components

of individual risk-benefit management processes associated with sea ice travel, consisting

of: 1) travel skills; 2) knowledge gathering and sharing; 3) preparation; and 4) managing

'trouble' events individually, with social support, and with formal support. Following

this, we report on the landscape of search and rescue in Nain. We then report perspectives

on safety responsibility and informal and formal support for land-based safety, as well as

perspectives on changes that can be made to promote personal and community safety. By

informal support, we refer to on-the-land assistance provided by family, friends, and

other community members outside of any organizational or institutional setting, while

formal assistance encompasses SAR support by governmental SAR institutions (police,

military) and local community-based organizations. We employ the following convention

to describe representation of responses by community members for different themes: few,

1–20%; some, 20–40%; many, 40–60%; most, 60–80%; nearly all, 80–100%.

8.4.1 Risk-benefit management for safe sea ice travel

8.4.1.1 Travel skills

The fundamental importance of accumulated, practical travel knowledge or skills

for safety on the sea ice and the ability to negotiate the ongoing changes in the sea ice

environment in and around Nain was reported by expert travellers, SAR consultants, and

nearly all community members. Expert travellers and primarily very experienced

community members expressed that it was difficult to articulate this knowledge,

describing it as "common sense," "common knowledge," "natural safety," and a "way of

life." Overall, participants described how 1) knowing places and having the capacity to

spatially orient themselves, 2) knowing the kinds of sea ice and freshwater ice conditions

that can occur and how to interpret indicators of good and bad ice, and 3) knowing how

to prepare and survive, are foundational to staying safe on the ice. Expert travellers

emphasized that they feel safe on the ice because they know when it is safe; that they can

make this assessment based on the knowledge that was passed down to them from older

generations and years of experience.

All expert travellers and community members described learning from experience

from going out on the land as young people with family or other community members.

This process was characterized by a number of participants as "watch and learn."

> [I learned] by observing, by listening, by watching and by practising. Elders'
> advise, people's advice, hunters' advice, my husband's – a lot of people can teach
> you. It's such an everyday thing almost. Winter time here, it's hard to avoid it!...It
> was all hands on and doing and being there. We were fairly nomadic when I was
> growing up and we were right there all the time with it all. Coming home in the
> springtime, dogs running over ice pans and falling in and whatnot, so you learn as
> you go. (EW, FN)

A few community members (MN, MA, FA) described particular lessons that they learned

from experiences managing major challenges, such as falling through the ice.

All group factors were associated with some differences in responses related to

indicators of travel skills, which included the following: personal perception of sea ice

knowledge, frequency of hunting or fishing during ice season, seasonal travel duration

(from new ice to spring break-up), territorial range travelled, and frequency of travelling

alone. While male and female community members reported similar frequencies of

hunting and fishing during the ice season, nearly all males reported travelling during the whole ice season, while less than half of females reported travelling on new ice and late spring ice. Male community members also reported travelling alone more often than females did. On average, very experienced community members reported a higher perception of their sea ice knowledge, more frequent sea ice use for hunting and fishing, a longer season of sea ice use that included new ice and spring ice, and a larger territorial range. However, there was no difference related to travelling with or without companions based on level of experience. Participants assisted by SAR had a higher perception of their sea ice knowledge, but there was no representation of SAR assisted individuals who had moderate experience in the sample group.

Male expert travellers and many, primarily very experienced community members (all except FM) expressed worry and concern about the travel skills of young people today. A few participants additionally described land use practices of young people that concern them, such as young people "just following tracks," "taking off on their own," and "racing around" near dangerous ice. Male expert travellers and some community members, particularly very experienced men, described how young people today do not have the same travel skills because they did not grow up on the land as older generations had. Further, male traveller experts reported that opportunities for young people to learn through experience are constricted by educational obligations, but also that some young people prefer to stay in town to connect socially through technology.

At the same time, expert travellers and some community members described how changing environmental conditions are affecting their ability to interpret and predict ice and weather conditions based on their existing knowledge. A few community members

(MN, FM) and expert travellers reported that their ability to interpret and trust their knowledge of the ice is changing because the conditions are changing and becoming more unpredictable.

8.4.1.2 Knowledge gathering and sharing

All expert travellers and community members described gathering and assessing information about ice and weather conditions as a frequent and important activity, with the intensity of gathering information and tools used varying according to: 1) time, from season to time of day; 2) location; and 3) the person.

Gathering environmental information before trips

Expert travellers and some very experienced community members (MN, MA, FA) described how they begin gathering knowledge about sea ice conditions when the ice is forming in fall or early winter, as this is the basis for knowing when the ice is safe to use and locations where it will degrade first in spring. However, most community members (all groups) described more intensive knowledge gathering directly before a trip. For ice conditions, most community members reported that they talk to people who they know have been travelling in the area to find out about ice conditions, and this practice was also noted before sea ice trips that the lead author participated in. A few people (MN, MA) reported that they specifically ask members a local Inuit environmental consulting company that conducts community-based sea ice monitoring for information. A few community members (MM, FM, FN) reported that they know when the ice is sufficiently safe because they see tracks. A few female participants (FN, FA) reported that they rely on their husbands to gather information about ice conditions before a trip. For gathering information about weather conditions, many community members from all groups

reported finding out about weather conditions by checking online, or listening to the TV or the radio, and a few (MN, FN) additionally reported observing sky conditions.

Expert travellers and a few community members (MN, MA) reported gathering more information environmental conditions before trips to compensate for conditions becoming more unpredictable and unusual, including seeking more information from others who are knowledgeable, such as the individuals who conduct community-based ice monitoring in Nain. For example, a female expert traveller described that because the weather and ice are changing, she now has to gather information about conditions before she "goes off," which she did not have to do in the past:

> You just can't just get up and go, like you normally did I guess before. Like, I always ask my dad or my brothers or anybody. Like there was a time that I was able to go out on skidoo, like way up, so far up before...But now I can't go, unless I ask, like, what's it like. You don't trust it anymore, eh, the ice. You don't trust the weather. (MD, female expert traveller)

Gathering environmental information during trips

Expert travellers emphasized gathering information almost continuously during any time spent on the ice and land, which a number of people described as "watching" the ice and weather, and many community members (all groups except FM) reported the same. Continuous information gathering through numerous means was also observed during sea ice trips. Expert travellers and a few community members (MM, FN, FA) reported observing the colour and texture of the ice to gauge its strength. Male expert travellers emphasized the importance of checking ice thickness and strength with tools, such as axes or rods, particularly in the spring. Fewer female expert travellers and few community members (MA, FN, FA) reported using this strategy; however, some female community members (all female groups) reported that checking the ice is carried out by

their guide, usually a male family member. Expert travellers and a few community members (MA, FN) also reported that some locations require additional knowledge gathering because they can be more dangerous. For instance, at the *sinâ* (ice edge), swells on the open ocean that can quickly break up the sea ice are listened for along cracks near the shore.

Watching the weather, sky conditions, and direction of winds was reported by expert travellers and some community members (all except FM). Male expert travellers and a few male community members from all groups also described gathering information about their location visually for spatial orientation, such as noting the location of landmarks, and few community members (MM) reported using a Global Positioning Satellite (GPS) unit to gather information about their location, particularly when inland or in unfamiliar places.

Male and female expert travellers and a few community members (MN, FN) reported increased information gathering during trips because of the ice changing and becoming more unreliable, primarily related to being more careful and observant of conditions. Further, female expert travellers reported that there were many places during the winter of 2009/10 where they could not tell whether the ice was safe or not because rain and warm temperatures changed its appearance and physical properties, so they had to use techniques for checking the ice that they would normally reserve for new or late spring ice, such as constant stopping to observe the colour and texture of ice and to check its strength with a tool.

Sharing information

Many community members (all groups) reported sharing knowledge about conditions by talking with others over the phone or in person, primarily family and friends but also other residents they encounter, while a one female expert traveller and one female community member (FM) reported using social media. Male expert travellers who were also NGSAR members reported increased sharing of information through markings left on the ice in recent years, such as placing sticks around unusual areas of bad ice.

8.4.1.3 Preparing

The importance of preparation for safety and successfully managing obstacles and crisis events was emphasized by expert travellers and SAR consultants, and nearly all community members reported preparation activities for trips (all groups). Some community members (all groups) also reported that preparation varies according to the season, destination, activities to be pursued, length of trip, and person. For instance, participants reported that they prepare more during freeze-up and break-up times (male expert travellers, MN); when they are going on long trips where they may need shelter (MA, FN); or if their personal responsibility increases related to going alone, bringing children, or guiding a trip (MN, FM, FA). Conversely, a few participants noted that they prepare more minimally if they are going to their cabin where they have supplies or for short wooding or hunting trips (MM, MA, FN).

Almost all community members reported bringing basic equipment and supplies, such as food, extra clothes, axe, rifle, ammunition, spare gas and motor oil, matches, and rope to haul themselves or others out of the water. A male expert traveller described this

process as *pannaisiak*, meaning getting prepared thoughtfully. A division of labour in terms of preparing equipment and supplies was described by a few female participants (FM, FN), who reported that they managed food or clothing while their husbands would prepare the remaining items.

Mental preparation was primarily reported by male expert travellers, although aspects related to mental preparation were also reported by a few community members (MM, FA). A male expert traveller described the importance of mental preparation before going off on the ice:

> To go off, to the sea ice, you, even if you are lying down or in bed or whatever, in your mind you are prepare yourself to have a safe trip, to not come across difficulty, difficult obstacles...And also to be of a good mind, to be of a sound mind before you go off, not to have bad thoughts or anything. (Lucas Ittulak, male expert traveller)

He described this act of mental preparation as *isumatsiak* or *isumatsiagigasualluni* (referring to the person), meaning being of sound mind, in this case in preparation for being safe while going off.

Many community members (all groups) reported that travelling with companions on multiple skidoos is safer than travelling alone in case of snowmobile breakdown or other obstacles, especially when travelling long distances. One male expert traveller described how his sled dogs used to act as companions and have saved him at different times, and that because snowmobiles are a less reliable mode of transportation than dog teams, it is safer to go with a companion than travelling alone. Additionally, expert travellers and some participants reported letting someone know before they go off (MM, FM, FN, FA). The importance of informing family or friends of the intended destination was also emphasized by key consultants, who described the difficulties of finding someone without any tips on their location.

Female expert travellers and a few community members (MM, MN, FN) reported sometimes preparing more for travel because of the additional risks posed by changing ice and weather conditions, primarily related to anticipating having to managing challenges more than usual and being ready to be careful. One female expert traveller reported the atypical preparation of wearing a floatation coat for ice fishing in March 2010, as others also did, because she was scared that she was going to fall through the ice.

8.4.1.4   Managing 'trouble' events

All participants reported multiple ways that they have managed trouble events, a term we have used to describe particular events that can have serious physical health impacts, such as becoming stranded because of mechanical problems, lost in a blizzard, or falling through the ice. Expert travellers described dozens of incidents where they had challenges related to ice and snow conditions and several incidents related to weather and mechanical problems, and ice conditions were the predominant contributing cause to incidents described by community members. Many community members (MM, FM, FN) reported that they had not encountered an incident that they would consider being in trouble, stranded, or stuck. However, some very experienced community members (MN, MA, FN) and male expert travellers reported incidents where they were stranded or stuck, but explained that they did not view these incidents as troubles. For instance, one male travel expert explained that there are always things in your way, and you just find a way around them.

> We've certainly gotten caught out in weather and had to pitch tent or make a
> shelter or just get to cabin but that hasn't been, not like trouble. We don't see it as
> trouble. You try to do the best you can, I guess, survive it and get back home.
> (EW, FN)

Managing trouble events independently

Expert travellers and most community members (all groups) reported remaining flexible in their trip planning to avoid obstacles or difficulties, including adjusting the timing of trips related to weather and ice conditions, and adjusting routes and destinations, primarily related to unsafe ice conditions. Expert travellers described numerous instances of changing trip routes or trip timing, or avoiding travel altogether because of concerns about safety due to changing ice conditions. Also, a few community members (MA, FM) described occasions when they changed trip timing, routes, or cancelled trips because of unusual and unsafe ice conditions.

Expert travellers and a few community members (MN, MA, FA) explicitly reported that their experience, knowledge about conditions, and preparation allows them manage the challenges they encounter on the ice, and most community members also provided examples of successfully managing challenges and crises using knowledge and preparation.

> Bad experiences are inevitable, because, you know, you could leave here on a beautiful day and before you get halfway up to the cabin it's starting a bad storm, and you just have to be prepared. And I think the more experiences that you have like that and you get through them, the better off you are in knowing how to deal with situations like that. (William Andersen, MN)

Expert travellers also described the importance of staying calm and aware or their surroundings, as they learned from Elders. For instance, a male expert traveller and Elder, Lucas Ittulak, described how his health and safety on the sea ice come from being *ippigusutsianik* – which translates to being aware and conscious of his surroundings, being of sound mind, having knowledge of what could happen, and being prepared for what may occur. Some community members (MM, MN, FN, FA) reported the importance of attitude and perseverance, describing that to get through troubles, you have

to "work hard," "be patient," and "not stop," because giving up means perishing. Some community members (MM, MN, FN, FA) described how help from their travel companions has allowed them to get through challenges.

Not all reports of managing troubles related to risk minimization or mitigation. A few participants described situations where they accepted greater risks to access benefits. For instance, one community member (MM) reported that his friends will take risks even on bad ice when there is the potential for getting caribou, and a male expert traveller described how the potential for getting geese motivates him and others to travel on very degraded ice in the late spring.

Expert travellers reported that changes in ice conditions that they were not expecting based on their prior experience resulted in them having to manage numerous challenging situations, including two people (male and female expert travellers) falling through the ice in the recent past. These reports were echoed by a few community members (MA, FN). Expert travellers and a few community members also reported challenges that other people experienced because of changes in ice conditions, including one family that fell into a deep pool of water because of an unusual pressure ridge, and two men that perished after falling through ice that had been safe at that time of the year in the past, but was no longer reliably safe. Expert travellers and a few community members (MN, FN) reported needing to be more aware and careful of ice and weather conditions to manage the challenges associated with changing conditions.

Managing trouble events with informal assistance

Expert travellers and many community members (all groups) reported incidents where they received informal assistance – that is, assistance from family or community

members who were neither with their travel group nor associated with any search and rescue organization. Male expert travellers and some community members (all except FA) reported finding or being found by other travellers during trouble events, either at the location of the incident or at a nearby cabin. The most frequent causes of these incidents were mechanical problems and falling through the ice, with a few community members also reporting being stuck in snow or slush and needing to be pulled out. Some community members (MM, MN, FN, FA) reported requesting assistance from family or friends using a satellite phone. Many community members (MM, MN, FM, FN) reported never having needed help from people outside of their travelling party at the time. Also, many community members (all except FM, FA) reported having provided interpersonal assistance to other community members on the land. Many (all except FM, FA) came across someone who needed help on a trail, and a few (FN, MA) were called by satellite phone to help with a gas shortage or mechanical problem. The most frequent cause of incidents that participants reported helping with was mechanical, although other causes included gas shortages, being stuck in snow or slush, falling through the ice, and injury from unintentional impacts. A female expert traveller reported an incident where she fell through freshwater ice at location that she had never had to worry about before for that time of year, and received help from a family member she found at a nearby cabin.

Managing trouble events with SAR assistance

Some community members were recruited to participate in our study based in part on having received formal SAR assistance (n=8) (see Table 3.5). Some community members (MA, FA) reported that searches for them were initialized because they were overdue, with the most frequent contributing causes being ice conditions and weather.

One female expert traveller reported being involved in a SAR incident she linked to changing environmental conditions – specifically, becoming stranded at the cabin without sufficient food provisions because of rapidly degrading spring ice. A community member (FM) reported a SAR incident that family members of hers were involved in, where they also become stranded far north of the Nain because the ice degraded and became impassable more quickly than usual.

8.4.2 Search and rescue: organizations and practices

As reported by NGSAR and RCMP consultants, NGSAR is the primary group that carries out search and rescue operations in the Nain area in the winter season. NGSAR is run by volunteers primarily made up of local hunters and travellers from Nain. The team consists of about a dozen active members, all male, but more people are available to join searches if there is a need. According to NGSAR key consultants and team members, the group began in the early 1990s in response to tragic incidents on the land and the desire to have a more organized community response to minimize risks for those going out searching for others. Further, there was a desire to use the local knowledge of Nain residents to help improve search and rescue response time and effectiveness. This was in part related to an RCMP policy at the time of waiting 24 hours to act on a report of a missing person, which was an inappropriate SAR policy from the community's perspective. An NGSAR consultant described most search requests as "genuine" because they relate to unavoidable situations such as weather issues, but also noted that NGSAR has helped some people repeatedly, to the point that the team has nicknamed these individuals "frequent fliers." While the primary mission of the team is to carry out searches and rescues, it has also promoted travel safety by distributing

literature on trip preparation, occasionally announcing hazardous conditions on the regional radio broadcast, and placing markers around unusual spots of bad ice.

The RCMP in Nain helps coordinate and sanctions searches to allow for the provision of resources to NGSAR, such as radios and reimbursement for gas, based on the provincial Emergency Measures Act. An officer from the RCMP liaises with NGSAR. RCMP officers are stationed in the Nain detachment for a maximum of two years, creating a biannual turnover of RCMP SAR liaisons. For searches on the land and ice that are challenging because of weather or cannot be successful resolved locally, the RCMP can mobilize their own air support outside of the community, or contact the federal Joint Rescue Coordination Centre (JRCC) in Halifax, Nova Scotia – one of three regional SAR centres in Canada – operated by the Department of National Defence (DND) and the Canadian Coast Guard (CCG) (Canadian Forces Canada Command, 2009). If the JRCC determines that the situation meets their criteria, they may mobilize their own air support resources. An Impact-Benefit Agreement (IBA) between the Nunatsiavut Government and Vale Newfound and Labrador provides the framework for the provision of mutual SAR aid between Vale and the NGSAR, including search support. Further, through the IBA, Vale provides financial support to NGSAR in relation to travel and safety impacts from winter shipping through the sea ice to the mine. If the search is boating-related and open water during the ice-free season, the CCG is contacted by the RCMP to assist with the search, and if incidents occur inside the boundaries of Torngats Mountains National Park, Parks Canada will deploy their own SAR resources. Both NGSAR and RCMP consultants described a close and positive working relationship between the organizations, with acknowledgement from both that NGSAR has the local

environmental knowledge to carry out searches more effectively than the RCMP.

NGSAR consultants also described a positive working relationship between their team

and the JRCC, but described how building this relationship has been ongoing. For

instance, an NGSAR member described how in the past, helicopters dispatched by the

JRCC would bypass landing in Nain on searches north of the community, but have

amended this practice to some extent after NGSAR conveyed that they are ignoring local

knowledge of routes and individual travel practices which could improve their search

times.

8.4.3   Perspectives on safety responsibility

Some community members (MM, MN, FM, FA) and SAR consultants reported

that travellers themselves should be primarily responsible for their own safety on the ice,

while a few community members (MA, FM, FN) viewed safety as a community

responsibility, describing how everyone has a role to play. One community member

reported the desire for people to take more responsibility for each others' safety in the

community:

> I guess it upsets a lot of people when we know bad weather is coming and some
> people are still going off. I think it's the community's responsibility if you know
> somebody who is going off, to say, "Hey, it's bad weather tomorrow."...maybe we
> could stop those people some how. I wish we could, you know. Would save
> people a lot of grief. (SAD, FM)

Some community members (MM, MN, FM, FN, FA) reported that they have help

available from friends and family if they need it, and that people in the community

regularly help each other on the ice and land. However, a few community members (FA)

reported that people in the community do not help each other as much as they used to.

One community member described how she no longer asks residents outside of her

family for help because in the past people have refused or expected to be compensated. Only one person (MN), however, described an incident where he was refused help from others, and these individuals were travellers from another community.

Many community members (all groups except FA) reported that NGSAR is and should be available to help people if they need it. A few of these participants (MM, MA, FN) also reported positive views of the work of the RCMP and NGSAR and trust of NGSAR members. Consistent with these views, an NGSAR key consultant reported that NGSAR is respected by Nain residents as the backbone of the community. However, a few community members (FA) and female expert travellers reported more negative views of local SAR-affiliated institutions. For instance, one participant (FA) reported that assistance would be provided immediately if a non-Inuk needed help, but Inuit are not treated the same way and provided the help they need on the land or in the community. Two participants (FA) encountered some challenges with receiving assistance from NGSAR. The participants requested food supplies to be airlifted to them after they became stranded with family north of the community related to severely degraded spring ice conditions in spring 2010. Apparently related to political pressure, NGSAR airlifted some supplies and returned some individuals to the community, for which it asked for financial contributions. Depletion of the additional supplies and continuing poor ice conditions that prevented the whole family's return meant that some individuals travelled on extremely degraded ice to acquire and bring back additional food. A female expert traveller not involved in the incident described anger at the institutional response:

> I think that this government showed a lack of empathy towards Inuit that are stuck out on the land that needed help. It was just a little bit of help. They needed this food, and like, that's a disgrace to me...I didn't like it. A lot of people didn't like that. (ERM, female expert traveller)

8.4.4 Perspectives on personal and community safety promotion

Overall, participants were more concerned about the safety of others in the community than their own travel safety. Many community members (all groups) reported that there was nothing that they would change to make their trips safer for them personally. Most of the participants reporting this view expressed that they already practice everything that they know and prepare as much as possible.

> I don't know that there could be or there is a safer way. I mean, we always try and travel as safely as possible. (William Andersen, MN)

A few community members (FM) reported that more knowledge of the ice and places would make their trips safer for them, while a few community members (MM, MA, FM, FN) reported that having access to different technologies could improve their safety, including GPS or Spot™ units, hovercrafts, and cell phones if coverage was expanded.

Expert travellers, SAR consultants, and most community members suggested changes to improve community travel safety (Table 8.1). Some expert travellers, community members (MM, FM, FN), and SAR consultants reported that residents simply need to improve their personal knowledge and use of established risk-benefit management practices. Specifically, some community members (all groups except MM) and a SAR consultant reported that communication about ice conditions in Nain was already very good because of the community-based ice monitoring work conducted locally, and because of announcements over community radio. A few community members (FN, FA) reported that they would not change anything to improve community travel safety, viewing current practices as sufficient.

Table 8.1. Participant suggestions for strengthening community safety for sea ice travel

Aspect	Participant representation*	Details
Travel skills	ET; SAR; few CM	• Land skills transmission programs targeting young people, people without skidoo access, and new residents, taught by local sea ice users
	ET; few CM	• Assistance for families/hunters to travel to facilitate traditional experience-based skills transmission, esp. financial assistance
	ET	• Broader issues of self-determination
Knowledge gathering and sharing	Some CM	• Community meetings or radio announcements regarding ice conditions, particularly during critical times (freeze-up, break-up)
	One CM	• Thermal images of local ice conditions
Preparation	SAR; few CM	• Promotion of trip planning, e.g., informing others before departure
Managing trouble events	SAR; few CM	• Improved satellite service, improved access to GPS or Spot™ technology, or introduction of cell phone service
	Few CM	• Improved helicopter support
	ET; one CM	• Cessation or reduction of winter shipping through sea ice
	One CM	• Introduction of community wood supply program

* ET = expert travellers (n = 2); SAR = SAR key consultants (n = 3); CM = community members (n = 22)

8.5 Discussion

This collaborative study investigated the factors influencing risk-benefit management during sea ice use for Nainimiut, to provide insight into how social factors may influence the response strategies of different individuals in the context of changing environmental and climatic conditions. This level of information is the next step in developing our understanding of vulnerability and adaptive capacity in Inuit communities.

We found that elements of how individuals managed the risks and benefits of sea

ice travel consist of three main short-term strategies – knowledge gathering and sharing,

preparing, and managing 'trouble events' – that are supported by baseline environmental

knowledge and travel skills (Fig. 8.1). Further, these short-term practices contribute to

and strengthen travel skills. We have conceptualized the relationship between these short

and long-term practices in Fig. 8.1., which illustrates this iterative cycle. Travel

knowledge is not only gained through one's own personal experience; is also shared and

learned through social networks (spatial scale), and through the intergenerational

transmission of knowledge (temporal scale). Embedded in and indivisible from a cultural

and social context, travel skills and risk-benefit management practices are Inuit

knowledge (Laidler et al., 2006; Tester and Irniq, 2008; Wenzel, 2004). As Wenzel

(2004) and Arnakak (2000) described, *Inuit Qaujimajatuqangit* – which most closely

translates to "the ancient knowledge of the Inuit" and is a term used primarily in Nunavut

to conceptualize and express Inuit epistemology – is a living technology, set of teachings,

knowledge of country, and holistic approach to knowledge and knowing that underpins

the exchange of knowledge, ideas, values, and skills within traditional kinship structures

and between generations in Inuit society. Our findings are consistent with this

understanding and expression of Inuit knowledge and skills and how they are transmitted.

Other research on risk-benefit management for safe sea ice travel, specifically, has

identified similar elements to the ones we have described here for Nainimiut. Laidler et

al. (2009) described risk management, risk sharing, and resource use flexibility as three

main aspects of *Inuit Qaujimajatuqangit* that underpin safe travelling and hunting on sea

ice and adaptive capacity for sea ice change in Igloolik, Nunavut. Ford et al. (2009)

identified land-based knowledge, sharing networks, flexibility in hunting behaviour, use

of technologies, and local institutional support as key aspects of current and future

adaptive capacity for sea ice change. As noted in the Introduction, the summary of

findings by Ford et al. (2010b) on sources of adaptive capacity in Inuit communities

encompass a number of themes that we have also reported on for this case study,

including traditional knowledge and land skills, social and communication networks,

technology use, flexibility in resource use and planning, and institutional support. Our

conceptualization of risk-benefit management in this case is also consistent with some of

the risk management or decision-making cycles that have been employed in work on

environmental health and health impacts of climate change (Health Canada, 2007; Kovats

et al., 2003; Robson and Toscano, 2007). These findings on the elements of risk-benefit

management for safe sea ice use corroborate themes from existing literature, and add an

understanding and conceptualization of how risk-benefit management elements for safe

sea ice use relate to one another, based on the perspectives of sea ice users. The

conceptual model of risk-benefit management for safe sea ice use can be used to organize

future investigations and interventions regarding sea ice use and potentially other

environmental activities in Inuit communities.

Time

Travel skills

Managing
'trouble events'

Knowledge
gathering
& sharing

Preparing
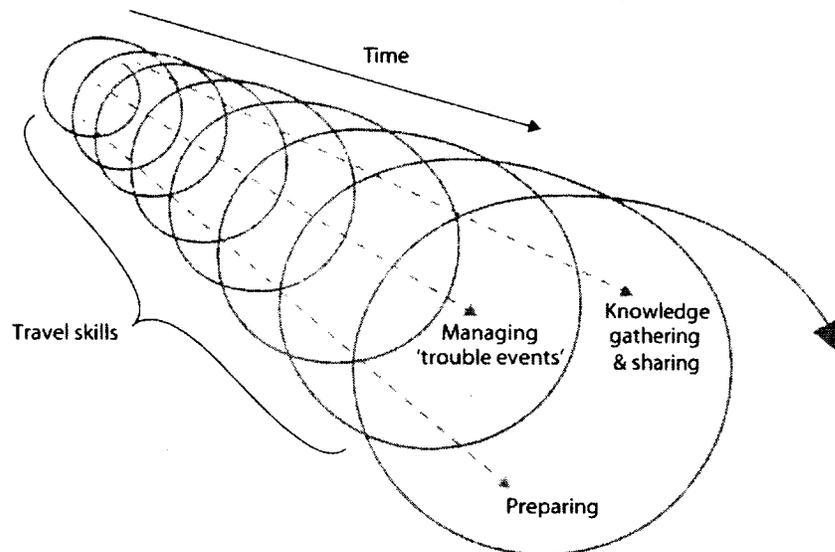
Figure 8.1. Inuit and Kablunângajuit risk-benefit management cycle for safe sea ice use

Our findings also illustrate differences in risk-benefit management practices according to years of travel experience (which is an indicator of accumulated travel knowledge) and gender, with no significant differences based on past experiences of receiving SAR support. With regards to years of travel experience, there were some knowledge gathering practices only or primarily reported by expert travellers and very experienced community members, including beginning to gathering information about ice conditions for the travel season when new ice forms in the fall; observing the colour and texture of ice and checking its strength with tools, such as a harpoon; gathering additional knowledge about ice conditions in more dangerous locations (e.g., *sinâ*); and gathering information on current and future weather before trips by observing sky conditions. Conversely, of the few community members that reported following tracks, these were primarily moderately experienced travellers. While there were no differences in reporting on physical preparation or *pannaisiak* based on experience, mental preparation or *isumatsiak* was reported on very minimally overall, and primarily discussed by one male

expert traveller, an Elder. There were no differences in reporting based on experience

regarding being prepared by using the risk sharing practice of travelling with

companions. Reports of managing trouble events independently, with social support, or

with SAR support were reported by various participants, regardless of experience level.

However, primarily expert travellers and very experienced community members reported

the perspective that situations such as becoming stranded or stuck are not 'trouble,' but

simply part of sea ice travel, indicating a certain acceptance of risks that may be related to

personal confidence in being able to prevent or mitigate physical health impacts. Only

expert travellers reported the importance of staying calm and aware of their surroundings,

which is encompassed by the holistic concept of *ippigusutsianik*, meaning being aware

and conscious of one's surroundings, being of sound mind, having knowledge of what

could happen, and being prepared for what may occur. These findings demonstrate that

knowledge or experience level is associated with some key differences in risk-benefit

management strategies for safe sea ice travel, primarily related to the range and intensity

of knowledge gathering and mental preparation and orientation for safe travel and

obstacle management. Other practices, such as physical preparation to minimize health

risk, flexibility in travel routes and timing of travel to avoid of risky conditions, and

seeking informal support from others outside the travel party, were not associated with

any reporting differences based on experience level. These findings corroborate other

research has demonstrated that travel skills and knowledge are key to safety on the sea ice

and adaptive to environmental changes (Ford et al., 2009; Laidler et al., 2009; Tremblay

et al., 2006). They also add to our knowledge regarding the relationship between travel

knowledge and experience, and strengths and weaknesses in applying specific risk-benefit management strategies for safe sea ice travel.

Gender was also associated with a few differences in risk-benefit management strategies reported. Some differences in gender roles were reported in terms of gathering knowledge, as a few female participants reported that they rely on their husbands to gather information about ice conditions before a trip, and some female community members reported that checking ice thickness and strength is not usually carried out by them, but instead by their guide, who tends to be a male family member. Additionally, only male participants reported gathering visual information about their location for the purposes of spatial orientation and wayfinding, or using a GPS as a complement to this practice. A gendered division of labour for physical preparation before trips was also reported by a few female participants, who reported that they and their husbands tend to manage different aspects of preparation before trips. However, gender was not a factor in numerous other strategies reported, such as observing ice and weather conditions during trips, and various strategies to manage obstacles. These findings corroborate ethnographic research that reports differences in some Inuit land-use practices based on a gendered division of labour have given rise to distinct knowledges among Inuit men and women, which are tied to different but flexible gender roles in traditional Inuit society (Briggs, 1974; Dowsley et al., 2010; Guemple, 1995). Dowsley et al. (2010) noted that there has been a greater emphasis in Canadian Arctic research on male observations of environmental change and impacts on male-centred activities from those changes, leaving us with an incomplete understanding of the impacts of environmental change for Inuit communities. Kukarenko (2011) similarly pointed to gaps in research on human

dimensions of climate change that incorporate gender perspectives, despite the knowledge that the impacts of climate change, including on health, are not gender neutral. Our findings make a preliminary contribution to filling this gap by explicitly investigating gender as a determinant of risk-benefit management approaches. We have demonstrated some key differences in safety strategies based on gender, but also that many strategies were not gender-dependent as reported by participants. This evidence demonstrates the value of incorporating a gender lens into studies of adaptive capacity to develop a full understanding of environmental health risk management strategies and how they may be influenced by environmental change.

We also found that a number environmental and social factors and processes are influencing risk-benefit management practices or perspectives on safe travel among Nainimiut, which underpins the suggestions made by most community members, SAR consultants, and expert travellers of the need to improve community health and safety for sea ice travel. Changing ice and weather conditions were reported by a number of participants as influencing their risk-benefit management strategies and practices. Expert travellers and a few community members reported that environmental changes were affecting the accuracy of their accumulated travel knowledge, undermining their trust in this key aspect of risk-benefit management. Adjustments in short-term strategies to respond to the increased safety risk posed by changing conditions were expressed by some individuals. Only expert or very experienced travellers reported increased knowledge gathering before and during trips and additional sharing of information with others. Some participants reported increased preparation or increased instances of risk avoidance or management related to ice conditions changing, but there were no

differences between groups. Our result regarding perspectives of changing conditions impacting confidence in Inuit knowledge and travel skills corroborates other research that has found that changing environmental conditions are impacting the confidence of sea ice users in Inuit knowledge for safe travel, and thus the confidence of expert sea ice users in transmitting their knowledge to younger generations (Gearheard et al., 2006; Nickels et al., 2006). Our finding regarding increased knowledge gathering by more experienced sea ice users supports our previous result that linked experience with a greater range and intensity of observation and testing of ice conditions and observation of weather. However, our result regarding there being no distinction between groups for increased preparation does not support the perspectives of expert travellers and very experienced community members about insufficient preparation of young people travelling on sea ice; views which are corroborated by other findings on Inuit perspectives on safety practices of younger generations (Ford et al., 2006b, 2008b). These findings suggest that more research is needed on the use of different safety strategies for sea ice travel to explore issues around perceptions of young peoples' skills and the strategies that they employ or do not employ in practice when travelling on the sea ice.

Broader social factors and processes were reported to be affecting risk-benefit management strategies adopted for sea ice travel among participants. Specifically, expert and very experienced travellers reported that educational obligations and changing interests and values of young people are disrupting travel knowledge transmission. Participants from all groups also expressed the importance of social networks for safe sea ice travel, and the observation that traditional social support networks are no longer as strong as they once were. Both of these results corroborate other research that has

discussed the erosion of traditional knowledge and skills as well as social networks, as well as explored the socio-political context for these changes (Ford et al., 2006b; Kral et al., 2011; Laidler et al., 2009; Pearce et al., 2011). Many community members reported that NGSAR is and should be available to provide assistance to sea ice travellers and a few elaborated to report positive views of the organization. However, a few community members reported more critical views, with the criticisms leveraged pointing to a tension related to NGSAR being both a form of social support rooted in a traditional support ethos, and simultaneously a formal search and rescue institution linked to other militarized institutions and agencies that are external to the community. For instance, part of the disappointment and anger expressed by a few participants related to their NGSAR experiences seemed to be related to NGSAR breaking social norms by initially refusing to provide support and monetizing the transaction. At the same time, participants expressed their anger at the NG, and not at the NGSAR, which points to how the organization is also viewed as a social service agency, one with statutory obligations to provide health and support services. Thus, while institutional support has been identified as a key aspect of adaptive capacity (Berkes and Jolly, 2002; Ford et al., 2010b), the perception and expectations of that support and implications for health risk management are complex. For instance, Ford et al. (2006b, 2008b) assert that more risk-taking behaviour is associated with community search and rescue teams, while in another paper, Ford et al. (2010b) identify search and rescue as an important component of sea ice safety and adaptation to climate change. Based on our results, community-based search and rescue is indeed a key aspect of adaptive capacity for sea ice safety and is predominantly viewed as valuable by residents. However, more research is needed to understand how

perceptions of search and rescue organizations and support structures influence risk

perspectives of sea ice users, and risk management decisions.

We acknowledge that other factors may also have an important influence on risk-

benefit management for safe sea ice travel, such as access to financial resources and age

(Ford et al., 2010b; Pearce et al., 2011). Based on these results, there is evidence for the

need to investigate differences in risk-benefit management for sea ice travel further and in

more detail to discern associations between socio-demographic factors and safety

strategies. In investigating the landscape of SAR, we have identified a gap in the

literature that investigates place, health, care-giving and care-receiving in the North.

While this is beyond the scope of this paper, we suggest that geographies of care

(Milligan et al., 2007) and health geography of volunteerism (Skinner and Power, 2011)

approaches could bring a fresh perspective to these important issues in northern

communities. While we have considered the role of social supports, we have not

conducted a social network analysis to identify characteristics of social networks, and so

our analysis of social support related to risk-benefit management for sea ice travel is

preliminary. Nonetheless, this study makes an important contribution to furthering our

understanding of factors that influence safety strategies for sea ice travel, information that

is important for informing targeted climate change adaptation programmes and policies

across the North.

8.6 Concluding comments

The results of this CBPR study demonstrate the need and value of investigating

determinants of risk-benefit management for safe sea ice use among Inuit to expand our

understanding of what groups may need greater assistance and support in adapting to

changing environmental conditions. We articulated a conceptualization of the elements of and relationship between short and long-term strategies for safe sea ice travel, and demonstrated some differences based primarily on sea ice travel experience in how these strategies are being employed, as reported by sea ice users in the community of Nain. These differences primarily related to a greater duration, intensity, and variety of knowledge gathering about environmental conditions by more experienced sea ice users, as well as more mental preparation for trips. Further, we identified some gendered practices for gathering knowledge and physical preparation for trips. We also identified some responses to changing environmental conditions, including increased knowledge gathering and sharing, preparation, and risk avoidance. However, only knowledge gathering was associated with differences between groups, with only very experienced and expert travellers practicing this risk-benefit management strategy more in response to changing ice and weather conditions. In our consideration of the role of broader social factors, we identified the importance of informal or interpersonal support, and community-based search and rescue for sea ice safety. These results demonstrate that adaptation related to managing health risks varies according to a number of social factors, and that the lens of daily land-use risk-benefit management practices is valuable for illuminating how different individuals in Inuit communities are responding to environmental change through their environmental practices. These results can be used to inform interventions aimed at strengthening the capacity of individuals in northern communities to manage and minimize health risks associated with sea ice use so that this environmental activity can continue to be a strong contributor to positive health for Inuit.

9 DISCUSSION AND CONCLUSIONS

This thesis employed a collaborative case study in the community of Nain in Nunatsiavut, northern Labrador, to address the central questions: i) what is the relationship between using sea ice and health in the Inuit community of Nain; and ii) what are the implications of this relationship? While the first question was primarily driven by concerns across Inuit communities in the Canadian Arctic, including in Nain, regarding the influence of changing environmental conditions on sea ice travel safety (Ford et al., 2008a, 2009; Furgal et al., 2002; Gearheard, 2006; Nickels et al., 2006), coupled with gaps in our knowledge of the role of the environment for unintentional injuries (GNWT, 2004; Légaré, 2007; Young, 2003), the second question emerged out of a desire to broaden our understanding of Indigenous environmental health. The five papers that constitute the results of this thesis (Chapters 4–8) address specific objectives that relate to different aspects of the central questions (Objectives 1–5). In addition, there are also themes that cut across all the results. Discussing these themes, and what we can learn from them, forms the primary purpose of this concluding chapter. As such, this chapter primarily contributes to addressing the second central question of this thesis: *what are the implications of the relationship between sea ice and health?*

First, I will review results and their implications for research on Indigenous health-environment relationships according to four broad themes: 1) the role of the environment as a determinant of health impacts and benefits; 2) the role of other determinants mediating environmental influences on health, particularly the role of social determinants; 3) the importance of place-meanings and environmental risk perspectives; and 4) the influence of environmental change on health. Next, I will review the strengths

and limitations of the methods used in this thesis by reflecting on how the methods and approach were applied in practice. In this discussion, I will focus on the mixed methods design, the case study approach, the CBPR approach, and the interdisciplinary health approach used in this study. I will conclude by outline avenues for potential future research based on the results of this thesis.

9.1 Key findings

9.1.1 Environment as a complex determinant of health: Health impacts and benefits from environmental use

This thesis contributes to our understanding of the environment as critical and complex determinant of Indigenous health. By investigating the relationship between one key element of the environment for Inuit and health influences on diverse aspects of health, this thesis demonstrates the importance of considering both health benefits and impacts to develop a holistic and nuanced understanding of environment-health relationships.

Chapter 4 demonstrates that the environment is a critical factor contributing to physical health risk in Inuit communities. Ice and weather conditions were the primary contributing cause for SAR cases from 1995 to 2010, and nearly all cases identified in NGSAR and RCMP sources took place during the ice season, from November to May. A combination of SAR data, Nain Aboriginal population data, and Nunatsiavut harvesting participation data yielded an estimated average annual SAR incidence rate of 19 individuals per 1000, based on a total of 83 cases involving 218 people. However, this estimate is an underrepresentation of both the SAR incidence rate and rate of 'trouble' incidents overall related to land-based activities during the ice season, where the former is related to gaps in data, and the latter is related to reported high rate of trouble events

that occur and are managed outside of SAR. Thus, while 35% of individuals in SAR cases where health status was indicated, or 22 people, experienced physical health impacts ranging from hunger and frostbite to perishing, this too is an underestimation of health impacts. Based on these results, we know that the environment is an important source of health risk, even as we have incomplete information about the total extent of SAR incidents and total rate of unintentional injuries and trauma from land-based activities. The findings from Chapter 4 demonstrate that the environment can act as a source of physical health risk, and present strong evidence for the further investigations into the role of environmental exposure for unintentional injury and trauma. These findings forms an important contribution to the literature on unintentional injury and trauma in the North, as little is currently understood about the role of environmental influences on injury and trauma rates in Canadian Inuit communities (GNWT, 2004; Légaré, 2007; Young, 2003). This issue is critical because unintentional injury and trauma rates in Inuit regions that are over four times higher than in Canada as a whole (ITK, 2010), and environmental change is predicted to exacerbate injury rates (Furgal et al., 2002; Furgal and Prowse, 2008). Thus, the findings on the role of the environment for SAR incidents and in causing injury and trauma on the land contribute to filling a major gap in our knowledge.

Nonetheless, if this investigation of the role of environment in health stopped after Chapter 4, this thesis would present a skewed understanding of the health influences of environment for Inuit, with a focus on physical impacts and a disregard for the role and potential importance of benefits of environmental exposure for health. Considering positive and negative influences from environmental exposure is a major focus in the

latter four results chapters, as Chapter 5 investigates health impacts and benefits from sea

ice use, Chapter 6 investigates health benefits and impacts associated with different

factors, Chapter 7 considers perceptions of risk and benefit related to environmental use,

and Chapter 8 explores the management of risks and benefits related to sea ice use.

Chapter 5 illustrates the complexity of environmental influences on health,

illustrating a holistic and cultural model of environment-health interactions. This chapter

demonstrates that majority of influences that expert travellers and community members

reported were health benefits, while a minority of influences were health impacts. Also,

many participants who reported some health impacts also reported that they either did not

view these experiences as "bad" for their health, or considered them part of using sea ice.

Further, the aspects of health that were reported as being influenced negatively from

environmental use were not the same as those that were influenced positively. Benefits

were reported for mental/emotional health, economic/material wellbeing, social

wellbeing, cultural wellbeing, and physical wellbeing, in order of frequency of reporting.

For some health aspects, such as cultural and social wellbeing, only health benefits were

reported. Impacts were reported for physical health, and to a lesser extent for

mental/emotional health and economic/material wellbeing. These findings confirm results

from Chapter 4 regarding the role of the environment in contributing to health impacts,

and add to these results by documenting in greater detail the range of physical impacts

that may be sustained. However, the findings on health influences also extend well

beyond physical impacts, and expand our understanding of health influences from

environmental use and exposure by documenting positive and negative influences related

to a wide range of health aspects including and extending out from the individual (i.e.,

physical, mental/emotional, social, material/economic, and cultural health). A major contribution to our knowledge of Indigenous environmental health from Chapter 5 relates to the close relationship between health benefits and place experiences, which is discussed in Section 9.1.3. Taken together, the reports on diverse aspects of health influenced by sea ice use and the importance of place experiences illustrate a model of environmental health that is holistic and place-based. The model describes how environmental activities and uses bring about exposure that results in influences on different aspects of health and wellbeing, and captures how the how the environment is not only a hazard, nor exclusively beneficial. This model also contributes to the literature on frameworks for understanding environmental health (Dahlgren and Whitehead, 1991; Lalonde, 1974; Knol et al., 2010), and can be used as a conceptual tool to inform future investigations of how the environment acts as a determinant of Inuit health, and Indigenous or human health more broadly. Further, by investigating Inuit health meanings and perspectives related to environmental use, one of the contributions of this chapter is that it adds to the sparse literature on Inuit understandings of health (Kral et al., 2011; NAHO, 2008; Richmond, 2009; Richmond and Ross, 2009).

Chapter 6 reveals how the health influences of environmental exposure to a critical element of the environment for Inuit are informed by other health determinants. In this chapter, sea ice travel experience and frequency of hunting, fishing, or wooding activities are shown to be associated with differences in reported health experiences related to sea ice use. For example, frequent hunters reported proportionately more on mental and emotional health benefits from sea ice use than infrequent hunters. Further, the majority of frequent hunters reported having not experienced worries about their

safety in the past, while the majority of infrequent hunters reported that they had

experienced such worries. This result demonstrates that increased frequency of land-use

activities, as an indicator of environmental exposure, is associated with some increased

benefits related to greater environmental knowledge and engagement. These results

illustrate how environmental exposure does not just mean exposure to hazards that can

affect health, but also benefits accessed through knowledge and use of the environment.

Limited literature has documented health benefits and impacts from environmental use

for Inuit, primarily related to wild food consumption (Donaldson et al., 2010; Schuster et

al., 2011; Van Oostdam et al., 2005). Sparse literature has considered the benefits of sea

ice use for health and wellbeing, except in general ways (Condon et al., 1995; ICC-C,

2008; Riewe, 1991). Thus, these results contribute to a more complex understanding of

the health influences of environmental use for Inuit by documenting the relationship

between environmental use and exposure and specific health benefits, as well as impacts.

This consideration of health impacts and benefits from environmental exposure

makes an important contribution to the literature on Indigenous environmental health.

Indigenous health literature in Canada is dominated by studies that use a biomedical lens

and health risk framework, with relatively little attention on social determinants of health,

protective factors, and aspects of health extending beyond the physical (Furgal et al.

2010; Healey and Meadows, 2007; Young, 2003). For instance, Furgal et al. (2010)

identified the rapid growth of Aboriginal health risk literature since the 1990s, and while

the authors discussed potential benefits related to targeted interventions and programs,

they also noted that the relative lack of attention on positive health promotion and

protective factors may change the ways in which Aboriginal health is understood and

represented. Healey and Meadows (2007) found that most papers on circumpolar Inuit women's health described health through a biomedical lens, with a focus on biology and reproduction. The authors linked this to the disease-centred state of Inuit health research in Canada, of which they were critical. This focus on the negative is not only apparent is Indigenous health literature; Havelka et al. (2009) argued that there is a trend of focusing on the distribution, aetiology, and management of diseases in health research more broadly. In Indigenous environmental health literature, some literature swings to the other extreme, focusing exclusively on health benefits from environmental use (Kingsley et al., 2009; Nettleton et al., 2007; Panelli and Tipa, 2007). This focus is rooted in a desire to explore and communicate the unique relationship between Indigenous peoples and the environment based on Indigenous epistemologies and connections to traditional lands (Kingsley et al., 2009; Nettleton et al., 2007; Panelli and Tipa, 2007), but may also be motivated by the underrepresentation of health benefits for Indigenous populations from environmental exposure in the literature. As noted, few papers on Inuit environmental health have documented both risks and benefits of environmental exposure, primarily in the field of health influences of wild food consumption (Donaldson et al., 2010; Schuster et al., 2011; Van Oostdam et al., 2005). Thus, the investigation of health benefits and impacts in this case study makes an important contribution to our understanding of the environment as a critical and complex determinant of Inuit and Indigenous health. These findings demonstrate that both health impacts and benefits of environmental use and exposure must be considered to develop a holistic and nuanced understanding of the relationship between environment and health.

9.1.2   Importance of social determinants: Factors influencing environment-health interactions

Understanding the ways in which the environment as a determinant of health is mediated by other determinants, particularly social factors, is a major contribution of this thesis. Investigating the role of various factors in shaping environment influences on health formed a recurrent theme in nearly all of the results chapters, as Chapter 4 investigates risk factors associated with SAR incidence rates; Chapter 6 investigates how health influences of environmental exposure are informed by other health determinants; Chapter 7 explores differences in environmental risk perception among groups of sea ice users; and Chapter 8 explores differences in risk management strategies among groups of sea ice users. All of these results chapters illustrate the role of individual or community-level factors in shaping the influences of environmental interactions or responses to environmental exposure.

Chapter 4 demonstrates that gender and age are risk factors for SAR incidents. The estimated average annual SAR incidence rate was six times higher for males than females, and the age range with the highest incidence rate was 26 to 35, which corresponds to injury mortality and morbidity risk factors for drownings and off-road vehicle collisions in the NWT (GNWT, 2004). Chapter 6 shows that gender, employment, institutional education, Inuttitut speaking ability (which is related to culture), and age (which is related to biology and genetic endowment) – factors which all correspond to determinants of health in Canada – mediate the health influences of the environment, another key determinant of health (PHAC, 2003). Of these five factors, all but the last are social determinants of health. For instance, the investigation of the role of gender showed that female participants reported proportionately more than males on

mental and emotional health benefits from using sea ice, while a greater proportion of

male participants reported on material or economic benefits and impacts from sea ice use.

These results add to the finding from Chapter 4 that identifies gender as a risk factor for

SAR incidents, by demonstrating how gender plays a role not only in mediating physical

health impacts but also in health benefits, and for a wide range of aspects of health. The

role of gender as a social determinant of Indigenous health has received some attention in

social science Aboriginal health research (Wilson and Young, 2008), but as investigations

that consider gender are still marginal in Aboriginal and Inuit health research and overall

(Healey and Meadows, 2007; Young, 2003), the findings on the role of gender in

mediating environmental health make a valuable contribution to the literature. In another

example, Inuttitut fluency, which is an indicator of cultural continuity (Daniels-Fiss,

2008; Nicholas, 2009), was associated with higher proportional reporting of positive

health benefits for cultural wellbeing related to connections to Inuit traditions, ancestors,

and culturally-important places on the land. This finding corroborates other literature on

the importance of cultural continuity for Indigenous health (Chandler and Lalonde, 1998;

Kral et al., 2011; Reading and Wien, 2009; Richmond and Ross, 2009). Older age was

associated with benefits for social and cultural wellbeing, physical activity, and benefits

from hunting, which offset the increased sensitivity to physical health impacts reported

by a few participants related to older age. These findings complement results regarding

age from Chapter 4. Few papers have investigated the role of age on Indigenous health

(Collings, 2001; Wilson et al., 2011); as such, this investigation helps fill a gap in our

understanding of the role of age as a determinant of environmental health. Chapter 6 also

demonstrated that sea ice travel experience and frequency of hunting, fishing, or wooding

activities were associated with differences in reported health experiences related to sea ice use, as described in Section 9.1.1. In addition to these individual factors, Chapter 6 shows that community-level factors also play an important role in mediating environmental health influences. Emerging themes included socio-cultural change and living in a "white-ways world," and the influences of these processes on sea ice travel practices and knowledge. These results demonstrate the importance of considering factors that influence health at the individual and the community level. These findings also corroborate recent developments around Inuit and Indigenous-specific determinants of health that include cultural understandings of health and distal or upstream determinants that reflect contextual factors and historical legacies for Indigenous peoples (ITK, 2007; NAHO, 2007; Reading and Wien, 2009; Richmond and Ross, 2009).

Chapters 7 and 8 demonstrated that risk perspectives and risk management strategies varied according to gender and sea ice travel experience, while SAR status (whether participants had been previously assisted by SAR while on the land) was not associated with any significant differences. Sea ice travel experience was associated with more knowledge of dangerous ice conditions; a greater spatial and temporal range and intensity of knowledge gathering about environmental conditions; and more mental preparation for safe travel and obstacle management. This evidence shows that sea ice travel experience mediates risk perception and risk management strategies, adding to previous findings about associations between sea ice travel experience and environmental influences on health in this thesis. These findings corroborate other research that has shown a relationship between travel skills and knowledge, safety, and adaptation to environmental changes (Ford et al., 2009; Laidler et al., 2009; Tremblay et al., 2006), and

add new information about specific correlations between land-based knowledge or experience and choices around specific strategies for sea ice travel safety. These findings also enrich our understanding of the association between environmental experience and risk perception. For example, greater knowledge of environmental risks may increase the sense of 'controllability' of the risk, such that people have continued to purse potentially dangerous environmental activities in the long-term (Fischhoff et al., 1978). Further, positive associations with sea ice use based on long-term experience may influence how environmental risks are perceived and how experienced ice users make decisions about continuing to use the ice (Slovic et al., 2004). Thus, these findings add to our understanding of environmental risk perception and the relationship to environmental knowledge in Inuit contexts.

Chapters 7 and 8 also showed that gender was associated with differences in risk communication related to dangerous ice conditions (i.e., greater use of "scared" or "scary"); differences in roles regarding knowledge gathering before and during trips; and differences in roles for physical preparation during trips. These differences correspond to a reported and observed division of labour within families during sea ice trips based on gender, as described in Chapter 7. However, gender did not influence reports of having been worried about one's safety in the past, or use of several risk-benefit management strategies for safe sea ice use. These findings demonstrate that gender is important to some elements of risk perception and risk management related to sea ice travel, based in distinct knowledges between men and women based on a division of labour during land-based activities (Briggs, 1974; Dowsley et al., 2010; Guemple, 1995). These findings also

add to previous findings from Chapters 4 and 6 regarding the importance of gender as a determinant of environmental health.

Overall, these findings make a dual contribution to the broader Indigenous environmental health literature. First, they demonstrate the complexity of environment-health interactions, and the importance of considering diversity within populations when evaluating how the environment acts as a determinant of health. As the role of the environment for Inuit health is not well understood, as described in Section 9.1.1, bringing to light how the environment contributes to differential health impacts and benefits for different members of the population makes an important contribution in our understanding of the complexity and nuances of environment-health interactions.

Second, these findings provide evidence for the role of specific factors in mediating environmental interactions and health outcomes, including social factors, such as gender, employment, institutional education, and Indigenous language ability; biological factors, such as age; environmental exposure factors and attendant environmental knowledge; and community-level, broader or distal factors. While there is some existing literature on social determinants of Indigenous health, particularly in relation to explaining the health gap between Indigenous and non-Indigenous populations (Carson et al., 2007; King et al. 2009; Reading and Wien, 2009), Indigenous health research is predominantly epidemiological (Young, 2003). Literature exploring the influence of specific social determinants of health on health outcomes in Indigenous populations is still quite sparse (Booth and Carroll, 2008; Richmond, 2009: Richmond and Ross, 2009; Shepherd et al. 2012). This thesis contributes to the body of literature investigating the role of different determinants of health in Indigenous populations by

establishing the how a number of factors influence Indigenous environmental health. This work adds to our knowledge of how gender, employment, education, age, and cultural factors interact with the environment to influence risk perception, health risk management, and ultimately health outcomes. Given the small size of the body of literature that has investigated the role of specific determinants of Indigenous health in detail, and the scarcity of literature that has explored how other factors mediate environmental influences on health in general, this is a meaningful contribution to the Indigenous health and environmental health literature.

Some have argued that determinants of Indigenous health, and the causes of poorer health outcomes among Indigenous populations, cannot solely be explained by the usual population health or social determinants of health frameworks (ITK, 2007; King et al., 2009; NAHO, 2007; Reading and Wien, 2009; Richmond and Ross, 2009). Indigenous health, while influenced by general health determinants, is also shaped by factors related to impacts of colonization and assimilation, as well as responses and actions related to self-determination; culturally-specific conceptions of health; and geographic factors and access to basic services (ITK, 2007; King et al., 2009; NAHO, 2007; Reading and Wien, 2009; Richmond and Ross, 2009). The authors identify broader or distal determinants of Indigenous health variously as colonization, globalization, migration, acculturation, cultural continuity, self-determination, access (related to remoteness and barriers), territory, poverty, and racism and social exclusion. This thesis contributes to the literature on the role of these broader determinants on Indigenous health by documenting and exploring how the role of historical legacies and local context, as described in the emerging theme of socio-cultural change in Chapter 6, shapes

environmental health. This corroborates the work of Richmond and Ross (2009), Reading and Wien (2009), King et al. (2009) on the importance of considering not just individual determinants of health, but broader or distal factors in shaping Indigenous health outcomes, and adds to our understanding of how these distal factors interact with environmental use and engagement specifically, with implications for health.

9.1.3 Co-constructing the environment: Meanings of place and risk

Understanding the environment as more than biophysical – as a place of health and risk, a place that is both socially and physically constituted – is a major contribution of this thesis to Indigenous environmental health literature. The importance of place to health and positive and negative place-based health influences forms a key focus of Chapters 5 and 7. Chapter 5 establishes that a major part of the health benefits associated with environmental use relate to place-meanings, and Chapter 7 documents environmental risk perspectives and both the location-specific nature of environmental risks and place-based nature of positive environmental use experiences and perspectives. Together, the findings from these chapters indicate a complex relationship between place, risk, culture, and health.

In Chapter 5, many of the highest response rates for the question of what sea ice means to health were on themes that related to experiences of places. Nearly all participants reported the importance of sea ice as a platform for hunting, and the acts of hunting and consumption of wild foods were emphasized as sources of good health. Most participants also reported the holistic health benefits of just being on the sea ice, related to the meanings they associate with this place. These place-meanings included freedom of movement, freedom of decision-making, and freedom from social pressures in town.

These findings demonstrate that place-meanings arise out of environmental use and engagement, and also inform environmental use. They create a lens and context in which environmental activities take place and are understood and experienced by users, and as such are a critical part of environment-health relationships. These results help fill a major gap in our knowledge of Inuit health, as there is little literature that looks explicitly at themes of place and health for Inuit (Cunsolo Willox et al., 2012), or risk and place in Inuit contexts (Jardine et al., 2009). The results on how interactions between health and environment are located in and give rise to place-meanings are incorporated into the conceptual model of environmental influences on health (Fig. 5.1), as noted in Section 9.1.1. This model of environment and health interactions also serves as an example of how health geography approaches – namely the concept of place, and broad conceptualizations of health and wellbeing – can be integrated into a determinants of health approach, addressing the need identified by Cutchin (2007) for integration of geographic thinking into social epidemiology.

In Chapter 7, factors that participants reported as contributing to a good/safe or difficult/unsafe trip are documented. With regards to perspectives on difficult/unsafe conditions, ice conditions and weather conditions were reported by nearly all community members and constituted nearly all of the reference made by expert travellers. Participants detailed dangerous ice conditions related to freezing processes, melting processes, as well as effects of tides, currents, winds, precipitation, and winter shipping. Participants were specific in their reporting of particular locations that are more dangerous, for example because of stronger currents and thinner ice, or the effects of the ocean and winds at the *sinâ*. While identification of dangerous conditions was location-

specific, documentation of factors contributing to safe or good trips were place-specific.

Activities that were key to enjoyment and relaxation, hunting, and other social and

cultural activities were contingent on access to and use of particular places on the land.

These results build on the results from Chapter 5 to demonstrate the importance of sea ice

as a facilitator of social and cultural connections, and through the activities and uses

carried out on the ice, as a place of health. However, more significantly, some reports did

not fit into the categories of good/safe or difficult/unsafe exclusively. Some reports of

travel on the sea ice being "scary," but never being worried about one's safety; having

fallen through the ice, but sea ice travel having never been "bad" for one's health; or

difficulty simply being part of being on and "loving" the land, indicate that there is a

disjuncture between the ways that environmental hazards tend to be constructed in

literature on climate change and vulnerability to sea ice hazards (e.g., Ford et al., 2008a,

2009; Laidler et al., 2009) – as universal hazards – and the complex way environmental

risks are conceived by environment users. These examples point to environmental risk

perspectives being shaped by culture and relationships to places, and in ways that are

difficult to disentangle as Indigenous cultures are so strongly place-based and informed

by environmental relationships. These findings build on themes around the relationship

between culture, place, and risk (e.g., Masuda and Garvin, 2006; Wildavsky and Dake,

1990), and add new knowledge as the relationship between these themes has not been

explicitly explored in Inuit contexts previously.

In Chapters 5 and 7, the importance of social and cultural meanings for informing

the nature of environmental exposure and the implications of this exposure for health are

established. These chapters demonstrate that the environment is both physically and

socially constructed, providing evidence for the theories of environmental sociologists like Freudenburg, et al. (1995), Irwin (2001), and Wildavsky and Dake (1990), and corroborating other studies on the social nature of risk perception (Casiday, 2007; Lee et al., 2005; Lemyre et al., 2006). These findings are also in line with the work of health geographers on the importance of place to health (Kearns and Moon, 2002; Rosenberg and Wilson, 2005), and corroborate the work of risk scholars regarding the key roles that place (Eyles et al., 2009; Jardine et al., 2009; Masuda and Garvin, 2006) and culture (Baxter, 2009; Casiday, 2007; Dake, 1992; Boholm, 2003; O'Neil et al., 1998) play in shaping risk perspectives. Research has been conducted on environmental risk perception among Indigenous populations related to development and its impacts (Elias and O'Neil, 1995; Joyce and Satterfield, 2010; Richmond et al., 2005). Some research has also looked environment as a place of health for Indigenous peoples (Donatuto et al., 2011; Kingsley et al., 2009; Wilson, 2003), but few authors have considered environment as both a place of health and a place of risk, and unpacked the socio-economic and political forces and cultural relationships that are drivers of these place-meanings (Donatuto et al., 2011; Richmond et al., 2005). Considering that the way that the environment is socially and physically constructed, and that environmental influences on health are place-based and culturally embedded, we can presume that there will be unique connections between the environment and health for every Indigenous nation in every place it considers its territory. Thus, the relatively small number of papers that have considered the complex ways that the environment acts as a source of health risk and benefit for Inuit and Indigenous populations means that there is still much that we do not know on these

topics. In this case, investigating these themes for Inuit in Nunatsiavut adds to our understanding of the connections between place, health, and risk.

9.1.4 Influence of changing environmental conditions on health

Understanding in detail the influences of environmental change on Indigenous health is a major contribution of thesis. The health influences of environmental change are a consistent theme throughout all of the results chapters, reflecting both the high level of reporting on this theme by participants and the relevance of environmental change influences to various aspects of environmental interactions. Chapter 4 investigates trends in cases over time to ascertain if environmental and other changes have been affecting SAR incidence rates; Chapter 5 documents implications of environmental change on diverse aspects of health and place relationships; Chapter 6 identifies factors associated with differential benefits and impacts from sea ice use for application in climate change adaptation research and policy; Chapter 7 documents perspectives on travel safety today compared to in the past; and Chapter 8 investigates different risk-benefit management for safe sea ice travel between groups of individuals, and the ways people are adjusting their safety practices in light of environmental changes. These results provide detailed knowledge of how environmental and other changes are influencing the health of a group of environmental users, using a key element of the environment as a lens and point of investigation.

In Chapter 4, there were no trends identified from 1995 to 2010 in the number of SAR cases per year, the number of individuals assisted by SAR per year, the number of cases during the ice season per year, or the percentage of cases where ice and weather were a contributing factor per year. Reports from key SAR consultants that the vast

majority of land-based incidents are managed by travellers outside of SAR, coupled with the perception and reports of increasing accidents related to changing ice and weather conditions in Inuit communities (Ford et al., 2008a; 2009; Furgal et al., 2002; Gearheard, 2006; Nickels et al., 2006), indicates that there may be changes in land-based incidence rates related to the impact of changing environmental conditions that are not being captured in the SAR data. These results contribute to our understanding of surveillance methods for changing travel safety and injury and trauma related to environmental change for Inuit (Furgal et al., 2002; Furgal, 2008; Furgal and Prowse, 2008).

The remaining results chapters report the perspectives of sea ice users regarding influences of changing environmental conditions on health and management of changes for safe environmental use. In Chapter 5, some participants reported that changing environmental conditions are already contributing to increased impacts on physical and mental/emotional health. However, as documented in this chapter, the most substantive influences are and will continue to be loss of health benefits for mental/emotional, social, cultural, material, and physical health and wellbeing; impacts on place experiences and place attachment; and impacts on hunting and harvesting activities. This understanding of impacts on access to places and benefits from environmental uses makes an important contribution to the literature on human dimensions of climate change, as little research has looked at place-dimensions of the these impacts for Inuit (Cunsolo Willox et al., 2012). These findings also illustrate how environmental change is an agent of environmental dispossession for Inuit. Chapter 6 provides evidence for different impacts and benefits based on a number of factors, including the level of environmental use and engagement, social factors, and biological factors. This level of detail on the distribution

of health impacts and benefits from environmental use in Inuit communities can be used to project changes in the distribution of impacts and benefits related to environmental change or other factors, and help inform targeted climate change adaptation programs.

As reported in Chapter 7, nearly all participants reported changes in safety today compared to the past. Expert travellers and many community members specified that because of changes in the environment, travel is more dangerous today. Chapter 8 documents how changing ice and weather conditions are influencing risk-benefit management strategies and practices for safe sea ice travel. Regarding long-term strategies, expert travellers and a few community members reported that environmental changes were undermining the accuracy of their accumulated travel knowledge and skills. In terms of short-term strategies of knowledge gathering and sharing, preparing, and managing trouble events, some individuals reported adjustments in strategies in response to increased safety risk brought about by changing conditions, with differences varying primarily with levels of sea ice travel experience, and to a lesser extent gender. These results demonstrate that adaptation and management of health risks related to environmental changes varies according to a number of social factors, and risk-benefit management practices used daily by sea ice users provide a valuable lens for illuminating how different individuals are responding to environmental changes through their environmental practices. These findings fill a gap in our knowledge of the determinants of adaptive capacity to manage climate change influences on environmental or subsistence activities (Ford and Pearce, 2012).

Overall, the findings from this thesis make a critical contribution to the Indigenous environmental health and climate change literature, as our knowledge of

human dimensions of climate change is still quite basic (Ford and Pearce, 2012). Due to the young nature of this field, and the predominant focus on biophysical vulnerability in the early development of climate change science, there are still many gaps in our understanding of the health implications of climate change in northern Canada (Ford and Pearce, 2012; Furgal, 2008; McLaughlin and Dietz, 2008). Travel safety implications from changing sea ice conditions have been identified as a priority for future research (Ford et al., 2009; Furgal et al., 2002; Furgal, 2008), but a limited number of studies have explored this issue (Breton-Honeyman and Furgal, 2008; Johansson and Manseau, 2012). Related to this gap is the lack of cause-specific unintentional injury and trauma data in northern Canada, which means that we have little understanding of the role of the environment in contributing to injury and trauma (GNWT, 2004; Légaré, 2007; Young, 2003). There are also gaps in our knowledge of health implications of climate change beyond physical impacts. For instance, there are major gaps in our knowledge of the relationship between environmental change, and psychosocial, mental, and cultural health for Inuit populations (Furgal, 2008). Hess et al. (2008) argued for the need to incorporate an emphasis on place into assessments of health implications of climate change, as place is not a framework by which climate change health impacts are currently understood and assessed. The authors argued for place-based public health approaches, describing how climate change will affect relationships to place and precipitate disruptions to place attachment and identity, with consequences for mental and cultural health and the resilience of communities. Cunsolo Willox et al. (2012) argued for an inclusion of place as a lens to analyze climate change impacts and adaptation in northern Canada, by describing how disruptions to traditional land use practices brought about by climate

change have caused distress among Inuit in Rigolet, Nunatsiavut. The authors linked this distress to loss of place attachment and disruptions to place-based identities. In addition to gaps in our knowledge of health impacts, our knowledge of climate change adaptation is also incomplete. Areas where our knowledge could be improved include our understanding of determinants of adaptive capacity on the individual level, and the role of institutions and community-based organizations in influencing adaptation (Ford and Pearce, 2012). Overall, gaps in our knowledge of the relationship between climate change and health include knowledge of climate change influences on diverse aspects of Inuit environmental health; mediating factors on climate change health influences and adaptations; and determinants of individual and collective management of environmental and other risks related to changing conditions.

This case example adds to our understanding of human dimensions of climate change, and specifically implications of climate change for Inuit and Indigenous health. For instance, the findings regarding the health impacts and benefits from environmental exposure on diverse aspects of health and wellbeing (Section 9.1.1) and place-meanings and attachment (Section 9.1.3) form the context for understanding influences of climatic and environmental change on diverse aspects of Inuit health. While broad understandings of health and wellbeing and place relationships are useful for gaining a more holistic understanding of climate change health influences for human populations in general, they are particularly informative for understanding health implications of climate change for Indigenous populations, for two reasons. First, many Indigenous peoples continue to have a close connection to their traditional lands, and Indigenous epistemologies inform unique conceptualizations of the role of the environment and health-environment

relationships (Cajete, 1999; Colomeda, 1999; Haudenosaunee Environmental Task Force, 1999; McGregor 2004; Nettleton, 2007; WHO, 2007), which means that human-environment connections are especially important for Indigenous health. Second, many Indigenous populations are living in locations where climate change impacts will be more strongly felt (Galloway McLean et al., 2009), are already experiencing disproportionately poor health outcomes (Gracey and King, 2009; King et al., 2009), and are also coping with environmental dispossession related to impacts of colonization (Richmond and Ross, 2009; RCAP, 1999). This mixture of factors means that Indigenous populations are potentially more vulnerable to climate change than other populations. Given these realities, the results from this thesis improve our knowledge of the scope and extent of health implications for Indigenous populations so that they can be better understood and addressed. Further, results regarding how people have been managing environmental health risks and benefits in their daily lives, and adjustments they are making to cope and adapt to changing climatic and environmental conditions, frames the investigation of adaptation around local conceptions of risk and safety management. This makes a contribution to the adaptation literature around centering community perspectives on environmental risk-benefit management as a lens to investigate climate change adaptation and adaptive capacity. In sum, this case is not only useful for improving our understanding of climate change implications for Inuit-environment relationships, but also adds to our understanding of climate change implications for Indigenous environmental health more broadly.

9.2 Reflections on methods: Strengths and limitations

This thesis employed a case study approach (Stake, 2005) to allow for the inclusion of multiple sources of information, perspectives, and contextual information. It also employed a mixed methods strategy (Creswell, 2007) to minimize the weaknesses and maximize the strengths of different methods. The methods consisted of focus groups, semi-directed interviews, key consultant interviews, document review, and participant observation. A CBPR approach (Fletcher, 2003) was used to help ensure that the project addressed community needs and goals.

The mixed methods strategy selected allowed for the use of multiple methods and sources of data to answer complex questions about Inuit environmental health and sea ice use. This included collecting qualitative and quantitative document review data, and qualitative interview, participant observation, and focus group data. It also involved analyzing qualitative and quantitative data, and in some cases transforming data to make it comparable to other sources for analysis (SAR records in Chapter 4) or performing some quantitative analysis on qualitative data (focus group and interview data in Chapter 6). By using multiple methods, I was able to draw on the strengths and minimize the weaknesses of different methods (Creswell, 2009; Johnson and Onwuegbuzie, 2004) to create a more holistic understanding of Inuit-sea ice interactions. For instance, quantitative results from Chapter 4 yielded information on SAR incidence rates which are valuable for comparisons with other health statistics or incidence rates for SAR or land-based events in other communities. Further, qualitative data that conveyed the perspectives on sea ice users regarding health influences of their environmental use yielded critical information about additional impacts, and also benefits. A drawback to

this approach was the extensive amount of time needed to collect and analyze different sources of data with different methods, and to ensure validity of each piece and the study as a whole (see Tables 3.6 and 3.7).

The use of the case study approach, as identified by Stake (2005) and Tellis (2007), was a strength as it allowed for the use of a mixed methods approach, facilitated the creation of an in-depth understanding of a system where the subject and context are not easily disentangled, and allowed for the inclusion of the perspectives of multiple individuals and groups as well as the interaction between groups. For instance, using a case study approach allowed the tight connection between the topic of this thesis – Inuit health and sea ice use – and multiple contexts in which this relationship operates, including that of environmental risk perspectives, health conceptualizations, environmental change, etc., to be explored. In another example, the documentation of perspectives of SAR representatives, expert sea ice users, and various groups of community members was important to creating a clear understanding of risk management in the community, which was necessary to address Objective 5 (explore the factors influencing risk-benefit management for safe sea ice use).

As Creswell (2007) notes, a limitation of the case study approach is that it can be challenging to demarcate the parameters of the case, if there are multiple activities, sites, and individuals involved. This was true in for this study as well. For much of the study, it was difficult to decide on the place of SAR conceptually in this thesis: to what extent was this thesis a case study of SAR, and how much focus should there be on SAR activities, organizational history, and relationships between institutions and groups? This was resolved by deciding that while SAR was an important part of sea ice use and safety in

Nain, a case study of SAR could be – and should be – a separate study. Another aspect that was difficult to disentangle was the environmental factor of interest. Winter land users do not exclusively travel by sea ice – people use sea ice to travel longer distances because it is easily and quickly traversable landscape that allows access to numerous places of interest, but people also use freshwater ice and land for transportation. While there were some early questions of demarcation around what environmental use is relevant and what is not, using a case study approach meant that context and other factors – such as freshwater ice and terrain use – could be included, and this broad inclusion contributes to a strength of this thesis in that it reports on numerous aspects of Inuit-environment relationships to create a holistic understanding of this topic, with sea ice as its central focus.

There have been calls for more widespread use of collaborative and participatory research approaches in Aboriginal health research or research on other aspects of Aboriginal environmental interactions (Ford and Pearce, 2012; Wilson and Young, 2008), which are part of a broader movement around research involving Indigenous peoples employing collaborative, participatory, or decolonizing methodologies (Denzin et al., 2008; Nicholls, 2009; Smith, 2000). The strengths of CBPR as an approach to conducting research in Aboriginal contexts are multiple (see Chapter 3). As a non-Inuk from outside the local community and with relatively little lived experience of the North, my use of CBPR was motivated by a desire to ensure relevance of the research questions and outcomes to local goals and needs, and ethical and appropriate methods and processes of engagement. In practice, the benefits of using a CBPR approach spanned four main points: 1) relevance of the study to the community and local decision-makers; 2)

inclusion of multiple perspectives; 3) improved trust and engagement; 4) capacity-building and support (Fletcher, 2003; LaVeaux and Christopher, 2009).

First, relevance of the study to residents and decision-makers was strongly rooted in engagement of community representatives and organizations in the research design, which ensured that questions of mutual interest were being addressed by the study. The NG Division of Environment expressed strong support for a study focusing on travel safety in the region after an unusually mild winter in 2009/2010 led to concerns being expressed by residents about climate change impacts on travel safety. Mutual interest in this topic, coupled with a history of collaborating among the research team members and the NG, led to the decision to pursue this topic of study using a collaborative approach with the NG. In the preliminary consultations that were conducted in February 2010, the NG DHSD suggested to expand the study to include mental health benefits of sea ice use and impacts on mental health from changes in access to sea ice, feedback which directly informed the expansion of the study beyond unintentional injury and trauma related to environmental use. Feedback and engagement of local partners in the study from the beginning and spanning the entire study timeline meant that all throughout the project, local partners were helping to ensure the relevance of the study to their needs, and the needs that they had identified in the region. Prior to the end of the study, some of this engagement had already facilitated local action. For instance, collaboration with the NGSAR led to improvements in their SAR incident surveillance and data management. The prioritization of knowledge translation from this thesis was the impetus of hosting meetings with the NG and NGSAR in June 2012 to discuss the preferred content and form of results for partner and community use. The interest in and engagement in these

meetings is evidence that the early work of engagement and relationship-building were effective in making this project locally relevant, and means that the findings from this study, when they are presented in final form, are likely to inform policies and programs that will support sea ice travel safety.

Second, the use of a CBPR approach reflected a desire to include multiple perspectives and ways of knowing in this research. My personal commitment to including multiple perspectives led to me trying to being self-reflexive in all my interactions, and to invest time and effort into engaging with people in Nain and learning from them about their lives and ways that they see the world. While this effort was by no means perfect, a few people that were participants or otherwise involved in the research conveyed to me at various points that they recognized and appreciated my openness and commitment. They also shared valuable perspectives with me on research in general or this research process, insights that I suspect would have been shared had I not made this effort. Further, having community partners and mentors meant that I received assistance with framing questions to ensure that they were appropriate and created space for multiple perspectives. For instance, reviews of the survey for interview participants by the NGRAC helped make sure that questions were asked in a way that was relevant to local experiences. The results of these efforts are captured in the multiple perspectives reported in this thesis, and contribute to the validity of this work.

Third, the emphasis on relationships in CBPR means that building trust is a priority, which is especially important for research in Indigenous contexts (Fletcher, 2003; LaVeaux and Christopher, 2009). The prolonged engagement in the field and effort put into building relationships with research partners, participants, other community

organizations, and residents helped build trust and promote engagement. This was apparent in a number of ways – by people coming to meetings and engaging in dialogue, opening up their homes, helping me in the research process, and generally being generous with their time and knowledge. The best example of this is being invited on sea ice trips with people, and being recommended for joining on sea ice trips. This was very meaningful, considering that my lack of travel skills meant that I could contribute little while being essentially a liability, and that I was practically a stranger that would be present during highly valued family time. Without the trust built through honest and prolonged engagement, opportunities to travel on the sea ice with families may have not been available to me, and the opportunities to learn first-hand the richness of land-based knowledge would have been reduced.

Fourth, an outcome prioritized by CBPR is building local capacity (Fletcher, 2003). By developing relationships with local organizations and government, this research was able to contribute to building local research capacity by using and developing the skills of local research assistants. As described in Chapter 3, the NG was able to hire local research assistants because of a critical mass of research projects that they were involved in locally that required and could support to these employment positions. Two research assistants were involved in recruitment and data collection, and one was also involved in results dissemination to an academic audience. The NG and I viewed working with these assistants as a training and capacity building opportunity. Some additional work was carried out by Sikumiut Environmental, a local firm, which helped channel research funds into the local economy and support an independent small business. More broadly, the collaboration with the NG was part of their vision for

research in the region (NG, 2010), and this study helped to implement that vision for participatory and locally relevant research that leaves a positive legacy. On the reverse side, assistance from local people and organizations was critical to successful research design, implementation, and dissemination, and these collaborations helped build my skills and capacity as a researcher.

While these benefits are substantive, the application of a CBPR approach was not without some limitations and difficulties. Part of the CBPR approach involves recognizing and addressing the power dynamics between communities and knowledges (Fletcher, 2003). This encompasses recognizing and acknowledging complex North/South, Settler/Inuit, Western/Indigenous, Researcher/Subject power dynamics, as well as the histories that they are based in and the privileges they furnish. While in this process of cross-cultural research, I have been aware of my personal location, the markers of which are being white, queer, female-bodied, able-bodied, middle-class, educated, Polish-Canadian, and an immigrant. I appreciate that I have access to numerous privileges, and strive to work from an anti-racist position, particularly in conducting research with Inuit. Regardless of my intention of working from an anti-racist standpoint, the reality was that I could not decouple myself from a fraught and traumatic history of outsider (and researcher) involvement in Inuit lives. These dynamics felt bigger than me, because they were. A few times, my presence and implication in the history of outsider involvement in the Arctic triggered complex, negative emotions for people. I describe one such instance in an article reflecting on my experiences as a non-Inuk conducting research in the North:

> When I asked a friend if I could join her family on her next trip to the place on the land she considers home, she asked if I wanted to go "as a person or as a

researcher." I gave a complicated answer about how I wanted to come both on a personal level, but also to inform my work. She invited me to come, and the trip was an invaluable experience, but my presence remained complicated... Occasionally, conversations took place about the complicated, sometimes threatening presence of white people on the land. I realized over the course of this trip that people's places on the land are those places where they have traditionally not been within easy reach of Eurocentric institutions and policies, where Inuit are experts still in charge of where they go and what they do, making my presence loaded. When we returned, my friend expressed to me that she hadn't been sure how to relate to me on the trip; that my dual roles had been confusing. She wasn't sure what was safe to say or do in front of me. Even though my friend decided that she wanted to take on the challenge of teaching me by allowing me to join the trip, I was still a white person, a researcher. (Durkalec, 2012: 22; Appendix 11.15)

Part of why these various experiences were unsettling is that my whiteness was being made visible to me, which it is largely not in my daily life in southern Canada; indeed, this in/visibility of whiteness (invisibility to those who experience white privilege, and visibility to people of colour), its normativity, is part of the racialized structure that uphold white hegemony (Ahmed, 2007; Martin-McDonald and McCarthy, 2008; Owen, 2007). Coming to terms with the implications of my positionality, alone and in conversations with others, was very difficult and continues to be a process. There were some times that I considered stepping away from research in the North. However, I came to the conclusion that improving research relationships between non-Indigenous researchers and Indigenous communities is a process that necessarily includes vulnerability and healing. While it is not simple or easy, progress can only be made through ongoing engagement and relationship building. In practice, the binaries of Settler/Inuit or Researcher/Subject or Participant were and are not absolute; they are complex and blurry, and can be ruptured. As I go on to discuss in the article (Durkalec, 2012; Appendix 11.15), I experienced a number of ruptures as I became more comfortable and started figuring out how to rectify my own conception of myself and my location or position in this different context. This process of 'coming out' as myself (and

also as queer) has facilitated building authentic relationships and trust, and disrupted the idea of an objective, unmarked researcher who cannot be known but only seeks to know and impose particular ways of knowing on others.

The interdisciplinary approach to understanding health and environment connections used in this thesis is one of its clear strengths. As described in Chapters 1 and 2, the majority of recent literature on Inuit-sea ice interactions has investigated Inuit vulnerability or resilience to sea ice hazards in the context of climate change (Berkes and Jolly, 2002; DeSantis, 2008; Ford et al., 2008a, 2009; Laidler et al., 2009; Nichols et al., 2004). This research has made important contributions to our understanding of human dimensions of climate change in the North related to sea ice use. However, it also means that Inuit-sea ice relationships have been explored using a fairly narrow range of theoretical orientations, for the most part, creating a number of research gaps. The value of drawing on approaches from health geography, population health, social epidemiology, environmental sociology, risk perception, climate change adaptation, and other bodies of literature or (sub)disciplines means that this thesis has been able to address a number of these critical gaps, as described elsewhere. The limitation of this approach includes potential difficulty in reaching multiple audiences because the scope is so large and diverse, and also some of the more specialized investigative approaches rooted in specific disciplines were not used (for example, the psychometric model for analyzing risk perception, or social network analysis). Nonetheless, this thesis makes an important contribution to our understanding of Inuit-sea ice relationships and Indigenous environmental health.

9.3 Conclusions and directions for future research

This thesis sought to understand the nature and implications of the relationship between sea ice and Inuit health in the community of Nain in Nunatsiavut. It has made a number of contributions to our understanding Inuit-sea ice relationships, including the role of the environment in unintentional injury and trauma; the role of the environment as a determinant and place of health benefits and impacts; intersections between environment as a determinant of health and other determinants in the context of sea ice use; environmental risk perspectives related to sea ice use; and the nature and determinants of risk-benefit management for safe sea ice travel and adaptations for a changing climate. It has also made a number of broader contributions to the Indigenous environmental health literature, including understanding how the environment is a source of complex health impacts and benefits; the importance of social determinants and other factors in mediating environment-health interactions; the role of social meanings for environmental interactions, including constructions of place and risk; and the influence of environmental change on health. There are, however, a number of critical research areas that this thesis has not been able to address or address fully, which could form areas of fruitful future research:

- Rate of unintentional injury and trauma from environmental use in Inuit communities managed outside of SAR, and the level of underreporting of unintentional injury and trauma represented by each SAR case.

- Conceptualization of Inuit health that is grounded in an Inuit worldview.

- Understanding of how Inuit communities and other forces shape and alter the environment, and how these activities ultimately influence health.

- Statistical analysis of the relationship between socio-demographic factors and health experiences from sea ice use, and the distribution of impacts and benefits in the Inuit population.

- Perspectives of young people and people with little to moderate sea ice travel experience regarding sea ice risks and risk-benefit management for safe travel.

- Psychometric study of risk perspectives for Inuit environment users.

- Associations between additional socio-demographic factors (e.g., financial resources, age) and risk-benefit management for safe sea ice use.

- Relationship between place, health, care-giving, and care-receiving in the North (both formal and informal care).

- Analysis of social networks for informal support for sea ice travel.

In addition, this thesis has demonstrated the benefits of using an interdisciplinary health approach, mixed methods strategy, and collaborative and participatory approach to research to investigating health and environment issues of import to Inuit communities. We know that environment is an important determinant of health; the contribution of this thesis is that we now know in-depth what a critical element of the environment means to Inuit health, which not only broadens our knowledge of environment-health relationships, but can inform action at the community and regional levels in the North to ensure that sea ice continues to be a place of health for generations to come.

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11 APPENDICES

11.1 Trent University Research Ethics Board (REB) approval

TRENT UNIVERSITY

June 29 2010

File # -21729
Title: Understanding Inuit community health and safety during travel on sea ice: A case study of Nain, Nunatsiavut

Dear Ms. Durkalec,

The Research Ethics Board (REB) has given approval to your proposal entitled " Understanding Inuit community health and safety during travel on sea ice: A case study of Nain, Nunatsiavut ".

Please add a running footer to your consent form, with the date of Trent REB approval and consent revisions number (e.g., 01-Jan-09, Version 2), so that the consent form used can be easily identified in future.

In accordance with the Tri-Council Guidelines (article D.1.6) your project has been approved for *one year.* If this research is ongoing past that time, submit a *Research Ethics Annual Update* form available online under the Research Office website. If the project is completed on or before that time, please email Karen Mauro in the Research office so the project can be recorded as completed.

Please note that you are reminded of your obligation to advise the REB before implementing any amendments or changes to the procedures of your study that might affect the human participants. You are also advised that any adverse events must be reported to the REB.

On behalf of the Trent Research Ethics Board, I wish you success with your research.

With best wishes,

Dr. Stephen Katz
Department of Sociology
Chair, Research Ethics Board

Phone: (705) 748-1011 ext. 6020, Fax: (705) 748-1587
Email: skatz@trentu.ca

c.c.: Karen Mauro, Office of Research

The tri-council will be shortly stating that university ethics committees should insure all researchers working with human participants add a statement to consent forms that provide contact information allowing participants to contact administrative staff responsible for ethics applications. We at the Trent REB believe that it is consistent with research participants rights and general research accountability that a statement outlining for participants that in addition to contacting the researcher for clarification regarding research, that they may also contact the Trent REB at the office of Research Administration with regard to any ethical questions they may have. Thus we ask that from now on all consent forms include a statement advising that research participants can also contact the Trent Research Ethics Board by either phoning Karen Mauro at 748-1011 x 7050 or emailing her at kmauro@trentu.ca

11.2   Nunatsiavut Government Research Advisory Committee (NGRAC) approval

Nunatsiavut

14th July 2010

Agata Durkalec
Frost Centre for Canadian Studies and Indigenous Studies, M.A. Program
Catharine Parr Traill College
Trent University
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Peterborough, ON K9H 7P4
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Email: agatadurkalec@trentu.ca

Dear Ms. Agata Durkalec:

Re: Research Proposal - Understanding Inuit community health and safety during travel on sea ice: A case study of Nain, Nunatsiavut.

As stated in the Research Process a review to your proposal was initiated, involving appropriate Inuit Community Government(s) and NG staff ensuring for a comprehensive review.

As a reminder NG recommends that researchers submit their research proposal at least three (3) months before the start date of their project to ensure that a comprehensive review will be conducted on your proposal.

We do have a support letter from Tom Sheldon, Director of Environment, Nunatsiavut Government, to Kristeen McTavish, Nasivvik Centre Coordinator, for the scholarship application that was submitted "Perceptions and experiences of risk and injury during travel on sea ice in Nunatsiavut communities".

Please accept this letter as confirmation of the Nunatsiavut Governments support for the above research project as outlined in your application.

1.   We would appreciate a copy of the ethics approval from the Trent University Research Ethics Board that you received on June 21, 2010.

2.   We suggest that you contact Paul Pigott, pigott.paul@gmail.com, for his project "sikkuginnait Kanuittusuatuinnanik Inuttut ice typology".

17 Sandbanks Road, PO Box 70, Nain, NL, Canada A0P 1L0 ▶ Tel: 709.922.2942 Fax: 709.922.2931 ▶ Email: nain_reception@nunatsiavut.com

www.nunatsiavut.com

Nunatsiavut

3. Traditional Knowledge is a very important issue for the NG and beneficiaries to the Agreement. All of the Traditional Knowledge data, raw and processed, that is collected is to be shared with NG. We require exact copies of all the raw and processed data, plus exact copies of any recording and transcripts.

4. Please provide copies of any reports, journal articles, papers, posters or other publications related to this project to the, Nunatsiavut Inuit Research Advisor, and the Director of Torngasok, Nunatsiavut Government and the Inuit Community Governments of Nain, Hopedale and Makkovik upon completion of your work. A plain language summary detailing the work, translated into Nunatsiavut Inuktitut should also be provided.

NG would appreciate copies of any photographs that you acquire during your research in the Nunatsiavut area as Nunatsiavut Government is developing a digital database of regional photos. Recognition will always be given to the photographer.

Please note that if you are going to make any changes to your proposal, any such changes must be considered and supported by the NGRAC before they are implemented.

We thank you for considering our feedback on your work and look forward to more collaboration.

Sincerely,

John Lampe
Chair, Nunatsiavut Government
Research Advisory Committee
Nunatsiavut Government
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11.3 Nunatsiavut Government letter of support

Nunatsiavut

Kristeen McTavish
Nasivvik Centre Coordinator
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February 25, 2010

Re: Letter of Support for "Perceptions and experiences of risk and injury during travel on sea ice in Nunatsiavut communities"

Dear Kristeen McTavish,

Please accept this letter of support for the scholarship application being submitted to the Nasivvik Centre by Agata Durkalec of Trent University. Her research project focusing on the perceptions and experiences of risk and injury during travel on sea ice in the communities of Nain and Hopedale, Nunatsiavut is a priority program for our region. This is especially true given the record lows in sea ice conditions along the Nunatsiavut coast experienced this winter.

The project is part of growing collaborations between the Environment Division of the Department of Lands and Natural Resources within the Nunatsiavut Government, and Prof. Chris Furgal of Trent University. The project will explore the relationship between environmental changes and the health of Nunatsiavimmiut, an important interface and link that has been identified as a research gap within our region. As a part of these collaborations, our department has been working with Agata on the development and implementation of community-based ice monitoring and surveillance programs in the communities of Nain and Hopedale since 2008. We are pleased with the positive collaborations between Agata, Prof. Chris Furgal, the Nunatsiavut Government, a local

Nunatsiavut

Inuit environmental consulting firm (Sikumiut Environmental Management Ltd.), and the communities of Nain and Hopedale that have been developing as a part of this work.

The research that is currently being proposed to explore the social and health-related impacts from the changing local environment, including ice conditions, addresses a very important issue in our region. Our communities are concerned with what these changes may mean for the health and safety of our residents that use the ice for travel and hunting. We look forward to working together with Agata on this project for the safety and security of all Nunatsiavummiut and strongly endorse her scholarship application to the Nasivvik Centre.

Sincerely,

Tom Sheldon
Director of Environment
Nunatsiavut Government

11.4 Project Information Letter

Project Title: "Understanding Inuit community health and safety during travel on sea ice: A case study of Nain, Nunatsiavut"

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Health and environment are tightly connected in an Inuit context, and sea ice is a particularly important component of the environment for Inuit for accessing food and livelihoods, for travel between communities, and as a key part of Inuit knowledge, culture, and identity. There are social, economic, environmental and cultural factors that may be changing how Inuit interact with sea ice, which may have effects on health. Understanding these factors is important for developing a better understanding of health in this context to inform positive action for improving community health.

To address these issues, this study is asking the question: What is the relationship between travel on sea ice and community health and safety in the community of Nain?

Interviews with community members and direct input from the community are important ways to help answer this question. As a participant, your contributions will be used in this project, which is part of my (Agata Durkalec's) Master's thesis at Trent University in Peterborough, Ontario. A report will be produced from this project and potentially other publications. Results throughout the project and a final report will be shared with project participants, the wider community of Nain, and the Nunatsiavut Government.

This knowledge can potentially benefit the community of Nain and other Nunatsiavut communities by informing health policies, search and rescue practices, and supporting the ongoing use of sea ice for travel and hunting.

This project is funded by ArcticNet and is supported by Trent University and the Nunatsiavut Government. It has been approved by the Trent University Research Ethics Board and the Nunatsiavut Government Research Advisory Committee.

If you have any further questions, please do not hesitate to contact me or any of the individuals listed above. Thank you very much for considering participating in this project. Nakummek!

KAUJISANNIUP PIGIANNINGATA KAUJITITSIUTINGA

Kaujisanniup Taijaugusinga: "Tukisigasuanni Inuit nunalet inositsiaginnisanginnut amma Kanuittailinnik ingganimmi sikutigut: Kaujisannik Nain-imi, Nunatsiavut"

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Inositsiagigasuannik amma avatet ilingallagittut Inunnut, amma sikuit ikKanammagittuk avatinganut Inuit niKitsasiugiamut amma inogusigillugu, inggavigillugu akungani nunalet, amma ilingallagilluni Inuit Kaujimausinginnut piusituKanginnut, amma kinakkoninginnut. Inogusiujuit, avatigijaujuit amam piusituKaujut asianguvalliajut Kanuk Inuit ilinganniKammangâta sikumut, attuiniKammagigajattuk inogusiujunnik. Tukisigasuagiak tamakkunga ikKanammagittuk sakKititsigiamik tukisiannisammik inogusiujunnik âkKigiatsigiamut nunalinni inogusiujunnik.

kamagigasuallugit tamakkua pidjutaujut, tamanna Kaujisanniujuk apitsuniKaniattuk. Kanuilingavâ ilagennik akungani ingagiamut sikutigut amma nunalet inositsiaginnisangit nunagijaujummi Nain-imi?

Apitsunik nunaliujunnik amma uKausigijangit nunaliujuit ikKanammagittut kiugasuagiamik tâtsuminga apitsotimmik. IlauKataullutit, ikajutisigutitit atuttaulâttut tâtsumani Kaujisannimi, ilangautillugu (Agata Durkalec's) Kaujisattiugiamut ilinniajuk Trent University Ilinniavitsuangani Peterborough, Ontario-mi. Kaujititsiutik sakKititaulâttuk tamatsumangat Kaujisanniusimajummit asinginillu allataumajunit. Piusiusimajut Kaujisannimi amma pijagellagittuk Kaujititsiutik tunijaulâttuk ilauKatausimajunnut, nunalinnut Nain-imi, amma Nunatsiavut kavamanganut.

Kaujimausiujut ikajutsisiagajattut nunalinnik Nain-imi asinginillu Nunatsiavut nunaKutinginni Kaujimattitautillugit inositsiagigasuannimut maligatsanik, asiumajuKatillugu Kinijattinut, amma atuttauninnaninganut sikuit inggavigigiangit amma pinasuapvigiagiangit.

Tânna Kaujisanniujuk kenaujaKattitaujuk ArcticNet ikajutsitaullunillu Trent University amma Nunatsiavut kavamanganut. Angittaumajuk Trent University Research Ethics Board amma Nunatsiavut kavamangata Kaujisattet UKaudjigiajiullutik katimajinginnut.

ApitsotitsaKagiallaguvit, nukKanganiannak uvannik Kaujititsilutit allataumajunik Kulâni. Nakummek isumatsasiusimagavit ilauKataugiamik. Nakummek!

11.5 Informed consent form

Project Title: "Understanding Inuit community health and safety during travel on sea ice: A case study of Nain, Nunatsiavut"

The purpose of this project is to improve the understanding of the relationship between Inuit community health and travel safety on sea ice. This knowledge can potentially benefit the community of Nain and other Nunatsiavut communities by informing health policies, search and rescue practices, and supporting the ongoing use of sea ice for travel and hunting.

My participation will consist of attending one 60-120 minute one-on-one guided interview with the researcher.

It is intended that there is no personal risk in participating in this project and I should feel comfortable with its nature at all times. I understand that I have the right to withdraw from this interview or the project at any time without any prejudice, judgement or consequence.

I understand that information from this focus group/interview is being collected by note-taking. In addition, I consent to the information from this focus group/interview being collected and recorded on a digital audio recorder:
Yes ☐ No ☐.

I understand that the contents of the focus group/interview will be used in a research report, Masters thesis report and potentially other publications that will be based on this research. None of the interview content will be used for any commercial purposes.

Regarding my privacy and confidentiality, I choose one of the following options:

☐ I do not agree to direct quotes of mine being used in publications, and I prefer to stay anonymous and do not want my name to be listed or associated with any information that I provide
☐ I agree to have direct quotes of mine used in publications, but I prefer to stay anonymous and do not want my name to be listed or associated with any of the quotes or information that I provide
☐ I agree to have direct quotes of mine used in publications, and I agree to have my quotes associated with or attributed to my name

In any case where I provide authorization to use my name and quotes, I understand that I will have the opportunity to review it, in its presented context before it is finalized and published.

I agree to have my name listed in the Acknowledgements section at the end of any report:
Yes ☐ No ☐.

I would like a copy of the transcript from this focus group/interview:
Yes ☐ No ☐.

I would like a copy of the final report:
Yes ☐ No ☐.

Under the responsibility of the student researcher Agata Durkalec and Supervisor Chris Furgal, all information will be stored securely under lock and key for a minimum of 5 years after publication at Trent University in Peterborough, Ontario. After this time, all materials will be destroyed.

I understand that my participation in this project is voluntary and I am free to withdraw from the project at any time, before or during and interview, refuse to participate and refuse to answer questions. If I decide to withdraw from the project, any information I have given will be promptly destroyed and will not be included in the project in any way. I understand that my withdrawal will bear no consequences and no judgements or prejudice will be held against me.

I understand that this project has been approved by the Trent University Research Ethics Board and the Nunatsiavut Government Research Advisory Committee.

If I have any questions, I can contact the Primary Researcher Agata Durkalec, Supervisor Chris Furgal, the Nunatsiavut Government Research Advisor John Lampe, or the Trent University Research Ethics Board representative Karen Mauro at the contact information provided below.

Agata Durkalec, Primary
Contact/Investigator
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Ethics Board
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John Lampe, Nunatsiavut Government
Research Advisor
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Email: john_lampe@nunatsiavut.com

There are two copies of the consent form, one of which I may keep for my records.

By signing below, I (print name)_____
agree that I have been fully informed and understand the nature of the project, and agree to participate.

_____   _____
Signature of Participant   *Date*

_____   _____
Signature of Researcher – Witness   *Date*

Participant Contact Information:
Address: _____

Telephone: _____ Email: _____

ILAUKATAUJUNNUT ANGIUTIULLUNI TATATTUGAK

Kaujisanniup Taijaugusinga: "Tukisigasuannik Inuit nunalet inositsiaginnisanginnut amma Kanuittailinnik ingganimmi sikutigut: Kaujisannik Nain-imi, Nunatsiavut"

Pidjutigijanga tâtsuma Kaujisanniup piusitigiagasuallugit tukisimannet ilingaKatigenningit akungani Inuit nunalet amma Kanuigani ingganiup sikutigut. Tamanna ilisimanniujuk ikajutsigunnatuk nunaliujunnik Nain-imi asinginillu Nunatsiavut nunaKutinginni Kaujimattitaullutik inositsiagigasuannimut maligatsanik, asiumajuKalimmat Kinijattet piusinginnik, amma KaujimajautsiatiIlugit atuKattanet sikunik inggavigigianga amma pinasuapvigigianga.

IlauKataunniga ilautitsilâttuk:
☐ Malillunga atautsimik 90-120 minotinni apitsutaunimmut Kaujisattimut
☐ Malillunga atautsimik 60-90 minotinni aippatuagillugu apitsutaunik Kaujisattimut

Tugâpviugasuajummut ilimanattumetitauniangitunga ilauKataugiamut tâtsumani Kaujisannimi amma kangusotiKannanga piusiugasuajummik. Tukisimavunga pivitsaKanniganik nukKagiamik apitsutaunimmik upvalu tâtsumanga Kaujisanniujummit Kangautinnak apviataunanga, kamagijaunnanga upvalu asiagut piusiukKujaujuttut.

Tukisimavunga tâkkua Kaujititsiutet tâkkungat katimaKatigejinnit/ apitsotet allatauKattanianninginnik. Ilagiallugu, angiutiKavunga Kaujititsiutet katimajiuKatigennit/apitsujunnit katitsutauninginnik amma atuttautillugu piusiliugutik: Angijuk ☐ Aukâjuk ☐.

Tukisimavunga ilumiutanginnik katimajiuKatiget/apitsotet atuttaulânninginnik Kaujisanniup Kaujititsiutingani, Ilisimallagittuit Kaujititsiutinginni asinginillu allataugiaKaKattajuni malillugu tânna Kaujisanniusimajuk. Nallingillonet apitsotiusimajut atuttaulâgitut kenaujaliugutigigiangit.

Pidjutigillugu kamagijaugiaKanginiga amma siammatitaugiaKanningit, ukuninga nallinik tigusigunnaKunga piusiugunnatunik:

☐ AngiutiKangilanga uKausigisimajakka atuttauKunnagit atuagaliutaujunni, amma atiga KaujimajaukKungittaga atigalu allataukKunagi upvalu ilingattilugit sunanut Kaujititsiutigisimajakkanut
☐ AngiutiKavunga uKausigisimajakka atuttaugunnatillugit allataumajunni, tâvatuak atiga allataukKungittaga upvalu nallingit uKausigisimajakka upvalu Kaujititsiutigisimajakka apitsutaunikkut.
☐ AngiutiKavunga uKausigisimajakka atuttaugunnatillugit allataujunut, amma angiutiKallunga uKausigisimajakka ilautitsitillugit atiganik

Kanutuinnak pikKujiguma atiganik amma uKausigisimajakka piajgettauKâttnagu atuagatsauKâtinagullu.

AngiutiKavunga atiga allatautillugu nalummegutiujunnut nâningani Kaujititsiutet:
Angijuk ☐ Aukâjuk ☐.

Pigumavunga adjiliuttaumajumik allatausimajunik katimajiuKatigennut/apitsutimmut:
Angijuk ☐ Aukâjuk ☐.

Pitâgumavunga adjiliutaumajumik pijagettumik Kaujititsiutimmik:
Angijuk ☐ Aukâjuk ☐.

Atâgut ilinniatop Kaujisattiugimaut Agata Durkalec amma aulatsijiup Chris Furgal,
ilonnatik Kaujititsiutet pigiattausialâttut palangaitsimallutik tallimani jârini
allataukKâtillugu Trent University Ilinniavisuamut Peterborough, Ontario-mi. Taimanallu
ilonnatik atuttaumajut, nongutitaulâttut.

Tukisimavunga ilauKataunninga tâtsumunga Kaujisannimut apviataungitunga amma
pivitsaKallunga nukKagiamut apitsutaunimmut Kangatuinnak, sivungani upvalu
apitsutaunimmi, Kipilugunnalunga ilauKataugiamik amma kiugumangikuma
kiuKattananga. NukKaniaguma Kaujisanniujmmi, sunatuinnait Kaujititsiutigisimajakka
tapvainak nonguttitaulâttut amam ilijaugatik Kaujisannimut. Tukisimavunga nukKaniga
apviatitsiniangituk amam kamagijaunnaga upvalu nâmmagijaunnaga.

Tukisimavunga tamanna Kaujisannik angittausimanninganik Trent University Research
Ethics Board amma Nunatsiavut kavamangata Kaujisattet UKaudjigiajiullutik
katimajinginnut.

ApitsotitsaKaguma, Kaujititsigunnakunga Kaujisattimik Agata Durkalec, Aulatsijimmik
Chris Furgal, Nunatsiavut kavamangata Kaujisattet UKaudjigiajinganut John Lampe,
upvalu Trent University Research Ethics Board kiggatuttinganut Karen Mauro atâni
Kaujisapviusonut.

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Maggonik adjilittaumajonnik angiutiKannimut tatattugaKavuk, atautsimik piulimatsigunnatillunga.

Atâni atitâgillunga, uvanga_____angiutiKavunga Kaujimattitautsiagiamut amma tukisillunga piusiugasuajummik Kaujisannimi, amma angiutiKallunga ilauKataugiamut.

_____   _____

Atiliuttanga IlauKataujop   *Ullunga*

_____   _____

Atiliuttanga Kaujisattiup-Takunnâjop   *Ullunga*

IlauKataujop Tukisiniapvigigunnatanga:

Nunangata tugâgutinga:_____

Fonninga: _____ Kagitaujakkut: _____

11.6 Focus group guide

I am trying to learn how Inuit used to keep themselves safe for travelling on sea ice, how Inuit keep themselves safe today, and what sea ice means to your health today. Please feel free to bring up anything that you feel is important to these topics. I will start with a few questions to help get discussion going.

Perspectives on Safe / Hazardous Conditions

1. For you, what are the kinds of things that make a 'good trip' for travelling or hunting on sea ice? *(Probe with alternate terms)* What things make a trip comfortable or enjoyable for travelling or hunting on the ice? Can you describe times when you've experienced good / comfortable / enjoyable trips? What made these different or better than other trips?

2. When travel on sea ice is challenging or difficult, what words do you use to describe the conditions? *(After focus group language has been exhausted, probe further)* What conditions would you describe as dangerous or risky?

3. Can you describe a time when you were on sea ice when it was challenging or difficult (ie., you had difficulties, got into trouble or nearly got into trouble in terms of your safety)? What were the issues / conditions that made it a challenge?

Traditional Teachings and Approaches Regarding Ice Safety

4. As far as you know, how did your parents / grandparents traditionally keep themselves safe on the sea ice (i.e., make sure they had a successful and safe trip or hunting activity)? *(Probe)* How did they do this in preparation for traveling on the ice? During travel on the ice?

5. Were there stories or teachings that were told to young people to ensure that they would be careful on the ice and stay safe while traveling or hunting on the ice? (If yes) Can you tell or explain any of those to me?

Changes in Safety Strategies Over Time

6. a) What are the ways that you personally keep yourself healthy and safe on the ice now (today) *(probe: things you do, things you don't do, things you use etc?)*

   b) From what you know, what are the ways that other people in Nain keep themselves healthy and safe on the ice now (today) *(probe: things they do, things they don't do, things they use etc?)* Has this changed at all over time?

7. Have you personally changed anything as far as how you stay safe on the ice today as compared to 10 or 20 years ago ? Have you had to do anything different today? What and Why? *(probe: things you do, don't do, things you use etc)*

8. Do you think that anything needs to be done to make sure that people in Nain are able to stay safe while using the ice for hunting and travelling? (If yes) What do you think should be done? How / by whom?

9. What makes you feel safe while travelling on the ice?

Health Concept Questions and Connection between Sea Ice and Health

10. What does your use of sea ice mean for your health? *(Probe with examples, probe by asking how going off on the ice makes people feel different than when they're in town)*

11. What makes you healthy, or what makes you feel healthy?

12. Do you have any questions or think that there are other things we should discuss and you would like to share on this topic if I am trying to learn about peoples' safety on the ice and the importance of ice for community health?

11.7 Focus group survey

I would like to ask you a few questions about yourself. The purpose of asking these questions is to provide some background information that can help me understand who the participants are in the group. If any of these questions make you uncomfortable, feel free to skip the question. Your answers will remain confidential.

1.　Gender:　Male □　　　Female □

2.　What is the year of your birth?

3.　How long have you lived in Nain? If you lived somewhere else before, where?

4.　a) How would you describe your employment status?

　　b) If you are working, is it:

　　　i) Seasonal □　or　Year-round □

　　　ii) Full-time □　or　Part-time □ (If part-time,_____ hrs/week)

5.　What grade did you last complete in school? Grade _____

　　□ Adult education (ABE)　　　　□ None

　　□ College (any level)　　　　　□ No response

　　□ University (any)　　　　　　□ Other (e.g., trade school)_____

6.　Can you please identify to me your level of Inuktitut?

	Fluent / very good	Some	Little / few words	None	No response
Speaking					
Reading/ Writing					

7.　On average, over the last 5 years (knowing that this past year was a very extreme year and out of the norm) how often did you go out on the land, sea or sea ice for hunting / fishing in each season?

	Never	Less than once a month	1-3 days/ month	1-3 days/ week	4 or more days/ week	Do not know	No response
Spring							
Summer							
Fall							
Winter							

8. When you go hunting or travelling, do you usually go alone or with someone else? Who do you typically go with (e.g., family, spouse)?

9. If you were in any trouble on the land, who would you contact first for assistance?

11.8 Key consultant interview guides

Key consultant interview guide for NGSAR members

I am trying to learn about your perspective on the role of Nain SAR in the community, and also your perspective the kinds of situations that are leading to people being in trouble on the ice and needing SAR assistance. Please feel free to bring up anything that you feel is important to these topics, or let me know if you don't understand a question or don't think that the question is very good. There are no wrong answers. I'm really interested in learning from you what your perspective is on these issues.

Personal background with Nain SAR

1. When did you get involved in Nain SAR? Why? In what ways have you been involved? How often do you go on or coordinate searches?

2. If you are no longer an active member of Nain SAR, why did you leave?

Nain SAR history

3. Do you know when Nain SAR started? Do you know what happened that it was started then?

4. Has the group changed over time in any way, in terms of its members? Has the mandate or the approach of the group changed over time?

Role of Nain SAR in relation to other institutions

5. What are the kinds of situations that Nain SAR assists with?

6. What is the role of the RCMP in searches? Do you know when the RCMP began sanctioning searches? Do they only sanction searches, or do they also come on searches? When? Are there ever situations where the RCMP has not approved a search, but Nain SAR will go on the search anyway? Why / what kinds of situations has this happened in?

7. What are the kinds of situations that the Military / Coast Guard handle? How does the decision get made to get Military / Coast Guard assistance for someone?

8. Do you know of situations where Vale has provided assistance for a search, such as by providing a helicopter?

9. Do the Inuit Community Government of Nain or the Nunatsiavut Government have any role in search and rescue activities? If Nain SAR communicates with these groups, who / what department would they talk to there?

10. What is the relationship between Nain SAR and the RCMP? Military / Coast Guard SAR? Vale? NG? Inuit Community Government of Nain?

11. Are there any other institutions or groups that Nain SAR communicates or works with?

Search trends

12. What are the ways that Nain SAR finds out that a search is needed? What tends to be the most frequent way that a search is triggered?

13. Are there situations where Nain SAR has decided to not go on a search? Why?

14. From the time that you've been involved in Nain SAR, what has been the average total number of searches been per year, approximately? If the number has changed over time, why do you think that is (e.g., changing technologies, changing conditions, changing SAR mandate)?

15. Do you know approximately how many of these were false alarms per year? Of the remaining searches, what time of year did most of them take place? Are there places that Nain SAR tends to go to look for people who are in trouble (can you mark these on a map)? Have the places where you go to search / distances from town changed over time?

16. Would you be able to list off what, in you experience, are the reasons for people needing assistance, from the most frequent to the least frequent (e.g., weather or ice, mechanical problem, out of gas, etc.)? Do some factors tend to be related to each other (e.g., they happen at the same time, or one thing triggers another thing)?

17. In your experience, what are the sea ice and weather conditions that tend to be associated with people having troubles while they're travelling around freeze-up? In winter? In spring? Where do these tend to occur (can you describe this with the help of a map)?

Subjects of assistance

18. Do you think that there are any trends amongst the people that have gotten in trouble and that Nain SAR assisted (e.g., age or gender, alone or with others, older machines, use of technology, etc.)?

19. When people have been rescued / assisted, what has their health status generally been like? Do you know if anyone has needed to go to the health clinic?

20. Has Nain SAR ever had to do recoveries? Could you tell me about what happened in those situations?

Informal search help

21. Do family members or other community members ever help with conducting searches with Nain SAR? Does Nain SAR encourage or discourage this kind of help?

22. Do you know how often people receive help from family or friends on the ice, instead of calling Nain SAR?

Perspectives on responsibility for safety / safety promotion strategies

23. Who do you think <u>should</u> be responsible for people's safety on the ice? What are the kinds of situations that Nain SAR should assist with? Are there situations where you think that Nain SAR should not provide assistance? Why?

24. Do you think that anything needs to be done to make sure that people are able to stay safe while using the ice for hunting and travelling? (Probe for examples, perspectives). Has Nain SAR been involved in any efforts to help prevent people from getting trouble on the ice while you have been involved? Were these efforts successful?

25. Do you have any questions or think that there are other things we should discuss and you would like to share on this topic?

Key consultant interview guide for RCMP members

I am trying to learn about your perspective on the RCMP's role in search and rescue in the community, and also your perspective the kinds of situations that are leading to people being in trouble on the ice and needing SAR assistance. Please feel free to bring up anything that you feel is important to these topics, or let me know if you don't understand a question or don't think that the question is very good. There are no wrong answers. I'm really interested in learning from you what your perspective is on these issues.

Personal background with RCMP

1. When did you start working for the RCMP? What has your level of involvement been with search and rescue?

Role of RCMP in relation to other institutions/organizations

2. What is the role of the RCMP in searches? Do you know when the RCMP began sanctioning searches? Do you only sanction searches, or do you also go on searches? When? Has the level of responsibility that the RCMP has with regards to searches changed over time (e.g., over the last 20-30 years)?

3. From the RCMP's perspective, what is the role of Nain SAR?

4. Do you know if there have ever been situations where the RCMP has not approved a search, but Nain SAR will go on the search anyway? Why / what kinds of situations has this happened in?

5. What are the kinds of situations that the Military / Coast Guard handle? How does the decision get made to get Military / Coast Guard assistance for someone?

6. Do you know of situations where Vale has provided assistance for a search, such as by providing a helicopter?

7. Do the Inuit Community Government of Nain or the Nunatsiavut Government have any role in search and rescue activities? If the RCMP communicates with these groups, who / what department would they talk to there?

8. What is the relationship between the RCMP and Nain SAR? Military / Coast Guard SAR? Vale? NG? Inuit Community Government of Nain?

9. Are there any other institutions or groups that the RCMP communicates or works with related to search and rescues?

Search trends

10. What are the ways that the RCMP finds out if a search is needed? What tends to be the most frequent way that a search is triggered?

11. Are there situations where the RCMP has decided to not sanction a search? Why? When this has happened, has there ever been a situation where Nain SAR will go on the search anyway? Do you know why this might be?

12. From the time that you've been involved in the RCMP, what has been the average total number of searches been per year, approximately? If the number has changed over time, why do you think that is?

13. Do you think that there are any trends amongst the people that have gotten in trouble and that Nain SAR assisted (e.g., age or gender, alone or with others, older machines, use of technology, etc.)?

14. When people have been rescued / assisted, what has their health status generally been like? Do you know if anyone has needed to go to the health clinic?

15. Has the RCMP ever had to do recoveries, where someone that needed assistance has died? Could you tell me about what happened in those situations?

Informal search help

16. Do family members or other community members ever help with conducting searches? What is the RCMP policy on this?

17. Do you know how often people receive help from family or friends on the ice, instead of calling the RCMP / Nain SAR?

Perspectives on responsibility for safety / safety promotion strategies

18. Who do you think <u>should</u> be responsible for people's safety on the ice? What are the kinds of situations that the RCMP should assist with? Are there situations where you think that the RCMP should not provide assistance? Why?

19. Do you think that anything needs to be done to make sure that people are able to stay safe while using the ice for hunting and travelling? (Probe for examples, perspectives). Has the RCMP been involved in any efforts to help prevent people from getting trouble on the ice? Were these efforts successful?

20. Do you have any questions or think that there are other things we should discuss and you would like to share on this topic?

11.9 Semi-directed interview guide

I am trying to learn about your perspective on your use of sea ice—your perspective on dangerous sea ice conditions, how you keep yourself safe on sea ice, your experiences of what your use of sea ice has meant for your health, and how people help each other ensure that they are safe on the ice. Please feel free to bring up anything that you feel is important to these topics, or let me know if you don't understand a question or don't think that the question is very good. There are no wrong answers. I'm really interested in learning from you what your perspective is on these issues.

Participation in activities on the land and land-based/Inuit knowledge:

1. Has going off an important part of your life? What are the reasons that you personally go off on sea ice?

2. How many years of experience travelling on and using the sea ice would you consider yourself having, starting from the time when you were able to go off on your own or had more substantial responsibilities preparing for or during the trip? (Probe: More than 20, less than 20)

3. Where do you usually go off during freeze-up? Mid-winter? Springtime? Can you mark the areas and directions you usually go on a map?

4. How do you get onto sea ice when you make trips (dog team, snowmobile, walking)? Of the equipment you use, what items do you own? What items do you borrow, and from who / where?

5. How would you describe how comfortable you are with your ability to keep yourself safe while you're off on the sea ice in different seasons (from extremely comfortable to a little bit comfortable)? How would you describe your level of knowledge about sea ice (from extremely knowledgeable to a small amount of knowledge)?

6. Please describe to me how you typically get ready before going out on the ice for a hunting or other trip during freeze-up. Please walk me through the things you do in preparation. What do you take with you? How do you decide where to go? Where do you find information to help you decide on your route? Etc. What about mid-winter? Spring?

7. When you travel on sea ice, how much of this is alone per week, and how much is with companions (in hours)? Who do you usually travel with?

8. Do you get and share information with others on sea ice and weather conditions? When / where do you do this? With who?

Connections between sea ice, place, and health:

9. What does your use of sea ice mean for your health? What does it do for your health?

10. Can you tell me about an experience when it was good for you when you were going off? What was it about this trip which made it good, or better than other times? Where was it and what time of year?

11. When you're going off, what are the places that you go to that are good for you / improve your sense of wellbeing? When you've gone off, are there some places you prefer over other places for improving your sense of wellbeing (or do different places affect your sense of wellbeing about equally)?

12. Are there places that you would feel uncomfortable going? Why? Can you mark these on a map? Are there places you want to go but can't access? Why?

Traditional ways of passing on knowledge about staying safe on sea ice:

13. How did you learn about staying safe while travelling on the sea ice when you were young? Who taught you?

14. Were you ever told stories that helped teach you about staying safe on the ice?

Sea ice travel challenges:

15. Can you describe a time when you had troubles while you were off on the sea ice? What caused the troubles? Do you remember the location (can you mark it on the map)? What was your reason for going off at the time (wooding, hunting, fishing, travel between communities, going to cabin)?

16. Can you remember other times when you had troubles while you were off on the ice? Can you describe these to me? Why do you think you experienced troubles at those times?

17. What are the kinds of sea ice conditions and weather conditions to watch out for (that can be dangerous or scary) around freeze-up? Mid-winter? In the springtime? At the ice edge/sinâ? Are there any typical locations where these kinds of conditions occur (can you mark the locations on the map)?

18. Have you ever had an experience where going off has been bad for you / for your health? Can you describe it to me?

19. What kind of sea ice or weather conditions are rough on your body? In what ways? Rough on your equipment? In what ways?

20. Have you ever been worried about your safety while you've gone off? What were the ice and weather conditions? Why were you worried? What did you do?

21. Have you ever had to turn back from a trip, or take an unusual route because of the ice or weather conditions? Have you ever gotten stranded or stuck? Why, what happened? Have you not gone off when you were planning to, because you were worried about the ice conditions? When? What were the conditions?

22. Do you think it is more, less, or the same level of danger for you to go off now compared to before? Why?

Community supports and assistance for ensuring travel safety:

23. Has Nain SAR or RCMP / Military search and rescue ever assisted you while out on the ice? What happened? Do you remember the location (can you mark it on the map)?

24. Have you had troubles while off on the ice where family or friends helped you? How did they help / what happened? Who helped you / what is your relation to them? How did you get in touch with them / how did they know to help you? Where they with you at the time, or did they have to come from town? Do you remember the location (can you mark it on the map)? Who usually helps you when you have troubles on the ice / what is their relation to you?

25. Have you ever helped others when they got into trouble while they were off on the ice (as part of NSAR, and also apart from NSAR)? Can you describe one of these situations to me? Who did you help / what is your relation to them? How did they get in touch with you / how did you know to look for them? Do you remember the location (can you mark it on a map)? How often do you help others out? What is their relation to you, usually? How do people usually get in touch with you for help?

26. Have you ever asked for help while you've been travelling on the ice and not gotten it? Who did you ask for help from? What happened? Why do you think you did not receive the help that you asked for?

27. Is there anyone outside of the people you call on for help that you think should be responsible for your (personal) safety on the ice, and be available to help you if you need it? In the community, who do you think should be responsible for people's safety on the ice or be available for help if they need it?

Safety promotion perspectives:

28. If there was something you could change to make your trips onto the sea ice safer for you, what would it be?

29. Is there anything that you think should be done to make sure residents of Nain are able to stay safe while using the ice for hunting and travelling?

11.10 Semi-directed interview survey

I would like to ask you about yourself to help me understand your background. If any of these questions make you uncomfortable, feel free to skip the question. Your answers will be confidential.

1. Gender?   ☐ Female   ☐ Male   ☐ Transgendered / two-spirited

2. What is the year of your birth? _____

3. How long have you lived in Nain? _____

   If you lived somewhere else before, where?_____

4. Which of the following best describe your present job status? (check all that apply)

☐ Work full-time (with a salary)   ☐ Employment/unemployment
                                              insurance
☐ Work regular part-time (with a salary)   ☐ Income support
☐ Work occasionally (seasonal, contract) (with   ☐ Student
   a salary)
☐ Self-employed   ☐ Other: _____
☐ Hunter support program   ☐ Do not know
☐ Housework   ☐ No response
☐ Retired on pension

5. What was the highest level of schooling you have completed (even if you are still in school)?

☐ No formal schooling   ☐ Partial training in college or trade school
☐ Some years of elementary school   ☐ Diploma/certificate from college/trade school
☐ Elementary school completed   ☐ Some university (not completed)
☐ Some years of secondary school   ☐ University degree (completed)
☐ Secondary school completed   ☐ Do not know
                                            ☐ No response

6. Can you please identify to me your level of Inuktitut?

	Fluent / very good	Some	Little / few words	None	No response
Speaking	☐	☐	☐	☐	☐
Reading / Writing	☐	☐	☐	☐	☐

7. On average, over the last 5 years (knowing that this past year was a very extreme year and out of the norm) how often were you out on the **land, sea or sea ice for hunting / fishing** in each season?

	Never	Less than once a month	1-3 days/ month	1-3 days/ week	4 or more days/ week	Do not know	No response
Spring	☐	☐	☐	☐	☐	☐	☐
Summer	☐	☐	☐	☐	☐	☐	☐
Fall	☐	☐	☐	☐	☐	☐	☐
Winter	☐	☐	☐	☐	☐	☐	☐

8. If you go **wooding**, during what months do you go?_____
   During these months, on average, over the last 5 years during (knowing that this past year was a very extreme year and out of the norm) how often did you go wooding?

☐ Never ☐ Less than once a month ☐ 1-3 days/ month ☐ 1-3 days/ week ☐ 4 or more days/ week ☐ Do not know ☐ No response

katimaKatiget kinakkunut Kaujisannimi Apitsotitsait

Ilinnik apitsugalâgumavunga igvit pidjutigillugu. Pidjutigiluattanga apitsuniup apitsotinnik Kaujigiagasuamut tukisititsiutinnik uvannik ikajugunnatunik kinakkoniammangâta katimajinniKataujut. Tamakkua apitsotet ilinnut ilimanattojâppata, Kujanâgaluagunni apitsotik asianut aigunnaKutit. kiugusigijatit siammatitauniangitut.

1. Kanuittumangâppit: Angutik ☐   Annak ☐

2. Kanga jâringani inolisimavet?

3. Kanuk akuniutigijuk nunaKasimalikKet Nain-imi? _____

   Nani asiani nunaKasimaguvit, nani? _____

4. Nalia nalunaitsiavâ suliagijannut manna?

☐ SuliaKanginnatuk (akilittauKattaluni)   ☐ EI
☐ SuliaKanginnatuk Kangaulimmat   ☐ ikajuttauKattajuk
  (akilittauKattaluni)
☐ Kangaulimmat suliaKaKattatuk (nalliuvimmi,   ☐ Illiniajuk
  kântrâkkikut, pigumajauliguni)
  (akilittauKattaluni)
☐ Imminik suliaKaKattajuk   ☐ asia: _____
☐ Pinasuattet ikajotinginnik   ☐ Kaujimangituk
☐ SalummasaiKattajuk angiggami   ☐ Kiungituk
☐ SuliaKagunnaituk (ittusiutilik)

5. Suna puttunippâk pijagesimajân ilinniavimmi (ilinniavimmegaluaguvit manna)?

☐ Ilinniaviliasimangituk   ☐ Ilinniagalâsimajuk nunalet
                                           ilinniavigiallanginnik, upvalu
                                           kenaujaliugutet ilinniavigiallanganik
☐ ilinniaviliagalâsimajuk (grade-ingit 1- ☐ Nalunaikkutak upvalu ilitagiutik Nunalet
  6)   ilinniavigiallamit, upvalu
                                             kenaujaliugutet ilinniavigiallanganik
☐ ilinniavimmik pijagesimajuk   ☐ Ilinniavitsualiagalâsimajuk
                                           (pijagesimangituk)
☐ Ilinniavitsualiagalâsimajuk (grade-ingit ☐ Ilinniavitsuamit nalunaikKutalik
  7-11)   (pijagesimajuk)
☐ Ilinniavitsuamik pijagesimajuk   ☐ Kaujimangituk
                                        ☐ Kiungituk

6. killigiudjigunnaKet Inuktitut uKâlasongunninek?

	uKâlagunn-asiattuk/ piujumik	Ilanginnik	Mikijumik / ikittunik uKausinnik	UKâlagunn -agittuk	Kiungituk
UKâlannik	☐	☐	☐	☐	☐
Atuatsinik/alla nik	☐	☐	☐	☐	☐

7. Oilonnâgut, tallimani jârini Kangisimajuni (tânna jârik adjiulukKautinnagu) Katsetullutit aullalaustimavet nunamut, imakkut upvalu sikukkut pinasuagiallutit/iKalunniagiallutit?

	AullaK a- ttangitt uk	Ikinnisa -mik takKim i	1-3 ulluni / takKim i	1-3 ulluni / wogemi	4 ununnis a-nik ulluni- takKim i	Kaujim a- ngituk	Kiungit uk
Upingasâ-mi	☐	☐	☐	☐	☐	☐	☐
Aujami	☐	☐	☐	☐	☐	☐	☐
Ukiatsâk	☐	☐	☐	☐	☐	☐	☐
Ukiuk	☐	☐	☐	☐	☐	☐	☐

8. **KijuttagiaKattaguvit**, Kangautillugu takKini KijuttagiaKattaven?

Ukunani takKini, ilonnâgut, tallimausimalittuni jârini taitsumani (Kaujimadluta tagvani jâriusimalittumi ajunnatummagiulaummat jâriudluni ammalu taimaitsainagani) Kanuk akulaittigijumik KijuttagiaKattalauKen?

AullaKa- ttangittuk	Ikinnisa- mik takKimi	1-3 ulluni / takKimi	1-3 ulluni / wogemi	4 ununnisa- nik ulluni- takKimi	Kaujima- ngituk	Kiungituk
☐	☐	☐	☐	☐	☐	☐

11.11 Focus group reportback and construct validation summary

Understanding the relationship between travel on sea ice and community health and safety in Nain

Research project being conducted by Agata Durkalec

Focus group reportback

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1. Project purpose

This project is trying to answer the question: What is the relationship between travel on sea ice and community health and safety in Nain? The main reason for this project is that the changing environment is affecting how safe people feel in going off in Nain and other northern communities.

The goal of this project is to understand what things influence peoples' safety while traveling on the sea ice, and the role of Nain Ground Search and Rescue in promoting community health and safety related to sea ice travel.

This project could be used to inform local search and rescue practices in Nain, and help the community decide what ways it can support people going off safely. Other communities could learn from this information as well.

2. Activities in Nain

- 2 focus groups on relationship between sea ice and health and safety (one with men who go off frequently, and one with women) in July, 2010.
- Meeting with Search and Rescue members (July and November, 2010).
- 22 one-on-one interviews with people in Nain (November, 2010).
- Going off when I can and talking with people to learn more about history and way of life.

3. Work related to focus groups

- Transcribed focus groups last summer and fall.
- Gave back copies to participants during trip in November to fix mistakes and make changes if they wanted to.
- Added changes to transcripts.
- Organized main ideas of the kinds of things that people said and topics they thought were important this winter. I read through transcripts and made notes on everything that people said, and tried to group them based the kinds of questions I asked in the focus group.
- This trip, checking if I have a good understanding of what people in focus group said, and sharing info on what will happen next.

4. What I learned from focus group

➤ **Things that makes a good and/or safe trip:**

- **Weather conditions:** The kinds of conditions like cold temperature, snow, winds that can impact how safe the ice is and how easy it is to travel.

- **Ice conditions:** Sea ice and lake ice conditions that are indicators of safe ice, and/or affect the going.

- **Knowledge and support:** Having knowledge about travel safety or being with people who do, and being able to get help if you need it.

- **Places travelled and experience of environment:** Places/locations that people go to and pass through, including what those places mean to people (EX. historical, cultural, memories, etc.), and the ways that people experience the environment during travel (what people see, smell, hear) in ways they enjoy.

- **Activities carried out while off:** The things people do, including activities that are social, traditional, hunting, resting, daily food gathering/living.

- **Reliability of transportation:** How reliable the way you're travelling is and how that affects safety.

➤ **Things that make a difficult and/or unsafe trip:**

- **Weather conditions:** The kinds of conditions like temperature, snow, rain, winds that can impact how safe the ice is and how easy it is to travel (EX. getting lost in whiteout conditions, extreme cold temperatures, mild temperatures that bring rain and ice melt, rain and then freezing that make it hard to tell good and bad spots on ice).

- **Ice conditions:** Sea ice and lake ice conditions that affect safety and where people can go or how difficult it is to get there (EX. pressure ridges, air pockets, snow on new ice, snow drifting over bowl of water between ice pans, candley ice) and impacts of different conditions (EX. falling through, not being able to get to certain places, hunting areas being overcrowded inland because ice conditions not good)

- **Land conditions:** Conditions on land that affect how hard it is to travel or that can be unsafe (EX. slippery, no snow).

- **Knowledge/awareness/preparation:** Lacking knowledge, experience, or awareness to be able to travel safely or not having people with you that have this. Also includes ice and weather conditions changing, so not being able to trust your knowledge of the weather or the ice.

- **Reliability of transportation:** How reliable the way you're travelling is and how that affects safety (EX. skidoo breaking down).

- **Ability to locate wildlife:** Going of more or for longer if not able to find caribou or other animals, and what that means for safety and if people can afford trips.

❖ **Ways that people keep themselves safe when they're off:**

- **Land skills:** Knowledge of areas, of the kinds of conditions that can occur, how to prepare and how to survive, which people learn from watching, experience and listening to others. Also views on how young people can gain land skills (EX. programs run by hunters, young people should get together and learn, parents should take children out at young age).

- **Knowledge gathering and judging conditions:** The ways that knowledge about conditions is gathered before a trip (EX., observing conditions and watching the ice freeze, getting information from others, checking weather information online) and during the trip (EX., being aware of surroundings at all times, observing and checking with tools like a dart or ax). Also, views on any improvements that can be made for how people gather and assess knowledge about conditions.

- **Preparing for what could happen:** Getting ready for trip, pannaisiak (EX., taking grub, gas, extra clothes, spare parts, ropes), and also mental preparation, issumatsiak. Also views on how people can be more prepared.

- **Dealing with obstacles:** The kinds of things people do to make sure they'll be safe when they come across obstacles, like being aware of what is around you, kamatsiak, being flexible about where and when you go (e.g., avoiding bad areas, taking alternative routes or adjusting the trip), getting support (e.g., going off in groups, asking for help from others passing by, calling for help on sat phone), staying calm and not panicking in case of something happens, etc. and views on how people can better deal with challenges.

❖ **What is the relationship between going off and people's health:**

- **Physical health:** How going off affects your physical body in positive and negative ways (EX., exercise, injuries, eating wild foods).

- **Mental/emotional/spiritual health:** What going off does for mental/psychological, emotional and spiritual wellbeing (EX. rejuvenation, clear thinking, feeling free, feeling the emotional trauma of people perishing while going off).

- **Social wellbeing:** How going off affects how people interact socially and connect with family and community (EX., getting to spend quality time with family).

- **Cultural wellbeing:** How going off affects identity, cultural practices, connections to history through traditional hunting or living places.

- **Economic/material wellbeing:** What going off does for material welfare (EX., wood for fuel, food, also cost of going off).

❖ **Ways that the environment is changing:**

- **Observations:** Ways that the ice and weather were before, compared to how they are now (EX. before would be fine weather condition after thundering, but now this doesn't always happen)

- **Impacts:** How the changing environment impacts people socially and their health (EX. some people not going off).

- **Adapting:** Ways that people are responding and adapting to the changes that are happening (EX. asking more before they go off, using other tools).

❖ **Search and rescue support perspectives:** Positive and negative perspectives on formal and informal supports, the role that supports and interventions (e.g., by the NG or Nain SAR) should have for promoting safety, and suggestions for improvement (focus group with women only).

❖ **Ship track impacts:** Perspectives and observations on travel safety impacts from the VBNC ship track and other past ship tracks and suggestions for improvement (focus group with women only).

5. What happens next?

- I will fix my summary of the focus group based on feedback.
- I will be summarizing the one-on-one interviews and information on Search and Rescue cases, and then trying to put these together to get a big picture of travel safety in Nain.
- I will be coming back next in the summer to do a community meeting about what I found from whole project.

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Tukisinnik ingiggagiamik tagiup sikungani ammalu nunalet inositsiagittotigasuannimut ammalu kamatsiagiamut Nain-imi

Kaujisannik suliangujuk suliagijaujuk Agata Durkalec-imut

katingaKatigejunut AllaKutinga utittitaujuk

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1. Suliangujop tugâgutinga

Tânna suliangujuk kiugasuajuk apitsutauKattajunik: Sunauva atuttauKattajuk ingiggagiamut tagiup sikungani ammalu nunalet inositsiagittotigasuannimut ammalu kamatsiagiamut Naini-imi? Pitjutigiluattanga tânna suliangujop asianguvallialimmat avatik attuilimmat kamatsiagutigiKattajanginnik Inuit aullaKattajunut Nain-imi ammalu asinginnik taggâni nunalimmiunut.

Tugâgutigijangata tâpsumaup suliangujop tukisigiamut sunait attuiKattamangâmmik inunnik kamatsiagiamut ingiggalimmata tagiup sikungani, ammalu inigijangita Nainimi KinijattinginnuT nunakkoKattajunut Kaujimajaukkugianga nunalet Kanuittailinnimut ammalu kamatsiagiamut ilinganiKajunut tagiup sikukkut ingiggalimmata.

Tânna suliangujuk atuttausok KaujisonguKattaniammata nunalet Kinijattiujunut atuttausonik Nainimi, ammalu ikajugiamut nunalet kajusiutiKasonguKattaniammata ikajugiamut inunnik aullaKattajunut kamatsiasonguKattaniammata. Aset nunalet ilinniasongummijut Kaujigatsamit.

2. Piniannet Nain-imi

- Maggok katingaKatigejut pitjutiKatlutik atuKattajangit tagiup sikunganik ammalu Kanuittailinimmut ammalu kamatsiagiamut (atautsik angutinnut aullanginnaKattajunut, ammalu atautsik annanut) Juli-mi, 2010.
- katimaKatigennik Kinijattinut (Juli ammalu Novembera, 2010)
- 22 immigolingatlutik apitsutausimajut inunnik Nain-imi (Novembera, 2010).
- AullasonguKattanik pigunnaliguma ammalu uKâlaKatiKannik inunnik ilinniagasuagiamut piusituKanginnita inosinginnik.

3. Suliatsait ilinganiKajunut katingaKatigesimajunut

- Nenillugit katingaKatigesimajut uKausinginnik aujaulauttumi ammalu ukiatsângulauttumi.
- Utittisinnik adjiliuttausimajunik ilauKataulauttunut aullalaugama Novemberami âkKisugiangit tammasimajunik ammalu asiangutitsinik pigumasimappata.
- Ilagiatsianik asiangutitausimajunut nenittausimajunik.
- ÂkKisuinnik pitjutausimajunik sunatuinnanik inuit uKausigisimajanginnik ikKanattogasugisimajanginnik omani ukiumi. AtuatsilaukKunga nenittausimajunik ammalu nalunaigutittâKattatlugit ilonnanginnik uKautausimajunik, ammalu katingatiKattasimajakka apitsotigisimajakkanik katingaKatigeniammata.

• Omani ingiggavigisimajaganik, takuniatluni tukisitsiasimagaluammangâmma taikkuningat inuit uKautigisimajanginnik katingaKatigesimajunut, ammalu atuKatigetlunga Kaujigatsanik Kanuk pinianniKaniagalualimmangât.

4. Sunanik ilisimammangâmma katingaKatigesimajunut

➢ **Sunait piujumik sakKititsiKattajunut/upvalu kamatsiatigisonik ingiggalimmata:**

- **Silak piusingit:** silaginiattanga sollu Kiujananninga, Kannik, anugik attuiKattamat Kanuk kamatsiasongugiamut sikunga ammalu Kanuk ajunnanginiKammangât ingiggavigigianga.

- **Sikunga Piusingit:** Tasiup sikunga ammalu taset sikungit takutsaujut Kanuingitut, ammalu/upvalu attuiKattajut ingiggaligamik.

- **Kaujimannik ammalu ikajuttaunik:** Kaujimagiamut pitjutigillugit ingiggasongugiamut Kanuingitunut upvalu ilaKagiamik taikkuninga Kaujimajunut, ammalu ikajuttausongugiamut ikajuttaugiaKaliguvit.

- **Inet aivigisimajait ammalu atusimajait avatinga:** Inet/inigijaujuillu inuit aivigiKattajangit ammalu KângiKattajangit, ilauKatautillugit taikkuninga tukiKajunut inunnut (sollu, piusituKait, ilugguset, ikKaumajauKattajut, sunatuinnailu) ammalu sunatuinnait inuit atuKattajangit avatimmi ingiggalimmata (inuit takuKattajangit, naimaKattajangit, tusaKattajangit) aliagiKattajanginnik.

- **PiniannigijauKattajut aullasimalimmata:** Inuit piniannigiKattajangit, ilauKatautillugit inunnegalagiamik, piusituKait, pinasuannik, nukkasimagalânnik, ullu tamât niKitsasiunnik/inogasuannik.

- **NajuttiKagiamut ingiggautet:** Kanuk najuttiKattiKammangâppit ingiggaliguvit ammalu Kanuk tamanna attuiKattamangât kamatsiagiamut.

➢ **Sunatuinnait ajunnatunik sakKititsiKattajut ammalu/upvalu ulugianattoKattajut ingiggalimmata:**

- **Silak piusingit:** Sunatuinnait piuset sollu onanninga, Kannik, silaluk, anugik attuiKattajut kamatsiasongugiamut sikunganik ammalu Kanuk ajunnanginiumangat ingiggavigigianga (sollu, asiumagiamut takutsaungitumi, itjinattualummi, niguminattuni silaluniattiluni ammalu sikunga auvalliaKattaninga, silalulluni Kiujananiattiluni ajunnaniattiluni nalet piujogaluammangâmmik ammalu piungitoniattunik sikunginni).

- **Sikuk Piusingit:** Tagiup sikunga ammalu taset sikunga attuiKattajunut kamatsiasongugiamut ammalu inuit aivigiKattajangit upvalu Kanuk ajunnatigimmangât aivigigasuattanik (sollu, manittoninga, Kuppait, appisimajut sikuliangujunik, pittujuk sikusimangituni, pakkujanni taset

sikunginni) ammalu attuiKattajunut adjigengitunut piusiKajunut (sollu, katagiamut, aivigigasuattait aivigijaugunnangitunut, pinasuapvet ninniunik sikunga piujongimat)

- **Nunait Piusingit:** Piusigijaujut nunami attuiKattajunut ajunnatogianga ingiggavigigianga upvalu piungitogajattunut (sollu, siaggijânnatuk, aputiKangituk).

- **Kaujimagiamut/tupangagiamut/atuinnaugiamut:** Kaujimatsialugani, atusimannik, upvalu tugangasongugiamut ingiggaligami kamatsiasongugiamut upvalu ilaKalugani taimâk pisongugiamut. Ilautitsimijuk sikuk ammalu silak piusingit asianguvalliajut, taimaimmat sulijugigunnangitait Kaujimajait silamit upvalu sikumit.

- **NajuttiKagiamik ingiggautet:** Kanuk najuttiKattiKammangâppit ingiggautigijait ammalu Kanuk tammana attuiKattamangât kamatsiasongugiamut (sollu sikitot siKumiutigiamut).

- **Pigunnautet napvâgiamik omajunnik:** aullanginnaluagiamut upvalu akuniunnisak aullasimagiak napvâgiamut tuttunik upvalu asinginnik omajunik, ammalu Kanuk tamanna tukiKammangât kamatsiasongugiamut ammalu inuit nâmmatuKagajammangâmik taimâk aullasonguKattagiamut.

❖ **AtuttauKattajut inunnut kamatsiasonguKattagiamut aullasimalimmata:**

- **Nunanik Kaujimannik:** Kaujimalluni inigijaujunik, piusigiKattajangit sunatuinnait sakKisonguKattamata, Kanuk atuinnaguttisongugiamut ammalu Kanuk inogasuasongugiamut, inuit ilinniaKattamata takunnâtuinnatillugit, atutlutik ammalu nâlatlutik asimminik. Ammalu takunnâtaummijut Kanuk inosittut ilivalliasongummangâmmik nunamesongugiamut (sollu, suliatsait aulatautillugit pinasuattinut, inosuttut katingaKatigellutik ammalu ilinnialutik, angajukKât aullaKatiKagialet sugusinginnik nukatliulippata).

- **Kaujimannik katitsuigiamut ammalu malugususogiamut piusigijanginnik:** PiusigijauKattajut Kaujimajaujunut piusigijaujunik aullaKâgani (sollu, takunnâgiamut piusinik ammalu takunnâlunillu sikulittumik, Kaujigatsatâgiamut asinginnit, takuniagiamut silagijauniattumik Kagitaujammi) ammalu ingiggalimmata (sollu, Kaujimanginnagiamut Kanitagijamminik, takuninginnagiamut atutlutik tommik upvalu ulimautammik). Ammalugiallak, takunnâgiamik piunitsautitaugajakkotunik inuit katitsuisongugiamut ammalu Kaujimajamminik Kimiggugiamut piusigijaujunik.

- **Atuinnaguttigiamut sujuKagajappat:** Atuinnaguttigiamik aullagiamut, pannaisiak (sollu, takuannik tigusigiamut, kiasalenik, anugatsagiallanik, piKutitsagiallait, nuluajait), ammalu isumakkut atuinnaguttisiagiamut, issumatsiak. Ammalu takunnâluni Kanuk Inuit atuinnaguttisialuasongugiamut.

- **Kamagiamut apomautaugajattunik:** Sunatuinnait atuttausot inuit kamatsiasonguniammata apomagajappata, sollu saninnejunik, kamatsiak, tuavingimagillutit namut ammalu Kanga aullaniammangâppit (sollu, ilaKallutit aullagiamut, ikajuttaugumallutit Kângijannik, ikajuttaugumallutit sâtilait phonnikut), tuavingimagillutit sujuKagajappat, sunatuinnanillu. Ammalu takunnâtaujunik Kanuk inuit kamatsialuagajammangâmmik apomautaugajakkotunik.

❖ **Kanuk IlinganiKavâ aullasimagiamut ammalu Inuit Inositsiagittotigasuannimun:**

- **Timikkut Inositsiagittotigasuannimut:** Kanuk aullasimagiak attuiKattamangât timinnut piujumik ammalu piungitunik (sollu, iKattainikkut, ânninik, nigigiamut niKituKannik aippiujannik).

- **Isumakkut/tannikut/uppinikkut Inositsiagittotigasuannimut:** Kanuk attuiKattamangât isumakkut/tannikut ammalu uppinikkut Kanuingigiamut (sollu, ulapitsainikkut, isumakkut apviataulugani, tatiKattisilugani, ippiniannik taikkuninga ajuliKattasimajunut aullasimalimmata).

- **Inuligijet Kanuittailinimmut:** Kanuk aullasimagiak attuiKattamangât inunnik asinginnik inunneKattagiamik ammalu ataKatsiagiamik ilagijamminik ammalu nunagijamminik (sollu, ilamminigalagiamik).

- **PiusituKannik Kanuittailinimmut:** Kanuk aullagiamut attuiKattamangât kinaummangâppit, piusituKannik atuKattanik, atagiamut iluggusigijannik atutillutit piusituKannik pinasuagalagiamut upvalu inigiKattajannik iniujunik.

- **kenaujaliugutet/atuttausot Kanuittailinimmut:** Kanuk atuttausot attuiKattamangât inosinnut (sollu, Kijuit kiatsagiamut, niKet, ammalu akigijangit aullagiamut).

❖ **Sunait avatimmi asianguvalliajut:**

- **Takunnâtaujut:** Piusigisimajangit sikuk ammalu silak sivungani, piusigilittanginnik ullumi (sollu, sivungani silakkisuanguKattalauttuk kalluKâttilugu, tâvatuak taimâk pilugunnaKattaluguannaituk)

- **Attuinik:** Kanuk asianguvallianinga avatik attuiKattamangât inuit inogasuagiamut ammalu inosigijanginnik (sollu, ilangit inuit aullaKattalugunnaitut).

- **Sungiutigasuannik:** Inuit kiugusingit ammalu sungiutigasuagiamut asianguvalliajunik (sollu apitsuluaKattalittut aullaKâgatik, atutlutik asinginnik piKutiujunik).

5. SujuKanialikkâ?

- ÂkKisuilangavunga naittotisimajaganik katingaKatigesimajunut uKausingit atullunga.
- Naittotitsilangavunga immigut apitsusimajakkanik ammalu Kaujigatsanginnik Kinajattiujunit, ammalu atullunga tâkkuninga katillugit anginitsamik takunnânialluni kamatsiasongugiamut aullaKattajunut Nainimi.
- UtilâkKunga kingullimi aujami nunaliujunut katimattisigiattulunga pitjutiKagiattulunga Kaujisimajakkanik ilonnâgut suliagisimajakkanik Kaujimattisigiattulunga.

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11.12 Semi-directed interview reportback and construct validation summary

Understanding the relationship between travel on sea ice and community health and safety in Nain

Research project being conducted by Agata Durkalec

Interview reportback

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1. Project purpose

This project is trying to answer the question: What is the relationship between travel on sea ice and community health and safety in Nain? The main reason for this project is that the changing environment is affecting how safe people feel in going off in Nain and other northern communities.

The goal of this project is to understand what things influence peoples' safety while traveling on the sea ice, and the role of Nain Ground Search and Rescue in promoting community health and safety related to sea ice travel.

This project could be used to inform local search and rescue practices in Nain, and help the community decide what ways it can support people going off safely. Other communities could learn from this information as well.

2. Activities in Nain

- 2 focus groups on relationship between sea ice and health and safety (one with men who go off frequently, and one with women) in July, 2010.
- Meeting with Search and Rescue members (July and November, 2010).
- 22 one-on-one interviews with people in Nain (November, 2010).
- Going off when I can, especially this spring, and talking with people to learn more about people's history, way of life and perspectives.

3. Work related to interviews

- Transcribed interviews in winter.
- Gave back copies to participants during trip in March to fix mistakes and make changes if they wanted to.
- Organized main ideas of the kinds of things that people said and topics they thought were important. I read through transcripts and made notes on everything that people said, and tried to group them based the kinds of questions I asked in the interviews.
- Now I am checking to see if I have a good understanding of what people said, and sharing info on what will happen next.

4. What I learned from the interviews

I spoke with many people, and my impression of the most important things people talked about below:

❖ **Personal land use practices and experiences:** People's background related to travelling on the land and descriptions of when/where/how often they go off at this point in their life.

> ➤ **Land skills:** Indicators/ways of describing knowledge, experience and skills related to travelling on sea ice and ability of people to keep themselves safe (EX. years of experience, comfort in travelling to more difficult places/times of year like on new ice or in spring, how people describe their knowledge and ability to keep themselves safe, how often people travel alone).

> ➤ **Travel safety learning:** Personal histories and experiences of how people learned to travel and stay safe on sea ice throughout their life, through experience, observation, stories/teachings, careers (EX. trapping).

> ➤ **Places and activities:** Where people go in different seasons and what activities they carry out in those different places.

> ➤ **Travel companions:** Frequency of travel with companions, size of groups and other characteristics (EX. family or friends, experience level).

> ➤ **Equipment:** The equipment and supplies that people use and own, borrow, or access some way for their trips.

❖ **Ice travel, place and health relationships:** Perspectives and experiences of what going off means or does for people's health, and ways that people experience different environments/places and what that means for their health.

> ➤ **Positive relationships:** Positive impacts/benefits from travelling on people's physical health (EX. exercise, eating wild foods), mental/emotional health (EX. freedom, time away from town), social wellbeing (EX. connection to family), cultural connections and identity (EX. traditional practices, language), food and energy security (EX. eating wild foods, wooding), and place experiences (EX. historical, cultural, memories, etc.).

> ➤ **Negative relationships:** Negative impacts from travelling on people's physical health (EX. injury, discomfort), mental/emotional health (EX. stress, emotional trauma related to personal loss like friends/family perishing), social wellbeing cultural connections (EX. loss through lack of access to land people used to be able to go to), food and energy security (EX. costs of travelling), and how people experience the environment/places (EX. lack of access to some places, or connections between certain places and emotional traumas).

❖ **Risk and safety perspectives and experiences:** Perspectives and experiences of the kinds of conditions and factors that contribute to trips being positive/safe and negative/unsafe for people.

➤ **Things that make a good or safe trip:** Descriptions of good trips and experiences of the kinds of things that people view as contributing to a good and/or safe trip for them.

- **Weather conditions:** The kinds of conditions like cold temperature, snow, winds that can impact how safe the ice is and how easy it is to travel.

- **Ice conditions:** Sea ice and lake ice conditions that are indicators of safe ice, and/or affect the going.

- **Knowledge and support:** Having knowledge about travel safety or being with people who do, and being able to get help if you need it.

- **Places travelled and experience of environment:** Places/locations that people go to and pass through, including what those places mean to people (EX. historical, cultural, memories, etc.), and the ways that people experience the environment during travel (what people see, smell, hear) in ways they enjoy.

- **Activities carried out while off:** The things people do, including activities that are social, traditional, hunting, resting, daily food gathering/living.

- **Reliability of transportation:** How reliable the way you're travelling is and how that affects safety.

➤ **Things that make a difficult or unsafe trip:** Descriptions of challenging/difficult/unsafe trips and experiences of the kinds of factors or conditions that people view as contributing to a challenging/difficult and/or unsafe trip for them.

- **Weather conditions:** The kinds of conditions like temperature, snow, rain, winds that can impact how safe the ice is and how easy it is to travel (EX. getting lost in whiteout conditions, extreme cold temperatures, mild temperatures that bring rain and ice melt, rain and then freezing that make it hard to tell good and bad spots on ice).

- **Ice conditions:** Sea ice and lake ice conditions that affect safety and where people can go or how difficult it is to get there (EX. pressure ridges, air pockets, snow on new ice, snow drifting over bowl of water between ice pans, candley ice) and impacts of different conditions (EX. falling through, not being able to get to certain places, hunting areas being overcrowded inland because ice conditions not good)

- **Land conditions:** Conditions on land that affect how hard it is to travel or that can be unsafe (EX. slippery, no snow).

- **Knowledge/awareness/preparation:** Lacking knowledge, experience, or awareness to be able to travel safely or not having people with you that have

this. Also includes ice and weather conditions changing, so not being able to trust your knowledge of the weather or the ice.

- **Reliability of transportation:** How reliable the way you're travelling is and how that affects safety (EX. skidoo breaking down).

- **Ability to locate wildlife:** Going of more or for longer if not able to find caribou or other animals, and what that means for safety and if people can afford trips.

➢ **Safety perspectives:** Broader perspectives on how safety is changing for individuals and the community over time, who should have responsibility for safety, and suggestions for improvement.

- **Changes in safety:** Perspectives on whether people think their safety/danger while travelling is different now compared to before and why.

- **Safety responsibility and health promotion:** Perspectives on who should be responsible for people's safety and available to help if they need it, for people themselves and the wider community, including perspectives on current role/activities of Nain Ground Search and Rescue, NG, etc. and suggestions for improvement.

❖ **Ways that people keep themselves safe when they're off:** Experiences and practices of minimizing risks and maximizing benefits during travels on sea ice, including individual and collective strategies.

➢ **Knowledge gathering and sharing:** Experiences of gathering knowledge about conditions before a trip (EX., observing conditions and watching the ice freeze, getting information from others, checking weather information online) and during the trip (EX., being aware of surroundings at all times, observing and checking with tools like a dart or ax). Also, the ways that knowledge about conditions is hared with others, and views on any improvements that can be made for how people gather and judge knowledge about conditions.

➢ **Preparing for trips:** Getting ready for trip, pannaisiak (EX. taking grub, gas, extra clothes, spare parts, ropes), and also mental preparation, issumatsiak.

➢ **Dealing with obstacles:** The kinds of things people do to make sure they'll be safe and others will be safe when they come across obstacles, so they can get the best benefits from being off.

- **Without additional support:** Experiences of taking action to deal with challenges without additional support from others outside of the group travelling together and without search and rescue support. (EX. being flexible about where and when people travel, like avoiding bad areas, taking different routes; staying calm and not panicking in case something happens; and taking actions to minimize the impacts of situations, such as not stopping moving your joints after you fall in).

- **With informal/social support:** Experiences getting help from family/friends/community members who are not travelling with you (EX. people you come across while travelling, or family/friends called on sat phone), including experiences of being refused help. Also experiences of helping others informally.

- **With formal/institutional support:** Experiences of getting help from Nain Search and Rescue, RCMP, Military search and rescue, Coast Guard, etc. during travels on sea ice, including experiences of being refused help. Also, experiences of providing support to others as part of these institutions and organizations.

❖ **Additional topics people brought up:**

➢ **Environmental change:** Specific observations of changes in environment, including sea ice, weather, and wildlife populations, and including what the environmental conditions or wildlife numbers were in the past, and observations of and perspectives on health/social/knowledge/cultural impacts of environmental change, and responses/adaptations to those impacts.

- **Observations:** Observations of environmental change, including observations of past conditions.

- **Impacts:** Social and health impacts of environmental changes.

- **Adaptations:** Ways that people are responding and adapting to the changes that are happening (e.g., asking more before they go off, using other tools).

➢ **Ship track impacts:** Perspectives and observations on impacts from the VBNC ship track and other past ship tracks and suggestions for improvement.

➢ **Research process:** Thoughts about the history of research in Nain/Inuit communities, and this research process, particularly critical feedback (EX. questions not making sense for people's lives and how they think of going off, not finding the project relevant/beneficial to them, feeling over-researched in general, there not being enough trust established and mutual knowledge of each other before the interview to share openly, but also feedback about finding the project useful, feeling good about sharing information, thinking about things in new ways from doing the interview).

❖ **Personal survey information**

➢ **Personal background information:** Age, gender, length of residence in Nain, Inuttitut language skills, etc.

➢ **Participation in on the land activities:** How often people go off in different seasons for hunting/fishing and wooding.

5. What happens next?

- I will fix my summary of the interviews based on feedback.
- I will be putting all the pieces of the project together - information from these interviews, and also focus groups and search and rescue cases - to try to get a big picture of travel safety in Nain.
- I will be coming back in the summer to do a community meeting or two about what I found from whole project.

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Tukisinnik ingiggagiamik tagiup sikungani ammalu nunalet inositsiagittotigasuannimut ammalu kamatsiagiamut Nain-imi

Kaujisannik suliangujuk suliagijaujuk Agata Durkalec-imut

Apitsunimmik Utittisinnik

1. Suliangujop tugâgutinga

Tânna suliangujuk kiugasuajuk apitsutauKattajunik: Sunauva atuttauKattajuk ingiggagiamut tagiup sikungani ammalu nunalet inositsiagittotigasuannimut ammalu kamatsiagiamut Naini-imi? Pitjutigiluattanga tânna suliangujop asianguvallialimmat avatik attuilimmat kamatsiagutigiKattajanginnik Inuit aullaKattajunut Nain-imi ammalu asinginnik taggâni nunalimmiunut.

Tugâgutigijangata tâpsumaup suliangujop tukisigiamut sunait attuiKattamangâmmik inunnik kamatsiagiamut ingiggalimmata tagiup sikungani, ammalu inigijangita Nainimi Kinijattinginnut nunakkoKattajunut Kaujimajaukkugianga nunalet Kanuittailinnimut ammalu kamatsiagiamut ilinganiKajunut tagiup sikukkut ingiggalimmata.

Tânna suliangujuk atuttausok KaujisonguKattaniammata nunalet Kinijattiujunut atuttausonik Nainimi, ammalu ikajugiamut nunalet kajusiutiKasonguKattaniammata ikajugiamut inunnik aullaKattajunut kamatsiasonguKattaniammata. Aset nunalet ilinniasongummijut Kaujigatsamit.

2. Piniannet Nain-imi

- Maggok katingaKatigejut pitjutiKatlutik atuKattajangit tagiup sikunganik ammalu Kanuittailinimmut ammalu kamatsiagiamut (atautsik angutinnut aullanginnaKattajunut, ammalu atautsik annanut) Juli-mi, 2010.
- katimaKatigennik Kinijattinut (Juli ammalu Novembera, 2010)
- 22 immigolingatlutik apitsutausimajut inuit Nain-imit (Novembera, 2010).
- AullaKattanik pigunnaligama, piluattumik upingâmi, ammalu uKâlaKatiKannik inunnnik ilinniagiamut inuit piusigilautsimajanginnik, inosigijanginnik ammalu takunnâgusingit.

3. Suliatsait ilinganiKajunut katingaKatigesimajunut

- Nenittausimajunik apitsotigijausimajunik ukiumi.
- Utittisinnik adjiuliugittausimajunik ilauKatausimajunut maunganiagama Merz-imi âkKisuigiatutlugit tammasimajut ammalu asiangutitsinik asiangutitsigumasimappata.
- ÂkKisuinnik isumagijausimajunik sunatuinnanik inuit uKausigisimajanginnik ammalu taijaulauttunik ikKanattogasugijausimajunik. Atuatsisimavunga nenittausimajunik uKautausimajunik ammalu allaKattatlugit Inuit

uKautigisimajangit, ammalu katingaKatigettigasuasimajakka isumagitlugit
pitjutigijausimajut katingasiakKutlugit apigisimajakkanik apitsugalaniagama.

- Mânna takunialikKunga nâmmatumik tukisigaluammangâmma Inuit
uKautigisimajanginnik, ammalu atuKatigetlugit Kaujigatsait Kanuk
pijuKanialimmangât.

4. Ilinniagutigisimajakka Apitsugalaniagama

Unuttumaginnik Inunnik uKâlaKatiKalaukKunga, ammalu isumaganut
ikKanannipângujaugasugijausimajut Inuit uKausingitigut atâni allasimajut:

- ❖ **Imminik Inuit nunamik ottugaKattasimajangit ammalu atuKattasimajangit:**
Inuit piusigisimajangit ilinganiKajunut ingigganimmik nunakkut ammalu
nalunaisimajangit Kanga/namut/Kanuk akulaittumik aullaKattamangâmmik
inosigijata ullumimut.

    - ➤ **Nunami Kaujimajangit:** Nalunaigutet/piuset nalunaitsigiamik Kaujimajaujunik,
    atusimajangit ammalu ilisimajangit ilinganiKajunut ingiggagiamut tagiup
    sikungagut ammalu pigunnagiamut kamatsiasongugiamut ingiggalimmata (sollu,
    jâret atusimajangit, Kanuitsângigiamut ajunnatukkolippata/ilanginni jârini sollu
    sikuliakkut upvalu upingâmi, Kanuk nalunaitsiKattamangâmmik
    Kaujimajanginnik ammalu kamatsiasongugiamut, Kanuk akulaittumik inuit
    inutotlutik aullaKattamangâmmik).

    - ➤ **Ingigganik kamatsiagiamut ilinnianik:** Inuit piusigisimajangit ammalu
    atusimajangit Kanuk Inuit ingiggasiasonguKattamangâmmik tagiup sikungagut
    inosigijamminit ullumimut, atusimajangitigut, takusimajanginnik,
    unikausingit/ilinniagutingit, suliaKautigisimajangit (sollu mikigianniatlutik).

    - ➤ **Inet ammalu piniannet:** Namut Inuit adjigengitunut iniujunut
    aullaKattamangâmmik Kangatuinnak jârimi taikkununga adjigengitunut iniujunut
    aigiamut.

    - ➤ **Ingiggatluni ilagiKattajangit:** AullaKatiKaKattanik ilaKatluni, inunnik
    asigijamminik adjigengitunik piusiKajunik (sollu, ilaget upvalu ilannât, Kanuk
    angitigijumik ilisimattigimmangâmmik).

    - ➤ **PikKutet:** PiKutet ammalu taKuat inuit atuKattajangit ammalu namminigijangit,
    attasiKattajangit, upvalu pitâgisonguKattajangit aullalimmata.

- ❖ **Sikukkut Inigganik, inet ammalu Kanuittailinimmut ilaKagiamut:**
TakunnâtauKattajut ammalu atuttausimajut Kanuk tukiKagasugimmangât aullagiamut
upvalu Inuit Kanuittailinimmut, ammalu Kanuk inuit atuKattamangâmmik
adjigengitunik avatiujuni/iniujuni ammalu tamanna Kanuk tukiKammangât
Inosigijanginnut Kanuittailinimmut.

    - ➤ **Piujut ilaKaKatigennimik:** Piujut attuiKattajut/ikajotiuKattajut
    ingiggaKatiKannimik Inuit timinginnik Kanuittailinimmut (sollu. Ikittainikkut,

niginimmik aippiujannik niKituKannilu), isumakkut/ilukkulu Kanuittailinimmut (sollu. Aullasimatuinnagiamik nunalimmit), inotluni Kanuingigiamut (sollu. AtaKatigennik ilagijanginnik), piusituKannik atannik ammalu kinaunninganik (sollu, iluggusinnik atuKattagiamik, uKausinnik), niKet ammalu nukiKagiamut kamatsianik (sollu, nigigalagiamik aippiujannik niKituKannik, Kijuttagiannik), ammalu iniujunik atuKattasimajanginnik (sollu, piusituKait, ilugguset, ammalu ikKaumautigijanginnik sunatuinnanillu.).

> **Piungitut ilaKaKatigennimik:** Piungitut attuiKattajut inuit timinginnik ingiggalimmata (sollu, ânnik, itlukkijangimut), isumakkut/ilukkut Kanuittailinimmut (sollu, uKumaitsanikkut, isumakkut uKumaitsanik ilinganiKajunut ilagijamminik asiujisimannimut sollu ilannâminik/ilagijamminik ajulisimammata), inuligijet Kanuittailinimmut piusituKannik atannikut (sollu, asiujisimammata aivigiKattasimajanginnik nunanut inuit atuKattasimajanginnik aivigisonguKattalauttanginnik aivigigunnalugunnaitamminut), niKet ammalu nukiKagiamut (sollu akigijangit ingiggagiamut), ammalu Kanuk inuit atuKattamangâmmik avatimmik/iniujunik (sollu, aivigijautsiagunnangitut ilangit iniujut, upvalu ataniKagiamut akungani iniujunut ammalu isumakkut uKumaitsautigijausimajunik).

❖ **Ulugianattut ammalu kamatsiagiamut takunnâtauKattajut ammalu atuttauKattasimajut:** Ulugianattut ammalu atuttauKattasimajut piusiujunit ammalu ilusigijaujunik sakKititsiKattajunik ingiggalimmata piujunik sakKititsiKattajunik/kamatsiagiamut ammalu piungitunik sakKititsiKattasimajut/ilimanattut inunnut.

> **Sunait piujumik sakKititsiKattajunut/upvalu kamatsiatigisonik ingiggalimmata:** Nalunaigutet piujunik ingiggasimajunut ammalu atusimajunut sunatuinnanik inuit isumanginnik piujosimajut ammalu Kanuisimangitut ingiggalimmata taikkununga.

- **Silak piusingit:** silaginiattanga sollu Kiujananninga, Kannik, anugik attuiKattamat Kanuk kamatsiasongugiamut sikunga ammalu Kanuk piujosimammangât ingiggavigigianga.

- **Sikunga Piusingit:** Tasiup sikunga ammalu taset sikungit takutsaujut Kanuingitut, ammalu/upvalu attuiKattajut ingiggaligamik.

- **Kaujimannik ammalu ikajuttaunik:** Kaujimagiamut pitjutigillugit ingiggasongugiamut Kanuingitunut upvalu ilaKagiamik taikkuninga Kaujimajunut, ammalu ikajuttausongugiamut ikajuttaugiaKaliguvit.

- **Inet aivigisimajait ammalu atusimajait avatinga:** Inet/inigijaujuillu inuit aivigiKattajangit ammalu KângiKattajangit, ilauKatautillugit taikkuninga tukiKajunut inunnut (sollu, piusituKait, ilugguset, ikKaumajauKattajut, sunatuinnailu) ammalu sunatuinnait inuit atuKattajangit avatimmi ingiggalimmata (inuit takuKattajangit, naimaKattajangit, tusaKattajangit) aliagiKattajanginnik.

- **PiniannigijauKattajut aullasimalimmata:** Inuit piniannigiKattajangit,

ilauKatautillugit inunnegalagiamik, piusituKait, pinasuannik, nukkasimagalânnik, ullu tamât niKitsasiunnik/inogasuannik.

- **NajuttiKagiamut ingiggautet:** Kanuk najuttiKattiKammangâppit ingiggaliguvit ammalu Kanuk tamanna attuiKattamangât kamatsiagiamut.

➤ **Sunatuinnait ajunnatunik sakKititsiKattajut ammalu/upvalu ulugianattoKattajut ingiggalimmata:** Nalunaigutet apomautausimajut/uKumaittosimajut/ilimanattosimajut ingigganikkut ammalu atuttausimajut sunatuinnait piuset ammalu ilusigijausot inuit takunnâjanginnik sakKititsisimajunik apomautausimajunik/uKumaigijausimajunik ammalu/upvalu ilimanattosimajut ingiggautigisimajangit taikkununga.

- **Silak piusingit:** Sunatuinnait piuset sollu onanninga, Kannik, silaluk, anugik attuiKattajut kamatsiasongugiamut sikunganik ammalu Kanuk ajunnanginiumangat ingiggavigigianga (sollu, asiumagiamut takutsaungitumi, itjinattualummi, niguminattuni silaluniattiluni ammalu sikunga auvalliaKattaninga, silalulluni Kiujananiattiluni ajunnaniattiluni nalet piujogaluammangâmmik ammalu piungitoniattunik sikunginni).

- **Sikuk Piusingit:** Tagiup sikunga ammalu taset sikunga attuiKattajunut kamatsiasongugiamut ammalu inuit aivigiKattajangit upvalu Kanuk ajunnatigimmangât aivigigasuattanik (sollu, manittoninga, Kuppait, appisimajut sikuliangujunik, pittujuk sikusimangituni, pakkujanni taset sikunginni) ammalu attuiKattajunut adjigengitunut piusiKajunut (sollu, katagiamut, aivigigasuattait aivigijaugunnangitunut, pinasuapvet ninniunik sikunga piujongimat)

- **Nunait Piusingit:** Piusigijaujut nunami attuiKattajunut ajunnatogianga ingiggavigigianga upvalu piungitogajattunut (sollu, siaggijânnatuk, aputiKangituk).

- **Kaujimagiamut/tupangagiamut/atuinnaugiamut:** Kaujimatsialugani, atusimannik, upvalu tugangasongugiamut ingiggaligami kamatsiasongugiamut upvalu ilaKalugani taimâk pisongugiamut. Ilautitsimijuk sikuk ammalu silak piusingit asianguvalliajut, taimaimmat sulijugigunnangitait Kaujimajait silamit upvalu sikumit.

- **NajuttiKagiamik ingiggautet:** Kanuk najuttiKattiKammangâppit ingiggautigijait ammalu Kanuk tammana attuiKattamangât kamatsiasongugiamut (sollu sikitot siKumiutigiamut).

- **Pigunnautet napvâgiamik omajunnik:** aullanginnaluagiamut upvalu akuniunnisak aullasimagiak napvâgiamut tuttunik upvalu asinginnik omajunik, ammalu Kanuk tamanna tukiKammangât kamatsiasongugiamut ammalu inuit nâmmatuKagajammangâmik taimâk aullasonguKattagiamut.

➤ **Kamatsiagiamut takunnâtauKattajut:** Anginitsamik takunnâtauKattajut kamatsiasongugiamut asianguvallialittuk inunnut ammalu nunalimmiunut Kângilittuni, kina kamagialeng kamatsiasongugiamut, ammalu pikKujatsiat

piunitsauKullugu.

- **Asiangusimajut kamatsianikkut:** Takunnâtaujut inuit isumanginnik kamatsiagiamut imminik/ulugianattut ingiggalimmata adjigilugunnaitanga ullumi sivunganinit ammalu summat.

- **kamatsiagiamut kamagialet ammalu Kanuittailinimmut KaujimajaukKujaujut:** Takunnâtaujut kinakkut kamajutsaumangâmmik inuit Kanuikkunagit ammalu atuinnausongujut ikajuttaugiaKalippata, imminut ammalu iluingajunut nunalimmiunut, ilauKatautillugit takunnâtaummijut mânna inigijaujut/pinianniujunullu Nainimi Kinijattiujunut nunami, Nunatsiauvut kavamakkut, asigiallait, ammalu pikKujausongummijut piunitsautigasuanganut.

❖ **AtuttauKattajut inunnut Kanuiniangimata aullasimalippata:** Atuttausimajut ammalu ottutausimajut mikinitsauniammata ulugianattut ingiggalippata tagiup sikungatigut, ilauKatautillugit inuit ammalu katillugit atuttausongummijut.

- ➤ **Kaujimajaujut katitsuinikkut ammalu atuKatigennikut:** Atuttausimajut katitsuinikkut iligajattanginnik pitjutigillugit aullaKâgatik (sollu, piusiujunik takunnâluni ammalu takunnâlunillu sikulippat Kanuk sikiniammangât, Kaujigatsatâlluni asinginit inunnik, takunialluni silagijauniakKotumik Kagitaujatigut) ammalu aullasimalimmata (sollu Kaujimanginnaluni sunatuinnanik nunamejunik, takunnâluni ammalu kamagigiattuKattalugu atutluni tommik upvalu ulimautimmik). Ammalugiallak, Kanuk Kaujimajaujut pitjutigillugu piusigijanginnik aippanginnut KaujimajaukKujauKattamangâmmik, ammalu takunnâtaummijut Kanuk piunitsautitausongummangât Kanuk inuit katitsuiKattamangâmmik ammalu malugusuKattamangâmmik piusigijaujunik.

- ➤ **Atuinnaguttinik Aullagiamut:** Atuinnaguttigiamut aullagiamut, to prepare properly (sollu, tigusigiamut takuatsanik, kiasalenik, anugatsagiallanik, piKutitsagiallanik, nuluajannik), ammalu isumakkut atuinnaguttinik, being smart.

- ➤ **kamagiamut apomautaujunik:** Inuit atuKattajangit kamatsiasonguniammata ammalu aset Inuit Kanuiniangimata apomautiKaliaKilippata, piunitsamik ikajotiKaniammata aullasimaligutik.

  - **Asianik ikajotitsaKagiallalugani:** atuttausimajut kamagigianganut apomautausimajut ikajuttiKalugani asinginnut ammalu ikajuttaulugani Kinajattiujunut nunakkut. (sollu, namut ammalu Kanga aullaKattamangâmmik Inuit, sollu piungitokkogasuangigiamut, asinginnik akKutinnik atuKattagiamut; tuavikallaKattalugani sujuKagajappat; ammalu pinianniKaKattaluni ikilliumititsigiamut attuigajattumik, sollu nukKangatuinnalugani nagguanik nakkagajaguvit).

  - **KaujigatsaKalluni/Inunnut ikajuttiKalluni:** atuKattagiamut ikajuttaugumagiamut ilagijannit/ilannânit/nunalimmiunit aullaKatigingitanni (sollu, takotiKattajait aullasimaliguvit, upvalu ilagijatit/ilannâgijatit phonnisimajannik satilait phonnikut), ilauKatautillugit ikajugumasimangitunut. Ammalu atusimajannik ikajotigisimajait asinnik.

- **Taimâtuinnak/SuliaKapviujunut ikajotigijausimajut:** Atuttausimajut ikajuttautluni Nainimi Kinijattiujunut nunakkut, RCMP, Unatattuligijiujunut ammalu Kinijattinut, imakkut Kinijattet, asigiallanillu. Sikukkut ingiggalimmata, ilauKatautillugit ikajugumasimangitunut. Ammalugiallak ikajotigisimajait asinnik taikkununga suliaKapviujunut ammalu katutjiKatigengujunut.

❖ **Ilagiattausimajut pitjutet Inuit uKautigisimajangit:**

  ➢ **Sunait avatimmi asianguvalliajut:**

   - **Takunnâtaujut:** Piusigisimajangit sikuk ammalu silak sivungani, piusigilittanginnik ullumi (sollu, sivungani silakkisuanguKattalauttuk kalluKâttilugu, tâvatuak taimâk pilugunnaKattaluguannaituk)

   - **Attuinik:** Kanuk asianguvallianinga avatik attuiKattamangât inuit inogasuagiamut ammalu inosigijanginnik (sollu, ilangit inuit aullaKattalugunnaitut).

   - **Sungiutigasuannik:** Inuit kiugusingit ammalu sungiutigasuagiamut asianguvalliajunik (sollu apitsuluaKattalittut aullaKâgatik, atutlutik asinginnik piKutiujunik).

  ➢ **Umiat akKutigiKattajangi attuiKattanik:** Takunnâtaujut attuiKattajut VBNC umianga akKutiliuttauKattajumut ammalu pikKujaliangusot piunitsautigianganut.

  ➢ **Kaujisattet piusingit:** IsumagijauKattajut piusigijauKattasimajunut Kaujisanninik Nainimi/Inuit nunagijanginni, ammalu tânna Kaujisannik piusinga, piluattumik angijummaget uKautausimajut (sollu, apitsotet tukiKangitunut inuit inosinginnut ammalu Kanuk isumaKammangâmmik aullaKattagiamut, suliangujuk ilinganiKalungituk/ikajulungituk taikkununga, ippiniajut Kaujisattauluatlatut ilonnâgut, sulijugijautsiagutigijaungitut ammalu aippanginnik Kaujimatsianginik apitsugiasikKâgani, tâvatuak Kaujitlutik suliangujuk atuniKatsianinganik, ippiniatsiaKutiKagiamik atuKatigemmata Kaujigatsanik, isumaKagiamik asinginnik atuttausonik nutânik apitsulippata).

❖ **Immigut inuit Kaujisannik Kaujigatsangit**

  ➢ **Immigut Inuit Kaujigatsagijangit:** jârik, kinaunninga, Kanuk akuniutigijumik nunaKasimalimmangât Nainimi, Inuttitut uKausinganik Kaujimattigijanga, asigiallait.

  ➢ **IlauKatauKattanik nunami piniannigijaujunik:** Kanuk akulaittumik inuit aullaKattamangâmmik adjigengituni nalliuvinni jârimi pinasuagiattugiamut/iKalunniagiamut ammalu Kijuttagiamut.

5. SujuKanialikkâ?

- ÂkKisuilangavunga apitsotigisimajakkanik naittotigillugit atullunga uKautausimajunik.
- Ilonnanginnik suliagisimajakkanik katiutitsilangavunga-Kaujigatsait taikkunangat apitsotigisimajakkanik, ammalu katingaKatigesimajunut ammalu KinijattaugiaKasimajunik-angijumik takunnâgasuallunga kamatsiagiamut aullaKattagiamut Nainimi.
- Utilâgivunga aujami nunalimmiunik katimattisigiattulunga upvalu magguitullunga katimattisillunga pitjutiKagiattulunga Kaujisimajakkanik ilonnâgut suliagisimajaganit.

Kanuk Kaujisapviutausongummangâmma:

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Tuavittukut: (705) 748-1416
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Nunalet Kaujisapviutausok: John Lampe, Nunatsiavut kavamak Kaujisapvingita
            UKautjigiaji
Phonnik: (709) 922-2942 ext 235
Tuavittukut: (709) 922-2931
Kagitaujatigut: john_lampe@nunatsiavut.com

Understanding community health and safety during travel on sea ice in Nain

Who is doing this project?
My name is Agata Durkalec, and I'm a research student at Trent University in Peterborough, Ontario. I am the primary researcher on this project. I am working with Chris Furgal, Trent University and the Nunatsiavut Government Division of Environment.

What is the purpose?
The purpose of this project is to understand what things influence peoples' safety while traveling on the sea ice. I am interested in the role of Nain Ground Search and Rescue in promoting community health and safety related to sea ice travel. The overall question of my research is 'What is the relationship between travel on sea ice and community health and safety in the community of Nain?'

Who is participating? When?
In July, I will organize small focus groups with Inuit Elders and adults that have expertise about travelling on sea ice. The discussion will be about the importance of sea ice to Inuit health and well being. In October, I will return to have interviews with residents of Nain that are a variety of ages about their individual experiences travelling on the ice and how people deal with challenging conditions.

What are the benefits to us in Nain?
This project is expected to improve the understanding of the ways in which peoples' use of the sea ice influences individual and community health in Nain. This project could be used to inform local search and rescue and health promotion practices and policies in Nain and other Nunatsiavut communities.

How will the results be shared?
All reports will be shared with the NG with summaries provided in English and Inuktitut. Transcripts will be provided to participants for verification. Project results will also be presented at a community workshop and discussed on community radio.

Who do I contact for more info?
If you have any question, please don't hesitate to contact us at the info below!

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NG Research Advisor
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Email: john_lampe@nunatsiavut.com

Tukisimannik nunalet inositsiaginnisanginnik amma Kanuittailinitsanginnik ingganimmini sikutigut Nain-imi

kina tamatsuminga suliaKausiKavâ?

Atiga Agata Durkalec, Kaujisagiamut ilinnialunga Trent University Ilinniavitsuangani Peterborough, Ontario-mi. KaujisattiulâkKunga tâtsumani suliaKanniujumi. SuliaKaKatiKavunga Chris Furgal, Trent University Ilinniavitsuanganit amma Nunatsiavut kavamangata suliaKapvinganut Avatiliginnimut.

Suna pidjutauluattok?

Pidjutigijanga tâtsuma suliaKanniup tukisiumigiamik sunait KanuittailititsiKattamangâta inunnik ingganinginni sikutigut. Kaujigiagumavunga suliagiKattajanginnik Nain-imi AsiumajuKalimmat Kinijattingita amma piusitivalligasuallugit nunalinni inositsiaginnet Kanuittailinitsangillu ilingajut sikutigut ingganinginni. Ilonnâgut apitsotiga Kaujisannigani," KanuilingausiKavâ ilagennik akungani ingganiup sikutigut amma nunalinni inositsiaginnet Kanuittailinelu nunagijaujummi Nain-imi?

kinakkut ilauKataulâkKât? Kangalu?

Juli-mi, pigiasititsilâkKunga mikijotillugu katimajitsanik Inunnik inutuKaujunik amma inommaginnik ilisimanniKatsiajunik sikutigut inggagiamik. UKâlautaulâttuk pidjutiKalâttuk Kanuk ikKanattigimmangât sikuit Inuit inogusigijanginnut amma Kanuittailinitsamut. Oktober-imi, utilâkKunga apitsugiattulunga nunalinnik Nain-imi jâriKatigengitunik pidjutigillugit ilisimausingit sikutigut inggagiamik amma Kanuk Inuit kamaKattamangâta ilimanattunik.

Kanuk ikajutsigajakKâ uvattinik Nain-imi?

Tamanna Kaujisanniujuk nigiugijaujuk tukisinitsaugiamut Kanuk inuit atuKattamangâta sikumik amma nunalet inositsiaginitsuaninginnut Nain-imi. Tamanna Kaujisannik atuttaugunnatuk Kaujimatitsigiamik asiumajuKalimmat Kinijattinik amma piusitivalligasuallugit inositsiaginitsangit amma maligatsaujut Nain-imi asingillu Nunatsiavut nunaKutingit.

Kanuk piusiusimajut aviukKataugajakKât?

Ilonnatik Kaujititsiutet aviuKataulâttut NG-kunut naillitisimatillugit Kallunâtitut Inuktitullu. Allataumajut tunijaulâttut ilauKatausimajunut tammasimamangât kamagijaujutsaulutik. Kaujijaumajut tunijaulâmmijut nunalet katimaKataulippata amam uKâlautiullutik nunalet nâlautingagut.

kinamit KaujisagiallagunnaKingâ?

ApitsotiKaguvit, uvannik KaujititsigunnaKusi upvalu John atâni allasimaju!

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11.14 Project results fact sheet

Sharing What We Know About Sea Ice Travel Safety

Research Project Report
by Agata Durkalec

What was the project about?

Understanding how going off on the sea ice influences the health and wellbeing of Nain residents.

When was it done?

From February 2010 to May 2011, we spent three months doing consultations and collecting information

How was it done?

- Interviewed and had focus groups with sea ice users
- Interviewed Nain Search and Rescue (SAR) members and RCMP.
- Reviewed search and rescue records from Nain SAR, RCMP, and federal government.
- Went on trips on the sea ice.

Why is it important?

Local organization and government can know how to **better help support residents** to get the benefits of going off and minimize the impacts, now and in the future.

What did we find?

- Large majority of people reported **health benefits** for mental/emotional, material, social, cultural and physical health and wellbeing from using sea ice, as well as benefits from hunting and eating wild foods and just being on the ice (Fig 1.).

Fig 1. Relationship between travel on sea ice and health
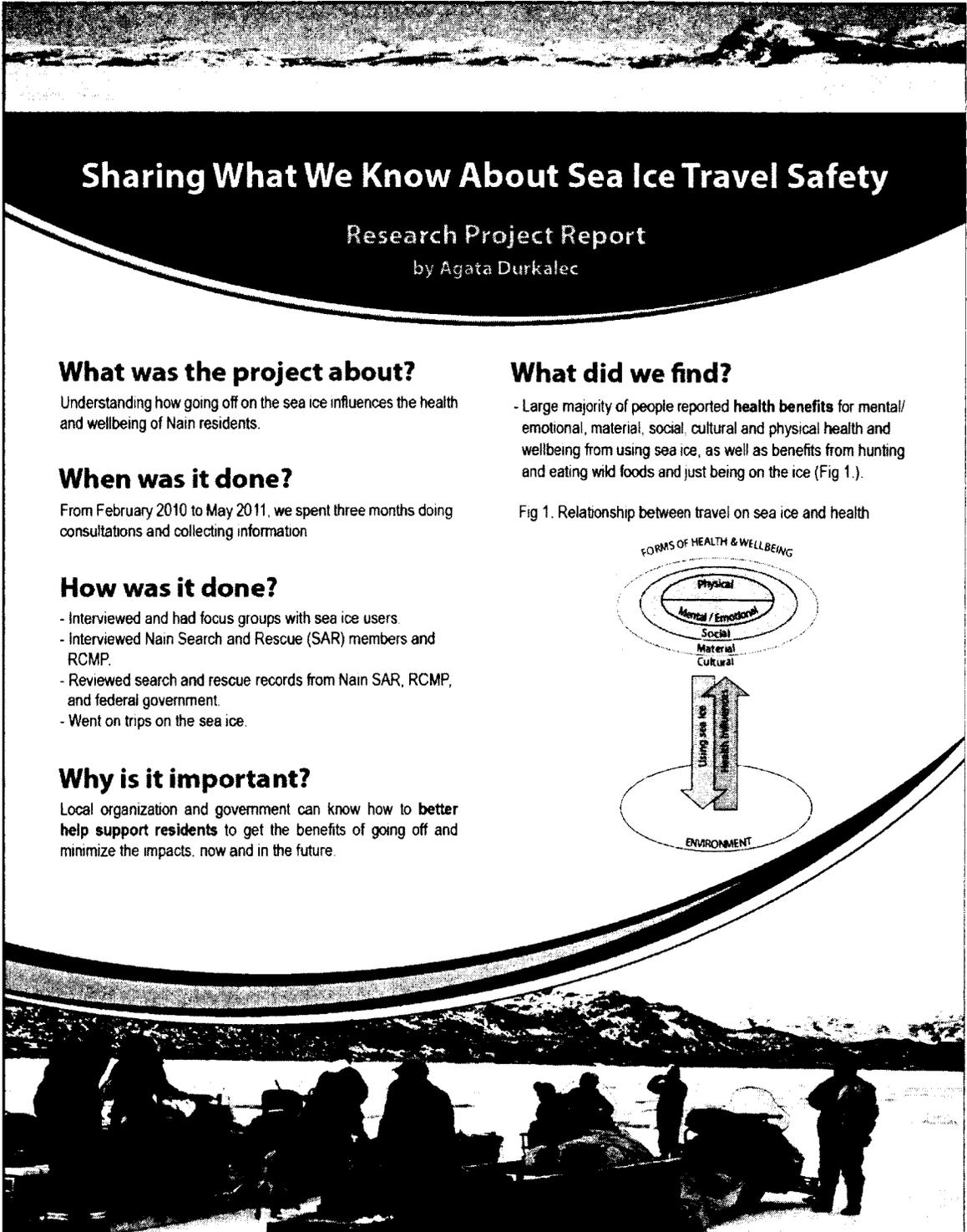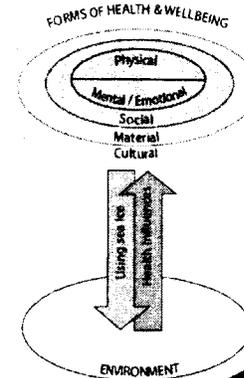
- Minority of people reported **health impacts**, mostly related to physical health (e.g., travel being hard on body, injuries, falling through ice), and also related to stress and expense.

- **Weather/ice conditions** were the primary contributors to SAR incidents, and people reported that safety depends on ice/ weather conditions and knowledge.

- Majority of people reported that travel is **more dangerous today** compared to in the past because of changes in ice and weather and people's ability to predict conditions, but there were **no trends in the number of SAR incidents** from 1995 to 20.

- Majority reported suggestions to **improve community safety**, such as locally-run winter travel skills programs, and more formal information sharing about ice conditions in meetings and through
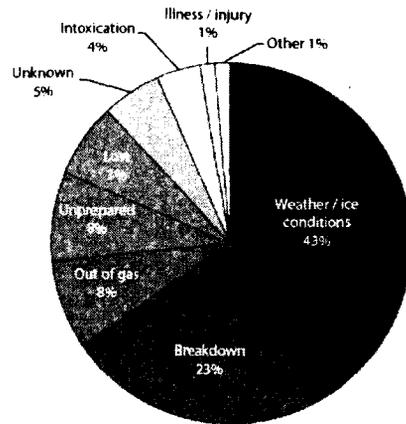

Fig. 2. Reasons for SAR cases from 1995 to 2010, from 49 cases involving 113 people (RCMP and Nain SAR data)

TRENT UNIVERSITY NUNATSIAVUT
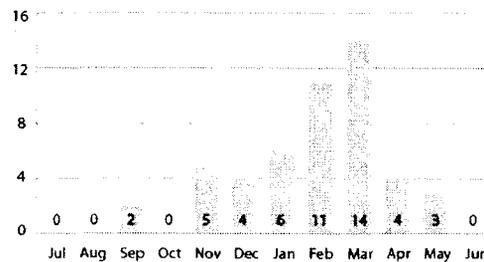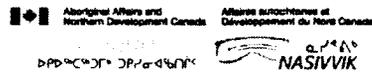
Fig. 3. Number of SAR cases per month from 1995 to 2010 (RCMP and Nain SAR data)

For more information, please contact any of the following people at the addresses provided below:
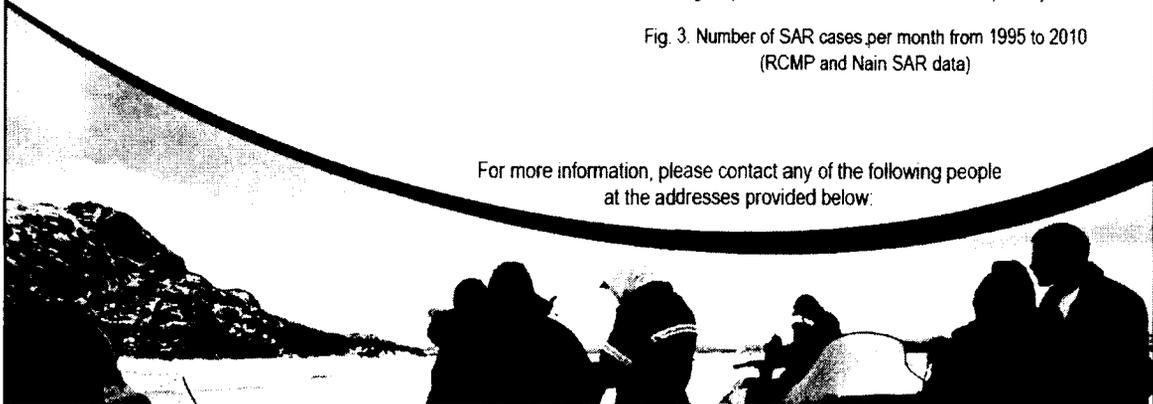
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11.15 How we relate – Research Notes from Nunatsiavut, Labrador

By Agata Durkalec

Originally published by *FUSE* magazine.

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I am a white, queer Polish-Canadian immigrant from the suburbs of Toronto, not doing research on the experiences of surburban queer Polish women. Instead, I am a white researcher involved in Inuit environmental health research in Inuit Nunangat — Inuit lands. I inhabit this role with some unease, given that research by white people in Indigenous contexts has historically been an active force in furthering colonization, and that these historical dynamics are still echoing in current research practices. In my experience, these apparent binaries in North/South and Indigenous/non-Indigenous relations are complex and nuanced, situated in local history, and influenced by individual and collective agency. This piece explores these dynamics on the ground as someone who is implicated in them, with all of their ruptures, tensions and blurred lines.

There are Indigenous environmental justice issues and solidarity efforts much closer to home for me, but this doesn't diminish the urgency of pursuing allyship and solidarity. Large geographic distances and cultural and historical difference do not erase the connection between Canada's North and South. Even though the North is an abstract concept to many in southern Canada, the influence of Southern institutions and economic policies are overwhelming. This is the case even with settled land claims and self-government in large parts of the North, including all of Inuit Nunangat. Without a doubt, ideas about the vast, resource-rich, presumed empty North have shaped Canadian

economic policy from the time when Canada was still an imperialist idea, up to the present. Canadian Prime Minister Stephen Harper's interest in the militarization of the North and assertion of State sovereignty within it are only the latest iteration in a relationship where the South views the North as territory that is our backyard, a place that we can claim, ignore, exploit, whatever. All of us who live in Canada are necessarily implicated in this relationship.

We are also connected in another significant way, through our asymmetrical relationship to climate change. The effects of climate change have been observed on the ground in the North for many years. In the place where I am currently doing research, in the Inuit land claims settlement region of Nunatsiavut in northern Labrador, 2010 saw weeks of rain during the normally frigid month of February. A recent Statistics Canada report from 2011 stated that sea ice in the northern Labrador sea, along the coast of Nunatsiavut, shrank by 73% from 1968 to 2010, the biggest decrease in all of Canada (Henry, 2011). Climatic changes are causing Inuit sea ice territories to shrink dramatically, and routes to "the land" — the places where many were born, where they hunt, where they are free from the constraints and stresses of life in a remote town — are impassible for more and more of the year. These changes are not being caused by Northerners, but are facilitated by the decisions of the Canadian State. This is an issue of gross environmental injustice. Climate change is acting as an agent of dispossession for Inuit, and it is critical that we in the South recognize our role in this dispossession.

White researchers have had a major historical presence in the North, but the North is hot topic right now because of climate change, resource development issues and Indigenous sovereignty assertions. This means that many Northern communities are full

of researchers. Some researchers are interested in community engagement and local priorities, but many are not. I try to work from an anti-racist position, supporting Indigenous sovereignty and decolonization, and engaging various critical bodies of theory in my work. However, I can't claim that I am doing research that is decolonizing or anti-racist — it's not for me to say, and it doesn't feel particularly transformative on the ground most of the time. Currently, I'm completing an MA that is exploring the importance of sea ice for Inuit in the Nunatsiavut town of Nain as a place of health and risk. This work is critically-oriented and collaborative with the Nunatsiavut Government, but this does not mean that I am seen as anything other than another white researcher in a long line of outsiders coming to town to collect information and leave. And being a person who is not grounded in Inuit ways of life or knowledge, with very minor lived experience of the North, I think people are right to be cautious; I am just another white researcher.

Yet, it is important to recognize that the binary between Indigenous and Settler in the North is by no means absolute. In every region and community I've been to in the North — in Nunavut, in Nunavik in northern Quebec, and now Nunatsiavut — the local history of colonization is different. In Nunatsiavut, the history of Settlers as well as Moravian missionaries from Germany is long and intertwined with Inuit history in complex ways. European immigrants and Newfoundland fishers relocated to the northern coast starting in the eighteenth century. This gave rise to a settler culture that was both distinct from, and connected to, Inuit culture, as Settlers adopted Inuit ways of life and families mixed. In recognition of these interconnections, Kablunângajuit — people of

Settler and mixed Settler-Inuit descent — and Labrador Inuit are considered equal land claim beneficiaries in Nunatsiavut.

Outside perceptions of these colonial power dynamics, however, don't necessarily correspond to lived experiences of these dynamics, as other influences — such as local knowledge, or lack thereof — reshape relations. In early summer a few years ago, I arrived in the seemingly deserted hamlet of Naujaat, Nunavut (known to many as Repulse Bay). At the town office, I was informed that there was a fishing derby on. Sure enough, when I walked on the beach, it seemed like the entire town was way out on the ice, jigging for sculpin. I could see dozens of skidoos and young people riding bikes and skateboards between large, flat ice pans in the distance, and with a twinge of excitement I decided that I should join. I started picking my way over huge beached icebergs, and then clambering over equally large icebergs floating in the cold sea water. Now a good distance from the shore and in deep water, I saw a small piece of ice floating between me and the next big iceberg. The little piece of ice had a footprint on it, so I figured it would be okay to use. As I stepped on it, the ice chunk sank, and I pushed off as hard as could and launched myself onto the iceberg in front of me, one leg now soaked to the knee. By this time, the entire town noticed that this white girl was going to get herself killed out here, and started calling to me – step left, now right, cross there, jump right again! Slowly, people guided me safely towards them, and a middle-aged woman decided to adopt me for the day, keeping me close as we jigged together, and inviting me over for fresh *maktaaq* — whale skin — later on. What stands out to me about this experience is how clearly my foolishness contrasts with the knowledge and patience of local people.

Power dynamics have played out in my research relationships in complicated and challenging ways. The experience that was the hardest for me was going out on the land and ice with people. Many participants told me that I needed to go off on the sea ice, multiple times and in different seasons, to understand the perspectives that they were sharing with me. Even though I agreed, this was not simple to do. Besides some logistical challenges, going out on the ice with people required the kind of relationships where people would want me to be there, while they are having quality time with family and friends on their land. This was not an easy sell, given that my inexperience made me somewhat of a liability instead of a useful contributor, in addition to carrying the baggage of being a researcher. When I asked a friend if I could join her family on her next trip to the place on the land she considers home, she asked if I wanted to go "as a person or as a researcher." I gave a complicated answer about how I wanted to come both on a personal level, but also to inform my work. She invited me to come, and the trip was an invaluable experience, but my presence remained complicated.

On the second day, we took off from the cabin to ride around, visit other people's cabins and look for seals, making it the first hunt I had ever been on. The sun was bright on the white ice, and it took me a long time to recognize the tiny specks of black in the distance as seals. After a few tries my friend's son got a seal, and began butchering it immediately on the ice. My friend took out the heart, which was still warm and contracting, and cut off pieces for me and the kids, while her son gave me some liver and brain — all delicacies. There have been a few times that Northern friends have described experiences of having their wild foods and hunting practices judged as offensive by Southerners, particularly Southern animal rights activists. With this in mind, I felt

incredibly fortunate to have raw seal shared with me and to be trusted and allowed in on this incredible hunting experience. Soon birds started circling overhead, and our group decided to move before polar bears came, attracted by the smell.

These times of connection and shared enjoyment of the land were marked by moments of awkwardness and strain. Occasionally, conversations took place about the complicated, sometimes threatening presence of white people on the land. I realized over the course of this trip that people's places on the land are those places where they have traditionally not been within easy reach of Eurocentric institutions and policies, where Inuit are experts still in charge of where they go and what they do, making my presence loaded. When we returned, my friend expressed to me that she hadn't been sure how to relate to me on the trip; that my dual roles had been confusing. She wasn't sure what was safe to say or do in front of me. Even though my friend decided that she wanted to take on the challenge of teaching me by allowing me to join the trip, I was still a white person, a researcher. The conversations we had about my presence were important but challenging, and they also made me want to step away from Northern research. But the longer view that I've taken is that this is a very difficult relationship that we are engaging in; if it's painful for her and she is still trying, then it makes sense that it should be just as painful for me, and I have a responsibility to keep trying and engaging.

While power dynamics between Researcher and Subject/Participant are important, they are more complex than they may appear at first glance. While I have a certain kind of power as the asker of questions and the interpreter of the responses, there is also a cross-language, cross-cultural, cross-experience dynamic that complicates this apparently simple power divide. These complications rose to the forefront when I was conducting an

interview with Elder Lucas Ittulak through translation. He is an expert sea ice user who has survived in conditions I find hard to fathom. The result of our first meeting was the most awkward and simultaneously informative hour of interview time I've done. Not being able to speak Inuttitut, the Labrador Inuit dialect of Inuktitut, added to the issue of my lack of experience on the land, and meant that it was a major struggle for me to understand the concepts that he was trying to convey. What I was asking Ittulak through our translator, K. Naeme Merkuratsuk, was what are the ways to describe in Inuttitut how going on the sea ice influences his health, which brought us to his response:

> **Ittulak (I)**: *taimâk kitâneligama kitâneligatta tainna nunaup killinga nujnau killinga titigutilli titiguti Kailauguk tânna nutâ nunaummat imaummat mânna ukua Kuppakuluit Kaingonai nunau killingani Kakauma unau mânna mânguattilugu ukua Kuppakuluit Kupuilasimajukuluit nunau saniani imaliummangâta imailiummangâta kamagitsialugit kitânigiak kitânegiaKaKattuKavuk*

> **Merkuratsuk (M)**: *KanuilinganiKaKattamangât apitsuluajuk vallualungitogaluak ipvili taimâk pisongunnigijannik*

> **I**: *taimâk pisongunniga ila tainna*

> **M**: *ilali*

> **I**: *tainna akKutiginiattaga kamgillugu akKutiginiattaga kamagillugu ingiulisimappat*

> **M**: It's difficult for him to... he's describing situations when he has to know certain things when he's out there to be safe. Like, if he's out on the coast out there, you can see bellycaters near the beach — that's them ol' rocks that's frozen over. And if there's a crack in the...

> **Durkalec (D)**: Would it help to draw it? [Rustles around and find some paper and a pen]

> **M**: [Starts drawing two mountains and the shore in front] He was saying that that's the mountains there, that's the land and that's the beach. And on the beach there's bellycaters, um, boulders frozen over on the beach. And then there's a crack on the sea ice. He have to watch how that's being controlled, whether the edge of the crack is going down or going up. That's the motion of the high tide and low tide.

D: So watching that...

M: Yeah, is the only way he can describe...

D: Describe?

M: Describe what we're trying to get after! What you're trying to get after.

D: Okay, okay. Like, being conscious of everything around you?

M: And to try to ask him how he feels about it is... he needs to give examples.

After much more explaining, it finally clicked: Ittulak was patiently trying to impress

upon me through examples that *knowledge* is the source of his health and wellbeing on

the sea ice (see Ittulak, 2012). Even when I revisit this interview a year and a half later, I

still learn things from it. Over and over I find in my work that my project participant are

the experts; they are my teachers, and I'm fortunate to learn from them.

There are two recent developments that have affected how I do research and

engage with Northern friends and project participants, for the better. First, I'm still

coming out as queer a decade after I first came out. One of the last outposts of discomfort

is with my family, which has tended to be on the conservative and traditional side. I've

been pushing that wall for years, but finally feel like I'm making some breakthroughs that

are changing the way I carry myself. This is in turn affecting the other remaining outpost

where I remain closeted, which is in my work. In the last year, I've begun to talk about

my queer identity with the people I work with, which has been an overwhelmingly

positive experience. I've connected to an amazing queer community in Nain — which, I

should point out, only consists of just over 1,000 people. More importantly, it means that

I am more myself, more honest and transparent, instead of being (seen as) a generic

researcher that keeps themselves separate, erasing their subjectivity, history and

personality. In my experience, this has made personal connections easier.

Also, Facebook has not only been a useful tool for keeping in touch with people across long distances, but has also been a surprising equalizer of the power dynamic between Researcher and Participants/Subjects. It has facilitated the sharing of information back and forth about our lives, so people that have only known me in the context of a visitor to their community can also find out about and comment on my life in southern Ontario. While I tried to be careful not to be too touristy when I took pictures during my trips, once I uploaded them I realized that I didn't have to worry so much about my gaze. People tagged themselves, commented, and they became quasi-public property. The potential to easily chat, email, and generally keep in touch means that even when I'm not in Nain, I'm more accessible and therefore accountable to people there than researchers may have been in the past.

While self-reflexivity, honest engagement and accountability on the part of researchers are important on an individual level, they don't change the larger structures that inform the power dynamics in these relationships. Research is a huge industry in the North and recently, the Nunatsiavut Government has been trying to harness this industry to reflect Inuit priorities and leave a positive legacy. This government is doing an impressive and important thing; it is trying to move from a reactive relationship to research, in which the research agenda is created by Southern academics, to one that is by and for Inuit in the region. Their first step in this process was to host Tukisinnik, a week-long community forum on research in Nunatsiavut. Senior researchers who work in the region were invited, but the forum tried to flip the conventional power dynamic between researchers and community members on its head. Local residents led a wide variety of forums on the vision of research in the region with participation from researchers, and

community-oriented activities like researcher bingo and speed-date-a-researcher meant that Nain residents got to know those researchers as people. In disrupting the binary between Southern Researcher and Northern Subject/Participant not just at the individual level, but at the community level, the initiative shows how agency can shift the power dynamics that have long determined these relations.

Every now and then when I exchange emails with someone I know in Nain, they ask me when I'm coming to visit again, expressing that they hope they will see me soon or go off with me on the sea ice on my next trip. This relationship that we are engaging is not always easy, but the North/South or Inuit/Settler binaries that seemingly separate us from each other are more complex than they are often perceived to be, and disrupted by the sense of agency, responsibility and caring that comes with direct engagement, made possible by being in the North.

References

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