# IS HUNTING STILL HEALTHY?
## STRENGTHS AND LIMITATIONS OF DOMINANT DISCOURSES USED TO EXAMINE CONTEMPORARY INDIGENOUS LAND-HEALTH INTERRELATIONSHIPS

By

Ursula King

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The author attests that this thesis is the original work of the author. Where contributions have been made by co-authors to published material, clear acknowledgement is made of the specifics of each author's contribution.

Signature of Student:

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# TABLE OF CONTENTS

## LIST OF TABLES

## LIST OF FIGURES

## ABSTRACT

Around the world, Indigenous people continue to experience some of the greatest health disadvantages compared to the non-Indigenous population in the same state or country. As the United Nations Second Decade of the World's Indigenous People's (2005-2014) draws to a close, questions are still being asked about how best to remedy this situation. One approach that has emerged is research and policy responses focused on engagement in land-based practices (LBPs) - from hunting, and fishing, to wild food gathering, ceremony and land care. Participating in these LBPs is considered to be fundamentally healthy, for both people and the places in which they occur. However, the evidence in the international literature that supports Indigenous people to embrace this engagement is disjointed, and in some cases, contradictory. Informed by a transdisciplinary approach to the topic, this project sought to organise and critique this disparate body of evidence. The aim was to place what was presented in the literature in a broader discussion of how 'Indigenous health' has been constructed, and the implications these constructions have on the ways 'Indigenous health' is measured, understood and promoted.

With a large Canadian Indigenous epidemiological health survey used as an illustrative case study (Nunavik Inuit Health Survey), this research examined the strengths and limitations of the current dominant discourses in 'Indigenous health' as they related to LBP participation. The data analyses identified socio-demographic characteristics of those participating in one of the major LBPs in this region - i.e. hunting, and examined these against key health indicators and behaviours associated with cardiovascular risk, social capital, and community connectedness. Those who hunted most frequently in these communities were few, mainly older men, and apparently healthy on a number of key biomedical indicators. However, they did not report any greater level of satisfaction with their life than those who hunted less frequently or not at all, were no more physically active than those who hunted less frequently, but were more involved and connected to their communities, and much more likely to share and prepare the country foods they caught. These frequent hunters comprised a specific group, which were a distinct minority in these communities, and this finding raised a number of questions about the ongoing place of LBP participation in this setting, including how research and policy should best respond.

When the analyses findings were critiqued against the broader landscape of contemporary 'Indigenous health' constructions, these questions became more complex. It became apparent that current research emphasis on individual human health indicators needed to be considered alongside the less metric-amenable issues of identity politics, generational aspirations, and impacts of technologies. In addition, ecosystem factors, such as the consequences of climate changes, diminishing stocks of preferred country foods, and extractive industries on the 'health of the land', required consideration if Indigenous land-health interrelationships were to be adequately understood, and responded to. This research focuses on a number of these intersecting issues to argue for a rethinking of 'Indigenous health', and the current limiting, and problematic, approaches to investigating the issues that impact it. The challenge is to both acknowledge the dominant discourses that exist, and extend beyond them in order to develop sustainable, and respectful, engagements that consider the fundamental interdependence between ecosystems and human 'health'.

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# CHAPTER ONE

## PROJECT OVERVIEW

*The significant problems we have cannot be solved at the same level of thinking with which we created them.* Albert Einstein

## 1.1 Introduction

This thesis explores the interrelationships between land and health in contemporary Indigenous contexts. It argues that understanding this complex connection has relevance for the development of sustainable and mature research and policy responses to continuing inequities in Indigenous health. These inequities have real significance for the lives of many of the 370 million Indigenous[1] people who reside in over 90 countries across the globe (United Nations 2009). There are many ways that people live and identify as Indigenous in this diverse global population (Anderson 1997; Gardiner-Garden 2003; Paradies 2006; Said 1993), and acknowledging this diversity is an important theme of this thesis. On this background, the focus is an examination of contemporary constructions of 'Indigenous health', and the impacts these have had on how the health of Indigenous people has been approached. In particular, the thesis considers how 'Indigenous health' has been measured, and the ways in which links have been made with the underpinning influences of land-health connections; a recognized and promoted determinant of Indigenous health. A tool of investigation used in this thesis was that of an illustrative case study derived from analysis of a large Indigenous Canadian epidemiological health survey ("Qanuippitaa?" (How are we?): Nunavik Inuit Health Survey). This enabled investigation of some of the key 'health' associations with participation in Indigenous land-based practices (LBPs), using the major LBP of hunting as the lens of inquiry. From this, new insights emerged about the necessity of considering 'Indigenous health' in the complex context of contemporary environments, including the cultural frameworks of the tools used to measure it (Brough 2001; Kowal and Paradies 2005). Central to this are research and policy considerations that occur within the wider lens of integrated, inter-dependent socio-

[1] 'Indigenous' is a contested term. In this thesis the term is used according to the current international approach that advocates a focus on self-definition as Indigenous and distinctly different from other groups within a state; on a special attachment to and use of their traditional land whereby ancestral land and territory has a fundamental importance for their collective physical and cultural survival as peoples; on an experience of subjugation, marginalization, dispossession, exclusion or discrimination because these peoples have different cultures, ways of life or modes of production than the national hegemonic and dominant model (African Commission on Human and Peoples Rights 2005).

ecological systems, and are approached and measured in ways that capture this complexity (Brandt et al 2013; Brown et al 2010; Cash et al 2003; Stokols, Lejano et al 2013).

Given the pressing need to address the disturbing health inequities that exist for many of the world's Indigenous people, and the interrelated concerns about the health of place, this research project harnessed these overarching questions to investigate three interdependent issues. Firstly, how 'Indigenous health' was currently being constructed. Secondly, the implications these constructions had for how policy and program responses were being developed, measured, and promoted. Thirdly, how these understandings were interconnected with LBPs and health in Indigenous contexts where these interrelationships had been explored. Respecting Indigenous constructions of 'health', and the emerging emphasis on 'healthy country, healthy people' (Burgess et al 2009; Garnett and Sithole 2007; Weir et al 2011), the connections between human and land/sea health were the obvious starting point. From there, the research progressed into the more nuanced interrelationships with LBP participation and land-human health, using LBPs as a useful case study that enabled more detailed inquiry. This inquiry led to a critique of a dominant tool for investigating 'Indigenous health', that of epidemiology (Brough 2001). This then led back to why knowing how 'Indigenous health' was being framed, and measured, was fundamental to moving beyond the current constraints that were identified (Kowal and Paradies 2005, 2010; Taylor et al 2010).

## 1.2 Research Approach and Design

This research project used three interrelated strategies to explore the issues under consideration. Firstly, an international review of the literature, including a summative analysis of the key issues and themes that emerged. Secondly, the use of an existing Indigenous health database (Nunavik Inuit Health Survey) as an illustrative case study to examine the associations between LBP participation and health indicators/behaviours, and potential opportunities and constraints of using these types of epidemiological tools to elucidate understandings of 'Indigenous health'. Thirdly, placing these approaches within an interweaving critique of the key concepts of 'health', 'Indigenous health', and 'land-based practices'.

### 1.2.1 Key Questions

On this background, three primary research questions were framed:

1) *How have researchers and policy makers approached and constructed Indigenous health and contemporary Indigenous land-health interrelationships, and what are the factors contributing to, and consequences of, these constructions?*

2) *What are the socio-ecological related issues influencing ongoing Indigenous participation in land-based practices (LBPs), and how do these interrelate with human and ecosystem health?*

3) *Using analysis of the Nunavik Inuit Health Survey, what are the interrelationships between Indigenous LBP participation and human health behaviours/outcomes, and what can they add to current understandings of Indigenous land-health interrelationships?*

## 1.3 Organisation of Thesis

This thesis is organised as a manuscript format thesis, with ten chapters. Chapter One provides an overview of the project and research questions; Chapter Two presents the background and rationale for the overall focus of the research; Chapter Three the methodological considerations; Chapter Four describes the illustrative case study; and Chapter Five the ethical considerations. Chapters Six, Seven, Eight and Nine are independent, first author, peer-reviewed manuscripts either published or in revision with international journals, that reflect results, and the progressively developed critique, associated with the three central research questions. Chapter Six presents a summative review of an extensive and representative selection of the interdisciplinary, international literature currently available on Indigenous land-human health interrelationships. This Chapter presents two new models for engaging with the complexity inherent within these issues, and explores these through a global lens. Chapter Seven presents findings of the psychosocial and community connectedness/social capital analyses from the Nunavik Inuit Health Survey related to hunting frequency. These analyses were critiqued in the context of a broader

understanding of 'Indigenous health', and the interrelationships with epidemiological inquiry methods. Chapter Eight extends this through presentation of findings from the biomedical and health behaviours analyses related to hunting frequency in the Survey, with a focus on cardiovascular health. The findings in these analyses challenge the assumptions about LBP engagement and physical activity, and these analyses are then critiqued within a wider, socio-ecological view of 'health'. Chapter Nine presents analyses of the share and prepare aspects of Indigenous land-health interrelationships, and relates them to the intersections with the catch and consume aspects of these activities. Using the initial model developed for the literature review, this paper focuses on the factors that are contributing to the disconnected ways research approaches these issues, the implications for policy and program development, and potential ways forward. Chapter Ten concludes the thesis by restating the thesis objectives, and provides a synthesised summary of the main findings. This final Chapter also discusses the limitations and implications of the overall study, and proposes recommendations for future areas of research and policy engagement.

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# CHAPTER TWO

## BACKGROUND AND RATIONALE

> *Land, then, is not merely soil; it is the foundation of energy flowing through a circuit of soils, plants, and animals…An ethic to supplement and guide economic relations to land presupposes the existence of some mental image of land as a biotic mechanism. We can be ethical only in relation to something we can see, feel, understand, love, or, otherwise have faith in.* Aldo Leopold (A Sand County Almanac)

## 2.1 What is 'Indigenous health'?

### 2.1.1 *A human right*

As an international population, Indigenous people achieved recognition only in the past few decades. It was not until 1982 that the United Nations established the Working Group on Indigenous Populations, a year later Indigenous people themselves had a voice on this Group. It then took a further eighteen years before the United Nations Permanent Forum on Indigenous Issues (UNPFII) was created in 2000. Subsequently, in September 2007, the United Nations formally adopted the Declaration on the Rights of Indigenous Peoples (United Nations Organisation 2007). Four countries initially refused to sign the Declaration - Australia, New Zealand, Canada, and the United States of America. These countries all cited their track records in upholding human rights, including the recognition of Indigenous rights within their own national governance systems (Lightfoot 2010). However, even with the subsequent signing of the Declaration by each of these countries during 2009 and 2010, many still argue that the commitment by these governments is lukewarm at best, with an emphasis on "soft rights" like language and culture, not "hard rights" such as rights to land and genuine self-governance (Lightfoot 2012). This relatively recent international history highlights the ongoing struggle by the world's Indigenous people for recognition of, and tangible responses to, their rights.

Key amongst these rights is that of health. The world over, 'Indigenous health' has become synonymous with poor health, as reflected in the substantial health disparities and inequalities that persist. Across the globe, Indigenous people are commonly considered to have the poorest health in their state or country compared to their non-Indigenous community members (World Health Organisation 2014). These health discrepancies are not confined to developing country contexts. In Australia, New Zealand, Canada and the United States of America, all developed, Anglo-settler

countries with a history of colonisation and dispossession of Aboriginal[1] lands, these health discrepancies are also marked. Of particular concern is Australia where the current life expectancy gap between its Indigenous and non-Indigenous populations is 17 years[2], the highest in the world (World Health Organisation 2014).

On every current human health indicator, Indigenous people often score the lowest when compared to their national averages (World Health Organisation 2014). Premature deaths from suicide, preventable accidents, cardiovascular disease, and Type 2 diabetes, are often complicated by obesity, sedentary lifestyles, alcohol, family violence, and cigarette smoking (World Health Organisation 2014). This contemporary 'health' picture is linked to the impacts of extractive industries, contamination and depletion of land and natural resources, and forced displacement from territories (United Nations 2009). These factors serve only to compound the profoundly negative psychosocial effects of colonisation – i.e. eroded self-worth, societal marginalisation, identity fragmentation – that have shaped, and continue to shape, many Indigenous peoples' experiences (Smith 1999), and that are argued to underpin the disadvantage that is reflected in ongoing inequities. The cumulative impacts of these have resulted in Indigenous people frequently being over-represented in health inequity statistics. As such, Indigenous health is one of the most important human rights challenges of the current century. Strengthening of international co-operation to address Indigenous health inequities through action-oriented programs and projects is a central goal of the United Nations Second Decade of the World's Indigenous People's (2005-2014) (United Nations 2009).

### 2.1.2 *A contested space*

'Indigenous health' is a complex concept. 'Health' itself is a contested term (Gatrell & Elliott 2009; Gesler & Kearns 2002; Helman 1994; Huber et al 2011), with 'Indigenous health' being more so. In the main, there appear two distinct ways in

[1] The term 'Aboriginal' is an alternate term used in this thesis to refer to 'Indigenous' people. It is appreciated that each of these terms are contested. Where specific Indigenous or Aboriginal groups, communities or tribes are discussed they are referred to by their preferred name, either collectively as Inuit, Aboriginal and Torres Strait Islanders, Maori, First Nations or with respect to self-identified regional/cultural groups as specified.

[2] There are a number of acknowledged cautions in comparing Indigenous life expectancy across countries due to differing definitions of 'Indigenous' and mortality data collection methods (Australian Institute of Health and Welfare 2011).

which 'Indigenous health' is currently presented. One is through a Western biomedical lens, which uses standardized biomedical and health behavior indicators placed against individual people so that issues like blood pressure, low birth weight, smoking rates, and depression scales are the focus (Australian Indigenous Health*InfoNet* 2014; Wallace 2014).

> *Both in research and clinical practice, "health" is used as a generic term that is empirically approached by various indicators such as medical diagnoses, functional status, experienced symptoms, and laboratory values; there is no standard rule or equation for how to develop these into an exhaustive global indicator of "health"* (Jylhä 2009:309).

The other approach encompasses 'health' as an interdependent, multidimensional relationship between people, their communities, and the ecosystems in which they live (Cajete 2000; National Aboriginal Health Strategy 1989). The former is amenable to metrics, the latter is not as easily constructed in that way. One focuses on correcting individual human biology, while the other looks at ways to collectively balance the health of people and place as part of a 'healthy biosphere'. Thus to be 'healthy' for many Indigenous people (and, it could be argued, humans in general), is to have more than just good blood pressure or body weight. Being 'healthy' requires genuine connection to the places people live, and understanding the mutual care relationship between planet and people (Arabena 2006; Hunt et al 2009; Johnston et al 2007; Nettelton et al 2007; Wilson 2003). An extension of Maslow's hierarchy[3], and the social determinants of health[4], this broader understanding of 'health' embraces a socio-ecological frame that currently sits beyond biomedical world-views and practices (Brough 2001; Izquierdo 2005; Stokols, Lejano et al 2013). It is argued that this complex, interdependent, and culturally reflective conceptualisation is what lies at the heart of Indigenous understandings and expressions of 'health' - these are difficult constructs to 'measure' using current tools.

A fundamental, underlying principle within Indigenous conceptualisations of 'health' is the notion that the health of people and planet are synergistically interwoven

[3] Maslow's hierarchy: Maslow, A.H. (1943). A theory of human motivation, *Psychological Review*, 50(4):370–96.Available at http://psychclassics.yorku.ca/Maslow/motivation.htm

[4] For overview of 'social determinants of health' refer to the World Health Organisation website http://www.who.int/social_determinants/thecommission/finalreport/en/

(Cajete 2000; Griffiths and Kinnane 2010; Hunt et al 2009; Kingsley et al 2009). This results in a contract between people and the places they live, whereby 'caring for country' is an ongoing responsibility, undertaken by all (Anderson 1995; Brody 1987; Ganesharajah 2009; Weir et al 2011). Local practices, in the context of contemporary influences, will determine how this occurs in different ecozones (Garnett and Sithole 2007). However, the overarching belief is essentially the same, that is, 'healthy country' facilitates 'healthy people', and 'healthy people' are better able to ensure 'healthy country'. In this way, 'health' embraces a mutually beneficial idea of exchange between individuals, communities, land, sea, air, and spirit in an ongoing cycle (Cajete 2000). Thus, understanding 'Indigenous health' requires understanding these interplays (Eckermann et al 2006).

The challenge then is how to fit these broad, multidimensional understandings into the standardised spaces created, and favoured, by a predominantly biomedical understanding of health (Eckermann et al 2006; Ivanitz 1999). Epidemiology is a major tool in this regard, and affords the capacity to gather data in a homogenised manner, thus enabling comparisons against established norms. This is useful if the aim is to measure discrete aspects of a populations 'health', and then present them in a predominantly biomedical frame. Arguably, epidemiology facilitates the measuring of 'like against like', and can map outliers to the agreed norms it utilises. With respect to 'Indigenous health', epidemiology has been a well-used tool (Brough 2001; Kowal and Paradies 2005, 2010; Taylor et al 2010). However, given the breadth and complexity of Indigenous conceptualisations of 'health', which extend far beyond just physiology and psychology, how effective is epidemiology in elucidating 'health' in Indigenous contexts? What other ways might there be, or might need to be developed, to meaningfully explore and map these broader and more layered understandings? This is particularly pertinent when seeking to understand how ecosystems interplay with 'health', and why this is important to appreciate in many Indigenous contexts. Current dominant constructions of 'Indigenous health' do not necessarily grasp or consider this, let alone measure it. This appears a major gap, and has resulted in narrow presentations of 'Indigenous health' (Kowal 2008; Paradies 2006; Stoneham 2014). This belies the wider, and fundamental, socio-ecological interplays that are occurring, and arguably are determining, many Indigenous people's experiences of 'health' today.

## 2.2. Why is land important to understanding 'Indigenous health'?

### 2.2.1 *Healthy country, healthy people*

Key to addressing 'Indigenous health' issues, and the current inequities that exist, is an understanding of Indigenous people's fundamental connections to 'land'.

> *Our identity as human beings remains tied to our land, to our cultural practices, our systems of authority and social control, our intellectual traditions, our concepts of spirituality, and to our systems of resource ownership and exchange. Destroy this relationship and you damage - sometimes irrevocably - individual human beings and their health (Anderson 1995:15).*

This assertion is based on a two-way interrelationship whereby the health of the land/sea itself is considered fundamental to human health. In Australia, this has been referred to as 'healthy country-healthy people' (Putnis et al 2007). Over many decades, Indigenous people, including authors from a variety of academic disciplines and ecozones, have sought to explore and explain the intricacies of this interrelationship (King and Furgal 2014). Fundamental to this is the appreciation that Indigenous identities are tied to place, and that human and ecosystem health are inseparable, co-dependent entities. Embedded within this interdependent relationship are the ongoing struggles with separation from place experienced by many of the world's Indigenous people's because of a history of colonisation, and the ensuing policies of assimilation and eradication. 'Contemporary' Indigenous contexts pose challenges for remaining actively connected to 'place'. These connections are complicated by both the legacy of these histories as well as the more recent and rapid impacts of urbanisation, environmental changes from climate and competing commercial land uses, and sociocultural tensions from changing lifestyles, including participation in formal schooling and the market economy (Bjerregaard and Young 1998; Dombrowski 2007; Waldram et 1995).

This contemporary picture highlights a complex story whereby 'land rights' have become a central theme for the reclamation of Indigenous identity, and with it, 'health', in all of its meanings (Alston et al 2000; Blakney 2010; Gibson et al 2000; Kamugisha et al 1997; Natcher et al 2009). Thus, maintaining strong ancestral land-sea relationships has an intrinsic significance for human and ecosystem health

(Putnis et al 2007; Wilson 2003). However, in countries like Australia, New Zealand, Canada, and the United States of America, many Indigenous people live in regional or urban areas (United Nations 2009). This does not remove the ancestral land-sea connection, or its significance, but does complicate how it is understood in the context of contemporary Indigenous lives, and responses to inequities experienced by Indigenous people in these settings.

### 2.2.2 *Traditional Indigeneity*

A key consideration within this discussion is that the connection with 'culture' has been recognised as facilitating 'good health' through the maintenance of a strong Indigenous identity and sense of belonging (Fleming and Ledogar 2008; Wexler 2009). However, there is a tendency to "museumise" Indigenous people based on ideas of 'traditional Indigeneity' (Fairchild 1961; Krech 1999; Paradies 2006). This is a highly sensitive issue, and one that many health-focused researchers do not appear to have considered when investigating 'Indigenous health'. How 'traditional' practices operate within these 'contemporary' contexts is complex, and reflects a highly political blend of both historical and modern constructions of what it means to be 'Indigenous'. Having fought to be recognised at all by the State, many Indigenous people in these contemporary spaces have found themselves in a double bind. On the one hand, to be 'Indigenous' often requires claiming a singular identity to the exclusion of any other ancestry or cultural relationship formed by age, gender, class, sexuality, ethnicity or acquired through income or education (Paradies 2006). This is an understandable response to being excluded from the dominant societies that sought to either eradicate or subsume Indigenous people following colonisation. On the other hand, contemporary experiences, and the shared reality that cultures are fluid and change over time, mean that Indigenous identities, and lives led, are hybrid, reflecting a diversity that challenges these more linear constructions (Paradies 2006). This sits awkwardly with the socio-political constructions of a unique, and readily identifiable, 'authentic Indigeneity' that justifiably arose from the oppression of Anglo-settler occupation. It is in this context that contemporary Indigenous land-health interrelationships need to be understood.

The ongoing struggle for recognition of the significance of land-health interrelationships for the world's Indigenous people sits squarely at the heart of understandings of 'health'. However, the difficulty lies in understanding the complexities of contemporary Indigenous identities and ways of living in rapidly changing environments. Within this sits the tension about how 'health' is defined and approached, with a tendency to focus on narrow biomedical constructions that do not consider either this history or what it means to be 'Indigenous' and 'connected to land' in the 21st century.

## 2.3 What is the relationship between land-based practices and 'Indigenous health'?

### 2.3.1 *Benefits of participation*

Land-based practices[5] (LBP) are the major means by which many Indigenous people have sought to remain connected to the land/sea, with reciprocal benefits advocated for both people and place (King and Furgal 2014). In recent decades, particularly in developed country contexts, there has been increasing research and policy interest in facilitating/promoting LBP participation as a means to improve Indigenous health (Ganesharajah 2009; Garnett and Sithole 2007; Wilson 2003). In Australia, this has taken the form of 'healthy country-healthy people', whereby Indigenous people are encouraged to participate in 'on country' LBPs (Weir et al 2011). In Canada, the emphasis has been on promoting wild/country food consumption, including the hunting/fishing focused activities required to procure these foods (Egeland et al 2009).

With this impetus, the prevailing argument is that LBPs/'caring for country' are 'healthier', for both people and place. For Indigenous people, this occurs because participation in LBPs is considered to (King and Furgal 2014):

- increase physical activity with its associated cardiovascular benefits;
- promote consumption of a healthier diet based on country/bush/wild foods;

[5] Indigenous land-based practices (LBP) encompass a number of, often interrelated, activities, including hunting, fishing, harvesting and/or gathering of wild/country/bush foods, land care, and ceremony. In recent decades, LBP has also encompassed sustainable livelihood activities, such as Indigenous ecotourism, based on 'traditional' practices.

- facilitate cultural connection, which strengthens social/mental/emotional well-being/social capital;
- improve food security;
- offer economic benefits through engagement in commercialised LBP enterprises.

With respect to place, Indigenous LBP participation is considered to benefit the environment because:

- Indigenous people are seen as responsible land custodians through the practice of 'traditional knowledge' informed natural resource management (Weir et al 2011).

This is considered especially beneficial because many of the richly biodiverse landscapes in which Indigenous people engage in LPBs are under threat (Convention of Biodiversity 2014). Therefore, enabling/promoting LBP/'caring for country' by Indigenous people who occupy these landscapes has human *and* environmental health benefits.

### 2.3.2 *Risks of participation*

Sitting alongside these potential environmental positives of Indigenous land-health engagement are a growing list of potential negatives. Couched as 'risks', these include the emerging impacts of climate change; contested land uses, including those arising from the presence of extractive industries; environmental contaminants which have entered the food chain; and the tensions between the pros and cons of Indigenous-led ecotourism activities (King and Furgal 2014).

Each of these is a major field of research inquiry, and one of the most substantive has been the impacts of climate change on these fragile ecosystems, and the consequences for Indigenous health (Furgal 2008; Green et al 2009a; Green et al 2009b). Ironically, these impacts, and potential opportunities for development of adaptation strategies linked to LBPs, were overlooked in initial climate change and health discussions (McMichael et al 2009). Once again, Australia and Canada were progressive in this arena with respect to advocating Indigenous engagement (Green

et al 2009b; Seguin 2008). This was on the background of efforts by the United Nations to address the opportunities and vulnerabilities for Indigenous people from climate change impacts, especially regarding health[6]. As a result, this research project commenced its exploration of Indigenous land-health interrelationships through a climate change lens. In particular, the potential role of utilising Traditional or Indigenous Ecological Knowledge[7] (TEK or IEK) approaches as a tool for climate change adaptation in Indigenous contexts. Two co-authored manuscripts and a co-authored editorial were initially published with this emphasis in mind (Appendices F, G and H). However, as this project unfolded, it became apparent that climate change was just one of a number of interrelated environmental drivers potentially influencing 'Indigenous health' (King and Furgal 2014). Consequently, the research broadened to encompass a socio-ecological frame to reveal the multifarious influences on Indigenous land-health interrelationships. Climate change issues thus became one of a number of the embedded influences.

### 2.3.3 *Land-based practices in focus*

Utilising this broader benefits-versus-risks frame, the role of LBPs in defining and impacting understandings of Indigenous health was developed into an illustrative case study. The learning derived from this entry point challenged a number of the previously held assumptions about Indigenous LBP engagement and health outcomes. This research project maps the journey of those discoveries, and presents an argument for moving beyond the disciplinary, ecozone, and field of inquiry boundaries that have framed investigation and presentation of Indigenous land-health interrelationships to date.

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[6] The International Indigenous Peoples Forum on Climate Change (IIPFCC) has been part of the United Nations Framework Convention on Climate Change (UNFCCC) since 2000.

[7] TEK/IEK: For many Aboriginal people, Indigenous ecological knowledge encompasses all aspects of human and environmental relatedness. It is culturally embedded in a relationship with country and consists of detailed knowledge of species and natural resources, as well as a wide ranging set of land and sea management principles geared towards sustainable use.

## 2.4 References

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# CHAPTER THREE

## METHODOLOGICAL CONSIDERATIONS

*If we knew what it was we were doing it would not be called research, would it?* Albert Einstein

### 3.1 Community connections

The approach to investigating the interconnected questions examined in this thesis was threefold and, as with all good research journeys, non-linear, unfolding over time and space. Engagement with Indigenous elders, researchers, land/sea custodians, activists, and policy advisors in both North America and Australia was actively woven through the years of this process, from a summer Indigenous science camp in the Yukon with 250 First Nations participants representing the 76 Tribal members of the Yukon River Inter-Tribal Watershed Council, to catching fish discussing the meaning of 'country' with Kuku Nyungkal rangers and elders on the Mulgrave River north of Cairns in Queensland, Australia, to an Inuit hunters meeting debating the place of caribou in the contemporary lives of Indigenous peoples in the Canadian Arctic. This thesis is underpinned and informed by the ideas, insights, and reflections arising from the many thought-provoking conversations and experiences that occurred in these and other settings.

### 3.2 Theoretical frame

These experiences 'on country' led to a broad and encompassing approach to identifying and critiquing the literature, and engaging with the subsequent case study database analyses. To achieve this a transdisciplinary lens was used, which framed the ways of engaging with both the literature, and analyses. "Transdisciplinarity" is an emerging and evolving practice that aims to transcend existing disciplinary boundaries, and, in so doing, create new ways of thinking and knowing (Brown et al 2010; Horlick-Jones and Sime 2004; Max-Neef 2005; Stokols 2006). In health, transdisciplinary approaches are rapidly emerging as a conceptual means of unifying understandings, and developing workable solutions, to intractable problems (Albrecht 1990; Albrecht et al 1998; Rosenfield 1992; Stokols et al 2013). This lens was chosen because of its capacity to see beneath and beyond linear representations of the world, and for its consideration of the multiplicity of interplays that contribute to complex concepts. With respect to 'health', this approach enabled

acknowledgement, and exploration, of the intersections between the 'physical' variables of genetics and physiology, and those arising through social, political, cultural, economic and ecological factors (Albrecht et al 1998; Thompson Klein 2004). Another advantage of working with transdisciplinarity is its non-privileging approach to knowledge systems (Albrecht 1990). This is particularly pertinent when engaging with marginalised world views, such as those encompassed by Indigenous concepts of 'health'.

Transdisciplinarity is very much a world-view, a way of thinking, rather than a predetermined set of methods or practices. This 'way of thinking' seeks to draw together disciplinary specific theories, concepts and approaches to understand the issues under consideration (Rosenfield 1992). At an individual researcher level, it involves synthesizing findings from a multitude of disciplines to provide a comprehensive explanation of a complex issue (Albrecht et al 1998). This approach enables an appreciation of the multiplicity of causal connections at play, and, it is argued, the complexities within 'Indigenous health' require such a comprehensive and reflective process of inquiry. One of transdisciplinarity's key concepts is 'transformation knowledge' (Hirsch Hadorn et al 2006; Max-Neef 2005), which was embraced as the broad frame in which to place this research project. 'Transformation knowledge' enables the evaluation of different problem-solving strategies with the aim of changing existing habits, practices and institutional responses towards achievement of a shared goal (Horlick-Jones and Sime 2004; Stokols et al 2013). Such an approach embraces complexity, which facilitates the identification of 'blind spots' in existing ways of knowing, thereby enabling the creation of novel solutions (Albrecht et al 1998). This considered, reflective, and expansive 'way of seeing' seemed a good fit given the focus of this research project. Figure 3.1 encapsulates the conceptual framework adopted in this undertaking, illustrating the dynamic processes of engagement and reflection that are required to 'make sense' of a complex issue (Albrecht et al 1998). In the Indigenous contexts encountered during this work, the willingness to accept complexity and uncertainty as givens rather than trying to control for, or eliminate them, ensured survival: this was transdisciplinary thinking in practice. Transdisciplinarity embraces this challenging but pragmatic approach, and offered many advantages when seeking to traverse and investigate the multifaceted issues found within Indigenous land-health interrelationships.

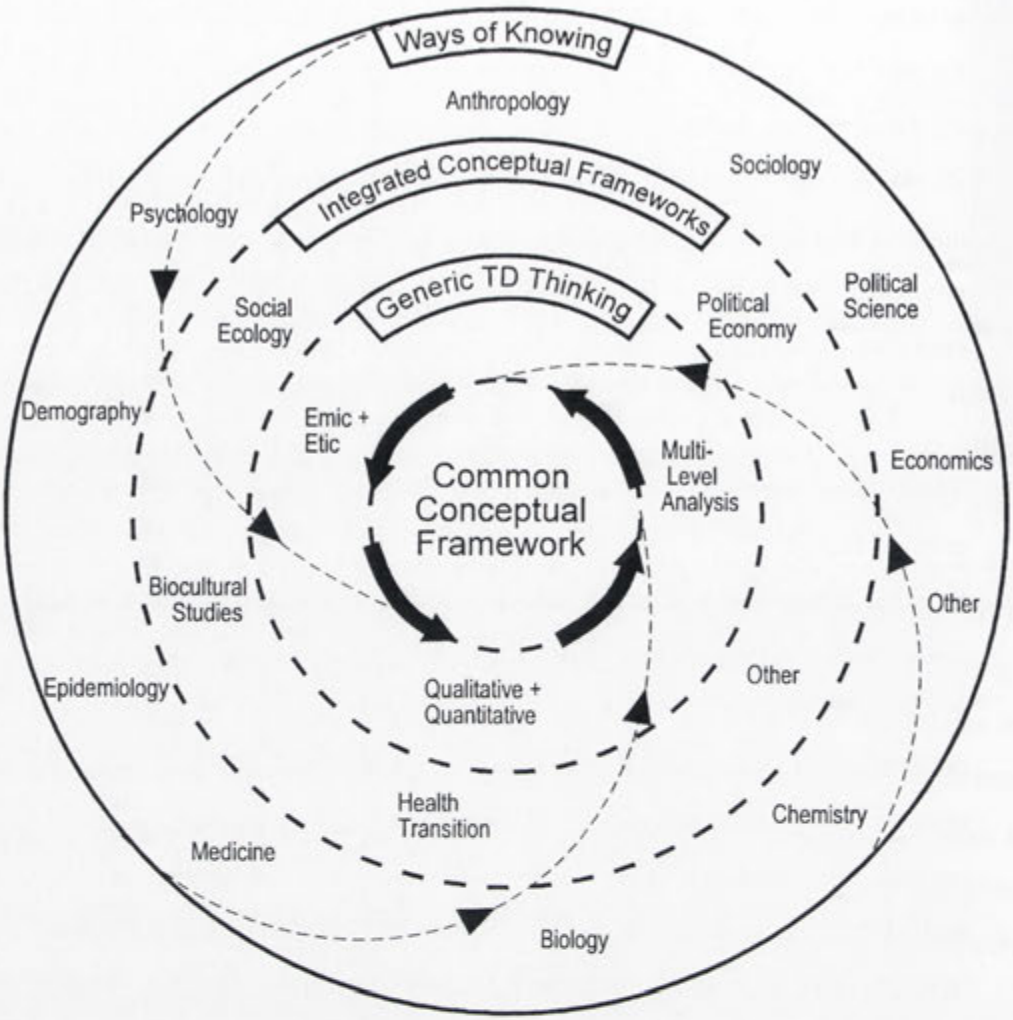


**Figure 3.1**: The dynamic process of transdisciplinary thinking (Albrecht et al 1998).

Embedded within this conceptual space are the evolving ideas of complexity theory. Predating these ideas were those of 'wicked[1] problems'. Complexity theory acknowledges the necessity of needing the "non-discipline" of being able to work across disciplines (Nelson quoted in Chu and Simpson 1994:21), and understanding that the sum is greater than the parts (Davies 1989). 'Wicked problems' are complex issues that defy complete definition, and for which final solutions are not possible because in finding resolutions, these, in turn create further issues, so it is more useful to acknowledge that solutions are neither good nor bad nor definitive, simply the best that could be developed at the time (Rittel and Webber 1973). Whichever of these frames are used, the principle is the same, some issues are so complex, existing modes of enquiry and decision making are not adequate to consider, let alone attempt

[1] 'Wicked', not in a moral sense but diabolical in that they resist all usual attempts at resolution.

to redress, them. Further, each resolution creates more issues that then need to be incorporated into decision-making, thus the process is continuous and unpredictable. This is the antithesis of the methodological reductionism (Glass and Hall 2008), which has tended to be adopted in statistically-driven approaches to understanding human health, and has emerged as a dominant way of engaging with and presenting 'Indigenous health' (Brough 1991; Kowal and Paradies 2010; Taylor et al 2010). However, unless epistemological and ethical processes, including critical reasoning, are open, themselves, to inquiry and scrutiny, then 'knowledge' risks sliding into reified, dogmatic or closed schemas (Feyerabend 1993, 1999). When the concepts of 'health', and particularly 'Indigenous health', are placed in this space, one 'way of seeing' favours possibilities and fluidity, with uncertainty and complexity considered integral parts of the package, while the other advocates absolutes and definitives with every attempt made to remove uncertainty and contain complexity. Each of these ways of seeing and engaging has advantages and disadvantages, with a combination of these approaches potentially synergistic (Fang 2011). Nonetheless, with respect to 'Indigenous health' constructions, the socio-cultural consequences of a statistically-driven frame have become problematic and require further critique (Brough 1991; Kowal and Paradies 2010; Taylor et al 2010).

On this background, one of the key advantages of adopting a transdisciplinary approach to 'health' problems is the ability to move beyond linear understandings and associations of cause and effect relationships. As a concept, 'Indigenous health' has many documented cause and effect statements attached to it. However, as an experience it is much more than the sum of its parts. Thus, the theoretical thinking used for this research project aimed to do more than just identify the separate bits that 'Indigenous health' appears to comprise, and then link them with land-health interrelationships. Instead, the aim was to try to understand the bits *and* capture the interplays and complexities created when these bits are considered together, and see what new understandings might emerge. The only way to do this meaningfully was by using a transdisciplinary approach.

> *The task is therefore to draw on all our intellectual resources, valuing the contributions of all the academic disciplines as well as other ways in which we construct our knowledge...to allow for a holistic leap of the imagination (Brown et al 2010:4).*

### 3.3 International literature review

Using these principles, an international, interdisciplinary literature review was undertaken to identify methods used, priorities emphasised, and understandings presented of Indigenous land-human health interrelationships. The aim was to obtain a wide-ranging and over-arching view, as well as illustrative examples, of what was being studied, where, how and by whom, for what expressed purpose(s) and outcome(s). This entailed identifying and reviewing a substantive and diverse international literature, encompassing a wide range of disciplinary perspectives, methodologies, and ecozones. With the transdisciplinary thinking model as a guide (Figure 3.1), published and grey literature available in English was accessed from online databases and repositories, as well as leading Indigenous organisations in Australia, New Zealand, Canada and the United States of America. The process and findings of this are presented in Chapter Six. This approach enabled significant gaps, contradictions, tensions and opportunities to be identified and explored through a global lens, which had not previously been done. These literature review findings were then used as a guide to determining the focus of each of the three other main manuscripts produced for this thesis. Using a transdisciplinary approach, each of these subsequent manuscripts used analyses of data from a case study (detailed below) to focus on a key 'health' issue connected with Indigenous land-health interrelationships. In so doing, they draw together new 'ways of seeing', and collectively contribute deeper understandings to the wider discourse of 'Indigenous health'; these manuscripts are presented in Chapters Seven, Eight, and Nine.

### 3.4 Epidemiological case study

One of the issues that emerged through the literature review was a clear preference for the 'evidence' provided by epidemiological enquiry methods (King and Furgal 2014). As such, understanding and critiquing the reasons for, and consequences of, this preference became an important part of the thesis. As arguably one of the 'privileged' disciplines of biomedicine with respect to uptake in health promotion strategies and policy responses, epidemiological approaches were seen as providing the most credible data for understanding and responding to Indigenous land-human health interrelationships; a debatable view (Brough 1991; Kowal and Paradies 2010; Taylor et al 2010). The further the journey went into the literature, the more

problematic this 'privileging' became, with three main issues arising. Firstly, the relative absence of both datasets, and analysis of them, that had looked at the relationships between Indigenous LBP participation and 'health' (King and Furgal 2014). Secondly, the (lack of) capacity of epidemiological approaches to consider the complexity inherent in Indigenous land-health interrelationships, in particular, the holistic considerations embraced within Indigenous understandings of 'health', and the broader socio-ecological issues framing and impacting 'health' (Arabena 2010; Kowal 2008). Thirdly, the absence of acknowledgement of the cultural lens embedded within epidemiology, and the how this influenced the use, interpretation, and consequences, of results derived from these methods with respect to 'Indigenous health' (Altman et al 2009; Cowlishaw 2004; Brough 1991; Kowal and Paradies 2005, 2010).

In an attempt to shed light on these interrelated questions, a search was made for a large Indigenous health-focused database, which could be used as a case study to explore these issues. One of the largest epidemiological surveys undertaken on Indigenous health identified was the "Qanuippitaa? (How are we?) Nunavik Inuit Health Survey (described in more detail below), which had gathered extensive data on the remote Inuit communities living in the region of Arctic Quebec, Canada. After a two-year process of negotiation, access was granted to analyse a selection of data from this Survey. The resulting analyses were incorporated into the suite of interrelated manuscripts at various stages of publication that comprise Chapters Seven, Eight, and Nine. These papers used the analyses to explore the broader questions about the strengths and limitations of current discipline-specific 'ways of seeing' and investigating 'Indigenous health'. In so doing, each of these data-focused papers offered deeper perspectives on key aspects of Indigenous land-health interrelationships. Importantly, the findings in these papers present a cogent argument for ensuring 'Indigenous health' is firmly placed within the socio-ecological contexts that both inform and determine it. In particular, this enquiry highlighted the importance of moving beyond the cultural and metric-based confines of favored tools, such as those of epidemiology, towards a more transdisciplinary engagement that considered many perspectives and knowledge systems (Albrecht 1990; Altman et al 2009; Brough 1991; Brown et al 2010; Cash et al 2003).

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# CHAPTER FOUR

## CASE STUDY - "Qanuippitaa?" (How are we?)

> *There are two kinds of Arctic problems, the imaginary and the real. Of the two, the imaginary are the most real.* Vilhjalmur Stefansson (The Arctic in Fact and Fable)

## 4.1 Introduction and Background

The Nunavik Inuit Health Survey was a region-wide undertaking co-ordinated by the Nunavik Regional Board of Health and Social Services (NRBHSS) in collaboration with the Ministere de la Sante et des Services Sociaux (MSSS) du Quebec, and Institut national de santé publique du Quebec (INSPQ), the Unite de recherché en santé publique (URSP) of the Centre hospitalier universitaire de Quebec (CHUQ), and Institut de la statistique du Quebec (ISQ). The Survey's aim was to verify the evolution of health status and risk factors in the 14 communities that comprise the Nunavik region in the Arctic north of Quebec. The 2004 Survey was designed to progress the findings of the original region-wide Survey conducted by Sante Quebec in 1992. This original Survey was prompted by concerns about the impacts of socio-cultural, economic and environmental changes being experienced by Inuit in this region. As a population in transition, co-ordinated monitoring of population health and its determinants was considered essential for the development of effective health prevention and promotion programs. Both the 1992 and 2004 Surveys were some of the largest of their kind in the world, and have enabled detailed analysis of health patterns over time in this Inuit population. No equivalent, large scale health surveys with Indigenous communities have been undertaken outside of Canada so the Nunavik Surveys offer a unique epidemiological window into the many and complex issues impacting Indigenous people's health today. Given the scale and cost of these Surveys, estimated at approximately AU$3 million for each iteration, the Nunavik Survey data managers encourage use of the data for the purposes of improving health outcomes for the Nunavik Inuit.

To date, there have been 19 thematic reports[1] published by the INSPQ from analysis of the 2004 Survey. Presenting mainly descriptive analyses, these address many of the key issues identified in the Survey, including health outcomes related to tobacco

[1] INSPQ website http://www.inspq.qc.ca

use and gambling, exposure to environmental contaminants, transportation injuries and safety, nutrition profiles, cardiovascular health, and women's health[2]. However, to date, no detailed analysis of the available Survey data had been undertaken addressing the interrelationships between participation in key land-based practices (LBP), such as hunting, and human health. This was despite the Nunavik population, and other Inuit communities, increasingly expressed concerns about the strained relationship between participation in LBP and people's health, a consequence of rapidly modernizing lifestyles and changing regional environments. Of particular concern was the belief that reduced participation in LBP meant reduced levels of physical activity, and this was adversely impacting people's health and well-being. This research project sought to address this gap in knowledge by identifying, and subsequently analysing, the relevant variables in the Survey related to LBP and human health behaviours/outcomes.

Initial discussions about the project occurred during late 2009 and early 2010 with the Nunavik Nutrition and Health Committee (NNHC), who were the body responsible for overseeing the use of the data. A formal proposal for the research project was subsequently submitted in July 2010 (Appendix A). Following further submission of an analytical protocol, which detailed the specifics of the variables to be used, and proposed analysis (Appendix B), approval to access the 2004 Survey data was granted in August 2011. With this approval, the NRBHSS and INSPQ were then approached to release the requested data (Appendix C). All requested data were consequently made available in November 2011. Details of the variables used and the analyses undertaken are included with each of the relevant manuscript-based chapters in this thesis.

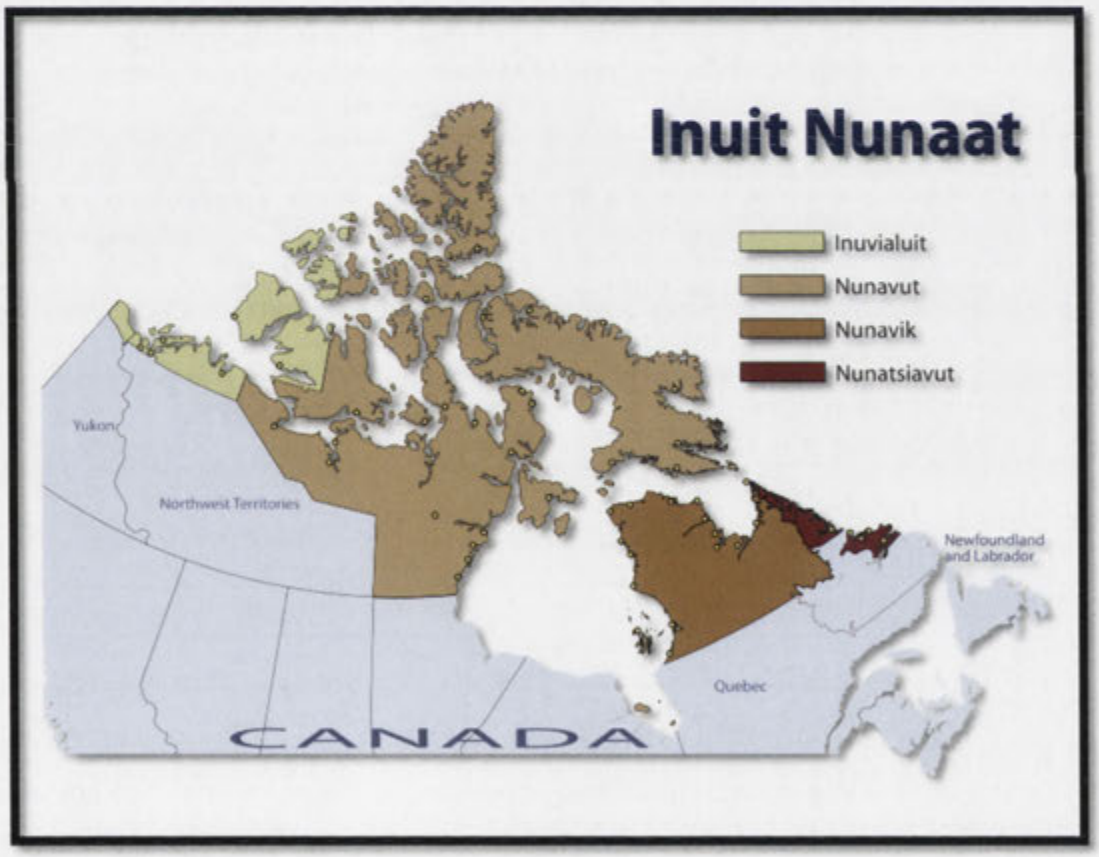
Following is an overview of the 2004 Nunavik Inuit Health Survey, explaining its location, aims and objectives, design, frame and sampling, and data collection methods.

[2] The INSPQ has published all of these reports in English and they are available online at http://www.inspq.qc.ca/english/publications/default.asp?Submit=1

### 4.2 Location

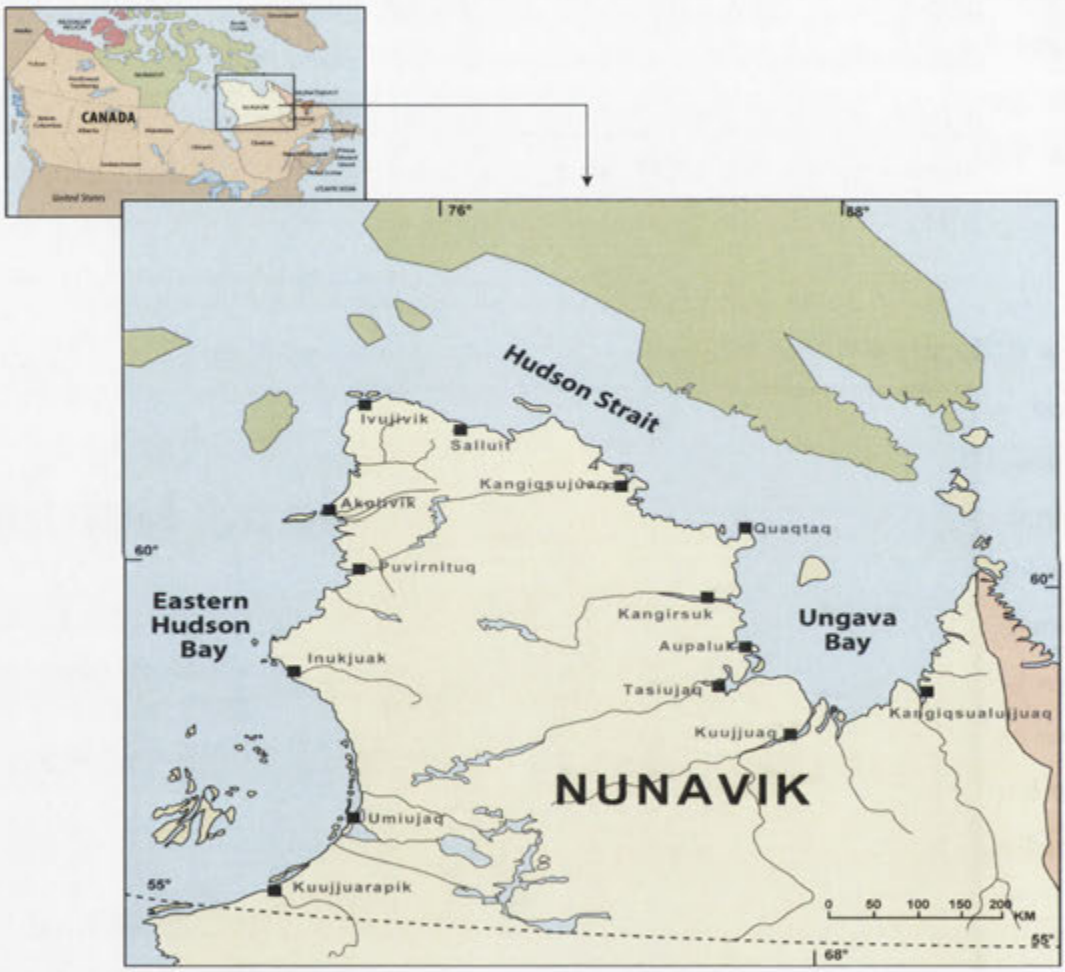
The territory of Nunavik lies north of the 55th parallel in Quebec, Canada, and covers a third of the total surface area of the province. The territory is within a larger area known as the Canadian North or Canadian Arctic. There are three recognized territorial administrative regions in the North – Nunavut, Yukon, and North-West Territories, all north of 60°. Nunavik (Arctic Quebec north of 55° N), and the north coast of Labrador within the Nunatsiavut land claim settlement, are also considered part of this Northern region (Figure 4.1). These regions have communities with proportionally large Indigenous populations, and share many bio-geographical characteristics with the other Arctic regions of Canada. Nunavik, in northern Quebec, is home to 10,750 Inuit, or 18.1% of the total Inuit population, and Inuit living in Nunavik account for 89.1% of the total population of this region (Statistics Canada 2011).

**Figure 4.1:** Map of the Inuit regions of Canada (www.itk.ca)



The Nunavik population resides in 14 coastal villages, divided into two sub-regions by coast. The Hudson coast includes the villages of Kuujjuarapik, Umiujaq, Inukjuak, Puvirnituq, Akulivik, Ivujivik and Salluit, while the Ungava coast includes Kangiqsujuaq, Quaqtaq, Kangirsuk, Aupaluk, Tasiujaq, Kuujjuaq and Kangiqsualujjuaq (Figure 4.2).

**Figure 4.2:** Map of the Nunavik territory (www.itk.ca)




At the time of the 2004 Survey, Nunavik comprised approximately 9632 inhabitants, 91% of who identified as Inuit (Statistics Canada, 2011). The target population of the Survey was permanent residents of Nunavik living in private Inuit households, and participants had to be over 15 years of age. Additionally, at the time of the Survey, it was estimated that 40% of the total Nunavik population were under 15 years of age (Statistics Canada 2011).

### 4.3 Design Frame and Sampling

Two-stage stratified random sampling was used to select private Inuit households with proportional allocation. The community was the sole stratification variable used. The Methodological Report (Rochette and Blanchet 2007) argued that basing sampling on households rather than individuals was appropriate because many Inuit move frequently from house to house, therefore, household recruitment was seen as a means of increasing coverage of the target population. A proportional allocation of sampling units corresponding to the size of each village was chosen (Table 4.1). This approach resulted in a 77.8% household response rate.

**Table 4.1: Breakdown of Nunavik Households in the Sample Frame by Village** (Rochette and Blanchet, 2007)

| Municipality | Inuit households (Total) | Inuit households (Sample size) |
|---|---|---|
| Kuujjuarapik | 138 | 45 |
| Umiujaq | 77 | 25 |
| Inukjuak | 281 | 91 |
| Puvirnituq | 271 | 88 |
| Akulivik | 99 | 32 |
| Ivujivik | 54 | 17 |
| Salluit | 210 | 68 |
| Kangiqsujuaq | 113 | 37 |
| Quaqtaq | 70 | 23 |
| Kangirsuk | 93 | 31 |
| Aupaluk | 36 | 12 |
| Tasiujaq | 53 | 17 |
| Kangiqsualujjuaq | 153 | 49 |
| Kuujjuaq | 441 | 142 |
| **Total** | **2089** | **677** |

An extensive, Inuit-led promotional campaign was designed and conducted to facilitate widespread Inuit community involvement with the Survey, and distributed in three locally spoken languages: Inuttitut, English and French.

## 4.4 Data collection

### 4.4.1 Overview

Among the 677 households visited by the interviewers, 521 agreed to participate in the Survey. The individual response rates were obtained by multiplying the household participating rate by the individual collaboration rate since the household and individual instruments were administered in sequence. The collaboration rate corresponded to the proportion of eligible individuals who agreed to participate among the 521 participating households. In this Survey, about two thirds of individuals accepted to participate for a response rate of approximately 50% for most of the collection instruments used in the Survey. A total of 1056 individuals signed a consent form and had at least one test or completed one questionnaire (Table 4.2).

**Table 4.2: Response rates for the 2004 Nunavik Inuit Health Survey Individual Questionnaire, Clinical Session and Test** (adapted from Rochette and Blanchet, 2007)

| Questionnaire | Eligibility Criteria | Number of eligible individuals | Number of participants[1] | Collaboration rate (%) | Response rate (%)[2] |
|---|---|---|---|---|---|
| **Individual** | 15 years of over | 1527 | 1052 | 68.9 | 53.6 |
| **Clinical Session** | 18-74 years | 1330 | 925 | 87.9 | 68.4 |
| **Clinical Test** | | | | | |
| • Venous Blood Sample | 18-74 years | 1330 | 919 | 69.6 | 54.1 |

[1] For the clinical tests and anthropometric measurements, eligible individuals were estimated since the information about pregnant women and diabetic individuals was available for respondents only.
[2] The response rate is the product of the collaboration rate and response rate to the household questionnaire (77.8%).

A Canadian Coast Guard icebreaker ship, the 'Amundsen', was used to administer the Survey. Overhauled for scientific research purposes by ArcticNet, a Canadian government funded research collaboration focused on circumpolar research, the ship served as a base for data collection as it stopped in each community. Between August 27 and October 1, 2004, the 'Amundsen' visited all 14 Nunavik villages.

The Survey was based on self-administered and interviewer-completed questionnaires, as well as a clinical component involving a nurse-completed questionnaire, and anthropometric and biological measurements.

### 4.4.2 Variance Estimation

The 2004 Survey used the bootstrap technique[3] for the estimation of variance derived from the sample design. The justification for this was that, given the Survey's complex sampling method, the bootstrap method afforded the greatest precision. As such, subsamples were drawn from the original sample and estimates then generated on those subsamples, with the variance deduced by measuring the dispersion between those estimates. This technique relied on the sampling weights produced by the ISQ in order to calculate the bootstrap weights subsequently used. This technique meant that variables collected in each of the Survey instruments could not be cross-tabulated or cross-referenced, except for those in the *individual* tool with the results in the *clinical sessions* and *clinical tests*.

### 4.4.3 Land-based Practice (LBP) data

In the surveyed Nunavik communities, the main LBP activities were hunting and fishing, and these were the central issues focused on within the data analysis for this study. Berry collecting was also captured in the Survey but was a single season activity and, therefore, not included in subsequent analysis. Hunting and fishing were both recorded by frequency of participation by season (spring, summer, fall, winter). These constituted only two questions in the Survey, and were the only questions that captured respondent's participation in LBP activities.4 Given the key role played by hunters in these communities, it was decided to focus on the hunters rather than the fishers. Thus, although analyses on both hunters and fishers were done, only the hunter analyses were subsequently presented in the manuscripts produced for this thesis. Given the predominance of hunting-focused research in the literature, this emphasis also enabled more direct comparison of the analyses with this broader body of research.

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[3] Bootstrap sampling is a technique that relies on random sampling with replacement - i.e. it enables inference about a population from sample data to be modeled by resampling the sample data and performing inference on these. For a more detailed explanation see Efron, B. and Tibshirani, R. (1993). *An Introduction to the Bootstrap*, CRC Press, Boca Raton, Florida, USA.

[4] It was interesting to note that despite the significance afforded LBPs in these communities, the Nunavik survey did not seek to capture more detailed data about these activities. The reasons for this could only be postulated and may have reflected assumptions made about how LBPs were perceived in these communities and/or assumptions about the interrelationships between LBPs and 'health'. Whatever the reasons, the paucity of available variables that captured data on LBPs significantly limited the analyses.

### 4.5 References

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# CHAPTER FIVE

## ETHICAL CONSIDERATIONS

> *You can't stay in your corner of the Forest waiting for others to come to you. You have to go to them sometimes*. A.A. Milne (Winnie the Pooh)

## 5.1 Procedural ethics

Research involving Indigenous people has a long and troubled history (Anderson 2002; Smith 1999). As such, great care was taken in the framing, undertaking, and dissemination of findings for this research project. This project involved both scholarly critique of existing literature, and analyses of data in an existing database. Two ethical frames were utilized to facilitate responsible approaches to working with each of these, and the findings presented. These were the Australian National Health and Medical Research Council (NH&MRC) Values and Ethics: Guidelines for Ethical Conduct in Aboriginal and Torres Strait Islander Health Research (NHMRC 2003), and the Inuit Tapiriit Kanatami (ITK) guidelines for responsible research in Inuit communities (ITK and NRI 2007). The NH&MRC is the national body overseeing human research ethics in Australia. Inuit Tapiriit Kanatami is the national Inuit organization of Canada advocating for the interests and concerns of Inuit in Canada. Both of these organisations have a strong emphasis on the ethical conduct of research with Indigenous communities. This includes the centrality of negotiating meaningful relationships with Indigenous stakeholders, and clearly articulating the benefits of the research for the communities involved.

The questions asked in this project through analyses of the Nunavik Inuit Health Survey were initially raised by the NNHC. These questions arose as part of an ongoing discussion in Nunavik about the possible connections between community participation in LBPs and improved health outcomes. The subsequent Survey analysis undertaken for this project sought to provide possible answers to these questions. From the initial project proposal (Appendix A) and analytical protocol (Appendix B), there was ongoing formal and informal reporting to the NNHC, and key stakeholders associated with the database. This involved presentation of findings as the analyses progressed, review of drafts of each proposed paper to be published that included the data analyses, and review of data to be presented at several international conferences during the research project.

Additionally, attendance at a key Inuit hunters meeting in Edmonton, Alberta, Canada in April 2010 enabled a face to face meet and greet with many of the Inuit community representatives who were interested, and potentially impacted, by the findings of this research project. This project formed part of a much larger International Polar Year Program funded initiative in Canada, and was supported by both the ArcticNet research program (Network Centres of Excellence), and the Nasivvik Centre for Inuit Health and Changing environments in Canada. Formal ethics approval for this specific project was given by both the Canadian data and Survey managers (NNHC, INSPQ), and the Australian National University, under the guidelines of the NHMRC/AVCC (Australian Vice Chancellor's Committee) National Statement on Ethical Conduct in Human Research (Appendix E).

### 5.2 Personal Positionality

'Personal positionality' refers to an acknowledgment of the self and inherent subjectivity of the research process that involves naming key characteristics of the individual researcher that might suggest ways the research has been influenced (Hay 2005). It recognises that who is doing the research matters to research participants, and influences the research process and outcomes. The concept of 'personal positionality' was encountered during time spent over several extended visits with the graduate research students in the Health, Environment and Indigenous Communities Research (HEIC) group at the Indigenous Environmental Studies (IES) program at Trent University, Peterborough, Ontario, Canada. The HEIC group, and the IES program, provided a substantive base of support over the course of this research project. Offering one of the few integrated Indigenous environment, health and science research-focused programs in the world, the group and program were rich and generous spaces to explore these issues.

As a non-Indigenous Australian finding herself researching Inuit in an Arctic region of Quebec, Canada, questioning how and why I had arrived there appeared important to the integrity of the work being undertaken. The path involved a meandering and continuously unfolding physical, intellectual and emotional journey, the essence of which is difficult to encapsulate. The following attempts, at least in part, to explain

the key influences and frames of reference that have, and continue, to underpin my engagement in this area of research. Additionally, the two short videos[1] produced during my doctoral candidature for inclusion in a core 'culture and health' unit for health science students I was teaching at the University of Western Sydney (UWS), New South Wales, Australia, offer further depth of explanation (CADRE 2010).

On this background, my positionality statement is detailed below:

*Growing-up Anglo-Australian on the east coast of the vast, dry continent that is Australia, my first encounters with Indigenous issues came from my father. Fascinated by his stories of a young British farmer travelling to the former Rhodesia (Zimbabwe), I listened enthralled to his tales of being chased by elephants, outrunning baboons on an old Norton motorcycle, and working on a tobacco plantation. Woven into these narratives were the not so hidden injuries of race, quietly recalled by a man still reflecting on being a white man in a black country. A family trip to Papua New Guinea in 1979 brought me face to face with what my father had been talking about – the injustices of race based on power and resulting structural inequity. This stayed with me, and, many years later as a junior medical doctor, I chose to work in the Australian Central Desert, where I experienced first hand, and for the first time, these injustices in my own country.*

*The soul searching that followed these early years of my medical career made me begin to question the biomedical approaches to human health, particularly Indigenous health, that formed the bulk of the health response in Australia. I could not see the sense in either this narrow a focus nor waiting until people had washed down to the end of the stream before the system fished them out, sick and often defeated, to respond to their needs. Paralleling these reflections in the desert was a growing appreciation about how disconnected I, along with so many non-Indigenous Australians, were from the 'health of the places' we lived in, and why this mattered.*

[1] Links to UWS videos:
http://webapp.cadre.com.au/applications/cocm/permalink.php?link=129255242910;http://webapp.cadre.com.au/applications/cocm/permalink.php?link=129254126310

*My parents had also been hippies and we grew up 'herbal' at a time well before it became cool in Australia. Alfalfa sprouts grew on the kitchen windowsill, I built my own veggie patch in primary school, and we went to yoga classes. My folks ran a health food shop. In that world, 'healthy' meant knowing where your food came from, understanding that humans functioned best with body and spirit connected, and community was about communication.*

*Over the years, these seemingly disconnected experiences coalesced into a passion for working with social justice, a love of seasonal foods, and being in the outdoors. The hybrid worldview that emerged from these formative years saw me increasingly becoming involved in ecology and public health. A chance offer to speak at a conference in New York allowed me to meet Indigenous researchers and activists engaged in Traditional Ecological Knowledge[2] (TEK) and climate change responses. From there I encountered many more ways of seeing, imagining and being 'healthy in place'. The North American connections made during that trip led me to Canada, and the work of the Indigenous Environmental Studies program at Trent University, Ontario. Since then I have had the privilege to journey around the globe in search of deeper understandings of 'health and place'. Indigenous voices were always the most prophetic on these travels, and are the ones that resonate most strongly still.*

[2] Traditional Ecological Knowledge (TEK) or Traditional Indigenous Knowledge (TIK) refers to a way of seeing by Indigenous people to engage in the world. Berkes (1993) considers four interrelated levels within TEK termed the knowledge-practice-belief complex: Firstly, knowledge based on empirical observations essential for survival (species taxonomy, distribution, and life cycles); the second focuses on the understanding of ecological processes and natural resource management (practices, tools, and techniques); the third is the socio-economic organization necessary for effective coordination and cooperation (rules and taboos); and the fourth is referred to as the worldview or "cosmovision" (religion, belief, and ethics).

### 5.3 References

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# CHAPTER SIX

## Is hunting still healthy? Understanding the interrelationships between Indigenous participation in land-based practices and human-environmental health

## 6.1 Introduction

The intellectual starting point for this project was finding what was currently known, and being presented in the literature, about Indigenous land-health interrelationships. As each thread was pulled to unravel the fabric of current understandings, more threads emerged. It quickly became apparent that a narrow disciplinary or geographic focus for this inquiry missed important connections. Using a transdisciplinary framework, the literature review presented in this Chapter highlights the challenges of this process and the benefits of a multidisciplinary inquiry. The resulting published paper also presents a novel approach to considering Indigenous land-health interrelationships that demonstrates the need to consider the inherent complexity that is occurring in this space.

Unintentionally, hunting became a major means of investigating, and understanding, the complexities inherent within Indigenous land-health interrelationships. A major LBP around the world, especially in the Arctic ecozone, hunting was strongly represented in the reviewed literature. As such, it became a useful case study for revealing the disconnected ways much of the literature had approached LBPs and Indigenous health, including the uneven geographic distribution of this inquiry. From this emerged a complex and contradictory picture of disciplinary-bounded perspectives, each offering an important but disjointed piece of the bigger puzzle. The question of 'is hunting still healthy?' became a legitimate but controversial one as these disconnects became more evident. A conceptual model was subsequently developed that offered both a means into and through this difficult space. The first version of this model was based on the intersections between three identified key aspects of LBPs, that of catch, prepare/share, and consume. The subsequent model incorporated these three starting points, and then placed the complex understandings that had emerged into a more encompassing socio-ecological framework. Both of these models offered a unique lens on Indigenous land-health interrelationships. This new perspective reinforced the importance of considering the health of people in the context of place, and the advantages of doing so using a transdisciplinary lens.

## 6.2 Manuscript Summary

**Authors:** Ursula King[1], Chris Furgal[2]

[1] National Centre for Epidemiology and Population Health, College of Medicine, Biology and Environment, Australian National University, Canberra, ACT, Australia, 2600

[2] Indigenous Environmental Studies Program, Trent University, Peterborough, ON, Canada, K9J 7B8

**Statement of Student Contribution:** U.K. and C.F. conceived of the original idea for the article. U.K. undertook the international literature review, meta-analysis, model development and major writing. C.F. provided detailed review and editing on each draft.

**Publication Outlet and Status:** 10th Anniversary Edition, *International Journal of Environmental Research and Public Health,* 11(6), 5751-5782.

**Abstract:** Indigenous participation in land-based practices such as hunting, fishing, ceremony, and land care has a long history. In recent years, researchers and policy makers have advocated the benefits of these practices for both Indigenous people and the places they live. However, there have also been documented risks associated with participation in these activities. Environmental change brought about by shifts in land use, climate changes, and the accumulation of contaminants in the food chain sit along side equally rapid shifts in social, economic and cultural circumstances, preferences and practices. To date, the literature has not offered a wide-ranging review of the available cross-disciplinary or cross-ecozone evidence for these intersecting benefits and risks, for both human and environmental health and wellbeing. By utilising hunting as a case study, this paper seeks to fill part of that gap through a transdisciplinary meta-analysis of the international literature exploring the ways in which Indigenous participation in land-based practices and human-environmental health have been studied, where the current gaps are, and how these findings could be used to inform research and policy. The result is an intriguing summary of disparate research that highlights the patchwork of contradictory understandings, and uneven regional emphasis, that have been documented. A new model was subsequently developed that facilitates a more in-depth consideration of these complex issues within local-global scale considerations. These findings challenge the bounded disciplinary and geographic spaces in which much of this work has occurred to date, and opens a dialogue to consider the importance of approaching these issues holistically.

**Keywords:** Indigenous; land-based practices; health; environment; transdisciplinary

## 6.3 Manuscript

***Is Hunting Still Healthy? Understanding the Interrelationships between Indigenous Participation in Land-Based Practices and Human-Environmental Health***

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*Review*

# Is Hunting Still Healthy? Understanding the Interrelationships between Indigenous Participation in Land-Based Practices and Human-Environmental Health

**Ursula King [1,*] and Christopher Furgal [2]**

[1] National Centre for Epidemiology and Population Health, College of Medicine, Biology and Environment, Australian National University, Canberra, ACT 0200, Australia

[2] Indigenous Environmental Studies Program, Trent University, Peterborough, ON K9J 7B8, Canada; E-Mail: chrisfurgal@trentu.ca

* Author to whom correspondence should be addressed; E-Mail: ursulaking@ausdoctors.net; Tel.: +61-2-6125-2378; Fax: +61-2-6125-0740.

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**Abstract:** Indigenous participation in land-based practices such as hunting, fishing, ceremony, and land care has a long history. In recent years, researchers and policy makers have advocated the benefits of these practices for both Indigenous people and the places they live. However, there have also been documented risks associated with participation in these activities. Environmental change brought about by shifts in land use, climate changes, and the accumulation of contaminants in the food chain sit alongside equally rapid shifts in social, economic and cultural circumstances, preferences and practices. To date, the literature has not offered a wide-ranging review of the available cross-disciplinary or cross-ecozone evidence for these intersecting benefits and risks, for both human and environmental health and wellbeing. By utilising hunting as a case study, this paper seeks to fill part of that gap through a transdisciplinary meta-analysis of the international literature exploring the ways in which Indigenous participation in land-based practices and human-environmental health have been studied, where the current gaps are, and how these findings could be used to inform research and policy. The result is an intriguing summary of disparate research that highlights the patchwork of contradictory understandings, and uneven regional emphasis, that have been documented. A new model was subsequently developed that facilitates a more in-depth consideration of these complex issues within local-global scale considerations. These findings challenge the bounded disciplinary and

geographic spaces in which much of this work has occurred to date, and opens a dialogue to consider the importance of approaching these issues holistically.

**Keywords:** Indigenous; land-based practices; health; environment; transdisciplinary

## 1. Introduction

A feature of the Second International Decade of the World's Indigenous People (2005 to 2014) has been the promotion by human-rights agencies of Indigenous ("Indigenous" is the term used in this paper to describe Inuit, Aboriginal, First Nation and other First Peoples, except when referring to a specific group, in which case the term preferred by that group is used) peoples' knowledge's and participation in land-based practices [1,2]. As part of a wider sustainable development agenda, the key focus has been the contribution Indigenous people make to improvements in ecosystem health through "traditional" land-based (land-based practices encompass both land and sea/waterway/seaice activities engaged in by Indigenous people, and include hunting, fishing, gathering/collecting, natural resource management, plant cultivation, and ceremony) activities. By extension, there has been growing interest in how these activities could be harnessed in human health policy and programs to improve Indigenous health and wellbeing [3–5]. Central to the call for promotion of these activities has been the assertion that both Indigenous health, and the health of the places Indigenous people live, could be improved by ongoing and supported Indigenous participation in activities that connect them. It is an appealing argument, from both a human and ecosystem health perspective.

Considered a staple part of many remote Indigenous people's lives, the historical image of people living on and from the land through activities such as hunting, fishing and gathering of local resources is still seen today as a culturally important, and fundamentally healthy, way of life. On a background of, often substantial, Indigenous health inequity compared to non-Indigenous members of the same state/country, and increasing concerns about the impacts on Indigenous health of environmental contamination and degradation from competing land uses, the assertion that "hunting is healthy" has gathered momentum. Hunting is used here as an illustrative case because of its predominance in the international literature as a substantive land-based activity practised by numerous Indigenous peoples around the world, and taken to mean hunting, fishing and gathering of local resources. Led by calls from health researchers, and echoing long expressed Indigenous voices, current thinking supports encouragement of Indigenous participation in land-based practices (LBP), such as hunting, as a means of promoting health—of both people and place. To date, no papers appear to have been published that offer an in-depth review of the available international, cross-disciplinary evidence drawn from various ecozones to support this promotion. By drawing on techniques used within transdisciplinary health research, this paper seeks to fill that gap by identifying, gathering and critically analysing the international literature to identify the available evidence, and any omissions that may exist.

### *1.1. Transdisciplinary Approaches to Human Health*

Transdisciplinary approaches to thinking about human health are increasingly being seen as a way of unifying understandings, and developing workable solutions, to intractable health issues [6,7]. Transdisciplinary approaches recognise that health problems arise from highly complex interacting systems, being the combined result of multiple, intersecting variables from genetics and physiology to those manifesting from social, political and ecological causes [8]. In this paper, utilisation of this approach enabled identification and subsequent analysis of literature across a wide-range of academic disciplines and perspectives. This in turn enabled clarification of what is currently documented about the interrelationships between hunting, and the impacts on Indigenous peoples' health inequities, including how they relate to the physical environments in which these activities are undertaken. From these analyses a new conceptual model is developed that, we argue, may enable more nuanced engagement on this complex topic, and guide enquiry and novel responses to these issues.

It is acknowledged that "transdisciplinary" is a term used in ecohealth contexts to denote the creation of new ways of thinking through transcendence of previous discipline-specific boundaries and "ways of knowing".

> While the Ecohealth approach embraces the tools of core domains such as public health, ecology and ecosystem management, its emphasis on interdisciplinarity and cross-sectoral collaboration enables it to transcend important limits and blind spots of individual fields of expertise [9] (p. 2).

It is, in particular, these "blind spots" in current discipline-oriented thinking about Indigenous land-health interrelationships that this paper seeks to identify and critique.

### *1.2. Land-based Practices and Health*

For many of the world's Indigenous peoples', the health of the land and the health of the people and community are thought to be one and the same [10–12].

> Our identity as human beings remains tied to our land, to our cultural practices, our systems of authority and social control, our intellectual traditions, our concepts of spirituality, and to our systems of resource ownership and exchange. Destroy this relationship and you damage—sometimes irrevocably—individual human beings and their health [13] (p. 15).

These "ties to the land" involve an ongoing ability to engage in LBP. These include activities associated with hunting, fishing, plant cultivating and collecting/harvesting, land/water care and natural resource management, and ceremony. Numerous examples from around the world have promoted the benefits of these land ties, including:

- Human health and wellbeing, e.g., physical and nutritional benefits of catching and consuming traditional country foods, such as in Inuit communities in northern Canada [14];
- Cultural and political, e.g., the cultural pride and positive identity politics of land tenure over traditional lands, such as the sacred groves of North Pare Mountains in northeastern Tanzania [15];

- Economic, e.g., establishment of sustainable livelihood initiatives based on traditional ecosystem management practices such as harvesting wild rooibos tea by the Khoisan community in the Western Cape, South Africa [16]; and,
- Environmental, e.g., sustainable land management practices such as the Aboriginal fire abatement program in West Arnhem Land, Australia [17].

A focus on benefits is understandable but raises the question as to whether such an approach is sufficient to inform sustainable policy and program responses. There are also well-documented risks associated with aspects of Indigenous LBP participation, and the consequent adverse outcomes for human health, and the health of the environment in which these activities take place. These risks and benefits are more often presented separately and by different disciplines in the international literature. Without the availability of interdisciplinary review papers the conclusions in these separate literatures paint an inaccurate picture of the variables that need to be considered when seeking to understand the complexity of land-human health interrelationships in the Indigenous context.

## 2. Methods

A literature review was done to identify publications focusing on Indigenous land-health interrelationships. Given the breadth of literature being considered, a wide search of electronic databases was undertaken seeking both peer-reviewed publications and published reports between 1980 and 2013 available in English. Peer-reviewed literature was identified through eight electronic library databases (CINAHL, Pubmed, Sage Journals online, Scholars Portal Journals, ProQuest Group, MEDLINE, EMBASE, and PsychINFO). The key search terms used were "Indigenous, Aboriginal, Inuit, First Nation, Native peoples, land, land-based practices, caring for country, country foods, traditional foods, bush foods, wild foods, subsistence, nutrition, food security, human health, wellbeing, culture, traditional, traditional knowledge, hunting, fishing, climate change, environmental contaminants, land tenure, tenure insecurity, health and place, vulnerability, safety", and their variations and combinations. Published reports were identified using both online search engines and key Indigenous-focused health and environment agency websites in Australia, Canada, New Zealand and the United States.

## 3. Results

Over 1100 publications were initially identified. Further sorting was then done to identify those publications that reported on Indigenous participation in LBP, particularly, but not limited to, hunting/fishing/collecting activities, and had explored or discussed an aspect of human health and/or wellbeing. There were 256 papers or reports subsequently identified that discussed issues and/or presented research on various aspects of these interrelationships retained for the analysis.

The vast majority of reviewed literature focused on Indigenous hunting/fishing/gathering activities in northern parts of Canada and the United States of America, with some, but to a lesser extent, looking at issues in remote northern Australia. Arctic Canada was particularly strongly represented, with an emphasis on activities associated with land and/or sea-based hunting activities. While there are findings from a review of that literature particular to the Arctic context, many of the key underlying

issues and intersecting complexities identified in that literature were common to literature from other environments that shared the central themes of cumulative post-colonial consequences, competing land uses, rapid socio-economic change, diminishing intergenerational knowledge transfer, climate change impacts, and resulting "health" inequities. Interestingly, the literature coming from "the north" tended to take a more risk focused approach *versus* that from the "south" where benefits were the most commonly presented focus. Although beyond the scope of this paper, this raises intriguing issues as to why this might be the case, and acknowledges that understandings of LBP occur in cultural, not just, physical ecosystems, with multiple perspectives and influences at play. In part, this could reflect the current position of Indigenous issues within the socio-political landscape of the countries in question, whereby some emphasise the key "similarities" shared by Indigenous and non-Indigenous people's living in that place as opposed to "differences" that Indigeneity brings to understandings of land-health interrelationships.

Appreciably, in a literature as broad as that discussing these topics in different locations, the disciplines represented in the selected publications were diverse, highlighting the inherently complex nature of the issues involved in Indigenous LBP and human-environmental health. This was a major challenge in reviewing the identified literature because the writings ranged across the fields of health and social policy, human rights and civil law, medical and health anthropology, health economics, public health, human ecology, nutritional epidemiology, Indigenous studies, environmental science, political science, climate science, nutrition and dietetics, social epidemiology, health and medical geography, sociology and psychology.

Despite the diverse starting point of this review, and the varying representations of the current place and understandings of Indigenous land-health interrelationships in different ecozone contexts, two primary themes emerged from this seemingly disparate, wide spread literature. That is, the "benefits" of Indigenous people's participation in LBP (subsistence hunting, fishing and collecting), and the "risks" participation presents for Indigenous health. A pattern also existed in the way the literature discussed these relationships. This was based on an intersecting discourse that emphasised a specific set of activities that are embedded in Indigenous peoples relationship with food accessed from the local environment. These activities relate to actions involved in three distinct but inter-related subgroups of practices—"catching", "preparing/sharing", and "consuming" these foods (see Figure 1). Publications reviewed predominantly focused on one of, or one specific aspect within these practices, often in isolation from associated activities within and/or between practices. The consequences of this tendency to focus on one aspect, and to do so from within a bounded disciplinary perspective, were significant. Key conflicts and important gaps were overlooked. These are argued to be the "blind spots" of concern raised by the transdisciplinary researchers, and are the main focus of this review.

"Catch", refers to those activities involved in the act of obtaining traditional/country/bush/wild foods (foods from the local natural environment via a number of means). "Prepare/share" involves those activities associated with preparing and/or sharing country foods that are "caught" (both giving and receiving). "Consume" refers to activities involved in eating country foods that are "caught" or received via "sharing". Surrounding these three intersecting groups of activities are the fluctuating influences of culture, community, environment, politics, and economics.

**Figure 1.** Three main sub-groupings of hunting/fishing/gathering activities associated with Indigenous participation in land-based practices with implications for human health.

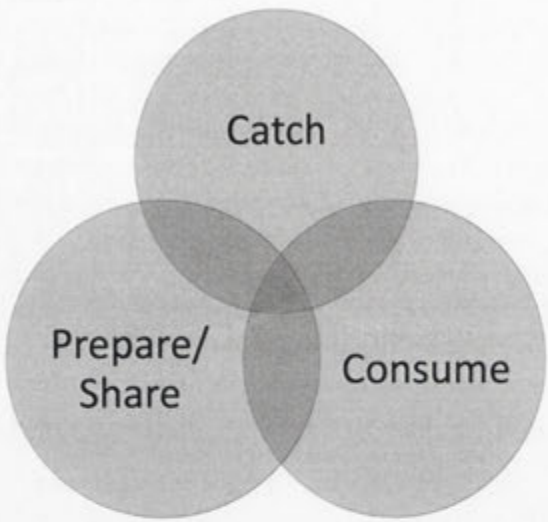



**Table 1.** Summary of the key benefits and risks of Indigenous participation in hunting/fishing/gathering identified in the reviewed literature.

| | |
|---|---|
| **Benefits** | • Nutritional benefits of eating country foods<br>• Physical activity associated health benefits of LBP participation<br>• Social capital gains for individuals and communities (e.g., community cohesion and connectedness, heightened wellbeing, strong cultural ties)<br>• Economic benefits for individuals and communities<br>• Environmental benefits from land care associated with LBP<br>• Food security through nutritious, readily available, supplementation of weekly diet with country foods |
| **Risks** | • Unsafe environments (environmental hazards) caused by climate related changes e.g., thinner ice, higher UV radiation, more extreme weather events<br>• Increased risk of accidents when out on the land:<br>o inherent with hunting activities, especially when using motorised transport and firearms<br>o minimal use of personal safety equipment<br>o associated with inadequate knowledge transfer to safely read and navigate the local environment<br>o over-reliance on technology (such as GPS) to navigate<br>o inadequate mechanical repair knowledge of equipment (such as snowmobiles)<br>• Exposure to environmental contaminants in consumed country foods (e.g., heavy metals and organochlorines in sea mammals)<br>• Biological contamination from emerging zoonotics, or inappropriate storage and preparation of country foods, especially associated with the loss of "traditional" food preparation practices (e.g., fermented meats among Inuit)<br>• Relying on limited diversity of seasonally variable and/or diminishing country food stocks for food security<br>• Resource depletion from over-hunting/fishing to maintain adequate food supply<br>• Prohibitive cost of equipment and maintenance required for LBP participation |

LBP: Land-based practices.

### *3.1. The Benefits and Risks of LBP*

Within the identified literature, the "benefits" and "risks" attributed to Indigenous LBP were synthesized and summarized, and are presented in Table 1. This initial division clearly highlights tensions and complexities regarding the net balance of health benefits contributed to Indigenous peoples by LBP. It also reflects the strong presence of the Arctic literature with its tendency to focus on hunting. On this background, and given the dominance of this ecozone-specific literature, this paper utilises hunting as an illustrative case study to explore current understandings of Indigenous land-human health interrelationships. As such, the findings are not proffered as a definitive but rather as a "widow into" an intriguing, complex and highly contested space. The resulting lens provided by the "catch, prepare/share, consume" approach is subsequently used to examine how the reviewed literature has explored these issues, the potential problems with the way this exploration has been done and presented, and the tensions and complexities that result.

### *3.2. Catch*

Safe and successful "catch" activities require skills, knowledge, time, equipment, physical ability, and motivation. "Catching" also requires the environment in which these activities are undertaken to be accessible, adequately stocked with animals and other collected/harvested foods stuffs, and predictable. Therefore, "catching" involves a suite of interrelated activities and circumstances that are environmental, cultural, technological, economic, educational, and human resource dependent. Despite this interrelatedness, the reviewed literature demonstrated the disciplinary bounded tendency to separate these activities/issues, and focus on only one or a few without mention or reference to the others. The result is the potential for incomplete conclusions to be drawn about the "catch" aspects of land-health interrelationships.

#### 3.2.1. Physical Activity

According to the reviewed literature, it appeared to be a given that engaging in the "catch" aspects of LBP meant people were more physically active. This was then proffered as a major reason for promoting such activities in Indigenous populations where high levels of obesity, diabetes and cardiovascular disease often predominated [5,18–20]. However, few publications had actually investigated physical activity levels associated with LBP, and the papers found only presented self-report as the measure [3,21,22]. There were no quantitative studies identified. Several qualitative papers focused on the Canadian Arctic suggested that increased use of motorised transport (such as snowmobiles) had contributed to reduced levels of physical activity by Indigenous members of communities, particularly younger members [14,21,23,24]. No publication was found that specified the actual physical activities involved in "catching" country foods, nor their frequency, intensity or duration.

#### 3.2.2. Social Capital

The positive relationships between social capital and human health are well documented [25–29]. Social capital and "catch" activities were seen as strongly tied *i.e.*, participation in "traditional" activities, such as hunting, were considered to give people a sense of connection to their culture,

environment and community. In many respects, social capital was considered to be at the heart of Indigenous ways of experiencing "health" [11,30–32]. In the reviewed literature, social capital was a commonly asserted benefit of LBP participation, especially the "catch" aspects because of their positive contribution to maintenance of healthy social relations [12,33–36].

However, few of the reviewed publications acknowledged the unequal nature of social capital experiences related to "catch" activities in Indigenous communities. Older men were seen as the most likely to engage in regular hunting/fishing activities [14,37,38], even though they were often the significant minority in communities where the majority of people were young, a common population age profile in contemporary Indigenous contexts. Those who actually did the "catching" were afforded higher status, as their hunting abilities enabled them to provide food for their families, and their skills and knowledge were considered both key to their own sense of self, and the cultural integrity of the community through the maintenance of "traditional practices" [39,40]. However, other literature suggested that if a person was a "frequent" or "heavy user" of country foods by virtue of "catching" them, they could also be the most economically, and consequently socially, marginalised because their "catching" activities were done from necessity, *i.e.*, it was a survival strategy in the absence of other ways of making a living [37]. Additionally, other than mentioning the food security disadvantage of not having a hunter in the household, particularly for women [41,42], the reviewed literature did not further explore the consequences of these potential inequities between hunters and non-hunters on broader individual and community social capital factors.

Given the mostly positive angle many authors took on the relationship between social capital, human health, and "catch" activities, a noted contradiction was that between reported high levels of social support in Indigenous communities [43], and the often correspondingly disproportionate levels of morbidity and mortality in these settings influenced by social pathologies, such as family violence, sexual abuse, poverty and suicide [44]. Raised in the Canadian First Nation and Inuit context [43], this led to questions about the complexities between self-report of strong social relations (often connected to "being on the land", *i.e.*, engaging in land-based practice activities) and highly "unhealthy" communities. To better understand this, some authors called for a more holistic approach to Aboriginal health in which the health of individuals is connected to the health status and behaviours of their families and communities [44–47]. This matched the literature that called for an embracing of "Indigenous constructions of health", which emphasised the importance of the social systems within which an individual resides, and the centrality of "nature", family and community in balance [12,48,49]. However, it could be argued that this "in balance" view assumed that "catching" activities in Indigenous communities were still possible, facilitated equity in and between community members, and were actively chosen as a means of remaining connected with "nature" and community. As this interdisciplinary review of the literature highlights, this may not necessarily be the case.

#### 3.2.3. Human Safety and Security in the Environment

Beyond rapidly changing socio-cultural and economic environments, the other major reported change is climate. Increasingly, these climate-related changes have been connected to "catch" activities. According to the reviewed literature, the most studied peoples in this regard have been Aboriginal communities in Northern Canada [50–56].

Climate change is seen as a major challenge to "catch" in the context of sustainable, and safe, Indigenous livelihoods. To "catch" country foods, people have to venture out into the environment. Given that hunting and fishing activities in these remote settings are already considered innately risky [37,54], the increased risks from climate-mediated changes are considerable [52,55]. In the Arctic regions, the "catch" associated risks linked with climate-related changes impact how and when people can safely access the land and sea to hunt/fish/gather. These impacts include decreases in ice distribution, stability and coverage; changes in snow composition; unpredictable and more extreme weather events; sea level rise; lower inland waterway levels (impacting freshwater access); permafrost thaw with associated structural instability; changes in animal travel/migration routes; increases in UV-B exposure, and numbers of mosquitos and other biting insects [54,56].

The research focused on climate change adaptation also identified problematic issues with respect to "catch". On the one hand, increased use of motorised transport (such as snowmobiles, tractor-trucks, long-range boat engines), use of GPS navigation, VHF radios, and consulting satellite images of sea ice, have the potential to make hunting/fishing activities safer [54]. On the other hand, these technologies have also been reported to increase risk because they can create false confidence in the users, and people do not always have the knowledge to fix them if they fail or do not know how to "read" the landscape without them [54,56]. Compounding this are findings that use of such technology creates inequalities in communities because not everyone can afford them. This not only impacts their LBP activities and potential yield in competition with those that can, but also strains social relations [37,54].

Additionally, these increased risks impacted people's ability to manage and adopt flexible approaches to resource use [57–59]. Arctic Indigenous hunters, for example, have traditionally been very adept at dealing with very dynamic environments [51,60,61]. However, the rapid nature of the current climate-mediated environmental changes, over-reliance on technology, and diminishing land-based hunting knowledge/skills particularly among younger hunters, have weakened Indigenous community capacities to employ these previously relied upon adaptive approaches [37,54].

Decades of colonisation resulted in many Indigenous communities being moved from semi-nomadic lifestyles to permanent settlements [62,63]. Although some, predominantly older, members of these communities continue to engage in LBP, the increasing move to a more market-based economy has seen an associated decreasing reliance on "traditional" activities [64–66]. A number of these settlements only occurred in the past five or six decades, and when people were moved from their "traditional" environments, their existing hunting skills and knowledge where not always useful in their new environment, compromising access to country foods [54,65]. Thus, "catch" skills/knowledge were location specific and not readily transferrable when environments changed.

#### 3.2.4. Connection between People and Place

The reviewed literature reported a sense amongst older Indigenous community members that the skill and knowledge required of hunting/fishing activities was rapidly diminishing [67–69]. Common reasons for this included the following [14,70–73]:

- Inadequate training in the techniques of hunting and fishing due to the requirements of western-style schooling, changing lifestyle aspirations;

- Lack of access to necessary funds for the purchase of capital equipment used in unting/fishing;
- Lack of interest in becoming involved in activities that have become increasingly marginalised from an economic perspective (e.g., demise of the seal fur trade);
- Language differences now exist between generations;
- An increasing dependence upon wage employment that severely limits time available to hunt, fish and gather.

Changing social relations were also seen as a contributor, whereby a loss of respect for and/or diminishing access to elders by younger members of the community substantially reduced skills transfer [20,43]. In the reviewed literature, the importance of intergenerational knowledge transfer about how to "catch" was commonly approached as a loss of connection to land through colonisation and dispossession [74], and the consequences this had for all members of communities to engage in "traditional" land-based practices. Indeed, the adverse and ongoing impacts of colonisation featured strongly in many papers reviewed. The tension between "traditional" and "contemporary" Indigenous experiences and aspirations were commonly filtered through the pervasive lens of the legacy of colonisation. The resulting loss of connection between people and place, and the impacts on intergenerational engagement, were seen as major contributors to why "catch" activities and capacities were disappearing.

#### 3.2.5. Land Tenure

Consequences of ongoing land dispossession were strongly emphasised in the tenure insecurity literature. This literature highlighted the problems many Indigenous people faced in the context of uncertain land rights, and therefore, access to and use of, ancestral lands [75]. It found that if Indigenous people are not secure in access to and use of their lands, then resource competition can result in both conflict and indiscriminate use of resources [76]. Further, tenure insecurity has also been associated with a loss of incentive to protect the land [77], and a tendency to prioritize short-term benefits over sustainable, long-term resource use [78]. These findings are controversial given the negative light they cast on Indigenous natural resource use. However, the issue is one of tenure insecurity and its consequences for Indigenous people attempting to maintain a living in, on and from the land/sea under those circumstances. The issue clearly highlights the importance of the need to actively consider the political and legal dimensions of "catch" in these situations.

#### 3.2.6. Natural Resource Management

The tenure insecurity literature was at odds with a substantive other literature that had investigated "catch" activities and natural resource management [1,5,79,80]. In the vast majority of cases, "catch" was seen as beneficial, for both people and place. This literature argued that Indigenous people participating in LBP provide a wide range of environmental services including border protection, quarantine, fire management, wildfire abatement, carbon sequestration and trading, weed control, feral animal control, biodiversity conservation, fisheries management, restoration of wetlands, water resource management and sustainable commercial enterprises such as eco-tourism [11,30]. Although these particular environmental benefits were being referred to in the Australian context, a number of authors

articulated similar environmental gains in other geographic regions and ecosystems [81–85]. However, the political and legal aspects of tenure security required for sustainable access to and participation in these activities was often absent from this literature.

An extension of these reported environmental benefits were the associated human economic benefits associated with eco-tourism. Eco-tourism, which included cultural eco-tours, eco-lodges, hunting and fishing tours, cultural attractions and other nature-based facilities or services [86], was considered a particular strength of Indigenous engagement in LBP [87–91], particularly from a sustainable livelihoods perspective. However, on this point, there were as many cautions found in the literature about the risks of ecotourism for Indigenous people with respect to sustainable environmental management, and distribution of resources within participating communities [92–97], including the potential for a loss of authenticity for Indigenous people through engagement in these activities [98]. This last point raising the controversial issue of what "authenticity" means in the context of contemporary Indigenous lives.

This emphasis on economic benefits overrode any substantive discussion of the considerable "non-metric" gains associated with Indigenous engagement in eco-tourism related activities, such as "cultural pride" and positive identity. These issues did arise [15–17,88,90] but, like the point about "authenticity", they were considerably diluted by the strong emphasis on the purported monetary and land care gains.

#### 3.2.7. Food Security

"Catching" was also associated with food security. On the one hand, "catching" country foods was seen to potentially reduce weekly food costs *i.e.*, accessing country foods could reduce reliance on more expensive store-bought foods in remote Indigenous settings [99]. This was considered a particular issue where low household income and associated food insecurity were concerns, as was the case in a number of reported Canadian Indigenous communities [99,100–102]. However, in other literature, "catch" activities were associated with substantial increased costs because of the need to purchase and maintain hunting/fishing equipment (including guns and ammunition, outdoor gear and navigation equipment, motorised transport such as snowmobiles, boats or trucks, and fuel costs), as well as the costs associated with lost income from waged employment whilst away hunting or fishing [64,72,103].

A further reported "cost" of "catch" activities were the potential environmental consequences of depleted country foods stocks. In the Canadian Arctic, it has been widely reported that caribou stocks are diminishing. This is a popular country food source for many Indigenous people living in this region. If stock numbers are falling as suggested, the implications on food security in settings where subsistence hunting is relied upon would be considerable. With fewer animals available, despite "catch quotas" put in place for conservation reasons, over-hunting is a potential issue. Hunters would also potentially have to travel much greater distances in order to "catch" available stock, thereby adding to the costs of participation (economic and time), and increasing their risks to environmental hazards. Added to this is the finding that substituting one country food, due to reduced availability, with another that may be more available/plentiful poses challenges. There is the issue of skills/knowledge and capacity (including equipment) required to successfully hunt one species *versus* another [54]. A further

issue is that of taste, which has been reported as a reason for Indigenous people often not being willing to actively substitute one species for another in their country food diet [104]. Given these factors, relying on country food sources for food security becomes questionable.

#### 3.2.8. "Catch" in Summary

Understanding "catch" activities proved challenging from the literature reviewed, in part because the available research was strongly focused on one ecozone, the Arctic. Despite this, the many interwoven issues that comprised and informed the concept and practices of "catch" revealed a contradictory story. The social capital benefits derived from reinforcing a sense of "traditional" Indigenous identity were juxtaposed against inequities created by both gender and age, as well by who could afford "catch" equipment *versus* those that could not. Poorly supported claims of physical benefits appeared frequently, and sat in contrast to the increased physical risks posed by climate change that made an already inherently risky activity even more so. A loss of skills and knowledge in how to "catch" further added to the problem of safety, and dilution of social capital gains. Diminishing food stocks, potential for environmental exploitation, and tenure insecurity issues added further layers of complexity to "catch" activities that were not adequately considered in the more human health-focused literature. As such, "catch" becomes a challenging area in which to try to balance potential benefits and harms, many of which are not clear-cut. Based on the reviewed literature, many of these issues also do not currently appear to have a substantive evidence base to support a definitive policy position.

### *3.3. Prepare/Share*

The preparation and sharing of country foods by Indigenous peoples has long been associated with maintenance of cultural traditions and strengthening of social ties [37,105,106]. These activities are considered to bond community members. However, in the reviewed literature these activities were the least evident or discussed. Few papers presented evidence or explored in any depth understandings of "prepare/share", although statements about the significance of these activities in Indigenous communities were common. The small amount of literature that did present findings about these issues indicated several potentially conflicting perspectives with respect to both "prepare" and "share" related activities.

#### 3.3.1. Field Dressing Techniques

One issue was that of who was actually doing the preparing. Age and gender were implied as being important with respect to this issue, although generally not articulated or critiqued. Field dressing techniques (*i.e.*, skinning, gutting, butchering, *etc.*), as well as country food preparation for both immediate consumption and storage for later consumption, require particular skills and knowledge. The nuances of these skill and knowledge sets were not clearly defined or examined in the reviewed literature. This was a major gap, which made it difficult to understand what "prepare" with respect to country foods actually involved and/or required. What was highlighted was the decline of intergenerational knowledge transfer as a major factor in the loss of this skill/knowledge set in

communities [54,74]. As emphasised in the "catch" literature, this was explained by shifting social relations whereby the older community members who knew how to field dress were not able to pass their capacity on to younger community members for a variety of interrelated reasons to do with respect, language, time constraints, motivation, and costs [20,43,70–73]. Participation by younger people in waged employment and formal schooling were seen as particularly significant constraints in this regard [14,107]. These impediments were commonly cited in the reviewed literature and raise the controversial issue of how community engagement in "traditional" activities such as country food preparation sit alongside the demands of "contemporary" lives in Indigenous communities. This is particularly so for the younger generations who have grown up at a time where participation in formal schooling and waged employment have been emphasised.

*Food Safety*

A particular point of concern raised in the literature about the consequences of these diminishing "prepare" knowledge and skills related to food safety. There was emerging evidence that "unsafe" country food preparation techniques were occurring that could lead to food contamination with pathogens such as botulism [104]. The potential significance of this was not adequately explored in the reviewed literature despite the obvious danger of handling and consuming foodstuffs contaminated in this way. As such, knowing how to "prepare" required a consideration of safe techniques. However, "safety" was only actively discussed in the "catch" and "consume" related literature.

*Climate and Food Preparation/Storage*

Complicating this last issue were the reported impacts of warmer temperatures in settings such as the Arctic, and how these were further compromising not just food preparation but also safe country food transport and storage [55,56]. With warmer temperatures and associated unpredictable weather patterns impacting the landscape, transporting food could become unsafe, not only for those doing the transporting but also for the food itself. In addition, higher temperatures or extended periods of unseasonal warmth could compromise safe food storage [52,54–56]. With the speed of climate changes exceeding adaptive capacity in these settings, including the apparently yet unexplored issue of mitigation measures to address the impacts of higher temperatures on food transport and storage, the consequences could be considerable. This would have a flow on effect from the significant climate change impacts on "catch", and further diminish safety in accessing country foods. The reviewed literature only touched on these issues with respect to "prepare" yet the implications are substantial, as highlighted by the Arctic research where these issues have been most actively explored to date.

3.3.2. Sharing

With respect to "share" activities related to local food resources, the available literature indicated that the modernising of Indigenous communities had impacted sharing practices. These influences were seen to have created inequalities and impacted previous kinship-based relationships, which meant people were not sharing as much as they might have in the past. The major contributing factors were reported to be [54,107–112]:

- The introduction of waged-based economies, and the resulting differential in household incomes and time available to participate in LBP;
- Compulsory schooling, and the resulting loss of time and skills/knowledge regarding LBP;
- Contemporary lifestyles with the associated diminishing interest in "traditional" practices, especially by the young, and the introduction and increasing consumption of store-bought foods;
- Unequal purchasing capacity and, therefore, access to resources, for hunting/fishing.

These changes were noted to be complex, and varied regionally. However, there was a general sense that "share" activities were not necessarily a reliable means of ensuring food security in these settings. If this is the case, then the often repeated statement that "sharing" is a fundamental aspect of Indigenous community life, and it can be relied on to facilitate distribution of food, especially country foods, may need to be revisited as it may be undergoing transformation in some locations. Once again, the issues are complex and the available literature offered a limited view. Economic differences were highlighted, as were changing preferences. These were also mentioned in the literature relating to "catch" and aspects of "prepare" related activities. However, the breadth and depth of these intersecting factors remained largely unexplored.

*Food Support Programs*

An interesting case in point regarding this complexity was the community freezer programs that had progressively been introduced into northern Canadian Indigenous communities since the 1970s. The principle behind the community freezers in these remote, Inuit and First Nations, communities was to enable greater access to country foods. The idea was that local hunters would procure country foods that could be placed in the freezer for community use. Elders and single mothers were seen as being in particular need in these communities as they often would not have a hunter in their household or access to other means to ensure a regular supply of country foods [113]. However, it has also been noted that food availability, quality and supply are not sufficient, in themselves, to determine food security because other factors such as social relations and structure; the impact of age, gender and education level on food choices; and cultural appropriateness of available food also come in to play [114–116].

A recent community freezer-focused study undertaken in one Inuit community in northern Canada (Nain, Nunatsiavut) [113], highlighted some of these "share" related issues. Echoing other study findings [51,54,117,118] this study revealed that there was a perception that country food consumption behaviours were becoming more individualised, with a focus on only supplying to family members because of the costs of hunting (equipment, time and safety), and available yield. The community freezer therefore made it possible for community members without the means to "catch", and those outside "share" networks, to access country foods, especially larger, more preferred, country foods such as caribou, at the time of the study. However, with the previously mentioned issue of reported caribou herd decline in these regions, the pressures of filling the community freezer to meet this need was seen as a potential contributor to over harvesting of some species. The issue of stigma attached to accessing the community freezer for those other than elders, single mothers or the sick/infirm, was not discussed. Nor was the potential for a community freezer program to disrupt previously established, and potentially highly political and adaptive, community food sharing arrangements; an issue raised in other related literature [37].

#### 3.3.3. "Prepare/Share" in Summary

It was noteworthy that the issues of "prepare" and "share", although often mentioned in the reviewed literature as important to Indigenous community wellbeing, were not substantively studied. Once again, complexities became apparent when considering the role and place of "preparing" and "sharing" activities in these settings as authors tended to adopt one or other side of the more established "benefits" *versus* "risks" approach, raising questions as to the utility of these often limited perspectives. The scant literature that was identified, and the strong focus on Artic settings, made it difficult to draw any clear conclusions about how and to what extent "prepare" and "share" activities actually operate in contemporary Indigenous contexts. Being interested in and knowing how to "prepare" country foods, and do so safely, is one issue. Being willing and able to "share" what is "caught" and "prepared" is another, and these issues intersect in important ways existing literature does not appear to have considered.

### *3.4. Consume*

Eating country foods has generally been considered a healthy option. Advocates across the board have emphasised the benefits for Indigenous people of "consuming" foods they procure from their local environments. Country food consumption also has strong associations with Indigenous identity, especially as challenges to "traditional" ways of life encroach into rural and remote Indigenous settings and impact bio-psycho-social health and wellbeing. Not least of these impacts has been the rise of chronic, lifestyle related health problems, such as diabetes, obesity and cardiovascular disease that are occurring in many of the worlds Indigenous populations at rates disproportionate to non-Indigenous populations in the same state/country. Additionally, social-emotional health issues, which are not separated by Indigenous peoples from their physical health, are seen to benefit from the activities associated with country food consumption. Perhaps in response to these two key issues, the most substantive literature identified regarding LBP and Indigenous health was that related to the "consume" aspects of country foods.

#### 3.4.1. "Healthy" Foods

By far the most substantive quantitative literature available on the topics of Indigenous land-health interrelationships relates to "consume" activities. There were strong arguments advocating consumption of country foods based on their high nutritional content, especially in contexts where the incidence of obesity, diabetes, cardiovascular disease and their associated adverse health outcomes are increasing. In the Arctic, substantial effort had gone into measuring the various macro and micro nutrient content of country foods [119–125]. Findings from these studies were often reported in the context of identified nutritional deficiencies in sub-groupings of Indigenous peoples (e.g., women of child-bearing age, children, elders), identified in food frequency questionnaires, 24 h dietary recalls [126,127], and anthropometry [128], which were attributed to a shift in diet away from "traditional" food sources to store-bought foods. By all accounts, "consuming" country foods was considered an excellent option and, therefore, should be actively promoted.

3.4.2. "Contaminated" Foods

However, paralleling this was a growing literature on the presence of environmental contaminants in country foods. Concentrated on Arctic regions again, this literature highlighted the contemporary complexities of "consume" in the presence of environmental contaminants in country foods, which included mercury, cadmium, Persistent Organic Pollutants (POPs), PCBs (a group of anthropogenic industrial organochlorine chemicals) [129,130], and previously lead from lead shot fragments found in hunted game birds [131]. This was a substantive, rigorous and rapidly growing body of literature, with varying degrees of corresponding evidence presented about current understandings on how these agents impact human health when consumed in foodstuffs [130–139]. Interestingly, although the presence of these contaminants highlighted the necessity of considering land and sea use issues more broadly than just the foods themselves, the up and down stream causative chain was more implied than actively discussed in this literature. This could have been a consequence of the disciplinary bounded space in which this research was taking place and/or a reluctance to "politicise" the science. Either way, an absence of detailed discussion of the factors contributing to the introduction of these contaminants into the food chain, and a focus on the human health consequences, was apparent. Although there were indications in the literature that levels of many of these contaminants were decreasing in country foods, and thereby, also in the people that consumed them in these regions, it is important to note these contaminants can bio-accumulate in the food chain, meaning humans regularly "consuming" country foods are most affected. This is not an inconsiderable issue when the risks and benefits of increased country food consumption are under discussion.

3.4.3. "Preferred" Foods

Compounding the "consume" issue further are changing food preferences. With modernising lifestyles, and with the challenges of accessing adequate amounts, and quality, of preferred country foods, many Indigenous community members are increasing their consumption of store-bought foods [109,140–142]. These foods are generally considered less nutritious and people, especially the young, have been reported to be trending away from country foods towards the high fat and sugar options such as carbonated drinks and snack foods [14,107]. Although a number of authors reported Indigenous peoples across the age spectrum stating they considered country foods as the most healthy, this did not necessarily translate into increased or preferential consumption of country foods [72,104,138–142].

3.4.4. "Consume" in Summary

What people choose to eat is a major issue of concern for health researchers and agencies around the world [143], not just for Indigenous people. However, the life expectancy differences between Indigenous and non-Indigenous people in many of the countries to which the reviewed literature relates, made food choices and preferences a key focus because of the link with obesity and preventable cardiovascular disease [3,139,144]. This was frequently cited as the major justification for Indigenous people to consume country foods, and there was a strong body of literature that provided the nutritional evidence base to support this promotion. In contrast, important caveats to the safety of

such consumption arose in the environmental contaminants literature, and the literature on changing food preferences by Indigenous people, especially the young, added further complexity to the issue of "consume" in these settings. Links between these contrasting issues were not routinely made in the reviewed literature. This posed challenges in meaningfully interpreting how the consumption of country foods actually relates to human health, and the broader implications for the health of the environment in which many of these foods are being sourced.

## 4. Discussion

The interrelationships between LBP and human-environmental health are complex. Given its strong research presence in the literature, hunting was utilised as a contemporary lens to explore understandings of these connections, and proved an intriguing case in point. This international, interdisciplinary review demonstrates the often discipline specific, fragmented and deconstructed patchwork of current understanding on this topic. The result is an uncovering of the considerable gaps, contradictions and biases that exist if one were to be interested in the central issue, that of the connections between Indigenous health and participation in LBPs. Food security; the contemporary place of cultural traditions; impacts of a market economy, waged employment and formal schooling; modernising lifestyles and changing "tastes"; land tenure; contaminants; intergenerational shifts; climate changes; identity politics including age, gender, and what it means to be "Indigenous"; cultural constructions of "health"; nutrition; and technology, all play a part. The question "is hunting still healthy?" a presumably direct question in the context of Indigenous health today, is therefore, not straightforward.

The challenge, as always, in attempting to present evidence-based complexity from the literature is one of depth, as much as breadth. The tendency for the North American, particularly the dominant Arctic, literature to focus on "risks", and the other literatures, especially the Australian work, to focus on "benefits", with respect to land-human health interrelationships was intriguing. Perhaps this arose from differing "cultural" and "political" constructions and interpretations afforded these issues in these regions. It could be a consequence of how Indigeneity is currently understood and located in these societies, based on accumulated historical learning, or perhaps a tendency to emphasise "difference" over "similarities" as an extension of these politics. Alternatively, some of the identified gaps could be the result of a rejection of research by some Indigenous groups because of previous and ongoing exploitation using these techniques. Finally, it could be related to unconscious biases and assumptions arsing from deeply embedded constructions of "health" that exist in both Indigenous and non-Indigenous contexts in these locations.

Each of these issues requires careful and lengthy exploration and discussion, and are beyond the scope of this paper. However, a strength of this paper, despite the unequal representation of research in different Indigenous contexts evident in the literature and reflected in this review, and only brief reference to some of these overarching "political" issues, is the attempt to take and critique the available literature internationally, and present it through a transdisciplinary lens. This includes identification of the significant gaps, and differences of emphasis in various ecozones, and the challenge of identifying and critiquing literature across such a diverse array of disciplines.

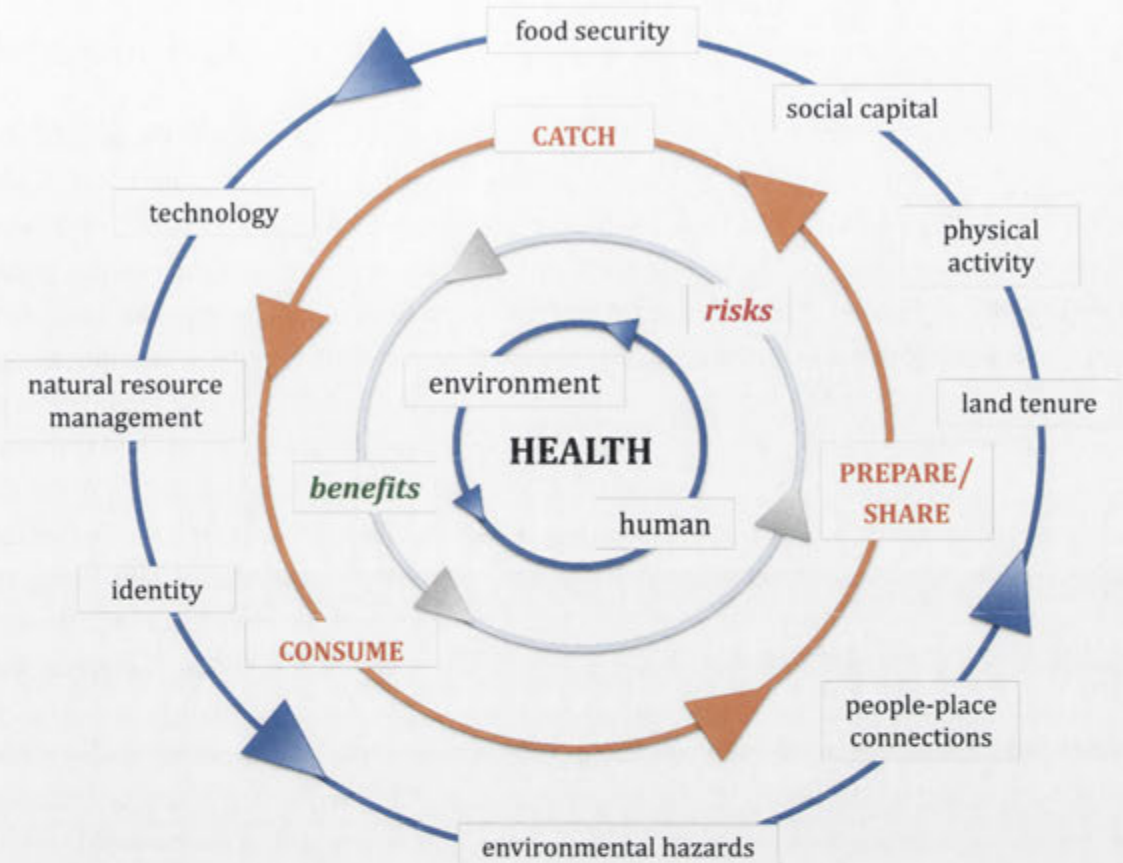
Despite these important caveats, the process of bringing diverse disciplinary literatures related to the same topic under the umbrella of a single paper demonstrates the challenges, importance and utility, of the insights that can emerge from gathering and reflecting on this diversity. Although hunting is only one of the many LBPs engaged in by Indigenous people around the world, it is a substantive and highly complex activity. In this way it draws together many of the major elements of LBP in Indigenous contexts and served as a useful case study to explore these complexities.

In the context of Indigenous land-health interrelationships, the more familiar benefits *versus* risks approach to understanding the interplay of these people-place interactions only goes so far, and is not adequate to map and explore the multi-faceted realities that shape these relationships. As demonstrated through this literature review, a disciplinary-bounded lens is similarly limited. In contrast, the use of a transdisciplinary approach enabled the catch, prepare/share, consume model to emerge, with the resulting matrix-view of LBP and human-environmental health revealing a very complex picture. Although catch, prepare/share, and consume were predominantly explored using hunting, reflecting the focus in the available literature, this activity-based analysis enabled a highly nuanced understanding to emerge about what was known about these fundamentally interrelated, and socio-culturally located, aspects of this major form of LBP. Identifying and then attempting to use the catch, prepare/share, consume model quickly revealed some significant gaps in current understandings about what LBPs actually involved, and why that is important to address.

Reflecting on this initial construction, this paper sought to go further. By using the presented critique to reframe this simpler activity-focused model, a subsequent considerably more inclusive and comprehensive model is proposed. This model acknowledges the interdependence and overlap of the issues involved, and the array of factors influencing Indigenous people's participation in LBPs, including constructions of "health". Figure 2 presents this reframing and offers a means of engaging with the health of both people and place within this complexity. The central driver in all of the interrelationships is the environment. In this way, "health" is not separated from its social, ecological, cultural, economic, technological or political influences nor is it just focused on biological constructions of human wellbeing. This is far more in keeping with many Indigenous understandings of "health", and challenges the reductionist tendencies of more Western representations of health where individual human biology is focused on in relative isolation from the multitude of factors that influence it. The activities of catch, prepare/share and consume are thus located in these broader influences, beyond the narrow view of this individual human biology, and out into the complex world of intersecting behaviours, politics, economies, technologies, hopes, fears, aspirations, cultures, weather, industry, and the multitude of other factors that determine benefits and risks. These all change over time, and are interpreted according to perspective, which further complicates how, what, why, when and through whom these intersections occur and are understood.

Consideration of these overlaps, differing worldviews of "health", power relationships, politics, and interpretations are a major consideration in this proposed model. The push/pull that occurs between these various intersections only became evident when the breadth and depth of available literature was explored, revealing the intrinsic complexity that exists.

**Figure 2.** Conceptual model of the interrelationships and key drivers associated with catch, prepare/share and consume aspects of Indigenous land-based practices.




This revised model attempts to encapsulate this inherent complexity, and offers a template for those engaged with these issues to better work in this multifaceted space. The idea is not to suggest that all of these issues be included, just that they be actively considered. Without this reflection, the "blind spots" identified in the reviewed literature will continue to hamper understandings of Indigenous land-human health interrelationships, in whatever ecozones they are studied, and result in limited or constrained solutions.

It was utilisation of this integrated view that enabled important contradictions and omissions to be identified in this review. For example, despite the frequently reported physical activity benefits of hunting participation, these were not clarified or supported by available evidence. Equally, the vigorous promotion of country food consumption based on the nutritional evidence sat in stark contrast to the evidence about increased risks of catching or preparing it. Dangers in the environment caused by contaminants in the food chain, climate change, and profound shifts in adaptive capacities being brought about by rapid socio-cultural change, all contributed to the potential for harm. Discussion of these harms was most commonly done in literature that was separate to that emphasising the reported benefits. In the same vein, a narrow emphasis on only the human health benefits of catching, preparing/sharing and consuming country foods, was a further concern. Any gains advocated quickly become diluted, and potentially compound health inequities rather than reduce them, if the broader picture and inherent complexities surrounding these issues are not acknowledged. This tendency to emphasise the health needs of the people over the places they live was particularly worrying.

"Healthy" country foods require "healthy" environments, both with respect to so called "natural habitats" as well as the social-political-economic-cultural spaces people occupy and in which they practice their activities of daily living. A failure to adequately consider this creates unease when seeking to ascertain how best to support ongoing Indigenous participation in LBPs so that people and planet can sustainably benefit.

In exploring these issues in the reviewed literature, another major problem was the general absence of substantive evidence for many of the claims made. Appreciating the opportunities and constraints of research methods to provide "holisitic" views of the issues under investigation, understanding land-human health interrelationships appeared too complex for the majority of the studies presented. The need for evidence that enables informed decisions to be made about where, and how, to focus attention is essential. However, the reliance on disciplinary-bounded investigations did not enable either the production of this required evidence nor the necessary identification and exploration of key and often contradictory intersections. With the exception of some of the consume-related literature, the vast majority of reviewed literature relied on small, qualitative studies (e.g., [14,30,52,54]). On the one hand, this approach made sense as it enabled capture of specific stories and contexts that influenced LBP and human-environment interrelationships. These are the voices of the people living in and negotiating these complex realities, and need to be recorded and heard. On the other hand, the absence of complementary quantitative data about many of the issues raised through these narratives made it difficult, if not impossible, to substantiate and subsequently argue for investment in responses to the identified key drivers impacting land-human health interrelationships. With so much at stake for both the people living in these remote and fragile environments, and the environments themselves, it could be argued that more integrated, and empirically supported research approaches are essential.

This is not to suggest that the focus should shift to predominantly epidemiology-based research approaches. These also have their limitations, especially when seeking to elucidate the complex, culturally influenced links between health and place [145]. Questions utilising epidemiological methods are necessarily reductionist for the sake of specificity, which can then lack sensitivity and overlook context with respect to key intersecting nuances in and between areas of interest. There is a further tendency to reduce "health" to biomedical constructs such as blood pressure and serum concentrations of nutrients because these lend themselves to metrics. This cultural construction of "health", which is Western derived, not only overlooks the bio-psycho-socio-cultural-economic-political interplays and overlaps that influence and determine health [146,147], but also takes people"s health out of the health of the places people live [148]. When considering how Indigenous LBP participation impacts "health" this is of considerable concern if such narrow tools are given preference. In this review, this was most obviously highlighted by the consume-focused literature.

> The challenge is to look beyond the limitations of traditional epidemiology and bridge the reductionism of our scientific training by embracing a more ecologically focused social determinants approach to health [149]; (p. 469)

As such, a balance needs to be struck between the often narrow but illuminating quantitative perspectives of epidemiology, and the powerfully informative shades and nuances derived from the qualitative and mixed methods literature that add the necessary "why" and "how" understandings to

the "what" of biostatistics. The linking step is then to place these collective understandings into this ecologically focused view of the social determinants of health.

If these integrated approaches offer the most potential for gaining the necessary evidence-based understandings of land-human health interrelationships, then adopting a transdisciplinary approach is the path that needs to be explored. The complex landscape that appears when disciplinary and policy fences are removed can become overwhelming. This paper seeks to present a case for active engagement with these complexities as a requirement, not an option, for development of sustainable responses. Indigenous worldviews appear to intrinsically understand this. However, perhaps key, although controversial, in approaching an issue this complex is that of the challenge of not romanticising Indigenous peoples' land use, resource management and conservation values [150,151]. Indigenous land-health interrelationships have a long history. As with other post-settlement critiques of culture-nature relations and Indigenous politics [152,153], this paper seeks to move beyond static cultural constructions into more holistic conceptions that support Indigenous peoples ways of living now that still honour inherited responsibilities, cultural knowledge's, and self-determination [154]. The landscapes, both "natural" and "human-made", in which LBPs such as hunting are being undertaken requires this maturing and respectful view. Neither a single disciplinary, culturally static or methodologically limited lens provides the necessary balance or interrogation these issues demand for practical, sustainable and culturally relevant approaches to be adopted.

In the same vein, understanding what LBP actually involves through a detailed, contemporary critique of the specifics of catch, prepare/share and consume activities and motivations, is also required. The reviewed literature demonstrated substantial holes in these understandings. Land-based practices are occurring in environments that are changing physically, socially, culturally, and economically. These changes are creating considerable tensions. Without acknowledging this and the resulting complexities, research aimed at informing policy and program responses to Indigenous health and wellbeing will inevitably fall considerably short of their intended aims. Central to this is the active consideration of the impacts of changing environments, which profoundly frame the contexts in which people are undertaking these activities.

In this way, this review and critique of the international literature revealed some of the significant "blind spots" and limitations that are inescapable if engagement with land-human health interrelationships continues to occur in exclusively disciplinary and culturally bounded spaces.

> In order to deal with these limitations, various sets of obstacles need to be revised or dismantled: first, ontological frameworks or worldviews that do not embrace the complexity of the natural and human-made environment; second, constructions of knowledge that value rational utilitarian approaches to interpret the layout, use and management of human and natural ecosystems; third, specialisation, segmentation and bureaucratization of knowledge and expertise; and finally, the lack of transfer and communication between professionals, politicians, interest groups and the public [155] (p. 17).

Only through such transdisciplinary-mediated approaches can the current gaps and assumptions, often incorrect, about the complex interrelationships between land and human health in Indigenous contexts become understood and sustainably addressed.

## 5. Conclusions

"Is hunting still healthy?" is not a simple question. Despite the importance of this question in the area of Indigenous environmental health policy and programming and the context of the changing nature of Indigenous relationships with land/sea, the literature appears to have approached this question solely in a deconstructed, unidisciplinary way. Land-human health interrelationships are inherently complex. Using hunting as a powerful case in point, this paper has sought to demonstrate there is considerable benefit in looking out the window of disciplinary and culturally bounded spaces into a broader landscape in order to better understand this complexity. As unfamiliar, and potentially uncomfortable this may be its necessity is difficult to argue against. Land-based practices are neither a single act nor an entity practised in isolation of culture, society, economics, environment, politics or technology. Health of people and place demand an integrated engagement with these inherently multifarious realities. It is not viable to address one without the other, and embracing this more holistic view through development and use of new, transdisciplinary methods has considerable merit. The end goal for Indigenous people of being able to realise any benefits of ongoing LBP can only be achieved if the health of the environment is seen as integral to, not separate from, that of the people in it. Additionally, how "health" is understood requires a considerably broader lens than that focused predominantly on individual human biology. To do this requires a radical rethink in the way research and policy makers approach these complex issues.

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## Author's Contributions

Ursula King and Christopher Furgal conceived of the original idea for the article. Ursula King undertook the international literature review, meta-analysis, model development and major writing. Christopher Furgal provided review and editing on each draft.

## Conflicts of Interest

The authors declare no conflict of interest.

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# CHAPTER SEVEN

## Quantifying the romance: Critical lessons for environmental epidemiology from analysis of the relationship between hunting and health in the Qanuippitaa? Nunavik Inuit health survey

## 7.1 Introduction

Access to data from the Nunavik Inuit Health Survey opened up a number of possibilities for investigating key human health associations with Indigenous LBP participation. This database is large and statistically complex. The Survey also reflects an epidemiological view of human health and wellbeing, and sought to apply that in a remote Indigenous context to understandings of 'health'. To date, the Survey had not been analysed to specifically explore LBP and human health interrelationships, and given the NNHC request for such an enquiry, was a unique opportunity. On the background of the meta-analysis findings, the Survey offered the potential to identify 'evidence' about the detail of Indigenous land-health interrelationships with some statistical rigour. The Inuit ownership of the Survey added cultural rigour to this, which was a principal consideration for the integrity of the research process.

Given the centrality in the reviewed literature about the positive contribution of social capital to Indigenous health and wellbeing, this was a logical place to start the analyses. Intuitively, having the ability to be 'connected to country' through LBP participation would likely be health promoting. With little current quantitative evidence available to support this assumption, this Survey analysis had the potential to populate that gap. However, surrounding this enquiry needed to be a critique of what 'health' actually meant in these contexts. Additionally, it was important to consider what 'traditional' meant in these Indigenous communities where rapid social, ecological and economic change were altering ways of living. Given the size and scope of the Survey, analysing Inuit participant's involvement in LBP's, and their possible associations with social capital and psycho-social wellbeing, was a way to investigate these intersecting issues.

Three issues became apparent as this process unfolded. Firstly, there were only three questions in the Survey that directly addressed LBP participation – one asked about seasonal hunting participation rates, another asked the same in relation to fishing, and there was a question on berry collecting, a single season activity. Secondly, the bootstrap weighting method used for the variance estimation in the sampling design posed major issues regarding which variables could, and could not, be cross-

tabulated in the different Survey instruments. This substantially restricted the field of view permissible for the subsequent analyses. Finally, and perhaps controversially, was the epidemiological lens itself that the Survey was based on. The issue was the uncritiqued assumptions embedded within this methodology regarding what 'health' is, how it can be measured, and what these measurements actually mean in the broader context of contemporary 'Indigenous health' in these types of settings.

## 7.2 Manuscript Summary

**Authors:** Ursula King[1], Chris Furgal[2], Geoff Navara[3]

[1] National Centre for Epidemiology and Population Health, Research School of Population Health, Australian National University, Canberra, ACT, Australia, 2600

[2] Indigenous Environmental Studies program, Trent University, Peterborough, ON, Canada, K9J 7B8

[3] Department of Psychology, Trent University, Peterborough, ON, Canada, K9J 7B8

**Statement of student contribution:** U.K. and C.F. conceived of the original idea for the article. Methodological approach and subsequent data analysis were undertaken by U.K. supervised by G.N.. U.K. completed the major writing, with C.F. and G.N. providing review and editing on each draft.

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**Abstract:** Indigenous participation in land-based practices (LBP) has been advocated as a win-win for the health of people and place. However, challenges to 'traditional' practices, and a privileging of 'evidence' derived from epidemiological methods are evident. Against a critique of how 'health' is constructed, this paper examines these issues through analysis of one of the world's largest regional Indigenous health databases. The Qanuippitaa? (How are we?) Inuit Health Survey included over 1000 adult Inuit living in Nunavik, the Arctic region of Quebec, Canada. This paper presents previously unanalysed data about a major LBP in the region, hunting, and the links with key psychosocial/community connectedness indicators. Frequent hunters were found to be few, and mainly older men, which represented a distinct minority However, they were alive and connected in communities where young people predominate, high rates of premature death are rising, and capacity to hunt is diminishing. These findings raise important questions about both the role of epidemiological methods in understanding Indigenous land-health interrelationships, and the critical importance of considering 'health' beyond the confines of bio-psycho-social medicine.

**Keywords:** Indigenous, land-based practices, epidemiology, environment, health, culture, Arctic Quebec.

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## 7.3 Manuscript

***Quantifying the romance: Critical lessons for environmental epidemiology from analysis of the relationship between hunting and health in the Qanuippitaa? Nunavik Inuit health survey***

### Introduction

*Understanding Indigenous health and place interrelationships*

Connections between the health of people and the places they live are multi-dimensional. Indigenous land/sea-health interrelationships are a complex case in point, and understanding them has occupied research, policy and advocacy efforts for decades. Land-based practice (LBP) participation is considered by many to be central to maintaining 'healthy' Indigenous lives (Corvalan et al., 2005; Burgess et al., 2009; Richmond et al., 2007; Weir et al., 2011). This belief is especially so in land and seascapes that are changing rapidly because of sociocultural-economic, climate change mediated, and land-use tensions. One of the challenges in substantiating the claims to support Indigenous people's participation in LBP as a means to improve 'health' has been a disparate evidence base. Intuitively, participating in LBP, including sharing and consuming the products of this effort, would afford benefits to both those engaged in these activities and the environments in which these occur. However, a recent international review of key literature suggests there are significant gaps, and challenging contradictions, in understanding how Indigenous involvement in LBP impacts both the health of people and place (King and Furgal, 2014).

A major part of the problem appears to lie in how these issues have been approached. With a strong emphasis on narrow, often individually focused, human health parameters, such as measurable biomedical and psychosocial indicators, the broader context of the interdependence of humans within 'ecosystem health' has often been lost. Additionally, there is an ongoing tension between the concepts of 'contemporary' and 'traditional' notions of Indigeneity, which are difficult to navigate. In this complex space are challenging questions about how to better understand health and place interrelationships. In particular, how to do so without privileging the human aspects of ecosystems or inadvertently 'museumising' Indigenous people or reducing 'health' to metric aspects of human biomedicine, and,

thereby, disregarding important pieces of the interdependent 'health' chain fundamentally embedded within LBP engagement.

A key challenge in moving beyond current approaches to understanding Indigenous LBP participation and human-ecosystem health inter-relationships, is the way 'health' has been constructed. This requires an acceptance that 'health' is a culturally bounded, and highly nuanced, concept. There is a substantial literature exploring various aspects of this issue (Helman, 1994; Gesler and Kearns, 2002), including how Indigenous ideas of 'health' need to be more actively considered in contemporary human health-focused policies and programs (Cajete, 2000; Eckermann et al., 2006). An important part of this consideration is the recognition that cultures are fluid and changeable. This includes Indigenous cultural frames and practices, and this acknowledgement creates real challenges when seeking to understand LBP participation in 'contemporary' Indigenous spaces.

Acknowledging this challenge, this paper seeks to explore the opportunities and constraints of a major tool utilised to enquire into these issues, that of epidemiology. Although not considered a cultural lens, a significant amount of weight has been placed on epidemiological understandings of Indigenous human-environmental health interrelationships (Corvalan et al., 2005; Brough, 2001). Perhaps this is due to the accepted place of epidemiology within biomedicine and/or the perception that the tools of epidemiology afford an 'objective' and measurable view. Whatever the justification, the fact that human and environmental health are approached as a binary hints at the cultural frame in which epidemiology operates.

This is particularly the case when the much broader and multifaceted ideas of Indigenous science and knowing are considered. In these Indigenous worldviews, there is no such separation, as the ecological approach adopted incorporates human health as part of an integrated and interdependent physical-metaphysical-ecological-spiritual whole with the planet (Cajete, 2000; Eckermann et al., 2006; Nettleton et al., 2007). However, the tendency to fix these more holistic Indigenous ways of knowing and doing in time, such that change is not recognised as an intrinsic part of these cultural spaces, also creates problems. The desire to preserve 'tradition' in

these contexts is totally understandable in response to the loss of tradition faced by so many Indigenous people from the assimilationist and genocidal consequences of colonialism. However, an absolute preservation can potentially override needed understandings and responses to the complexities of 'contemporary' Indigenous lives and landscapes. These are deeply fraught and contested issues, and are not commonly brought together. However, this paper utilises a novel approach to exploring these issues through critique of analysis undertaken on a large Indigenous epidemiological database. It is argued this process can contribute to needed understandings about how Indigenous LBP-human health interrelationships are constructed, and the implications this can have on ongoing responses to these issues.

*Qanuippitaa? (How are we?): An epidemiological case study*

Although there have been a number of studies in various ecozones exploring LBP and human health (King and Furgal, 2014), Inuit communities in Arctic Quebec have been some of the most proactive in undertaking larger scale epidemiological research on these issues. *Qanuippitaa?* (How are we?), a regional health survey of the Inuit population of Nunavik (Arctic Quebec), Canada, is one of the largest databases of this type in the world, and has provided an invaluable window into the intersections between the 'health' of people and their relationship to place. Managed by the Nunavik Regional Board of Health and Social Services (NRBHSS), the survey aimed to verify the evolution of health status and risk factors in the 14 communities that comprise the region of Nunavik (Figure 1).

The 2004 Survey was designed to progress the findings of the original region-wide survey conducted by Sante Quebec in 1992. This original survey was prompted by concerns about the impacts of socio-cultural, economic and environmental changes being experienced by Inuit in this region due to the impacts of changing land uses from commercial mining and climate, changing health patterns, and rapid shifts in lifestyle aspirations of the local communities, particularly the young, and the consequent move away from more 'traditional' ways of life. As a population in transition, coordinated monitoring of population health and its determinants was considered essential for the development of effective health prevention and promotion programs. No equivalent, large scale health surveys with Indigenous

communities have been undertaken outside of Canada so the Nunavik surveys offer a unique epidemiological window into the many and complex issues impacting Indigenous people's health today. Utilising standardised instruments, the surveys have quantitatively captured the human health profile of over 1000 adult Inuit living permanently in the fourteen coastal villages that make up the Nunavik territory, north of the 55th parallel. With a population of nearly 10,000 permanent residents at the time of the survey, the people in this region are predominantly Inuit, with 40% being under the age of 15 years (Statistics Canada, 2006).

**Figure 1: Map of the Nunavik territory** (www.itk.ca)


One of the issues captured by the Nunavik Inuit health surveys was LBP participation. With growing calls in the international literature advocating the health-promoting role of LBP involvement for Indigenous people (Corvalan et al., 2005; Weir et al., 2011), the latest iteration of the Nunavik surveys was analysed to explore this interrelationship. In particular, the role of hunting was examined, which is a major LBP in the region. This had not been done before. The aim was twofold. Firstly, to find out what the surveys could identify about the 'health' of those who hunted in these communities. Secondly, to place these analyses back into the bigger

picture of Indigenous land-health interrelationships as presented in the international literature. In so doing, this research explored the ways in which 'health' itself has been constructed, and the potential impacts this has had on how Indigenous land-health interrelationships have been understood and promoted.

With respect to the Nunavik Inuit health survey analyses, two main questions were posed:

1. Who are the hunters in Nunavik?
2. What are the characteristics of the hunter's health, and how do these compare to those in Nunavik who do not hunt?

The aim was to test the hypothesis that Indigenous participation in LBP's was associated with improved health outcomes. The Nunavik surveys provided an opportunity to test this with reasonable statistical power given the large number of participants.

Using the available variables, this paper specifically examines the socio-demographic profile of the people who hunt in Nunavik, and explores this in relation to the interrelationships with two key reported benefits in the international literature of participation in LBP i.e.

1. Improved life satisfaction (psychosocial well-being)
2. Stronger sense of community connectedness (social capital)

**Methods**

Permission to analyse the 2004 Nunavik Inuit Health Survey was obtained from the Nunavik Regional Board of Health and Social Services (NRBHSS). Variables were then identified from the existing database that corresponded to the two issues of interest.

The target population of the survey was permanent residents of Nunavik living in private Inuit households, and participants had to be over 15 years of age. Two-stage

stratified random sampling was used to select private Inuit households with proportional allocation. The community was the sole stratification variable used. The 2004 Nunavik Inuit Health Survey Methodological Report (Rochette and Blanchet, 2007) argued that basing sampling on households rather than individuals was appropriate because many Inuit move frequently from house to house, therefore, household recruitment was seen as a means of increasing coverage of the target population. A proportional allocation of sampling units corresponding to the size of each of the 14 villages in the region was chosen. This approach resulted in a 77.8% household response rate.

Six survey instruments were utilized to capture a wide range of data relating to the health and wellbeing of the Nunavik residents. These were *household*, *individual confidential*, *food frequency*, *24-hour dietary recall*, a *clinical session*, and series of *clinical tests*. However, because of how the data had been sampled, some important statistical considerations had to be taken into account before finalising a list of variables for the analysis presented in this study. As bootstrap weights had been calculated for each separate survey instrument, this effectively precluded cross-tabulation of variables used in different instruments. As such, this paper restricted analyzed variables to those available in the *individual* survey instrument.

As this research focused on Inuit health, only those cases identifying as Inuit were included in the analysis. This meant that of the 1052 *individual* instrument respondents, 1035 comprised the study sample for this paper. This represented an Inuit participation rate of 98.5% in an overall population where Inuit comprised 91% of the Nunavik total. It is important to note that, in order to facilitate Inuit participation, the surveys were developed in collaboration with Inuit researchers and key community representatives, and subsequently translated into the three languages spoken in the region, namely Inuttitut, French, and English. Of the 1035 Inuit participants, 969 responded to the question about hunting participation (Table 1).

**Table 1: Original layout and wording of hunting frequency question (2004 Nunavik Survey)**

| Question: In the past 12 months, on average, how often did you go hunting? | Never | Less than once a month | 1-3 days/ month | 1-3 days/ week | 4 or more days/ week |
|---|---|---|---|---|---|
| Spring | 1 | 2 | 3 | 4 | 5 |
| Summer | 1 | 2 | 3 | 4 | 5 |
| Fall | 1 | 2 | 3 | 4 | 5 |
| Winter | 1 | 2 | 3 | 4 | 5 |

These responses were firstly regrouped to a single scale of frequency per month i.e.

- None or never (1 above)
- 1 to 3 times per month (2 + 3 above)
- 4 or more times per month (4 + 5 above)

Participants were then grouped according to their reported monthly frequency of participation across these four seasons, to create the following three groups of hunting frequency:

1. Never hunt (n = 195): those who reported never participating in hunting (answered 1 in all seasons)
2. Infrequent hunt (n = 632): those who reported hunting 1 to 3 times per month (answered either 2 or 3 for hunting frequency in 2 or more seasons)
3. Frequent hunt (n = 142): those who reported hunting 4 or more times per month (answered either 4 or 5 for hunting frequency in 2 or more seasons).

These frequency groupings reflected the previously used groupings in the published thematic reports (Furgal and Rochette, 2007). These three groupings were then analysed against the variables identified from the *individual* survey instrument that corresponded to the characteristics of interest i.e. psychosocial wellbeing, and social capital. This resulted in the creation of three inter-related groupings of variables:

1. Socio-demographic: age, sex, education level, employment status, income.
2. Psychosocial: satisfaction with life, perception of health.

3. Community connectedness factors: closeness to village, work for benefit of community, get together to play sports etc., someone demands too much in everyday life.

In choosing the corresponding variables to include in each of these groupings, the focus was on those variables that would enable analyses of known key health drivers and indicators. This meant a small selection of variables were subsequently included, with a preference for those where validated items had occurred in the literature (Table 2).

**Table 2: Socio-demographic and psycho-social wellbeing/community connectedness variables used in the analysis (2004 Nunavik Inuit Health Survey)**

| | |
|---|---|
| 1. Socio-demographic | • Age<br>• Sex<br>• Schooling<br>• Employment<br>• Income |
| 2. Psycho-social wellbeing/ community connectedness | • Life satisfaction<br>• Perception of health<br>• Closeness of village<br>• Work for benefit of community<br>• Get together to play sports etc.<br>• Someone demand too much |

The questions relating to education level, employment and income were complex, with multiple potential answers available to the participants. Previous cautions in the published thematic reports when interpreting findings derived from analyses of these variables meant that care had to be taken (Rochette et al., 2007). Given this, the decision was made to include only those survey response options that best reflected the known key levels of significance in these communities regarding these factors (Anctil, 2008; Rochette et al., 2007). As such, new, grouped variables were created as follows:

- % of those reporting some years of secondary schooling
- % of those reporting being in full-time waged employment
- % of those reporting an income less than $20,000/annum

Using SPSS v.20 (Statistical Package for Social Sciences, SPSS Inc.), frequencies were calculated for each of the hunting groups (never, infrequent, frequent) using the identified variables grouped in the above ways. One-way ANOVAs were then performed to compare means between each of the variables of interest in each of the three respective hunting groups, and these were adjusted for age and sex. Pearson correlations followed for each dependent variable within each hunting frequency group, with a focus on the frequent hunters. Lastly, multiple comparisons were made using the Bonferroni correction to test for between group differences.

**Results**

The analyses revealed an intriguing picture of "who are the hunters?" in Nunavik at the time of the survey. It had been previously reported that nearly half of the Nunavik Inuit population participated in weekly hunting during the spring and summer seasons, considered the most active times of year (Furgal and Rochette, 2007). However, closer analysis demonstrated that the frequency with which people participated varied considerably, as did the characteristics of the people within each of these different hunting frequency groups. Of the total Inuit survey participants, men comprised 44.7% and women 55.3%, which reflected the ratio in the total Inuit population in the region. The median age of Nunavik Inuit residents was 19 years, with 12.3% aged 50-64 and only 7.5% over 65 years. This meant that the frequent hunter profile of older i.e. > 50 years of age, and male, represented a small and distinct group in this population.

With respect to socio-demographics, the analyses revealed statistically significant differences between those that either never or infrequently hunted compared to those that frequently hunted. The frequent hunters had fewer years of formal education ($p = 0.007$), were more commonly in full-time waged employment ($p = 0.024$), and reported a higher individual annual income ($p < 0.001$). Given the significance of being an older male and hunting frequency, age and sex were controlled for in these and the following analyses (Table 3).

**Table 3: Socio-demographic characteristics by hunting frequency in Nunavik**

| | Age | Sex | Education | Employment | Income |
|---|---|---|---|---|---|
| | % >50 yrs | % male | % some yrs of 2ndry schooling | % f/time waged | % <$20,000/ annum |
| **Overall (n=1035)** | 19.5 | 44.7 | 58.6 | 50.4 | 58.2 |
| **Hunting (n=969)** | | | | | |
| **Never (n=195)** | 17.4 | 15.4 | 60.8 | 46.3 | 62.5 |
| **Infrequent (n=632)** | 15.8 | 47.5 | 61.4 | 49.4 | 61.6 |
| **Frequent (n=142)** | 33.1 | 71.1 | 42.3 | 62.6 | 37.3 |
| Oneway ANOVA (adjusted for age and sex) | | | | | |
| **F (df1, df2)** | | 61.825 (2, 966) | 5.009 (2, 920) | 3.754 (2, 797) | 17.052 (2, 822) |
| **p value** | < 0.001 | < 0.001 | 0.007 | 0.024 | < 0.001 |

In the psychosocial analysis, the frequent hunters did not report being any more or less satisfied with their lives ($p = 0.914$) or perceive themselves as more or less healthy ($p = 0.340$) than those that hunted less frequently (Table 4). However, community connectedness was notably different between the hunting groups (Table 5). Frequent hunters reported feeling closer to their community ($p = 0.004$) and working more for its benefit ($p < 0.001$), and were also more likely to participate with others in games/sports ($p < 0.001$). Frequent hunters did not report feeling any more demanded of in everyday life than those who hunted less often ($p = 0.985$).

**Table 4: Psychosocial factors by hunting frequency in Nunavik**

| | Satisfaction with Life | Perception of Health |
|---|---|---|
| | % satisfied/very satisfied | % excellent/very good |
| **Hunting (n = 969)** | | |
| Never (n = 195) | 68.2 | 23.1 |
| Infrequent (n= 632) | 71.5 | 21.5 |
| Frequent (n = 142) | 74.6 | 19.0 |
| Oneway ANOVA (adjusted for age and sex) | | |
| F (df1, df2) | 0.090 (2, 966) | 1.081 (2, 966) |
| p value | 0.914 | 0.340 |

**Table 5: Community connectedness by hunting frequency in Nunavik**

| | Closeness to Village | Work for Benefit of Community | Get together with people to play games, sports or other recreational activities | Someone makes you feel worried or demands too much from you in your everyday life |
|---|---|---|---|---|
| | % very or somewhat close | % very often/often | % very often/often | % all of the time/most of the time |
| **Hunting (n 969)** | | | | |
| Never (195) | 61.7 | 14.9 | 18.2 | 23.3 |
| Infrequent (632) | 69.9 | 24.1 | 31.7 | 17.9 |
| Frequent (142) | 79.3 | 32.6 | 43.3 | 20.6 |
| Oneway ANOVA (adjusted for age and sex) | | | | |
| F (df1, df2) | 5.644 (2, 909) | 15.506 (2, 941) | 25.980 (2,955) | 0.016 (2, 953) |
| p value | 0.004 | <0.001 | <0.001 | 0.985 |

When these findings were analysed to determine key correlations, the association for frequent hunters between age > 50years *and* male *and* fewer years of secondary schooling *and* higher individual annual income held with 2-tailed significance using Pearson correlations all indicating $p < 0.001$. Using the more conservative Bonferroni correction, male sex and age older than 50 years were still the factors of most significance between the three hunting frequency groups ($p < 0.001$). This meant that if a person was a frequent hunter then they were most commonly male *and* over 50 years of age when compared with both those who never or only infrequently hunted. Years of secondary schooling were only statistically different between frequent and infrequent hunters (both $p = 0.010$) but not between never and infrequent ($p = 0.256$) or frequent ($p = 0.672$) hunters. Conversely, frequent hunters had higher individual annual incomes when compared to both infrequent ($p < 0.001$) and never hunters ($p < 0.001$). With respect to psychosocial factors, between group comparisons confirmed the initial descriptive findings of no significant between group differences. For satisfaction with life, between group comparisons for all three hunting frequency groups had a p value of 1.000. For general health there were no significant between group differences either with frequent versus infrequent ($p = 1.000$), frequent versus never ($p = 0.966$) and infrequent versus never hunters ($p = 0.437$).

The between group comparisons for community connectedness factors did indicate differences between the hunting frequency groups. Regarding closeness to village, the significant difference lay between the frequent and infrequent hunters ($p = 0.030$), and the infrequent and never hunters ($p = 0.030$), not the frequent and never hunters ($p = 0.690$). With the question about working for the benefit of the community there were also significant between-group differences. In this case, the never and frequent hunters ($p < 0.001$), and never and infrequent hunters ($p < 0.001$) both recorded significant differences but not the frequent and infrequent hunters ($p = 0.114$). When it came to the issue of getting together to play sports etc., all three groups recorded a significant difference with p values for all between group comparisons <0.001. On the other hand, the question about someone demanding too much did not achieve significance between any of the hunting frequency groups ($p = 1.000$).

**Discussion**

On a background of a growing Arctic literature that indicates increasing concern within Indigenous communities about loss of capacity and interest for participation in hunting (Blakney, 2010; Chabot, 2003; Condon et al., 1995; Duhaime et al., 2002; Ford and Beaumier, 2011; Richmond and Ross, 2008), knowing who is currently doing the hunting, and hunting's relationship with key human health indicators is important. Approaching these issues through an epidemiological lens enables needed quantitative data to inform discussions, both about factors that could enable or inhibit engagement with LBP, such as hunting, in these environments, and important associations with health outcomes. Analysis of the 2004 Nunavik Inuit Health Survey suggests there are certain socio-demographic, psychosocial, and social capital characteristics associated with frequency of hunting in this population. However, the epidemiological findings paint an incomplete picture. As such, these findings need to be carefully considered if hunting, and its interrelationships with these key aspects of human health, are to be properly understood in these contexts.

In Nunavik, nearly half of the Inuit participants indicated they participated in hunting between one and four times a month across two or more seasons. This suggested hunting was clearly still an important activity in these communities. The details

embedded within this number, however, indicated quite different characteristics between those who hunted more often versus those reporting less frequent or no participation. Thus these analyses paint a picture of unequal participation within the community, which has implications for hunting's continued role, effective contribution, and ongoing significance.

Older men were the most frequent hunters, despite being a minority in a population where younger people predominate. This raises some interesting questions about why and how these individuals have survived in communities with disproportionate rates of premature death from preventable causes such as suicide (Kirmayer et al., 2007), and increasing rates of cardiovascular disease (Dewailly et al., 2007), and in what ways their involvement in hunting may have or have not contributed to this longevity. Perhaps part of the answer lies in the reported high rates of community connectedness for this group. The social capital literature supports this association between a person's level of involvement in their community and improved health (D'Hombres et al., 2010). This finding corresponds with Indigenous views of 'health' that encompass more holistic constructions of mind, body, and spirit as intricately and inseparably connected with interactions with the land/sea (Cajete, 2000; Eckerman et al., 2006; Nettleton et al., 2007). This extends to the assertion that ongoing connections with the land/sea through activities such as hunting enable maintenance of 'health'. However, these same respondents did not report a statistically significant difference in their life satisfaction when compared with the infrequent or never hunters, nor a greater sense of good health, markers that are both associated in the literature with the ability to predict health outcomes (Jylhä, 2009). Given this, one may speculate about what 'health' may actually mean to Inuit living in Nunavik, and the capacity of an epidemiological questionnaire to accurately capture those meanings.

On a related issue, given the established associations between economic status and education levels and 'health' (Baum, 2002; Gatrell and Elliott, 2009), the epidemiological picture becomes even more intriguing when hunting frequency is looked at through these parameters. The identified frequent hunters education and income were opposite each other. They reported both the lowest levels of secondary

years of education, yet had the highest levels of annual individual income in these communities. Explanations for this can only be postulated but not clarified by the analyses. Is this a case whereby, in these remote communities, frequent hunting affords an economic benefit over and above income opportunities able to be derived from higher levels of formal education? Does this reflect the types of jobs available in these settings and the educational level they require? Or is this part of the influence of being 'male and married' in these communities, which has been demonstrated to improve overall household income because of the advantage of a wage plus the ability to hunt within the one family unit? (Organ et al., 2013).

Taken together, what do these findings suggest about the association between hunting involvement and key socio-demographic, psychosocial, and social capital indicators in these communities? When the broader literature is reviewed, the picture remains complex. A substantive literature has previously reported a number of reasons for diminishing interest, and capacity to participate, in LBP's such as hunting in Arctic Inuit communities. These issues include the impacts of wage-based economies and compulsory schooling on time to participate in, and opportunities for skill/knowledge transfer about, LBP's; contemporary lifestyles with the associated diminishing interest in 'traditional' practices that have become increasingly marginalised from an economic perspective; increasing consumption of store-bought foods in preference to country foods procured through LBP activities; increasing language differences and decreasing respect between generations hampering intergenerational knowledge transfer; and the expense of purchasing and maintaining equipment required to undertake LBP's (Blakney, 2010; Condon et al., 1995; Dombrowski, 2007; Dombrowski et al., 2013; Ford and Beaumier, 2011; Laidler et al., 2009; Mead et al., 2010; Stern, 2005).

In addition, there are a number of place-based factors, particularly related to climate change, that have been demonstrated to further complicate people's capacity to safely engage in LBP in these remote settings (Arctic Climate Impact Assessment, 2004; Berkes and Jolly, 2002; Ford et al., 2006; Furgal, 2008; Furgal et al., 2002). These are interwoven and interdependent issues, and only add further layers of complexity to the 2004 Nunavik Inuit Health Survey analysis. Do the frequent

hunters identified in the analysis represent a group that, because of many of these issues, will not be replaced by subsequent generations? Are the environments in which these activities are occurring capable of sustaining safe and ongoing engagement? The implications of these issues are considerable. The frequent hunters are arguably the ones providing these communities with both access to country foods, and, through the associated LBP's, a strong link with 'traditional' means of 'being Indigenous' in rapidly socio-culturally, and physically changing, environments. The persistence of a 'hunting class', and their place and role in community health and wellbeing in this, and other, Arctic regions is something that merits further research attention. It is also a controversial area of enquiry because it raises difficult questions about the sustainability of 'traditional' LBP involvement, and contemporary Indigenous identities and ways of life.

Analysis of the 2004 Nunavik Health Survey does not enable such nuanced enquiry as to the origin and detail of these important questions. However, working within these limits, an intriguing picture emerged. This new analysis highlights the importance of complementing epidemiological approaches with other enquiry methods to flesh out the multifaceted interplays. As such, the oft-reported assertion of the importance, and centrality, of LBP participation in Indigenous communities is more complex than existing literature would suggest (King and Furgal, 2014).

It is important to acknowledge the considerable methodological limitations of the Survey. In the main, this is related to the type and extent of variables used to map the ways in which participants were involved in hunting beyond seasonal frequency; the limitations for cross-tabulation between potentially useful comparison variables in different survey instruments, and the subsequent interconnections that could be made with identified outcomes; and the requirement to exclude potentially significant variables in the analyses because of confusion in the wording or layout of the questions that included them, such that any analyses based on them would be unreliable. This was possibly an unanticipated consequence of seeking to be inclusive in questions by offering multiple potential responses, and also the challenge of a survey developed and conducted in three languages. Additionally, the surveys were based on household data capture, which may have impacted the ways in which

participants responded to questions about both themselves and the members of the household they shared. Although potentially increasing data capture, as argued by the survey architects, this methodological approach also introduced a number of potential problems. These included possible bias in responses, and potentially uncaptured or misconstrued data, based on inaccuracies or perceptions of the household head about their household members, or the way in which their answers were interpreted and recorded by the interviewer.

These limitations not withstanding, the Nunavik health surveys represent a huge commitment by the Nunavik communities, and the surveys' co-ordinating agencies, to elucidate the complex factors and interactions impacting human health in these rapidly changing environments. However, the question remains to what extent these types of approaches can be relied upon to inform public policy and program responses to Inuit health needs in the region. Beyond the arguments for and against various survey designs are the much broader cautions in the international literature about utilising and relying on epidemiological constructions of Indigenous health. In part, these cautions arise because of a failure to appreciate the "undeclared baggage of epidemiology", which is "not able to be left behind, but not acknowledged either for fear of disrupting the privileged travel arrangements of objective, value free science" (Brough, 2001:67). This "baggage" includes a host of assumptions, perceptions, and ideologies that stem from the socio-political frame of biomedicine from which epidemiology is derived. Epidemiology is part of the social world, and favoring its methods and outcomes obscures moral judgments about individual and population behaviors and choices (Lupton, 1995). In so doing,

> *"The privileged knowledge of 'hard science' carries with it a capacity to further entrench social ideologies, hence any science dealing with 'populations' must be wary of its power to not just reflect but reinforce prejudice" (Brough, 2001:68).*

This tendency for epidemiological approaches to both construct and reinforce 'stereotyped norms' of Indigeneity is highly problematic. As such, health science discourses, in particular epidemiology, have been inadvertent contributors to these marginalising constructions (Martin, 1992; Treichler, 1987).

Added to these cautions are the ways in which quantitative approaches to examining and presenting Indigenous health can reinforce a discourse of 'risk'. This not only has the potential to 'blame the victim' but to institutionalise new forms of inequality by 'organising marginality' (Castel, 1991).

> *"In deeming Indigenous people 'at risk,' we must be wary of who shall ultimately carry the greatest burden of blame and responsibility. New welfare state logics which seek to reserve effective citizenship only for active, self-managing populations have the potential to re-invoke old logics of exclusion" (Brough, 2001:79].*

This is, perhaps, the key tension when relying on current epidemiological tools to investigate and represent these issues. On the one hand, a quantified, individually focused 'health risk' discourse offers a point of political leverage for Indigenous people's regarding the inequities identified. On the other hand, the same discourse can be appropriated by policy makers to lay blame and justify paternalism, which arrests further control away from Indigenous people's about how their health issues are framed and responded to. Crucially, neither of these positions considers the interdependence of 'Indigenous health' with socio-ecological contexts.

**Conclusion**

Epidemiological approaches to understanding the contemporary drivers and influences impacting Indigenous health are an important tool. However, as with any modality, these tools have their limits. With so much research interest in how best to improve 'health', and reduce the life expectancy gap between Indigenous and non-Indigenous people who share the same state/country, appreciating these limits is important. It is argued a balance needs to be struck between investments in epidemiologically driven research enquiry in these spaces, and the more culturally considered opportunities afforded by socio-ecologically informed interdisciplinary mixed method approaches (Brown et al., 2010; Trostle, 2005). Central to this is how 'health' is constructed and understood, and the incomplete views presented if biomedical constructions are given preference. A preference strongly bounded within epidemiology. This analysis of the 2004 Nunavik Inuit Health Survey was an illustrative case in point.

Hunting in Nunavik was clearly still important. However, the analysis results raised difficult questions about the capacity of these communities to remain effectively engaged in these activities. The rapidly changing social, economic and cultural landscapes in which Inuit people are living in these regions have created real challenges for continued participation in long-established LBP activities such as hunting. Tensions between contemporary and 'traditional' ways of life are growing. The most frequently engaged hunters are derived from a significant, and diminishing, minority in these populations. The incentives, economic and lifestyle related, for continued participation in activities such as hunting are also diminishing. The ways of responding to and ameliorating this are not identifiable through the epidemiological lens of the Nunavik Inuit Health Survey. Also missing were key understandings of human-environmental health intersections influenced by rapidly altering local ecosystems that profoundly influence safe, and sustainable, LBP engagement. This tendency to focus on individual people, through a reductionist, biomedical lens that operates both uncritically outside its socio-political context, and dislocated from the physical landscapes people live in, highlights the ongoing tendency to disconnect the health of people and place. These are central issues in the ongoing discussions about the role of LBP in the lives of contemporary Inuit communities, and, potentially, other Indigenous communities in similar situations around the world. To redress this requires an active critique of the tools currently used to define and measure 'health'.

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# CHAPTER EIGHT

## Understanding the relationships between cardiovascular health and land-based practices: A Case Study in Nunavik, Arctic Quebec

## 8.1 Introduction

The increased physical activity associated with Indigenous engagement in 'on country' activities is argued to be one of the main human health benefits of LBP participation cited in the literature. Participation in these activities are touted as being important particularly in light of growing global concern about increasing sedentariness, and the associated obesity and poor cardiovascular health consequences, for the wider global population[1]. However, the contribution LBP engagement plays in reducing these and other health risks for Indigenous people is not well supported with existing quantitative data (King and Furgal 2014). The Nunavik Inuit Health Survey offered the opportunity to explore this issue through an epidemiological lens, and contribute some data to this discussion. Using the available variables within the Survey, the focus was on exploring the associations between hunting frequency, selected health behaviours and some biomedical measurements. In particular, smoking and physical activity levels, and key cardiovascular risk factors, were examined in association with participant's hunting frequency throughout the year.

This inquiry revealed a complex and incomplete story, and highlights some of the challenges with restricting understandings of 'health' to a solely biomedical view. In the context of Inuit in Nunavik, a remote population of Indigenous people's living on, and trying to remain connected to, their rapidly changing ancestral lands and livelihoods, clarifying what 'health' actually meant for this population was difficult from the analyses undertaken. It appeared to have much broader, interwoven meanings, and required an active consideration of the socio-cultural, economic and ecological contexts that were influencing it. These concepts and constructs were not able to be clarified from this analyses of the Survey, however, the picture that emerged was interesting with respect to previously held assumptions about the relationship between LBP engagement, physical activity, and cardiovascular health in these settings.

[1] World Health Organisation strategy targeting diet and physical activity at http://www.who.int/dietphysicalactivity/en/

## 8.2 Manuscript Summary

**Authors:** Ursula King[1], Chris Furgal[2], Geoff Navara[3]

[1] National Centre for Epidemiology and Population Health, Research School of Population Health, Australian National University, Canberra, ACT, Australia, 2600

[2] Indigenous Environmental Studies program, Trent University, Peterborough, ON, Canada, K9J 7B8

[3] Department of Psychology, Trent University, Peterborough, ON, Canada, K9J 7B8

**Statement of student contribution:** U.K. and C.F. conceived of the original idea for the article. Methodological approach and subsequent data analysis were undertaken by U.K. supervised by G.N. U.K. completed the major writing, with C.F. and G.N. providing review and editing on each draft.

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**Abstract: Introduction:** Rapidly changing lifestyles and environments pose challenges for Indigenous people seeking to remain connected to their lands/seascapes through land-based practice (LBP) engagement. Researchers have been investigating and promoting Indigenous LBP participation as a means to facilitate health and well-being in these settings, however, the relationships are complex. One of the populations actively engaged in this inquiry are the communities of Nunavik, located in the Arctic region of Quebec, Canada. The nearly 10,000, predominantly Inuit, residents living in this remote area have been engaged in a longitudinal cohort study that has enabled mapping of the health and well-being of the 14 communities in the region. One of the issues of interest in the survey was cardiovascular disease. Inuit have most commonly been reported as having a generally lower overall cardiovascular risk profile than the broader Canadian population, although recent research suggests this may have been underestimated. Concerns over 'westernising' lifestyles and diets have raised questions about whether this situation is changing, and in what ways this is associated with participation in LBPs in these communities. **Methods:** Using data from the 2004 Nunavik Inuit Health survey, this paper presents the results of descriptive, and age and sex adjusted one way ANOVAs and post hoc analyses examining the associations between hunting frequency, physical activity, smoking, and cardiovascular risk factors (body mass index, body fat %, waist girth (cm), systolic blood pressure, fasting glucose, and total cholesterol/HDL) in this population. **Results:** The frequent hunters in these communities were identified as few, predominantly older and male, their cardiovascular health generally good, and their physical activity levels no greater than those who did not hunt. Frequent hunters had lower levels of reported daily smoking than those who hunted less often or not at all. **Conclusions:** These analyses did not find any significant associations between hunting frequency and physical activity levels or that those who hunted most frequently had a 'healthier' cardiovascular risk factor profile. These findings challenge previously reported associations in the literature between LBP participation and increased physical activity and consequent improved cardiovascular health. However, the most frequent hunters in Nunavik were still alive in communities where 40% of the population are under 15 years of age, and rates of some causes of preventable death are rising. As such, these analyses are only a piece of a much larger puzzle on the health benefits of Indigenous relationships with the land and sea. This paper argues for taking a broad

view of these complex issues, and looking behind, and beyond, the data to find potential solutions to these important public health problems.

**Key words:** Indigenous, Inuit, land-based practices, Arctic, hunting, physical activity, cardiovascular disease

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## 8.3 Manuscript

***Understanding the relationships between cardiovascular health and land-based practices: A Case Study in Nunavik, Arctic Quebec***

### Introduction

*Land-based practices and health*

Hunting is an important land based practice (LBP) holding a significant place in the lives of many of the world's Indigenous peoples. In the Arctic, hunting forms a core part of the identity of First Peoples who have lived in that region for millennia. In recent decades, health researchers and policy makers have responded to the long held claims by Indigenous people that LBPs, such as hunting, are an essentially healthy, and health promoting activity, by supporting initiatives that promote LBP engagement (Corvalan and others 2005; Richmond and others 2007; Burgess and others 2009; Weir and others 2011). This support for LBP-focused initiatives has only gained momentum as the health of Indigenous peoples in many regions around the globe has declined, with increasing rates of premature death from such things as suicide, and a rise in lifestyle-related illnesses such as cardiovascular diseases, obesity, and diabetes (United Nations 2009). The reasons for this decline in health status are complex and reflect a collision of cultural fragmentation rooted in the colonial legacy, shifts in intergenerational interactions, rapidly changing lifestyle preferences, increasing economic pressures, and competing land uses in environments experiencing precipitous transformation from the impacts of such things as extractive industries and climate change (ACIA 2004; Corvalan and others 2005; United Nations 2009). Under these influences, the place and character of 'traditional' ways of life, such as hunting, are changing.

Negotiating these changes through engagement in LBPs is an active area of research; however, there are considerable gaps and contradictions in the literature about how safe and sustainable these engagements might actually be (King and Furgal 2014). Embedded within this wider discourse is a discussion about the possible links between LBP involvement and increased levels of physical activity, and many questions remain unanswered. With a long history of LBP involvement, especially hunting, Canadian Inuit communities have been some of the most active in investigating these complex relationships. The challenge has been to find place-

based approaches to addressing the known causes of Indigenous ill-health in these settings, and to do so in ways that consider the needs of communities, and landscapes, that are in considerable flux. Engagement in LBPs is seen by many to meet these intersecting land-human health needs, particularly with respect to increasing physical activity levels and the subsequent benefits for cardiovascular health, although empirical evidence has only been reported with respect to BMI (Burgess and others 2008, 2009). This lack of a more substantive evidence base to support the association between LBP engagement and cardiovascular risk factors means that there is still much to discern (King and Furgal 2014). To potentially add to this currently limited evidence base about the links between participation in LBPs and human health outcomes, this paper draws on analyses of data from a large regional Inuit health survey, *Qanuippitaa?* (How are we?). Although focused on adult Inuit in the Nunavik region of Arctic Quebec, these analyses offer an interesting perspective on these complex and yet to be fully clarified issues. This paper then uses these analyses to discuss the broader issues of the current and future place of Indigenous LBP engagement given the many changes – social, cultural, economic, ecological - that are occurring in the environments in which they are being practiced.

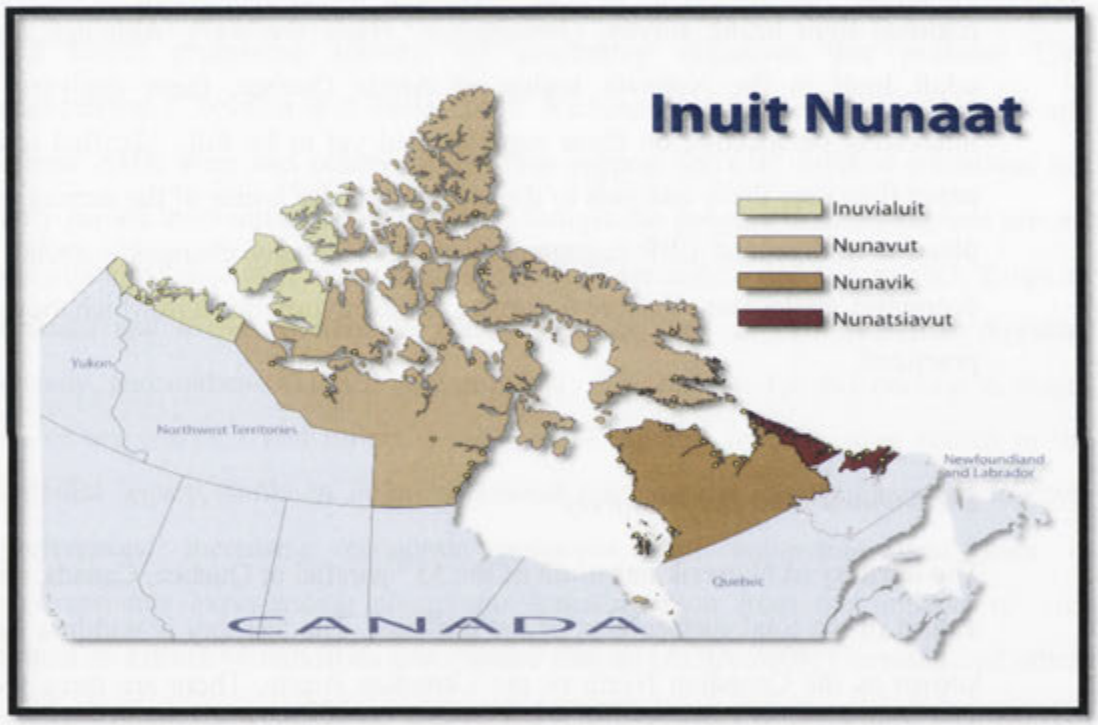
*The Nunavik Inuit Health Survey*

The territory of Nunavik lies north of the 55$^{th}$ parallel in Quebec, Canada, and covers a third of the total surface area of the province. The territory is within a larger area known as the Canadian North or the Canadian Arctic. There are three recognized territorial administrative regions in the North – Nunavut, Yukon, and Northwest Territories, all north of 60$^{o}$. Nunavik (Arctic Quebec north of 55$^{o}$ N), and the north coast of Labrador within the Nunatsiavut land claim settlement, are also considered part of this Northern region yet are situated within provincial boundaries (Figure 1). They have communities with proportionally large Indigenous populations, and share many bio-geographical characteristics with the other Arctic regions of Canada.

*Qanuippitaa?* (How are we?), was the region-wide Nunavik Inuit Health Survey co-ordinated by the Nunavik Regional Board of Health and Social Services (NRBHSS). Initially conducted in 1992, and again in 2004, the survey includes a longitudinal

cohort that has mapped the health of over 1,000 adult Inuit, in a population of 10,000 living in the region. As a population in transition, co-ordinated monitoring of population health and its determinants was considered essential for the development of effective health prevention and promotion programs. No equivalent, large scale health surveys with Indigenous communities have been undertaken outside of Canada of this nature such that the Nunavik survey offers a unique epidemiological window into the many and complex issues impacting the contemporary health of one group of Indigenous people.

**Figure 1: Map of the Inuit regions of Canada** (www.itk.ca)




To date, analysis of the 2004 Survey has produced nineteen, mainly descriptive, thematic reports, and numerous scientific publications on such topics as nutritional status of the population, risk factors for various chronic diseases, mental health status, and contaminant exposure (Kirmeyer and others 2007; Plaziac and others 2007; Blanchet and Rochette 2008). However, the specific issue of LBP participation and potential associations with key health behaviours and biomedical risk factors for cardiovascular disease has not been reported on previously.

This study explores the relationships between health status, as measured by physical activity and smoking, and known biomedical markers of cardiovascular risk, and the level of hunting frequency among survey participants. Using this region as an illustrative case study, these findings are then discussed in the context of the current debate occurring within the broader field of Indigenous land-health interrelationships.

## Methods

*Qanuippitaa? Survey*

The 2004 *Qanuippitaa?* Survey utilized six survey instruments, and one clinical assessment protocol, to gather interrelated data. Details of the survey are provided elsewhere (Rochette and Blanchet 2007). The target population of the Survey was permanent residents of Nunavik living in private Inuit households, and participants were over 15 years of age. Two-stage stratified random sampling was used to select private Inuit households with proportional allocation. The community was the sole stratification variable used. The 2004 Nunavik Inuit Health Survey Methodological Report (Rochette and Blanchet 2007) argued that basing sampling on households rather than individuals was appropriate because many Inuit move frequently from house to house, therefore, household recruitment was seen as a means of increasing coverage of the target population. A proportional allocation of sampling units corresponding to the size of each of the 14 villages in the region was chosen. This approach resulted in a 77.8% household response rate (Rochette and Blanchet 2007).

The *Qanuippitaa?* Survey (2004) was approved by the Nunavik Regional Board of Health and Social Services (NRBHSS). All participants provided written informed consent. The NRBHSS approved data access from the 2004 survey for this analysis. The analysis here focused on variables that enabled examination of the relationship between hunting frequency, and key health risk behaviours and biomedical markers of health. Hunting frequency was measured by the question: *"In the past 12 months, on average, how often did you go hunting? In spring, summer, fall, winter – never, less than once a month, 1-3 days/month, 1-3 days/week, 4 or more days/week"*. Basic demographic information such as age (years), sex, schooling, employment, and income was also included.

To examine health behaviours, two variables were included from the *individual* survey instrument i.e. smoking and physical activity. Cigarette smoking was recorded as those who reported 'smoking daily' (yes/no), and the 'number of cigarettes per day'. Leisure and work-based physical activity data were collected in separate questions (Nolin and others 2007). Leisure-related physical activity questions asked about frequency, duration and intensity of participation, and the work-based activity question asked only about intensity. For the purposes of measuring leisure and work-related physical activity, this study did not consider participation to hunting and fishing in these categories.

Biomedical markers of health included height, weight, body fat %, waist girth (cms), mean systolic blood pressure, fasting glucose and cholesterol measurements. These were all measured during the clinical assessment conducted by research team nurses aboard the CCGS Amundsen, a Canadian Coast Guard icebreaker ship overhauled for scientific research by ArcticNet, a Canadian government funded research program focused on Canadian coastal Arctic research. Between August 27 and October 1, 2004 the CCGS Amundsen served as a base for data collection and visited all 14 Nunavik villages. Specifics of the clinical parameters and procedures are detailed in the Methodological Report (Rochette and Blanchet 2007).

*Statistical analysis*

Due to the sampling methods used, bootstrap weights had been calculated for each separate survey instrument. This effectively precluded cross-tabulation of variables used in different instruments except for those included in the *individual* and the *clinical* assessments (Rochette and Blanchet 2007). Therefore, only variables available in these two instruments were included in the presented analyses.

The three hunting frequency groupings (never, infrequent, frequent) were used as previously described (King and others 2014), and reflected the groupings used in the published thematic reports (Furgal and Rochette 2007).

Daily smoking (yes/no) was used to describe smoking pattern as a greater number of participants responded to this question than to the number of cigarettes smoked. Physical activity was calculated as the total recorded participation time in leisure-related activity in number of minutes per week for each participant. Body mass index was calculated as the weight (kg) divided by the height (m) squared. Mean systolic blood pressures were calculated from the two recorded systolic blood pressure readings. Fasting glucose was used as presented in the data i.e. a single reading in mmol/L. The total cholesterol/HDL ratio was chosen as presented in the data, as it was considered the most currently useful measure of cholesterol for assessing cardiovascular risk (World Heart Federation 2014).

All analysis was undertaken using SPSS v.20 (Statistical Package for Social Sciences, SPSS Inc.). Frequencies were tabulated for each of the hunting frequency groups (never, infrequent, frequent) across categories of the described variables. One-way ANOVAs were used to examine differences in the variables of interest according to hunting frequency. Statistical analyses for comparisons have been conducted at a threshold of $\alpha = 0.05$. A chi-square test with a correction for the design effect was used to measure association between variables, and age and sex were both corrected for.

**Results**

Of the 1052 respondents completing the *individual* survey instrument, 1035 identified as Inuit, and 969 responded to the questions about hunting participation. Results of analyses presented in this paper come from this portion of the dataset, and are inclusive of adjustments for both age and sex.

As this paper draws on secondary analysis of variables within an existing database, variables were identified that corresponded to these key health markers (Table 1). As previously reported by the authors (King and others 2014), the socio-demographic profile of the participants indicated that the more frequently a person hunted, the more likely they were to be male ($p < 0.001$) and over 50 years of age ($p < 0.001$). Just over 71% of those indicating frequent participation in hunting were male

compared to only 15% of never hunters and 47% of infrequent hunters, in a population where the ratio of male to female is 1.05 (Rochette and others 2007). Additionally, 33% of these frequent hunters were aged over 50 years, in an overall population where the median age is 19 years, and 40% of the population are aged under 15 years (Rochette and others 2007).

**Table 1: Variables used in the analysis of the relationship between participation in hunting practices and health status**

| | |
|---|---|
| 1. Socio-demographic characteristics | • Age<br>• Sex |
| 2. Health behaviours | • Smoking (daily)<br>• Physical activity (minutes/week) |
| Biomedical health markers | • Body Mass Index (BMI)<br>• Body fat %<br>• Waist girth (cms)<br>• Mean systolic blood pressure<br>• Fasting glucose<br>• Total cholesterol/HDL |

HDL: high density lipoprotein

The mean and standard deviations for the two health behaviours as they related to the three hunting frequency groups are presented in Table 2. With respect to daily smoking, the one-way ANOVA and indicated that frequent hunters were least likely to report smoking daily compared to the other hunting frequency groups (p=0.013, F 4.377, 2 (df1), 962 (df2)). However, all hunting frequency groups reported a high incidence of daily smoking (62% for frequent hunters, 70% for infrequent hunters, and 72% for those reporting never hunting). Using the Bonferroni adjustment, significant differences were found between the frequent hunters and the infrequent hunters (p=0.021), and the frequent hunters and those who reported never hunting (p=0.019) (Table 2). In both instances, the frequent hunters smoked less. However, the physical activity (total minutes/week) analyses did not indicate any significant differences between hunting groups (p=0.318, F 1.148, 2 (df1), 686 (df 2)).

**Table 2: Hunting frequency and the relationship to two key health behaviours**

| | Do not smoke daily | Total physical activity (minutes/week) |
|---|---|---|
| Hunting Frequency | Mean (SD) | Mean (SD) |
| Never | 1.47 (0.796) n=194 | 7.32 (18.16) n=128 |
| Infrequent | 1.51 (0.830) n=630 | 12.76 (42.45) n=457 |
| Frequent | 1.72 (0.949) n=141 | 12.03 (16.34) n=104 |

Some biomedical markers were significantly different between the three hunting frequency groups (Table 3). Both BMI (p=0.062, F 2.792, 2 (df1), 781 (df2)), and fasting glucose (p=0.479, F 0.736, 2 (df1), 828 (df2)) did not demonstrate a significant between group difference. However, body fat % (p=0.009, F 4.775, 2 (df1), 780 (df2)), waist girth (p=0.010, F 4.620, 2 (df1), 796 9df2)), mean systolic (p<0.001, F 7.701, 2 (df1), 826 (df2)), and total cholesterol/HDL (p<0.001, F 7.753, 2 (df1), 828 (df2)) did demonstrate statistically significant differences. Using the Bonferroni adjustment, these significant findings were further examined by looking at the post hoc comparisons. For body fat %, the significant difference was between the never and infrequent hunters (p=0.006), with the never hunters having a higher body fat % of these two hunting frequency groups. Waist girth between the infrequent hunters and those who hunted most frequently was significantly different (p=0.008), with the frequent hunters having a larger waist girth of these two groups. With respect to mean systolic BP, the frequent hunters had a significant difference when compared to those who never hunted (p<0.001), and the infrequent hunters also were significantly different from the never hunters (p=0.033). In both instances, the never hunters had the lowest systolic BP readings. For total cholesterol/HDL, the frequent hunters and those who never hunted recorded a significant difference (p<0.001), as did the infrequent hunters compared to the never hunters (p=0.012). In each instance, never hunting was associated with a lower total cholesterol/HDL level.

Taken together (Table 3), the means for the cardiovascular risk factors of BMI, body fat % and waist girth were above recommended levels for all hunting frequency groups. However, the other biomedical markers (mean systolic BP, fasting glucose, and total cholesterol/HDL) were all well below these recommended levels for all of the three hunting frequency groups (World Heart Federation 2014).

**Table 3: Hunting frequency and relationships with key biomedical markers known to increase cardiovascular risk**

| | BMI | Body Fat % | Waist Girth (cm) | Mean Systolic BP | Fasting Glucose | Total chol/HDL |
|---|---|---|---|---|---|---|
| Hunting Frequency | Mean (SD) | Mean (SD) | Mean (SD) | Mean (SD) | Mean (SD) | Mean (SD) |
| Never | 27.3 (6.3) n=160 | 29.2 (10.7) n=160 | 91.1 (14.7) n=160 | 114 (13.6) n=167 | 4.5 (1.3) n=166 | 2.9 (0.8) n=166 |
| Infrequent | 27.1 (5.4) n=499 | 26.4 (10.2) n=498 | 90.6 (13.1) n=510 | 118 (14.6) n=534 | 4.5 (0.9) n=533 | 3.2 (1.0) n=533 |
| Frequent | 28.4 (5.4) n=125 | 26.9 (9.8) n=125 | 94.6 (12.9) n=129 | 121 (15.1) n=128 | 4.7 (0.8) n=132 | 3.4 (1.1) n=132 |

BMI: body mass index

BP: blood pressure (mean of systolic reading 1 + systolic reading 2)

Total chol/HDL: total cholesterol/high density lipoprotein

'Healthy' levels (World Heart Federation, 2014):

BMI 18.50 - 24.99

Body Fat % < 24% men and < 31% women

Waist circumference <94cm men and <80cm women

Mean systolic BP <140 mmHg

Fasting glucose 5.0 - 7.2 mmol/L

Total cholesterol/HDL ratio <4.1

## Discussion

In brief, these analyses did not find significant associations between hunting frequency and physical activity levels nor did the analysis show that those who hunted most frequently had a 'healthier' cardiovascular risk factor profile. This was partly unexpected given the common claims that LBP participation is associated with increased physical activity, and, therefore, improved health (Burgess and others

2008, 2009), however, the literature is divided on this point (King and Furgal 2014). With respect to the Nunavik survey participants, many of the findings in these new analyses correlate with the patterns identified in previous related analyses of the data (Dewailly and others 2007a; Nolin and others 2007). However, a more recent publication by Chateau-Degat and others (2010) suggested that rates of cardiovascular disease in this population had been considerably underestimated.

In this study, although the prevalence of daily smoking was high for all three hunting frequency groups, it was lowest in the frequent hunting group. When these findings are examined against the previously published smoking behaviour data in these communities, age and sex offer a possible explanation. Previously published analyses (Plaziac and others 2007) indicate that 70.1% of the Nunavik population aged 15 years old and over reported smoking daily. Only 40.7% of individuals over the age of 50 reported daily smoking as compared to 81.6% for those aged 18-29 years and 74.6% for those aged 30-49 years (Plaziac and others 2007). The frequent hunters were predominantly older, with a significant proportion of them being over 50 years of age. They were also predominantly male, and men in Nunavik had a slightly lower reported smoking rate than women overall (68% of men and 73% of women (Plaziac and others 2007).

Despite being more involved in hunting, frequent hunters did not report a higher level of physical activity than those reporting infrequent hunting, although both groups appeared to be more physically active than those that reported never hunting. It has been previously reported that men in these communities have decreasing levels of physical activity as they get older, and that women are considerably more inactive than men across all age groups (Nolin and others 2007). This could partially explain the findings in this study as a significant proportion of the frequent hunters were older than 50 years of age (33.1%) compared to only 19.5% of the overall Nunavik population (King and others 2014). Frequent hunters were also more likely to be male (77.1%) compared to the infrequent hunters (47.5%) and never hunters (15.4%) (King et al 2014), and men over the age of 50 years had the lowest reported levels of physical activity of all men in the Nunavik population (Nolin and others 2007). However, this lack of apparent difference in physical activity levels based on hunting

frequency is a concern if LBP participation has been advocated as a means of increasing physical activity levels in this population. This is on a background of reported sedentary levels in the adult Nunavik population of over 60% for men and greater that 70% for women (Nolin and others 2007). It has to be acknowledged that the questions about physical activity in the survey did not specifically ask about participation in LPBs, including hunting, nor did the questions about LBP ask for details of the physical activity levels involved in those activities. However, hunting is considered a major 'leisure' or 'recreational' activity in these communities, and one would expect that those reporting the most frequent hunting would have also reported higher levels of physical activity, yet this was not the case.

One explanation for this may be that the changing methods of hunting, which have been identified in previous Arctic-focused studies (Blanchet and others 2002; Condon and others 1995; Pars and others 2001; Foulds and others 2012), are occurring in these Nunavik communities. The reported increased use of motorised transport and satellite tracking methods in the existing literature makes sense in terms of potential hunting efficiency but could be inadvertently impacting the 'physicality' of hunting participation. This resonates with the wider issue of the impacts of industrialisation on physical activity levels in 'contemporary' societies (Transportation Research Board & Institute of Medicine 2005). However, this issue does not appear to have been considered in Indigenous contexts in relation to how physical activity may be interpreted, understood, and has been changing, with respect to LBP participation, and the consequent impacts on human health. To do so would require considering not just the mechanics of this interrelationship e.g. how much walking versus use of a vehicle, but also the political, socio-cultural, economic and ecosystem impacts of critiquing what constitutes, and what is still possible, regarding 'traditional' LBP participation in various ecozones. This is a controversial but arguably important issue, given the growing tensions between reports of increasing cardiovascular risk factors in Indigenous populations, including the Inuit (Adler and others 1994; Murphy and others 1995; United Nations 2009), and the purported health-promoting benefits of LBP participation (Condon and others 1995; Corvalan and others 2005; Burgess and others 2009; Weir and others 2011). However, it is also important to note that hunters may not consider hunting, or other LBPs, a physical activity as they would a sporting activity, such as volleyball. This has

implications for how questions relating to physical activity are interpreted, and how they can then be related to LBPs, and subsequent human health outcomes, in these settings.

With respect to the biomedical markers, the mixed picture that emerged did not enable any clear conclusions to be drawn about the relationship between hunting frequency and these major cardiovascular risk factors. The frequent hunters had a higher mean systolic blood pressure compared to the other two hunting frequency groups but previous analyses had indicated that being older in this population was associated with higher mean systolic blood pressure (Dewailly and others 2007a); the frequent hunters were significantly older than the other two hunting groups: 33.1% older than 50 years of age compared to the overall population where only 19.5% were over 50 years (King and others 2014). With respect to sex, previous survey analyses had reported no association with higher blood pressure but that higher waist girth was associated with increased mean systolic blood pressure (Dewailly and others 2007a). In these new analyses, the frequent hunters also recorded statistically greater waist girth than the infrequent and never hunters. Additionally, frequent hunters recorded higher total cholesterol/HDL ratios than both of the other hunting frequency groups but, once again, this could be explained by sex as males in this population had previously recorded significantly higher ratios than women (Dewailly and others 2007a), and 77.1% of the frequent hunters were men.

With these points in mind, analysis of the biomedical markers in relation to hunting frequency did not reveal any new findings when compared to previously published analyses from this survey. However, these new analyses do represent an addition to the literature on this topic of health-LBP relationship. Although the frequent hunters recorded higher levels of total cholesterol/HDL, mean systolic BP, and waist girth, all of these levels were still well below the 'healthy' levels currently recommended in the international literature (World Heart Federation 2014), and could be explained by the male sex and older age profile of these frequent hunters. These findings are consistent with the literature that indicates, although Inuit populations have been experiencing an increase in cardiovascular risk factors in recent decades (Alder and others 1994; Bjerregaard and Young 1998; Murphy and others 1995), they still have

relatively low rates of cardiovascular disease related morbidity and mortality (Blanchet and others 2002; Cote and others 2004; Dewailly and others 2003). This has been attributed to protective factors that may still be in place, such as lower genetic susceptibility (Bjerrgaard and others 1997; Dewailly and others 2001; Hegele and others 1997), and the presence of anti-oxidative substances (omega-3, selenium, flavonoids) contained in a diet rich in country foods (Kuhnlein and others 2002; Kuhnlein and others 2004). However, a more recent paper on this topic in Nunavik suggested that the increasing rates of obesity and hypertension in Inuit populations, coupled with very high rates of smoking and increasingly sedentary lifestyles, have contributed to a greater increase in cardiovascular disease than previously reported (Chateau-Degat and others 2010). On this point it is important to note that BMI has previously been reported as potentially overestimating the prevalence of overweight and obesity among the Inuit (Charbonneau-Roberts and others 2005).

Taken together, the findings in these new analyses do not clarify what factors are contributing to the survival of these frequent hunters. Perhaps the frequent hunter profile in this dataset reflects "survivor bias" where these people are those who were still alive, and contributing to their communities. Previous analyses of the survey have shown that being a frequent hunter was associated with statistically significant higher rates of key social capital indicators, such as community connectedness and working for the benefit of the community (King and others 2014). Social capital has been widely acknowledged in the literature as a positive contributor to improved health outcomes (Islam and others 2006; Folland 2007; Kawachi and others 2008; D'Hombres and others 2010). This is potentially significant in communities marked by high rates of premature death from suicide (Kirmayer and others 2007). However, this previous analysis did not reveal statistically significant rates of higher life satisfaction or perception of health amongst frequent versus infrequent hunters or individuals reporting never hunting (King and others 2014). This sits in contrast to the strong correlation between higher self-reported health levels and improved health outcomes reported in the broader health literature (Jylhä 2009). When interpreting these results, it is important to note that cautions have been raised regarding assumptions about how health may be interpreted and understood in Indigenous contexts, especially when using biomedical measures and meanings (Izquierdo 2005).

The relationships between Indigenous participation in LBPs and human health are an ongoing area of research enquiry. To date, the available literature has tended to suggest that engagement in LBPs involves increased physical activity, and, therefore, better cardiovascular health, so should be encouraged as culturally acceptable health promoting activities. However, this has not been well supported by empirical studies, with several qualitative studies contradicting this claim (King and Furgal 2014), and these new analyses not providing any additional clarification.

In separate literature, several major risks have been identified regarding safe engagement in LBPs. These include the impacts of rapid climate change in vulnerable ecosystems such as the Arctic, and the subsequent dangers these changes pose in the form of environmental hazards and increased risk of injury and trauma, for those participating in LBPs (Berkes and Jolly 2002; Furgal and others 2002; ACIA 2004; Ford and others 2006). In other literature, concerns have been raised about the shifts in lifestyle aspirations and subsequent loss of intergenerational knowledge transfer, whereby there has been diminished interest and learning by younger generations about how to safely engage in LBPs (Condon and others 1995; Duhaime and others 2002; Gombay 2005; Dombrowski 2007; Ford and Beaumier 2011). Related literature acknowledges the tensions posed by the requirements of formal schooling and participation in wage-based economies in many Indigenous communities on time available to engage in LBPs, and, additionally, the cost of equipment required to effectively participate (Chabot 2003; Lambden and others 2006). In the Arctic, this means that young Indigenous residents may either not know or not be interested in knowing about LBPs, nor have the funds or time to participate. If they do participate, they may use a snowmobile or long-range powered boat rather than more physically demanding modes of transportation previously employed. They may also gain false assurance from access to these faster and more powerful technologies, and computerized way-finding and weather-monitoring devices such as global positioning systems. Additionally, they may not be able to repair necessary equipment when out on the land or know how to safely 'read' the weather, landscape or behaviours of their prey to enable LBP success or safe passage. The land, itself, may also be at risk from potentially unsustainable hunting in environments where stock numbers of preferred prey, such as caribou, are diminishing.

Around the world, few papers investigating Indigenous land-health interrelationships have attempted to draw these issues together, and none have provided a strong empirical base on which to explore key aspects of these issues in any depth (King and Furgal 2014). The results of the analysis done for this study provide some additional detail regarding one of the major questions embedded in the interplay of the relationships between LBPs and physical activity. However, the Nunavik survey did not afford the opportunity to look at this issue with respect to the broader, intersecting factors influencing contemporary LBP involvement. Australian Aboriginal health research has looked at some aspects of this issue with respect to validating a 'caring for country' tool (Burgess and others 2008). 'Caring for country' refers to Indigenous participation in interrelated activities 'on the land and sea', with the objective of promoting ecological and human health. The focus of this Australian research was measuring associations between participation in 'caring for country' activities, and a selection of validated biomedical and depression measures. Perhaps this type of approach is worthy of consideration when seeking to identify the more direct interrelationships between LBP participation and physical activity. However, the considerable impact of the intersecting issues arising from socio-cultural, economic, technological, and ecosystem changes in which contemporary LBP engagement is occurring were not part of that research either. This raises questions about the utility of health statistics in isolation of these broader influences to inform understandings of the complexities involved, and this is a fertile area of future inquiry.

**Conclusion**

Hunting and human health occupy a multifaceted and evolving space in the lives and landscapes of those engaged in this important form of LBP in Indigenous settings. Previous analyses undertaken on the Nunavik Inuit Health Survey data suggest that the interrelationships between place and health are complex, and understandings are incomplete (Blanchet and Rochette 2008; Dewailly and others 2007b; Furgal and Rochette 2007). This new analysis only adds to this complexity. A key factor in interpreting these findings is the caution required when relying upon statistical perspectives alone to represent culturally situated and nuanced interrelationships. This paper highlights the challenges of data analyses providing a wide enough window through which to see and understand these complex issues. Frequent hunters

in Nunavik are a very small and distinct group. How they have survived in these communities, and how this may be related to hunting, remains largely unanswered. Knowing the answers to these questions would be very useful to understand for future generations of Inuit, and potentially other Indigenous communities engaged in LBP, who are attempting to remain connected to the land, and reverse the deteriorating trends in the health of their populations. However, answers as to how best this might be achieved require placing these epidemiological understandings into the necessary, but complex, intersections between social, cultural, economic, and ecosystem factors that influence LBP. This is not an easy task but, it is argued, a necessary one if sustainable approaches to understanding and facilitating human health in contemporary Indigenous contexts is to occur.

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# CHAPTER NINE

## Eat, share, catch: Understanding the associations between country food hunting, sharing and preparation practices in northern Arctic Inuit communities

## 9.1 Introduction

With respect to Indigenous LBP engagement and 'health', this thesis has argued for the need to take a wider, interdisciplinary view than is currently found in the literature (King and Furgal 2014). This final manuscript attempted to bring together some of the key aspects of LBP, and demonstrate the importance of making these connections. Using the initial 'catch, prepare/share, consume model' developed from the international literature review, descriptive analyses were undertaken with the Nunavik survey data to investigate the potential interrelationships between these aspects of LBP. It was postulated that there would be a strong correlation between 'catch, share-prepare, and consume' activities in this setting, and the findings bore this out. When these new findings were considered together with the descriptive analyses undertaken on the diet and nutrition questions in the survey, (*24-hour dietary recall* and *food frequency* questionnaire), they demonstrated a concerning trend (Blanchet and Rochette 2008). Older members of these communities, most commonly men, reported eating the largest quantities of all types of country foods (birds, fish, land and sea mammals), and older men in these communities were a significant minority (Blanchet and Rochette 2008). Equally, the most frequent hunters were also a distinct minority of older, predominantly male, members in these communities (King et al 2014). The new analyses found that the most frequent hunters were those who reported the highest levels of engagement with both sharing and preparing country foods, especially with respect to land and sea mammals. However, none of the three hunting frequency groups reported that country foods were "easy to prepare', with the smallest proportion of frequent hunters reporting "yes" to this question among the hunting frequency groups. Over all three groups, approximately 50% reported "liking the taste" of country foods, which was consistent with previous findings (Blanchet and Rochette 2008).

The findings of these new analyses highlight the important interrelationships between the 'catch, share-prepare, and consume' aspects of LBPs. These analyses raise questions about what might happen to country food sharing and preparing capacities if the frequent hunters in these communities are not replaced by subsequent generations. Compounding the socio-cultural and economic issues already impacting LBP engagement in these settings, are the wider issues of

environmental safety discussed in previous manuscripts. Even broader are the ways LBP engagement have been promoted by Indigenous people, policy makers, and researchers as a means to enable improvements in 'Indigenous health'. This is complex territory, and not an 'either or' but rather, it is argued, a necessary place of inquiry so that stereotypes, unsustainable, unsafe, and/or misguided approaches are not an unintended outcome. Indigenous land-health interrelationships are complex, not well understood, and changing, but these interrelationships have a fundamental place in many Indigenous people's lives. However, 'best practice' with respect to these issues requires more than just promoting an ideal, it requires reflection and critique, and this is fertile territory for development of responses that consider that the whole is more than simply the sum of its parts.

## 9.2 Manuscript Summary

**Authors:** Ursula King[1], Chris Furgal[2], Geoff Navara[3], Robyn Lucas[1,4]

1. National Centre for Epidemiology and Population Health, Research School of Population Health, Australian National University, Canberra, ACT, Australia, 2600

2. Indigenous Environmental Studies program, Trent University, Peterborough, ON, Canada, K9J 7B8

3. Department of Psychology, Trent University, Peterborough, ON, Canada, K9J 7B8

4. Telethon Kids Institute, University of Western Australia, Perth, Australia, 6008

**Statement of student contribution:** U.K. and C.F. conceived of the original idea for the article. Methodological approach and subsequent data analysis were undertaken by U.K. supervised by G.N., with data presentation guided by R.L.. U.K. completed the major writing, with C.F. G.N. and R.L. providing review and editing on each draft.

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**Abstract:** Links between Indigenous participation in land-based practices (LBP) and human health are established, however, the interrelationship between the catch aspects of LBP, and sharing, preparing, and consuming aspects are not well understood. Descriptive analyses of the Nunavik Inuit Health Survey explored the potential intersects between frequency of hunting and these other LBP aspects in this region of Arctic Quebec, Canada. Frequent hunters, a minority in these communities, were most involved in sharing and preparing their catch. Factors effecting hunting include climate changes, environmental contaminants, intergenerational knowledge transfer, changing lifestyles and aspirations, and diminishing country food stocks. Sustainable engagement requires consideration of these intersecting issues.

**Key words:** Indigenous, Inuit, Arctic, land-based practices, health, sharing, socio-ecological.

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## 9.3 Manuscript

### Eat, share, catch: Understanding the associations between country food hunting, sharing and preparation practices in northern Arctic Inuit communities

### Introduction

A growing body of literature has demonstrated the importance of participation in land-based practices (LBP) for the health of Indigenous people (Burgess et al 2009; Corvalan, Hales, and McMichael 2005; Weir, Stacey, and Youngtob 2010). Although often lacking substantive evidence, there does appear to be a strong relationship between Indigenous people's engagement in activities 'on the land' and their health outcomes (King and Furgal 2014). One key aspect of this LBP engagement relates to the sharing and preparing of the foods caught or foraged from the local environment, and the interrelationships with the catch and consume aspects of LBP activities. Although there is a considerable literature on the importance of social networks, and the associated social capital, related to sharing and preparing aspects of LBP, especially for Inuit in Arctic contexts (Bodenhorn 2000; Dombrowski et al 2013; Ford and Beaumier 2011; Mead et al 2010; Pufall et al 2011; Richmond and Ross 2008), there is a distinct lack of available literature that explores the important interconnections between all of these interrelated aspects - i.e. catch, share, prepare, and consume activities (King and Furgal 2014). Often studied in isolation, the distinct but interwoven share and prepare aspects of LBP participation require this reconnection with the catch and consume components in order to understand the collective consequences of engagement. The absence of this connection in the literature has made it difficult to draw any meaningful conclusions about the overall impacts of LBP participation on human health and wellbeing (King and Furgal 2014), including the broader health of the often fragile and strained ecosystems in which these activities are taking place (Parlee and Furgal 2012; Chapin III et al 2005; Corvalan et al 2005).

Although of interest in a variety of ecozones, by far the most substantive literature exploring LBPs and Indigenous health associations has been in the

Canadian Arctic, with the following disciplinary emphases:

- Resource management researchers and ecologists have explored the catching aspects of country foods, with an emphasis on hunting. In particular, the focus is on the conservation challenges of diminishing stocks of favoured country food such as caribou, and/or the impacts regional climate changes are having on the safety and continued viability of participation in this major LBP, and/or the impacts on food security (Ford, Smit, and Wandel 2006; Furgal 2008; Furgal 2010; Furgal, Martin, and Gosselin 2002; Laidler et al 2009; Parlee and Furgal 2012; Wesche 2010);
- Anthropologists and sociologists have explored the community connectedness aspects of the sharing and preparing of the country foods caught or gathered, and/or the impacts of changing food preferences on country food consumption patterns, and/or the tensions created by changing sharing practices (Bodenhorn 2000; Condon, Collings, and Wenzel 1995; Dombrowski et al 2013; Ford and Beaumier 2011; Mead et al 2010; Pufall et al 2011; Richmond and Ross 2008);
- Environmental scientists have focused on the contaminants entering the country food chain, such as the presence of heavy metals in sea mammals, and the associated dangers of consumption of these foods, and/or issues of food security (Armstrong et al 2007; Dewailly et al 2007a; Dewailly et al 2007b; Donaldson et al 2010; Furgal and Rochette 2007; Van Oostdam et al 2009);
- Nutritional epidemiologists have concentrated on identifying the micro and macro nutrient composition of country foods, and the health gains offered by increased consumption (Blanchet et al 2000; Fediuk et al 2002; Haman et al 2010; Kuhnlein, Kubow, and Soueida 1991; Kuhnlein and Chan 2000; Kuhnlein et al 2002; Kuhnlein et al 2004; Kuhnlein et al 2006; Kuhnlein et al 2008);
- Public health researchers have focused on the presumed increased physical activity associated with LBP participation, and the resultant cardiovascular health benefits, and/or social-emotional wellbeing benefits associated with 'being on the land' (Burgess et al 2009; Foulds, Bredin, and Warburton 2012; Ng, Marshall, and Williams 2006; Nolin et al 2007; Sharma 2010).

Nowhere in the literature have all of these factors been considered together. It is argued that, in order to enable sustainable strategies to be developed, these issues need to be 'in view' as research and policy processes are progressed. Such an approach raises necessary awareness of potential up- and down-stream influences, and consequences, that could impact the effectiveness of health initiatives. To do this requires strengthening capacities for working with complexity, and being willing to bring multiple perspectives to the table for consideration at each stage of the process. In so doing, research and policy efforts are meaningfully placed into the contemporary, and multifaceted, socio-ecological contexts in which these LBPs are occurring.

As a means of demonstrating this integrated and inclusive 'way of seeing' with respect to LBP engagement, this paper used a model previously published by the authors (Figure 1). Given the considerable challenges of embracing such a wide frame of view on such issues, the model provides one possible means of thinking about the interconnections, and interdependence, of Indigenous LBPs, and potential ways forward for research and policy. A fundamental consideration inherent in the model is acknowledging the inseparable links between catching, sharing, preparing, and consuming country foods, and the important links with ecosystem wellbeing.

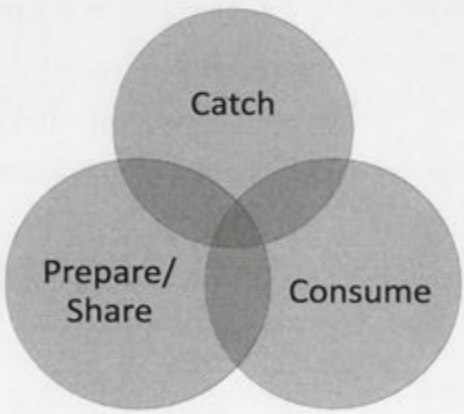


**Figure 1.** A model for considering three main sub-groupings of hunting/fishing/ gathering activities associated with Indigenous participation in land-based practices with implications for human health[1](King and Furgal 2014).

[1] "Catch", refers to those activities involved in the act of obtaining traditional/country/bush/wild foods (foods from the local natural environment via a number of means). "Prepare/share" involves those activities

To investigate these issues, this paper draws data from the Nunavik Inuit Health Survey: *Qanuippitaa?* (How are we?). A number of thematic reports have previously been published based on these data, addressing a wide range of interrelated issues. Two of these reports had particular relevance for this paper: perceptions of contaminants, hunting and fishing activities, and potential impacts of climate change (Furgal and Rochette 2007), and nutrition and food consumption (Blanchet and Rochette 2008). This second of these was the largest and most comprehensive report produced from the survey, providing an extensive presentation of the *24-hour dietary recall* and *food frequency questionnaire* data from the 2004 survey. It indicated that Inuit over 15 years in Nunavik were acquiring 16% of their daily calorie intake from traditional foods, compared to 84% supplied by store-bought foods (Blanchet and Rochette 2008). These findings reflected a decline in country food consumption since the 1992 survey, and those consuming the highest amounts of these traditional country foods were invariably in the oldest age group, (50-74 years), in these communities (Blanchet and Rochette 2008). Traditional foods, such as marine mammals, provided better nutritional quality, and had long been associated with a protective cardiovascular effect for the Inuit (Dewailly et al 2001; Dewailly et al 2003). Due to growing concerns about food security and nutritional deficits in this region, this emphasis on traditional food consumption is understandable as it has major importance for public health. However, a further layer of complexity is added by the presence of environmental contaminants in these food sources (Donaldson et al 2010). Making these connections, and developing sustainable responses to them, requires a broad view of the many issues involved. In this vein, this paper uses descriptive analyses of the Nunavik survey data to discuss how the share and prepare aspects of LBP are interconnected with hunting and consuming issues. These connections have not previously been a focus of analyses from the survey, and are largely absent from the wider literature (King and Furgal 2014).

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associated with preparing and/or sharing country foods that are "caught" (both giving and receiving). "Consume" refers to activities involved in eating country foods that are "caught" or received via "sharing". Surrounding these three intersecting groups of activities are the fluctuating influences of culture, community, environment, politics, and economics.

Undertaking analyses on this existing dataset sought to make use of already available material that was Inuit developed and controlled, and that could potentially provide new insights on issues of considerable relevance to these communities. As such, the focus of this study was on how the survey data could be used to explore the interrelationships between participation in a major LBP in the region i.e. hunting, and the sharing, preparing, and consuming aspects of catching country foods. The broader aim was then to use these analyses to inform more integrated research and policy responses involving Indigenous land-health interrelationships in the region.

## Methods

Analyses were undertaken with data from the Nunavik Inuit Health Survey: *Qanuippitaa?* (How are we?). This survey measured the health of 1,035 adult Inuit in a population of 10,750 living in Nunavik, an Arctic region of Quebec, Canada (Statistics Canada 2011). Managed by the Nunavik Regional Board of Health and Social Services (NRBHSS), the survey aimed to quantify trends in health status and risk factors in the 14 communities that comprise a region where 91% of the population are Inuit. The survey was originally undertaken in 1992, then again in 2004, and a subsequent survey planned for 2016. Managed by the regional Inuit health authority in collaboration with the National Institute of Public Health of the Province of Quebec, and a series of University partners, this longitudinal cohort study has enabled mapping of trends in key health and environment indicators that are impacting the lives of the population in this rapidly changing region.

### *Qanuippitaa? Survey*

Utilising six survey instruments and a clinical assessment protocol, the 2004 *Qanuippitaa?* survey gathered interrelated data about the health and wellbeing of the adult population in Nunavik. Survey tools and methods were approved by the Nunavik Regional Board of Health and Social Services (NRBHSS) and The Centre Hospitalier Universite de Quebec (CHIUQ-CHUL) research ethics committee. All participants signed written informed consent. Eligible participants were those aged 15 years or older living in private households as permanent residents in the 14 communities that comprise the Nunavik region. Two-stage stratified random

sampling was used to select private Inuit households with proportional allocation. The community was the sole stratification variable used. As bootstrap weights had been calculated for each separate survey instrument, cross-tabulation of variables used in different instruments was not possible, except for between the *individual* questionnaire and *clinical session,* which were administered to individuals in a single session. Full details of the survey methods are available in the Methodological Report (Rochette and Blanchet 2007). Variables analysed for this paper were drawn from those available in the *individual* tool. The NRBHSS approved data access from the 2004 survey for this analysis. The analysis here focused on variables that enabled examination of the relationship between hunting frequency, and measures relating to preparing, sharing and consuming country foods.

Hunting frequency was measured by the question: *"In the past 12 months, on average, how often did you go hunting? In spring, summer, fall, winter – never, less than once a month, 1-3 days/month, 1-3 days/week, 4 or more days/week"*. To measure "prepare", responses to a single question from the individual survey were used, i.e. *"In the past 12 months, how many of the following animals did you prepare such as skinning, washing, cutting etc.?"*, with the responses separately for birds, land mammals (such as fox, caribou etc.), and sea mammals (such as seal, beluga etc.) (none, 1 or 2, 3 to 9, 10 to 29, more than 30). Aspects of "share" were also captured with a single question from the individual survey *"Do you usually share your catch with your family or friends?"* (responses: I do not go hunting/Often /Sometimes/Never). A proxy measure was chosen to represent 'consume': *"What is it you like about eating country foods?"* (I like the taste of country food; It is easy to prepare; I don't like country foods; I can't do without country food, with each sub-question answered as yes/no).

*Statistical analysis*

Three hunting frequency groupings were used: never/infrequent/frequent (as previously described by King et al 2014). Measures of preparing, sharing and consuming were analysed in the categories noted above. All analysis was undertaken using SPSS v.20 (Statistical Package for Social Sciences, SPSS Inc.). Frequencies

were tabulated for each of the hunting frequency categories (never, infrequent, frequent) across categories of the prepare/share/consume variables.

## Results

The hunting frequency group most likely to report sharing their catch 'often' were the frequent hunters (84.5%) when compared with those who reported hunting infrequently (64.7%) (Figure 2).

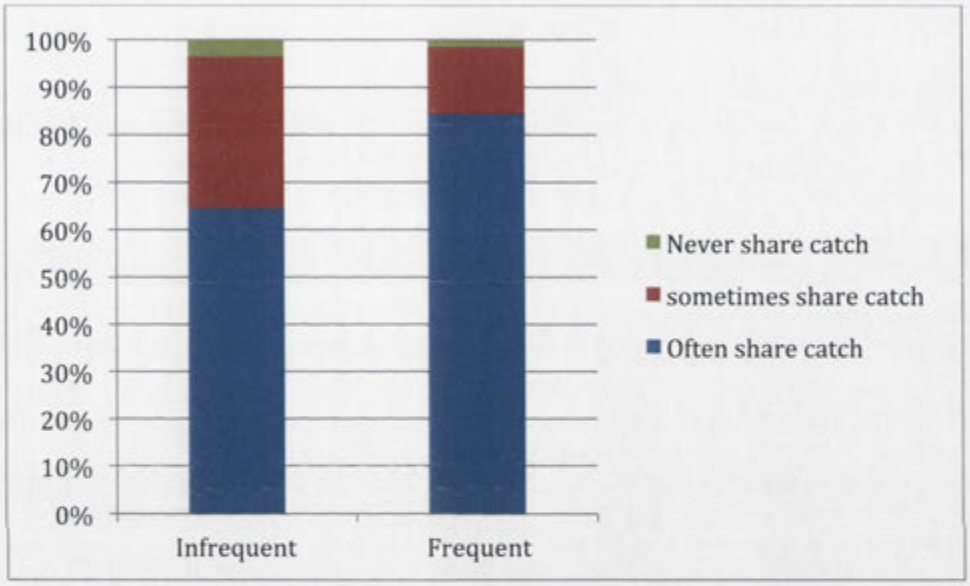


**Figure 2: Sharing catch in relation to hunting frequency (infrequent and frequent hunting)**

With respect to preparing country foods, as hunting frequency increased so did the amount of reported preparing of country foods. This finding was consistent across all of the major groups of country foods caught in these settings i.e. birds (Figure 3), land mammals (Figure 4), and sea mammals (Figure 5).

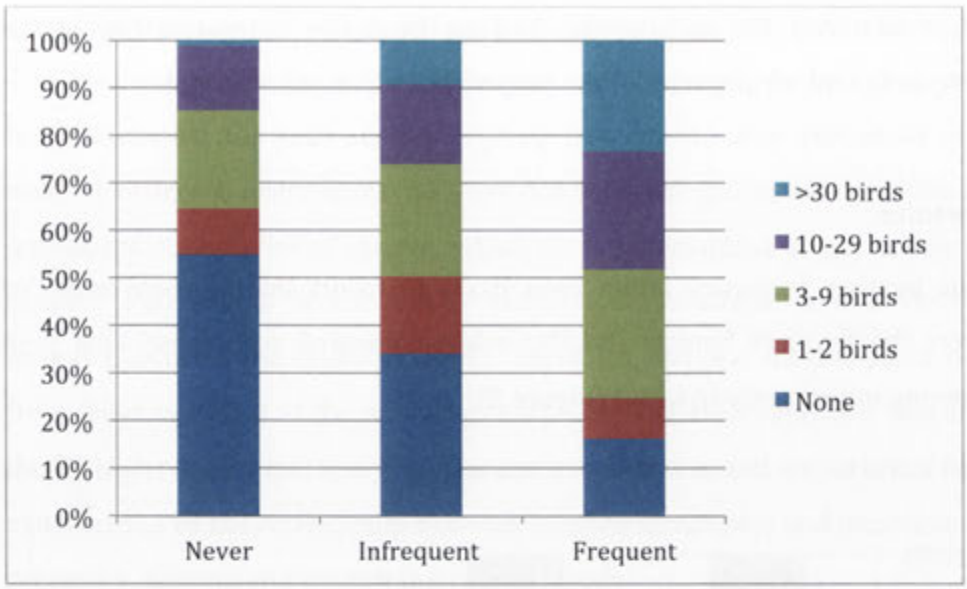


**Figure 3. Comparison of preparing birds across different groups of hunting frequency (never, infrequent, and frequent hunting)**

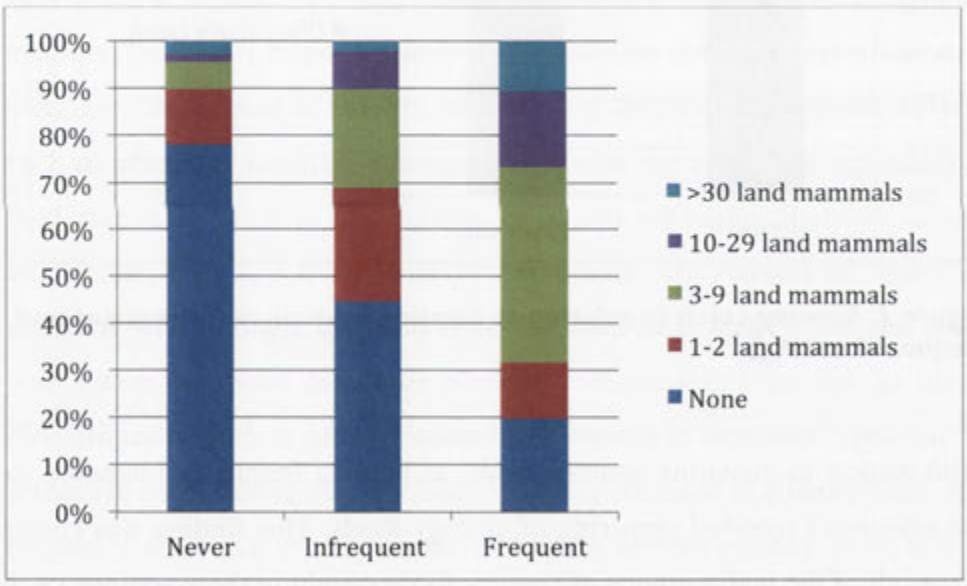


**Figure 4. Preparation of land mammals in relation to hunting frequency (never, infrequent, and frequent hunting)**

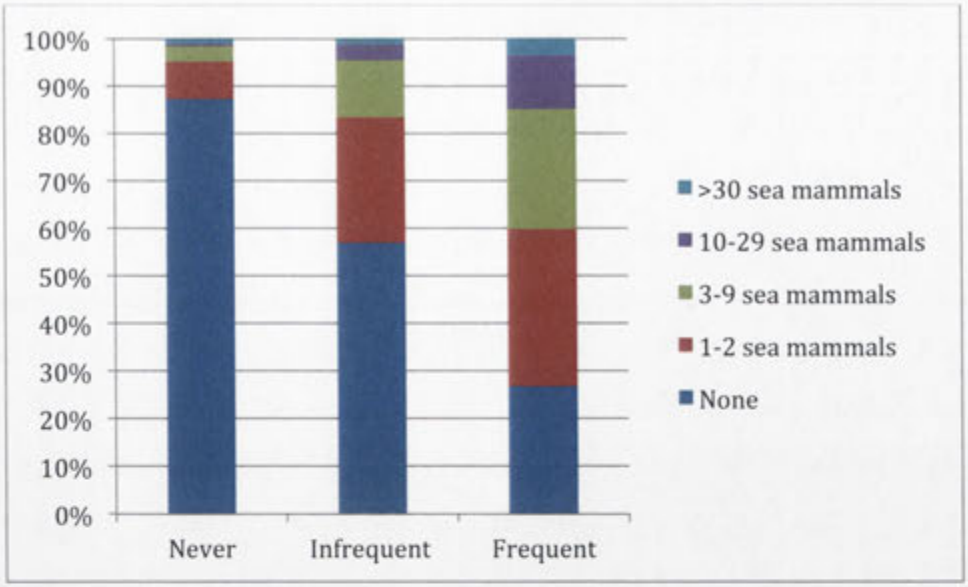


**Figure 5. Preparation of sea mammals in relation to hunting frequency (never, infrequent, and frequent hunting)**

Only around 50% of each respective hunting frequency group agreed that they "liked the taste of country foods": never hunters 50.8%; infrequent hunters 53.8%; and frequent hunters 45.8%. When asked whether preparing country foods was easy, few in any of the hunting frequency groups reported "yes": never hunters 11.8%; infrequent hunters 7.3%; and frequent hunters 8.5%.

## Discussion

Connecting key aspects of LBP engagement with each other enables needed links to be made between the many, overlapping issues involved. These descriptive analyses highlight some interesting questions about the interrelationships between hunting frequency and catch, share, prepare, and consume related activities. Further analyses are warranted, however, these findings indicate these issues are interwoven, and include interdependent associations between participation in hunting and sharing-preparing country foods; the difficulty of preparing country foods; and changing tastes and food preferences in these communities. These issues are further interrelated with the wider tensions between resource management and food security, and associated relationships with hunting, and the interconnections of all of these issues with the broader ecological and socio-economic challenges occurring in these settings.

These analyses confirmed the previously reported finding that sharing was still important in Inuit communities. These findings found that over half (57%) of those involved in hunting stated they shared 'often' (Furgal and Rochette 2007). Not surprisingly, these new analyses also confirmed that the more frequently a person hunted, the more likely they were to report sharing their catch: 84.5% of frequent hunters and 64.7% for infrequent hunters. However, these findings need to be considered against other literature that suggests sharing of country foods is becoming more constrained in these settings. This has been attributed to a range of interconnected factors including lower catch rates because of diminishing stock of some favoured country foods, such as caribou, so there is less available to share; increased costs of equipment, and time, needed to catch species that are harder to find as stock numbers fall; and the associated ongoing issues of food security in these settings, which have reduced sharing of catch outside immediate family's; all of these factors have strained previous traditional sharing relationships (Bodenhorn 2000; Dombrowski et al 2013; Duhaime, Chabot, and Gaudreault 2002; Ford and Beaumier 2011; Lambden et al 2006; Wenzel, Hovelsrud-Broda, and Kishigami 2000). These issues stem from a complex interplay of socio-economic and ecological issues occurring in these settings, and raise questions about how to negotiate these factors. Importantly, if the frequent hunters are most likely to share their catch but only make up 14.6% of the adult population (King et al 2014), and food sharing networks are under strain with country foods still an important component of people's diets, the food security implications for those who do not catch as frequently or never in these settings are considerable (Ledrou and Gervais 2005; Mead et al 2010; Myers, Powell, and Duhaime 2004; Organ et al 2014; Schuster et al 2011).

The results also indicate a strong relationship between frequency of catching and involvement in preparation of the country foods caught. For all groups of animals caught (birds, land mammals, and sea mammals), the frequent hunters prepared more of these species compared to both those who either infrequently or never hunted (Figures 2, 3 and 4). Further, these analyses suggested that few considered the preparing of these country foods "easy", regardless of hunting frequency. This point adds to existing concerns about the diminishing country food preparation skills and knowledge in these settings that have been associated

with unsafe food preparation practices (Food Safety Network 2009). Given that the frequent hunters in these communities are a significant minority, and preparing is an essential part of access to country foods (King and Furgal 2014), these findings have implications for the ability of these communities to maintain the necessary skills and knowledge of this fundamental aspect of LBP. The older age profile of the frequent hunters, i.e. 33.1% aged over 50 years, also poses challenges as the younger generations in these settings have been found to have a diminishing interest in LBP engagement for a mix of reasons from cost of participation, to loss of intergenerational knowledge transfer, and changing lifestyle preferences (Condon et al 1995; Dombrowski et al 2013; Ford and Beaumier 2011; Lambden et al 2006; Mead et al 2010; Pufall et al 2011; Sharma 2010).). These interconnected issues highlight the strong link between catch and prepare elements of LBP, and that if one aspect diminishes there is likely a flow on effect to the other aspects.

The issue of "liking the taste" of country foods was also an interesting finding in these analyses. Only around half of those responding to this question in the survey said "yes", regardless of how frequently they hunted. This reflected the finding by Blanchet and Rochette (2008) from summary of the *food frequency* and *24-hour dietary recall* analyses where 51% of overall survey respondents reported "liking the taste" of country foods. Placing this against other literature that has examined changing food preferences in these communities towards store-bought foods (Mead et al 2010; Pufall et al 2011; Sharma 2010), the implications of this finding is unable to be determined from these analyses. Further analyses would potentially elucidate more of the detail regarding this issue, and add necessary layers of understanding about the important interplays that determine 'consume' aspects of LBP in these settings.

With respect to these newer analyses, an overarching issue is that of the 'risks' associated with LBP engagement in these settings. These include safety concerns arising from rapidly changing climates; the presence of environmental contaminants in the country food chain; and the intersects with the loss of interest and intergenerational capacity in various aspects of LBP engagement

(Arctic Climate Impact Assessment 2004; Berkes and Jolly 2002; Ford, Smit, and Wandel 2006; Furgal 2008; Furgal, Martin, and Gosselin 2002; Donaldson et al 2010; Dombrowski 2007; Dombrowski et al 2013; Laidler et al 2009). These issues only add further layers of complexity and raise questions about the implications of a declining group of skilled and knowledgeable hunters in these communities.

Considering these findings together, the results from this study highlight the importance of looking at LBP participation as part of an integrated spectrum of activities, where 'catching' appears to be a major trigger for the interrelated activities of sharing and preparing country foods. The pattern that emerged here is of a minority of older men doing the majority of the frequent hunting in these communities in a population that is predominantly young who appear to be having a diminishing involvement in hunting activities. The implications of these findings are complex, and these analyses add further weight to the argument that these intersecting issues need to be considered collectively if policy responses are to enable sustainable LBP engagement now and into the future.

Without such an approach, the consequence is a continuance of the currently disjointed ways of seeing these issues (King and Furgal 2014). It is argued that this is self-defeating because narrow strategies, promoted without consideration of the interrelated issues, potentially undermine any gains that might be made overall. If such an integrated approach was able to be achieved it would mean that: an Indigenous person living in a community would have the opportunity to acquire, maintain and share across generations, the required skill and knowledge to safely engage in LBPs, and have the time, energy and ready access to necessary resources, to safely and successfully participate in environments where country food sources are plentiful, and free from contaminants; and that this engagement would be occurring in ecosystems that local communities take responsibility for as part of ongoing 'caring for country', on lands/seas they have security of tenure over; and which enable adaptation to the impacts of climate changes, and promote sustainable land uses; and that provide culturally

considered approaches to schooling and meaningful, well-paid work, that are locally available, and provide flexibility to engage in LBPs throughout the year; and that these opportunities are occurring in connected communities where people know and support each other, and where diverse expressions of cultural identities are celebrated; and sharing (including of country foods) is widespread and sustainable, and compliments a nutritious and tasty food, and water, secure diet, which considers intergenerational cultural preferences, and is affordable with locally generated incomes; and housing, based on community choices, with reliable amenities and utilities, is readily accessible; and local languages are an integrated part of everyday conversations; and community members are actively involved in, and responsible for, decision-making about local services, resource management, and the socio-cultural well-being of the community. This 'integrated' world-view merely collects existing awareness into one frame, with each of these objectives already forming a part of current human and ecosystem 'health' efforts that are being undertaken in these settings. To 'make this happen' does not require reinventing the wheel but rather an awareness of the need for co-ordinated approaches that recognise, and harness, the strengths of the many discipline-focused perspectives, including Indigenous knowledge systems, that are currently operating in these settings. In part, this requires new ways of engaging with, as well as new ways of framing, these issues, and the co-operation generated through this reframed engagement, will enable culturally reflective and sustainable responses that benefit both people and place.

## Conclusion

Hunting is an important LBP for the Inuit in Nunavik, and other remote regions of the Canadian Arctic. There appear to be important interrelationships between the catch, share-prepare, and consume aspects of LBP activities, and those who are catching country foods appear to be a minority in these settings. The implications for the diminishing presence of this 'hunting class' are considerable in communities struggling with rapid changes that are challenging notions of traditional ways of engaging such as LBPs. However, the viability of continued LBP engagement, and the well-being of the lands and seas in which they are being practised, will require a wide lens of consideration if sustainable responses are to be developed and maintained.

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# CHAPTER TEN

# Conclusions

> *There is nothing like looking, if you want to find something. You certainly usually find something, if you look, but it is not always quite the something you were after.* J.R.R. Tolkien

## 10.1 Summary

Trying to unravel and understand 'Indigenous health', and the interconnections with land in contemporary contexts, is an ongoing project. Given the considerable inequities experienced by so many of the world's Indigenous people (World Health Organisation 2014), and escalating loss of biodiversity in many of the places Indigenous people live (United Nations 2009), it is also a vitally important one. As the United Nations Second Decade of the World's Indigenous Peoples (2005 to 2014) draws to a close, efforts to address the significant health inequities experienced by many Indigenous people have increasingly promoted the benefits, for both people *and* place, of engagement with 'land' (Burgess et al 2009; Corvalan et al 2005; Weir et al 2011). However, land and health interrelationships are complex, and research and policy efforts can approach these issues without considering some of the key underlying complexities. One of the major issues in this regard is the way 'health' has been constructed, measured and applied in Indigenous contexts, which tend to emphasise a discourse of risk and dependence (Brough 2001; Kowal 2008; Kowal and Paradies 2005; Taylor et al 2010). A further challenge is the disciplinary-bounded and, consequently, disconnected, ways the various issues within Indigenous land-health interrelationships have been approached. These overlook the up- and down-stream associations that could derail narrowly considered initiatives, and are a real challenge for the bounded world of the academy to negotiate (King and Furgal 2014). In this context, there has emerged a tendency to promote health-focused strategies that lean towards an idea of a 'traditional indigeneity' (Griffiths 1995; Anderson 1997; Appiah 1994), which encourage the maintenance, or reclaiming, of an 'authentic' connection with the land through participation in land-based practices (Brody 1987; Burgess et al 2009; Johnston et al 2007; Weir et al 2010; Wilson 2003). All of these factors are contributing to the continuance of a limited view, and, therefore, development of responses to, Indigenous land-health interrelationships. Contemporary Indigenous contexts are made up of multiple layers of influences – social, cultural,

political, economic, environmental – and, it is argued, all of these layers need to be 'on the table' for consideration when developing research and policy in these spaces. If not, then important connections will be missed, and efforts to address health inequities will fall short. This is difficult territory but is essential if the current poor health being experienced by many Indigenous people, and the fragile ecosystems in which they live, are to be sustainably redressed.

This thesis attempted to enter this complex space to see what new ways of looking at, and understanding, these issues may be possible. Using the thinking within a transdisciplinary approach, both the journey through, and the outcomes of, this process have provided new insights; these, in turn, offer potential ways forward.

## 10.2 Key Findings and Links to the Literature

This project sought to 'join the dots' regarding Indigenous land-health interrelationships in a way not previously considered. The focus was on understanding how 'Indigenous health' had been constructed, the implications these constructions had on how research and policy were being approached, and how land relationships were being factored into that equation. In so doing, it was found that research and policy regarding Indigenous land-health interrelationships had appeared to take the following path.

### 10.2.1 *Indigeneity and Health*

Both the concepts of 'indigeneity' and 'health' are contested. The way research and policy responds to 'Indigenous health' is, therefore, based on how these terms are constructed and understood. Despite the growing 'Social Determinants of Indigenous Health' movement and literature, current dominant constructions appear to be based on biomedical definitions of 'health' (Brough 2001; Johnston and Thomas 2008; Kowal 2008; Kowal and Paradies 2010). Juxtaposed against this representation are the broader, often metric-eluding constructions by Indigenous people of 'land is life is health', which integrates the 'body, mind, and spiritual' wellbeing of the land/sea as being integral with that of the people's (Garnett and Sithole 2007; Hearn and Wise

2004). However, biomedically-derived, statistical presentations of 'Indigenous health' have been afforded considerable weight and emphasis in policy responses, which have resulted in these ways of presenting 'Indigenous health' being 'privileged' (Brough 2001; Kowal and Paradies 2005, 2010). A 'stats' based approach argues that the numeric constructions of ill-health are an essential tool for identifying and mapping the extent of the problem. By extension, these statistical representations of 'Indigenous health' are then seen as a useful, if not essential, means of advocating for intervention because their magnitude constitutes an undeniable level of 'Indigenous health inequality' that must be addressed (Brough 2001; Taylor et al 2010). However, these ways of presenting 'Indigenous health" present several problems. Firstly, such presentations inadvertently reinforce a 'risk' discourse that can stereotype Indigenous people and their 'health' (Coffin 2007; Kowal & Paradies 2010; Nairn et al 2006; Rankine et al 2008), and this moves the focus away from determinants. As such, the emphasis becomes one of containment of risk rather than consideration of the determinants - i.e. the socio-ecological contributing factors - which would enable a much broader consideration of the issues, and, therefore more holistic and integrated responses. Secondly, the 'negatives' that the statistically-driven presentations of 'Indigenous health' constantly reinforce can be profoundly stigmatizing and disempowering (Larson et al 2007; Taylor et al 2010). The consequence for Indigenous people of this disempowerment is a reduced incentive to engage in 'health enabling' behaviours, which can further reinforce negative stereotypes (Johnston and Thomas 2008). Commenting on the impact of this in the Australian context, Kowal and Paradies (2010) make the point that:

> *The publication of Indigenous health statistics draws attention to health problems and attracts resources to deal with them. However, for Indigenous Australians, it also creates a sense that an Indigenous identity is tied to inevitable ill health, homogenising the varied health and wellbeing of individual Indigenous people (Kowal and Paradies 2010:599).*

Thirdly, the use of negative statistical representations reinforces a racist discourse by linking 'Indigenous health' with a language of passivity, neediness, and dependence, which only compounds these stereotypes (Nairn et al 2006; Stoneham 2014). Further, emphasising this one, numerically-derived, way of seeing and constructing 'Indigenous health' has meant other ways of understanding 'health' are obscured, and

this limits the potential responses that can be developed. Finally, a focus on 'health' through this statistical frame removes all 'health' understandings, including those applied to 'Indigenous health', from the necessarily complex 'real world' contexts in which they occur. It is argued that this obscures a needed appreciation of the wider drivers influencing 'health', and hampers development of mature, empowering and sustainable responses based on these more inclusive understandings.

By extension, when contemporary constructions of 'Indigenous health' get caught-up in a complex socio-political interplay with ideas about 'authenticity' (Paradies 2006), this only further clouds the ways people engage with these issues. Understanding what 'traditional' and 'connections to land' mean in a modern world where landscapes are rapidly changing, and there are a myriad ways in which Indigenous people live and identify, are a necessary focus of inquiry. However, an emphasis on 'finding a solution' by researchers and policy makers could, in itself, inadvertently perpetuate ideas of dependence on dominant cultural understandings of what it means to be Indigenous (Grootjans 2010). These considerations are pivotal to negotiating 'Indigenous health' responses in the 21st century that are to be driven by and respectful of Indigenous peoples and 'ways of knowing', maintaining cultural integrity and self-determination, sustaining land and seascapes, and having the capacity to reduce the pervasive health inequities that exist. Whether these goals can be achieved by prioritising programs and policies that support 'traditional' notions of Indigenous on-country engagement is a controversial question. This requires a willingness to acknowledge the underlying disempowering discourses embedded within Western constructions of 'Indigenous health', and carefully unpacking 'authentic Indigeneity' and realities within this context.

### 10.2.2 *Land and Health*

A major focus for 'Indigenous health' research in recent decades has been investigating Indigenous land-health interrelationships, which, in part, advocates the considerable benefits for people and place of these approaches (Burgess et al 2009; Corvalan et al 2005; Garnett and Sithole 2007; Weir et al 2011). However, when this evidence is more closely looked at, and placed within a contemporary, global context,

it quickly becomes apparent that our current understanding is a patchwork coming from different disciplinary traditions and perspectives and often, they are contradictory (King and Furgal 2014). The key issue of interest is how Indigenous LBP participation is connected to 'human health'. However, it can be argued that what LBPs actually entail, and what participation in them actually means, are not well understood (King and Furgal 2014). There are risks and benefits for participants, and the ecosystems in which they are practiced, and the duality and complexity of these factors have not been well elucidated in the literature to date (King and Furgal 2014). Additionally, looking at the separate components of LBP engagement in relative isolation from the wider, interdependent processes - ecosystem and human derived - that are embedded within LBPs, reduces the utility of the findings presented. This is argued to be the consequence of using unidisciplinary approaches to investigate LBP-health interrelationships that have prioritised human health needs, and which favour biomedical constructions of 'Indigenous health'. By overlooking the inherent complexity and intersections that operate in this space, numerous 'blind spots' are both created and perpetuated (King and Furgal 2014). This has considerable implications for developing sustainable policy responses that facilitate promotion of 'health' for both Indigenous people *and* the places they live. As such, the fundamental links between the interdependent synergy of human 'health' with the 'health' of the biosphere continue to be missed (Brown et al 2010).

Three of the manuscripts prepared for this thesis explored these issues using data from the Nunavik Inuit Health Survey (*Qanuippitaa? How are we?*). Although one of the largest epidemiological Indigenous health databases in the world, there were limitations on how, and to what extent, this Survey could elucidate the nuances of the interrelationships between human health and LBP participation. This was due to a combination of factors including the extent of the analyses able to be undertaken within the frame of this research project, as well as the challenges posed by the Survey design. Of the nineteen thematic reports produced from analyses of this database to date, all have used descriptive measures as the initial primary way of presenting findings[1]. Descriptive measures of health status provide a starting point for

[1] INSPQ website http://www.inspq.qc.ca/english/

epidemiological analyses in these types of context (Buck and Aron 2001). However, the analyses raised more questions than they answered about land-health interrelationships in this population, not only with respect to the findings but, perhaps more importantly, about the utility of approaching these complex issues using these analytical tools. The goal of this thesis in undertaking these initial descriptive analyses using the Nunavik dataset was to explore the epidemiological world-view they occupy, and then situate this exploration in the broader discussion on 'Indigenous health'. It is argued that only in this way can the opportunities and constraints of this predominant tool - i.e. epidemiology - be identified, and, if necessary, moved beyond.

The descriptive findings from the analyses undertaken for this research presented an interesting, albeit incomplete, view on some of the key issues associated with Indigenous land-health interrelationships. These preliminary analyses, and the gaps they identified, offered insights into the contemporary, and highly nuanced, interplays between hunting and 'health' in these contexts. Given the known factors about the history and contemporary place of hunting engagement in these communities, there was no surprise that the most frequent hunters were older men nor that these same men had less formal secondary schooling, were more likely to be employed full-time, and had the highest reported annual incomes (King et al 2014a). Indeed, these findings are consistent with the known socio-economic associations of being older, and may simply represent the 'healthy worker effect' (McMichael 1976). The extent to which these factors may be directly linked to these peoples higher levels of hunting engagement in these communities remains unanswered.

Interestingly, the analyses did not find a significant difference in the life satisfaction or self-reported health based on hunting frequency (King et al 2014a). This was unexpected given the asserted association in the literature about the strong links between being 'on-country' and improved sense of wellbeing (Burgess et al 2009; Hunt et al 2009; Johnston et al 2010). This could be related to the way questions were worded and interpreted; a known difficulty when conducting 'health' research in Indigenous contexts because of differing understandings of what 'health' means for

participants and researchers (Izquierdo, 2005). The analysed biomedical markers indicated a relatively 'healthy' population of hunters (King et al 2014b). Although the age- and sex-adjusted findings indicated a mixed picture with respect to the major cardiovascular risk factors, the majority of survey respondents across all hunting frequency groups, including those that 'never' hunted, recorded levels within the 'healthy' range (World Heart Federation 2014). Additionally, hunting frequency did not appear to be correlated with greater levels of physical activity (King et al 2014b). As to whether this was a true association or not, these analyses were not able to elucidate this further. However, with respect to social capital indicators, the analyses did demonstrate an association between more frequent hunting and key factors such as working for the benefit of the community, feeling close to one's village, and getting together to play sports etc. (King et al 2014a). However, these same frequent hunters did not report significantly higher levels of self-rated health (King et al 2014a). The degree to which the interplay of these factors was directly related to the frequency of hunting participation is unclear, and supports further analyses of the survey data. These findings also highlight the real difficulties of elucidating the potential associations between these issues of interest, and whether and to what extent, the types of epidemiological tools used in the survey are suited to this purpose.

The third data-focused manuscript from this thesis (Chapter Nine) focused on analyses exploring the potential interrelationships between key aspects of LBP participation presented in the literature review i.e. 'catch', 'prepare/share', and 'consume' (King and Furgal 2014). Unsurprisingly, those who reported the highest frequency of hunting were also the ones most frequently sharing and preparing the 'catch' (King et al 2014c). All hunting frequency groups reported that preparing country foods was "not easy", with frequent hunters the most likely to state this (King et al 2014c). Additionally, about 50% of each of the three hunting frequency groups indicated that they "liked the taste" of country foods, which was consistent with previously reported levels from the survey (Blanchet and Rochette 2008). Interpreting these results is difficult but the more commonly made statement by the frequent hunters that country foods were "not easy to prepare" might reflect the cultural confidence and esteem that derives from 'being a hunter'. This factor has been reported as potentially reducing the need for community-acknowledged 'frequent

hunters' to adhere to a cultural script; whereby they do not need to publicly downplay any of the difficulties associated with hunting because of concerns this might question perceptions of their 'authentic indigeneity' (Brody 1987; Dombrowski 2007) – another controversial issue. However, the key issue from these analyses was that the frequent hunters appeared to be the most engaged across the range of interrelated LBP activities. These same people were the minority in these communities where rapid socio-cultural and ecosystem changes have been found to be adversely impacting engagement in LBPs (King and Furgal 2014). On this background, these new analyses raise questions about both the sustainability of this 'hunting class', and the implications for the place and sustainability of LBP participation, and any of its associated benefits, in these communities into the future (King et al 2014a).

In order to approach, and derive useful understandings about these interplays, the manuscripts sought to place these analyses of 'human health' into broader socio-ecological and cultural contexts. In these contexts it is argued that 'health' is the result of highly complex integrated systems, and that to understand and work with these realities requires embracing a transdisciplinary approach (Albrecht et al 1998; Brown et al 2010; Stokols, Hall et al 2013; Stokols, Lejano et al 2013). One potential way of doing this is to consider the paradigm developed by Brown (2008) (see Table 10.1).

**Table 10.1 Tentative paradigm for open transdisciplinary inquiry** (adapted from Brown 2008)

| | |
|---|---|
| Content: | Wicked problems arising from social-environmental change |
| Methods of inquiry: | Eclectic: can choose among reflection, dialogue, grounded theory, cost-benefit analysis, narrative, creativity, the social learning spiral and more |
| Validation: | Combining personal insights, local stories, observations, pragmatism and a holistic leap that together generate synergy |
| Synthesis: | Eclectic: systems, stories, games, design, commitment, imaginative leap, etc. |
| Role model: | Independent scholar, critical friend, collaborative networker, team-member |
| Epistemology: | Open critical inquiry based on multiple knowledges |

This paradigm starts from the premise that a 'wicked' problem requires embracing multiple ways of seeing, and doing so simultaneously, which requires a blend of formal theoretical frames, the nuanced perspectives derived from narratives and participatory engagement, and various means of collaboration. This way of considering Indigenous land-health interrelationships underpinned the basis of the second model developed from the literature review (King and Furgal 2014). That model considered 'health' associated with LBPs as part of a complex and interdependent engagement between humans and the environment, and could only have emerged out of a broad-based enquiry into those interplays. In the context of Indigenous land-health interrelationships, thinking about 'health' in this way is often absent from traditional unidisciplinary approaches to research enquiry, and this poses considerable challenges for being able to identify and address the underlying causative factors (King and Furgal 2014). The question of 'how' to do this is the issue, and is an ongoing and fertile area of research (Albrecht 1990; Albrecht et al 1998; Hirsch Hadorn et al 2006; Kendall et al 2011).

## 10.3 Study Challenges and Limitations

This thesis negotiated complex and controversial territory. Working with the thinking derived from transdisciplinarity was illuminating, yet highly problematic. However, it is argued that understanding 'Indigenous health' and Indigenous land-health interrelationships requires such a multifaceted approach. The insights and lessons presented in the interwoven suite of manuscripts are testament to this. However, there were a number of challenges encountered in this dissertation that require acknowledgement.

### 10.3.1 *Identity*

Firstly, the issue of being a non-Indigenous researcher in Indigenous health presented certain limitations and challenges. There were numerous warnings and hesitations from within the academy about both proceeding down this path (Kendall et al 2011; Moje 2000; Rigney 1997; Selby 2004). Additionally, the history of exploitation and abuse that has characterized research in Indigenous spaces carried further cautions (Anderson 2002; Kovach 2009; Smith 1999). These concerns and tensions never

dissipated. The process of engagement with the Indigenous partners and stakeholders who shared this journey was a constant source of reflection and discussion. The capacity to honour the required time to foster these relationships (National Health and Medical Research Council 2002) was a further difficulty of a time-restricted doctoral process. The ethnography of these aspects of the thesis is a thesis on its own.

### 10.3.2 *Place*

The analytical aspects of this research borrowed data from another place, the Nunavik region in Arctic Quebec, Canada. In this way, this research was both defined and constrained by the decision to access these secondary data in a place far removed from the researcher. However, given the history of disrespect and disregard by researchers investigating Indigenous-related issues (Smith 1999), using the Nunavik database was an attempt to address this. The Nunavik Inuit Health Survey was developed, and is maintained, by Inuit in the region in which the Survey exists. Through an extensive and well-established collaborative relationship with Regional and Provincial agencies and academic institutions, the Survey managers have achieved something unique. The database is large, standardized, and was established to enable Inuit-controlled investigation into the pressing human-environment health issues impacting the predominantly Inuit inhabitants in the region. As such, the invitation to use data from the Survey by the Nunavik Nutrition and Health Committee (NNHC) offered a rare opportunity. It also ensured that the research undertaken was focused on needs identified by the communities involved, and findings would contribute to the wider pool of analyses already gathered from the Survey. However, given that this thesis sought to examine the 'strengths and limitations of dominant discourses used to examine contemporary Indigenous land-health interrelationships', using this data carried with it important responsibilities. This meant ensuring that the analyses being undertaken were transparent to the database holders and contributing communities, as was the surrounding critique about 'Indigenous health'. As the analyses emerged, and manuscripts developed, these were presented to the NNHC for review and comment. Permission to publish the analyses was also sought from the NNHC to ensure the research honoured the communities' preferences for presentation of their data in the international literature. The candor of those involved in the NNHC was greatly appreciated as they, too, were seeking to

find the best ways to understand and enable their communities to engage with these complex issues.

A further limitation relating to place was the timeframe between original data collection and subsequent analyses. The data utilised for this research were from a Survey undertaken a decade ago. The 2004 data were the most recently available from a Survey that had only been conducted twice – 1992 and 2004. Given the logistics and expense of undertaking this type of Survey, this timespan is understandable. However, the delay between data collection and analyses does raise questions about the utility of the current analyses to accurately represent the 'health' of the Nunavik communities in environments that are experiencing rapid socio-cultural, economic and ecological change, i.e. Nunavik in 2014 is likely a different place than in 2004. This was a significant limitation of the presented analyses, and caution must be made in drawing conclusions about the present day situation. This point also highlights the bigger issue of putting significant resources into the one means of collecting human and environmental health data in this region via the Nunavik Inuit Health Survey, and only being able to do so every ten to twelve years. On the background of the wider concern about privileging an epidemiological lens, the related question needs to be asked whether this is the most effective means of capturing the data of interest?

### 10.3.3 *Content*

A global transdisciplinary lens is more about a way of thinking about and through issues, and using it for this research enabled a breadth and depth of enquiry not available through a single case specific unidisciplinary approach. Thus this research was able to traverse a vast landscape, and unearth important intersections not commonly considered with respect to 'Indigenous health' or land-health interrelationships. However, the challenges of working across these disciplinary and ecozone boundaries were considerable. Despite the calls for more interdisciplinary research, the pragmatics and institutional barriers for doing so are ever present (Albrecht 1990; Brown et al 2010). How wide and inclusive should a transdisciplinary lens be? How is this decided and by who, using what criteria? The academy also struggles to 'fit' research that travels through such unbounded spaces, posing

difficulties for supervision, and the ability to publish (Bammer 2005; Kueffer et al 2007). These realities aside, and the inevitable bumps on the journey, this project demonstrates the considerable advantages of embracing transdisciplinary thinking with issues as complex as 'Indigenous health' and land-health interrelationships.

With respect to the data-focused aspects of this thesis, the caveat, as always, with accessing secondary data is the issue of being restricted to available data. Thus the possible questions that could be asked of the Survey were determined by the original Survey design, and respondent's interpretation of the questions included. The consequences of this for analyses are often not evident until analyses are undertaken. This was the case when seeking to use the Survey database to answer the question of how participation in LBPs may be associated with health outcomes in this population. Both the paucity of actual questions that focused specifically on LBPs, and the bootstrap weightings used in the Survey design, substantially restricted the variables that could be used and, therefore, the analyses that could be undertaken for this analysis. This was a significant limitation of this project, and highlighted the challenges when 'retro-fitting' questions onto data in an already-established database. These realities were also constantly needing to be placed back into the larger question of this thesis, that of the strengths and limitations of these types of tools to ask and potentially answer these questions in these settings. It was by doing this that the analyses acquired relevance to the 'real' world of socio-ecological complexity, and, perhaps, where the greatest learning about, and potential contribution to, current understandings occurred.

## 10.4 Recommendations

This research advocates a number of recommendations that actively consider the complex contemporary spaces many Indigenous peoples are living in, how these frame 'health', and the importance of considering their inherent interconnections.

### 10.4.1 *Health in place*

Health *in* and *of* place are central concepts that were reinforced by this research. This

is not just a prepositional shift beyond the already established health *and* place literature. This requires broadening the understandings of the depth and breadth of how land and health are interconnected in Indigenous contexts. To do this entails placing ecosystem health at the centre, with individual human health considered a part of, rather than the sole focus or reason for, engagement with these issues (Arabena 2006; Costanza 2003). This is the basis of a socio-ecological 'health' framework, and this research adds further weight to embracing this approach.

In Nunavik, a remote region of Arctic Quebec inhabited by a predominantly Inuit population, the health in and of place are crucial to well-being (Duhaime 2002; Furgal 2008). Just how this is related to engagement with 'on country' activities has yet to be clarified (King and Furgal 2014). However, the fact remains that people's health and the health of the places they live in and from, are linked in a complex relationship (Aron and Patz 2001; Johnston et al 2007; Garnett and Sithole 2007; Gesler and Kearns 2002; Kingsley et al 2009; Wilson 2003). Understanding what 'health' means in these contexts is difficult. 'Human health', as many Indigenous peoples advocate, is profoundly interwoven with the 'health' of the land and sea (Corvalan et al 2005; Nettleton et al 2007; United Nations 2009). However, waiting until human 'health' is affected by ecosystem ill-health, such as accumulated environmental contaminants in country foods or dangers posed by rapidly changing climates, focuses too far down the causative chain to hope for policies and programs that will affect positive change in Indigenous health into the future. The emphasis needs to shift towards the 'health' of ecosystems, with 'human health' being recognized as an interrelated aspect of this, but not the sole or main driver of investigation and action (Brown et al 2010). The language of 'ecosystem services' that is the current focus of much of the international sustainability agenda (Department of the Environment, Water, Heritage and the Arts 2010; United States Environmental Protection Agency 2009) goes part way to considering this. However, the 'ecosystem services' approach promotes the economic benefits of engagement, and links these with 'human health' in ways that tend to promote the idea that ecosystems are at the service of humans for the benefit of their individual and collective 'health' (Millennium Ecosystem Assessment 2005), i.e. privileging people over planet.

### 10.4.2 *Moving beyond dominant tools*

Within this broader frame is the appreciation of the need to move beyond the confines of biomedical approaches to understanding 'Indigenous health'. In the Australian context, this was acknowledged in the National Aboriginal Health Strategy (1989) as one of the significant impediments to improving Aboriginal health:

> *The domination of Aboriginal health care by the medical model approach fitted well with other assimilationist policies of the period. (National Aboriginal Health Strategy, 1989:1)*

For all of those working with 'Indigenous health' issues in Anglo-settler contexts, this statement still resonates and raises important challenges. Further,

> *...health practitioners should accept that such tensions are inherent in all efforts to bring about change in Indigenous health contexts. We should be aware of the wider debates concerning cultural difference and statistical equality, and the dilemma of marginalised identities (Kowal and Paradies 2010:600)*

On this background, it is pertinent to note that "disease-focused thinking", and a significant reliance and trust in numeric and risk based representations embedded within Western biomedicine, is not restricted to health practitioner's perspectives, as many Western social scientists also struggle to move beyond this view of 'health' (Wolder Levin and Browner 2005). One of the dominant tools used by Western biomedicine to measure this 'disease focus' is epidemiology, and, although useful, it has some considerable limitations when seeking to understand 'health', especially in Indigenous and other unique cultural contexts (Brough 2001; Izquierdo 2005). Epidemiology has arisen from the cultural frame of Western biomedicine and inadvertently reinforces a risk discourse with respect to 'Indigenous health' (Brough 2001; Kowal and Paradies 2005; Taylor et al 2010). Learning how to harness the strengths of epidemiological constructs of 'health', while moving beyond the appreciable limitations, is a fertile area of future enquiry. One potential strategy is to shift the research focus in these spaces. At a minimum, this should include a move towards approaches that consider the socio-ecological determinants of health (Brown et al 2010; Cash et al 2003; McDonald et al 2010; Stokols, Lejano et al 2013). To do this requires developing transdisciplinary approaches, which draw on new models of enquiry to develop both integrating and inclusive ways of seeing and engaging

(Albrecht 1998 et al; Brown et al 2010; Stokols, Hall et al 2013). These include collaborative, interdisciplinary processes that give 'all ways of knowing' a seat at the table, which also embrace the benefits of 'learning in place' i.e. on the land and seas and landscapes that bear the evidence of the choices that have been, and continue to be, made about how things were, are and could be in 'that place'. From a socio-ecological perspective, this brings planet and people into a tangible connection that facilitates re-establishing the Universe as the primary value in all our affairs (Arabena 2006). Bringing a transdisciplinary lens to these encounters is, in the first instance, about open critical deliberation on the relationships between evidence, the processes of research, and approaches to reasoning, which include an active appreciation of the socio-cultural context of the work we are undertaking (Russell 2006). To do that necessitates acknowledging the 'traditions of understanding' (Ison 2005) that humans use to make sense of situations, and this requires an appreciation of the judgments – good, bad and indifferent - that are embedded in these traditions. 'How we see' is determined by 'how we have been taught to see', and epidemiological ways of seeing 'Indigenous health' are powerful within the systems that use them but, it is respectfully argued, short-sighted in many other ways. If the reductionism within epidemiological world-views could be broken open to reconnect its ways of seeing with ways of knowing and being 'in place', that would be a significant initial step. From there, shifting the mirror view away from humans towards ecosystem 'health', and learning how to do that in genuinely reflective, and culturally aware, ways would enable the much needed 'real life' understandings of the complex interrelationships between human-environmental health and well-being to emerge. This, in turn, would lead to more effective and sustainable policy, and potentially better outcomes, for Indigenous communities, and broader ecosystems, involved.

> *The challenge is to look beyond the limitations of traditional epidemiology and bridge the reductionism of our scientific training by embracing a more ecologically focused social determinants approach to health* (Nettleton et al 2007:469).

### 10.4.3 *The politics of identity*

Perhaps most important is challenging how 'Indigenous health' is itself constructed. Contemporary influences continue to shape the way Indigenous people live, identify and express their indigeneity (Anderson 1997; Gardiner-Garden 2003; Paradies 2006;

Said 1993). Honouring tradition and self-determination does not have to mean 'museumising' Indigenous people within stereotyped identities or ways of living, including how people interact with their environment through LBPs (Altman 2009; Appiah 1994; Brough 1999; Fairchild 1961; Griffiths 1995; Krech 1999; Palmer 2006; Perkins 2007; Russell 2001). Contemporary ways of being Indigenous include hybrid identities that embrace the realities of cultural fluidity, and these are often not acknowledged because of concerns over politics and sensitivities around the ongoing injuries of 'race' (Boladeras 2002; Cowlishaw 2004; Mills 1998; Scotney et al 2010; Werbner and Modood 1997) – this is delicate territory. Responding to the historical struggle to be recognised as 'authentically' Indigenous is embedded within these competing issues (Griffiths 1995), and 'Indigenous health' constructions have often, inadvertently, become caught-up in this, without adequate critique (Brough 1999; Kowal 2008). Many of the world's Indigenous people live in urban and regional areas (United Nations 2009), not in the remote areas in which a significant body of health-focused research has been concentrated, and in these varying landscapes there are many ways of expressing an 'Indigenous voice' (Appiah 1994; Griffiths 1995). The 'voice' of an epidemiological view of 'Indigenous health', despite its intention to identify 'health' issues that can then be used to garner support for action, has, instead, emphasised an ill health discourse. This has had unintended consequences of narrowing the focus onto individual disease, and, by extension, reinforcing ideas of dependence and lack of capacity about, and by, Indigenous people, to have 'good health' (Brough 2001; Kowal and Paradies 2010; Taylor et al 2010). These are complex and highly sensitive issues but 'going there' is an essential step if the structurally embedded assumptions that frame engagement in 'Indigenous health' are to be addressed. This is not merely a philosophical enquiry but is central to being able to move beyond both the current limits of understanding, and the inadvertent reinforcing of negative stereotypes. Both 'health' and 'Indigenous' are contested terms. They have no universally accepted definitions, and are deeply embedded in highly fluid cultural and political contexts. It is important to acknowledge that these terms are contested not just from outside, but also within, Indigenous spaces (Anderson 1997; Bolederas 2002; Griffiths 1995). Historical constructions of 'being Indigenous' would benefit from a reflective rethink in the context of changing socio-political and environmental circumstances. Understanding this is key to removing the, often unconscious, constraints created by these constructions, and which impede

progression towards genuinely enabling 'health' in Indigenous contexts.

### 10.5 Concluding Comments

This research project was a privilege. The process was as illuminating as the outcomes, and demonstrated the importance of being willing to step back and take a broad view. Discovering, and attempting to use, a transdisciplinary way of thinking was both profoundly challenging, and powerfully illustrative. Transdisciplinarity is an informative and humbling way of engaging with complex issues, and was well suited to this enquiry into 'Indigenous health'. A contested concept, and a real world challenge, this research reinforced the need to rethink approaches to 'Indigenous health'. Overwhelmingly, the contemporary picture for many of the world's Indigenous people is framed by experiences of poor health. To rectify this situation requires moving beyond the 'how' and 'what' of current approaches, and also addressing the assumptions behind the 'why' of engagement and representation. This involves being willing to consider the limitations of current dominant tools, and embrace the less familiar, but potentially much more effective, opportunities offered by novel interdisciplinary methods, and ways of seeing. Central to the success of this will be the degree to which these methods embed socio-ecological views of 'health'. Additionally, having the courage to wade into the identity politics that cloud these issues, and prevent maturation of responses, is key - this process requires respectful partnerships across the board. In so doing, the 'blind spots' highlighted in this research journey may have a chance to be both acknowledged and more effectively responded to. 'Indigenous health' is complex, and, as such, requires engagement with these complexities if sustainable gains are to be made now and into the future.

> *What humanity needs is a deep re-examination of the main premises and values of the cultures that exist on the planet, a rejection of the conceptual models that have outlived their usefulness. In undertaking these tasks, we also undertake the responsibility to imagine new futures* (Arabena 2010:261).

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# APPENDICES

# APPENDIX A

## Research Project Proposal

**Investigation of the links between participation in hunting, fishing and collecting activities and the health, well-being of Arctic residents and communities: a detailed analysis of Qanuippitaa and other Arctic datasets**

**Researchers:**
Ursula King, MD, PhD Candidate (Epidemiology, Australian National University, Anthony McMichael Supervisor)
Chris Furgal, PhD, Trent University

**Request for Data Access**

*This document is presented as a request for support from the Nunavik Nutrition and Health Committee to access the Qanuippitaa database for the analysis described below.*

**Purpose and Objectives of the Project:**

The Inuit Health Survey (Qanuippitaa) and other datasets (SLiCA and ArcticStat) have gathered significant data on socio-demographic characteristics of northern communities and individuals over the last 7 years. These data included information on the hunting, fishing and collecting practices of communities across the Canadian Arctic, as well as data on people's general health, living habits, anthropometric measurements and issues such as suicide, violence, and social support. Previous literature has suggested that participation in land-based activities has an association with both human and environmental health. However, quantifying this has, to date, been difficult. This study proposes to use the existing Arctic datasets to conduct regionally specific analyses that explore the relationships between individual/community bio-psycho-social health status and people's involvement in hunting, fishing and collecting activities, with the aim of quantifying this relationship. The results can then potentially be utilised to inform integrated policies addressing human-environmental health issues in remote Inuit contexts (e.g. the importance of participation to land based activities for health and well-being, the factors involved in influencing this relationship).

**Assumptions:**

- Inuit health is impacted by place (where someone lives) and the nature and extent of their relationship with the environment (as measured by participation in land-based activities in that place)
- Inuit health can be characterised by a series of variables, many of which have been gathered by recent northern health and socio-economic survey projects but not analysed for the specifics of this inter-relationship between health and relationship to land / place

**Hypothesis:**

- An active and ongoing connection with place through participation in land-based activities is a positive contributor to key bio-psycho-social health indicators (e.g. decreases BMI, blood pressure, cholesterol, reports of

depression, substance use, and increases social capital through improved cultural connection, knowledge transfer, local economy and community involvement etc).

**Methods:**

Review of the existing databases gathered through the Nunavik Qanuippitaa study (Inuit Health Survey), other regional Inuit Health Surveys and the SLiCA project and other accessible northern databases (ArcticStat) will take place in co-operation with the project leaders or data managers of those initiatives. Review of survey tools will take place to identify key biological (e.g. BMI, blood pressure, BSL, cholesterol), psychological (e.g. depression, substance use, health perceptions) and social (e.g. community participation, social support, cultural connection) indicators, and match these against both socio-demographic data (e.g. age, sex, education level, employment, income, marital status), and the corresponding data detailing individual participation in land-based activities (i.e. frequency of seasonal participation to hunting, fishing, collecting berries). This will enable cross-tabulation of data via a statistical analysis protocol, which will be developed to guide the analysis at the regional, or appropriate, scale depending on database organisation and original survey design. Analysis will then be conducted to test the hypothesis identified above via appropriate multivariate analytical designs.

For this work a PhD student in epidemiology will be working with Trent University researcher C Furgal as part of the IPY ACRC (Arctic Communities, Resilience and Caribou) project (C Furgal co-PI). Where appropriate, this work will involve appropriate individuals within the health departments of the regions or Aboriginal partner organisations (e.g. Nunavik Regional Board of Health and Social Services, ITK Health Department etc) to further develop this analytical capacity and the inter-regional analysis where possible and appropriate.

**Implications:**

By utilising existing northern databases, this project will provide a quantitative analysis of the relationships between key variables related to human health and the relationship individuals have to the place where they live through participation in land-based activities. This project will work to develop method(s) for utilising these analyses in the development of integrated policies directed at human-environmental health issues in remote northern community contexts.

**Deliverables:**

The analysis will result in a regional report on this topic, a presentation by the student and C Furgal to the NNHC and ITK, the production of 1-2 peer reviewed scientific publications, and a contribution to the PhD thesis of the student on this topic (based at Australian National University) looking at this issue in Canadian and Australian Indigenous populations.

## APPENDIX B

### ANALYTICAL PROTOCOL – 2004 NUNAVIK INUIT HEALTH SURVEY

*Household*, *Individual*, and *Confidential* instruments

All identified questions outlined below to be analysed as a function of age + sex + geography in the following groupings:

Age (in years) and Sex:

| | Female | | | Male | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|
| | 15-29 | 30-49 | 50+ | 15-29 | 30-49 | 50+ | 15-29 | 30-49 | 50+ |
| | | | | | | | | | |

Geographic-Urban/non-urban location:

| | Hudson Bay | | Ungava Bay | | Total | |
|---|---|---|---|---|---|---|
| | Urban | Non-Urban | Urban | Non-Urban | Urban | Non-Urban |
| Self-reported health etc. | | | | | | |

Geographic location:

1. Hudson Bay: Kuujjuarapik, Umiujaq, Inukjuak, Puvirnituq, Akulivik, Ivujivik, Salluit
2. Ungava Bay: Kangirsujuaq, Quaqtaq, Kangirsuk, Aupaluk, Tasiujaq, Kangiqsualujjuaq, Kujjuaq

Urban/Non-urban communities:

1. Urban: Kuujjuaq, Puvirnituq, Inukjuaq
2. Non-urban: Kuujjuarapik, Umiujaq, Akulivik, Ivujivik, Salluit, Kangirsujuaq, Quaqtaq, Kangirsuk, Aupaluk, Tasiujaq, Kangiqsualujjuaq

#### SOCIO-DEMOGRAPHIC

All grouped by age/sex and geographic-urban/non-urban location

Household Questions

Section 8.

ho31 1. % "yes" (% responding)

Individual Questions

Section 13.

Relationship status:

in55 1. % in each of category (1-5)

2. % currently in a relationship ("yes"), either in55(2) + in56(1)

3. % in in56(1)

Education:

in57 1. % in in57 - lowest bound (below) and upper bound (above)

in61 1. % 1, 2, 3+4

in62 1. % in F/time paid employment (1)
P/time paid employment (2)
Hunter support (5)
Income support (8+9)
NILF (not in labour force) (6+7+10)
Other (3+4+10+11)

## CURRENT HEALTH STATUS

All grouped by age/sex and geographic-urban/non-urban location

Individual Questions:

Section 1.

Self-reported health: in1 1. $\bar{x}$ + SD of 1-5

Satisfaction: in2 1. $\bar{x}$ + SD of 1-5

Section 4.

Weight: in9 1. % overweight (1), % underweight (2)

Confidential Questions:

Section 1.

Poor self worth: $\bar{x}$ + SD ($\sum$ co1i, co1l, co1q)

Distress: $\bar{x}$ + SD ($\sum$ of co2, co3, co4, co5, co6, co7)

Household Questions:

Section 3.

5a. (yes, no) % 1, 2

5c. (yes, no) % 1, 2

5d. (yes, no) % 1, 2

Clinical Questions:

(ever diagnosed with)

Presence of physical illness/disease by self-report

cl2a-d, cl3a, cl4a, cl5a all % "yes"

## HEALTH-RELATED BEHAVIOURS I (PHYSICAL ACTIVITY)

All grouped by age/sex and geographic-urban/non-urban location

Individual Questions:

Section 6.

Quantity of physical activity: in19 x in20 (in minutes)

Intensity of physical activity: in21 % 1-5

| | Spring | Summer | Fall | Winter |
|---|---|---|---|---|
| Quantity PA | 0-n | 0-n | 0-n | 0-n |
| Intensity PA | 0-n | 0-n | 0-n | 0-n |
| $\bar{x}$ hunting | 1-5 | 1-5 | 1-5 | 1-5 |

(control for in22 in regression analyses)

## HEALTH-RELATED BEHAVIOURS II (SUBSTANCE USE)

All grouped by age/sex and geographic-urban/non-urban location

Combine…

Individual Questions:

Section 9.

Smoking — in34 and in35c into How many cigarettes/day 0-n
(note in in34(2) = 0)
Check %

And…

Household Questions:

Section 7.

Smoking — ho15 % "yes"

Confidential Questions:

Section 3.

Alcohol — Compile categories

A. Heavy/hazardous drinking
B. Binge drinking
C. Problem drinking (dependence)
D. Non-drinking = co16(6) N and %
E. Safe/social drinking

$\sum$ co20-co25 inclusive

So, if none of C endorsed, C = 0

Drugs — $\sum$ co27 to co31 (if none endorsed, drugs = 0)

**NUTRITION**

All grouped by age/sex and geographic-urban/non-urban location

Individual Questions

Section 5.

Country foods in16-1 to in16-12

Household Questions:

Section 8.

Fat consumption ho22(1-7), ho23(1-6) can these be grouped by nutritional status?

Preparation preference ho24(1-6), ho25-1(1-6), ho25-2(1-6), ho25-3(1-6), ho26(1-6), ho27(1-6) can these be grouped?

**CONNECTEDNESS**

All grouped by age/sex and geographic-urban/non-urban location

Individual Questions:

Section 7.

Share hunting catch in24 % 2, 3, 4 (of those who answered 2, 3, 4)

Section 11.

Social support in48c

In48a(1-5) + in48b(1-5) + in49(1-4) - EFA

Section 12.

Community Wellness in50a % of 1+2 that said "yes"

in50b % "yes" to church(1) in50b-1

in51-in54 (all 1-5) – EFA

Household Questions:

Section 8.

Community freezer in28(1-4), in29(1-4), in30(1-3) %

**COMMUNITY ENVIRONMENT**

All grouped by age/sex and geographic-urban/non-urban location

Household Questions:

Section 7.

No smoking around children ho16-3 %

Confidential Questions:

Section 2.

| | |
|---|---|
| Suicide | co9 % "yes"(1) |

Section 7.

| | |
|---|---|
| Lifetime experience of violence | $\sum$co41aa to co41ad + co41ca to co41cf + co42aa to co42ac |
| | $\bar{x}$ + SD |

# APPENDIX C

## VARIABLE NAMES WITH CODES

### Individual Survey

| Code | Variable Name |
|---|---|
| in1 | 1. In general, would you say your health is: (1-5) |
| in2 | 2. How satisfied are you with your life in general? (1-5) |
| in9 | 9. Do you consider yourself: (1-2) |
| in11 | 11. How often would you say you add salt to your food at the table? (1-3) |
| in12 (1-10) | 12. What is it you like about eating store-bought food? |
| in13a | 13. a) Have you ever heard of country food contamination such as the presence of pollutants or chemicals in country food? (1-2) |
| in14a<br>in14ba(1-4)<br>in14bb(1-4)<br>in14bc(1-4)<br>in14bd(1-4) | 14. a) Have you modified your eating habits since you heard about contamination in country food? (1-2)<br>b) If yes, can you tell me some of the changes you have made? (a-d) |
| in16(1-13) | 16. What is it you like about eating country food? (1-13) |
| in17a | 17. a) Do you use country food for its medicinal properties (as cure or treatment)? (1-2) |
| in18(a-d) | 18. During your free time, do you take part in physical activities such as sport, an outdoor pastime, fitness training, dancing or walking? (yes, occasionally, no) |
| in19 | 19. In general, how many days a week do you engage in physical activity during your free time? (day(s) a week) |
| in20<br>in20-hour<br>in20-minutes | 20. In general, during a typical day, how much time do you actually spend on this type of activity? |
| in21 | 21. In general, when you engage in physical activity during your free time, at what intensity do you work? (1-4) |
| in22 | 22. Thinking back over the past 12 months, which of the following best describes your usual daily activities or work habits? (1-4) |
| in23(a-d) | 23. In the past 12 months, on average, how often did you go hunting?<br>a) spring, b) summer, c) fall, d) winter<br>(never, less than once a month, 1-3 days/month, 1-3 days/week, 4 or more days/week) |
| in24 | 24. Do you usually share your catch with your family or friends? (2-4) |
| in26a<br>in26b(1-6) | 26. a) Compared to the same season, since 2000, have any species you hunt for food been harder to catch/hunt/find? (1-2)<br>b) If yes, which one(s)? (1-6) |

| | |
|---|---|
| in26c(1-6) | c) Do you think this is because of any of the following reasons? (1-5) |
| in27(a-c) | 27. In the past 12 months, how many of the following animals did you prepare such as skinning, washing, cutting etc.?<br>a), b), c)<br>(none, 1 or 2, 3 to 9, 10 to 29, more than 30) |
| in28(a-d) | 28. In the past 12 months, on average, how often did you go fishing?<br>a) spring, b) summer, c) fall, d) winter<br>(never, less than once a month, 1-3 days/month, 1-3 days/week, 4 or more days/week) |
| in29 | 29. In the past 12 months, during berry picking season, how many days per week did you go berry picking? (1-5) |
| in34 | 34. At the present time, do you smoke cigarettes daily, occasionally, or not at all? (1-3) |
| in35c | 35. c) How many cigarettes do you smoke each day now?<br>(number of cigarettes) |
| in48 (a-c) | 48 a) How often do you find that you have someone to have a good time with? (1-5)<br>48. b) How often do you have someone to talk to if you feel troubled or for some reason need emotional support? (1-5)<br>48. c) How often does someone make you feel worried or demand too much from you in your everyday life? (1-5) |
| in49 | 49. Are you ever alone when you would in fact prefer to be with others? (1-4) |
| in50a<br>in50b(1-5 and 5s) | 50. a) In the past 12 months, have you taken part in any activities to promote your own healing or wellness? (1-2)<br>50. b) I yes, did this involve: (1-5) |
| in51 | 51. How strong is the feeling of togetherness or closeness in your village? (1-5) |
| in52 | 52. In your opinion, is this village generally peaceful or affected by violence? (1-5) |
| in53 | 53. In the past 12 months, how often have you participated in any activities where people came together to do work for the benefit of the community? (1-5) |
| in54 | 54. In the last month, how often have you gotten together with people to play games, sports, or other recreational activities? (1-5) |
| in55 | 55. What is your marital status? (1-5) |
| in56 | 56. Are you living with a common law partner (with someone else as a couple)? (1-2) |
| in57 | 57. What is the highest level of schooling you have undertaken (even if you are still in school)? (1-9) |
| in59(1-19)<br>in59-19s | 58. Thinking about your total income, from which of the following sources have you received income in the past 12 months? (1-19) |

| | |
|---|---|
| in60(1-19)<br>in60-19s | 60. What was your main source of income? (1-19) |
| in61 | 61. What is your best estimate of your total personal income, before taxes and other deductions, from all sources in the past 12 months? (1-4) |
| in62<br>in62-11s | 62. Which of the following best describes your present job status? (1-11) |

**Household Survey**

| Code | Variable name |
|---|---|
| ho5a<br>ho5c<br>ho5d | 5. Is there anyone in the household who has nay of the following health problems diagnosed by a nurse or doctor? (yes, no)<br>a) depression<br>c) serious trouble with the back or spine<br>d) emphysema or chronic bronchitis |
| ho15 | 15. Are there any restrictions against smoking cigarettes in your home? (1-2) |
| ho16(1-4)<br>ho16-4s | 16. How is smoking restricted in your home? (1-4) |
| ho22 | 22. What kind of fat do you use most often for cooking? (1-7) |
| ho23 | 23. What kind of fat do you use most often as a spread on bread? (1-6) |
| ho24 | 24. Which of the following way do you most often eat your fish? (1-6) |
| ho25(1-3) | 25. Which of the following way do you most often eat your seal or whale: (1-6)<br>1-seal, 2-whale or beluga, 3-walrus<br>(deep fried, boiled, roasted, raw/frozen, dried, don't eat) |
| ho26 | 26. Which of the following way do you most often eat your other meats? (1-6) |
| ho27 | 27. Which of the following way do you most often eat your bannock? (1-6) |
| ho28 | 28. Do you get country food from the community freezer? (1-4) |
| ho29(1-4)<br>ho29-4s | 29. Why don't you get food from the community freezer? (1-4) |
| ho30 | 30. Do you receive country food from your friends or relatives outside your household? (1-3) |
| ho31 | 31. In the last month, did it happen that there was not enough to eat in your house? (1-2) |

## Confidential Survey

| Code | Variable name |
|---|---|
| co1i<br>co1l<br>co1q | 1. For each of the following statements about yourself, please tell how often the statement applies to you: (i, l, q) |
| co2 | 2. During the past 30 days, about how often did you fell nervous? (1-5) |
| co3 | 3. During the past 30 days, about how often did you feel hopeless? (1-5) |
| co4 | 4. During the past 30 days, about how often did you feel restless of fidgety? (1-5) |
| co5 | 5. During the past 30 days, about how often did you feel so depressed that nothing could cheer you up? (1-5) |
| co6 | 6. During the past 30 days, about how often did you feel that everything was an effort? (1-5) |
| co7 | 7. During the past 30 days, how often did you feel worthless? (1-5) |
| co9 | 9. In the past 12 months, have you thought seriously about committing suicide? (1-2) |
| co13(a-l) | 13. What do you think can help someone who is feeling suicidal? Please check all the things that can help: (a-l) |
| co15 | 15. Have you ever had a drink of alcohol? (1-2) |
| co16 | 16. In the past 12 months, how often did you drink alcoholic beverages? (1-6) |
| co17<br>co17-6s | 17. In the past 12 months, what was your main source of supply for alcoholic beverages? (1-6) |
| co18 | 18. In the past 12 months, how many drinks did you usually have on the same occasion? (1-4) |
| co19 | 19. In the past 12 months, how often have you had 5 or more drinks on the same occasion (same evening, same party, etc.) (1-5) |
| co20 | 20. Have you ever felt that you should cut down on your drinking? (1-2) |
| co21 | 21. Have people annoyed you by criticising your drinking (such as partner, children, boss, colleagues, friends, acquaintances)? (1-2) |
| co22 | 22. Have you ever felt bad or guilty about your drinking? (1-2) |
| co23 | 23. Have you ever had a drink first thing in the morning to steady your nerves or get rid of a hangover (eye opener)? (1-2) |
| co27 | 27. In the past 12 months, have you tried to get high by sniffing glue, gasoline, propane, or any other solvent? (1-2) |
| co28 | 28. In the past 12 months, have you used or tried pot, marijuana, grass or hashish? (1-2) |
| co29 | 29. In the past 12 months, have you used or tried cocaine (such as coke, snow, crack, freebase)? (1-2) |
| co30 | 30. In the past 12 months, have you used or tried hallucinogens such as PCP, LSD, ecstasy acid, mushrooms, or mescaline? (1-2) |

| | |
|---|---|
| co31 | 31. In the past 12 months, have you used or tried injection drugs? (1-2) |
| co41b | 41. b) Have you as an adult been subjected to threats of violence that were so serious that you became afraid? (1-2) |
| co42aa<br>co42ab<br>co42ac | 42. a) Have you ever been subjected to any form of forced or attempted forced sexual activity? (yes, no)<br>a), b), c) |

## Clinical

| Code | Variable name |
|---|---|
| cl2a | myocardial infarction |
| cl2b | other heart disease |
| cl2c | stroke |
| cl2d | cancer |
| cl3a | diabetes: by MD or nurse |
| cl3ba | treatment diab: diet |
| cl3bb | treatment diab: exercise |
| cl3bc | treatment diab: pills |
| cl3bd | treatment diab: insulin |
| cl3be | treatment diab: other |
| cl3bf | no treatment diabetes |
| cl4a | high blood pressure: by MD or nurse |
| cl4ba | treatment high blood pressure: diet |
| cl4bb | treatment high blood pressure: exercise |
| cl4bc | treatment high blood pressure: pills |
| cl4bd | treatment high blood pressure: other |
| cl4be | no treatment high blood pressure |
| cl5a | high cholesterol: by MD or nurse |
| cl5ba | treatment cholesterol: diet |
| cl5bb | treatment cholesterol: exercise |
| cl5bc | treatment cholesterol: pills |
| cl5bd | treatment cholesterol: other |
| cl5be | no treatment cholesterol |
| cl6a-1 | infarction: parents |
| cl6b-1 | other heart disease: parents |
| cl6c-1 | stroke: parents |
| cl6d-1 | diabetes: parents |

| | |
|---|---|
| cl6e-1 | high blood pressure: parents |
| cl6f-1 | cholesterol: parents |
| cl6g-1 | cancer: parents |
| cl6g-1s | type of cancer: parents |
| cl6a-2 | infarction: siblings |
| cl6b-2 | other heart disease: siblings |
| cl6c-2 | stroke: siblings |
| cl6d-2 | diabetes: siblings |
| cl6e-2 | high blood pressure: siblings |
| cl6f-2 | cholesterol: siblings |
| cl6g-2 | cancer: siblings |
| cl6g-2s | type of cancer: siblings |

| **Code** | **Variable name** |
|---|---|
| nu1 | blood sampling: yes/no |
| nu1-hours | number of hours since last meal |
| nu2-blood | OGTT: time blood sampling T2 |
| nu2-fasting | OGTT: participant fasting |
| nu2-glucose | OGTT: time glucose administration |
| nu2-test | OGTT: capillary glucose test |
| nu4-1dia | diastolic: 1st |
| nu4-1sys | systolic: 1st |
| nu4-2dia | diastolic: 2nd |
| nu4-2sys | systolic: 2nd |
| nu4-pulse | pulse |
| nu4-temp | body temperature |
| nu5-BMI | BMI |
| nu5-bodyfat | body fat % |
| nu5-bodywater | body water (kg) |
| nu5-fatfreemass | fat free mass (kg) |
| nu5-fatmass | fat mass (kg) |
| nu5-height | height (cm) |
| nu5-hip | hip girth (cm) |
| nu5-waist | waist girth (cm) |
| nu5-weight | weight (kg) |

Clinical measurements for participants aged 18 to 74

| Code | Variable name |
|---|---|
| CHOL | total cholesterol |
| CT_HDL | tot chol/HDL |
| GLU | fasting glucose |
| GLUT2 | OGTT |
| HDL | HDL |
| INSULINE | insulin |
| LDLC | LDL |
| LDL_INTEGRATED | weighted av size of LDL S-fractions |
| LDL-PEAK | size + important S-fraction:LDL |
| TRIG | triglycerides |

| | |
|---|---|
| POIDS | population weight |
| B1-B500 | bootstrap weights |

## APPENDIX D

## 2004 Nunavik Inuit Health Survey 'individual questionnaire'


study no

**STUDY NO.** | E | S | I | | | | |

**INT. NO.** | | |
in-int

# Qanuippitaa?

| ᖁᓄᐊᑦᐱᒋ? | *How are we?* |
|---|---|
| ᐃᓕᓴᕆᓂᖅᓯᒪᑦ ᖁᐅᓵᓴᐅᑎᑦ ᐃᓄᐊᖅ ᓄᓇᕗᒻᒥᐅᓂ **– 2004** | ***Health Survey of the INUIT of Nunavik – 2004*** |
| ᐃᓄᐃᑦᑎᑐᓄᑦ | ***INDIVIDUAL*** |
| ᐊᐱᖅᓯᐃᑦ - ᐱᒃᓱᖅᑕᕆᑦ ᐊᐱᖅᓯᑎᑦ | ***Interviewer-Completed Questionnaire*** |

**INSPQ**
Institut national de santé publique du Québec
945, rue Wolfe
Ste-Foy (Québec) G1V 5B3
Tel.: (418) 650-5115

Completion date 04 / ____ / ____
y m d
in-date

Time: ____ / ____
h m
in-time

## SECTION 1 - HEALTH IN GENERAL

## ᖃᐃᓕᑐᓂᒃᑯᑎᒍᑦ 1 - ᐃᓚᓂᒃᑯ ᐃᓚᖅᓴᒍᑦ

**Let us start with a few questions on your health in general.**

ᐱᒋᐊᖅᐱᖅᑲᓪᓚᕐᒪᑐᐃᓐᓇᑦ ᐊᐱᖅᓯᒪᓂᑦ ᐊᒋᓯᒃᑎᑐᑎᓂᑦ ᐃᓕᓴᕐᒪᑐᑦ ᐃᓚᖅᓴᒍᑦ ᖃᓄᐃᓕᒪᖅᓯᒪᔪᖅᑕᑦ.

**1. In general, would you say your health is:**

**1.** ᐃᓚᖅᓴᒍᑦ, ᖃᓄᐃᑎᒋᑦ ᖃᓄᐃᒃᑎᒋᓯᐊᖅᑐᑎᓪᓗᒍᑦ?

in1

1- Excellent
2- Very good
3- Good
4- Fair
5- Poor
8- DNK
9- NR/R

1- ᐱᐅᔨᒪᓕᕆᐊᓗᐊᖅ
2- ᐱᐅᔨᐊᓗᐊᖅ
3- ᐱᐅᔨᖅ
4- ᖃᓄᐃᒃᑎᒋᑐᖅ
5- ᐱᐅᑦᔪᐊᖅᑎᑐᖅ
8- DNK
9- NR/R

**2. How satisfied are you with your life in general?**

**2.** ᐃᓚᖅᓴᒍᑦ, ᖃᓄᖅᓚᐊᑎᑎᒋᑦ ᓴᒪᓕᕐᓂᑦ ᐃᓇᓱᐊᓂᒃᑯᑦ?

in2

1- Very satisfied
2- Satisfied
3- Neither satisfied nor dissatisfied
4- Dissatisfied
5- Very dissatisfied
8- DNK
9- NR/R

1- ᓴᒪᓕᕐᓂᐊᑐᒪᓕᕆᐊᓗᐊᖅ
2- ᓴᒪᓕᕐᓂᑐᖅ
3- ᓴᒪᓕᕐᓂᑐᐃᓚᒃᑐᖅ
4- ᓴᒪᓕᕐᓂᖅᑎᑐᖅ
5- ᓴᒪᓕᕐᓂᖅᑎᓪᓗᑎᑐᖅ
8- DNK
9- NR/R

## SECTION 2 - DENTAL HEALTH

## ᖃᐃᓕᑐᓂᒃᑯᑎᒍᖅ 2 - ᑭᒍᑎᓪᓗᒍᖅ

**The following questions concern dental health.**

ᖃᐅᔨᓴᓂᑦ ᑭᒍᑎᓄᑦ ᐃᓪᓕᖅᓴᒍᑦ.

**I will ask you a few questions about your ability to chew different foods, whether you eat them or not.**

ᖃᒋᓯᒃᑎᑐᑎᒍᑦ ᖃᐅᔨᓴᓪᓕᖅᓯᒪᓂᑦ ᑕᒪᖃᒪᓕᕐᓂᑦ ᖃᑦᑐᑭᒃᑎᑐᑎᒍᑦ ᓂᕿ, ᓂᓪᓕᔪᒪᓕᖃᑭᐅᓚᐅᑭᑦ ᐱᔪᒪᒃᑯᓕᕐᓂᖅᐹᒪᔪᖅᑕᑦ?

**3. a) Can you chew firm foods such as meat?**

**3.** ᐃ) ᑕᒪᖃᑦᓴᖃᑭᓚᐅᑦ ᓂᕿᓂᑦ ᐅᑦᔨᑎᑎᓕᒍ ᓂᕿᑭᑐᐃᓚᒃᑐᓂᑦ?

in3a

1- Yes
2- No
8- DNK
9- NR/R

1- Yes
2- No
8- DNK
9- NR/R

**b) Can you bite off and chew a piece of fresh apple?**

ᐱ) ᓇᒃᑦᔪᒍᓚᐅᑦ ᑕᒪᖃᓕᒪᓕ ᖃᐳᒥᓂ ᓄᑖᓂᕿᒥᑦ?

in3b

1- Yes
2- No
8- DNK
9- NR/R

1- Yes
2- No
8- DNK
9- NR/R

## SECTION 3 - WOMEN'S HEALTH

**If the respondent is a man, Go to section 4, Q. 9**

**Now, we would like to ask some questions about women's health.**

**4. a) When did you have your last Pap test?**

**If the respondent answers « today », ask for the previous test.**

in4a
1- Less than 12 months ago
2- 1 year to less than 2 years ago
3- 2 or more years ago
4- Never
8- DNK
9- NR/R

Go to Q. 5a

Go to Q. 5a

**b) If never or 2 or more years ago, can you tell me why?**

**Do not read list, circle all that apply**

in4b-1 1- Was not offered
in4b-2 2- Never go to the clinic
in4b-3 3- Did not think it was necessary
in4b-4 4- No time/too busy
in4b-5 5- Fear (such as painful, embarrassing, find something wrong)
in4b-6 6- Have had a hysterectomy
in4b-7 7- Other (specify) in4b-7s
in4b-8 8- DNK
in4b-9 9- NR/R

**5. a) When did you have your last breast examination by a doctor or a nurse?**

**If the respondent answers « today », ask for the previous test.**

in5a
1- Less than 12 months ago
2- 1 year to less than 2 years ago
3- 2 or more years ago
4- Never
8- DNK
9- NR/R

Go to Q. 6a

Go to Q. 6a

**b) If never or 2 or more years ago, can you tell me why?**

**Λ) ᓯᐅᕐᓯᒪᓴᖅᓯᑯᐃᑦ, ᐊᕐᕋᔨᓄ ᒪᕐᑭᓄ ᐅᓴᒻᒋᔭᓪᓗᓂ ᓂᓴᖅᓯᑯᐃᑦ, ᐅᕐᖏᐅᑎᓯᐅᓴᖅᓴᒻ ᓱᔨᒪᓴᖅᓗᓂᑦ?**

**Do not read list, circle all that apply**

| | | | |
|---|---|---|---|
| in5b-1 | 1- | Was not offered | 1- ᖃᕐᕋᐅᑐᓯᓱᒪᓴᖅᑐᑎᓪ |
| in5b-2 | 2- | Never go to the clinic | 2- ᐊᓂᓂᐊᕆᐊᓯᐅᓯᓱᒪᓴᖅᑐᑎᓪ |
| in5b-3 | 3- | Did not think it was necessary | 3- ᑎᐊᖃᕐᑐᓗᓴᖅᑐᑎᓪ |
| in5b-4 | 4- | No time/too busy | 4- ᐱᐃᑦᓴᖃᓴᖅᑐᑎᓪ/ᐊᕐᓂᐊᑎᓪ |
| in5b-5 | 5- | Fear (such as painful, embarrassing, find something wrong) | 5- ᐃᕐᓱᓴᖅ (ᐊᓂᓂᐊᓂᐊᓴᖅᔨᒍᑦ, ᐃᓂᕐᕆᔨᑎᓴᖅ, ᑕᔨᐃᐅᓂᐊᓴᖅᔨᒍᑎᑦ) |
| in5b-6 | 6- | Other (specify) in5b-6s _____ | 6- ᐊᓯᐊᓂᒃ (ᓇᓄᓐᓄᕐᓄᒍ) _____ |
| in5b-8 | 8- | DNK | 8- DNK |
| in5b-9 | 9- | NR/R | 9- NR/R |

**6. a) Did you ever give birth?**

**6. Δ) ᓄᑕᖅᑕᓪᓚᐅᕐᓯᓱᒪᐃᑦ/ᐱᐊᖅᑕᓪᓚᐅᕐᓯᓱᒪᐃᑦ?**

in6a

| | | |
|---|---|---|
| 1- | Yes | |
| 2- | No | Go to Section 4, Q. 9 |
| 9- | NR/R | Go to Section 4, Q. 9 |

**b) For the last child you gave birth to, could you tell me his/her year of birth?**

**Λ) ᖃᓄᒃ ᐱᐊᖅᑕᓯᓕᕐᓂᖅᑐᑦ (ᒥᑭᖅᒍᑕᖅᓂᖅᑐᑦ)**

in6b

Year of birth ☐☐☐☐

**ᐊᕐᕋᔨᓄᒃ ᐃᓄᓕᖅᐸᐃᓂᕐᓗᒃᑕ** ☐☐☐☐

If child born before 2000 — Go to Section 4, Q. 9

8- DNK — Go to Section 4, Q. 9

9- NR/R — Go to Section 4, Q. 9

**ᐱᐊᖅᑲ/ᓄᑕᖅᑲ ᐃᓕᓴᖅᑐᐃᓂᕐᓂᖅᑕᐅᓯᒪᔪᑦ 2000-ᒍᓪᓄᐃᓕᑦ**

8- DNK — Go to Section 4, Q. 9

9- NR/R — Go to Section 4, Q. 9

**7. a) During your last pregnancy, did you take pills or shots to prevent iron deficiency:**

**7. Δ) ᑭᒃᒍᓕᕆᔨ ᐱᐊᖅᑎᖅᓴᓕᑎᑦ/ᓄᑕᖅᑎᖅᓴᓕᑎᑦ, ᐃᖅᓴᒪᖅᑐᑎᓪᓗᓂ ᑲᐱᕐᐅᖅᓴᕆᓂᖅᑭᑦ ᐊᐅᓪᓚᓂᐊᓂᖅᑭᑦ?**

in7a

| | |
|---|---|
| 1- | Yes |
| 2- | No |
| 8- | DNK |
| 9- | NR/R |

**b) During your last pregnancy, did you take pills or shots to prevent vitamin deficiency:**

in7b
1- Yes
2- No
8- DNK
9- NR/R

**c) During your last pregnancy, did you smoke daily, occasionally, or not at all?**

in7c
1- Daily
2- Occasionally
3- Not at all
8- DNK
9- NR/R

**d) During your last pregnancy, did you drink any alcohol?**

in7d
1- Yes
2- No — Go to Q. 8a
8- DNK — Go to Q. 8a
9- NR/R — Go to Q. 8a

**e) How often did you drink?**

in7e
1- Less than once a month
2- Once to 3 times a month
3- Once to 3 times a week
4- 4 times or more a week
8- DNK
9- NR/R

**8. a) Was the last child you gave birth to, given up for adoption?**

in8a
1- Yes — Go to Section 4, Q. 9
2- No
9- NR/R — Go to Section 4, Q. 9

**b) Are you breast-feeding that child now?**

in8b
1- Yes — Go to Section 4, Q. 9
2- No
9- NR/R — Go to Section 4, Q. 9

Λ) ᑭᖏᑦᓂᓕᕆᔨᑎᑦ/ᓄᑕᖅᓂᓕᕆᔨᑎᑦ, ᐃᖅᓱᒃᑐᓂᖅᑭᑦ ᑲᐱᐅᑦᓱᒃᑕᓂᖅᑭᓗᓐᓂᑦ ᑎᒥᐅᐱᑦ ᐃᓕᓴᕐᔪᑎᖓᓐᓂᒃ ᐱᑕᒃᓴᓕᓴᕐᔪᖓᓐᓂᒃᓂᓪᓗᒃ ᓄᐃᑦ?

1- Yes
2- No
8- DNK
9- NR/R

∩) ᑭᖏᑦᓂᓕᕆᔨᑎᑦ/ᓄᑕᖅᓂᓕᕆᔨᑎᑦ, ᐅᑦᓗᑕᒪᑦ ᓯᔾᔪᑐᒃᑕᓂᖅᑭᑦ/ᑐᐸᑭᒃᑕᓂᖅᑭᑦ, ᐃᓐᓇᖅ, ᓯᔾᔪᑎᑭᓐᓇᓂᑦ/ᑐᐸᑭᒧᐊᓂᓐᓇᓂᑦ?

1- ᐅᑦᓗᑕᒪᑦ
2- ᐃᓕᓴᒃᓱᓂ
3- ᓂᒃᒃᑎᑐᔪᒃ
8- DNK
9- NR/R

ᑭ) ᑭᖏᑦᓂᓕᕆᔨᑎᑦ/ᓄᑕᖅᓂᓕᕆᔨᑎᑦ, ᐃᒥᐊᓗᒃᑕᓂᖅᑭᑦ?

1- Yes
2- No
8- DNK
9- NR/R

ᒥ) ᖃᒃᓄᖓ ᐊᑯᓐᑎᒥᔪᒥᐅᑦ ᐃᒥᐊᓗᒃᑕᓂᖅᑭᑦ?

1- ᑕᖅᑭᑕᒪᓴᕐᔪᐊᑐᔪᑦᓴᓇᓂᑦ
2- ᐊᑕᐅᔪᐃᓕᓂᔾᔪᒪ ᐱᒃᓴᔪᓄᑦ ᑕᖅᑭᒥ
3- ᐊᑕᐅᔪᐃᓕᓂᔾᔪᒪ ᐱᒃᓴᔪᓄᑦ ᐱᓇᔪᐊᑭᔪᔪᑦᒥ
4- ᔪᑕᒪᐃᓕᓂᔾᔪᒪ ᐅᒃᓴᒋᓄᑦᓇᓂᑦ ᐱᓇᔪᐊᑭᔪᔪᑦᒥ
8- DNK
9- NR/R

8. Δ) ᑭᖏᑦᓂᓕᕆᖃᑦ ᐱᐊᖏᑦᒋᐃᓇᓂᑦ/ᓄᑕᖏᑦᒋᐃᓇᓂᑦ, ᑎᒍᐊᑦᒋᓐᓇᕐᐅᑎᑕᐃᓇᓂᑦ?

1- Yes — Go to Section 4, Q. 9
2- No
9- NR/R — Go to Section 4, Q. 9

ᐱ) ᐊᒻᒪᑦᑎᓕᔪᓂᑦ ᒋᑦᔪᒥᒃᓴᒪ?

1- Yes — Go to Section 4, Q. 9
2- No
9- NR/R — Go to Section 4, Q. 9

**c) Was the last child you gave birth to**

in8c
1- Breastfed
2- Bottlefed with formula, cow milk, carnation milk — Go to Q. 8e
3- Breastfed and bottlefed with formula, cow milk, carnation milk
8- DNK
9- NR/R

→ Go to Section 4, Q. 9

**d) Could you tell me how long you breastfed the last child you gave birth to?**

**Inscribe the quantity of time: only one answer**

in8d-1 1- __ __ Days
in8d-2 2- __ __ Weeks
in8d-3 3- __ __ Months
in8d-4 4- __ __ Years
in8d-8 8- DNK
in8d-9 9- NR/R

→ Go to Section 4, Q. 9

**e) Why did you [not breast-feed / stop breast-feeding] your child?**

**Do not read list, circle all that apply**

in8e-1 1- Afraid of environmental contaminants (PCB, mercury, lead, etc.)
in8e-2 2- Work/school
in8e-3 3- Nipple or breast problem
in8e-4 4- Not producing enough milk
in8e-5 5- Outdated habits
in8e-6 6- Doctor's/nurse's advice
in8e-7 7- Too busy with household duties
in8e-8 8- Bottle feeding easier
in8e-9 9- Formula as good as breast milk
in8e-10 10- Father/partner didn't want me to
in8e-11 11- Medical condition, mother
in8e-12 12- Medical condition, baby
in8e-13 13- Wanted to drink alcohol/beer/take drugs
in8e-14 14- Baby was old enough to stop
in8e-15 15- Other (specify)
_in8e_15s_____
_
in8e-98 98- DNK
in8e-99 99- NR/R

## SECTION 4 - WEIGHT

**Now I would like to ask some questions about your weight.**

**9. Do you consider yourself:**

in9
- 1- Overweight?
- 2- Underweight?
- 3- Just about right?
- 8- DNK
- 9- NR/R

**10. Are you presently trying to lose weight, gain weight or neither?**

in10
- 1- Lose weight
- 2- Gain weight
- 3- Neither
- 8- DNK
- 9- NR/R

## SECTION 5 – NUTRITION AND CONTAMINANTS

**The following questions are about nutrition.**

**11. How often would you say you add salt to your food at the table?**

in11
- 1- Often
- 2- Sometimes
- 3- Never
- 8- DNK
- 9- NR/R

**12. What is it you like about eating store-bought food?**

**12.** ᓱᓇᒥ ᐊᓕᐊᔪᑎᖅᑐᕐᓂᖅ ᓂᐅᐃᖅᑕᐃᒥᖅᓂ/ᓂᐅᐃᖅᓂᐊᐃᒪᒥ ᓂᖅᑭᓂᒃ ᓂᐅᐃᐊᖅᓴᐅᓱᓂᒃ?

**Do not read list, circle all that apply**

| | | |
|---|---|---|
| in12-1 | 1- | I like the taste of store-bought food |
| in12-2 | 2- | It is healthy |
| in12-3 | 3- | It is modern food |
| in12-4 | 4- | It is easier to get than country food |
| in12-5 | 5- | It varies my diet |
| in12-6 | 6- | I can't do without it |
| in12-7 | 7- | It is easy to prepare |
| in12-8 | 8- | It is less expensive |
| in12-9 | 9- | DNK |
| in12-10 | 10- | Other (specify) in12-10s |

| | |
|---|---|
| 1- | ᑎᒍᖅᑐᖅ ᒪᒪᓇᒪᒃᑭᖅ |
| 2- | ᐃᓗᓕᕐᔪᖅ ᐱᐅᔨᒪᒡᒪᑕ |
| 3- | ᐅᖅᓗᒥ ᓂᓇᓴᐅᓕᕐᔪᓚᖅᑕᖅᒪᑕ |
| 4- | ᐱᓴᓇᐊᑭᓂᓴᐅᒪᒡᒪᑕ ᓂᖅᑭᑐᐃᓐᓇᓂᖅ ᐱᒋᐊᒋᒃ |
| 5- | ᐊᖅᓯᑲᖅᑎᑐᒃ ᓂᓇᔪᓐᓇᕐᔪᒍᒪᒪ |
| 6- | ᐱᓗᖅᒪ ᑭᕐᐊᓂᐅᒪᒪ |
| 7- | ᐊᑐᐃᓐᓇᑭᖅᑎᒋᐊᒋᒃ |
| 8- | ᐊᑭᑭᓐᓂᖅᐅᒡᒪᑕ |
| 9- | ᑭᐅᔪᒪᓴᖅᑎᑐᖅ |
| 10- | ᐊᕐᓂᐊᓂᒃ (ᓇᓗᓀᖅᓗᔪ) |

**13. a) Have you ever heard of country food contamination such as the presence of pollutants or chemicals in country food?**

**13.** ᐃ) ᑐᖃᓪᓚᖅᓯᒪᔪᑦ ᓂᖅᑭᑐᐃᓐᓇᓐᓀᑦ ᓱᓴᓇᖅᑐᑦᓱᒃᑐᐃᓐᓇᓇᐊᖅᓴᓂᖅᑎᓐᓂᒃ?

| | | |
|---|---|---|
| in13a | 1- | Yes |
| | 2- | No — Go to Q. 16 |
| | 8- | DNK — Go to Q. 16 |
| | 9- | NR/R — Go to Q. 16 |

| | | |
|---|---|---|
| | 1- | Yes |
| | 2- | No — Go to Q. 16 |
| | 8- | DNK — Go to Q. 16 |
| | 9- | NR/R — Go to Q. 16 |

**b) Can you tell me if any of the following items are contaminants or pollutants that could be found in country food?**

ᐱ) ᖃᐅᔨᑎᒍᓐᓇᕐᓯᒪᒪ ᓇᑦᓂᑐᐃᓐᓇᓚᖅᑎᑦ ᓱᓴᓇᖅᑐᑦᓱᒃᑐᐃᓐᓇᓇᐊᖅᓴᓂᖅᑎᓐᓂᒃ ᐊᑐᐊᒃ ᐊᑦᓂᓱᒪᔨᐃᑦ ᓂᖅᑭᑐᐃᓐᓇᓇᓕᖅᓚᐅᒡᒪᑕ?

**Circle all that apply:**
**The instruction Go to Q. 16 applies only if respondent answers 4 exclusively.**

| | | |
|---|---|---|
| in13b-1 | 1- | Mercury |
| in13b-2 | 2- | PCBs |
| in13b-3 | 3- | Lead |
| in13b-4 | 4- | Worms and parasites — Go to Q. 16 |
| in13b-5 | 5- | Cadmium |
| in13b-8 | 8- | DNK |

| | |
|---|---|
| 1- | ᒍᑯᔨ |
| 2- | ᐱᓱᐃᑦ |
| 3- | ᐃᓗᓕᐊᑭᑦᓴᖅᖃ(ᐅᖅᑯᒪᓗᑕᑦᓴᖅᖃ) |
| 4- | ᖅᑯᑦᓗᑎᐊᓕᒃ ᖅᑯᐱᖅᓂᑦᓗᓂᑦ — Go to Q. 16 |
| 5- | ᓴᐃᕐᖅᑦᓴᖅᖃ |
| 8- | DNK |

**14. a) Have you modified your eating habits since you heard about contamination in country food?**

**14.** Δ) ᓂᓪᒍᔪᖅᓱᐃᑦ ᐊᔪᑦᓴᓕᒫᓐᖅᑦ ᑐᓴᒪᐅᔪᓂᑦ ᓂᖅᑭᑐᐃᓰᒃᓴᑦ ᐊᑦᑕᓐᑐᑦᑲᖅᑎᓗᒍᑦ?

in14a

1- Yes
2- No
8- DNK
9- NR/R

→ Go to Q. 15

1- Yes
2- No
8- DNK
9- NR/R

→ Go to Q. 15

**b) If yes, can you tell me some of the changes you have made?**

Λ) ᐊᖏᑦᕿᑦ, ᐅᖅᑲᐅᑎᓪᓗᐅᖏᓐᓄᑦ ᐊᔪᑦᓴᓂᓪᒍᔪᓕᒫᖅᑕᐃᓱᐃᑦ? (ᐊᒡᒪᓗᑭᑕᐅᓕᖅᓗᑦ ᐃᓗᓰᓐᓇᑎᒃ ᐊᑐᖅᑐᑦ)

**Circle all that apply**

| | | ᐱᓯᒍᒍᓰᓐᓄᑐᖅ **Do not eat anymore** | ᐱᖏᖓᓂᖅ-ᖃᓕᑐᖅ **Eat less** | ᐱᓂᖅᓴ-ᐅᓕᑐᖅ **Eat more** | ᐊᔪᑦᓴᓯᒍ ᓂᖅᔪᐅᑕᐅᒍᔪᖏᓐᓄᓪ **Change in the way it is prepared** | ᑭᐅᖏᖓᑐᖅ ᑭᐅᒍᒪᖏᖓᑐᖅ **NR/R** |
|---|---|---|---|---|---|---|
| a) Meat of beluga, whale, walrus, seal | a) ᑕᓂᐅᖅᑎᐅᔾᔨᓂᓰ ᓂᖅᑭᑐᐃᓰᓐᓇᓂᓰ (ᐅᑦᔨᑎᑎᓗᒍ, ᖅᑭᓕᓴᒪᐃᓂᖅ, ᐁᐱᐃᓂᖅ, ᓇᑦᔪᐃᓂᖅ | 1 in14ba-1 | 2 in14ba-2 | 3 in14ba-3 | 4 in14ba-4 | 9 in14ba-9 |
| b) Fish | b) ᐃᖅᓄᖅᑎᓰ | 1 in14bb-1 | 2 in14bb-2 | 3 in14bb-3 | 4 in14bb-4 | 9 in14bb-9 |
| c) Blubber or fat from beluga, whale, walrus, seal | c) ᐅᖅᔪᓂᓰᓂᓰ ᑎᔪᖃᓂᓰᓕ ᑕᓂᐅᖅᑎᐅᔨᑦ | 1 in14bc-1 | 2 in14bc-2 | 3 in14bc-3 | 4 in14bc-4 | 9 in14bc-9 |
| d) Caribou | d) ᑐᑦᑐᐃᓂᖅᑎᓰ | 1 in14bd-1 | 2 in14bd-2 | 3 in14bd-3 | 4 in14bd-4 | 9 in14bd-9 |

**15. Do you think there are contaminants (such as mercury and PCBs) in:**

**15.** ᓱᓴdᓭᖏᑐᖏᑐᓇᖅᓱᐸᑦ (ᐅᑦᑐᑎᑎᓗᒍ ᒎdᔪᓂᓴ ᐋᓱᐋᓂᑦᓗᓂᑦ ᐅdᓭᓂ:

| | | | ᖃᓄᖅᑎᑦ No I don't think so | ᐊᓂᒪᑦ Yes I think so | DNK |
|---|---|---|---|---|---|
| n15a | a) Country food | Δ) ᓂᖏᑐᐃᓵᓭᓂ | 1 | 2 | 8 |
| n15b | b) Yourself | Λ) ᓭᒪᒥᓂᒃ | 1 | 2 | 8 |
| n15c | c) People in your community | Ո) Δᓄᓵᓂ ᓄᓭᓪᓚᕆᐸᑦ | 1 | 2 | 8 |
| n15e | d) People in Nunavik | Ρ) Δᓄᓵᓂ ᓄᓭᐱᒪᒥᐅᓂᒃ | 1 | 2 | 8 |
| n15e | e) People in Southern Quebec | Γ) Δᑦᑐᓭᓂ ᖃᑦᑐᓭᑦ ᓄᓭᖃᓕᓵᓂ | 1 | 2 | 8 |

**16. What is it you like about eating country food?**

**16.** ᓱᓭᒥᒃ ᐊᓪᐊJՈᖃᖅᐱᑦ ᓂᖏᑐᐃᓵᓭᔨᓇᐊᒥᒃ?

**Do not read list, circle all that apply**

| | | |
|---|---|---|
| in16-1 | 1- | I like the taste of country food |
| in16-2 | 2- | It is healthy food |
| in16-3 | 3- | It gives me strength and warmth |
| in16-4 | 4- | I can't do without it |
| in16-5 | 5- | It is part of our tradition |
| in16-6 | 6- | It is what the land gives us |
| in16-7 | 7- | It is easy to prepare |
| in16-8 | 8- | It is nice to eat together with other people |
| in16-9 | 9- | It is less expensive |
| in16-10 | 10- | It creates jobs for Inuit |
| in16-11 | 11- | I don't like country food |
| in16-12 | 12- | Store-bought foods are not as healthy and nourishing as country foods |
| in16-13 | 13- | Other (specify) in16-13s _____ |

| | |
|---|---|
| 1- | ᒪᒪᖏᓂᖅᓴᓂᑦ |
| 2- | ᓂᖏᑦᓱᐊJᒪᒪᑦ |
| 3- | ᓄᑭᖏᑎᓂᓱᔪᒪᒪᑦ ᐅᓄᓂᓴᓱᓂᓗ (ᐃᓱᓂᖅJᓱᐊᖏᓴᒪᑦ) |
| 4- | ᐱᓗJ ᑭᓱᐊᓂᓱᐊᖏ |
| 5- | ᐱᐅᓱᑐᖏᑕ ᐃᓕᒥᒪᒪᐅᒃ |
| 6- | ᓄᓴᒥᑦ ᐱᓱᒪᒪᖏᑎJ |
| 7- | ᐱᓴᓇᐊᑭᑦᑐᒍᒪᑦ ᐊᑐᐃᓵᓴᑭᑎᑎᐊᒥᒃ |
| 8- | ᓂᓇᖏᑎᑭᒥᐊᒥᒃ ᐊᓕᐊᓴᖏᒍᒪᑦ |
| 9- | ᐊᑭᑭᓵᓂᖅᐅᒪᒪᑦ |
| 10- | Δᓄᓵᓂᒃ ᐱᓴᓱᒪᖏᖃᓂᖅᓴᓂᓄᓚᓄᑦ |
| 11- | ᓂᖏᑐᐃᓵᓴᒥᒃ ᐱᐅᑦᖅᑎᑦᑐᖅᒪ |
| 12- | ᓂᐅᐱᖏᓂᐊᐱᒪᒥᑦ/ᓂᐅᐱᖏᐱᒥᑦ ᓂᐅᐱᐊJᓱᒪᓱᐃᑦ ᓂᖏᑭᑦ ᑎᒥJᑦ ᐱᐅᖅᖅᒥᓂᖏᖅᓴᐅᒪᑦ ᓂᖏᑦᓱᐊJᖅᖅᒥᓂᖏᓱᐅᑎᓂᓗ ᓂᖏᑐᐃᓵᓴᒥᓂᑦ |
| 13- | ᐊᓱᖅᒪ (ᓴᓗᓂᖏJ) _____ |

**17. a) Do you use country food for its medicinal properties (as cure or treatment)?**

in17a

1- Yes
2- No → Go to Section 6, Q. 18
8- DNK → Go to Section 6, Q. 18
9- NR/R → Go to Section 6, Q. 18

**b) If yes, can you tell me what these country foods are and what you use them for?**

- Country food: _____ in17b-country1

Medicinal use: _____ in17b-medicinal1

- Country food: _____ in17b-country2

Medicinal use: _____ in17b-medicinal2

- Country food: _____ in17b-country3

Medicinal use: _____ in17b-medicinal3

**17.** Δ) ᓂᕐᐹᑐᐃᓐᓇᑐᓄᒃᔪᐃᒃ ᖃᓄᐃᖅᑕᑎᒍᓕᕆᔨᖅᑕᓂᒃ (ᐊᕐᕕᐹᔪᑎᖅᓯᓂᒃ ᐊᓂᓂᐊᓕᕐᓄᑎᒥᓂᐊᖅᓴᕐᔪ)?

1- Yes
2- No → Go to Section 6, Q. 18
8- DNK → Go to Section 6, Q. 18
9- NR/R → Go to Section 6, Q. 18

∧) ᐊᖅᑎᖅᑯᑦ, ᐊᓂᓂᐊᓕᕐᓄᑎᒥᓂᕐᔪᔪ?

- ᓂᕐᐹᑐᐃᓐᓇᑐᖅ: _____

ᖃᓄᐃᖅᑕᑎᒍᓕᕆᔨᖅᑕᓂᒃᓯᒪᖅ: _____

- ᓂᕐᐹᑐᐃᓐᓇᑐᖅ: _____

ᖃᓄᐃᖅᑕᑎᒍᓕᕆᔨᖅᑕᓂᒃᓯᒪᖅ: _____

- ᓂᕐᐹᑐᐃᓐᓇᑐᖅ: _____

ᖃᓄᐃᖅᑕᑎᒍᓕᕆᔨᖅᑕᓂᒃᓯᒪᖅ: _____

## SECTION 6 - PHYSICAL ACTIVITY

## ᐊᐱᑦᑐᓂᒪᓂᖅ 6 - ᐃᖅᓀᓴᖅ

**This section is about physical activity. The questions concern your free time (physical activity for leisure), and job or main occupation (physical activity at work).**

ᑕᒪᒃᓗ ᐃᖅᓀᓴᖅᔨᓕᕆᔨᒃ. ᐊᐱᖅᓯᐅᑦ ᐊᖅᑕᓂᑎᓯᖅᓯᒪᔪᒃᑐᑦ (ᐃᖅᓀᓴᖅᓯᐅᑦᓗ ᐊᐅᓪᓚᑎᑦᓯᔭᓗ). ᐃᓯᒣᒃᓗᕈᐅᑎᑦᓯᔭᒍ (ᐃᖅᓀᓴᖅᔪᔪᔭᐊᓂᖅ). ᐱᓗᓯᐊᖅᓂᓕᐱᒃᔨᓂᑦ (ᐃᖅᓀᓴᖅᓗᑐᑎᒃ ᐱᓗᓯᐊᓴᖅᑎᑦ).

**Part 1: Physical Activity for LEISURE**

ᐊᐱᑦᑐᓂᒪᓂᖅᓴᒃ 1: ᐃᖅᓀᓴᖅᑎᑦᓗ ᐊᐅᓪᓚᑎᑦᓯᔭᒍ

**18. During your free time, do you take part in physical activities such as a sport, an outdoor pastime, fitness training, dancing, or walking?**

**18.** ᐃᓯᒣᒃᓗᕈᑦᑐᑐᐊᖅᐸᑦ, ᐃᖅᓀᓴᖅᓯᒍᐊᖅ ᐱᔪᔪᒍᐊᑎᓂᑦ, ᓯᓪᑭᔪᔪᒍᐊᓯᑎᑦ, ᓂᐅᑭᓴᓯᑎᑦ, ᒥᓂᓯᑎᑦ, ᐱᓯᑦᓯᑎᑦᔨᓂᑦ ?

| | | | ᓴᓴ (ᐱᓗᓯᐊᖅᓯᓯᑦᑕᒪᑦ ᐊᑕᐅᓯᐊᖅᓯᓴᒃ ᐊᒥᓯᐱᑦᓴᖅᓴᒃᑕᓂᑦ) Yes (about once a week or more) | ᐃᓕᓴᒪᒍᑦ (ᐱᓗᓯᐊᖅᓯᓯᑦᑕᒪᑦ ᐊᑕᐅᓯᐊᖅᓯᓴᒃ ᐃᑭᓚᓂᓚᑦᔨᓂᑦ) Occasionally (less than once a week) | ᐊᐅᒃ (ᓄᑭᔪᔪᑎᑐᓴᒃ ᓕᐅᖅᓯᒪᔪᔪᑎᑐᓴᒃᑕᓂᑦ No (rarely or never) | NR/R |
|---|---|---|---|---|---|---|
| in18a | a) In spring | ᐃ) ᐅᐱᖅᓴᒪᓴᒥ | 1 | 2 | 3 | 9 |
| in18b | b) In summer | ᐱ) ᐊᐅᓗᒥ | 1 | 2 | 3 | 9 |
| in18c | c) In fall | ᑎ) ᐅᑭᐊᖅᓴᒥ | 1 | 2 | 3 | 9 |
| in18d | d) In winter | ᑭ) ᐅᑭᐅᒥ | 1 | 2 | 3 | 9 |

If YES (1) for one or more seasons of Q. 18, go to Q. 19.
If NOT, go to Q. 22.

**19. In general, how many days a week do you engage in physical activity during your free time?**

**19.** ᐃᔨᒃᐧᐃᒍᑦ, ᖃᐅᔨᓂᒃ ᐅᒃᓄᓂᒃ ᐱᓗᓯᐊᑭᓯᓯᑦᑕᒪᑦ ᐃᖅᓀᓴᖅᓯᒍᐊᖅᐸᑦ ᐃᓯᒣᒃᓗᕈᑦᑐᑐᐊᖅᐸᑦ ?

in19 ____ day(s) a week

____ ᐅᒃᓄᓂᒃ ᐱᓗᓯᐊᑭᓯᓯᑦᑕᒪᑦ

**20. In general, during a typical day, how much time do you actually spend on this type of activity?**

**20.** ᐃᔨᒃᐧᐃᒍᑦ, ᐅᒃᓄᒥ ᐊᑕᐅᓯᖅᓴᒥ, ᖃᐅᓂᒃᓄᐊᑎᑎᓂᒃ ᑕᒪᔨᒥᓴᒃ ᐃᖅᓀᓴᖅᑎᑦᓂᖃᖅᓯᒍᐊᖅᐸᑦ ?

____ hour(s) ____ minutes

in20-hour in20-minutes

____ ᖁᑦᓂᒍᓯᖅᓂᑦ ____ ᒥᓂᑦᓂᒃ

**21. In general, when you engage in physical activity during your free time, at what intensity do you work?**

in21

1- Very low? (Breathing and heartbeat change little)
2- Low? (Breathing and heartbeat increase slightly)
3- Moderate? (Breathing and heartbeat are fairly fast)
4- High? (Breathing and heartbeat are very fast)

**Part 2: Physical Activity at WORK**

**22. Thinking back over the past 12 months, which of the following best describes your usual daily activities or work habits?**

in22

1- Usually sit during the day and don't walk around very much
2- Stand or walk quite a lot during the day but don't have to carry or lift things very often
3- Usually lift or carry light loads, or have to climb stairs or hills often
4- Do heavy work or carry very heavy loads
8- DNK
9- NR/R

**21.** ᐃᓗᐊᓘᑦ, ᐃᖅᑲᓕᑐᑎᖅᑕᐃᓐᓇᖅ ᐃᓕᒥᐊᖅᑭᑦᑕᓕᓕᒫᑦ, ᖃᓄᐅᑦᑐᑦᑎᒍᑦ ᐃᖅᑲᓕᓴᕐᔪᐊᓘᑦ ?

1- ᐱᒪᓕᕐᒪᓕᖅᓴᖅ ? (ᐊᓂᖅᑎᓇᓂᑦ ᐅᑭᒪᑎᖅᐱᓗ ᑲᑦᔨᑦᓂᖅᒪ ᐊᓕᓴᕐᔪᐊᖅᑎᓗᒍᑦ)
2- ᐱᒪᓕᕐᒪᓕᖅᓗᐊᖅ ? (ᐊᓂᖅᑎᓇᓂᑦ ᐅᑭᒪᑎᖅᐱᓗ ᑲᑦᔨᑦᓂᖅᒪ ᓕᑲᓕᐅᕆᐊᖅᑎᓗᒍᑦ)
3- ᐱᒪᓕᕐᒪᓕᖅᒪᔪᖅᑎᑦ ? (ᐊᓂᖅᑎᓇᓂᑦ ᐅᑭᒪᑎᖅᐱᓗ ᑲᑦᔨᑦᓂᖅᒪ ᓕᑲᓕᒪᔪᐱᖅᑎᓗᒍᑦ)
4- ᐱᒪᓕᕐᒪᓕᖅᑐᑎᖅ ? (ᐊᓂᖅᑎᓇᓂᑦ ᐅᑭᒪᑎᖅᐱᓗ ᑲᑦᔨᑦᓂᖅᒪ ᓕᑲᑦᔭᒪᓕᕐᑐᑎᓗᒍᑦ)

ᐊᐱᑦᑐᓕᓂᒪ 2: ᐃᖅᑲᓕᖅᓴᔪᑎᖅ ᐱᓇᓕᐊᒪᖅᑲᓕᐱᐃᑦ

**22.** ᐃᓕᒪᒪᓗᐊᖅᓗᑎᑦ ᑕᖅᖁᓂ 12-ᓂ ᖃᓄᖅᑐᑐᓂ, ᓇᑦᓕᐊ ᐃᓕᓴᓂᖅ ᓇᓕᐅᑦᓕᓂᖅᓴᖅ ᐅᑦᓗᑕᒃ ᐱᐅᓕᓇᓕᖅᓱᐃᑦ ᐅᖅᓴᓗᓴᓂᖅ ᐱᓇᓕᖅᓂᐊᕐᓗᒍ ᐊᑐᑎᓕᖅᓱᐃᑦ?

1- ᐃᑦᓕᓕᓂᒃᑕᐃᓐᓇᓕᓕᒫᒪᓕᕐᓗᒍ ᐱᓕᕐᖃᑦᓗᒍ
2- ᓂᐊᖅᑕᒃᑕᓗᒍᒪᔪᖅᓗᒍ ᐱᓕᕐᖃᑦᓕᕐᒪᓗᓇᓴᖅᓂ ᑭᓕᐊᓂ ᐊᑦᖃᓕᐊᖅᑎᖃᒪᔪᖅᓗᒍ ᑭᐅᐯᓗᑭᖅᑎᖃᒪᔪᖅᓗᒍ ᓕᓇᑐᑦᓗᒍᒪᔪᖅᓗᒍ.
3- ᑭᐅᐯᐊᖅᑎᖃᒪᔪᖅᓗᒍ ᐊᑦᖃᓕᐊᖅᒪᓗᖅᑎᖃᒪᔪᖅᓗᒍᓇᓴᖅᓂ ᐅᖅᓴᐊᑦᑐᖅᑦᑐᓂᖅ, ᒪᔪᕐᓇᐊᖅᑎᖃᒪᔪᖅᓗᒍ ᒪᔪᕐᐅᑎᓂᖅ ᖃᓄᖅᑎᖃᒪᔪᖅᓗᒍᓇᓴᖅᓂ
4- ᐅᖅᓴᐊᑦᑐᓂᖅ ᐱᓇᓕᒪᖅᑎᒍᒪᒍ ᐅᖅᓴᐊᑦᑐᐊᓗᓇᓴᖅᓂ ᑭᐅᐯᐊᖅᑎᖃᒪᔪᖅᓗᒍ.
8- DNK
9- NR/R

## SECTION 7 - HUNTING AND FISHING

## ᐊᐱᑦᑐᓱᒪᓂᖅ 7 - ᒪᖅᑫᓂᖅ ᐃᖅᑲᓪᓂᐊᓂᖅᓗ/ᐃᖅᑲᓇᓂᐊᖅᓗ

**23. In the past 12 months, on average, how often did you go hunting?**

**23.** ᑕᕝᕕᒃ 12ᓂ ᐊᑐᑎᓪᓗᒍᑦ, ᒥᑦᓴᐅᔨᓴᓂᑦ, ᖃᓄᖅ ᐊᐅᓚᑎᒋᔭᖅ ᒪᖅᑫᖅᑕᑭᓱᐃᓐᑦ?

| | | | ᓯᐅᓴᓱᖅᓯᒪᔪᖅ **Never** | ᐊᑕᐅᓴᐱᓐ-ᓇᖅᓚ ᑕᕝᕕᒃ **Less than once a month** | ᐊᑕᐅᓴᐱ-ᐃᑦᓴᖅᓚ ᐱᖅᓴᐱᐃᑦᓴᖅ ᖅᓚ ᑕᕝᕕᒃ **1-3 days/ month** | ᐊᑕᐅᓴᐱᐃᑦᓴᖅᓚ ᐱᖅᓴᐱᐃᑦᓴᖅᓚᓗ ᐅᓇᓴᐊᑭᓴᑦ **1-3 days/ week** | ᓴᑕᒪᐃᑦᓴᖅᓚ ᐅᖅᓱᒋᓐᓂᓚᐅᑦ ᐱᓇᓴᐊ-ᑭᓴᑦ **4 or more days/week** | ᖃᐅᔨᒪᓂᖅ ᓚᖅᑕᐅᑦ **DNK** | ᑭᐅᖅᓯᒪᔪᖅ-ᑐᖅ **NR/R** |
|---|---|---|---|---|---|---|---|---|---|
| in23a | a) Spring | ᐃ) ᐅᐱᖅᓚᓴᖅᑎᑦ | 1 | 2 | 3 | 4 | 5 | 8 | 9 |
| in23b | b) Summer | ᐱ) ᐊᐅᔨᑎᑦ | 1 | 2 | 3 | 4 | 5 | 8 | 9 |
| in23c | c) Fall | ᑎ) ᐅᑭᐊᑦᓴᑎᑦ | 1 | 2 | 3 | 4 | 5 | 8 | 9 |
| in23d | d) Winter | ᑭ) ᐅᑭᐅᑦᑎᑦ | 1 | 2 | 3 | 4 | 5 | 8 | 9 |

**24. Do you usually share your catch with your family or friends?**

**24.** ᐅᒪᔪᖅᑕᐃᓂᖅᓂᐊᓕᐊᑦ ᕿᔨᑎᖅᑲᓱᒍᐊᑦ ᐃᓕᓴᕆᓕᐊᑦ ᐃᓕᓴᔨᓄᐊᓕᐊᑦᓄᓂᑦ?

in24

1- I do not go hunting → Go to Q. 27
2- Often
3- Sometimes
4- Never
9- NR/R

1- ᒪᖅᑫᓱᒍᓴᓴᑎᑐᖅ → Go to Q. 27
2- ᓄᐅᒥᔨᑐᖅ
3- ᐃᓕᓴᖅᓯᓂ
4- ᓄᐅᖅᓱᒪᔪᓴᓴᑎᑐᖅ
9- NR/R

**25. a) In the past 12 months, have you rejected catches or any parts of them because you were worried about the safety of eating them?**

**25.** ᐃ) ᑕᕝᕕᒃ 12ᓂ ᐊᑐᑎᓪᓗᒍᑦ, ᐅᒪᔪᖅᑕᐅᓂᐊᓕᐊᑦ ᐱᓕᒻᒥᓱᒪᓕᐊᑦ ᐃᓕᓴᖅᓯᓂᓗᓂᐅᓂᐊᓕᐊᑦ ᓂᕆᔨᓂᐊᖅᓴᔨᓱᑎᑦ ᓂᓗᓀᑭᕈᓕᐊᑦ?

in25a

1- Yes
2- No
8- DNK
9- NR/R

→ Go to Q. 26a

1- Yes
2- No
8- DNK
9- NR/R

→ Go to Q. 26a

**b) What food (or part of the animal)?** ᐱ) ᖃᓄᐃᑦᑐᑦ ᓂᕆᑎᓪ (ᓄᓇᕗᑦᓂᓕᕆᓂᖅ ᐅᒪᔨᑦ) ᐱᔪᒻᓂᕆᑭᑦ?

**Do not read list, circle all that apply**

| | | ᐅᑦᓄᖅ **Fat** | ᓂᕆᖅ **Meat** | ᓄᓇᕗᑦᑎᓪᓗᒍ ᐅᑦᔨᑎᑎᓕᒍ ᑎᖅᔪᖅᓂᒃ, ᐅᖃᓕᑎᖅᓯᒪᓂᖅ ᑕᑯᔭᑦᓂᖅ **internal organs such as liver, heart, kidneys** | ᐊᓂᖅᓂᖅ (ᓇᓗᓀᑦᓗᒍ) **Other (specify)** |
|---|---|---|---|---|---|
| a) Seal | a) ᓇᑦᓂᐱᓂᐅᑦ | 1 in25ba-1 | 2 in25ba-2 | 3 in25ba-3 | in25ba-other _____ |
| b) Beluga | b) ᖃᓪᓗᓇᐱᓂᐅᑦ | 1 in25bb-1 | 2 in25bb-2 | 3 in25bb-3 | in25bb-other _____ |
| c) Walrus | c) ᐁᐱᐱᓂᐅᑦ | 1 in25bc-1 | 2 in25bc-2 | 3 in25bc-3 | in25bc-other _____ |
| d) Caribou | d) ᑐᑦᑐᐱᓂᐅᑦ | 1 in25bd-1 | 2 in25bd-2 | 3 in25bd-3 | in25bd-other _____ |
| e) Goose | e) ᓂᑦᓚᐱᓂᐅᑦ | 1 in25be-1 | 2 in25be-2 | 3 in25be-3 | in25be-other _____ |
| f) Fish | f) ᐃᖏᓪᓗᐱᓂᐅᑦ | | 2 in25bf-2 | 3 in25bf-3 | in25bf-other _____ |
| g) Other (specify): in25bg-animal | g) ᐊᓯᐊᓂᖅ (ᓇᓗᓀᑦᓗᒍ): _____ | 1 in25bg-1 | 2 in25bg-2 | 3 in25bg-3 | _____ in25bg-other |

**c) Why were you concerned?** ᑎ) ᓯᒧᑦ ᐃᓯᒪᓕᓚᑦᑭᓂᑦᑭᑦ?

**Do not read list, circle all that apply.**
**Answer only for animals that were rejected.**

| | | ᓂᕆᖅᓚᒃ ᑕᑯᑐᖅᓚᓂᑦ **Color of meat** | ᓂᕆᖅᓚ ᑐᑦᔪᒍ **Texture of meat** | ᑎᐸᖅᓚᓂᑦ **Smell** | ᖃᐱᕐᓂᑦ **Parasites** | ᓯᑯᓚᑦᔨᓂᑦ **Contaminants** | ᐅᒪᔨᑦ ᐱᐅᓯᖅᓚᓂᑦ ᖃᐅᔨᒪᓂᖅᓂᒃ **Animal behavior was strange** | ᖃᓄᖅᓚᓂᖅ (ᓇᓗᓀᑦᓗᒍ) **Other (please specify)** |
|---|---|---|---|---|---|---|---|---|
| a) Seal | a) ᓇᑦᓂᐱᓂᐅᑦ | 1 in25ca-1 | 2 in25ca-2 | 3 in25ca-3 | 4 in25ca-4 | 5 in25ca-5 | 6 in25ca-6 | in25ca-other _____ |
| b) Beluga | b) ᖃᓪᓗᓇᐱᓂᐅᑦ | 1 in25cb-1 | 2 in25cb-2 | 3 in25cb-3 | 4 in25cb-4 | 5 in25cb-5 | 6 in25cb-6 | in25cb-other _____ |
| c) Walrus | c) ᐁᐱᐱᓂᐅᑦ | 1 in25cc-1 | 2 in25cc-2 | 3 in25cc-3 | 4 in25cc-4 | 5 in25cc-5 | 6 in25cc-6 | in25cc-other _____ |
| d) Caribou | d) ᑐᑦᑐᐱᓂᐅᑦ | 1 in25cd-1 | 2 in25cd-2 | 3 in25cd-3 | 4 in25cd-4 | 5 in25cd-5 | 6 in25cd-6 | in25cd-other _____ |
| e) Goose | e) ᓂᑦᓚᐱᓂᐅᑦ | 1 in25ce-1 | 2 in25ce-2 | 3 in25ce-3 | 4 in25ce-4 | 5 in25ce-5 | 6 in25ce-6 | in25ce-other _____ |
| f) Fish | f) ᐃᖏᓪᓗᐱᓂᐅᑦ | 1 in25cf-1 | 2 in25cf-2 | 3 in25cf-3 | 4 in25cf-4 | 5 in25cf-5 | 6 | in25cf-other _____ |
| g) Other (specify): in25cg-animal | g) ᐊᓯᐊᓂᖅ (ᓇᓗᓀᑦᓗᒍ): _____ | 1 in25cg-1 | 2 in25cg-2 | 3 in25cg-3 | 4 in25cg-4 | 5 in25cg-5 | 6 in25cg-6 | in25cg-other _____ |

**26. a) Compared to the same season, since 2000, have any species you hunt for food been harder to catch/hunt/find?**

**26. Δ) ᐃᓕᐱᓕᓂᐱᐱᓕ ᓂᓪᑕᐅᓕ ᐊᓂᓕᕆᑕᓕᓂᖏᓐ ᑌᒣᓪᓗᐊᓂᐊᓚᖅᓪᓗᒍ, ᐅᒪᓴᐃᓕ ᓇᓪᓕᑐᐃᓚᖅᓇᖏᓕ ᓂᓯᑭᓕᓂᓴᐅᓯᑎᓕ ᐱᔭᓇᐊᑐᓂᓵᓕᖏᓐᓄᑦᑕᓚᐅᖏᓐᓄᑦ ᐱᒪᓂᐊᓇᐊᒥᐅ/ᐅᒪᓴᓵᓂᐊᓇᐊᒥᐅ/ᑕᑯᒥᐊᒥᐅ?**

in26a

1- Yes
2- No
8- DNK
9- NR/R

→ Go to Q. 27

1- Yes
2- No
8- DNK
9- NR/R

→ Go to Q. 27

**b) If yes, which one(s)?**

**ᐱ) ᐊᖏᑎᓯᑦ, ᓇᓪᑕᐊ**

**c) Do you think this is because of any of the following reasons?**

**ᑎ) ᐱᓪᓯᑎᖏᑐᑐᓇᓪᓂᓵᓚᓪᓇᓪᑕᖏᓐᓂᐅ ᐊᑕᓂ ᐊᓪᓚᓂᓵᓯᓂᐅ?**

| | Circle all the numbers that apply | | Read the four answer choices and write the main reason in the box for each animal mentioned. |
|---|---|---|---|
| in26b-1 | 1- ᑐᓪᑐᐃᓪ Caribou | ☐ in26c-1 | 1- ᓄᓪᓂᓚᑕᓪᑐᓪ ᐁᓂᒪᐱᑎᓂᐅᓂᖏᓪᒥᓂ They have moved away from where they usually were |
| in26b-2 | 2- ᓇᓪᓂᓱᓪ Seal | ☐ in26c-2 | 2- ᐊᒥᓂᓗᐊᖏᑐᐃᐅᖅ ᐱᓴᐅᖏᑲᑕᓂᖏᓐᓂᓵᓪ ᐃᑭᓂᖏᐅᑕᖏᑐᓪ They have been overhunted so there are not as many around |
| in26b-3 | 3- ᖏᑭᑕᓗᒍᓪ Beluga | ☐ in26c-3 | 3- ᐃᑭᑕᓵᓪᑕᐊᑐᐃᓇᑕᖏᑐᓪ (ᖏᐅᐅᓚᓴᐅᒪᑎᐅ ᓂᒍᒪᓴᓱᓪ) There are fewer and fewer of them today (reason not known) |
| in26b-4 | 4- ᐁᐱᖅ Walrus | ☐ in26c-4 | 4- ᐊᓵᓇᓂᖏᓴᐅᑕᖏᑐᓪ ᐅᒪᓴᓚᖅᓇᐊᒥᐅ ᓄᓇᒪᓪ, ᐊᐳᑎᒪᓪ, ᓂᑯᒪᓪ, ᓂᓪᑕᐅᓪᓗ ᐱᐅᓂᖏᓴᓗᓄᓪ They are harder to get to because of land/snow/ice/weather conditions |
| in26b-5 | 5- ᓂᖏᓪᑦ Goose | ☐ in26c-5 | 5- ᐊᓂᐊᓂᐅ (ᓇᓗᓄᖏᓗᒍ) Other (specify) in26c-5s _____ |
| in26b-6 | 6- ᐊᓂᐊᓂᐅ (ᓇᓗᓄᖏᓗᒍ) Other (specify) ___ in26b-6s _____ | ☐ in26c-6 | |
| in26b-8 | 8- DNK | | 8- DNK |
| in26b-9 | 9- NR/R | | |

**27. In the past 12 months, how many of the following animals did you prepare such as skinning, washing, cutting, etc.?**

**27.** ᑕᖅᑭᓂ 12ᓂ ᐊᑐᑎᓪᓗᖅᑐᓂ, ᖃᒃᓯᓂᒃ ᐅᒪᔨᖅᓂᒃ ᒪᒪᖃᒃᑕᓪᓗᖅᑭᑦ (ᐃᓪᓗᐅᑎᑦᓯᒍᓐᓇᒥᔨᖅ ᐊᑦᑐᓂᒃᑯᑦ, ᐊᒡᒥᓇᓂᒃᑯᑦ, ᐃᖅᒥᓯᒍ, ᐱᓪᑦᓯᒍ, ᐊᓯᖅᑎᑦᓴ, ᐊᑐᑎᓄᑕᐅᓯᖅᑎᑦ ᒪᓪᑦᓯᒍᑦ)?

| | | | None | 1 or 2 | 3 to 9 | 10 to 29 | More than 30 | DNK | NR/R |
|---|---|---|---|---|---|---|---|---|---|
| in27a | a) Birds | a) ᑎᒥᒥᐊᓂᒃ | 1 | 2 | 3 | 4 | 5 | 8 | 9 |
| in27b | b) Land mammals (such as fox, caribou, etc.) | b) ᐱᓯᑦᑎᑦ (ᐅᑦᑐᑎᒥᓴᒍ ᑎᓇᒃᓂᓂᐊᑦ, ᑐᑦᑐᐃᑦ) | 1 | 2 | 3 | 4 | 5 | 8 | 9 |
| in27c | c) Sea mammals (such as seal, beluga, etc.) | c) ᐅᒪᔨᐃᑦ ᑕᓇᐅᖅᑎᐅᑌᑦ (ᐅᑦᑐᑎᒥᓴᒍ, ᓇᑦᓯᓂᒃ, ᖃᓪᓗᓂᒃᓂᒃ ᐊᓯᖅᑎᑦᓴ) | 1 | 2 | 3 | 4 | 5 | 8 | 9 |

**28. In the past 12 months, on average, how often did you go fishing?**

**28.** ᑕᖅᑭᓂ 12ᓂ, ᒥᑦᓴᐅᓴᖅᓯᒍ, ᖃᒃᖏᓴ ᐊᑯᓄᑎᑎᓯᒥᐸᒃ ᐃᒃᑲᔪᓇᐊᖅᓂᖅᑭᑦ?

| | | | Never | Less than once a month | 1-3 days/ month | 1-3 days/ week | 4 or more days/week | DNK | NR/R |
|---|---|---|---|---|---|---|---|---|---|
| in28a | a) Spring | ᐃ)ᐅᐱᖅᓴᓂᖅᑎᑦ | 1 | 2 | 3 | 4 | 5 | 8 | 9 |
| in28b | b) Summer | ᐱ) ᐊᐅᓂᖅᒥ/ ᐅᐱᖅᓯᒪᒥ | 1 | 2 | 3 | 4 | 5 | 8 | 9 |
| in28c | c) Fall | ᑎ) ᐅᑭᐊᓂᖅᑎᑦ | 1 | 2 | 3 | 4 | 5 | 8 | 9 |
| in28d | d) Winter | ᑭ) ᐅᑭᐅᓂᒥ | 1 | 2 | 3 | 4 | 5 | 8 | 9 |

**29. In the past 12 months, during berry picking season, how many days per week did you go berry picking?**

**29.** ᑕᖅᑭᓂ 12ᓂ, ᓄᓇᕗᓪᓕᐅᑎᒃᓪᓗᒍ, ᖃᒃᓯᓂᐊᓂᔪᑎᑦ ᐅᒃᓪᓗᓂ ᐱᓪᓕᐊᑭᓂᖅᑎᑦ ᓄᓇᕗᑦᑐᐊᓘᑦᑭᑦ?

in29

1- Never
2- Less than once a month
3- 1-3 days/month
4- 1-3-days/week
5- 4 or more days/week
8- DNK
9- NR/R

1- ᓯᐅᓂᒪᓂᖅᑎᑦ
2- ᐊᑕᐅᓂᐊᑦᑲᓪᓕᖅᒪ ᑕᖅᑭᒥ
3- ᐊᑕᐅᓂᐊᑦᓂᖅᒪ ᐱᖅᒪᓂᐊᑦᓂᖅᒪᑦᓴᒃᑯᑦ ᑕᖅᑭᒥ
4- ᐊᑕᐅᓂᐊᑦᓂᖅᒪ ᐱᖅᒪᓂᐊᑦᓂᖅᒪᓕᕆᓂᑦ ᐱᓪᓕᐊᑭᓂᖅᑎᑦ

5- ᓂᑕᒪᐊᑦᓂᖅᒪ ᐅᖅᓯᒃᓴᓕᕆᓂᑦ ᐱᓪᓕᐊᑭ-ᓂᓂᖅᑎᑦ
8- DNK
9- NR/R

## SECTION 8 – GAMBLING

**First, we'd like to ask some questions about activities you may have participated in the past twelve months. People bet money and gamble on many different things including buying lottery tickets, playing bingo, or card games with their friends. I am going to list some activities that you might have bet money on.**

## ᐊᐱᑦᑐᓱᒪᓂᖅ 8 - ᓴᓐᐯᓂᖅ/ᑭᓇᐅᔭᕐᓂᖅ

ᓱᑲᑦᓪᒥ, ᐊᐱᕐᓯᑎᕐᖃᑭᒍᒍᒍᑦ ᓱᕐᖃᑦᓱᒪᑦᓴᓂᐅ ᐃᓕᐅᐱᒥᔪᓇᓂᕐᓂᐱᑦ ᑕᕐᑭᓂᐅ 12ᓂ ᐊᑐᑎᓕᐅᕐᑦᑐᓂ. ᑭᓇᑐᐃᓇᓇᑦ ᓴᓐᐯᓯᔪᒪᒪᑕ/ᑭᓇᐅᔭᓯᒍᒍᒪᒪᑦ ᐊᒥᓱᐊᔭᓇᓂᐅ ᐃᑦᕿᕐᕋᑐᓂ ᐃᓕᐅᑎᑦᓱᒥᑦ ᓇᓕᐅᑦᓴᒪᓂᐅ ᓂᐅᐱᕐᓂᐅ, ᐱᕐᔪᕐᓂᐅ ᓴᑦᑕᓂᐅᔪᓇᑦᓯᕐᖃᕐᓂᐅᑦ ᓱᓕᕐᓂᐅᔪᓇᑦᓯᕐᖃᕐᓂᐅᑦ ᐃᓕᓇᒥᐅ ᐃᓕᓴᕐᓂᐅ. ᓱᕐᖃᑦᓱᒪᑦᓴᓂᐅ ᐊᑦᓓᓱᒪᓕᕆᔨᒪᔨᒪ ᓴᓐᐯᒍᑎᑎᕐᓂᐱᑎᓕᕐᖃᑦᓴᓂᑦ.

**If the respondent asks for clarifications, specify that we are trying to estimate how much money comes out of his/her pocket – not including winnings put back in the game.**

**30.** ᐃ. ᑕᕐᑭᓂ 12ᓂ ᐊᑐᑎᓕᐅᕐᑦᑐᓂ, ᖃᓄᐃᑎᒃ ᐊᓂᔭᑎᑎᓪᒃ ᓂᐅᐱᖃᑦᑕᓕᐅᕐᑭᑦ ᓇᓕᐅᑦᓯᑭᑎᓂᒃ ᐅᑦᑐᑎᑎᓕᓪᒃ ᒪᑦᐱᑐᑐᑦ, ᖃᑦᓱᖃᖅᑎᑦ ᐊᓱᔭᑎᑦᓂᓕᓵᓂᑦ?

**30. a) In the past 12 months, how often did you buy instant win or scratch tickets like « 7 chanceux », « Mots cachés », « Cartes frimées », Nevada strips, or others?**

in30a

| | |
|---|---|
| 1- | Daily |
| 2- | 2 to 6 times a week |
| 3- | About once a week |
| 4- | 2-3 times a month |
| 5- | About once a month |
| 6- | 6 to 11 times a year |
| 7- | 1-5 times a year |
| 8- | Never |
| 98- | DNK |
| 99- | NR/R |

| | |
|---|---|
| 1- | ᐅᑦᓗᑕᒪᑦ |
| 2- | 2-ᒥᑦ 6-ᓄᑦ ᐱᓇᐊᓱᓕᕐᓂᒥ |
| 3- | ᐊᑕᐅᓕᐱᑦᓴᓕᖅᑐ ᐱᓇᓕᐊᓕᕐᓂᒥ |
| 4- | ᒪᑉᑭᐱᑦᓴᓕᖅᑐᓗᓵᓂᑦ ᑕᕐᑭᒥ |
| 5- | ᐊᑕᐅᓕᐱᑦᓴᓕᖅᑐ ᑕᕐᑭᒥ |
| 6- | 6-ᓂᑦ 11-ᓄᑦ ᐊᑦᕿᔪᑦᒥ |
| 7- | 1-ᒥᑦ 5-ᔪᑦ ᐊᑦᕿᔪᑦᒥ |
| 8- | ᓯᐅᑦᓴᒪᔭᕐᒥᔭᖅᑐ |
| 98- | ᖃᐅᑭᒪᔭᕐᒥᔭᖅᑐ |
| 99- | ᐅᑦᖃᑭᒪᔭᕐᒥᔭᖅᑐ |

**32.** **a)** ᑕᕐᑭᓯᒪᒥ, ᖃᑦᓴᓂᐅ ᑭᓇᐅᔭᑦᓂᐅ ᐊᑐᔪᔪᐱᑦ ᓴᓐᐯᔪᑎᑎᕐᓂᐱᑦ ᐃᓚᖃᐅᑎᑦᓂᓕᕐᓂᐱᑦᓂᐅ ᐅᕐᑕᓗᓵᓂᑦ ᐊᒥᓱᓕᕆᔨᖅ?

**32.** **a) In a month, how much money do you generally spend on instant win or scratch tickets?**

| ᑭᓇᐅᔭᑦ ᓴᓐᑕᐅᑕᐅᔪᑦ Amount of money | ᐃᒃᐅᐅᑦᓵᑦ Unit |
|---|---|
| in32a-amount | 1- ᐅᑦᓗᖅ<br>2- ᐱᓇᓕᐊᓕᕐᓂᖅ<br>3- ᑕᕐᑭᓂᖅ<br>4- ᐊᑦᕿᔪ<br><br>1- Day<br>2- Week<br>3- Month<br>4- Year<br>in32a-unit |

**30.** ᐱ. ᑕᖅᑭᓂ 12ᓂ ᐊᔪᑎᓕᐅᕐᔪᓂ, ᖁᖏᒃ ᐊᐅᓪᓗᑎᒋᔭᕐᒪᑦ ᑭᓇᐅᔭᖅᑕᓕᐅᕐᓂᑦ ᓇᓕᐅᑦᓴᓂᑎᑦ ᐱᖓᔪᖅᓂᑎᑦᓄᓐᓂᒃ?

**30. b) In the past 12 months, how often did you bet or spend money on Bingo?**

in30b

1- Daily
2- 2 to 6 times a week
3- About once a week
4- 2-3 times a month
5- About once a month
6- 6 to 11 times a year
7- 1-5 times a year
8- Never
98- DNK
99- NR/R

1- ᐅᓪᓄᑕᒻ
2- ᒉ-ᒥᑦ 6-ᒍᑦ ᐱᓇᐊᓯᕐᓂᒥᒃ
3- ᐊᑕᐅᓯᐊᑦᓯᖏᓐ ᐱᓇᓯᐊᓯᕐᓂᒥᒃ
4- ᒪᑭᑭᐊᑦᓯᖏᓐ ᐱᖏᓯᐊᑦᓯᖏᓐᓄᓐᓂᑦ ᑕᖅᑭᒥ
5- ᐊᑕᐅᓯᐊᑦᓯᖏᓐ ᑕᖅᑭᒥ
6- 6-ᓂᑦ 11-ᓄᑦ ᐊᑦᕿᔪᑦᒥ
7- 1-ᒥᑦ 5-ᒍᑦ ᐊᑦᕿᔪᑦᒥ
8- ᓯᐅᑦᓯᒪᖏᖅᑕᖏᓐ
98- ᖁᐅᕆᒪᖏᖅᑕᖏᓐ
99- ᐅᖁᕈᒪᖏᖅᑕᖏᓐ

**31. b)** ᑕᖅᑭᓂ 12ᓂᓗ, ᖁᖏᒃᓄᓐᓗ ᐊᐅᓪᓗᑎᒥ ᒥᓂᓯᓂᑎᔪᑦ ᐃᑲᐅᑦᓂᑎᔪᓄᓐᓂᑦ ᓴᓇᕐᔪᑎᐊᑦ?

**31. b) In the past 12 months, how many minutes or hours did you normally spend each time you played?**

| ᐅᓄᑦᓂᖅᒥᑦ Quantity | ᐃᑲᐅᑦᓂᑦ Unit |
|---|---|
| in31b-quantity | 1- ᒥᓂᓯᓂᒃ<br>2- ᐃᑲᐅᑦᓂᓂ<br><br>1. Minutes<br>2. Hours<br><br>in31b-unit |

**32.** ᑕᖅᑭᓕᒫᒥ, ᖁᖏᒃᓄᓐᓂᒃ ᐱᖓᔪᖅᓂᒃ ᐊᔪᕐᓇᐊᕐᓇᖅᑐᑦ ᐱᓇᓯᐊᑦᓯᖏᓐ?

**32. b) In a month, how much money did you generally spend on Bingo?**

| ᐱᖓᔪᖅᑐᑦ ᓴᓇᔨᐅᑕᐅᔪᑦ Amount of money | ᐃᑲᐅᑦᓂᑦ Unit |
|---|---|
| in32b-amount | 1- ᐅᓪᓄᖓ<br>2- ᐱᓴᓇᐊᕐᓂᖓ<br>3- ᑕᖅᑭᓂᖓ<br>4- ᐊᑦᕿᒍ<br><br>1. Day<br>2. Week<br>3. Month<br>4. Year<br><br>in32b-unit |

**30.** ᑭ. ᑕᖅᑭᓂ 12ᓂ ᐊᔪᑎᓕᐅᕐᔪᓂ, ᖁᓄᖓ ᐊᐅᓪᓗᑎᒋᔭᕐᒪᑦ ᐱᖓᔪᖅᓂᑎᑦᓄᓐᓂᒃ ᓴᓇᑕᓂᑦᑭᐹᔪᒃᓄᑦ ᑭᓇᑕᓂᑦ ᐅᓇᑕᓗᒍ ᓴᓇ ᐱᓕᕆᔨᐊᓇᑎᓂᓗ?

**30. c) In the past 12 months, how often did you bet on cards, dice or board games?**

in30c

1- Daily
2- 2 to 6 times a week
3- About once a week
4- 2-3 times a month
5- About once a month
6- 6 to 11 times a year
7- 1-5 times a year
8- Never
98- DNK
99- NR/R

1- ᐅᓪᓄᑕᒻ
2- ᒉ-ᒥᑦ 6-ᒍᑦ ᐱᓇᐊᓯᕐᓂᒥᒃ
3- ᐊᑕᐅᓯᐊᑦᓯᖏᓐ ᐱᓇᓯᐊᓯᕐᓂᒥᒃ
4- ᒪᑭᑭᐊᑦᓯᖏᓐ ᐱᖏᓯᐊᑦᓯᖏᓐᓄᓐᓂᑦ ᑕᖅᑭᒥ
5- ᐊᑕᐅᓯᐊᑦᓯᖏᓐ ᑕᖅᑭᒥ
6- 6-ᓂᑦ 11-ᓄᑦ ᐊᑦᕿᔪᑦᒥ
7- 1-ᒥᑦ 5-ᒍᑦ ᐊᑦᕿᔪᑦᒥ
8- ᓯᐅᑦᓯᒪᖏᖅᑕᖏᓐ
98- ᖁᐅᕆᒪᖏᖅᑕᖏᓐ
99- ᐅᖁᕈᒪᖏᖅᑕᖏᓐ

**31. c)** ᑕᖅᑭᓂ 12ᓂᓗ, ᖁᖏᒃᓄᓐᓗ ᐊᐅᓪᓗᑎᒥ ᒥᓂᓯᓂᑎᔪᑦ ᐃᑲᐅᑦᓂᑎᔪᓄᓐᓂᑦ ᓴᓇᕐᔪᑎᐊᑦ?

**31. c) In the past 12 months, how many minutes or hours did you normally spend each time you played?**

| ᐅᓄᑦᓂᖅᒥᑦ Quantity | ᐃᑲᐅᑦᓂᑦ Unit |
|---|---|
| in31c-quantity | 1- ᒥᓂᓯᓂᒃ<br>2- ᐃᑲᐅᑦᓂᓂ<br><br>1. Minutes<br>2. Hours<br><br>in31c-unit |

**32. c)** ᑕᖅᑭᓕᒫᒥ, ᖁᖏᒃᓄᓐᓂᒃ ᐱᖓᔪᖅᓂᒃ ᖃᓄᖅᓯᓂᒃ/ ᖃᓄᖅᓯᓂᒃ ᑭᓇᑕᓂᑦ ᐅᓇᑕᓗᒍ ᓴᓇ ᐊᔪᔨᐊᓇᑎᓂᒃ ᐊᔪᕐᓇᐊᕐᓇᖅᑐᑦ ᐱᓇᓯᐊᑦᓯᖏᓐ?

**32. c) In a month, how much money did you generally spend on cards, dice or board games?**

| ᐱᖓᔪᖅᑐᑦ ᓴᓇᔨᐅᑕᐅᔪᑦ Amount of money | ᐃᑲᐅᑦᓂᑦ Unit |
|---|---|
| in32c-amount | 1- ᐅᓪᓄᖓ<br>2- ᐱᓇᓯᐊᕐᓂᖓ<br>3- ᑕᖅᑭᓂᖓ<br>4- ᐊᑦᕿᒍ<br><br>1. Day<br>2. Week<br>3. Month<br>4. Year<br><br>in32c-unit |

**33. Do you feel that you ever have, in the past, spent too much money or too much time gambling?**

n33
1- Yes
2- No
8- DNK
9- NR/R

**33.** ᐃᓯᐱᒃᖢᓪᓕᐊᓯᒪᔪᑦ, ᐊᑐᑎᓂᒪᓯᓂᔪ, ᑭᓇᐅᔨᓯᑐᓂᓯᒋᐊᓯᑎᓂ ᓴᖅᐯᓂᓯᒍᑦ?

1- Yes
2- No
8- DNK
9- NR/R

## SECTION 9 – SMOKING

## ᐊᕕᑦᑐᓂᒪᓂᖅ 9 - ᑐᑦᑭᖅᓂ/ᓂᐳᕈᓂᔪᓂᖅ

**I would like to ask you some questions about smoking.**

ᐊᐱᔪᓂᖅᓗᕈᒪᔨᒋᑦ ᑐᑦᑭᖅᓂᐅᑦ/ᓂᐳᕈᓂᔪᓂᐅᑦ ᒥᑦᓴᓇᑦ.

**34. At the present time, do you smoke cigarettes daily, occasionally, or not at all?**

in34
1- Daily
2- Occasionally — Go to Q. 38
3- Not at all — Go to Q. 41
8- DNK — Go to Section 10, Q. 45
9- NR/R — Go to Section 10, Q. 45

**34.** ᑕᒪᑕᒪᐅᑎᓕᔪᒍ, ᑐᑦᑭᑭᓯᒍᐱᑦ/ᓂᐳᕈᓂᔪᓯᒍᐱᑦ ᐅᓕᔪᑕᒧᑦ, ᐃᓕᖏᒪᓂᓂ, ᐅᕐᕈᔪᓂᓚᑦ ᐱᓯᒍᖏᖏᒥᓕᑎᑦ?

1- ᐅᓕᔪᑕᒧᑦ
2- ᐃᓕᖏᒪᓂᓂ — Go to Q. 38
3- ᐱᓯᒍᖏᖏᒥᑐᔪ — Go to Q. 41
8- DNK — Go to Section 10, Q. 45
9- NR/R — Go to Section 10, Q. 45

**35. For those who smoke daily**

**35.** ᐅᓕᔪᑕᒧᑦ ᑐᑦᑭᑭᓯᓂᓯᒋᐅᑦᑐᑭᓯᓂᑦ

**a) At what age did you smoke your first whole cigarette?**

in35a
Age _____
98- DNK
99- NR/R

ᐃ) ᖃᓄᑦᓯᓂᓴ ᐅᑭᐅᖃᓄᑦᓯᑎᓂᑦ ᐃᓗᐃᑦᑐᒥᓴ ᑐᑦᑭᑭᓯᓂᓴᑦᑐᑦᓯᓂᓴᑦᑭᑦ?

ᐅᑭᐅᖃᓕ _____
98- DNK
99- NR/R

**b) At what age did you begin to smoke cigarettes daily?**

in35b
Age _____
98- DNK
99- NR/R

ᐱ) ᖃᓄᑦᓯᓂᓴ ᐅᑭᐅᖃᓄᑦᓯᑎᓂᑦ ᐅᓕᔪᑕᒧᑦ ᑐᑦᑭᑭᓯᓂᓴᑦᑐᑦᓯᓂᓴᑦᑭᑦ?

ᐅᑭᐅᖃᓕ _____
98- DNK
99- NR/R

**c) How many cigarettes do you smoke each day now?**

in35c
Number of cigarettes _____
98- DNK
99- NR/R

ᑎ) ᖃᓄᑦᓯᓂ ᑐᑦᑭᑭᔪᓪᓚᑦᑭᑦ/ᓂᐳᕈᓂᔪᓯᒍᐱᔪᓪᓚᑦᑭᑦ ᐅᓕᔪᑕᒧᑦ ?

ᐅᓇᖃᓂᒪᑦ _____
98- DNK
99- NR/R

**36. In the past 12 months, did you stop smoking for at least 24 hours because you were trying to quit?**

in36

1- Yes
2- No → Go to Section 10, Q. 45
8- DNK → Go to Section 10, Q. 45
9- NR/R → Go to Section 10, Q. 45

**37. When you tried to quit, what method did you use to help you quit?**

in37

1- No method (cold turkey)
2- Nicotine patches
3- Nicotine gum
4- Pills (Zyban)
5- Other (specify) in37-5s _____
8- DNK
9- NR/R

**36.** ᑕᖅᑭᓂᒃ 12ᓂ ᐊᔪᑎᓪᓗᐅᕐᔪᓂ, ᔫᑦᐹᕐᓂᒃ/ᓱᔾᔪᑭᑎᒥᒃ ᓄᖅᑲᖏᓚᕐᓚᐅᒪᑦ ᐃᑲᐅᕐᓂᓂ ᐊᐢᑎᓗ ᓯᑕᒪᖅᓂᓂ (24-ᓂ) ᓄᖅᑲᖏᕐᓴᓱᑎᑦ?

1- Yes
2- No → Go to Section 10, Q. 45
8- DNK → Go to Section 10, Q. 45
9- NR/R → Go to Section 10, Q. 45

**37.** ᓄᖅᑲᖏᕐᓴᓱᑎᑦ, ᖃᓄᐃᑦᑐᑦ ᐃᑲᔪᑦᑕᐅᔪᑎᖃᕐᓂᖅᑭᑦ?

1- ᐃᑲᔪᑦᓱᔾᔨᐅᓪᓚᐅᔪᕐᓂᑐᖅ
2- ᓂᐱᑎᒐᕐᒥᒃ ᐅᐃᓂᒪᒥ
3- ᐊᑦᓱᑐᕐᒥᒃ/ᐊᑦᓱᒥᒃ
4- ᐃᖅᑲᒐᕐᓂᒃ
5- ᐊᓱᐊᓂᒃ (ᓇᓗᓀᕐᓗᔪ)

_____

8- DNK
9- NR/R

Go to Section 10, Q. 45

**38. For those who smoke occasionally**

**a) In your lifetime, have you smoked a total of 100 cigarettes or more (about 4 packs)?**

in38a

1- Yes
2- No
8- DNK → Go to Section 10, Q. 45
9- NR/R → Go to Section 10, Q. 45

**b) On the days that you smoke, about how many cigarettes do you usually have?**

in38b

Number of cigarettes _____
98- DNK
99- NR/R

**c) In the past 30 days, how many days have your smoked one or more cigarettes?**

in38c

Number of days _____
98- DNK
99- NR/R

**38.** ᐃᓕᖏᒃᓂᓂ ᑐᑦᑭᓱᓄᑦᓴᕐᓂᐅᓱᑎᑦ

ᐃ) ᐃᓄᐹᕐᓴᕐᓂᐊᓕᑦ, ᑐᑦᑭᑭᓱᒪᓕᐊᑦᓴᕐᓂᐅᓱᒪᓕᐊᑦ ᐊᐢᑎᓗ ᑕᑦᓂᒪᓂᒃ (100-ᓂᒃ) ᐅᖏᒪᒃᓄᓄᓂᑦᓂᓂ ᐅᓄᕐᓄᓂᑦᓂ (ᒥᑦᓴᐅᔭᕐᓴᓱᒥᑦ ᓱᑕᒪᓂᒃ ᑐᑦᑭᓱᖅᑭᓂᒃ/ᓱᔾᔪᑭᑎᖅᑭᓂᒃ?)

1- Yes
2- No
8- DNK → Go to Section 10, Q. 45
9- NR/R → Go to Section 10, Q. 45

ᐱ) ᐅᑦᓂᓂ ᑐᑦᑭᓄᐊᓱᕐᓴᓕᑦᓱᔾᔪᑭᑎᓂᐊᓱᕐᓴᓕᑦ, ᖃᑦᓱᓂᒃ ᐱᓱᔪᔭᑦ?

ᐅᓄᕐᓄᖏᑦ ᓱᔾᔪᑎᑦᓱᑦ/ᑐᑦᑭᓱᑦ _____

98- DNK
99- NR/R

ᑎ) 30-ᓂ ᐅᑦᓂᓂ ᐊᔪᑎᓪᓗᐅᕐᔪᓂ, ᖃᑦᓱᓂ ᐅᑦᓂᓂ ᑐᑦᑭᓄᐊᓕᖃᑦᓴᕐᓂᑦ/ᓱᔾᔪᑭᑎᓄᓕᖃᕐᓴᕐᓂᑦ ᐊᑕᐅᓱᕐᒥᒃ ᐅᖏᒪᒃᓄᓄᓂᑦᓂᓂ?

ᐅᑦᓂᐃᑦ ᐅᓄᕐᓄᖏᑦ _____

98- DNK
99- NR/R

**d) At what age did you smoke your first whole cigarette?**

in38d

Age _____
98- DNK
99- NR/R

**e) Have you ever smoked cigarettes daily?**

in38e

1- Yes
2- No
8- DNK
9- NR/R

**39. In the past 12 months, did you stop smoking for at least 24 hours because you were trying to quit?**

in39

1- Yes
2- No → Go to Section 10, Q. 45
8- DNK → Go to Section 10, Q. 45
9- NR/R → Go to Section 10, Q. 45

**40. When you tried to quit, what method did you use to help you quit?**

in40

1- No method (cold turkey)
2- Nicotine patches
3- Nicotine gum
4- Pills (Zyban)
5- Other (specify)
in40-5s _____
8- DNK
9- NR/R

Go to Section 10, Q. 45

ᑭ) ᖃᓕᓂᒃ ᐅᑭᐅᖃᓕᓂᒃ ᐃᓗᐃᑦᑐᑦ ᐊᑐᐃᑦᑐᑦ??

ᐅᑭᐅᖓᓪ _____
98- DNK
99- NR/R

ᑎ) ᐅᓐᓗᑦᓯ ᑐᑦᖃᖅᑕᕐᓂᐊᑦ/ᓴᓐᓴᑦᑐᖃᖅᑕᕐᓂᐊᑦ?

1- Yes
2- No
8- DNK
9- NR/R

**39.** ᑕᖅᑭᓂᒃ 12ᓂ ᐊᑐᑎᓪᓗᐅᑦᑐᓂ, ᑐᑦᖃᕐᓂᒃ/ᓴᓐᓴᑭᑎᒥᒃ ᓄᖅᖃᓚᓕᓕᐊᑦ ᐃᖅᐅᑦᓂᓂ ᐊᑦᑎᓗ ᓕᑕᒫᓂᓂ (24-ᓂ) ᓄᖅᖃᕐᓕᐊᓕᑎᑦ?

1- Yes
2- No → Go to Section 10, Q. 45
8- DNK → Go to Section 10, Q. 45
9- NR/R → Go to Section 10, Q. 45

**40.** ᓄᖅᖃᕐᓕᐊᓕᑎᑦ, ᖃᓄᐃᑦᑐᒥᒃ ᐃᖅᓱᑦᑕᐅᔪᑎᖃᑦᓯᑭᑦ?

1- ᐃᖅᓱᑦᓴᐅᓪᓚᐅᓱᖅᖁᑦᑐᖅ
2- ᓂᐱᑎᓚᑦᒥᓄ ᐅᐃᓂᒪᒥ
3- ᐊᑦᓴᑐᑦᒥᓄ/ᐊᑦᓴᒥᓄ
4- ᐃᖅᖃᓚᑦᓂᓄ
5- ᐊᓴᐊᓂᓄ (ᓇᓗᓂᑦᓗᔪ)

_____

8- DNK
9- NR/R

**41. For those who do not smoke at all at this time**

**41.** ᑐᑦᑭᓯᒪᔨᖅᑎᑐᓴᓂᓪ/ᓂᕆᑕᓂᓯᒪᔨᖅᑎᑐᓄᓂᓪ

in41a **a) In your lifetime, have you smoked a total of 100 cigarettes or more (about 4 packs)?**

Δ) Δᓄᓂᕐᓂᐅᕙᑦ, ᑐᑦᑭᑦᓯᒪᕙᑦ/ᓂᕆᑕᕐᓯᒪᕙᑦ ᐊᑦᑎᑎ ᑦᓪᓕᒪᓂᖅ (100-ᓂᖅ) ᐅᖅᓱᒋᓄᓪᓗᓂᑦ ᐅᑭᓄᓪᓗᓂᑦ (ᒥᑦᓴᐅᕐᓇᓂᑦ ᓯᑕᒪᓂᖅ ᑐᑦᑭᑦᖏᐅᑎᓂᖅ/ᓂᕆᑕᑎᑦᖏᐅᑎᓂᖅ?)

1- Yes
2- No — Go to Section 10, Q. 45
8- DNK — Go to Section 10, Q. 45
9- NR/R — Go to Section 10, Q. 45

1- Yes
2- No — Go to Section 10, Q. 45
8- DNK — Go to Section 10, Q. 45
9- NR/R — Go to Section 10, Q. 45

**b) Have you ever smoked cigarettes daily?**

Λ) ᐅᓪᓗᑕᒃᑲ ᑐᑦᑭᑦᖏᖑᓂᕐᓯᒪᔪᑦ/ ᓂᕕᑐᖏᖑᓂᕐᓯᒪᔪᑦ?

in41b

1- Yes
2- No — Go to Section 10, Q. 45
8- DNK — Go to Section 10, Q. 45
9- NR/R — Go to Section 10, Q. 45

1- Yes
2- No — Go to Section 10, Q. 45
8- DNK — Go to Section 10, Q. 45
9- NR/R — Go to Section 10, Q. 45

**c) At what age did you begin to smoke cigarettes daily?**

∩) ᖃᑦᓂᓂᓪ ᐅᑭᐅᖃᑦᓂᑎᑦ ᐅᓪᓗᑕᒃᑲ ᑐᑦᑭᑦᖏᖑᓂᕐᓂᐅᕙᑦ/ ᓂᕕᑐᖏᖑᓂᕐᓂᐅᕙᑦ?

in41c

Age _____
98- DNK
99- NR/R

ᐅᑭᐅᖃᓪᓚᒃ _____
98- DNK
99- NR/R

**d) How many cigarettes did you usually smoke each day then?**

P) ᐅᓪᓗᑕᒃᑲ ᖃᑦᓂᓂᓪ ᑐᑦᑭᑦᖏᖑᓂᕐᓂᐅᕙᑦ ᓂᕕᑐᓂᓴᖃᑦᖏᖑᓂᕐᓂᐅᕙᑦ ?

in41d

Number of cigarettes _____
98- DNK
99- NR/R

ᐅᓄᑦᓂᖅᑎᑦ ᓂᒃᑲᐊᑦ _____
98- DNK
99- NR/R

**42. a) When did you stop smoking? Was it**

**42.** Δ) ᖃᓄᖅ ᑐᑦᑭᑦᓂ/ᓂᕆᑐᑎᑦᓂ ᓄᑦᖃᓂᑦᑭᑦᑕ?

in42a

1- Less than one year ago — Go to Q. 43
2- 1 year to less than 2 years ago — Go to Q. 43
3- 2 years to less than 3 years ago — Go to Q. 43
4- 3 or more years ago
8- DNK — Go to Q. 43
9- NR/R — Go to Q. 43

1- ᐊᑦᖁᔪᓕᒫᖁᑦᑕᕐᑎᑐᑦ — Go Q.
2- ᐊᑦᖁᔪᓕᒫᑦ ᐅᖅᓱᒋᓂ ᐊᑦᖁᔪᓂᓂ ᒪᑦᑭᓂ ᒥᑦᓂᑎᔪᑦ
3- ᐊᑦᖁᔪᓐᓂ ᒪᑦᑭᓂᓂ ᐊᑦᖁᔪᐃᐅᑦ ᐱᖅᓱᓂᑦ ᒥᑦᓂᑎᔪᑦ — Go Q.
4- ᐊᑦᖁᔪᐃᐅᑦ ᐱᖅᓱᓂᑦ ᐅᖅᓱᒋᓄᓪᓗᓂᑦ
8- DNK — Go to Q. 43
9- NR/R — Go to Q. 43

n42b **b) How many years ago did you stop smoking?**

☐☐ years

Λ) ᖃᒃᓯᓂᖅ ᐊᖏᔪᔨᓂ ᓄᖏᒃᖃᓕᖏᑦ?

☐☐ ᐊᖏᔪᒍ

**43. When you quit, what method did you use to help you quit?**

in43
1- No method (cold turkey)
2- Nicotine patches
3- Nicotine gum
4- Pills (Zyban)
5- Other (specify)
in43-5s _____
8- DNK
9- NR/R

**43.** ᓄᖏᒃᓴᑎᑦ, ᖃᓄᐃᑦᑐᒥᒃ ᐃᒃᓴᖏᑕᐅᔭᕐᓂᖃᖏᑦ?

1- ᐃᒃᓴᖏᓵᕆᐅᓴᖏᕐᓂᑐᑲᓗ
2- ᓂᐱᑎᑕᖏᑦᑎᒥᒃ ᐅᐃᓂᓕᒥ
3- ᑯᑦᓴᑐᖏᑦᒥᒃ/ᑯᑦᓴᒥᒃ
4- ᐃᖏᒃᓚᖏᓂᒃ
5- ᐊᓴᐊᓂᒃ (ᓇᓗᓐᖏᑦᓗᒍ)

_____
8- DNK
9- NR/R

**44. What prompted you to quit smoking?**

**(Probe: What happened in your life to make you quit smoking?)**

**44.** ᓴᓇᒍᑦ ᓄᖏᒃᑭᒧᓕᖏᑦᕕᐅᓂᖏᑦ ᑐᕿᑎᒥᒃ/ᓴᓗᕐᑎᑎᒥᒃ?

(ᖃᐅᔨᓴᖏᓗᒍ: ᓴᓇᒍᑦ ᐃᓄᓴᖏᓂᕕᒃᑦ, ᓄᖏᒃᑭᒪᐅᓕᒥᑎᑎᑕᐃᓂᕕᐃᒃᑦ ᑐᕿᑎᒥᒃ/ᓴᓗᕐᑎᑎᒥᒃ)

**Do not read list, circle all that apply**

in44-1 1- Own health
in44-2 2- Allergy or asthma
in44-3 3- Pregnancy/had a baby
in44-4 4- Concern about health of family
in44-5 5- Got tired of smoking/bad smell/disgusting
in44-6 6- Less stress in life, different job
in44-7 7- Smoking related illness or death of family member or friend
in44-8 8- Pressure from family or friends
in44-9 9- Cost
in44-10 10- Restrictions on where can smoke
in44-11 11- Just wanted to quit/no reason
in44-12 12- Other (specify)
in44-12s _____
in44-98 98- DNK
in44-99 99- NR/R

1- ᐃᓗᓕᖏᓵᕐᓂᖅ
2- ᑎᑎᕐᒪᑕ ᓱᒃᓚᒋᕐᓂᕐᒥᒪᐅᒃ ᐃᐱᓂᐊᖏᓂᒥᓄᓗᓂᕐᓯᑦ
3- ᓄᑕᖏᑦᓴᖏᓂᒧᑦ/ᐱᐊᖏᑦᓴᖏᓂᒧᑦ
ᓄᑕᖏᑦᒋᓂᐱᓂᖏᑦᒥᓄᑦ/ᐱᐊᖏᑦᒋᐱᓂᖏᑦᒥᓄᑦ
4- ᐃᓴᒧᓗᑎᖏᓂᒧᑦ ᐃᓗᓴᓕᖏᓂᒃ ᐃᓕᕐᒪᑕ
5- ᑐᕿᑎᒥᒃ/ᓴᓗᕐᑎᑎᒥᒃ ᑕᖏᑦᓴᓂ/
ᒪᒐᓂᕐᒪᓄᑦ/ᒪᒐᒍᐅᔪᑦᓴᒧᒧᑦ
6- ᐅᖕᒍᒐᑦᓴᕐᓂᕐᓄᐅᓕᓂᒥᓄᑦ ᐃᓄᓴᖏᒥᒃ, ᐱᓇᓴᒪᖏᓂᒃ ᐊᓴᓴᓂᕐᓂᖅ
7- ᓴᓗᑎᑎᒍᑦ/ᑐᑕᑭᒍᑦ ᐊᓂᓂᐊᖏᖏᓂᒧᑦ
ᐃᓄᒍᓂᓄᑐᖏᓂᒪᓇᓂᓂᓄᑦ ᐃᓇᕐᒪᓂᒃ
ᐃᓇᓂᓄᕐᒪᓂᓇᓂᓂᓄᑦ
8- ᓄᖏᒃᖏᐅᕆᒪᒥ ᐃᓇᒥᓄᑦ ᐃᓇᓂᓄᒥᓄᓂᓂᓄᑦ
9- ᐊᑭᕐᒪᓄᑦ
10- ᑐᑕᑭᓴᐃᕆᒃᑐᕐᕕᑐᑦ/ᓴᓗᕐᑎᓴᖏᐅᖏᒃᑐᕐᕕᑐᑦ
ᐱᑦᔪᑎᑎᑦᓴᑎᑦ
11- ᓄᖏᒃᔪᒍᑐᐃᓂᓂᖏᓂᒥᓄᑦ/ᐱᑦᔪᑎᒃᖃᓂ
12- ᐊᓴᐊᓄᑦ (ᓇᓗᓐᖏᑦᓗᒍ)

_____
98- DNK
99- NR/R

## SECTION 10 - SAFETY AND MODE TRANSPORTATION

**We would like to know what kind of transportation you use and what kind of safety measures you use when travelling.**

## ᐊᕕᑦᑐᓱᒪᓂᖅ 10 - ᐊᑦᑕᓇᖅᑐᒋᐊᖅᓄᑦ ᐃᖅᑭᖅᑎᐅᑎᓪᓗᒍ

**45. In the past 12 months, when traveling outside the village on a skidoo, was there another skidoo with you?**

in45

1- Always
2- Most of the time
3- Rarely
4- Never
5- I did not go outside the village on a skidoo in the past 12 months
8- DNK
9- NR/R

**45.** ᑕᖅᑭᓂ 12-ᓂ ᐊᑐᓕᕆᔨᑐᓂ, ᓄᓇᓕᑦ ᓱᓕᒃᓂ ᐃᖅᑭᖅᑎᓕᕆᕕᐊᑦ, ᐊᓱᐊᓄᑦ ᓱᑭᑐᖅᒍᑦ ᒪᓕᑦᑕᐅᖅᑲᓕᑦᑕᓕᕆᕕᖅᑭᑦ?

1- ᑌᒪᒃᖏᒪᑦ
2- ᑌᒪᒃᖏᒪᓕᒻᒥᐅᖅ
3- ᓕᐅᖅᓱᒪᑦᓱᐊᒃᑭᑦᑐᖅ
4- ᓕᐅᖅᓱᒪᒃᖏᑎᑐᖅ
5- ᐊᖅᑯᓕᐅᖅᓱᒪᒃᖏᑎᑐᖅᓚᒃ ᓱᑭᑐᖅᑐᑦ ᑕᖅᑭᓂ 12-ᓂ ᖃᐅᖅᑎᑐᓂ
8- DNK
9- NR/R

**46. In the past 12 months, when riding in or driving a motorboat, did you wear a life vest or an overall?**

in46

1- Always
2- Most of the time
3- Rarely
4- Never
5- I did not ride in or drive a motorboat in the past 12 months
8- DNK
9- NR/R

**46.** ᑕᖅᑭᓂ 12-ᓂ ᐊᑐᑎᓕᐅᖅᑐᓂ, ᖃᐅᔨᓇᐊᖅᑐᖃᐅᓕᕆᔨᑦ ᖃᐅᔨᓇᐊᖅᑐᖏᓕᕆᔨᑦᓗᓂᑦ, ᐱᑦᑕᐅᑎᒥᑦ ᐊᑕᐃᓐᓂᓗᓂᑦ?

1- ᑌᒪᒃᖏᒪᑦ
2- ᑌᒪᒃᖏᒪᓕᒻᒥᐅᖅ
3- ᓕᐅᖅᓱᒪᑦᓱᐊᒃᖏᒪᑦᑐᖅ
4- ᓕᐅᖅᓱᒪᒃᖏᑎᑐᖅ
5- ᖃᐅᔨᓇᐊᖅᑐᓕᕆᕕᒃᖏᑎᑐᖅᓚᒃ ᖃᐅᔨᓇᐊᖅᑐᖏᓕᕆᕕᒃᖏᑎᑐᖅᓚᓗᓂᑦ ᑕᖅᑭᓂ 12-ᓂ ᖃᐅᖅᓯᐅᖅᑐᓂ
8- DNK
9- NR/R

**47. In the past 12 months, how often did you drive the following engines while under the influence of drugs or alcohol?**

**47.** ᑕᖅᑭᓂ 12ᓂ ᖃᐅᖅᑎᑐᓂ, ᐊᖅᑯᓱᒪᒪᓕᒃ ᓄᓇᕗᑦᓴᒥᐅ ᐊᖅᓚᔨᖅᓇᑐᖅᑎᓯᒪᓱᒪᓕᓱᑎᑦ ᐃᒥᖅᓱᒪᓱᑎᑦᓗᓂᑦ?

| | | | Often | Rarely | Never | Did not drive | DNK | NR/R |
|---|---|---|---|---|---|---|---|---|
| in47a | a) Automobile, van, or truck | ᐃ) ᓄᓇᕗᑦᓴᒥᐅ | 1 | 2 | 3 | 4 | 8 | 9 |
| in47b | b) 3 or 4 wheeler (Honda) | ᐱ) ᐱᖅᓚᓱᓕᒻᒥᐅ ᓱᑕᒪᓕᒻᒥᓗᓂᑦ (ᖃᓄᐃᑦᑐᐅ) | 1 | 2 | 3 | 4 | 8 | 9 |
| in47c | c) Skidoo | ᑎ) ᖃᒍᑎᓕᒃᓕᒥᐅ(ᓱᑭᑐᖅᑐᑦ) | 1 | 2 | 3 | 4 | 8 | 9 |
| in47d | d) Motorboat/ canoe | ᑭ) ᐅᒥᐊᑦᒥᐅ(ᖃᐅᔨᓇᐊᑦᒥᑦ) | 1 | 2 | 3 | 4 | 8 | 9 |

## SECTION 11 - SOCIAL NETWORK

## ᐊᐱᖅᑐᓕᕆᔨᖅ 11 - ᐃᓄᖅᑎᑎᒃᓴᖅ

**The next few questions are about your social network, <u>that is your family and friends, neighbours, colleagues and acquaintances.</u>**

ᐊᐱᖅᓯᒪᔪᖅ ᐊᒥᓱᓕᕆᔨᖅ ᐃᓄᖅᑎᖅᑲᓇᐱᒋᔭᐅᓕᖅᐸᑦ.

**48. a) How often do you find that you have someone to have a good time with?**

**48.** ᐃ) ᖃᓄᐊ ᐊᑯᓗᑎᒥᔾᔨ ᐃᓕᖅᑲᓇᐱᐃᑦ ᐊᓕᐊᓴᐃᓇᐱᖅᑎᒃᓴᐊᑦᑕᓂᐱᐃᑦ?

in48a

1- All of the time
2- Most of the time
3- Sometimes
4- Rarely
5- Never
8- DNK
9- NR/R

1- ᑌᒪᓴᓕᓕᒫᑐᐃᓐᓇᖅ
2- ᑌᒪᓴᓕᓕᒫᑲᓪᓚᖅ
3- ᐃᓕᓴᐅᓂᖅ
4- ᔪᖅᑲᓕᐅᖅᓯᒪᓕᕆᓂᐊᓴᖅ
5- ᔪᖅᑲᓕᐅᖅᓯᒪᓴᓴᒥᐅᑦᑐᖅ
8- DNK
9- NR/R

**b) How often do you have someone to talk to if you feel troubled or for some reason need emotional support?**

ᐱ) ᖃᓄᐊ ᐊᑯᓗᑎᒥᔾᔨ ᐃᓕᖅᑲᓇᐱᐃᑦ ᐅᖅᑲᖅᑎᑎᒍᓐᓇᑕᖅᓂᐱᐃᑦ ᐃᓯᒋᓐᓂᑦᑐᓕᕐᕋᐃᑦ ᐃᑲᔪᖅᓱᐅᔭᓕᕆᓂᕐᒥᔾᔨᓐᓂᒃᓂᑦ ᐃᓯᒋᓐᓂᑎᓐᓇᐃᑦ?

in48b

1- All of the time
2- Most of the time
3- Sometimes
4- Rarely
5- Never
8- DNK
9- NR/R

1- ᑌᒪᓴᓕᓕᒫᑐᐃᓐᓇᖅ
2- ᑌᒪᓴᓕᓕᒫᑲᓪᓚᖅ
3- ᐃᓕᓴᐅᓂᖅ
4- ᔪᖅᑲᓕᐅᖅᓯᒪᓕᕆᓂᐊᓴᖅ
5- ᔪᖅᑲᓕᐅᖅᓯᒪᓴᓴᒥᐅᑦᑐᖅ
8- DNK
9- NR/R

**c) How often does someone make you feel worried or demand too much from you in your everyday life?**

ᑎ) ᖃᓄᐊ ᐊᑯᓗᑎᒥᔾᔨ ᐃᓕᖅᑲᓇᐱᐃᑦ ᐃᓯᒋᓐᓄᕐᔪᐊᑦᑐᖅ ᐅᕐᓕᓐᓄᓐᓂᑦ ᑌᒪᓴᓕᓕᒫᑐᐃᓐᓇᖅ ᐃᓕᓐᓂᑦ ᐱᒍᑦᑐᓕᕐᓂᒃᑐᖅ ᐅᓪᓗᑕᒪᑦ ᐃᓄᖅᑎᖅᑲᓇᐱᐃᑦ?

in48c

1- All of the time
2- Most of the time
3- Sometimes
4- Rarely
5- Never
8- DNK
9- NR/R

1- ᑌᒪᓴᓕᓕᒫᑐᐃᓐᓇᖅ
2- ᑌᒪᓴᓕᓕᒫᑲᓪᓚᖅ
3- ᐃᓕᓴᐅᓂᖅ
4- ᔪᖅᑲᓕᐅᖅᓯᒪᓕᕆᓂᐊᓴᖅ
5- ᔪᖅᑲᓕᐅᖅᓯᒪᓴᓴᒥᐅᑦᑐᖅ
8- DNK
9- NR/R

**49. Are you ever alone when you would in fact prefer to be with others?**

**49.** ᐃᓄᐃᑦᓯᒪᔪᐃᑦ ᐃᓕᖅᑭᒪᓯᒪᓕᕆᔨᐃᑦ?

in49

1- No
2- Yes, but rarely
3- Yes, once in a while
4- Yes, often
8- DNK
9- NR/R

1- ᐊᐅᒃ
2- ᐊᐊ, ᑭᓯᐊᓂ ᐃᓭᓪᓂᔭᕐᑐᖅ
3- ᐊᐊ, ᐃᓕᓴᐅᓪ
4- ᐊᐊ, ᓕᐅᒥᔨᓴᑦᑐᖅ
8- DNK
9- NR/R

## SECTION 12 - COMMUNITY WELLNESS

ᐊᐱᑦᑐᓕᒪᓂᖅ 12 - ᓄᓇᕗᓂ ᖃᓄᐃᖅᑎᓕᕐᓂᖅ

**Now, I would like to ask some questions about community wellness.**

**50. a) In the past 12 months, have you taken part in any activities to promote your own healing or wellness?**

**50.** ᐃ)ᑕᖅᑭᓂ 12ᓂ ᐊᑐᑎᓕᐅᑦᑐᓂ, ᐃᓕᒥᔨᐅᑦᖃᑕᓕᐅᖅᑭᑦ ᓇᒥᒥᓂᖅ ᒪᒥᔨᐅᑎᑦᔨᓂᐊᑦ ᐅᖃᕐᓇᓐᓂᑦ ᖃᓄᐃᖅᑎᓕᕐᓂᖅᓴᓐᓂᑦᔨᓇᐃᑦ?

in50a

1- Yes
2- No
8- DNK
9- NR/R

Go to Q. 51

1- Yes
2- No
8- DNK
9- NR/R

Go to Q. 51

**Circle all that apply**

**b) If yes, did this involve:**

ᐱ) ᐊᓐᑎᖅᑕᑦ, ᓇᓕᓕᐊᔪᑦ:

in50b_1
in50b_2
in50b_3
in50b_4
in50b_5
in50b_8
in50b_9

1- A church-related group
2- A medical or psychological professional
3- A natural helper or healer
4- A healing circle
5- Other (specify): in50b-5s _____
8- DNK
9- NR/R

1- ᑐᑦᔨᐊᐃᒪᒥ
2- ᐋᓐᓂᐊᔨᐅᖅᓂᒥ ᖃᐅᔨᒪᔪᑦᓯᓇᓐᓄᑦ, ᐃᔨᒪᓯᓇᔨᓄᓐᓂᑦ
3- ᐃᖃᔪᖅᑎᒍᑦ ᒪᒥᔪᔨᓄᓐᓂᑦ
4- ᒪᒥᔪᖅᓂᒍᑦ ᐃᖃᔪᖅᑎᑦᑐᑐᓂ
5- ᐊᔨᔨᑦᑐᓂ (ᓇᓗᓂᖅᓗᒍ): _____
8- DNK
9- NR/R

**51. How strong is the feeling of togetherness or closeness in your village?**

**51.** ᖃᓄᖅᓴᓇᐊᑎᑦᑎᓐ ᓄᓐᔪᔪᓐᓇᑦ ᐱᓇᓱᖃᑎᒌᑦᑐᐊᓂᖅᓴᓐᓂᑦ ᖃᐅᔨᖃᖅᑎᒌᑦᑐᐊᓂᖅᓴᓐᓂᑦ ᓄᓇᕗᓱᓂ?

in51

1- Very close
2- Somewhat close
3- Neither distant nor close
4- Somewhat distant
5- Very distant
8- DNK
9- NR/R

1- ᐱᓇᓱᖃᑎᒌᑦᑐᐊᓇᓇᑦᑐᖅ
2- ᐱᓇᓱᖃᑎᒌᑦᑐᐊᓕᐅᒥᔪᖅᑐᑦ
3- ᐱᓇᓱᖃᑎᒌᑦᑐᐊᔭᐊᖏᑎᓐᓄᑦ ᐱᓇᓱᖃᑎᒌᑦᑐᓂᓪᓗᑎᓐᓄᑦᔭ
4- ᐱᓇᓱᖃᑎᒌᑦᑐᐊᔭᐊᖏᓴᓐᑐᑦ
5- ᐱᓇᓱᖃᑎᒌᓴᓐᑐᑦ
8- DNK
9- NR/R

**52. In your opinion, is this village generally peaceful or affected by violence?**

**52.** ᐃᓱᒪᓕᐊᑦ, ᒋᓐᓇ ᓄᓇᓕᓂ ᓄᓐᓇᕐᓂᖅᑭᑦ ᖃᓄᐃᖅᑎᓕᕐᓂᖅ ᐱᖁᔭᖁᐃᐅᓕᐅᒥᔪᔨᓄᑦᑐᑦᑐᓂ?

in52

1- Very peaceful
2- Moderately peaceful
3- Neither peaceful nor violent
4- Moderately violent
5- Very violent
8- DNK
9- NR/R

1- ᓄᓐᓇᕐᓂᖅᑕᐊᑐᖅ
2- ᓄᓐᓇᕐᓂᔨᑦ
3- ᓄᓐᓇᕐᓂᓗᐊᖏᓪᓗ ᐱᖁᔭᖁᖅᐃᐅᓗᐊᖏᓪᓗ
4- ᐱᖁᔭᖁᖅᐃᐅᓕᐅᒥᔪᔨᓄᑦᑐᖅ
5- ᐱᖁᔭᖁᖅᐃᐅᓇᓂᕐᖁᓗᒃ
8- DNK
9- NR/R

**53. In the past 12 months, how often have you participated in any activities where people came together to do work for the benefit of the community?**

n53
1- Very often
2- Often
3- Sometimes
4- Rarely
5- Never
8- DNK
9- NR/R

**54. In the last month, how often have you gotten together with people to play games, sports, or other recreational activities?**

in54
1- Very often
2- Often
3- Sometimes
4- Rarely
5- Never
8- DNK
9- NR/R

## SECTION 13 - SOCIO DEMOGRAPHIC INFORMATION

**I would like to ask you some general questions.**

**55. What is your marital status?**

in55
1- Never legally married
2- Legally married (and not separated) — Go to Q. 57
3- Separated, but still legally married
4- Divorced
5- Widowed
8- DNK
9- NR/R

**53.** ᑕᖅᑭᓂ 12ᓂ ᐊᔪᑎᓕᐅᕐᔪᓂ, ᐃᓕᐅᓕᐅᕆᖅᖅᑭᑦ ᐃᓄᐃᑦ ᑲᑎᓕᖅᓯᒪᑦ ᐱᔭᕆᐊᕐᓂᖅ ᓄᓇᓕᒥᐅᖅ?

1- ᑌᒪᖅᖅᓕᓕᒍᐃᓐᓇᖅ
2- ᑌᒪᖅᖅᓕᓕᒃᑲᖅ
3- ᐃᓕᖅᒪᓐᓂ
4- ᔪᖅᑲᓕᐅᕆᓕᖅᓯᒪᔪᖅᑕᒍᖅ
5- ᔪᖅᑲᓕᐅᕆᓕᖅᖅᑎᒍᖅ
8- DNK
9- NR/R

**54.** ᐅᑉᓗᓂ 30ᓂ ᐊᔪᑎᓕᐅᕐᔪᓂ, ᑲᑎᖅᖅᒍᐊᖅᑲᑎᖅᑲᕆᓕᒐᑦ ᐃᓄᐃᑦᓂᖅ ᐱᖅᖅᒍᐊᖅᑲᑎᑎᓕᒐᑦ, ᐃᖅᑲᓕᕆᖅᓂᓂᖅ ᐅᑉᓪᓕᐊᓂᑦ ᐊᓯᖅᑎᓂᖅ ᓯᒪᓕᐊᓕᒃᓂᓂ?

1- ᑌᒪᖅᖅᓕᓕᒍᐃᓐᓇᖅ
2- ᑌᒪᖅᖅᓕᓕᒃᑲᖅ
3- ᐃᓕᖅᒪᓐᓂ
4- ᔪᖅᑲᓕᐅᕆᓕᖅᓯᒪᔪᖅᑕᒍᖅ
5- ᔪᖅᑲᓕᐅᕆᓕᖅᖅᑎᒍᖅ
8- DNK
9- NR/R

ᐊᐱᑦᑐᓯᒪᓂᖅ 13 - ᐃᓅᖅᑲᑕᐅᓂᖅᒧᑦ ᖅᑲᐅᔪᕆᐅᑎᑦ

**55.** ᑲᑎᑎᑕᐅᒪᐃᑦ/ᑲᑎᑎᑕᐅᒪᖅᖅᓯᓕᑎᑦ?

1- ᑲᑎᑎᑕᐅᓕᐅᕆᓕᖅᖅᑎᒍᖅ ᐱᖅᔾᔨᑎᒧᑦ
2- ᑲᑎᑎᑕᐅᒪᔪᖅ — Go to Q. 57
(ᐊᐱᑦᓯᓯᒪᓂᓂ)
3- ᐊᐱᑦᓯᒪᔪᖅ, ᑭᓯᐊᓂ ᑲᑎᑎᑕᐅᒪᖅᑎᓐᓅᓯᓂ
4- ᐊᐱᑦᓯᒪᔪᖅ
5- ᐁᑦᐯᓯᒪᔪᖅ
8- DNK
9- NR/R

**56. Are you living with a common law partner (with someone else as a couple)?**

**Common law refers to two people of the opposite sex or of the same sex who live together as a couple, but who are not legally married to each other.**

in56

1- Yes
2- No
8- DNK
9- NR/R

**56.** ᑲᑎᑎᑕᐅᒪᓪᓕᒃᑲᓐ ᐁᑦᑐᓂᐱᐢ ᐃᓪᓗᒥᐅᑦᑲᑎᑦᑲᑎᓂᑦᑲᑲᑦᑎᑦᑐᖅ?

ᑲᑎᑎᑕᐅᒪᒪᓂᓂ ᐃᓪᓗᒥᐅᑦᑲᑎᑦᑲᓕᓪᓚᑦᑕᐅᖅᑐᑦ ᐊᑦᓐᓗ ᐊᖏᔪᑎᓗᓪᓂᑦ ᑲᑎᒪᓂᑦᒪᓂᑦ ᐅᑭᓂᓗᓪᓂᑦ ᐊᑦᖃᓐᓇ ᐊᖏᔪᑌᓐᓇᓗᓪᓂᑦ ᐃᓪᓗᒥᐅᑦᑲᑎᑦᓕᓂᑦᒪᓂᖅ, ᑲᑎᑎᑕᐅᒪᒪᑎᑎᓕᖅ.

1- Yes
2- No
8- DNK
9- NR/R

**57. What is the highest level of schooling you have undertaken (even if you are still in school)?**

**57.** ᐳᑦᑐᓂᑦᕿᒥᐸ ᐃᓕᓴᓂᐊᓂᒥᐸ ᖃᓄᓯᒍᑦ ᑎᑭᓯᒪᕕᐊᑦ (ᐃᓕᓴᓂᐊᖏᓪᓗᐊᑭᕕᐊᑦ ᑕᒪᑕᒪ)?

**Show card D and circle one answer only**

in57

1- No formal schooling
2- Some years of elementary school
3- Elementary school completed
4- Some years of secondary school
5- Secondary school completed
6- **Partial** training in a community college, a trade school or a private commercial college, a technical institute, a CEGEP, a nursing school, or a normal school
7- **Diploma** or **certificate** from a community college, a trade school or a private commercial college, a technical institute, a CEGEP, a nursing school, or a normal school
8- Some university (not completed)
9- University degrees (completed), Certificate, Bachelor, Masters, PhD
98- DNK
99- NR/R

1- ᐃᓕᓴᓂᐊᓕᐅᑦᓯᒪᔭᖏᑎᑐᓴ
2- ᐳᐸᑭᑦᓴᒥᐸ ᐃᓕᓴᓂᐊᓕᓪᓕᑦᓯᒪᔪᖅ
3- ᐳᐸᑭᑦᓴᒥᐸ ᐱᔭᓱᓯᒪᔪᖅ
4- ᐳᑦᑐᓂᑦᓴᒥᐸ ᐃᓕᓴᓂᐊᓕᓪᓕᑦᓯᒪᔪᖅ
5- ᐳᑦᑐᓂᑦᓴᒥᐸ ᐱᔭᓱᓯᒪᔪᖅ
6- ᐃᓕᖏᓂᐸ ᐱᒋᐅᑦᓴᑎᑕᐅᓯᒪᔪᖅ ᐃᓕᓴᓂᐊᓂᐊᖅᓚᒥ, ᐱᒋᐅᑦᓴᕕᒥ, ᐋᓐᓂᐊᓯᐅᑎᑕᐅᓯᒥ ᐃᓕᓴᓂᐊᓂᐊᖅᒥ, ᐃᓕᓴᓂᐊᓂᐊᖅᑐᓂᖏᓐᓇᒥᓂᓗᓐᓂᑦ
7- ᐱᔭᓱᑭᑎᒋᑦᓯᒪᔪᖅ ᓇᓗᓄᑦᑕᐅᓯᒪᔪᑦᓗᓐᓂᑦ ᓄᓇᓕᓴᓂ ᐃᓕᓴᓂᐊᓂᐊᖅᒥ, ᐱᒋᐅᑦᓴᕕᒥ, ᐋᓐᓂᐊᓯᐅᑎᑕᐅᓯᒥ ᐃᓕᓴᓂᐊᓂᐊᖅᒥ, ᐃᓕᓴᓂᐊᓂᐊᖅᑐᓂᖏᓐᓇᒥᓂᓗᓐᓂᑦ
8- ᐃᓕᓴᓂᐊᓂᐊᔪᓕᐊᓂᑦᓯᒪᔪᖅ ᐱᔭᓱᕐᓂ
9- ᐃᓕᓴᓂᐊᓂᐊᔪᐊᑎᑦ ᐱᔭᓱᑭᑎᒋᑦᓯᒪᔪᖅ, ᓇᓗᓄᑦᑕᐅᓯᒪᔪᖅ ᐳᐸᑭᑦᓴᒥᑦ ᐳᑦᑐᓂᑦᕿᒥᑦᓗᓐᓂᑦ
98- DNK
99- NR/R

**For greater precision, write the name of the highest diploma or certificate obtained:**

in57s _____

**58. Do you plan to carry on your education in the future?**

**58.** ᓱᑐᓂᕆᐳ ᐃᓕᓴᓂᐊᓇᐊᖅᓭᓱᒋᔭᖅᓴᓇᖅᑭᑦ?

n58

1- Yes
2- No
8- DNK
9- NR/R

1- Yes
2- No
8- DNK
9- NR/R

**Although many health expenses are covered by health insurance, there is still a relationship between health and income. Please be assured that, like all other information you have provided, these answers will be kept strictly confidential.**

ᐊᒥᓱᐊᓗᐃᑦ ᐃᓗᓱᓕᓇᓂᐅᑦ ᐊᑭᖅᑦ ᐃᓗᓱᓕᓇᓂᐅᑦ ᐃᒪᓕᖅᑲᐅᑎᖅᓴᓕᓂ ᐊᑭᓕᖅᑐᑕᐅᓱᒍᓗᓇᐊᑦ, ᐃᓗᓱᓕᓇᓂᖅᓯᒍᑦ ᑭᓇᐅᔭᑦ ᐃᓕᖅᓴᒍᔪᑎᖅᑐᑦ. ᖃᐅᔨᒪᑦᓱᐊᓇᑦ, ᑐᓴᖅᑕᐅᑎᑕᓕᒫᑎᑦ, ᑭᐅᔪᑎᖅᑦ ᓇᐅᔪᓐᓂᑦ ᖃᐅᔨᓴᐅᓂᐊᖅᖅᑭᒪᑦ.

**59. Thinking about your total income, from which of the following sources have you received any income in the past 12 months?**

**59.** ᐃᓱᒪᒪᓱᐊᖅᓗᑎᑦ ᑲᑎᑦᓱᑎᐳ ᑭᓇᐅᔭᖅᑎᓇᓱᑎᑦ, ᓇᓪᓕᐊᓂᑦ ᑭᓇᐅᔭᖅᑎᖃᖅᑕᓱᒪᕐᓂᑦ ᑕᖅᑭᓂ 12ᓂ ᐊᑐᑎᓪᓕᐅᖅᑐᓂ?

**Show card E and circle all that apply**

in59-1 1- Hunter support program
in59-2 2- Wages and salaries
in59-3 3- Income from self-employment
in59-4 4- Dividends and interest (such as on bonds, savings)
in59-5 5- Employment insurance
in59-6 6- Worker's compensation
in59-7 7- Maternity leave
in59-8 8- Preventative leave
in59-9 9- Carvers, sewing
in59-10 10- Home Day Care
in59-11 11- Participation to Committees
in59-12 12- Benefits from Canada or Quebec Pension Plan
in59-13 13- Retirement pensions, superannuation and annuities
in59-14 14- Old Age Security and Guaranteed Income Supplement
in59-15 15- Child Tax Benefit
in59-16 16- Provincial or municipal social assistance or welfare
in59-17 17- Child custody support
in59-18 18- Spousal support
in59-19 19- Other (such as rental income, scholarships, parental leave) (specify) in59-19s _____
in59-20 20- None
in59-98 98- DNK
in59-99 99- NR/R

1- ᐅᒪᔨᓕᓇᕐᔪᐊᓂᑦ
2- ᑭᓇᐅᔭᑦᓴᓂᑦ
3- ᑭᓇᐅᑦᔪᓴᐳ ᓇᒻᒥᓂᖅ ᐱᓵᓂᒻᒧᑦ
4- ᑐᖅᖅᒪᐱᓂᑦ ᖃᑐᑦᕈᐊᐱᓂᔭᓂᓗᓂᑦ (ᑲᑎᑦᓯᐊᐱᓂᔭᓂᐳ)
5- ᖃᑲᔭᓂᐅᑎᓂᐳ
6- ᐊᓂᓂᓯᒪᔨᖅᑲᓂᒻᒪᑦ ᐃᒻᒪᖅᑲᐅᑎᓂᐳ
7- ᓄᑕᑦᓴᖅᑲᔭᓂᒧᑦ/ᐱᐊᑎᑦᓴᖅᑲᔭᓂᒧᑦ
8- ᓯᐳᑯᑌᓂᔭᓂᒧᑦ ᓄᖅᑲᖅᓴᑎᑕ
9- ᓴᓇᐅᒪᔭᓂᒧᑦ ᒥᔭᓯᔭᓂᒧᑦ
10- ᐊᓂᔭᖅᒥᓂ ᐱᖅᑲᔭᖅᖅᑎᑐᓂ ᑲᒪᓂᔭᒧᑦ
11- ᑲᑎᒪᔨᐅᐱᓂᓂ ᐃᓕᐅᓂᔭᒧᑦ
12- ᐃᓄᒻᒪᓇᓐᓂᐅᑎᓂᐳ ᑲᓇᑕᒥᐳ ᑯᐯᐳ ᑲᑕᒪᐳᑯᓂᓂᓕ
13- ᐃᓄᒻᒪᓇᐅᓐᓂᐅᑎᓂᐳ ᐱᓇᓯᒪᔨᒥᒥᒥ, ᐃᓄᒻᒪᓇᐅᓂᔭᒥᓄᓂᑦ ᓄᖅᑲᖅᓴᒪᐅᑎᓂᐳ
14- ᐃᓄᒻᒪᓇᐅᓐᓂᐅᑎᓂᐳ
15- ᐱᐊᑎᔨᓯᐅᑎᓂᐳ
16- ᐃᑲᔪᑎᓂᐳ
17- ᐱᐊᑎᔨᒥᑕ ᔭᕐᒥᔭᐅᔪᒍᑎᓄᑦ
18- ᐁᑦᕿᒥᓂᐳ ᐊᐱᑦᓯᒪᔨᓯᓂ ᑭᓇᐅᔭᔨᓂᐳ ᐱᓯᒥᓂᐳ
19- ᐊᓯᖅᑦ (ᐅᑦᑐᑎᒥᓄᒥᑦ ᐃᓕᓄᑦᓴᖅᑐᒍᑎᓄᓄᑦ, ᐃᓕᓐᓂᐊᓂᔨᒥᓄᑦ, ᓄᑎᔨᒋᑲᒥᐅᓂᔭᒧᑦ/ᐱᐊᑎᔨᒋᑲᒥᐅᓂᔭᒧᑦ ᓄᖅᑲᖅᓴᒪᔪᑎᓂᐳ) (ᓇᓄᓂᔭᔪ)

_____

20- ᐱᓯᔪᖅᖅᑎᑐᖅ
98- DNK
99- NR/R

**60. What was your <u>main</u> source of income?** **60.** ᓇᖅᓕᐊᓂᖅ ᑭᓇᐅᑦᔨᖏᖅᓂᕐᐅᓯᐅᒪᐃᓕᖅ?

**Show card E and Circle one answer only**

in60

1- Hunter support program
2- Wages and salaries
3- Income from self-employment
4- Dividends and interest (such as on bonds, savings)
5- Employment insurance
6- Worker's compensation
7- Maternity leave
8- Preventative leave
9- Carvers, sewing
10- Home Day Care
11- Participation to Committees
12- Benefits from Canada or Quebec Pension Plan
13- Retirement pensions, superannuation and annuities
14- Old Age Security and Guaranteed Income Supplement
15- Child Tax Benefit
16- Provincial or municipal social assistance or welfare
17- Child custody support
18- Spousal support
19- Other (such as rental income, scholarships, parental leave) (specify)
in60-19s _____
20- None
98- DNK
99- NR/R

1- ᐅᒪᔨᓕᓇᕐᑐᓂᖅ
2- ᑭᓇᐅᔭᖏᓂᖅ
3- ᑭᓇᐅᑦᔨᖏᓂᖅ ᓇᒻᒥᓂᖓ ᐱᖏᓂᒧᑦ
4- ᑐᖓᖏᒪᐃᓂᖅ ᖃᑐᖏᖅᒥᐊᓂᔪᓂᕐᓂᖅ (ᑲᑎᖃᓯᐊᓂᖏᓂᓂᖅ)
5- ᖃᑲᖏᓂᐅᑎᓂᖅ
6- ᐊᓂᓂᓯᒪᔨᖏᑦᑕᖏᑦᒪᑦ ᐃᒻᒪᖏᑲᐅᑎᓂᖅ
7- ᓄᑕᖅᑎᖏᑲᓂᒍᑦ/ᐱᐊᖅᑎᖏᑲᓂᒍᑦ
8- ᓯᕗᔪᑦᓂᖏᒍᑦ ᓄᖏᑲᖓᒪᑎᑕ
9- ᖁᓇᐅᒪᖏᓂᒍᑦ ᒥᖏᓯᓂᒍᑦ
10- ᐊᓂᖏᕿᒥᓂ ᐱᖏᑲᖏᖏᑐᑐᓂ ᑲᒪᓂᖏᒍᑦ
11- ᑲᑎᒪᓕᐅᐃᓂᓂ ᐃᓕᐅᓂᖏᒍᑦ
12- ᐃᓄᒻᒪᓇᓂᓂᐅᑎᓂᖅ ᐊᓇᑕᒥᖅ ᑯᐯᖅ ᑲᑦᒪᖅᑯᓂᓗ
13- ᐃᓄᒻᒪᓇᐅᓂᓂᐅᑎᓂᖅ ᐱᓇᓯᒪᖏᒥᖅ ᓄᖏᑲᖓᒪᓕᕿᒥ, ᐃᓄᒻᒪᓇᐅᓂᖏᒥᓄᓂᒍᑦ ᓄᖏᑲᖓᒪᐅᑎᓂᖅ
14- ᐃᓄᒻᒪᓇᐅᓂᐅᑎᓂᖅ
15- ᐱᐊᖅᓯᓂᐅᑎᓂᖅ
16- ᐃᑲᔪᑎᓂᖅ
17- ᐱᐊᖅᒥᑕ ᓴᓗᒻᒥᔭᐅᔪᑎᓄᑦ
18- ᐁᑦᑕᒥᓂᖅ ᐊᐃᑦᓯᒪᑦᓯᓂ ᑭᓇᐅᔭᖏᓂᖅ ᐱᓯᒥᓂᖅ
19- ᐊᓯᖏᑦ (ᐅᑦᔨᑎᑎᓗᑦ ᐃᑦᓗᒍᖏᖏᖅᑐᑎᓄᑦ, ᐃᓕᓴᕐᓂᐊᕐᓂᖅ/ᐱᐊᖅᑦᑭᖏᒻᒥᐅᑎᓂᒍᑦ ᓄᖏᑲᖓᒪᔪᑎᓂᖅ) (ᓇᓗᓂᒻᓗᔪ)

_____

20- ᐱᓯᔪᖓᒥᑐᖅ
98- DNK
99- NR/R

**61. What is your best estimate of your total personal income, before taxes and other deductions, from all sources in the past 12 months?**

**61.** ᒥᑦᓴᐅᔪᓴᓂᒥᑦ ᑲᑎᑦᓂᒥᑎᑦ ᑭᓇᐅᑦᑲᔪᓴᐃᓂᑎᑦ ᖃᓄᖅᑐᕐᑦ, ᒡᓕᓂᔪᓴᑦᑕᐅᓪᓚᐅᔪᕐᓗᑎᑉ ᐊᓯᖏᐅᓪᓚᐅᔪᕐᓗᑎᑉ, ᐃᓗᓐᓇᓪᓕᒫᑐᕐᓂᑉ ᑕᕐᕿᓂᑉ 12ᓂ ᐊᑐᑎᓪᓚᐅᔪᓴᑐᓂ?

n61

1- Less than $20,000
2- $20,000 to less than $40,000
3- $40,000 to less than $60,000
4- $60,000 or more
8- DNK
9- NR/R

1- $20,000 ᒥᑦᓂᑎᓄᑦ
2- $20,000-ᒥᑦ $40,000-ᐅᑦ ᒥᑦᓂᑎᓵᓄᑦ
3- $40,000-ᒥᑦ $60,000-ᐅᑦ ᒥᑦᓂᑎᓄᑦ
4- $60,000-ᒥᑦ ᐅᖃᒪᒃᓄᓪᓗ
8- DNK
9- NR/R

**62. Which of the following best describes your present job status?**

**62.** ᓇᖕᓕᐊ ᓇᓪᐅᐅᑦᓂᔪᓴᐅᔪᒃ ᑕᒪᑕᒪ ᐱᓇᓂᒪᖏᑦ ᖃᐅᔨᓴᕐᓂᖅᓯᓂᖅᓯᓂᒃᓄᓄᑦ?

**Show card F and circle one answer only**

in62

1- Work full-time (with a salary)
2- Work regular part-time (with a salary)
3- Work occasionally on call (with a salary)
4- Self-employed (specify)
in62-4s _____
5- Hunter support program
6- Housework
7- Retired or on pension
8- Unemployment insurance
9- Social welfare
10- Student
11- Other (specify)
in62-11s _____
98- DNK
99- NR/R

1- ᐊᑕᐊᒥᑎ ᐱᓇᓂᑐᖅ (ᑭᓇᐅᑦᓴᓴᓂᓂᓂ)
2- ᐱᓇᓂᑐᖅ ᑲᔪᓂᔪᒥᑎ (ᑭᓇᐅᑦᓴᓴᓂᓂᓂ) ᑌᒪᖏᓕᒫᓴᓂ
3- ᐃᓕᖏᒪᓐᓂᑎ ᐱᓇᓂᓯᖅ (ᑭᓇᐅᑦᓴᓴᓂᓂ ᐊᑐᐃᓇᐅᒪᑦᓂᓂ ᐱᓇᓂᐊᖏᑲᓂᕐᓂᓂ)
4- ᓇᒪᒥᓂᖅ ᐱᓇᓂᐊᒪᓕᑎ (ᓇᓗᓂᑦᓗᔪ)

_____

5- ᐅᒪᔨᓕᓇᕆᑦᑯᓂ
6- ᐃᖕᓗᓂᑦᓴᑎᑎ
7- ᐃᓂᒪᒪᓇᐅᓂᑦᒍᑦ ᓂᖏᖏᖏᒪᓕᓂᑦᑐᖅ
8- ᖏᑲᖏᓂᐅᑎᑎᑦᑕᑐᖅ
9- ᐃᑲᔨᑎᑦᑕᑐᖅ
10- ᐃᓕᖕᓂᐊᑎ
11- ᐊᓂᐊᓂᖅ (ᓇᓗᓂᑦᓗᔪ)

_____

98- DNK
99- NR/R

**Thank you very much for your cooperation!** ᓇᑯᖏᒥᒪᓇᐊᓗᓕᖅ ᐃᑲᔨᖏᓂᐊᖏᑦ!

**Language of the interview**

nguage

1- Inuktitut only
2- English only
3- Inuktitut and English
4- French only
5- Inuktitut and French

## APPENDIX E

## Ethics approvals (Australia and Canada)

Australian National University

21st October 2014

Dear Ms Ursula King,

Protocol: 2014/033
Is hunting still healthy? Understanding the interrelationships between Indigenous participation in land-based practices and human-environmental health

I am pleased to advise you that your Human Ethics application received approval by the Chair of the Science & Medical DERC on 21 February 2014.

For your information:

1. Under the NHMRC/AVCC National Statement on Ethical Conduct in Human Research we are required to follow up research that we have approved.
Once a year (or sooner for short projects) we shall request a brief report on any ethical issues which may have arisen during your research or whether it proceeded according to the plan outlined in the above protocol.

2. Please notify the committee of any changes to your protocol in the course of your research, and when you complete or cease working on the project.

3. Please notify the Committee immediately if any unforeseen events occur that might affect continued ethical acceptability of the research work.

4. Please advise the HREC if you receive any complaints about the research work.

5. The validity of the current approval is five years' maximum from the date shown approved. For longer projects you are required to seek renewed approval from the Committee.

All the best with your research,

Kim

Ms Kim Tiffen

Human Ethics Manager

Research Integrity & Compliance,

Research Services,

Ground Floor, Chancelry 10B

The Australian National University

ACTON ACT 2601

T: +61 6125 3427

human.ethics.officer@anu.edu.au

# ENQUÊTE DE SANTÉ CHEZ LES INUITS DU NUNAVIK – 2004

## UTILISATION DES DONNÉES ET DES ÉCHANTILLONS SANGUINS

## FORMULAIRE D'ENGAGEMENT POUR LE RESPECT DES NORMES ÉTHIQUES

L'Institut national de santé publique du Québec (INSPQ) autorise l'utilisation et transmet à :

Nom : Chris Furgal
Organisme : *Trent University*
Adresse : Environmental Sciences / Studies Department and
Department of Indigenous Studies
1600 West Bank Drive, Peterborough, ON K9J 7B8

des données provenant de l'enquête de santé effectuée en 2004 auprès de la population inuite du Nunavik. Ces données concernent : (***Description of what parameters the data focus on***) :
place of residence, gender, participantion to traditional (land based) activities and physiological / biological parameters hypothesized to be affected by relationship to the land (self-reported health, CF consumption, social networks, smoking and other health behaviours, anxiety and mental health, diabetes and treatment, blood pressure and treatment, blood profile data re : fats)

Les données fournies sont non nominatives. L'INSPQ ne les rend disponibles que pour l'étude proposée par le demandeur. ***(The data are non personalized, the INSPQ only makes them available only for the proposed study outlined by the applicant)***

**Le demandeur s'engage :**

- à les garder en lieu sûr et à ne les rendre accessibles qu'aux personnes désignées par le demandeur, soit : ***(The applicant will keep them stored in a safe place and access will only be provided to those individuals designated by the applicant, they are :)***

-Data will be stored under lock and key on a password protected computer and will be provided to two individuals for analysis and research : Dr. Ursula King (Australia National University, PhD Candidate in Epidemiology) and committee member Dr. Helen Berry (University of Canberra, Faculty of Health);

- à les utiliser et en diffuser les résultats selon les exigences de l'INSPQ décrites dans le cadre de gestion de banques de données et des prélèvements sanguins (Juin 2005);
- à ne pas les transmettre à d'autres personnes, collègues ou chercheurs extérieurs;
- à ne les utiliser que pour les fins décrites dans leur demande;
- à ne mener aucune autre étude avec ces données sans en présenter la demande à l'INSPQ; le cas échéant, le demandeur s'engage à détruire les données;
- à acheminer à l'INSPQ trois copies des rapports ou publications tirées de ces données, dont une sera remise à la Régie régionale de la Santé et des Services sociaux du Nunavik et une autre au *Nunavik Health and Nutrition Committee*.

***English below*:**

**-to use them and distribute the results of them according to the requirements of the INSPQ described within the data management framework and policies for the use of**

**blood samples (June 2005);**

- **not to share or provide access to other external individuals, colleagues or researchers;**
- **to use them only for the ends described in the project request;**
- **not to undertake any other study with these data without presenting the request to the INSPQ;**
- **if necessary, the applicant agrees and promises to destroy the data upon completion of the proposed analysis;**
- **to share with the INSPQ, three copies of the reports or publications generated from these data, of which one will be given to the Public Health Director of the Nunavik Health and Social Services one other to the Nunavik Nutrition and Health Committee.**

**Demandeur : Chris Furgal**

**Organisme : Trent University**

**Date : November 5, 2011**

**Danielle Saint-Laurent**
**Responsable du Comité d'évaluation des demandes d'accès aux données**
**Institut national de santé publique du Québec**
**Date :**

## APPENDIX F

## Published manuscript

### Title: Linking Indigenous and Scientific Knowledge of Climate Change

**Authors:** Chief Clarence Alexander[1], Nora Bynum[2], Liz Johnson[2], **Ursula King**[3], Tero Mustonen[4], Peter Neofotis[5], Noel Oettlé[6], Cynthia Rosenzweig[7], Chie Sakakibara[8], Chief Vyacheslav Shadrin[8], Marta Vicarelli[5], Jon Waterhouse[1], and Brian Weeks[2]

[1]Yukon River Inter-Tribal Watershed Council, USA

[2]American Museum of Natural History, USA

[3]National Centre for Epidemiology & Population Health, Australian National University, Australia

[4]The Snowchange Cooperative, Finland

[5]Columbia University, USA

[6]Environmental Monitoring Group, Nieuwoudtville, South Africa

[7]NASA Goddard Institute for Space Studies, USA

[8]Appalachian State University, USA

[9]Yukaghir Elders Council, Russia

Statement of student contribution:

Authorship: C.A., U.K., T.M., N.O., C.S., V.S., and J.W. provided indigenous knowledge narratives and expert advice; C.R., P.N., and M.V. assembled the studies and narratives. N.B., L.J., and B.W. organized the conference that brought the knowledge-holders together. C.R., P.N., M.V., N.B., L.J., B.W., T.M., and U.K., wrote the paper. All authors jointly conceived the paper's framework, reviewed and provided feedback on drafts, and approved the final manuscript.

*N.B. To respect the request by the Indigenous collaborators on this paper not to privilege any one persons contribution, it was agreed authorship would be listed alphabetically rather than according to the usual academic preference of 1st author, 2nd author etc. based on extent of contribution.*

**Publication outlet and status:** *BioScience*, 61(6), 477-484.

**Abstract:** We present indigenous knowledge narratives and explore their connections to documented temperature and other climate changes and observed climate change impact studies. We then propose a framework for enhancing integration of these indigenous narratives of observed climate change with global assessments. Our aim is to contribute to the thoughtful and respectful integration of indigenous knowledge with scientific data and analysis, so that this rich body of knowledge can inform science, and so that indigenous and traditional peoples can use the tools and methods of science for the benefit of their communities if they choose to do so. Enhancing ways of understanding such connections are critical as the Intergovernmental Panel on Climate Change Fifth Assessment process gets underway.

# Linking Indigenous and Scientific Knowledge of Climate Change

CLARENCE ALEXANDER, NORA BYNUM, ELIZABETH JOHNSON, URSULA KING, TERO MUSTONEN, PETER NEOFOTIS, NOEL OETTLÉ, CYNTHIA ROSENZWEIG, CHIE SAKAKIBARA, VYACHESLAV SHADRIN, MARTA VICARELLI, JON WATERHOUSE, AND BRIAN WEEKS

*We explore the connections among indigenous climate-related narratives, documented temperature changes, and climate change impact studies from the scientific literature. We then propose a framework for enhancing synthesis of these indigenous narratives of observed climate change with global assessments. Our aim is to contribute to the thoughtful and respectful integration of indigenous knowledge with scientific data and analysis, so that this rich body of knowledge can inform science and so that indigenous peoples can use the tools and methods of science for the benefit of their communities if they choose to do so. Improving ways of understanding such connections is critical as the Intergovernmental Panel on Climate Change Fifth Assessment Report process proceeds.*

*Keywords: climate change, observed impacts, indigenous knowledge, assessment, temperature change*

**Ironically and tragically, climate change is being experienced** by many indigenous communities that have not participated in the industrial activity that is its primary cause. Climate change's negative effects on indigenous communities go beyond immediate threats to food supply (Diffenbaugh et al. 2007, Parry et al. 2007) to encompass aspects of health such as susceptibility to diseases as epidemiologies are affected by environmental factors (McCarthy et al. 2001, NAST 2001) and as long-lasting cultural disturbances and losses affect well-being (Green et al. 2009, Sakakibara 2008, 2009).

> *"Traditional knowledge is still underused by science, although it is of great value and can contribute significantly to the development of humankind."*
>
> *—Chief Vyacheslav Shadrin*

In this article, we explore possible complementarities among indigenous and scientific knowledge systems and discuss the potential for enhancing integration of indigenous observations of climate change with global assessments such as those of the Intergovernmental Panel on Climate Change (IPCC). Because the IPCC is subject to intense public scrutiny, it tends to rely primarily on information from peer-reviewed scientific studies and, in the past, has largely excluded traditional indigenous knowledge as a source of information for its assessment reports as a result of a general bias against evidence from non-peer-reviewed sources. *Science*—here, defined as a set of statistically analyzed data or instrumental records—rests on precise definitions of independent and dependent variables that can be empirically measured and that demonstrate acceptable levels of reliability and validity. Such quantitative rigor is not necessarily at the core of *indigenous knowledge*, which can be defined as "knowledge that an indigenous or local community accumulates over generations of living in a particular environment" (*www.unep.org*). However, we have found that indigenous knowledge can provide complementary information that has particular value in determining patterns of climate change for regions in which there are limited instrumental records. It can provide a broader picture of the impacts of climate change by putting scientific changes in the context of a human landscape. Although they are relatively limited in number, the indigenous knowledge records presented here represent different global regions and illustrate their general validity and potential usefulness.

## Traditional ecological knowledge

*Traditional ecological knowledge* (TEK) is a subset of indigenous knowledge that can be understood as "a cumulative body of knowledge, practice, and belief, evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment" (Berkes 1999, p. 8). TEK is often an integral part of the local culture and environment and sometimes includes management advisories adapted to specific areas. TEK can include diverse kinds of narratives or observations by an indigenous person or group (Menzies and Butler 2006). These narratives, in turn, can provide intergenerational observations of various kinds of natural resource phenomena.

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Since the 1980s, various forms of TEK have come to be commonly accepted by scientists in the fields of agriculture (Warren 1995), pharmacology (Schultes 1989), water engineering (Groenfelt 1991), architecture (Fathy 1986), ethnobotany (Nebhan 2002, Schultes and von Reis 2008), ethnozoology (Clement 1995), irrigation systems (Mabry 1996), soil and water conservation (Reij et al. 1996), and ethnoastronomy (Celi 1978) and by social scientists (Nelson 1980, Feld 1982, Freeman 1984, Allen 1998). TEK can be found all over the world, particularly within indigenous traditions across diverse geographical regions from the Arctic to the Amazon, and represents various understandings of ecological relationships, spirituality, and traditional systems of resource management. In recent decades, resource managers have gradually begun to embrace the usefulness of applying TEK to contemporary stewardship issues in various parts of the world (WCED 1987, UN 2008).

There are both similarities and differences between TEK and Western science (Berkes 1993, 1999, Ingold 2000). The recent and increasing academic and scientific interest in TEK has created a new reciprocal relationship that facilitates a synthesis of the two worlds through dialogue (Huntington 1992, Albert 2001, Fox 2003, Brewster 2004, ELOKA 2010). Although the path for integration of TEK with Western science for environmental management is new, there are now constructive opportunities for indigenous and scientific communities to collaborate, as in this case, on the crucial issue of climate change.

We are aware that any attempt to join scientific and indigenous knowledge systems may reflect the history of power relationships between indigenous groups and nonindigenous groups (Simpson 2004). We further recognize that traditional knowledge is not uniform, even within small communities, and that there can be substantial variation in the substance of TEK reported in what appear to be homogenous indigenous communities. Our aim is to contribute to the thoughtful and respectful integration of indigenous knowledge with scientific data and analysis so that this rich body of knowledge can inform science, and science can in turn perhaps contribute tools and methods that will allow indigenous communities to make informed decisions about their current situations and future prospects. Faithfully representing the people, voices, and history that hold much of the richness of indigenous knowledge is difficult, but by opening a pathway for the meaningful exchange of information, we hope that efforts to understand, adapt to, and mitigate climate change will be strengthened. This is especially true if the intent is to develop a methodology that might serve as a building block for similar comparisons in the future, and in which findings may be aggregated to build a larger body of knowledge.

## Climate change

For many indigenous communities, climate change is already altering physical, biological, and social systems. Initiatives such as the *Stories of the Raven* detailed such changes in narratives set forth at a three-day meeting with representatives from all circumpolar nations and various indigenous peoples (Mustonen 2005). The Arctic Climate Impact Assessment (ACIA 2005), prepared by more than 300 participants from 15 countries, includes many examples drawn from the local traditional knowledge of Inuit, Sami, Athabaskans, Gwich'in, Aleut, and other Arctic indigenous peoples. These publications demonstrate some of the possibilities for bringing diverse groups together to frame challenges related to climate change.

To further explore the challenges that climate change poses to indigenous groups and the role of indigenous knowledge in responding to climate change, the Center for Biodiversity and Conservation of the American Museum of Natural History (AMNH) brought together a panel in 2008 on indigenous

**Box 1. Participants in the Panel on Indigenous Peoples and Climate Change at the Sustaining Cultural and Biological Diversity in a Rapidly Changing World: Lessons for Global Policy Conference, American Museum of Natural History, 2–5 April 2008.**

Chief Clarence Alexander, Yukon River Inter-Tribal Watershed Council, United States.
Nora Bynum, American Museum of Natural History, United States.
Violet Ford, Inuit Circumpolar Council, Canada.
Elizabeth Johnson, American Museum of Natural History, United States.
Ursula King, National Centre for Epidemiology and Population Health, Australian National University, Australia.
Tero Mustonen, The Snowchange Cooperative, Finland.
Peter Neofotis, Climate Impacts Group, Columbia University; and City University of New York, United States.
Noel Oettlé, Environmental Monitoring Group, Nieuwoudtville, South Africa.
Cynthia Rosenzweig, NASA Goddard Institute for Space Studies, United States.
Chie Sakakibara, Appalachian State University, United States.
Chief Vyacheslav Shadrin, Head of the Yukaghir Elders Council, Russia.
Marta Vicarelli, Columbia University, New York City.
Jon Waterhouse, Yukon River Inter-Tribal Watershed Council, United States.
Ellen Wiegandt, Graduate Institute of International and Development Studies, Geneva, Switzerland.

peoples and climate change as part of a larger conference titled Sustaining Cultural and Biological Diversity in a Rapidly Changing World: Lessons for Global Policy (April 2–5, *http://symposia.cbc.amnh.org/biocultural*). The panel consisted of indigenous group leaders, scholars of indigenous knowledge, and climate change impact scientists (box 1). The goal was to provide some initial findings regarding the following questions: (a) Are indigenous communities experiencing and responding to climate change? (b) Do indigenous narratives relate to observed changes in temperature and other climate variables and vice versa? (c) Do indigenous narratives relate to climate change impact studies and vice versa?

Fifty-seven indigenous narratives describing climate change and its impacts were gathered from sources provided by the panel participants at the AMNH conference. The sources were either formal presentations or papers contributed by the some of the conference participants, representing observations from certain indigenous groups or communities (Mustonen 2005, Oxfam America 2007, Archer et al. 2008, Rhoades et al. 2008, Sakakibara 2008, 2009, 2010, Castillo 2009a, 2009b, Green et al. 2009). The narratives were assembled in a database and characterized by source and indigenous group, as well as by latitude and longitude. The latter represents the central location of the climate change impacts, either provided by the participants or approximated using NASA World Wind (*http://worldwind.arc.nasa.gov/download.html*) (figure 1). The narratives provided by the indigenous conference participants add a needed human dimension to the scientific observations of climate change. We focused on compiling narratives relating to climate change and not on compiling those documenting factors at work other than climate change. The observations were categorized as to whether the reported changes were expected symptoms of regional warming or cooling.

A geographic information system (ArcView GIS 9.3.1; Esri, Redlands, California) was used to overlay the locations of the narratives with temperature changes from 1970 to 2004 and with data from peer-reviewed studies documenting physical and biological climate-related changes (Rosenzweig et al. 2008). Two different gridded observed temperature data sets were used: HadCRUT3 (Brohan et al. 2006) and GHCN-ERSST (Smith and Reynolds 2005).

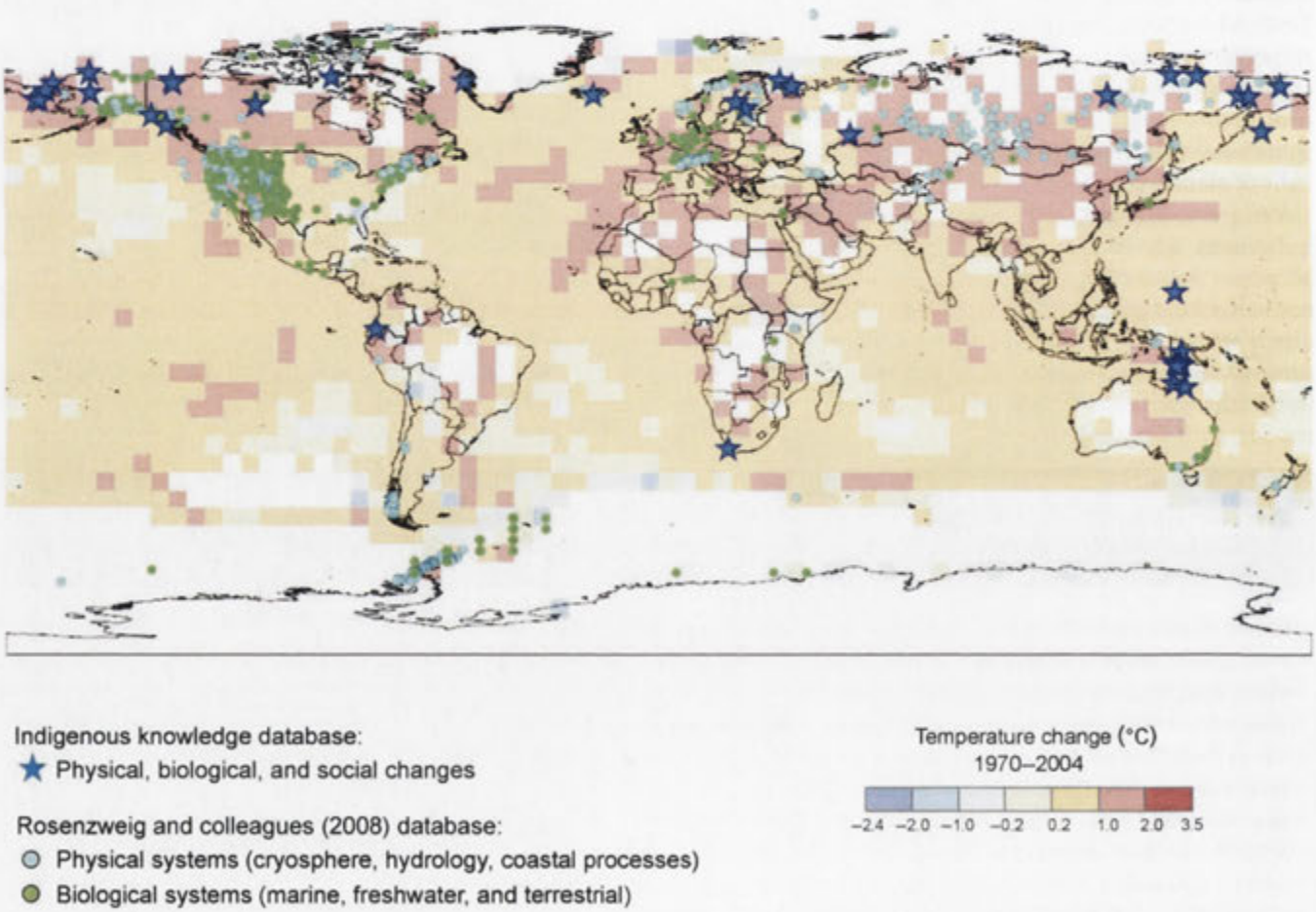


***Figure 1. Locations of physical and biological changes described in indigenous narratives and in peer-reviewed scientific studies overlaid on global HadCRUT3 temperature trends (Brohan et al. 2006). The circles represent locations of statistically significant trends in changes in either direction in systems related to temperature change or to other climate change variables and that contain data from at least 20 years between 1970 and 2004 (Rosenzweig et al. 2008). The stars indicate the central location of the climate change impacts described in the indigenous narratives provided by the panel participants.***

### Narratives related to impacts and adaptation

The collected narratives were related to the impacts of and adaptations to changing climate in North America, Europe, Asia, Oceania, Latin America, and Africa, but in this article, we focus primarily on the Northern Hemisphere high latitudes, where the predominance of the indigenous narratives from the participants originated. The assembled knowledge indicates in an exploratory way widespread impacts on indigenous populations perceived to be caused by global climate change. We acknowledge that the individual holders of indigenous knowledge are diverse and that reports from a number of individuals might reveal a wide range of observations. Future work in this area should involve more narratives from a larger group of participants and should involve further qualitative analysis and synthesis of the narratives. If narratives are to contribute to specific resource-management decisions, interviews with multiple observers and experts should be conducted, and all available sources of information should also be synthesized. However, even in its present form, this means of gathering individual narratives and knowledge mapping from the perspective of indigenous communities offers a view of the impacts of climate change experienced by local communities, broadening the understanding of climate change beyond what is measured by instruments (e.g., sensors that monitor glacial wastage).

### Northern high latitudes

In the northern high latitudes, particularly in North America and Asia, recent warming has resulted in physical, biological, and social changes in many communities (Parry et al. 2007). These alterations are often complex, and applying directional generalities can be difficult. However, changes in the northern high latitudes, found at multiple locations by multiple groups, have several shared characteristics:

**Many polar animals are being affected negatively.** The melting of snow and ice and increased variability has had a profound effect on the migration patterns of some birds and mammals, with several species of fauna particularly affected. These species include the bowhead whale (*Balaena mysticetus*) and the reindeer (*Rangifer tarandus*); the latter also shows signs of malnourishment (Mustonen 2005, Sakakibara 2009).

**Hunters are often having less success.** Changes in animal behavior, often accompanied by signs of stress, have caused problems for some indigenous hunters (Mustonen 2005, Sakakibara 2008, 2009).

**Hazards are increasing.** There are some reports that thinning ice jeopardizes modes of transportation, and that melting permafrost destabilizes community infrastructure (Mustonen 2005, Sakakibara 2008).

**Exotic species are appearing.** Rarely encountered or exotic species, such as willow trees (*Salix* spp.) and beavers (*Castor canadensis*), are migrating into some areas. Mosquitoes are increasing in abundance in some places. Some of these species changes necessitate the development of new food-gathering strategies (Mustonen 2005, Sakakibara 2008, 2009, 2010).

**Forest fire frequency appears to be increasing.** In some places, adversely affected land mammals, such as caribou (*Rangifer tarandus groenlandicus*), are modifying their migratory patterns, and causing geographic and temporal changes in indigenous livelihood practices (Mustonen 2005).

### Oceania, Latin America, and Africa

Some of the narratives from Oceania, Latin America, and Africa (which were of limited numbers in this collection) relate to impacts affecting health, coastal livelihoods, water resources, and food production, as well as adaptation to changes in climate regimes. For example, the impacts of climate change on the indigenous peoples in Australia may bring disproportionate burdens:

> For many indigenous people, a connection with "country"—a place of ancestry, identity, language, livelihood and community—is a key determinant of "health"... Therefore, as ecosystems change due to biophysical impacts and extreme weather events, many traditional owners living in remote areas are likely to face increased physiological, psychological, economic and spiritual stress as it becomes more difficult to "look after their country." (Green et al. 2009)

On the north coast of Australia, Aborigines have reflected on how climate change–induced animal migrations and sea-level rise threaten their own survival and identities (Castillo 2009a, 2009b). For example, saltwater intrusion threatens the Kowanyama, a coastal Aboriginal community in tropical Queensland, Australia. The delicate balance of freshwater from the rivers and ocean saltwater has in the past nurtured the life of the area. However, the Kowanyama report that the tide comes farther and farther inland each year, threatening terrestrial plant and animal life and freshwater ecosystems (Castillo 2009b). In the Torres Strait Islands, off the far north coast of Australia, the Saibai have adapted to higher sea levels by raising their homes on stilts, a return to traditional housing design (Green 2006). In Peru, changing climate regimes, a result of melting glaciers, have had detrimental effects on water supplies (Rhoades et al. 2008). In South Africa, droughts have had an influence on the methods of farming used to produce traditional teas (Archer et al. 2008).

### Spatial correspondence of indigenous observations and temperature changes

To explore the complementarities of indigenous and scientific knowledge, we first overlaid the geographic locations of the narratives onto a map of observed temperature data. We found that the majority of the narratives were from indigenous communities located in temperature cells with measured temperature increases (figure 1).

Narratives of observed changes in the northern high latitudes coincide with instrumentally observed changing temperature trends for the region (Parry et al. 2007). For several decades, the surface air temperature in the Arctic has risen at approximately twice the global rate (Trenberth et al. 2007). The warming trend is strongest over the interior parts of northern Asia and northwestern North America (ACIA 2005, Trenberth et al. 2007). Together with the Antarctic Peninsula, these are the most rapidly changing areas on the globe (Turner et al. 2007).

Narratives of warming effects that were located in cells with observed cooling may be a result of local warming's not being actively measured by scientific instruments and thus not contributing to aggregation at the 5 × 5 grid-box scale or may be related to global effects of warming, such as sea-level rise, rather than to local warming per se. Indeed, the six narratives from the Torres Strait north of Australia from cooling cells were all related to sea-level rise. These are six of the eight narratives located in grid cells with significant cooling. The two other such narratives were located in cells in Europe with slight cooling (0° to –0.2° Celsius), and the observed impacts there—both in the direction of warming, despite the slightly cooling grid cell—were related to animal migrations that could be influenced by the strong warming in adjacent grid cells.

## Linking to impact studies

To bring indigenous and scientific knowledge into a similar geographic context, we compared the locations of indigenous narratives with the locations of data series of observed changes included in peer-reviewed impact studies (Parry et al. 2007, Rosenzweig et al. 2008; figure 2; box 2). Many of these data series were over 35 years in length.

We found that the peer-reviewed observations of climate change impacts and the indigenous narratives located in the same cell were complementary, in that they both corresponded to system changes consistent with local-area warming temperatures. The presence of indigenous narratives in grid cells for which there may not be studies of climate change impacts showed that the indigenous narratives expand our knowledge of climate change impacts to regions that do not have scientifically documented changes. If this and other indigenous knowledge databases were to be expanded, more narratives from Oceania, Latin America, and Africa could prove very useful to climate science, since these are regions of the world

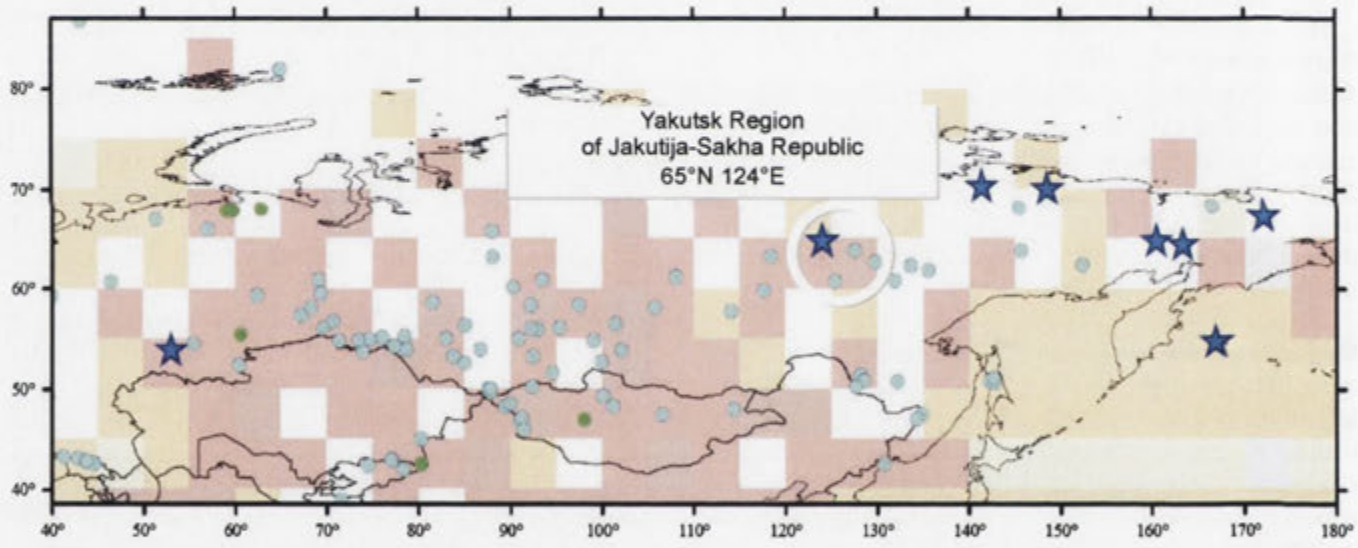


***Figure 2. Observed climate change impacts in Yakutsk, Russia, where changes described by indigenous narratives were located within 250 kilometers of observations from the peer-reviewed scientific literature (white circle). The blue circles represent locations of statistically significant trends in changes in either direction in systems related to temperature change or to other climate change variables and that contain data from at least 20 years between 1970 and 2004 (Rosenzweig et al. 2008). The stars indicate the central location of the climate change impacts described in the indigenous narratives provided by the panel participants.***

**Box 2. Narratives and evidence from the Yakutsk region.**

"Lakes are sinking as the permafrost melts, which means many fishing lakes have been lost. People have to go further, which is hard as the price of fuel goes up. Reindeer herders select routes based on weather forecasts so mistakes have detrimental effects."

*Source*: Vyacheslav Shadrin, Head of the Council of Yukagir Elders, 2005.

Mean monthly soil temperature data for 1930–1990 indicate that as temperatures have been rising, the active layer of permafrost has been deepening and the freezing depth has become more shallow.

*Source*: Frauenfeld et al. 2004.

generally lacking extensive long-term scientific data records of climate change impacts. We hope that development of this complementary framework will foster narratives and studies from other places in the world.

### Side-by-side approach

We next identified places where the indigenous knowledge observations were located within 250 kilometers (km) of data points from peer-reviewed studies. The stars on the map in figure 2 indicate the central location but do not cover the full extent of the region occupied by the indigenous groups and described in their narratives. For instance, the Iengra region, which is occupied by the 12 nomadic and seminomadic Yukaghir tribes, is a vast area covering multiple cells with significant warming (each cell being about 500 × 500 km). These examples further demonstrate how the two knowledge systems can complement each other (box 2). In Russia, changes in the ice and water content of lakes and streams, along with detrimental impacts on reindeer herders, coincide with climate-induced changes in seasonal freeze and thaw depths of permafrost (Frauenfeld et al. 2004). Further investigation into the relationships among these and other collocated reports is likely to yield more correspondences.

Indigenous narratives have also been linked with scientific data sets in other geographic areas (figure 3, box 3; Sakakibara 2009). In several Iñupiaq indigenous narratives, the changes in sea ice and whale migrations that have affected hunting success were described. This effect influences the Iñupiaq's spiritual and physical ties with the whale in relation to traditional musicmaking (Sakakibara 2009). These narratives were linked to NASA Earth Observations Records (NASA 2007). As time series of remotely sensed data become longer, further links between narrative and scientific observations may be found.

### Fostering connections

We found that indigenous knowledge can provide complementary information about climate change that has value in

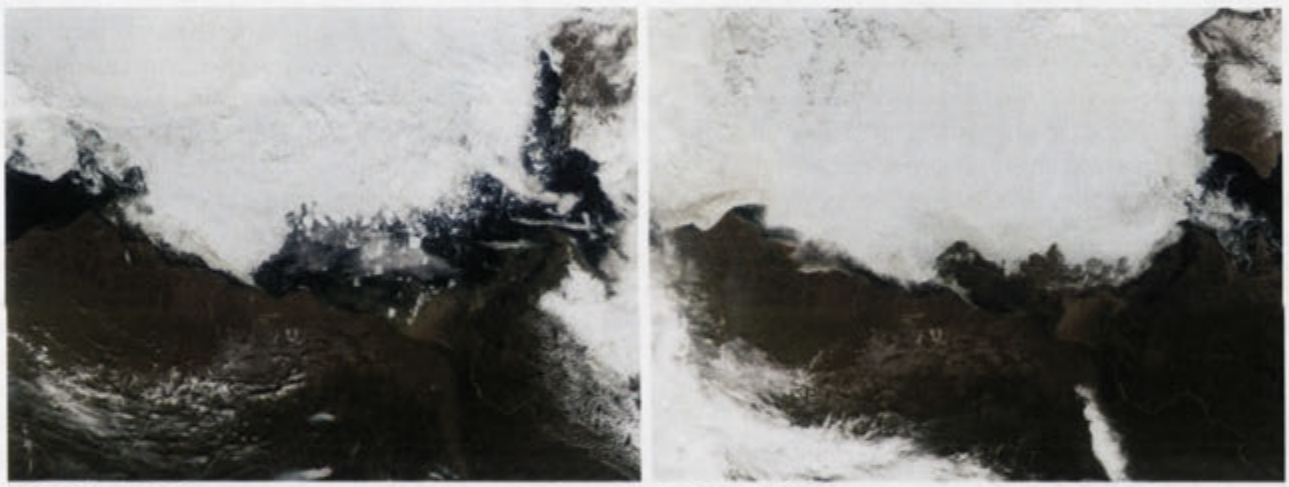


***Figure 3. Indigenous observations and remotely sensed data related to near-shore sea ice and whale hunting. Images of the Beaufort Sea, north of Alaska, and Canada's Yukon and Northwest Territories. The Moderate Resolution Imaging Spectroradiometer (MODIS) on NASA's Terra satellite captured these images on 25 July 2005 and 25 July 2006. Images: Courtesy of Jeff Schmaltz, MODIS Rapid Response Team at NASA Goddard Space Flight Center.***

**Box 3. Narratives and evidence from the Beaufort Sea area.**

Many Iñupiaq interviewees emphasized that the ice condition was out of the ordinary in both 2005 and 2006… An elderly captain stated that the 2006 spring season harvest in the North Slope Borough was the lowest in the past 35 years.

*Source*: Sakakibara 2009.

"Those poor whales out there in the ocean that we depend on. Are they going to come back to us? Are they going to really show up next year, like our ancestors always expected them for 20,000 years? We are heartily concerned."

*Source*: Earl Kingik, Iñupiaq tribesman.

Record melting during 2005 allowed old, thick ice from the north to drift into the Beaufort Sea. Some of this ice from the increased melting was pushed by wind toward the shore in 2006.

Though there was more ice in the Beaufort Sea at the end of July 2006 than there had been in previous years, the Arctic as a whole continued to melt at an ever-quickening pace. By June 2006, sea ice in the Arctic covered 1.2 million fewer square kilometers than the long-term average measured between 1979 and 2000. This put sea ice concentrations (the percentage of ice that covers a predefined area) at a record low for June, breaking the record set in June 2005, during which sea ice extent was down 0.8 million square kilometers from the average.

*Source*: NASA Earth Observatory 2007.

determining patterns for regions in which there are limited instrumental records. Furthermore, these narratives promote an expanded and multidimensional picture of the impacts of climate change by placing these changes in the context of a human landscape. Our indigenous knowledge assemblage is still at an embryonic stage, but we find these preliminary results promising and such linkages important to understanding climate change. Collating indigenous narratives in parallel with peer-reviewed studies represents a valuable approach to deepening assessments of the impacts of climate change and to sharing adaptive strategies. Indigenous knowledge, especially from remote areas, can contribute to a significant expansion of global knowledge and understanding of warming and sea-level rise that are already under way. This method of knowledge assemblage could also offer a voice to the larger universe of other resource-dependent communities beyond indigenous ones.

Currently, indigenous narratives are minimally included in the IPCC or other global assessments of climate change, because changes observed by local people are not frequently documented in peer-reviewed studies and are thus subject to the bias against non-peer-reviewed evidence. Yet indigenous narratives provide a rich source of information based on multigenerational knowledge about local climate that can contribute a great deal to science assessments, such as the IPCC, that provide policy-relevant information. Indigenous knowledge often deepens understanding about what climate change means for livelihoods, cultures, and ways of life beyond the understanding provided by statistically significant changes reported in the scientific literature. These narratives show that global climate change has already affected integrated physical, biological, and social ecosystems, especially in the northern high latitudes.

Guidance for the process of integrating indigenous narratives may be provided by the Convention on Biological Diversity (CBD), which has advanced a code of ethical conduct (a) to respect, preserve, and maintain the knowledge, innovations, and practices of indigenous and local communities embodying traditional lifestyles relevant to the conservation of biological diversity and sustainable use of natural resources; (b) to promote the wider application of indigenous knowledge with the approval and involvement of the holders of such knowledge; and (c) to encourage the equitable sharing of the benefits that arise from the utilization of such knowledge.

The IPCC could similarly provide guidance for how to include traditional knowledge in its assessments. Such a process of inclusion would enhance the IPCC Fifth Assessment Report process, which is now under way. Following and adding to the principles set forth by the CBD, this process could include (a) the full participation of indigenous and local communities in the detection and description of climate change impacts; (b) consideration and valuation of indigenous knowledge alongside scientific data obtained using statistically analyzed records; (c) a holistic approach that respects the spiritual and cultural values of the communities and allows indigenous knowledge to be brought forth in the form and format identified by the communities themselves; (d) an appreciation that indigenous knowledge can involve an integrated awareness of the stewardship of land, water, and living resources and that this knowledge can contribute to conservation and the sustainable use of resources; and (e) an understanding that access to indigenous knowledge will entail informed participation and approval from the holders of such knowledge.

We believe that it is crucial to foster linkages among indigenous and scientific knowledge systems. For example, in remote areas that do not have temperature data, indigenous knowledge narratives may be able to serve as proxy records. On the other hand, point data and remote-sensing measurements may aid in explaining phenomena that may be difficult to observe through tactile or visual means (e.g., ocean current strength and direction changes, ocean temperature, atmospheric oscillations). Our hope is that the relationship between the two knowledge systems can be strengthened and that there will be wide benefits both to indigenous communities and to scientific study. In the examples shown in this article, temperature and sea-ice records provide links to the global climate system, which is inarguably changing. The indigenous narratives resonate with human voices and with deep understanding and concern for our changing planet.

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*Chief Clarence Alexander, former Grand Chief of the Gwich'in Nation, and Jon Waterhouse are on the Yukon River Inter-Tribal Watershed Council, in Fairbanks, Alaska. Nora Bynum, Elizabeth Johnson, and Brian Weeks are affiliated with the American Museum of Natural History, in New York, New York. Ursula King is affiliated with the National Centre for Epidemiology and Population Health, Australian National University, in Canberra. Tero Mustonen is the Leader of the Snowchange Cooperative in Tampere, Finland. Marta Vicarelli is affiliated with Columbia University and Peter Neofotis is affiliated with Columbia University and the City University of New York, both in New York, New York. Noel Oettlé is affiliated with the Environmental Monitoring Group, Nieuwoudtville, South Africa. Cynthia Rosenzweig (crosenzweig@giss.nasa.gov) is with the NASA Goddard Institute for Space Studies, in New York, New York. Chie Sakakibara is at Appalachian State University, in Boone, North Carolina. Chief Vyacheslav Shadrin is the Head of the Yukaghir Elders Council in Yakutia, Russia.*

## APPENDIX G

### Published manuscript

**Title: Mind, Body, Spirit: co-benefits for mental health from climate change adaptation and caring for country in remote Aboriginal Australian communities**

**Authors:** Helen L Berry* [a b], James R. A. Butler [c], C. Paul Burgess [d], Ursula G King [b], Komla Tsey [e f], Yvonne L Cadet-James [e g], C. Wayne Rigby [h], Beverley Raphael [b]

a Faculty of Health, The University of Canberra
b College of Medicine, Biology and Environment, The Australian National University
c Australian Tropical Forests Institute, Commonwealth Scientific and Industrial Research Organisation, Cairns
d Menzies School of Health Research, , Institute of Advanced Studies, Charles Darwin University
e The Cairns Institute, James Cook University
f School of Education, James Cook University
g School of Indigenous Australian Studies, James Cook University
h Faculty of Nursing, Midwifery and Indigenous Health, Charles Sturt University

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**Abstract:**

Aboriginal wellbeing is strongly related to lifelong spiritual and resource-based connectedness to traditional country. Decades of displacement and, now, climate change constrain opportunities for connectedness to *healthy* country: through no fault of their own, Aboriginal people may be less able than they once were to honour their responsibilities to country. To be effective, public health policy must build on Aboriginal people's determination to care for country, traditional knowledge, formidable resilience and self-determination. Aboriginal-initiated natural resource management directed at climate change adaption would support caring for country. From this may flow substantial benefits for community strength and social and emotional wellbeing.

# Mind, body, spirit: co-benefits for mental health from climate change adaptation and caring for country in remote Aboriginal Australian communities

***Helen L. Berry*[A,B,J], *James R. A. Butler*[C], *C. Paul Burgess*[D], *Ursula G. King*[B], *Komla Tsey*[E,F], *Yvonne L. Cadet-James*[E,G], *C. Wayne Rigby*[H] *and Beverley Raphael*[B,I]**

[A]*Faculty of Health, The University of Canberra*

[B]*College of Medicine, Biology and Environment, The Australian National University*

[C]*CSIRO Sustainable Ecosystems and Climate Adaptation Flagship, Brisbane*

[D]*Menzies School of Health Research, Charles Darwin University*

[E]*The Cairns Institute, James Cook University*

[F]*School of Education, James Cook University*

[G]*School of Indigenous Australian Studies, James Cook University*

[H]*Faculty of Nursing, Midwifery and Indigenous Health, Charles Sturt University*

[I]*School of Medicine, University of Western Sydney*

[J]*Corresponding author. Email: Helen.Berry@canberra.edu.au*

**Abstract:** The evident and unresolved health disparity between Aboriginal and other Australians is testament to a history of systematic disenfranchisement. Stigma, lack of appropriate services and the expense of delivering services in remote settings make it impossible to adequately address mental health needs, including suicide, solely using a mainstream medical approach. Nor do mainstream approaches accommodate the relationship between Aboriginal health and connectedness to land, whether traditional or new land, remote or metropolitan. This review describes how caring-for-country projects on traditional lands in remote locations may provide a novel way to achieve the linked goals of climate change adaptation with co-benefits for social and emotional wellbeing.

There are links between the natural environment, cultural identity and health, especially among the world's indigenous peoples (we refer to indigenous peoples globally and Aboriginal Australians locally).[1] In Australia, the natural environment is threatened: the overwhelming weight of evidence suggests continuing and potentially catastrophic climate change, largely due to human actions.[2–4] Exposure to climate-related adversities will increase, and the most vulnerable communities and regions will be worst affected.[5] Reflecting a lack of research, policy and services for climate change and health in Australia, a *Tri-Ministerial Press Release* of 27 January 2009 on the health risks of climate change in Australia called for research to identify 'who will be most vulnerable and the action governments, individuals and communities can take to reduce the risks'.[6]

This paper describes how caring-for-country projects may provide a novel way to achieve the linked goals of climate change adaptation and co-benefits for remote Aboriginal social and emotional wellbeing. We summarise what is known about the environmental and health benefits of caring for country (defined in Box 1), together with the relationship between social processes in communities and mental health, and then link these in a proposed conceptual framework that illustrates how climate change adaptation may deliver co-benefits for wellbeing.

The health disparity between Aboriginal and most other Australians is well documented, as is the importance for Aboriginal people of lifelong connectedness to healthy country.[10,11] While we focus here on traditional lands, we acknowledge the importance for Aboriginal wellbeing of connectedness to new lands. Indeed, the last two centuries have seen people displaced from their traditional lands,[12] with remnants of populations relocated to remote area townships.[13] This movement has been associated with poor health outcomes for Aboriginal people[14,15] and for lands and seas. In their present state, many of these lands cannot offer their traditional custodians the benefits of connectedness to healthy country. Climate change poses a new threat to these lands, through physical, ecological and sociocultural

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**Box 1. Caring for country: definition**

For Aboriginal peoples, 'country' encompasses an interdependent relationship between Aboriginal peoples and their ancestral lands and seas.[7] 'Country is multi-dimensional – it consists of people, animals, plants, Dreamings, underground, earth, soils, minerals and waters, air ... People talk about country in the same way that they would talk about a person.'[8] 'Caring for country' means participation in inter-related activities on Aboriginal lands and seas with the objective of promoting ecological, spiritual and human health. It is also a community-driven movement towards long-term social, cultural, physical and sustainable economic development in rural and remote locations, contributing to the conservation of globally-valued environmental and cultural assets.[9] Aboriginal landowners deliver a broad suite of environmental services, including:

- Border protection
- Quarantine
- Wild fire abatement and carbon sequestration
- Controlling invasive weeds and feral animals
- Conserving biodiversity
- Fisheries management
- Water resource management
- Sustainable commercial use of wildlife
- Cultural maintenance.

changes.[16] Aboriginal and Torres Strait Islander people are particularly vulnerable: for example, many of the Torres Strait Islands' 7000 people live just 2 metres above sea-level.[17] Land degradation disproportionately disadvantages those living closest to the land,[18] especially Aboriginal Australians, who have and need a strong connection to land,[10,19] and already live with endemic, historically-based, 'whole person, whole community' disadvantage.[20,21] While we acknowledge the importance of Aboriginal connectedness to land, whether traditional or new, urban or remote, this paper focuses on rural and remote settings because Aboriginal people are over-represented here and disadvantage is even greater than it is in cities.[22]

Despite 'whole person, whole community' disadvantage, Aboriginal people have demonstrated formidable cultural resilience; a central tenet in maintaining wellbeing has been to preserve and evolve traditional knowledge from generation to generation. Community-initiated promotion and re-integration of this knowledge (to care for country) could assist in adapting to – and perhaps mitigating – adverse impacts of climate change. It could simultaneously support connectedness to healthy country; promote dignity, identity and self-determination; build community strength; offer opportunities for sustainable economic development and generate powerful co-benefits for social and emotional well-being, particularly where these activities are Aboriginal led.

## Aboriginal-led caring for country

Although community approaches are known to be more effective than individually-based approaches in improving mental health practices in the face of rural drought,[23,24] we do not yet know whether community-led caring-for-country projects could produce both benefits for country and personal empowerment (and its social and emotional co-benefits). However, there is growing interest in engaging rural and remote Aboriginal communities in these projects to build sustainable livelihoods. This is of interest because much of the world's biodiversity is found on indigenous traditional lands.[19] By restoring connections to country through land and sea management activities, traditional ecological knowledge is applied and re-invigorated, resulting in documented improvements in social, cultural and physical health as well as the health of the landscape. This is referred to as 'Healthy Country, Healthy People'.[13,25,26]

Healthy Country, Healthy People research in Arnhem Land has involved measuring participation in six caring-for-country activities and relating participation in these activities to prospective health indicators (Boxes 2 and 3). These studies demonstrated benefits for clinically-measured body mass index,[13] waist circumference, blood pressure, diabetic status, albumin : creatinine ratio, glycosylated haemoglobin, high density lipoprotein, lipid ratio and five-year cardiovascular risk.[25] Health screening also demonstrated that caring for country was associated with significantly lower levels of general psychological distress.[25] In addition, greater physical activity (associated with caring-for-country projects) is linked to better mental health directly and because it improves physical health, itself strongly linked to mental health.[27,28] These studies provide preliminary evidence for potential social and emotional wellbeing benefits.

As 20% of Australia's land mass is Aboriginal estate, much of it of high conservation value, there is considerable potential for establishing livelihoods based on providing environmental stewardship, resulting in linked social,

**Box 2. Case study: Healthy Country, Healthy People**

At the request of traditional landowners in central Arnhem Land, the Northern Territory, a transdisciplinary team of medical, ecological and social researchers investigated whether caring for country was associated with better health outcomes and better landscape health. A questionnaire measuring caring-for-country participation was developed and validated in the study population[7] and associations with health outcomes were explored.[29] Controlling for sociodemographic characteristics and health behaviours, greater participation was associated with significantly better health, including diet, physical activity, mental health and lowered risk of diabetes, kidney disease and cardiovascular disease;[29] and landscape conservation outcomes were superior to those in surrounding areas where stewardship had been disrupted, potentially increasing the landscape's resilience to climate change.[30,31]

**Box 3. Case study: Aboriginal Australians caring for country**

Climate change poses risks to Aboriginal peoples[32] but also presents opportunities to invest in climate change mitigation projects. One example is the West Arnhem Land Fire Abatement project where Aboriginal landowners have reinstated landscape burning regimes to prevent late season wild fires, generating tradable savings in greenhouse gas emissions.[33] Participation in caring for country-related programs seems to deliver significant health promotion,[34] in addition to delivering globally significant conservation outcomes.[26,35] Importantly, these initiatives reflect the wishes of Aboriginal landowners – to develop sustainable enterprises based on their continued association with ancestral lands and seas.[36]

> 'Our identity as human beings remains tied to our land... Destroy this relationship and you damage – sometimes irrevocably – individual human beings and their health.'[37]

cultural and biodiversity benefits.[38] Despite the practical difficulties of translating this idea into practice,[19] this opportunity is now recognised in the Commonwealth's Department of Environment, Water, Heritage and the Arts *Caring for Our Country Business Plan*. Funds are being made available to record and apply traditional ecological knowledge to protect biodiversity, while also aiming to build Aboriginal community capacity and partnerships. While this is evidently an empowerment approach, which (theoretically) ought to be beneficial for social and emotional wellbeing, these projects have not been considered in terms of such benefits.

Though there are as yet no programs addressing potential climate change impacts on Aboriginal health and wellbeing, government initiatives, including *Caring for Our Country*, have funded Aboriginal ranger programs to undertake land and sea management. These initiatives build on Aboriginal knowledge of local ecosystems and climatic patterns[39] and provide a partial template for how caring for country activities might support climate change adaptation *and* improved health. Encouragingly, many communities are independently engaging partners to enhance their own opportunities to care for their country. Examples of activities include feral animal and weed control, habitat restoration, monitoring climate change and bush tucker harvesting. These projects are of particular interest because they have been initiated by the communities themselves, rather than by governments or researchers.

## Strong people in strong communities

Cohort studies of the life-course dynamics of social and emotional wellbeing, together with research into community connectedness and mental health, might suggest a reason why caring for country is related to greater wellbeing. This body of research indicates that there are, respectively, two important features of those who are best placed to withstand long-term adversity. Such people tend to be 'competent selves', people who respect themselves, are goal directed and engage actively with their problems,[40] and live in functional communities that can and do sustain them.[41] These communities are often described as having high levels of social capital (see below) which is strongly linked to better mental health,[42–44] including in Australia.[45] Further, social capital may be even more important for Aboriginal Australians' wellbeing than it is for other Australians.[46] Of considerable importance in the context of continuing adverse climate change, social capital might be the key mediator of the relationship between climate change and mental health.[47]

The notion of a unique relationship between social capital and wellbeing among Aboriginal Australians is consistent with a view that social capital is a meaningful concept (and related to health) in remote Aboriginal communities but that it has to be re-interpreted to make sense: its components (such as norms, networks and trust) are best understood in terms of relationships with and obligations to *specific* land, around which life is organised. For example, among the Yolngu people of the Northern Territory living

in the homelands, norms are interpreted in terms of ways of perceiving and acting (mulkurr) that are directed by detailed knowledge of and respect for the footprints (djalkiri) – that is, the ecology – of their traditional lands; social networks (gurrutu) are place-specific knowledge of how entities such as individuals, groups, clans, totems, languages and ceremonies are related; and trust (maarr) is about powerfulness arising from collective identity and respect for the (land-related) responsibilities it confers.[11] In Australia, it has long been acknowledged that, to reduce the current preventable burden of disease, we must address lack of control as one aspect of a broader experience of Aboriginal powerlessness.[48,49] For Aboriginal people, this control and the responsibility that accompanies it are fundamental issues of trust.

Community control of resources and decision making have featured prominently in strategies to improve Aboriginal health.[50–52] Yet these initiatives, which are focused directly on health, do not address the stigma that surrounds mental health[53] or its social causation:[54] direct approaches are not necessarily the only or the best way, and nor do they address the need for connectedness to country or the dual threats to country posed by displacement (and associated environmental degradation) and climate change. Indeed, Aboriginal leaders have noted that effective health promotion activities might well emerge from outside the health sector.[55]

The first cohort study of how social and emotional needs in indigenous communities might be approached outside health-focused approaches was conducted by psychiatrist Alexander Leighton.[56] His stories of how a small indigenous rural 'slum' in Canada (the Road) became a connected, thriving and productive community[57] provide a template for how natural resource management projects might help redress Aboriginal disadvantage and adapt to climate change. Through successfully completing indigenous-led projects apparently unrelated to health, residents of the Road became practised at cooperating spontaneously to solve problems and achieve collective goals. Over time, based on continuing learning and successes, residents became creative and entrepreneurial.

The achievements of the Yolngu people in establishing homelands reflect a similar story of how people who are determined, who work project by project and who act in a context of respect for their culture can, with initially minimal infrastructure support, build a happy, healthy and, ultimately, sustainable place to live.[11] Caring-for-country projects could do likewise.

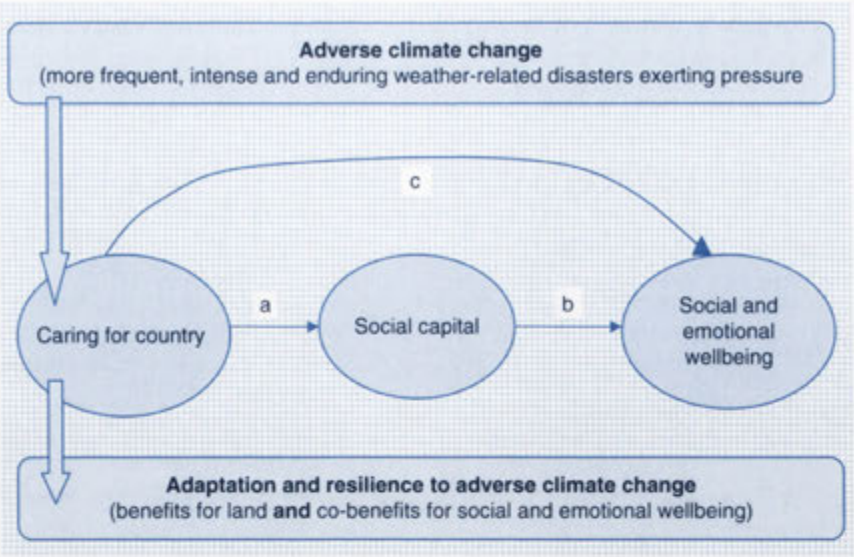
## Climate change, caring for country and wellbeing: a conceptual framework

Figure 1 is a conceptual framework representing our proposed relationship between Aboriginal-initiated and led caring-for-country projects and social and emotional wellbeing in the context of adverse climate change. We anticipate that caring-for-country projects, initiated partly in response to climate change, would strengthen Aboriginal-specific social capital (arrow 'a') as a result of (i) caring for and reconnecting – or connecting more deeply – with traditional lands, and (ii) the community development-like activities required to undertake such projects. Increases in social capital would, in turn, be associated with improved social and emotional wellbeing (arrow 'b') creating positive feedback loops whereby better health would contribute to enhanced social capital and greater engagement with caring for country. We have cited evidence that caring for country is directly related to improved health (arrow 'c'), but it is not known why this is, or whether caring for country project outcomes would differ across climate zones and, thus, be generalisable. This proposition could be tested and considered in terms of climate zone-specific climate change scenarios. Given the significance of the Aboriginal health disparity and of the need to adapt to climate change, testing these propositions empirically is a research priority.

## Conclusions

The evident and unresolved health disparity between Aboriginal and other Australians bears testament to a history of systematic disenfranchisement.[16] Suicide rates and the prevalence of mental health problems, while difficult to quantify precisely,[21] are of grave concern. Stigma,[53] lack of (culturally-appropriate)[58] services[22] and the expense of delivering services in remote settings make it impossible to adequately address these health needs solely using a mainstream medical approach.[18,47] Nor do mainstream approaches accommodate the relationship between Aboriginal health and connectedness to healthy traditional land. Caring-for-country projects, particularly when Aboriginal-initiated, may provide a way to achieve the linked goals of climate change adaptation with co-benefits for social and emotional wellbeing. However, it is not yet clear to what extent they may build social capacity, nor how such impacts may be manifested in different biocultural and climatic contexts. Culturally-engaged and community-focused scientific knowledge is needed in this emerging field. More important perhaps is the need to promote a more informed, insightful and respectful policy debate about the potential impacts of adverse climate change on Aboriginal health and its connectedness to land.

We propose that, especially in severely disadvantaged communities,[59] most mental health problems are socially caused and must be socially solved;[54] mainstream mental health services, essential though they are, cannot alone address social and emotional wellbeing. Caring-for-country projects offer an opportunity to address climate change adaption and social and emotional wellbeing together.




Key:
a direct relationship in which greater caring for country is hypothesised to be causally related to higher levels of social capital
b direct relationship in which higher levels of social capital are related to better social and emotional wellbeing in Aboriginal communities
c direct relationship in which greater caring for country is hypothesised to be directly causally related to better social and emotional wellbeing in Aboriginal communities net of its association with social capital.

**Figure 1. Hypothesised conceptual framework linking caring-for-country projects directly and indirectly (through increased social capital) to improved wellbeing. Note: In this proposed framework, social capital partially mediates the relationship between caring for country and social and emotional wellbeing.**

Such projects must be Aboriginal led, respecting a collective identity in which the group is always prior to the individual,[11] and the imperative to work with (rather than 'do things to') communities in partnership with their leaders.[55]

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## APPENDIX H

### Published editorial

**Title: Disproportionate burdens: the multidimensional impacts of climate change on the health of Indigenous Australians**

**Authors:** Donna Green[1], Ursula King[2], Joe Morrison[3].

[1] Climate Change Research Centre, University of New South Wales, NSW 2052

[2] National Centre for Epidemiology, Australian National University, Canberra ACT 0200

[3] Northern Australian Indigenous Land and Sea Management Alliance, Charles Darwin University, Darwin

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**Abstract:**

The impacts of climate change on human health are now being documented in Australia. Unsurprisingly, these impacts are not spread equally across our society: vulnerability depends on a number of factors including the degree of exposure, sensitivity and adaptive capacity. However, the intra-national heterogeneity of climate impacts on health has been inadequately considered in the literature to date.i This problem is especially true for Australia's Indigenous people living in remote areas of the country given their particularly low social and economic indicators.

# Disproportionate burdens: the multidimensional impacts of climate change on the health of Indigenous Australians

Donna Green, Ursula King and Joe Morrison

*For Indigenous Australians, the "health of country" is inextricably linked with human health*

The impacts of climate change on human health are now being documented in Australia.[1] Not surprisingly, these impacts are unequally distributed across our society, as vulnerability depends on a number of factors, including the degree of exposure, sensitivity and adaptive capacity. However, intranational heterogeneity of climate impacts on health has not been adequately documented to date.[2] Using this lens, the vulnerability of Australia's Indigenous people living in remote areas of the country is revealed. Their vulnerability to climate change is intensified by the social and economic disadvantage they already experience — the result of factors that include decades of inadequate housing and public services, and culturally inappropriate medical services. In addition, specific cultural ties between Indigenous people's wellbeing and the "health" of their "country" create significant indirect impacts of climate change.[3,4] We argue that it is vital to acknowledge the significance of this situation now, so that anticipatory adaptive policies can be implemented. Such policies should ensure that adequate resources are provided to mitigate some of the worst impacts of climate change on these communities, in a way that encourages community participation in decision making.

We now know that, across northern Australia, climate change is expected to bring hotter day- and night-time temperatures.[5] Elevated temperatures and increases in hot spells are expected to be a major problem for Indigenous health in remote areas, where cardiovascular and respiratory disease are more prevalent and there are many elderly people with inadequate facilities to cope with the increased heat stress. However, while the literature is not clear on the exact effects of increasing heat on people and communities, it does imply that these effects are likely to be less in regions where people are already acclimatised to hot conditions.

Communicable diseases such as bacterial diarrhoea, which are more common in hot, dry conditions, may increase in incidence unless additional preventive action is taken. One study predicted that a 1.0–3.5°C increase in average temperature by the year 2050 would lead to an estimated 5%–18% increase in diarrhoea cases in Alice Springs.[6] Dengue fever, spread by mosquitoes, also presents a climate-related risk to Indigenous communities. Although the virus is not currently endemic in Australia, there are sporadic epidemics, with occasional cycles over winter in the local mosquito populations in northern Queensland.[7]

The conceptual divide between Indigenous and non-Indigenous Australians about perceptions of "health" also needs to be recognised and accommodated.[8] The Indigenous concept of health is broad and multifaceted, reflecting a different world view to that of the Western biomedical model. For many Indigenous people, a connection with "country" — a place of ancestry, identity, language, livelihood and community — is a key determinant of health.[9] If community-owned

country becomes "sick" through environmental degradation, climate impacts, or inability of the traditional owners to fulfil cultural obligations through ongoing management and habitation of their land, the people of that land will feel this "sickness" themselves. That is, the elements contributing to Indigenous health and wellbeing are often abstract and based on social interactions with people and the non-human landscape. Thus, as ecosystems change in response to biophysical impacts and extreme weather events, many traditional owners living in remote areas are likely to face increased physiological, psychological, economic and spiritual stress as it becomes more difficult to "look after their country".

At both international and national levels, there is some recognition of the specific needs of indigenous people in relation to the impact of climate change. The World Health Organization's Commission on Social Determinants of Health and the United Nations Permanent Forum on Indigenous Issues have recently acknowledged the importance of tackling climate change, particularly with respect to health, for the world's 350 million indigenous people. In Australia, the Garnaut Climate Change Review has recognised the importance of some non-quantifiable costs, including the specific intangible costs associated with improving Indigenous health.[10]

A challenge for medical practitioners dealing with this issue in the Australian context will be to look beyond the limitations of traditional epidemiology and scientific reductionism to embrace a more ecologically focused, social-determinants approach to health.[11] This approach would enable the "health of country" and its inextricable links with human health to be considered in climate impact assessments.

To address these different paradigms of health, the first step is to begin discussions with Indigenous people to prioritise activities. This process will certainly require a significant increase in the capacity of medical professionals and health systems in northern Australia, as well as increased education and training programs for Indigenous trainees and cross-cultural programs for nurses and local Indigenous support staff. Changes also need to be made in teaching practice across Australia. Currently, Indigenous health still occupies a peripheral place in many medical school curricula, with government funding and research disproportionally supporting high-cost, acute-care medicine at the expense of preventive and primary health care.

In tandem with well planned, properly resourced programs that support strong livelihood activities in remote communities, there is the potential to begin to reduce the additional risk for many Indigenous communities from climate change. There are multiple co-benefits of this approach that would raise social and economic indicators. Ignoring the warning signs and failing to take action is no longer an option.

## Author details

**Donna Green,** PhD, Researcher[1]
**Ursula King,** FACRRM, MPH, Rural Emergency Medical Officer[2]
**Joe Morrison,** MA, Director[3]

1 Climate Change Research Centre, University of New South Wales, Sydney, NSW.
2 National Centre for Epidemiology and Population Health, Australian National University, Canberra, ACT.
3 North Australian Indigenous Land and Sea Management Alliance, Charles Darwin University, Darwin, NT.

*Correspondence:* donna.green@unsw.edu.au

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