EXPLORING VULNERABILITY TO FOOD INSECURITY: A CASE STUDY OF INUIT SENIORS' FOOD SECURITY STATUS IN NAIN AND HOPEDALE, NUNATSIAVUT

A Thesis Submitted to the Committee on Graduate Studies
in Partial Fulfillment of the Requirements for the Degree of Master of Arts
in the Faculty of Arts and Science

TRENT UNIVERSITY
Peterborough / Nogojiwanong, Ontario, Canada

Sustainability Studies M.A. Graduate Program
May 2022

Abstract

Exploring Vulnerability to Food Insecurity: A Case Study of Inuit Seniors' Food Security Status in Nain and Hopedale, Nunatsiavut

Shirin Ping Nuesslein

Addressing the issue of food insecurity effectively within a region in a way where interventions reflect the variability of food insecurity levels across subgroups of the population is important. It is a unique challenge and requires specific data. This study took in this direction by conducting an exploratory statistical analysis of a community-representative dataset of Inuit Seniors' food (in)security. The analysis was theoretically sensitive as well as knowledge-user-directed.

Results show that 52.7% of all Seniors in Nain and Hopedale, Nunatsiavut, are food insecure, and that food (in)security is associated with age group, education status, health status, mobility status and household financial situation. Further, younger Seniors aged 55-64 are more likely to be food insecure than their older peers.

This study is among the first to provide an analysis of quantitative associations between variables that characterize food (in)security among a specific subgroup in the Inuit population.

Acknowledgements

In many ways, this thesis only represents a sliver of all the learning I've done throughout my graduate studies and my work with the Health, Environment, and Indigenous Communities Research Group. I am humbled and immensely grateful for the opportunity to work with and be supported by many inspiring people, some of whom I would like to thank directly:

My first acknowledgement goes to Dr. Chris Furgal and his important role as my supervisor – I am grateful for your encouragement and mentorship over many years even before I started my graduate studies. I am inspired by your commitment to do work with integrity and in ways that are meaningful to communities. Through this, you have left an important impression on me: that work seen through the lens of collaboration and capacity-building is meaningful, consequential, and possible. Thank you as well for the hours of conversations about knowledge systems and the philosophy of science. These made me a more nuanced thinker as well as helped me better understand the research landscape and where to situate myself within it.

A big thank you goes to Dr. Geoff Navara for being on my thesis committee – You were a great sounding board for me, especially when I was grappling with understanding and applying statistical analysis methods that were new to me. Your enthusiasm during our committee meetings kept me motivated!

A sincere *Nakummek* to the Nunatsiavut Government, especially the folks at the Department of Health and Social Development (Kristeen McTavish, Sylvia Doody, Michele Wood, Michelle Kinney, Lynn Blackwood, Beverly Thomson, Bev Hunter) and

Carla Pamak, the Inuit Research Advisor at the Nunatsiavut Research Centre – Your collaboration on this project was my motivation to start and see it through to completion.

A special thank you to Kristeen McTavish, my main contact at the Nunatsiavut Government and good friend – Much of the success of this project is thanks to your unwavering support in the initiation, development, and evolution of this project, and making me feel welcome during my visits to Nain. Among many things, you have helped me see more clearly how to make decisions in the research collaboration process that make both conceptual as well as practical sense.

To my HEIC colleagues, who walked with me at different points in this journey – You know who you are, and I am grateful to each one of you! Thank you for your intellectual and emotional support! This thesis has without a doubt been enriched by you. You have shaped and challenged my thinking, and – most importantly – reduced the isolation of scholarly work.

An important thank-you goes to Brittany Curry-Sharples – Thank you for being a critical sounding board throughout, and for navigating this degree together through collaboration and encouragement. You've played an instrumental part in my learning journey and helped bring clarity and depth to my thinking, both about data analysis and the concept and measurement of food insecurity. I am really grateful to you!

A heartfelt thank-you goes to Rebecca Martin – It was a joy to work with you! Your teaching skills combined with encouragement and patience provided the perfect learning environment for me to catch up on statistical knowledge and better understand where statistics fit in the social science research landscape.

Seeing this thesis through to its end would not have been possible without the love of my family and friends outside my academic circle – Thank you for keeping me

grounded, nurtured and true to my values. Most importantly, thank you for reminding me of life beyond this thesis.

My roommates – Hannah, Erinn and Sophie – have been constants through all motions of this Master's journey, through the good days and the many challenging ones: Thank you for sharing in the moments of joy, the moments of reflections and for offering a helping hand, especially in times when I didn't realize I needed it most.

Mama and Papa, thank you for always supporting my love for learning. I am most grateful for the perspectives you've taught me: the importance of humility, seeing the inherent light in everyone that crosses my path and always connecting with others over similarities, not differences. These lessons have helped me immensely in my travels and fieldwork across Inuit Nunangat.

This thesis is dedicated to my grandparents: Uko Taja Madang and Uko Ping Kehing – Through your incredible life journeys, you taught me that it's never too late to learn something new, that you can never be too tired to be kind, and that hard work is a symbol of respect for yourself and others. Especially during the gruelling stages of this thesis, these teachings were great reminders. ***Tiga tawai, ake bimbin ikem dua!***

To everyone mentioned here and to many others who supported me and this work in other – but no less essential – ways, I offer my gratitude.

*

This study could not have been completed without the financial support of the Canadian Institutes of Health Research, ArcticNet Networks of Centres of Excellence of Canada, and the Northern Scientific Training Program.

Positioning the Researcher

"*Although philosophical worldviews remain largely hidden in research, they still influence the practice of research and need to be identified."* (Slife & Williams, 1995, in Creswell, 2014)

As all research is shaped by the context in which it emerged and by the researcher's positionality, it was important for me to preface this thesis by describing my position in this field of study as well as the experiences that shaped my interest in the topic and the approach to the study. This thesis was an exploration of a broader interest I have in health equity, especially in rural and Indigenous contexts, and a response to a sincere desire to understand why some groups have the privilege of being healthier than others.

I ground this interest in a few personal, academic, and professional experiences in my life where I have observed the impact that rapid socio-economic, cultural, political, and environmental changes have had on the health and wellbeing of Indigenous communities I have travelled to across Canada, the Arctic, in South America and Southeast Asia. This includes Indigenous communities on the island Borneo where my mother is from, where I regularly visit with my large extended family, and where I have seen disproportionate burdens of health outcomes similar to those that many Indigenous communities in North America experience. This sparked my interest in exploring what variables influence Indigenous health as a way of better understanding potential interventions that could improve health outcomes.

My interest in exploring Inuit-specific determinants of health – with food (in)security as a case study topic – is an extension to the work I did for several years before starting my Master's degree. I worked as a research assistant to Dr. Chris Furgal and as the administrative coordinator of the Nasivvik Centre for Inuit Health and Changing Environments. During this time, I was very fortunate to assist in a range of environmental-health research projects in collaboration with Inuit communities and organizations and to participate in several Indigenous health and Arctic research conferences.

This professional experience – combined with my academic background in International Development and Environmental Studies – lead me to see strength in interdisciplinary research and mixed-method approaches to understand issues at the intersection of the environment and human health, such as food (in)security. Motivated by this realization – that any single way of knowing is insufficient for comprehending the complexity of the world – I drew on literature from several disciplines in this study, including public health, nutrition, sociology, international development, and human geography.

I feel fortunate to have had the opportunity to travel to several Inuit communities over the last nine years, and to some several times. These experiences – having conversations with knowledge-holders and community members of various ages, participating in community gatherings and land trips – have allowed me to familiarize myself with the social and cultural reality of the North. These experiences led to positive research relationships and trusted friendship with many community members as well as Inuit organizations at the local, regional and national levels – all of which prepared me for the knowledge-user-engaged nature of this study and specifically for conversations with

my research project partners in Nunatsiavut. I also believe that this history made it possible for me to continue engaging project partners at distance during the COVID-19 pandemic when travel to the region was made impossible.

I am an outsider to Nunatsiavut and the entire Inuit lived experience. Mindful of my positionality, continual self-reflexivity throughout the entire research process aided me in choosing methods that would ground my findings in regional perspectives shared by knowledge users and regional experts.

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List of Abbreviations

CCHS	Canada Community Health Survey
DHSD	Department of Health and Social Development
FI, F(I)S, FS	Food Insecurity, Food (In)Security, Food Security
FSS	Food Security Status
HFSSM	Household Food Security Survey Module
NG	Nunatsiavut Government

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Chapter One | Introduction

Study Rationale

Food security – defined as "when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (FAO, 1996) – is a human right as well as recognized among the key determinants of overall health and as an indicator of health (De Schutter, 2012; UN OHCHR, 2010; Mikkonen & Raphael, 2010).

Food insecurity – i.e., when any of those conditions are not met – is, therefore, a serious public health issue. It is associated with a wide array of physical and mental health outcomes as well as higher health care costs. These health outcomes include increased likelihood of nutritional deficiency, obesity, diabetes, heart disease, neurological disorders, depression, anxiety, and family stress (Vozoris & Tarasuk, 2003; Tarasuk, 2009, Tarasuk et al., 2013; Tarasuk et al., 2015; Gundersen & Ziliak, 2015; Gundersen et al., 2018; Pooler et al., 2020). Further, a gradient exists between food insecurity and negative health outcomes. Food insecurity is shown to have a strong association with increased all-cause mortality rates, especially among individuals who are categorized as severely food insecure (Gundersen et al., 2018).

It is well described in the literature that some groups in a given population are more likely to experience food insecurity as a result of social, economic, political, environmental and geographic stressors and thus carry a disproportionate burden of physical, mental and social health outcomes reflected in higher rates of physical and mental health outcomes (Kuhnlein et al., 2014; Tarasuk, 2009). Such disparities amplify

public health and health equity concerns as well as raise questions about the intersectionality of the issue for specific subgroups of the population and what is needed to increase the potential of an entire population to be food secure.

In Canada, food security has been identified as a determinant of Inuit health (Inuit Tapirit Kanatami, 2021). Population health studies have shown that food insecurity levels are very high in the Northern territories and regions, and as a result among Inuit and other Indigenous populations that primarily inhabit the territories. Inuit are reported to experience the highest levels of food insecurity of any group in Canada (Inuit Tapirit Kanatami, 2021; PROOF, 2016a; Tarasuk et al., 2019). This is very concerning from a public health perspective, and even more, concerning because the probability and severity of high levels are disproportionate to average national levels.

For example, in 2014, household food insecurity levels documented in Nunatsiavut, one of the four Inuit regions in Northern Canada, were 59.3% (Furgal et al., 2017; Nunatsiavut Government, 2017), much higher than both the national average that year (12%) (Tarasuk, Mitchell & Dachner, 2016) as well as provincial levels of Newfoundland and Labrador in 2012 (13.4%) (Statistics Canada, 2012, in Tarasuk, Mitchell & Dachner, 2014). A significant disparity was also reported between communities within Nunatsiavut (Furgal et al., 2017; Nunatsiavut Government, 2017).

Regional population studies in Canada have studied many variables influencing food insecurity important to Inuit living in food systems with specific environmental, socio-economic, and cultural contexts. However, such studies have often resulted in narratives that paint Inuit as experiencing food insecurity in a homogenous way, often due to the sampling strategy (i.e., regionally representative data as opposed to community-

representative data) and the scale at which food (in)security was measured (i.e., household scale as opposed to individual scale).

While such data help understand the gravity of the issue of food insecurity in Inuit regions and which households within regions are more vulnerable to food insecurity, these regionally representative datasets are limiting especially when trying to address the issue of food insecurity effectively *within* a region and in a way where interventions reflect the variability of food insecurity levels that is believed to exist across subgroups *within* the regional population.

On the other hand, data at a higher level of granularity – for example, with samples representative at the community level, representative of different subgroups, and with food (in)security measured at the individual scale – could offer insight on groups of variables important for addressing food insecurity in specific subgroups.

In the Inuit food security literature, some groups identified and hypothesized to be more likely to experience food insecurity include individuals who are pregnant, households with children, low-income individuals, low-resource individuals, individuals who are ill as well as those who are elderly (Beaumier & Ford, 2010; Chan et al., 2006; Gilbert el al., 2020; Ruiz-Castel et al., 2015; Somogyi, 2015; Teh et al., 2017). Yet, few studies have provided quantitative estimates of the variables that uniquely combine to predict food insecurity among specific subgroups with characteristics that suggest multiple layers of vulnerability.

The intersectional nature of food insecurity within a diverse population is clear and, as such, understanding population-specific and subgroup-specific variable groups is important for developing precise and evidence-based policies to address food insecurity in a population. Without community-representative and subgroup-specific estimates,

regional policy strategies could potentially miss improving food access for specific groups, thereby limiting the entire population's potential to experience overall higher levels of food security.

Food (in)security among Seniors

In the scholarly literature, there is an emerging interest in food insecurity among Seniors and elderly persons.

The nature of published literature available on this topic, however, is both scarce and disparate and it has only been systematically reviewed by few, including by Thirakul (2019) in Canada and by Leroux et al. (2018) globally.

Both systematic scoping reviews highlighted that only few studies have quantitatively explored food insecurity in older Canadian adults and that those existing studies emphasize the complexity of food insecurity among this group (Thirakul, 2019; Leroux et al., 2018). One complexity includes the understanding that food insecurity can be both a determinant of poor health and the outcome of poor health for older adults (Pooler et al., 2019).

Generally, Seniors are reported to experience food insecurity differently compared to other age groups (Bickel et al., 2000; Lee & Frongillo, 2001; Wolfe et al., 2003) due to health-related challenges at an advanced age, such as mobility challenges or other functional and sensory impairments as well as health conditions that lead to diet sensitivities (Park et al., 2019; Pooler et al., 2019). Both literature reviews highlighted the characteristics that increase the risk of food insecurity among Seniors. This includes earning a low income, being an immigrant, belonging to a racial minority such as

Indigenous or Black individuals, having poor health, renting a home, feeling social isolation, and living in the Northern territories or Atlantic provinces. Some protective characteristics against food insecurity include available social networks, food program engagement, and access to public pension (Thirakul, 2019; Leroux et al., 2018). See Table A1 in Appendix A for a complete list of variables that resulted from Thirakul's scoping review.

Looking specifically at the food (in)security literature available on communities across Inuit Nunangat, very little information exists on Senior-relevant variables influencing Inuit food (in)security. One systematic literature review about Inuit Elderly by Somogyi (2015) identified food insecurity to be an important concern but did not study the risk factors to food insecurity among this specific group. In fact, no single study appears to exist to date that solely focuses on factors influencing Inuit Seniors' food (in)security, as can be assessed from screening titles and abstracts.

However, a systematic literature review currently being conducted by Curry-Sharples (Curry-Sharples & Furgal, 2020; Curry-Sharples, In Progress) on variables studied in relation to Inuit food (in)security (i.e., a composite measure of food (in)security, or one of its components: food availability, accessibility, utilization and consumption) among Inuit in Inuit Nunangat has found some Senior-relevant data embedded in studies. These data include the following nine variables identified as being relevant to Inuit Seniors' food (in)security: 'unsuccessful hunts' impeding food availability, 'being a woman' impeding food consumption, 'a low number of muskoxen' impeding food access, 'a high number of muskoxen' in one herd facilitating food access, the heavy use of traditional food facilitating food access, the low reliance on market food facilitating food access, better budgeting skills facilitating food access, as well as the

obligation to give country food, store foods, and money to adult children facilitating food insecurity.

While these nine variables provide some insight into variables important for understanding Inuit Seniors' food (in)security, they also reflect the disparate and scarce nature of the evidence available on this topic. Specifically, these Senior-relevant variables were extracted from only five studies (i.e., less than 10% of all studies currently in the systematic review). Further, these variables were found during the full-text screening stage of the review and could not have easily been identified while screening titles and abstracts of sources. They primarily appeared in studies focused exclusively on the country food system, and only represent a small portion (i.e., less than 1%) of the total number of variables identified in the entire systematic review. This percentage demonstrates – by inference – the large number of non-Seniors-relevant variables identified and available in the Inuit food (in)security literature. See Table A2 and Figure A1 in Appendix A for a tabular and mapped representation of Senior-relevant variables resulting from Curry-Sharples' systematic literature review and the corresponding reference for each variable.

Importance of this study

The disparate nature and knowledge gap on Inuit Seniors' food (in)security is evident from Curry-Sharples' literature review and highlights the importance of some first quantitative estimates of variables associated with Inuit Seniors' food insecurity.

The focus on Seniors in this study resulted from conversations with the Nunatsiavut Government in which Seniors were identified and hypothesized to be

vulnerable to food insecurity within the region. Additionally, a strategic commitment had been made in the most recent 2019-2024 regional health plan by the Nunatsiavut Government's Department of Health and Social Development (DHSD) to increase food security levels in the region as well as prioritize active outreach and learning around vulnerable groups specifically through developing and implementing a regional strategy that addresses food insecurity (DHSD, 2019).

By focusing on a group that is considered a vulnerable group and a priority group, this study was conducted with the expectation that results could contribute to the efforts by our community research partner, the Nunatsiavut Government, to advance program development addressing food insecurity among Seniors in Nunatsiavut.

Research Question

This study responds to the knowledge gap that exists on variables associated with food (in)security specific to subgroups of the Inuit population. It is an exploratory study guided by the following overarching research question: What variables are associated with food (in)security in a subgroup of the Inuit population?

Specifically, the research question was explored in the context of Inuit Seniors in the case study communities of Nain and Hopedale, Nunatsiavut, and through the following sub-questions:

1. What is the prevalence of food (in)security among Inuit Seniors in the case study communities of Nain and Hopedale, Nunatsiavut?
2. What associations exist between variables (i.e., individual and household characteristics) and Seniors' food (in)security in Nain and Hopedale, Nunatsiavut?

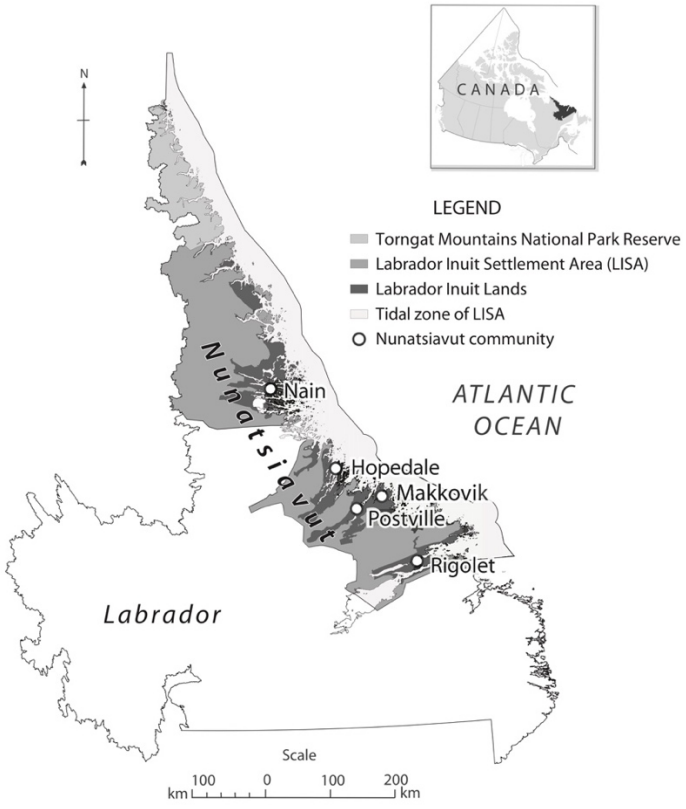
Introduction to the Case Study

Characterizing the case study region: Nunatsiavut

Nunatsiavut is the self-governing Inuit Settlement Area of Labrador and one of four Inuit regions in Inuit Nunangat, the homeland of Inuit in Canada. The region consists of five coastal communities (Nain, Hopedale, Postville, Makkovik, and Rigolet) and is the home to over 2,560 Inuit (Statistics Canada, 2018).

Figure 1

Map of Case Study Region



Food (in)security in Nunatsiavut

In 2007-2008, results from the Inuit Health Survey reported that 44.2% of households in Nunatsiavut were food insecure (Rosol et al., 2011). Food (in)security data was then updated in 2013-2014 with a sample that was representative at the regional level, that included all five coastal communities and was designed to increase understanding of community-specific household food (in)security issues. Results from the 2013-14 survey indicated that the percentage of households in Nunatsiavut that were food insecure in the study was 59.3% (Furgal et al., 2017; Nunatsiavut Government, 2017), much higher than both the Canadian level in 2014 (12%) (Tarasuk, Mitchell, & Dachner, 2016) as well as the level of Newfoundland and Labrador in 2012 (13.4%) (Statistics Canada, 2012, in Tarasuk, Mitchell, & Dachner, 2014). Significant disparity between the five coastal communities was also observed, with Nain and Hopedale showing the highest food insecurity levels (79.8% and 83.1% respectively; see Table 1).

Table 1

Food (In)Security Prevalence per Nunatsiavut Community (Furgal et al., 2017, in Nunatsiavut Government, 2017)

Community	Severely Food Insecure	Moderately Food Insecure	Marginally Food Insecure	Food Secure
Nunatsiavut	20.8 %	31.8 %	8.5 %	38.9 %
Nain	35.9 %	32.6 %	10.9 %	20.7 %
Hopedale	22.0 %	52.5 %	8.5 %	16.9 %
Makkovik	5.3 %	24.5 %	5.3 %	64.9 %

Postville	7.5 %	20.8 %	11.3 %	60.4 %
Rigolet	4.5 %	13.6 %	3.4 %	78.4 %

Food insecurity has been identified as a priority concern for the Nunatsiavut Government and their Department of Health and Social Development has committed to developing a regional food security strategy (DHSD, 2019). A recent mapping analysis by Bowers et al. (2020) of policies currently in place in Nunatsiavut showed that 25 policies address at least one aspect of food (in)security either explicitly or implicitly. The majority of these policies intend to make market food and country food available or provide financial resources to be able to purchase such foods (Bowers et al., 2020).

Similar to most food systems in the North and across Inuit Nunangat, the food system in all Nunatsiavut communities can be described as 'mixed' in that it features elements of a market food system and country food system (Kuhnlein et al., 2014). A defining feature is that the diet of a population living in a mixed food system consists of foods harvested and gathered from the land as well as imported market foods purchased in grocery stores.

The market food environment compares to those of many Indigenous populations in high-income countries who live in rural and remote contexts reflected in limited availability of and access to grocery stores, "heightened exposure to unhealthy food environments, inadequate market food supplies (i.e., high prices, limited availability, and poor quality), and common underlying structural factors including socio-economic inequality and colonialism" (Kenny et al., 2020).

The effects of climate change within Nunatsiavut – such as significant sea ice loss, unpredictable weather variability and changes to seasonal timing – have also posed threat

to the availability and accessibility of local food sources (Furgal & Sequin, 2006) and highlighted food insecurity as a climate-sensitive health priority (Harper et al., 2015).

Characterizing the case study communities: Nain and Hopedale

Nain and Hopedale share many similarities and some differences. They are the most Northern and largest of the five coastal communities as well as the home of important government services. Nain, the farthest north community along the Labrador coast, has a population of approximately 1125 (Statistics Canada, 2016a) and is the administrative capital of Nunatsiavut. Hopedale has a population of approximately 574 (Statistics Canada, 2016b) and is the legislative capital.

Based on 2016 census data, 210 of the 1125 residents in Nain are 55 years and over (NL Community Accounts, n.d.a.) and 100 of the 574 in Hopedale above 55 years old. These numbers slightly differ from those presented in Table 3, because they include Senior residents that are no land claims beneficiaries of Nunatsiavut.

Further, provincial data on demographics from 2016 show that the median age in Nain is 31 and 32 in Hopedale, compared to 46 in Newfoundland and Labrador (NL Community Accounts, n.d.a.).

The employment rate for individuals above 15 years old is about 40% in both Nain and Hopedale. The average income per capita is around $23,200 in Nain and around $20,300 in Hopedale (NL Community Accounts, n.d.a; NL Community Accounts, n.d.b.). Those employed typically work for government services, in sales or trades (Statistics Canada, 2016a; Statistics Canada 2016b) and those unemployed typically receive unemployment insurance, welfare or old age pension.

In terms of food access, Nain has four stores (i.e., two larger grocery stores and two smaller convenience stores) whereas Hopedale has two stores (i.e., one larger grocery store and one smaller convenience store). Both communities have a community freezer providing wild foods to community members. Guidelines for who can access food from the freezer differ between communities. In Nain, the freezer is accessible to all community members during hours that the Nain Research Center is open, while in Hopedale access to foods depends on family size and age (The OKâlaKatiget Society, 2021). A Household Food Security Survey conducted in 2013-2014 reported that community freezers are integral and very important for wild food access alongside other community programs such as breakfast programs, lunch programs, and Senior weekly/monthly dinners (Nunatsiavut Government, 2018). Both Nain and Hopedale also have food banks (The OKâlaKatiget Society, 2021).

While food access slightly differs between Nain and Hopedale, the food system – its challenges with and resources for food access – are more similar than different in Nain and Hopedale, especially when compared to other parts of Canada.

Population of Interest

The population of interest in this study is Seniors, defined as individuals 55 years and older. This definition was informed by the definition used by DHSD, our community research partner, as well as the general health literature discussing Seniors' age thresholds in Indigenous populations.

While DHSD does not have a standardized definition for Seniors, 55 years is typically used as the age threshold for Senior-related programming and policy

development in the region, including food programming (DHSD, 2019). Similarly, public data about Nunatsiavut made available by the provincial Newfoundland and Labrador Statistics Agency presents Seniors' community profiles starting at age 55 (NL Community Accounts, n.d.).

In the general Seniors' literature, there is considerable variability in how a 'Senior' is conceptualized. In the international Seniors' food (in)security literature, for example, old age is often defined as being 55, 60 or 65 years or older depending on officially recognized retirement age thresholds and eligibility for old age support (Leroux, 2018). In the Canadian Seniors' food (in)security literature, however, Seniors are often defined as 65 years and older (Thirakul, 2019) which is the age that corresponds with an individual's eligibility for Seniors' benefits and the average retirement age (Green et al., 2008; McIntyre, Dutton et al., 2016; Sakar et al., 2015 in Thirakul, 2019).

In contrast, the literature based on studies assessing the health status of Indigenous populations often uses a lower age threshold. For example, the age threshold of 55 years and older was also operationalized in the 2001 and 2012 Aboriginal Peoples Survey (APS) (Wallace, 2014), and the 2000/2001 Canadian Community Health Survey (CCHS) with the justification that this is an appropriate age threshold to delineate between younger and older Aboriginal individuals in Canada (Wilson et al., 2010). Evidence suggests that Indigenous individuals have the same health issues at the age of 55 as non-Indigenous individuals at 65 (Wilson et al., 2010). The same age threshold of 55 years is being used in other studies assessing the health status of Inuit Seniors, including in the most recent 2018 Greenlandic Health Survey (Nørtoft et al., 2019) and the forthcoming *Qanuippitaa? National Inuit Health Survey*. A recent study on community perceptions of ageing among Inuit in Nunavik illustrated that the process of ageing starts at the age of

50. This age threshold is considered a shifting point for social and physical changes that distinguish these age groups from those that are younger (Baron et al., 2020).

To contextualize this age threshold further, older Indigenous Australians are defined as individuals aged 45 years and above (Waugh & Mackenzie, 2011) compared to the 65-year age threshold used for non-Indigenous Australians. This is because the life expectancy among older Indigenous adults in Australia is around 17 years lesser compared to non-Indigenous adults due to higher prevalence levels of chronic health illnesses and injuries seen among older Indigenous adults (Waugh & Mackenzie, 2011).

Contextual Foundations

This section serves to provide information important for contextualizing the study, its focus and approach. First, a brief overview of the conceptualization of food (in)security is provided, which is followed by an overview of its measurement.

Food (in)security

The concept of food insecurity has evolved over decades since it first appeared in the 1970s in international policy statements around the insufficiency of food supply (Pinstrup-Andersen, 2009; Jones et al., 2013).

While many definitions exist to date, the FAO definition for food security, which was agreed upon at the World Food Summit in 1996, is widely recognized globally by many scholars and practitioners (Pinstrup-Andersen, 2009). It refers to the state of an individual or household in terms of their stable physical and economic access to food that meets energy and nutritional needs, is free from contaminants, is biologically safe as well

as meets food preferences and is acquired through socially and culturally acceptable means without resorting to coping strategies such as emergency food supplies, stealing and scavenging (FAO, 1996; 2003). All qualifiers are seen as necessary conditions for ensuring sufficient and appropriate food access.

Thus, *food insecurity* is understood to be the temporary or chronic state of an individual or household when any of those conditions are not met or are inadequate. This conceptualization does not merely refer to the absence of enough food. It is distinguished from hunger in that prolonged and severe food insecurity may lead to hunger (Jones et al., 2013; Bickel et al., 2000; UN OCHR, 2010). Food insecurity is also seen as the result of resource constraints, and different from situations where someone intentionally abstains from food or is too busy to eat but has the resources to procure food (Bickel et al., 2000).

Conceptually, food security is meant to capture and represent contextual information to food access, especially the important role food availability, utilization, consumption, and stability play in an individual's or household's access to food. However, there is a growing movement of critiques calling for clarification, augmentation or even reconceptualization of this concept to make the design and validation of measurement tools as well as the intended use of the data easier and more effective (Clay, 2002; CFS, 2012; Clapp et al., 2021; Jones et al., 2013).

Measurement of food (in)security

Designing a measurement tool that captures all aspects of the conceptualization of food (in)security is challenging and has resulted in the development of a wide array of tools used for studying food access and food security status at the national and household

level, for estimating the prevalence of food insecurity and its magnitude (Jones et al., 2013). At the household level, some tools include the food consumption score, dietary diversity proxy, household consumption and expenditures survey, and household dietary diversity score (Jones et al., 2013).

Among these tools, the primary used by in population health studies in Canada and the US (e.g., Canada Community Health Survey (CCHS) and Aboriginal Peoples Survey administered by Statistics Canada, the Inuit Health Survey in Canada, and the Current Population Survey administered by the US Census Bureau) have adopted the use of direct, experienced-based approaches to studying food access at the household level. This includes the use and adaption of the 'Household Food Security Survey Module (HFSSM)' which is meant to capture a household's lived experience with access to food instead of relying on nationally aggregated data on food supply to infer household food access.

Further, this tool measures a wide range of experiences ranging in severity – starting with anxiety that food will run out before being able to access more, to modifying the amount and quality of food consumed before being able to access more, to extreme cases of going an entire day without eating a meal (Bickel et al., 2000; Tarasuk et al., 2020). Accordingly, this tool categorizes respondents into food security categories based on severity to aid policymakers and service providers with monitoring and assessing changing food access needs in a population over time. This includes screening for priority groups and at-risk households, and – in response – designing and implementing programs and policies to address food insecurity, and evaluating them for their effectiveness (Bickel et al., 2000). While the HFSSM is being critiqued for being insufficient in capturing non-financial resource constraints to food access, this tool

continues to be used by population health surveys and is especially valued for being a consistent tool that allows for comparability of data over time and between populations.

Organization of the Thesis

This thesis is organized into four chapters. Chapter Two outlines a detailed rationale and description of the study design and methods for data collection and analysis. Chapter Three presents the results of the statistical analyses conducted to identify the prevalence of food (in)security among Inuit Seniors in Nain and Hopedale as well as to explore associations between Seniors' individual and household characteristics and their food (in)security. In Chapter Four, the results are discussed in light of insights gained from a focus group held with regional decision-makers and program managers at the Nunatsiavut Government, as well as insights from the Seniors' food (in)security literature and Inuit food (in)security literature. This chapter also reflects on the theoretical and methodological strengths and limitations of the analyses and the overall significance of this study. It concludes by providing recommendations for action and future research that would further increase our understanding of the network of variables that inform Inuit Seniors' vulnerability to food insecurity.

Chapter Two | Methods

Introduction

Chapter Two begins with describing approaches to research and the corresponding study design. This is followed by a detailed description of the secondary data source including methods for data collection and analysis. The systematic approach followed for the theoretically sensitive and knowledge-user informed selection of variables and interpretation of findings is then described, as well as the methods for statistical data analyses. The chapter concludes with a statement of how study results can be interpreted and generalized and a presentation of ethical considerations that were required for this project.

Research Approach

Fitting with the knowledge-user-directed nature of this study, this study was characterized by three broad approaches to research – namely a case study approach, integrated knowledge translation and pragmatism (Feilzer, 2009).

Case Study Approach

This study employed a case study approach because it is a valuable research strategy for focused data collection and in-depth exploration of the research question in the context of a specific system that is bound by time and space (Creswell, 2005; Cassell & Symon, 2004). Specifically, this study followed an *instrumental* case study approach as defined by Crowe et al., (2011). An instrumental case study approach seeks to describe

and explore a phenomenon with sufficiently rich description that the findings and insights gained can be transferrable to similar contexts as well as have direct and practical application for program development within the case study region.

Some researchers argue that the case study approach is so context-specific that it lacks generalizability or critique case studies for not providing sufficient information to warrant using results to understand the research topic in similar contexts (Willig, 2001); however, others argue that case study results can more easily be generalized when the rationale for selecting the case, case boundaries, and methods for data collection, data integration and reaching respondent validity are made transparent and well-described (Merriam, 2009; Crowe et al., 2011).

The communities of Nain and Hopedale within the region Nunatsiavut were chosen for this case study for several reasons. Previously established long-term research collaborations between the Nunatsiavut Government and Trent Professor Dr. Chris Furgal, the faculty supervisor of this thesis, facilitated the design of this study. Additionally, the topic of this study responded directly to a research need within the region. The Nunatsiavut Government had already shown interest in exploring Seniors' needs and through consultation with Dr. Chris Furgal at Trent University agreed to add the Food Security Survey Module Questionnaire to a larger survey about Seniors' needs designed by DHSD, conducted in 2017 and called 'Housing & Programming: Individuals 55+' survey'. Further, this case study region was chosen because current understandings of community-level food insecurity status in the region are fairly homogenous, primarily due to the scale at which previous food insecurity data was collected and analyzed. As such, analysis of the newly collected community-representative Senior's food (in)security dataset for the communities of Nain and Hopedale had the potential to provide more

nuanced insight into community-level vulnerabilities among one subgroup of the population that would have otherwise not been noticed using only regionally representative data. The Nunatsiavut Government prioritized data collection for Seniors' food (in)security in Nain and Hopedale for practical reasons. The highest food insecurity levels within the region were reported in these two communities and this demanded in-depth exploration of the issue.

Results from this study following an instrumental case study approach were intended to be primarily relevant for practical and direct application and program development in Nain and Hopedale and not intended to be generalizable to all Inuit. As described in Yin (2003, 2009), while case studies are not intended for making statistical generalizations to a larger population, they do provide helpful data for making analytical generalizations and generalizing theoretical propositions. With this in mind, results from this study – following an instrumental case study approach – were intended to provide theoretical insights on variables influencing the food security status of Seniors within another Inuit region with a food system shaped by environmental, socio-economic and cultural factors similar to that of Nain and Hopedale.

Integrated Knowledge Translation

This study was guided by an ongoing, long-standing research relationship and collaboration with the Nunatsiavut Government as our community research partner. This study intended that the results could be used by knowledge users to improve Seniors' food security in the region. Identified knowledge users (i.e., decision-makers and program managers from the Department of Health and Social Development at the Nunatsiavut Government) were involved in several stages of the research project.

First, we collaborated in identifying a research topic, i.e., focusing on Seniors' food insecurity was a priority for the Nunatsiavut Government and a knowledge gap in the research literature. Second, we were able to agree on a less disruptive research protocol by identifying a dataset that was already being collected by the Nunatsiavut Government and by deciding together that adding food security questions to the survey would make the dataset more relevant for this research project. Third, several meetings with knowledge users shaped the direction and focus of data analysis with the purpose of increasing the relevancy of results and uptake of results. As illustrated in Table 2, this included a focus group held in November 2019 to elicit insight into the type of analyses important for decision making and from which variables for statistical analysis were extracted and identified. This was followed by another focus group held in two parts in April and May 2021 to elicit regional perspectives on preliminary findings, interpretations, possible explanations for significant associations as well as direction for the finalization of the analysis.

Validation of the content of both focus groups was sought through the presentation of meeting minutes sent to meeting participants by email for review and approval. Approved minutes, preliminary findings and materials used for focus group discussions were then compiled and made available in Nuesslein et al. (2021), an unpublished report to our community research partner.

This type of collaboration with a community research partner is often referred to as integrated knowledge translation (IKT) in health research. It is a model of implementation science that involves those who might benefit from or might be impacted by research results (i.e., knowledge users) throughout several stages of the research process (Parry et al., 2009). This model is an evolution from what is traditionally known

as ‘end-of-research’ or ‘end-of-grant’ knowledge translation. End-of-research knowledge translation is concerned with communicating findings after the research project has been completed and typically involves informing potential knowledge users about the knowledge that has already been generated (Parry et al., 2009). In health research, IKT is seen as a means to improve health outcomes (Sibbald et al., 2019). If performed well, IKT has the potential to promote dynamic collaboration and partnership between researchers and knowledge users, thereby making it easier to move from what is known to what can be done about this knowledge (i.e., program development, policy changes etc.).

Table 2

Timeline of Knowledge User Engagement

Time	Type of Engagement	Location
August 2017	Discussions with DHSD staff about the inclusion of the Food Security Survey Module questions in the ‘Housing & Programming: Individuals 55+’ survey.	Phone, Email
September 2017	Participant observation during the first two weeks of data collection of the ‘Housing & Programming: Individuals 55+ survey’ in Nain, including regular meetings with the research coordinator and team of local research assistants. Consultations with the Inuit Research Advisor at the Nunatsiavut Research Centre and DHSD staff at the Nunatsiavut Government to inform the development, direction and focus of the study.	Nain, Nunatsiavut, Labrador (in-person)
March 2018	Research team receives a letter from the Nunatsiavut Government, outlining their support for and partnership in the project.	Phone, Email
October 2018	Research team receives the complete, anonymized and password-protected dataset after a data-sharing agreement was signed and approved between the Nunatsiavut Government and the Trent University Research Ethics Board.	Phone, Email

November 2019	Focus Group 1 with knowledge users to inform variable selection in the statistical analysis.	Happy Valley Goose Bay, Labrador (in-person)
April - May 2021	Focus Group 2 (in two parts) with knowledge users to inform the interpretation of preliminary findings and possible explanations for statistical results especially significant associations between variables.	Zoom (virtual)
Winter 2021-2022	Final results communication to research partners at the Nunatsiavut Government.	Email, Zoom (virtual)

Pragmatism

This study design falls within a pragmatic research paradigm, oriented towards producing socially useful knowledge (Feilzer, 2009). Pragmatism as a paradigm focuses on research problems – often in the social world – that require actions that will be consequential. As such pragmatism serves as a flexible and reflexive guide for privileging methods for data collection and analysis that are more likely to produce knowledge that would address the identified research problem (Feilzer, 2009). On an epistemological level, pragmatism assumes there are many ways in which social reality can be understood and that it's permissible for empirical inquiry to be guided by wanting to solve problems (Creswell et al., 2007, in Feilzer, 2009).

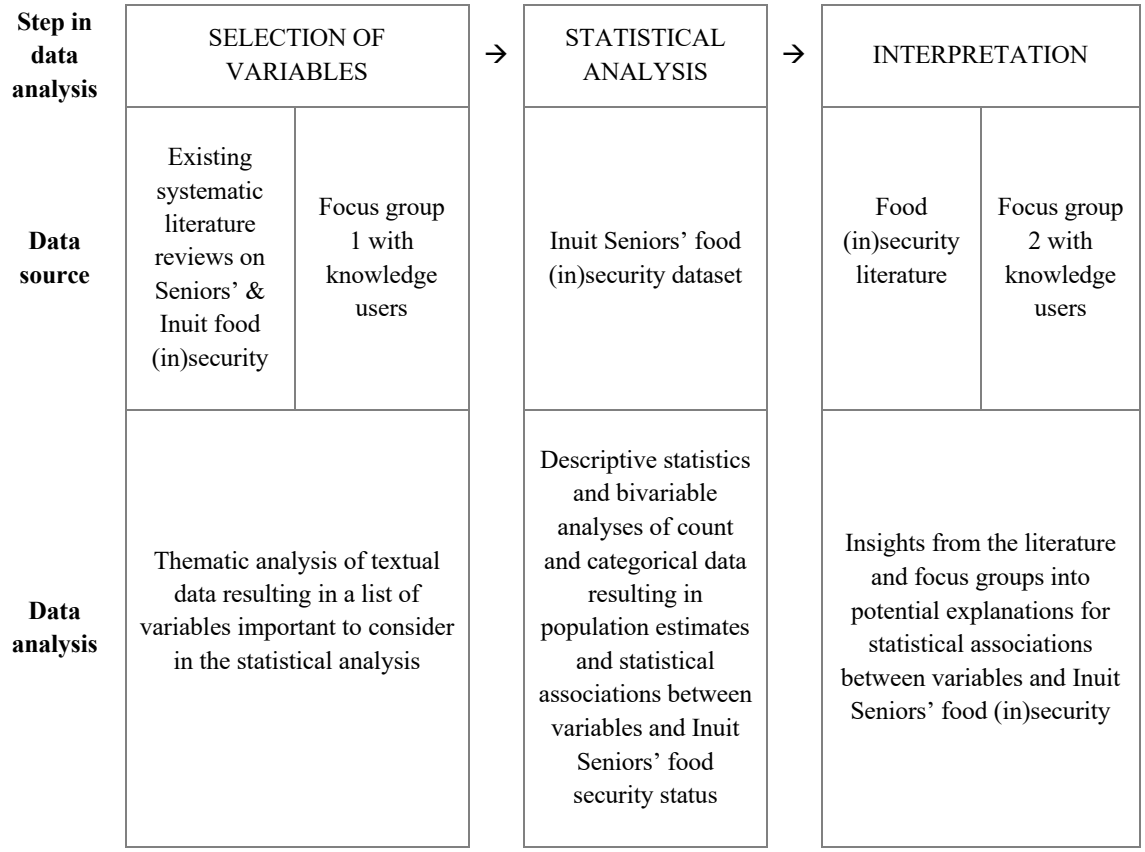
By framing this study under a pragmatic research paradigm, I make transparent that the methods I employed were chosen for reasons that ensure both rigour as well as practicality. In summary, these reasons include responding to the urgency of addressing the research problem, using data available through research partnership, focusing on a case study in two communities because of an established research partnership, as well as choosing knowledge-user-directed methods for analyses.

Study Design

This study was exploratory in its nature. It centred around the statistical analysis of a community-representative dataset of Inuit Seniors' food (in)security, using a sample that was adjusted with a finite population correction and weighted to represent the distribution of Seniors between the two communities from which the sample was drawn.

Figure 2

Study Design



The study design reflected an intentional and pragmatic approach to weaving qualitative and quantitative data and analyses. As illustrated in Figure 2, qualitative data

from the published literature and focus groups with knowledge users enriched the quantitative analysis of survey data. Specifically, data from the literature and focus groups ensured that the selection of variables for the statistical analysis as well as the interpretation of statistical results were theoretically sensitive.

Description of Data Source

Housing and Programming Individuals 55+ Survey

Survey objectives and content

The 'Housing & Programming: Individuals 55+' survey explored Seniors' needs in Nain and Hopedale. The intent of this survey was primarily for internal purposes and department program development. Nain and Hopedale were selected by the Nunatsiavut Government as priority communities for this data and analysis in light of 2013 food security survey results showing the highest regional prevalence levels of food insecurity in Nain and Hopedale.

The survey contained a total of 69 questions, covering the following themes: individual and household demographic data; food access and interest in food program use; self-rated health; mobility needs including physical challenges to access food; housing needs and preferences. In terms of the scale at which data was collected, the survey primarily asked participants questions about themselves, and some questions about their household (e.g., Which words best describe your household's money situation?).

Food (in)security was assessed using a slightly adapted version of the USDA Food Security Survey Module, which has also been used in the Canadian Community Health Survey (CCHS) since 2004. The version of the survey module used in this survey consists of 10 questions (see specific questions in Appendix B). The wording was slightly modified by DHSD staff from the wording in the CCHS survey module to make it easier to understand in the local context (e.g., statements were changed into questions to make it easier to answer). A similar version of this food security survey module was used to assess food security in Nunatsiavut in 2013/14 as well as in the 2007/08 Inuit Health Survey (Bickel et al., 2000).

Target population and sampling frame

The target population was individuals aged 55 and older registered as Nunatsiavut land claim beneficiaries in Nain and Hopedale in September 2017. In terms of the sampling frame, a list of all beneficiaries 55+ years old with their addresses was printed in September 2017 and distributed to a team of hired research assistants, as coordinated by a regional researcher. All beneficiaries at this age threshold and above were eligible to participate, regardless of whether they shared a household with another individual eligible to participate.

Recruitment of participants was conducted by research assistants. Research assistants called or visited individuals eligible to participate and asked if they were interested in participating in the survey. Participation was voluntary, and only those that agreed to participate and were in town during the data collection period (September and

October 2017) were included in the final dataset.

Sample and population sizes

The sample and population sizes of all Inuit Seniors in Nain and Hopedale are summarized in Table 3. Population sizes are based on the list of Nunatsiavut land claim beneficiaries in Nain and Hopedale, which represent the exact number of eligible participants at the time of data collection.

Table 3

Sample Size and Population Sizes of Seniors in Nain and Hopedale

	Sample (n) Count	**Total Population of Individuals 55+ (N)**	**% of Total Population**
Nain	76	191	39.8 %
Hopedale	70	103	68.0 %
Total	146	294	49.7 %

Data collection

The 'Housing & Programming: Individuals 55+' survey was designed by DHSD. Data collection took place in person using a hardcopy paper survey. The survey took roughly 45-50 minutes to complete and translation into Inuttitut was provided when requested. A team of local research assistants was hired and trained by a research coordinator in both Nain and Hopedale.

While it was not appropriate for the research to participate in the collection of data associated with a survey conducted by DHSD, the researcher was invited to come to Nain

and witness the rollout of the survey in Nain, meet the team of local research assistants and coordinator as well as experience the context in which the data was collected.

To ensure confidentiality during data collection, research assistants conducted survey interviews in private: either at an office of the Department of Health and Social Development or in the personal residence of the survey participant, if preferred by them. While the survey instrument (i.e., hard copy survey) did not include personal information, such as participant name, each research assistant did carry with them a list that included the names of all eligible participants. This list was used to keep track of who had been contacted, participated or refused to participate. The team of research assistants was informed of confidentiality standards during their training. As a result, all survey files were kept in designated folders, then dropped off to the local survey coordinator and subsequently locked in a secure location.

Data processing

Data entry

Data was entered into the OPINIO survey tool software by DHSD in the winter of 2017 and the spring of 2018. This method was used to standardize the data entry process and reduce possible errors that often occur when entering data from a hard copy survey into a spreadsheet directly.

Data management

In September 2018, a data-sharing agreement between the Nunatsiavut Government and Trent University Research Ethics Board was signed and approved. The

complete, anonymized and password-protected dataset was sent to the research team in October 2018.

Coding of variables

A comprehensive overview of variable coding is presented in Appendix C. The codebook shows each variable used in the analysis with associated variable names and labels. Some variables were computed (e.g., household crowding was computed from data on the number of people in the household and the number of rooms in the house).

Missing data

A complete case analysis was performed to deal with missing data. Missing data in this study refer to any data that cannot be used for the desired analysis including system-missing responses (e.g., selected 'no response' or blank cells) as well as user-missing responses (i.e., non-meaningful response options that were excluded in the process of recoding variables such as 'prefer not to say', 'don't know' and 'unsure').

First, the pattern of missing data (i.e., amount of missing data and distribution of missing data) was examined and then the missing data mechanism was diagnosed. Most patterns appeared multivariate yet non-monotone. All patterns appeared MAR (i.e., missing at random) except for the income variable, which appeared either MNAR (i.e., missing not at random) or MCAR (i.e., missing completely at random).

As a result, pairwise deletion was used for all crosstabulations (i.e., chi-square tests of independence and homogeneity). In other words, only participants with non-missing responses for both variables were included in crosstabulations. Pairwise deletion within complete case analyses is an appropriate approach to dealing with missing data if

the data are MAR (i.e., missing at random). It is understood that participants with missing data are a random sample of those that were intended to be observed or that the likelihood of missing data on one variable is independent of other missing data (Karahalios, 2012). One disadvantage of pairwise deletion when data are missing at random is that the N is reduced. Sample sizes often differ between analyses within the same study and as such computed statistics may be based on different subsets of cases.

In contrast, pairwise deletion is not an appropriate approach for dealing with the missing data that is MNAR (i.e., missing not at random). An examination and assessment of the patterns around the income variable in this study showed that participants with lower income, who are female and have one instead of two-income sources were more likely to not report their personal income. As a result, all associations with the income variable needed to be interpreted with caution. Caution is important because all associations of interest based on data that is MNAR show biased population estimates. In other words, participants with missing data on a variable that is MNAR are thought to be dissimilar to those participants with complete data (Karahalios, 2021).

Data quality

Complex sample

We defined this sample as complex because we did not have a simple random sample of our population of interest. Some characteristics of our complex sample included: a survey design without replacement, a known finite population, a small sample of a small population, an uneven representation of Seniors from the two sampled communities, and nested data.

To account for complexity in our sample design post-data collection we adjusted the dataset using the CSPLAN feature for complex samples in SPSS (IBM SPSS Statistics, 2011). This allowed us to improve the quality of the dataset in preparation for data analysis, and as a result improve the precision of overall population estimates. We set up CSPLAN to include weighting, a finite population correction, as well as the design effect. Because of missing information about which cases are nested, we were not able to account for nested data in CSPLAN.

Weighting

We used the 'community' variable (i.e., Nain, Hopedale) in a weighting via poststratification approach to re-balance the dataset and ensure that the sample data used for analysis is representative of the total Senior population in Nain and Hopedale from which the sample was drawn. Specifically, of the 294 Seniors in the total population of interest, about 61% live in Nain and 39% in Hopedale, so we re-balanced the sample so that it represented the same 61 to 39 % ratio between the two communities.

When sample data is representative, it is easier to make inferences about the total population of interest and to calculate more accurate population estimates (e.g., estimated food security prevalence levels in the total population of interest). In contrast, when the sample data does not reflect the true population of interest and certain groups in the sample are under or over-represented, results can be skewed (National Academies of Sciences, Engineering, and Medicine, 2018). Non-response weighting adjustments were not made.

Sampling error and finite population correction

The difference between the estimated food (in)security prevalence levels based on the sample and the true prevalence levels of the total population of interest obtained from a complete count under similar conditions is known as the *sampling error*. Since sampling error is expected in non-census studies, we used SPSS's CSTABULATE command for complex samples to account for sampling error and to obtain the 95% confidence intervals.

We sampled a decent proportion of the total population of interest (146 Seniors of a total of 294 Seniors in Nain and Hopedale) and adjusted the sampling error using the Finite Population Correction. The Finite Population Correction helps us get smaller and more accurate estimates of standard error. Without this correction, SPSS would have overestimated the amount of standard error (National Academies of Sciences, Engineering, and Medicine, 2018, p. 88).

Non-sampling errors

While errors not related to the sampling design could occur at any phase of data collection and processing (i.e., participants misunderstanding instructions or answering questions incorrectly; errors during manual data entry process; errors during the data cleaning and recoding process), we were unclear about the extent of non-sampling errors for this dataset. This dataset was provided to us without details about potential non-sampling errors. One potential indicator of non-sampling error was the partial non-response rate (i.e., failure to answer one or more questions), which could have an impact on our study results.

Anonymity

Anonymity was preserved by excluding counts equal to or below 5 from tables and figures (as indicated with an 'A'). In other words, if the number of sampled respondents that had the characteristic of interest (i.e., only valid responses and not counts for user-missing or system-missing) was equal to or less than 5, we decided to not release the weighted estimate regardless of the confidence interval. This decision follows common guidelines for publishing estimates of acceptable quality and for ensuring that respondents are not identifiable. The latter is especially important for small populations where individuals are easier to identify.

Variables

Primary variable of interest: Food (in)security

Food (in)security is a composite variable based on participants' responses to the 10-question food (in)security survey module. The food (in)security variable was constructed by converting responses to each question in the food (in)security survey module into a code. Responses were coded as either affirmative (i.e., code = 1), non-affirmative (i.e., code = 0), or missing (i.e., code = 999). Responses coded as affirmative included: Yes, Often, Sometimes, Almost every day of the month, or About half the days of the month. Responses coded as non-affirmative included: No, Never, A few days of the month, or not applicable. Not applicable responses exist for questions 5 and 10 and reflect those where participants selected 'No' to question 4 and question 9. Missing data (999) was ultimately changed to either an affirmative response (1) or non-affirmative response

(0) based on the USDA's imputation method described below (see Appendix D for details).

Depending on the number of affirmative responses to the questions, respondents were placed into four categories to report levels of food (in)security: food secure or marginally, moderately, or severely food insecure. In some cases, all three food-insecure categories are summarized as "food insecure" (see Appendix E for details).

Screening approach

To be able to score and classify individuals on the food (in)security scale, responses to each question are typically screened according to a two-level screening process. The screening approach in this study was completed during the data analysis and was consistent with the approach used in the analysis of the 2007-2008 and 2013-2014 Nunatsiavut food security data (see Appendix D for details).

The 1st 'internal screening' level looks at questions 1 to 3 in the food security survey module. A minimum of 1 affirmative response is required to continue looking at responses to the remaining questions. However, if there are only non-affirmative responses or a combination of non-affirmative and missing responses (0 and/or 999,), all responses for the remaining questions are (re)coded as non-affirmative responses (0). They are counted as valid responses.

The 2nd 'internal screening' level looks at questions 4 to 8 in the food security survey module. A minimum of 1 affirmative response is required to continue looking at the remaining questions. However, if there are only non-affirmative responses or a combination of non-affirmative and missing responses (0 and/or 999), participants'

responses for the remaining two questions (i.e., questions 9 and 10) are (re)coded as non-affirmative responses (0). They are counted as valid responses.

This screening approach follows an internal logic of the food security survey module which is organized according to the severity of food insecurity. It assumes that an individual who affirms a food security item will, in general, have affirmed less severe food security items and have responded non-affirmatively to more severe food security items (Bickel et al., 2000).

Imputation method

The purpose of imputing data is to complete responses and to be able to score and classify individuals based on the food (in)security scale. Values were imputed for respondents with incomplete responses following the USDA guide on dealing with missing items in the food security survey module (Bickel et al., 2000). According to USDA's direct imputation method, if there is a missing value a decision must be made about whether to replace the missing value with an imputed affirmative or non-affirmative response. This decision is based on the nature of the responses – a pattern of non-affirmative, affirmative and 'do not know' – which respondents gave to all the other items in the food security survey module (see details on the imputation procedure on p. 36 in USDA guide by Bickel et al., 2000). As a result, responses completed through the direct imputation method are then treated and scored on the food (in)security scale using the same method that is used for individuals with complete responses.

For responses where it was not clear whether to impute "yes" or "no" for the missing value based on the overall pattern of responses, it was decided that their food

(in)security status could not be determined. Their set of responses was labelled as "food (in)security status unknown" and had to be removed from the sample altogether. A total of 8 respondents were unscalable or "food (in)security status unknown", leaving a total remaining sample of 138 with complete responses. For example, the food (in)security status of participants who provided missing responses on the first three questions could not be determined.

Approach to variable selection

To ensure theoretical sensitivity for the statistical analysis in this exploratory study, variables selected for the analysis corresponded with variables mentioned in sources closest to the topic of this study.

Given the absence of subject-specific theories from an existing systematic literature review (i.e., variables that are thought to influence Inuit Seniors' food security status), variables were extracted from relevant scholarly literature as well as a focus group transcript from a focus group conducted with regional experts/knowledge users for this study. Gathering background knowledge is an acceptable and typical method for variable selection in health research (Talbot & Massamba, 2019). Existing theory and literature are meant to provide a general idea of variables that need to be considered for inclusion in a predictive model and for reducing selection bias, while the final list of variables included in a final model is typically determined through data-driven variable selection methods (Chwodhury & Turin, 2020).

Variables from the scholarly literature

In the absence of a literature review available specifically on variables influencing Inuit Seniors' vulnerability to food insecurity, variables were extracted from the results of two systematic literature reviews closest to the topic of interest: 1. The only systematic scoping review available on factors predicting food insecurity among Canadian and American Seniors (Thirakul, 2019), and 2. A subset of Senior-relevant variables from the only systematic literature review available on variables reported in relation to Inuit food (in)security across Inuit Nunangat (Curry-Sharples et al., 2020; Curry-Sharples, in progress).

The scope of the systematic literature review which is analyzed and conducted by Curry-Sharples aims to identify and map all relationships ever studied across Inuit Nunangat between food (in)security as an outcome and variables influencing food (in)security. Sources were systematically searched, reviewed and coding included an indication of relationships relevant to subgroups within the Inuit population, including Seniors.

For variables relating to the general North American Seniors' food (in)security literature, variables were extracted directly from the results of Thirakul's (2019) study through inductive coding and in-vivo coding. Independent variables were coded in-vivo and the type of relation between the independent variable and food (in)security as the outcome variable (i.e., facilitates, impedes) was coded inductively. See Table A1 in Appendix A for charted data of extracted variables.

For Senior-specific variables from the Inuit food (in)security literature, a sub-set dataset from Curry-Sharples (In Progress) was used containing the following variables: independent variables; outcome variables (i.e., food (in)security as a composite variable

or one aspect of food security: availability, accessibility, utilization and consumption); the relation between both variables (i.e., whether the independent variable is a facilitator or barrier to the outcome variable); source information (i.e., title, author names, year publication, region, food system, scale). See Table A2 and Figure A1 in Appendix A for charted data of extracted variables.

Variables from regional experts and knowledge users

Following a knowledge-user-directed approach to data analysis, a focus group was held with four regional experts and knowledge users (i.e., decision-makers and program managers) at Nunatsiavut Government's Department of Health and Social Services who are knowledgeable about Seniors and food security concerns at the regional level and involved in shaping community programming in Nain and Hopedale. The inclusion of variables from this type of source of knowledge is appropriate for exploratory statistical data analysis and ensures theoretical sensitivity (Heinze et al., 2018).

To this, a focus group was conducted and audio-recorded following a semi-structured discussion guide. The purpose of the discussion was to learn about current programming addressing Seniors' food insecurity in the region, about regional perspectives on what variables influence Seniors' food security status, as well as about what type of data and statistical analyses would practically support decision-making and action in the region (see Consent Form in Appendix F). The focus group included a review of variables available in the 'Housing & Programming: Individuals 55+' survey dataset and focus group participants selected those that are important to analyze.

To inform variable selection, variables were extracted from the focus group transcript through inductive and deductive coding (Bazely & Jackson, 2013). Codes were

then grouped and synthesized by similarity following a thematic analysis approach (Braun & Clark, 2006). To ensure the internal validity of extracted variables, variables were presented as part of a report to focus group participants for verification and approval (Creswell, 2014).

Variables mentioned in relation to Seniors' food security generally fell within the following variables groups: individual demographics, household demographics, health status, mobility status and needs, characteristics of the food environment, including indicators of food access. Some variables were mentioned by knowledge users because they were thought to influence Seniors' food insecurity based on anecdotal evidence from their lived or professional experience in the region. Other variables were mentioned based on a hunch that they would be important and because they hoped that the analysis of this dataset could yield insight into their association with Seniors' food insecurity.

Process for integrating variables

Selected variables were the result of a methodological and pragmatic process following a weight-of-evidence approach (see Table 4). Specifically, variables chosen for the analysis had to be mentioned in at least one of three sources and subsequently be available in the provided dataset.

- a focus group with regional experts and knowledge users in Nunatsiavut,
- the Seniors' food security literature, and
- Seniors-relevant variables mentioned in the Inuit food security literature.

Conversely, variables not mentioned in any of the three sources were not considered for use in the analysis. A level of importance was not attributed to variables that were mentioned in more than one source during the variable selection process.

Table 4

Joint Display of Variables Extracted from Relevant Knowledge Sources and Variables Available in the Dataset

Nunatsiavut Knowledge-User Focus Group [1]	**Seniors' food Security Literature of North America [2]**	**Inuit Seniors' Food Security Literature [3]**	**→ Variables available and used in statistical analysis [4]**
Age brackets (55-64 years old; 65+ years old)	Age	-	Age Group
-	Education	-	Educational Status
Gender	Gender	Being a woman	Gender
-	Homeownership	-	Homeownership
Social connection / Isolation	Social Capital	-	Marital Status [p]
Household composition	-	-	Number of People in Household [p]; Crowding [p]
Financial status; Income sources (incl. access to government income support); Income types	Income	-	Personal Income; Employment Status; Number of Income Sources; Household Financial Situation
Self-rated health	Health Status	-	Self-rated physical health; Self-rated mental health
Mobility; Access to transportation; Physical access	-	-	Mobility Issues; Help Needed with Groceries
Dietary recall; Type of food consumed (prepared or home-cooked)	-	-	Who Prepares Most Meals [p]; Number of Hot Meals Each Day [p]

Food Program Use	-	-	Interest in a Free Hot Meals Program [p]; Interest in Paying for a Hot Meals Program [p]
-	Race & Immigration Status	-	Not applicable to sample (Sample only includes Inuit)
-	Provinces and territories	-	Not applicable to sample (Sample is from coastal Labrador)
-	Urban and rural communities	-	Not applicable to sample (Sample is rural)
-	Food Management Strategies	-	Not available
-	-	Being a high number (ex 10-15) of muskox in one herd	Not available
-	-	Being a low number (ex 5) of muskox in one herd	Not available
-	-	Better budgeting skills	Not available
-	-	Heavy use of traditional food	Not available
-	-	Low reliance on market food	Not available
-	-	Obligations to give country food, store bought food and occasionally money to adult children	Not available
-	-	Unsuccessful hunts	Not available
-	-	An Elder requesting a muskox	Not available
Number of individuals depending on Seniors for food access	-	-	Not available
Addictions (e.g., cannabis and alcohol substance abuse); Abuse	-	-	Not available

Perception of sufficiency of food	-	-	Not available

NOTES
[1] Nuesslein, Martin & Furgal (2021). *Food (In)Security among Seniors in Nain and Hopedale: Preliminary Findings for Discussion* [Unpublished report]
[2] Thirakul, N. (2019). *An Analysis of the Prevalence and Predictors of Food Insecurity in Canadian Seniors* [thesis].
[3] Curry-Sharples, B. (in progress). *Variables Studied in Relation to Food (In)Security Status Among Inuit in Inuit Nunangat (Arctic Canada): A Systematic Literature Review*
[4] Each variable used in this study was labelled similarly to how the variables in the dataset were labelled. The description of each variable was closely aligned – yet not identical – to the description of the variable used in the literature or by knowledge users.
[p] Proxy variable
[Dash] no data available

This specific methodological process for variable selection was followed to provide transparency and improve rigour in building theoretical sensitivity for our exploratory statistical analysis. As illustrated in Table 5, a joint display was prepared as a data integration tool – i.e., a tool used to treat data from different sources in relation to each other (Fetters et al., 2013) – to illustrate visually where data overlapped or didn't overlap between the three sources of data.

Variables

Table 5 is a joint display listing all variables used in statistical analyses of this study as well as their corresponding source.

Table 5

Joint Display of Final Variable Selection Organized by Corresponding Knowledge Source

Variables available and used in statistical analysis	Nunatsiavut Knowledge-User Focus Group [1]	Seniors' food Security Literature of North America [2]	Inuit Seniors' Food Security Literature [3]
Age Group	x	x	
Educational Status		x	
Gender	x	x	x
Homeownership		x	
Marital Status	x	x	
Mobility	x		
Number of People in Household	x		
Crowding	x		
Personal Income	x	x	
Employment Status	x	x	
Number of Income Sources	x	x	
Household Financial Situation	x	x	
Self-rated physical health	x	x	
Self-rated mental health	x	x	
Mobility Issues	x		
Help Needed with Groceries	x		
Who Prepares Most Meals	x		

Number of Hot Meals Each Day	x		
Interest in a Free Hot Meals Program	x		
Interest in Paying for a Hot Meals Program	x		

NOTES
[1] Nuesslein, S., Martin, R. & Furgal, C. (2021). *Food (In)Security Among Seniors in Nain and Hopedale: Preliminary Findings for Discussion.* [Unpublished report]
[2] Thirakul, N. (2019). *An Analysis of the Prevalence and Predictors of Food Insecurity in Canadian Seniors* [Thesis].
[3] Curry-Sharples, B. (in progress). *Variables Studied in Relation to Food (In)Security Status Among Inuit in Inuit Nunangat (Arctic Canada): A Systematic Literature Review* [Thesis].

The codebook in Appendix C shows variables used in inferential analyses. In several cases, categories of variables had to be collapsed to make interpretation more meaningful, avoid low cell counts, and improve/maintain statistical power, especially for chi-square tests of independence. For example, self-rated health is presented in three categories (i.e., poor, good, very good) instead of the original five response options (i.e., poor, fair, good, very good, excellent).

Statistical analyses

Statistical analyses focused on understanding the characteristics of Seniors that are more likely to be food insecure, as well as on the independent impact of different variables on Seniors' food insecurity – as determined by a series of bivariable analyses. Bivariable analyses were employed because the dataset didn't lend itself to multivariate analyses (see 'Strengths and Limitations' in Chapter Four).

Results from statistical analyses are exploratory. They do not provide explanations for why Seniors are food insecure but are meant to form foundational research for future

predictive statistical models that can explain Seniors' food insecurity. All analyses were run using the IBM SPSS Statistics Version 25 software package.

Descriptive statistics

Counts and percentages of all study variables were provided to describe the characteristics of the full sample.

Population estimates

A sample of the total population of interest (n = 146, N = 294) was used to provide estimates for all Seniors in Nain and Hopedale (i.e., the total population of interest). In this study, estimates are provided for prevalence levels of food (in)security and any bivariable analyses assessing associations between variables. The SPSS's CSTABULATE command for complex samples was used to request population estimates (i.e., estimated counts and percentages).

Regarding the accuracy of estimates, it is possible that estimated prevalence levels would be slightly different if census data from the total population of interest had been available. In other words, estimated food (in)security prevalence levels in this study are subject to sampling error and only represent our single best guess of percentages and counts relating to all Seniors in Nain and Hopedale.

95% confidence intervals

Interval estimates at 95% confidence were requested using SPSS's CSTABULATE command for complex samples. Confidence intervals show a range of numbers that – with 95% confidence – contain the numbers of the total population of

interest. In other words, estimates of food (in)security levels in this study represent our best guess and confidence intervals are necessary to better understand the precision of these estimates.

Chi-square tests of independence and homogeneity

A series of omnibus chi-square tests of independence and homogeneity (χ_2) were performed to determine whether there are statistically significant associations between categorical variables (e.g., whether "Age Group" is related to "Food Security Status"). In this study, a statistically significant p-value ($p < .05$) based on a chi-square test of independence indicates that there is an association between variables.

Omnibus chi-square tests assess whether there is an association between variables in the model, in other words: if the value of one variable tends to co-occur with the value of another variable. Omnibus chi-squares do not provide information about the direction of such association or about prediction. They show that there are significant differences in the overall model, but do not show where specifically and between which groups this difference lies. As such, a series of 2x2 follow-up chi-square tests were performed to see between which groups a statistically significant difference lies, i.e., to determine which specific groups differed in their likelihood of being food insecure.

To lower the likelihood of a type 1 error in a study like ours with multiple bivariable analyses (as determined by chi-square tests), it was decided a priori to only perform 2x2 follow-up chi-square tests for omnibus chi-squares that were significant instead of all omnibus chi-squares.

All chi-squares presented in the results chapter are valid and passed the assumption check where a minimum of 75% of expected values are equal to or greater than 5. When chi-square assumptions were not satisfied, the chi-square statistic was considered invalid and therefore excluded from the analysis. For example, the association between Binary Food Security Status and 'Where you eat most meals' was removed from the analysis because it did not meet the assumption of expected values. Further, in keeping with APA 7th edition guidelines, exact p-values are reported.

All chi-squares were adjusted to a Finite Population Correction.

Effect sizes

Phi (φ) and Cramer's V (φ_c), effect sizes for categorical data, were requested and reported for chi-square tests of independence and homogeneity (only $p < .05$) to determine and compare the strength of association between variables.

Unlike for other test statistics in the analysis, effect sizes using the CSTABULATE command for complex samples were not requested. Instead, this effect size was requested using a weighted sample that was adjusted for the distribution of Seniors between the two communities but was unadjusted by finite population correction and design effect. This choice was made because Phi and Cramer's V are not meant to be used with chi-squares adjusted by design effect. This method follows guidelines provided by IBM SPSS (IBM, n.d.).

Interpretation and Generalization

Statistical inferences

Results from bivariate analyses were performed to describe associations with selected socio-demographic and household characteristics of Seniors. Because bivariable analyses do not take into consideration possible confounding or interaction effects, statistically significant associations should not be misinterpreted as predictors.

Results from statistical analyses based on this dataset can be used to estimate counts and percentages for the Inuit Senior population in Nain and Hopedale yet cannot be used to make inferences to the entire Inuit Senior population in Nunatsiavut. Further, we are not able to describe Seniors' vulnerability to food insecurity in Nain and Hopedale relative to other groups within both communities because the dataset that was analyzed did not include any comparison groups.

Nain and Hopedale data were intentionally combined for analyses based on the assumption that the food system, its challenges with and resources for food access are more similar than different in both Nain and Hopedale. Based on this assumption, it was further assumed that the associations between variables and food (in)security status would not differ between both communities were it possible to take into account all factors important for understanding food insecurity.

Approach to Interpreting Findings

The approach to the interpretation of findings was both intentional and systematic. To ensure the interpretation of findings was informed by existing theories in the published literature as well as grounded in the lived experience of knowledge users from

the case study region, this study engaged knowledge users in a focus group around preliminary findings.

Insights from the focus group yielded potential explanations for why certain variables may be statistically associated with Inuit Seniors' food (in)security – from a regional perspective. In the discussion of findings, these insights were weighted equally to the insights provided in the published literature on this topic.

Ethical Considerations & Approvals

This project yielded several ethical considerations. Foremost, as an outsider to Nunatsiavut and the lived Inuit experience, it was important to be considerate of and sensitive to cultural differences during all stages of the research process.

To ensure alignment with ethical standards, formal applications were submitted and approved by several research ethics boards including the Trent University Research Ethics Board (#25238), Trent University Indigenous Education Council (#25238), the Health Research Ethics Authority of Newfoundland and Labrador (#2018.154), and the Nunatsiavut Government's Research Advisory Committee. Close collaboration with our research partner organization, the Department of Health and Social Development of the Nunatsiavut Government Department, ensured that the project's purpose and its methods aligned with the region's needs and research priorities. See Appendices G and H for a support letter by the Nunatsiavut Government as well as all ethics licenses.

Chapter Three | Results

Introduction

Chapter Three presents the results of the statistical analyses and provides insight to the following questions: How many Seniors are food (in)secure? What are the characteristics of Seniors who are food (in)secure? Which groups of Seniors are more likely to experience food insecurity? What characteristics are more likely to lead to food insecurity among younger and older Seniors? Are Nain and Hopedale the same in terms of the distribution of food (in)security levels among Seniors?

Results are presented in three parts: *Results A* characterizes the sample, identifies the prevalence of food (in)security among Inuit Seniors in Nain and Hopedale, shows the food (in)security status across all individual and household characteristics selected for this study and explores which associations are significant. *Results B* is a follow-up analysis presenting differences in younger and older Seniors and *Results C* presents differences between Nain and Hopedale. The chapter concludes with a summary of findings.

Results A: Sample characteristics and population estimates

Sample characteristics

The sample included 146 participants. Ages ranged from 55 to 89 years old, with 65.1% representing the younger 55-64-year-old age group, 25.3% the 65-74-year-old group and 9.6% the 75 years and older age group. Men and women were nearly equally represented in the sample, with 52.1% identifying as male and 47.9% as female.

Participants' educational status ranged from no schooling to a completed university degree. The majority of the sample represents individuals with some years of elementary school (25%), having completed elementary school completed (11%), having completed some years of secondary school (18.5%), or having completed secondary school (15.8%). Regarding the participants' financial situation, 61% reported being unemployed, and 76.7% reported one income source. While annual personal income levels ranged from below $15,000 to above $61,000, the majority earned equal to or below $20,000 (54.10%), followed by 15% earning between $21-$40,000, 8.9% earning $41-$60,000 and 1.4% earning above $61,000. Describing their household financial situation, many reported that they can save a bit every now and then (26%) or have just enough money to get through to the next payday (19.9%), however many also reported running out of money before payday (21.2%). Describing the participants' household characteristics, the majority of respondents live in a household of two (25.3%), three (22.6%) or four (17.1%). Similarly, the majority of participants live in a house with three bedrooms (48.6%) or two bedrooms (23.3%).

A detailed breakdown of sample characteristics and missing responses is provided in Appendix I. Table I1 illustrates selected individual characteristics of sample participants and Table I2 illustrates selected household characteristics of sample participants. Table I3 describes the sample further by providing counts and percentages of responses to individual food (in)security items from the food security survey module.

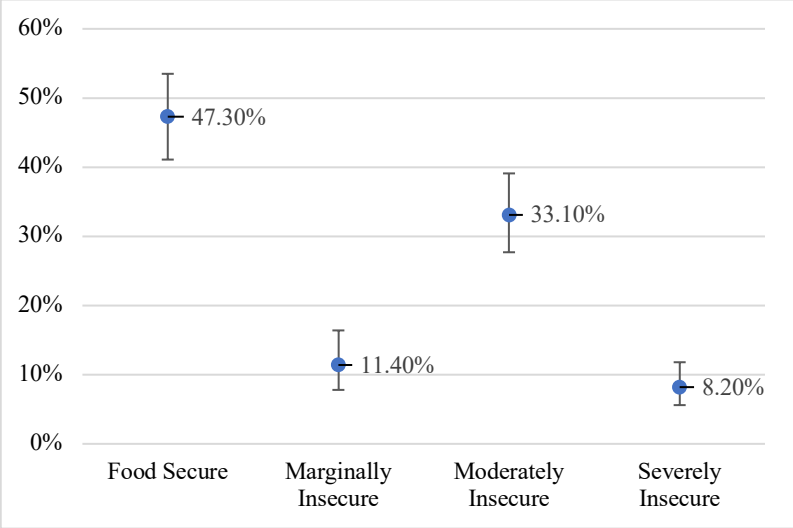
Prevalence levels of Seniors' food (in)security

Figure 3 and Figure 4 show the estimated prevalence of food security and insecurity (95% confidence intervals are drawn as error bars). Table 6 provides estimated population sizes of individuals in the corresponding food security classification categories.

In Nain and Hopedale combined, the estimated percentage of food insecure Seniors (i.e., marginally + moderately + severely insecure) is 52.7%. This represents an estimated number of 155 Seniors out of a total of 294 Seniors in Nain and Hopedale.

Figure 3

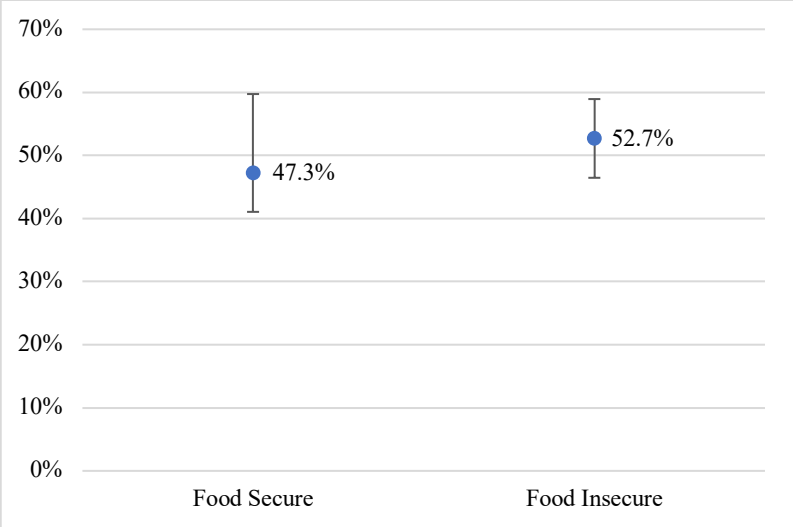
Weighted Prevalence of Food (In)Security Among Seniors in Nain and Hopedale (4-Point Classification, 95% Confidence Intervals, n = 138)



NOTES
Food (in)security could not be calculated for 8 participants (i.e., 1 participant from Nain and 7 participants from Hopedale) because of missing data. Estimated population percentages are based on Nain and Hopedale community sampling weights.

Figure 4

Weighted Prevalence of Food (In)Security Among Seniors in Nain and Hopedale (Binary Classification, 95% Confidence Intervals, n = 138)



NOTES
Food (in)security could not be calculated for 8 participants (i.e., 1 participant from Nain and 7 participants from Hopedale) because of missing data. Estimated population percentages are based on Nain and Hopedale community sampling weights.

Table 6

Estimated Population Size and 95% Confidence Intervals of Seniors' Food (In)Security Levels

	Estimated Population Size	95% Confidence Interval		Sample Count
		Lower	Upper	
Food Secure	139	120	158	61
Marginally Insecure	34	21	46	15
Moderately Insecure	97	80	115	49
Severely Insecure	24	15	33	13
Total	294	288	300	138

NOTES
Food (in)security could not be calculated for 8 participants (i.e., 1 participant from Nain and 7 participants from Hopedale) because of missing data. Estimated population sizes are based on Nain and Hopedale community sampling weights. All counts in Table 6 are rounded to whole numbers.

Estimated food (in)security across sample characteristics

Tables 7 and 8 show estimated food (in)security levels across group characteristics. Specifically, they describe the characteristics of Seniors who are food secure and food insecure.

As illustrated in Table 7, looking at the Seniors aged 55-64, it is estimated that 59.7% are food insecure. For Seniors aged 65-74, it is estimated that 43.7% are food insecure. Approximately half of female Seniors and half of male Seniors are estimated to be food insecure. Similarly, approximately half of employed Seniors and half of unemployed Seniors are food insecure. Further, among Seniors with one source of income, approximately half are food insecure as well as half of Seniors with two sources of income.

Looking at household characteristics, Seniors who live in households where they can save money, it is estimated that 26.9% are food insecure. For those in households that run out of money before or on pay day, 73% are estimated to be food insecure. Further, Seniors living in households that are overcrowded (i.e., more than one person per bedroom), approximately half are estimated to be food insecure. About half are estimated to be food insecure in households that are not overcrowded as well.

It is important to note that Tables 7 and 8 are meant to be read group by group (i.e., one row at a time) without comparing estimates between groups. Please see Table 9 for comparisons and statistically significant differences between groups.

Table 7

Breakdown of Food (In)Security Across Individual Characteristics (Estimated Counts, Estimated Percentages, 95% Confidence Intervals)

Individual Characteristics	Food Insecure (95% CI)		Food Secure (95% CI)	
	Est. Percentage	*Est. Count*	*Est. Percentage*	*Est. Count*
Age Groups				
55 - 64	59.7% (51.7 - 67.3%)	113 (95 - 130)	40.3% (32.7 - 48.3%)	76 (59 - 93)
65 - 74	43.7% (31.8 - 56.3%)	33 (21 - 44)	56.3% (43.7 - 68.2%)	42 (28 - 56)
75+	32.2% (17.1 - 52.1%)	10 (4 - 16)	67.8% (47.9 - 82.9%)	21 (11 - 31)
Gender				
Female	55.4% (46.0 - 64.4%)	76 (60 - 92)	44.6% (35.6 - 54.0%)	61 (46 - 77)
Male	50.5% (41.9 - 59.0%)	79 (63 - 95)	49.5% (41.0 - 58.1%)	78 (61 - 95)
Marital Status				
Married or with common-law	57.7% (49.7 - 65.3%)	102 (85 - 119)	42.3% (34.7 - 50.3%)	75 (58 - 92)
Not married or no common-law	45.1% (34.7 - 55.9%)	51 (37 - 66)	54.9% (44.1 - 65.3%)	62 (46 - 78)
Educational Status				
No schooling	*A*	*A*	91.6% (73.8 - 97.7%)	18 (8 - 28)
Less than secondary completed	62.9% (54.1 - 71.0%)	99 (81 - 116)	37.1% (29.0 - 45.9%)	58 (43 - 73)
Secondary completed	40.8% (26.7 - 56.5%)	21 (11 - 30)	59.2% (43.5 - 73.3%)	30 (18 - 43)
Beyond Secondary	49.0% (35.2 - 63.0%)	27 (17 - 38)	51.0% (37.0 - 64.8%)	29 (17 - 40)
Employment Status				
Yes	47.7% (37.8 - 57.8%)	49 (36 - 61)	52.3% (42.2 - 62.2%)	53 (39 - 68)
No	55.5% (47.3 - 63.5%)	105 (86 -123)	44.5% (36.5 - 52.7%)	84 (66 - 101)
Number of Income Sources				
1	52.7% (45.6 - 59.8%)	116 (99 - 134)	47.3% (40.2 - 54.4%)	104 (86 - 123)
2	50.6% (36.3 - 64.8%)	30 (19 - 42)	49.4% (35.2 - 63.7%)	29 (18 - 41)
Personal Income				
Less than $20,000	51.5% (42.9 - 59.9%)	88 (71 - 105)	48.5% (40.1 - 57.1%)	83 (65- 100)
$21,000 to $40,000	51.6% (36.1 - 66.8%)	23 (14 - 33)	48.4% (33.2 - 63.9%)	22 (12 - 32)
$41,000 to $60,000	37.0% (19.8 - 58.4%)	11 (4 - 18)	63.0% (41.6 - 80.2%)	19 (9 - 28)

Individual Characteristics	Food Insecure (95% CI)		Food Secure (95% CI)	
	Est. Percentage	*Est. Count*	*Est. Percentage*	*Est. Count*
Self-Rated Physical Health				
Excellent	40.1% (25.1 - 57.3%)	20 (10 - 31)	59.9% (42.7 - 74.9%)	30 (18 - 43)
Very good	42.3% (28.5 - 57.4%)	22 (12 - 31)	57.7% (42.6 - 71.5%)	29 (18 - 41)
Good	47.9% (37.6 - 58.3%)	53 (39 - 68)	52.1% (41.7 - 62.4%)	58 (43 - 74)
Fair	75.8% (63.6 - 84.9%)	50 (38 - 62)	24.2% (15.1 - 36.4%)	16 (8 - 24)
Poor	66.3% (35.4 - 87.5%)	10 (4 - 16)	*A*	*A*
Self-Rated Mental Health				
Excellent	48.2% (36.5 - 60.0%)	45 (31 - 60)	51.8% (40.0 - 63.5%)	49 (34 - 64)
Very good	44.1% (31.8 - 57.1%)	29 (19 - 39)	55.9% (42.9 - 68.2%)	37 (24 - 50)
Good	57.3% (46.7 - 67.3%)	59 (45 - 73)	42.7% (32.7 - 53.3%)	44 (30 - 58)
Fair	67.3% (45.8 - 83.3%)	19 (11 - 28)	32.7% (16.7 - 54.2%)	9 (2 - 16)
Poor	*A*	*A*	*NA*	*NA*
Mobility Issues				
At least one mobility issue	64.8% (51.7 - 75.9%)	41 (30 - 53)	35.2% (24.1 - 48.3%)	23 (13 - 32)
No mobility issues	49.2% (41.9 - 56.5%)	111 (93 - 129)	50.8% (43.5 - 58.1%)	115 (96 - 133)
Help Needed with Getting Groceries				
Yes	68.5% (52.5 - 81.0%)	37 (25 -49)	31.5% (19.0 - 47.5%)	17 (7 - 26)
No	49.2% (42.4 - 56.1%)	118 (100 - 136)	50.8% (43.9 - 57.6%)	122 (103 - 141)
Number of Hot Meals a Day				
Less than one	69.9% (51.4 - 83.6%)	27 (17 - 38)	30.1% (16.4 - 48.6%)	12 (4 - 20)
On average, one hot meal per day	72.7% (57.8 - 83.7%)	43 (30 - 55)	27.3% (16.3 - 42.2%)	16 (7 - 25)
Two or more	40.4% (32.8 - 48.6%)	74 (58 - 91)	59.6% (51.4 - 67.2%)	109 (91 - 128)
Where You Eat Most Meals				
Own House	52.9% (46.1 - 59.6%)	133 (114 - 151)	47.1% (40.4 - 53.9%)	118 (100 - 136)
Relatives House	66.7% (40.4 - 85.5%)	13 (5 - 22)	33.3% (14.5 - 59.6%)	7 (1 - 13)
Friend's House	39.0% (18.4 - 64.5%)	6 (1 - 11)	61.0% (35.5 - 81.6%)	9 (4 - 15)
Who Prepares Most Meals				
Myself	60.2% (49.4 - 70.0%)	65 (49 - 80)	39.8% (30.0 - 50.6%)	43 (29 - 56)
My spouse / partner	54.0% (43.7 - 63.9%)	56 (43 - 70)	46.0% (36.1 - 56.3%)	48 (34 - 63)

Individual Characteristics	Food Insecure (95% CI)		Food Secure (95% CI)	
	Est. Percentage	***Est. Count***	***Est. Percentage***	***Est. Count***
A family member	42.3% (30.6 - 55.0%)	32 (21 - 43)	57.7% (45.0 - 69.4%)	43 (29 - 57)
Interest in a Free Hot Meals Program				
Yes	74.2% (65.2 - 81.4%)	109 (91 - 127)	25.8% (18.6 - 34.8%)	38 (25 - 51)
No	29.5% (20.9 - 39.8%)	35 (23 - 48)	70.5% (60.2 - 79.1%)	84 (67 - 102)
Unsure	35.5% (20.1 - 54.5%)	9 (4 - 15)	64.5% (45.5 - 79.9%)	17 (9 - 24)
Interest in Paying for a Hot Meals Program				
Yes	62.5% (53.1 - 71.1%)	90 (73 - 107)	37.5% (28.9 - 46.9%)	54 (39 - 69)
No	34.9% (25.7 - 45.3%)	40 (27 - 53)	65.1% (54.7 - 74.3%)	75 (58 - 92)
Unsure	71.6% (57.5 - 82.4%)	25 (16 - 33)	28.4% (17.6 - 42.5%)	10 (5 - 15)
Frequency of Meals for a Fee				
Once per day, 5 days a week	57.5% (38.8 - 74.2%)	18 (10 - 26)	42.5% (25.8 - 61.2%)	13 (5 - 22)
Once per day, 2 to 3 days a week	75.4% (60.4 - 86.0%)	47 (33 - 60)	24.6% (14.0 - 39.6%)	15 (6 - 25)
Once per day, one day a week	66.5% (52.7 - 77.9%)	45 (32 - 58)	33.5% (22.1 - 47.3%)	23 (12 - 33)
Frequency of Free Hot Meals				
Once per day, 5 days a week	77.6% (56.6 - 90.2%)	23 (14 - 33)	22.4% (9.8 - 43.4%)	7 (1 - 13)
Once per day, 2 to 3 days a week	81.9% (68.4 - 90.4%)	57 (43 - 72)	18.1% (9.6 - 31.6%)	13 (4 - 21)
Once per day, on one day per week	61.8% (45.5 - 75.8%)	30 (19 - 41)	38.2% (24.2 - 54.5%)	19 (9 - 28)

NOTES

Missing data (i.e., blank responses) were ignored and inconclusive responses (i.e., prefer not to say, I do not know, unsure) were ignored when appropriate. Estimated population percentages and estimated counts are based on Nain and Hopedale community sampling weights, and estimated counts are rounded to whole numbers for ease of interpretation. Confidence Intervals (CI) could not be calculated when estimated percentages were either 0% or 100%.

NA – Counts, percentages and confidence intervals could not be estimated.

A – Estimated counts equal to or less than five are suppressed to protect potentially identifiable individuals of the small population.

Table 8

Breakdown of Food (In)Security Across Household Characteristics (Estimated Counts, Estimated Percentages, 95% Confidence Intervals)

Household Characteristics	Food Insecure (95% CI)		Food Secure (95% CI)	
	Est. Percentage	***Est. Count***	***Est. Percentage***	***Est. Count***
Household Financial Situation				
Spend more money than we get	66.1% (41.4 - 84.3%)	15 (8 - 22)	33.9% (15.7 - 58.6%)	8 (1 - 14)
Run out of money before or on pay day	73.0% (63.2 - 81.0%)	89 (71 - 106)	27.0% (19.0 - 36.8%)	33 (21 - 45)
Money left each week, but we just spend it	40.8% (20.4 - 65.0%)	9 (2 - 16)	59.2% (35.0 - 79.6%)	13 (5 - 22)
We can save	26.9% (18.0 - 38.1%)	25 (15 - 36)	61.9% (61.9 - 82.0%)	68 (52 - 85)
Number of People in Household				
1 person	52.0% (29.2 - 74.0%)	12 (4 - 20)	48.0% (26.0 - 70.8%)	11 (4 - 18)
2 people	55.9% (43.3 - 67.9%)	44 (30 - 57)	44.1% (32.1 - 56.7%)	34 (22 - 47)
3 people	62.2% (48.5 - 74.2%)	42 (29 - 54)	37.8% (25.8 - 51.5%)	25 (14 - 36)
4 people	21.6% (12.4 - 34.8%)	11 (5 - 17)	78.4% (65.2 - 87.6%)	39 (25 - 53)
5 plus people	63.3% (49.3 – 75.3%)	41 (29 – 53)	36.7% (24.7 – 50.7%)	24 (13 – 35)
Household Crowding				
Overcrowding (> 1 person per bedroom)	55.8% (45.6 - 65.5%)	59 (46 - 72)	44.2% (34.5 - 54.4%)	47 (32 - 61)
No Overcrowding	51.4% (42.9 - 59.9%)	90 (72 - 108)	48.6% (40.1 - 57.1%)	85 (67 - 102)
Homeownership				
Renter	61.1% (51.2 - 70.1%)	79 (63 - 96)	38.9% (29.9 - 48.8%)	51 (36 -65)
Homeowner	47.3% (38.7 - 56.1%)	73 (57 - 88)	52.7% (43.9 - 61.3%)	81 (64 - 98)

NOTES
Missing data (i.e., blank responses) were ignored and inconclusive responses (i.e., prefer not to say, I do not know, unsure) were ignored when appropriate. Estimated population percentages and estimated counts are based on Nain and Hopedale community sampling weights, and estimated counts are rounded to whole numbers for ease of interpretation.

Estimated food (in)security and group differences

This section focuses on differences between group, specifically which groups of Seniors are more likely to be food insecure.

A series of omnibus chi-square tests of independence (χ_2) were performed to determine whether there are statistically significant relationships between several variables and the binary classification of food (in)security (e.g., whether 'Age Group' is related to 'Food (In)Security Status'). Only for variables that are statistically significantly related at $p < .05$, a series of 2x2 follow-up chi-square tests of independence were performed. The purpose of the 2x2 follow-up chi-square tests was to see between which groups a statistically significant difference lies, i.e., to determine which specific groups differed in their likelihood of being food insecure compared to the reference group.

Results identified with an asterisk* in Table 9 indicate that Seniors in that group are more or less likely to be food insecure than a comparison group identified for each characteristic (referred to as the "reference group"). If the percentage of individuals in the group is higher than the percentage of individuals in the reference group, then Seniors in the group are more likely to be food insecure than Seniors in the reference group. If the percentage for the group is lower than the percentage for the reference group, then Seniors in the group are less likely to be food insecure than Seniors in the reference group.

Table 9

Associations Between Sample Characteristics and Prevalence of Food Insecurity Among Seniors in Nain and Hopedale

Characteristics	Food insecure (%)	χ^2 [1]	Adj. F	df1	df2	N [2]	Sig. [3]	φ_c [4]
Individual Characteristics								
Age Group		5.379	4.666	2.000	287.965	294.000	.010**	0.20
55 to 64 years old	59.7%**	3.865	6.736	1	144	219.455	.010**	0.19
65 to 74 years old	43.70%	.559	.993	1	144	105.640	.321	-
Reference Group: 75+ years old	32.20%							
Gender		.332	.572	1	144	294.000	.451	-
Female	55.4%							
Male	50.5%							
Marital Status		2.053	3.405	1	144	290.730	.067	-
Married or with common-law	57.7%							
Not married or no common-law	45.1%							
Educational Status		11.706	7.816	2.845	409.735	283.279	.000**	0.30
No Schooling	8.4%**	4.665	13.304	1	144	75.457	.000**	0.37
Less than Secondary Completed	62.90%	1.575	2.741	1	144	212.538	.100	-
Secondary Completed	40.80%	.343	.592	1	144	107.275	.443	-
Reference Group: Beyond Secondary	49.00%							
Employment Status		.770	1.376	1	144	290.730	.243	-
No	55.5%							
Yes	47.7%							
Number of Income Sources		.041	.067	1	144	280.543	.796	-
2	50.6%						.	
1	52.7%							
Personal Income		.993	.858	1.995	287.257	245.110	.425	-
Less than $20,000	51.5%							
$21,000 to $40,000	51.6%							
$41,000 to $60,000	37.0%							

Characteristics	Food insecure (%)	χ^2 [1]	Adj. F	df1	df2	N [2]	Sig. [3]	φ_c [4]
Self-rated Physical Health		9.906	8.466	1.994	287.163	294.000	.000**	0.27
Poor	74.0%**	9.347	16.104	1	144	182.355	.000**	0.33
Good	47.9%	.425	.721	1	144	213.481	.397	-
Reference Group: Very Good	41.2%							
Self-rated Mental Health		3.323	2.790	1.999	287.791	294.000	.063	-
Poor	70.0%							
Good	57.3%							
Very Good	46.5%							
Mobility Issues		2.278	4.256	1	144	289.818	.041*	0.13
At least one mobility issue (e.g., difficulties with steps, walking, standing, sitting or kneeling)	64.8%*	2.278	4.256	1	144	289.818	.041*	0.13
Reference Group: No mobility issues	49.2%							
Help Needed with Getting Groceries		3.054	4.809	1	144	294.000	.030*	0.15
Yes	68.5%*	3.054	4.809	1	144	294.000	.030*	0.15
Reference Group: No	49.2%							
Who Prepares Most Meals		2.674	2.340	1.999	287.898	286.360	.098	-
Myself	60.2%							
My spouse / partner	54.0%							
A family member	42.3%							
Number of Hot Meals Each Day		11.533	9.461	2.000	287.976	281.644	.000**	0.30
Less than one	69.9%**	5.222	8.603	1	144	223.102	.004**	0.23
One	72.7%**	8.529	14.173	1	144	242.375	.000**	0.28
Reference Group: Two or more	40.40%							
Interest in a Free Hot Meals Program		24.456	39.631	1	144	266.741	.000**	0.45
Yes	74.20%**	24.456	39.631	1	144	266.741	.000**	0.45
Reference Group: No	29.50%							
Interest in Paying for a Hot Meals Program		8.933	14.987	1	144	259.478	.000**	0.28
Yes	62.50%**	8.933	14.987	1	144	259.478	.000**	0.28
Reference Group: No	34.90%							

Characteristics	Food insecure (%)	χ^2 [1]	Adj. F	df1	df2	N [2]	Sig. [3]	φ_c [4]
Household Characteristics								
Household Financial Situation		22.320	12.133	2.996	431.468	259.824	.000**	0.43
Spend more money than we get	66.1%**	5.651	9.323	1	144	115.827	.003**	0.33
Run out of money before or on pay day	73.0%**	20.977	35.900	1	144	214.550	.000**	0.46
Money left each week, but we just spend it	40.8%	.760	1.259	1	144	116.015	.264	-
Reference Group: We can save	26.9%							
Number of People in the Household		11.589	5.091	3.956	569.687	281.644	.001**	0.30
Reference Group: 1 person	52.00%							
2 people	55.90%	.050	.082	1	144		.775	-
3 people	62.20%	.344	.554	1	144		.458	-
4 people	21.6%*	2.973	5.684	1	144		.018*	0.31
5 plus people	63.3%	.419	.672	1	144		.414	-
Household Crowding		.233	.419	1	144	280.009	.518	-
Overcrowding (> 1 person per bedroom)	55.8%							
No Overcrowding	51.4%							
Homeownership		2.504	4.210	1	144	283.090	.042*	0.14
Renter	61.1%*	2.504	4.210	1	144	283.090	.042*	0.14
Reference Group: Homeowner	47.3%							

NOTES

[1] Adjusted Pearson chi-square statistic

[2] Estimated population percentages and counts are based on Nain and Hopedale community sampling weights, and estimated counts are rounded to whole numbers for ease of interpretation.

[3] Significance is based on the adjusted F (a variant of second-order Rao-Scott adjusted chi-square statistic) and its degrees of freedom.

[4] Cramer's V effect size (φ_c) was requested using the unadjusted weighted sample and based on the following statistics: unadjusted chi-square (χ^2), q (q=min{row, column}), W (weighted sample). Effect sizes were rounded to two decimals.

* Statistically significant at the $p < .05$ alpha level

** Statistically significant at the $p < .01$ alpha level

The following individual characteristics were statistically significant associated with food (in)security:

- Individuals 55-64 years old are more likely to be food insecure than those that are 75+ years old.
- Seniors with some schooling beyond secondary (some and/or completed diploma, certificate, or university) are more likely to be food insecure than those that have no formal schooling.
- Seniors that rated their physical health as "poor" are more likely to be food insecure than those that rated their health as "very good".
- Seniors who report some mobility issues (e.g., difficulties with steps, walking, standing, sitting, or kneeling) are more likely to be food insecure compared to those reporting no mobility issues.
- Seniors reporting needing help with getting groceries are more likely to be food insecure than those that reported not needing help with getting groceries.
- Seniors eating 1 hot meal or less a day are more likely to be food insecure than those who eat 2 or more hot meals a day.
- Seniors interested in a hot meals program (free or with a fee) are more likely to also be food insecure than those not interested. Specifically, Seniors interested in a free hot meals program are more likely to be food insecure than those not interested. And Seniors interested in paying for a hot meals program are more likely to be food insecure than those not interested.

The following individual characteristics were not shown to be statistically significantly related to food (in)security: Gender, marital status, employment status, total sources of income, personal income, self-rated mental health, and who prepares most meals.

In terms of household characteristics, the following were shown to be statistically significantly related to food insecurity:

- Describing their household financial situation, Seniors in households that run out of money before or on payday are more likely to be food insecure than Seniors in households that can save. Similarly, Seniors in households that spend more than they can get (i.e., borrowing, credit, loans) are more likely to be food insecure than Seniors in households that can save.
- A Senior living alone is more likely to be food insecure compared to a Seniors living in a household of four people.
- A Senior who rents their home is more likely to be food insecure compared to a Senior who lives in a home that is owned by themselves or another member of their household.

The measure of household crowding (i.e., more than 1 person per bedroom) was not shown to be statistically associated with food (in)security.

Results B: Differences between younger and older Seniors

As identified in Table 9, younger and older Seniors statistically differ in their food security status with younger Seniors (aged 55-64) showing a higher likelihood of being food insecure compared to their older peers that are 65 years or older. To further explore the differences in age groups in the combined sample from Nain and Hopedale, first, the characteristics of both age groups were compared. This was followed by a series of chi-square tests of homogeneity to examine which associations (i.e., between characteristics and Seniors' food security status) are the same between younger and older Seniors.

Characterizing the sample by age groups

The sample included 95 participants in the 55-64 age category, and 51 participants in the 65 and older age category. There are similarities and differences when comparing the sample characteristics of both age groups. Higher and lower proportions described below do not indicate the likelihood of characteristics occurring in one age group more than in another.

Similarities are seen in the distribution of gender, personal income, self-rated physical health, and where Seniors eat most of their meals. More specifically, men and women were nearly equally represented in both age groups with an approximately equal split between male and female Seniors. Regarding personal income levels, around 40% of both age groups earned below $15,000 annually. The distribution of self-rated physical health is similar as well, with around 30% rating their health as poor (poor and fair combined), 30% good, and 30% very good (very good and excellent combined). In terms

of food access, around 80% of participants in both age groups said they eat most of their meals at home.

Differences are seen in some sociodemographic characteristics, such as marital status, educational status, employment status, household financial situation and number of people in the household, as well as food access characteristics, such as help needed with groceries and interest in a hot meals program.

Among older Seniors who are 65 and older, there is a higher proportion of widowed Seniors: 29.4% compared to 6.3% among younger Seniors. Looking at the educational status of older Seniors, there exists a higher proportion of individuals without formal schooling (11.8% compared to 2.1% among younger Seniors). Conversely, among younger Seniors, there is a higher proportion of individuals with some schooling beyond secondary school (27.5% compared to 5.9% among older Seniors).

In terms of employment status, there is a higher proportion of older Seniors without employment (82.4% compared to 49.5% among younger Seniors), however, when assessing their household financial situation, there is a higher proportion of younger Seniors that report running out of money before payday (25.3% compared to 13.7% among older Seniors) or having just enough money to get them through to the next payday (23.2% compared to 13.7% among older Seniors). Describing their household further, a higher proportion of older Seniors live alone (11.8% compared to 5.3% among younger Seniors) or in a household of two persons (35.3% compared to 20% among younger Seniors).

Looking at food access characteristics and those needing help with groceries, a higher proportion of older Seniors needs help with groceries (29.4% compared to 11.6% among younger Seniors). Further, a higher proportion of older Seniors reported having at

least one or more mobility issues (51% compared to 26.3%). When assessing interest in a hot meals program, more interest is seen among younger Seniors. Specifically, 61.1% are interested in a free hot meals program compared to 35.3% among older Seniors, and 55.8% of younger Seniors are interested in paying for a hot meals program compared to 37.3% among older Seniors.

A detailed breakdown of sample characteristics for both age groups is provided in Appendix J.

Differences between age groups

Table 10 presents the results of follow-up analysis to those results presented in Table 9. It only includes associations that are identified as significant among all Seniors in Table 9.

Table 10

Associations By Age Groups Between Sample Characteristics and Food Security Status

Characteristic BY Binary Food Security Status (FSS)	Age	χ^2 [1]	Adj. F	df1	df2	N [2]	Sig.[3]	φ_c [4]
Educational Status BY FSS	55-64	7.337	3.834	2.965	275.764	185	.011*	0.29
	65+	3.696	2.197	2.781	136.265	98	.096	0.29
Physical Health BY FSS	55-64	13.569	11.354	1.996	185.602	188	.000**	0.39
	65+	.409	.366	1.995	97.749	106	.694	0.09
Mobility Issues BY FSS	55-64	4.227	7.539	1	93	184	.007**	0.22
	65+	.748	1.351	1	49	106	.251	0.12
Help Needed with Getting Groceries BY FSS	55-64	4.220	5.904	1	93	188	.017*	0.22
	65+	1.554	2.534	1	49	106	.118	0.18
Number of Hot Meals Each Day BY FSS	55-64	2.466	2.025	2.000	185.974	176	.135	0.17
	65+	17.681	14.973	1.996	97.807	106	.000**	0.60
Interest in Free Hot Meals Program BY FSS	55-64	7.360	11.605	1	93	170	.001**	0.31
	65+	17.489	26.466	1	49	97	.000**	0.63
	55-64	1.635	2.662	1	93	162	.106	0.15

Interest in Paying for a Hot Meals Program BY FSS	65+	7.359	12.703	1	49	97	.001**	0.41
Household Financial Situation BY FSS	55-64	16.387	8.762	2.994	278.422	168	.000**	0.46
	65+	5.679	3.149	2.996	146.794	91	.027*	0.37
Number of People in the Household BY FSS	55-64	4.300	1.838	3.978	369.928	179	.121	0.23
	65+	7.794	3.235	3.925	192.340	102	.014*	0.41
Homeownership BY FSS	55-64	1.923	3.174	1	93	179	.078	
	65+	.852	1.451	1	49	104	.234	

NOTES
[1] Adjusted Pearson chi-square statistic
[2] Estimated population counts are based on Nain and Hopedale community sampling weights and are rounded to whole numbers for ease of interpretation.
[3] Significance is based on the adjusted F (a variant of second-order Rao-Scott adjusted chi-square statistic) and its degrees of freedom.
[4] Cramer's V effect size was requested using the unadjusted weighted sample and based on the following statistics: unadjusted chi-square (X^2), q (q=min{row, column}), W (weighted sample). Effect sizes were rounded to two decimals.
* Statistically significant at the $p < .05$ alpha level
** Statistically significant at the $p < .01$ alpha level

Looking at younger Seniors (aged 55-64) and older Seniors (aged 65+) separately in Table 10, it shows that in both age groups food access characteristics (such as Number of Hot Meals Each Day and Interest in Hot Meals Programs (free or with a fee)) as well as household financial situation are statistically related to binary food security status. However, when looking at educational status, physical health, and mobility issues in relation to food security status, there is only an association in the younger Seniors age group (aged 55-64). Conversely, looking at the number of people in the household in light of food security status, this association only exists among older Seniors aged 65 and older.

Table 11 is a follow-up to significant associations in Table 10, providing a more nuanced picture of vulnerability within each age group. Among younger Seniors aged 55-64, those who completed less than secondary education was more likely to be food insecure than individuals with any other educational status. Those who rated their health

as poor were more likely to be food insecure compared to those who rated their health as better than poor; those who reported to have at least one mobility issue were more likely to be food insecure than those who didn't report mobility issues; those who reported needing help with groceries were more likely to be food insecure than those not requiring help.

Looking at household financial situation in both age groups, those who run out of money before or on payday were more likely to be food insecure compared to those in all other financial situations. Conversely, those who said they can save were less likely to be food insecure than those in all other financial situations.

Looking at number of people in the household, older Seniors aged 65 and above who reported to live in a household of four individuals were less likely to be food insecure than those living in any other household size. Homeownership was not significant in either age group.

Table 11

Characterization of Sample by Specific Group Differences in Both Age Groups

Characteristic BY FSS	**Aged 55-64**		**Aged 65+**	
	Est. % food insecure[1]	***Sig.[2]***	***Est. % food insecure[1]***	***Sig.[2]***
Educational Status		.011*		.096
No Schooling	0%	NA	4.2%	
Less than Secondary Completed	64.2%	.007**	72.2%	
Secondary Completed	13.0%	.136	17.1%	
Beyond Secondary	22.8%	.239	6.5%	
Physical Health		.000**		.694
Poor	39.7%	.000**	35.0%	
Good	35.7%	.151	31.2%	
Very Good	24.6%	.007**	33.8%	
Mobility Issues		.007**		.251
At least one mobility issue	78.2%		41.0%	
No mobility issues	21.8%		59.0%	

Characteristic BY FSS	Aged 55-64		Aged 65+	
	Est. % food insecure[1]	*Sig.*[2]	*Est. % food insecure*[1]	*Sig.*[2]
Help Needed With Groceries		.017*		.118
Yes	17.8%		39.3%	
No	82.2%		60.7%	
Number of Hot Meals Each Day		.135		.000**
Less than one	21.2%		13.7%	.425
On average, one hot meal per day	23.0%		44.9%	.000**
Two or more	55.7%		41.5%	.000**
Interest in Free Hot Meals Program		.001**		.000**
Yes	77.7%		70.5%	
No	22.3%		29.5%	
Interest in Paying for a Hot Meals Program		.106		.001**
Yes	71.5%		63.9%	
No	28.5%		36.1%	
Household Financial Situation		.000**		.027*
We can save	16.4%	.000**	23.2%	.003**
Money left each week, but we just spend it	4.1%	.045	14.1%	.385
Run out of money before or on pay day	70.5%	.000**	46.5%	.039*
Spend more money than we get	8.9%	.287	16.2%	.387
Number of People in the Household		.121		.014*
1 person	6.3%		12.5%	.847
2 people	24.2%		43.1%	.399
3 people	29.4%		24.4%	.184
4 people	10.0%		0%	.001**
5 plus people	30.2%		20.0%	.220
Homeownership		.078		.234
Renter	51.1		55.1%	
Homeowner	48.9%		44.9%	

NOTES
[1] Estimated population percentages are based on Nain and Hopedale community sampling weights
[2] Significance is based on the adjusted F (a variant of second-order Rao-Scott adjusted chi-square statistic) and its degrees of freedom.
* Statistically significant at the $p < .05$ alpha level
** Statistically significant at the $p < .01$ alpha level

Results C: Differences between Nain and Hopedale

This section focuses on differences between Nain and Hopedale. It explores a series of questions including: Is the demographic makeup among Seniors in Nain and Hopedale the same? Is the food security status of Seniors in Nain and Hopedale the same? Looking at associations between characteristics and Seniors' food security status as well as the strength of association, how do they differ between Nain and Hopedale?

Examining community differences is important to better understand the contextual differences between the two communities from which the sample was drawn.

Demographic differences between communities

Table 12 shows how selected demographic characteristics (i.e., age groups, gender, marital status, primary language spoken in household, educational status, employment status, number of income sources, and personal income level) differed in their distribution between Nain and Hopedale, as analyzed by chi-square tests of homogeneity (χ^2). Results do not explain how the distribution of demographic characteristics differs between communities. Table 13 shows which specific demographic groups differed between Nain and Hopedale, as analyzed using 2x2 follow-up chi-square tests of homogeneity (χ^2).

Sample data were chosen to explore demographic differences instead of public census data because sample data was more recent (2017) and deemed to be more community-representative than census data available from 2016.

Table 12

Associations of Demographic Differences Between Nain and Hopedale

Community BY Characteristic	χ^2 [1]	Adj. F	df1	df2	N [2]	Sig.[3]	φ_c [4]
Community BY **Age Group**	.836	.933	1.995	287.212	308	.394	-
Community BY **Gender**	.213	.455	1	144	308	.501	-
Community BY **Marital Status**	5.956	13.687	1	144	303	.000**	0.20
Community BY **Language**	7.225	8.319	1.979	284.984	308	.000**	0.22
Community BY **Educational Status**	5.102	4.091	2.946	424.191	297	.007**	0.19
Community BY **Employment Status**	5.631	11.601	1	144	301	.001**	0.20
Community BY **Total Number of Income Sources**	1.104	2.488	1	144	295	.117	-
Community BY **Personal Income**	2.296	2.676	1.986	285.940	248	.071	-

NOTES
[1] Adjusted Pearson chi-square statistic
[2] Estimated population counts are based on Nain and Hopedale community sampling weights, and estimated counts are rounded to whole numbers for ease of interpretation.
[3] Significance is based on the adjusted F (a variant of second-order Rao-Scott adjusted chi-square statistic) and its degrees of freedom.
[4] Cramer's V effect size was requested using the unadjusted weighted sample and based on the following statistics: unadjusted chi-square (X^2), q (q=min{row, column}), W (weighted sample). Effect sizes were rounded to two decimals.
* Statistically significant at the $p < .05$ alpha level
** Statistically significant at the $p < .01$ alpha level
Dash effect size not requested

Table 13

Specific Demographic Differences Between Nain and Hopedale

Characteristic	Nain	Hope-dale	χ^2 [1]	Adj. F	df1	df2	N [2]	Sig. [3]	φ_c [4]
Marital Status			5.956	13.687	1	144	303	.000**	0.20
Married or with common-law	53.9%	74.6%	5.956	13.687	1	144	303	.000**	0.14
Not married or no common-law	46.1%	25.4%	5.956	13.687	1	144	303	.000**	0.14
Language spoken in Household			7.225	8.319	1.979	284.984	308	.000**	0.22
Mostly or only Inuttitut	26.3%	8.6%	6.780	17.396	1	144	308	.000**	0.22
Mostly or only English	50.0%	67.1%	4.074	8.946	1	144	308	.003**	0.17
About half and half – Inuttitut and English	23.7%	24.3%	.007	.014	1	144	308	.905	-

Educational Status			5.102	4.091	2.946	424.191	297	.007**	0.19
No Schooling	9.3%	1.4%	3.485	10.103	1	144	304	.002**	0.16
Less than Secondary Completed	52.0%	59.4%	.747	1.609	1	144	304	.207	-
Secondary Completed	20.0%	11.6%	1.693	3.980	1	144	304	.048*	0.11
Beyond Secondary	18.7%	21.7%	.200	.417	1	144	304	.520	-
Employment Status			5.631	11.601	1	144	301	.001**	0.20
Yes	28.0 %	47.8%	5.631	11.601	1	144	301	.001**	0.20
No	72.0%	52.2%	5.631	11.601	1	144	301	.001**	0.20

NOTES
[1] Adjusted Pearson chi-square statistic
[2] Estimated population percentages and counts are based on Nain and Hopedale community sampling weights, and estimated counts are rounded to whole numbers for ease of interpretation.
[3] Significance is based on the adjusted F (a variant of second-order Rao-Scott adjusted chi-square statistic) and its degrees of freedom.
[4] Cramer's V effect size was requested using the unadjusted weighted sample and based on the following statistics: unadjusted chi-square (X^2), q (q=min{row, column}), W (weighted sample). Effect sizes were rounded to two decimals.
* Statistically significant at the $p < .05$ alpha level
** Statistically significant at the $p < .01$ alpha level
[Dash] effect size not requested

Nain and Hopedale appear to be similar in terms of the distribution of age groups, gender, personal income levels, and the total number of income sources. However, Nain and Hopedale are statistically significantly different in terms of marital status, language spoken in the household, educational status, and employment status. More specifically,. in Hopedale, there are more reported couples (i.e., married or with common-law), fewer Seniors without formal schooling and fewer Seniors who have completed secondary school. Further, more Seniors report being employed in Hopedale than in Nain. In Nain, more Seniors speak mostly or only Inuttitut in their household compared to Seniors in Hopedale. At the same time, more Seniors in Hopedale report speaking mostly or only English in their household than Seniors in Nain.

Differences in food security status between communities

Chi-square tests of homogeneity were run to answer the following questions: Is the distribution of food security status the same in Nain and Hopedale? In other words, are Nain and Hopedale the same with respect to food security status?

Table 14

Differences in Food Security Status Between Nain and Hopedale

Food Security Status (FSS)	Nain	Hope-dale	χ^2 [1]	Adj. F	df1	df2	N [2]	Sig. [3]	φ_c [4]
Binary classification			10.425	23.866	1	144	294	.000 **	0.28
Food Secure	57.3%	28.6%	10.425	23.866	1	144	294	.000 **	0.28
Food Insecure	42.7%	71.4%							
4-point classification			16.431	11.299	2.927	421.518	294	.000 **	0.35
Food Secure	57.3%	28.6%	10.425	23.866	1	144	294	.000 **	0.28
Marginally Insecure	12.0%	7.9%	.548	1.305	1	144	294	.255	-
Moderately Insecure	26.7%	47.6%	6.144	12.829	1	144	294	.000 **	0.21
Severely Insecure	4.0%	15.9%	5.908	10.101	1	144	294	.002 **	0.21

NOTES
[1] Adjusted Pearson chi-square statistic
[2] Estimated population percentages and counts are based on Nain and Hopedale community sampling weights, and estimated counts are rounded to whole numbers for ease of interpretation.
[3] Significance is based on the adjusted F (a variant of second-order Rao-Scott adjusted chi-square statistic) and its degrees of freedom.
[4] Cramer's V effect size was requested using the unadjusted weighted sample and based on the following statistics: unadjusted chi-square (X^2), q (q=min{row, column}), W (weighted sample). Effect sizes were rounded to two decimals.
* Statistically significant at the $p < .05$ alpha level
** Statistically significant at the $p < .01$ alpha level
Dash effect size not requested

As illustrated in Table 14, Nain and Hopedale statistically significantly differ regarding their distribution of food security. This difference exists for both the binary and 4-point classification of food security status. More specifically: More Seniors are estimated to be food insecure in Hopedale compared to Nain. Looking at the distribution

of all four food (in)security levels, more Seniors are estimated to be moderately food insecure in Hopedale compared to Nain. Similarly, more Seniors are estimated to be severely food insecure in Hopedale compared to Nain.

Summary

Our analyses answered the two research sub-question by presenting the prevalence of food insecurity among Seniors in Nain and Hopedale as well as exploring their food (in)security in association with several individual and household characteristics. Beginning with prevalence levels, results showed that in Nain and Hopedale combined, the estimated percentage of food insecure Seniors (i.e., marginally + moderately + severely insecure) is 52.7%; this represents an estimated number of 155 Seniors out of a total of 294 Seniors in Nain and Hopedale.

As determined by running multiple independent comparisons, the following individual characteristics were statistically significantly associated with food (in)security among Seniors: age, education status, health status, mobility status, needing help with groceries, number of hot meals a day and interest in a hot meal program. Gender, marital status, employment status, total sources of income, personal income, self-rated mental health, and who prepares most meals were not shown to have an association. In terms of household characteristics, household financial situation, number of people in a household, and homeownership were shown to be statistically significantly associated with food (in)security whereas a measure of household crowding was not.

Results highlighted that different sets of characteristics are significantly associated with food insecurity among younger Seniors aged 55-64, and older Seniors aged 65 and

older. Of all associations that were valid and were run, only household financial situation was statistically associated with food (in)security in both age groups.

Results also provided a nuanced picture of the distribution of food (in)security levels between Nain and Hopedale. It illustrated that the distribution is not the same between both communities and that the difference is statistically significant. Specifically, Seniors in Hopedale are more likely to be food insecure compared to Nain. Further, Seniors in Hopedale are more likely to be moderately and severely food insecure compared to Nain.

Chapter Four | Discussion & Conclusion

Introduction

Chapter Four discusses the results of this thesis project in the context of existing theories drawn from a focus group held with regional experts and knowledge users (i.e., decision-makers and program developers) at the Nunatsiavut Government, as well as from the scholarly literature on Seniors' food (in)security and Inuit food (in)security. This chapter also reflects on the theoretical and methodological strengths and limitations of this study. It concludes with recommendations for action and identifies opportunities for future research to expand our understanding of the network of variables that inform Inuit Seniors' vulnerability to food insecurity.

Prevalence of food insecurity

Food insecurity affected an estimated 52.7% of Seniors in Nain and Hopedale (Figure 3). Specifically, the distribution of marginal, moderate, and severe food insecure Seniors was 11.4, 33.10, and 8.2% respectively (Figure 4).

These levels are similar to the levels identified in a household-representative dataset from a large regional household food insecurity survey conducted a few years prior in 2013-14 in all five Nunatsiavut communities (Nunatsiavut Government, 2017). In 2013-14, 69.3% of households in Nain were classified as food insecure (35.9% severely food insecure) while in 2017, 42.7% of Seniors in Nain were classified as food insecure (4% severely food insecure) (see Figure K1). Further, looking at Hopedale in 2013-14,

82.1% of households classified as food insecure (22% severely food insecure) whereas 71.4% of Seniors in 2017 (15.9% are severely food insecure) (see Figure L1).

While sampling designs, scale and scope differed between these two surveys and it is not wise to compare prevalence levels directly, results of both surveys illustrate the gravity of the issue of food insecurity in the region – both when measured at the household level as well as at the individual level for the Seniors subgroup. Results from both surveys also suggest that food insecurity levels are not uniform between individuals, households, and communities within the same population, which in turn highlights the importance of needing nuanced data to support understanding and action on this topic.

With about half of all Seniors either worrying about running out of food, compromising the quality or quantity of food they access, or having to skip meals, this reflects a serious public health issue, an indicator of poor physical and mental health or an indicator of barriers to health in this subgroup of the population, and a major compromise to the human right to adequate food. These prevalence levels also beg the question as to what systematic barriers exist in the Nunatsiavut food system and policy landscape that have led to such health inequities.

Two recent policy studies by Bowers et al. (2020, 2021) provide some insight into the food security policy landscape in Nunatsiavut. These studies highlight policy incoherence among the twenty-five regional, provincial, and federal policies which were identified to proximally address one or more components of food (in)security in the region. They also highlight that a food security-in-all policy approach is needed to improve the coherence between policies and effectively address health inequities in the region. While some policies exist that are meant to specifically support conditions for distinct groups such as women, children, and Seniors, the only two policies focused

specifically on Seniors (i.e., the Newfoundland and Labrador Seniors Benefit, and Guaranteed Seniors Income Benefit) are provincial and federal policies focused exclusively on income support.

No other non-income-specific social policies currently exist that intentionally create conditions for a flourishing older life for Nunatsiavut Seniors; however, individual-level data on the food security status of subgroups – and not just for households – is needed to be able to evaluate policy effectiveness for this subgroup.

Associations

In large part, results from bivariable analyses in Table 9 align with existing theories around variables influencing food insecurity including among Inuit and among Seniors. Some associations add nuance to existing theories; while others raise new questions to be explored in future research.

Age groups

Individuals aged 55-64 in Nain and Hopedale were more likely ($p = 0.1$, φ_c 0.2) to be food insecure (59.7%) than those who are 75 years and older (32.2%). This association between age and binary food security status supports insights from both regional experts as well as the scholarly literature. According to regional experts, this association makes sense in their cultural context. Older individuals are typically better provided for by the community in terms of food access compared to their younger peers. Further, older Seniors above 75 years old are likely great-grandparents while younger Seniors aged 55-

64 are likely grandparents, who carry the familial responsibility of feeding their grandchildren daily (e.g., not uncommonly up to twelve children), regardless of whether their grandchildren live with them in the same home (Nuesslein et al., 2021). Results of a qualitative study by Chan et al. (2006) on barriers to food security in Nunavut also saw elderly being relied upon to feed their children and grandchildren and stretching their pension to do so.

A plausible alternative explanation of lower levels of food insecurity among older Seniors is that these levels are underestimated because of a generational tendency to perceive food sufficiency differently. Regional experts suggested that older Seniors may have lower expectations of what constitutes food sufficiency and typically worry less about food access because of their past experiences with hardship (Nuesslein et al., 2021). Scholarly studies have also explored this phenomenon and have seen that Seniors often perceive their food security status as different from non-Seniors because of generationally distinct life experiences that enable them to tolerate hardship or even pride themselves in their ability to tolerate food insufficiency (Green La-Pierre et al., 2012; Mills, 2021; Nord, 2003; Quandt et al., 2001; Wolfe et al., 2003).

Further, the association found between age and food security status specifically with Inuit Seniors adds nuance to existing and recently published theories around younger Seniors' vulnerability to food insecurity. For example, a study by Men & Tarasuk (2020) on Seniors using 2005-15 Canada Community Health Survey (CCHS) data confirmed higher levels of vulnerability to food insecurity among 55-64-year-old Seniors compared to their older peers. Another recent study analyzing 2013-14 CCHS data found a similar association (Kansanga et al., 2021).

According to the scholarly literature, this association may in part be explained by the protective effect that old age security and public pension have on food insecurity risk. McIntyre et al. (2016) saw this association particularly clearly among low-income adults, such as the individuals in the sample of this study.

Other studies conducted with Canadian adults starting in their mid-50s confirmed this while also highlighting that the variation in food security status between younger and older Seniors corresponded with pre-and post-retirement age groups (Emery et al., 2013; Keller et al., 2007; Wolfe et al., 2003). Specifically, Seniors in the retirement age group are shown to experience lower levels of food insecurity compared to their younger peers who have not retired yet. As a result, public old age security is believed to ease the severity of overall food insecurity especially for low-income individuals who are transitioning from more precarious sources of income to a comparatively more stable and predictable financial situation when receiving public Old Age Security (Emery et al., 2013). An additional supporting piece of evidence for this explanation is that younger Seniors experiencing severe food insecurity are more likely than their food-secure peers to die before becoming eligible to receive a pension (Men & Tarasuk, 2020).

The disparity seen in food insecurity levels between younger and older Inuit Seniors – and more specifically the likelihood of Seniors under 65 being more food insecure compared to their older peers – highlights the importance of needing to pay closer attention to the food security status of younger Inuit Seniors. Explanations by regional experts also speak to the role cultural responsibilities and expectations (i.e., the expectation of grandparents feeding their grandchildren) play in influencing younger Seniors' food insecurity.

Overall, this finding of age group differences adds to the growing evidence of the variability of food insecurity levels experienced within the Senior's age category (Kansanga et al., 2021) and shows the value of disaggregating Seniors' data into sub-age groups of Seniors.

Educational Status

Among individual socio-demographic characteristics, the association between the educational status of Seniors and binary food security status ($p = 0.000$) was surprising to regional experts and divergent from evidence in the scholarly literature. Specifically, Seniors with some schooling beyond secondary (some and/or completed diploma, certificate or university) were more likely ($p = 0.000$, $\varphi_c = 0.37$) to be food insecure (49%) compared to those that have no formal schooling (8.4%). This finding contradicts other food (in)security studies which typically see lower – not higher – educational attainment as a predictor of food insecurity. Higher education attainment is seen as foundational to economic and career opportunities across an individual's lifespan, and as such is often associated with increased likelihood of income stability and disposable income for food. This association is reported both in the Seniors' food (in)security literature in Canada (Kansanga et al., 2021; Leroux et al., 2019) and globally (Park et al., 2019) as well as the Inuit food (in)security literature (Huet et al., 2012, Beaumier & Ford, 2010). More specifically, higher prevalence levels of food insecurity, especially severe food insecurity, are seen among those who have not completed secondary school education compared to those with higher educational attainment (Huet et al., 2012).

One potential explanation of the finding in this study relates to the limitations of the data analysis. This finding may not be about *educational status*, but in fact, be highlighting the potential effect of other variables not captured in this bivariable analysis. A larger proportion of individuals in the sample with no formal schooling are 75 years or older (results not presented) and likely did not have access to mandatory elementary school education on the northern coast of Labrador in the 1940s and 50s. Similarly, those Seniors with 'some schooling' (i.e., instead of 'no formal schooling') are largely below 75 years old and may not be food insecure because of their educational attainment but because of other characteristics that distinguish them from their older peers (see examples described in the discussion on 'age groups').

This finding raises the question of the causal mechanism underpinning elevated food security levels observed among those with no formal schooling. Further research is needed that engages with regional experts to clarify a regional and Nunatsiavut-specific mental model of the network of factors influencing food insecurity for different age groups and the role that educational status plays in explaining Seniors' food insecurity.

Health status and mobility challenges

In this study, Seniors that rated their physical health as 'poor' (on a scale of poor, good, very good) were more likely ($p = 0.000$, $\varphi_c = 0.27$) to be food insecure (74%) than those that rated their health as 'very good' (41.2%). This association between self-rated physical health and binary food security status is largely consistent with the wider food security literature (Choi et al., 2004; Quine & Morrell, 2006; Green-LaPierre et al., 2012 in Kansanga et al., 2021). In fact, Tarasuk et al. (2013) have illustrated that most chronic

health conditions increase the likelihood of household food insecurity, regardless of age and independent of the sociodemographic characteristics of the household.

Assuming that self-rated health is a good proxy for actual physical health, one potential explanation for the role that physical health, specifically among Seniors, plays in determining their food insecurity is the impact of limited physical functioning on their food access and utilization. This includes limited ability to go grocery shopping, to lift groceries and prepare meals, especially while Seniors live alone (Burns et al., 2011), and even when they have enough income to afford groceries (Ishikawa et al., 2016 in Kansanga et al., 2021; Tucher et al., 2020; Wolfe et al., 2003). A similar explanation was provided by regional experts, who had observed mobility-related food access issues among elderly residents in Nunatsiavut. Based on this observation, DHSD programming in both Nain and Hopedale had – for a time – made a van available to Seniors for transportation to events, gatherings, community feasts and the grocery store.

Evidence for this explanation is also seen in the findings of this study. Specifically, those who reported at least one or more mobility issues (e.g., difficulties with steps, walking, standing, sitting, or kneeling) were more likely ($p = 0.41$, $\varphi_c = 0.13$) to be food insecure (65.9%) compared to those reporting no mobility issues (46.9%). Similarly, Seniors reporting that they needed help with getting groceries were more likely ($p = 0.03$, $\varphi_c = 0.15$) to be food insecure (68.5%) than those that reported not needing help with getting groceries (49.2%).

Studies suggest that looking at a measure of mobility is an even more important indicator of food insecurity among Seniors than for other age groups (Wolfe et al., 2003) and possibly a reason to measure food insecurity among Seniors separately (Lee & Frongillo, 2001) or with an augmented questionnaire that more fulsomely captures food

(in)security experiences among Seniors (Duerr, 2007; Wolfe et al., 2003). This is because functional impairment and functional limitations – such as visual, hearing, or small impairments that impact eating or safe cooking activities, or the inability to feed oneself – impact Seniors' experience of food insecurity more than financial reasons (Duerr, 2007; Tucher et al., 2020; Wolfe et al., 2003). In fact, researchers that developed the USDA Household Food Security Survey Module clarified in their measurement guide that the module only captures food insecurity based on financial constraint and does not measure possible other constraints like functional limitations and reduced mobility which are often experienced by isolated elderly or ill persons (Bickel et al., 2000). This clarification about the measurement tool suggests that food insecurity levels among Seniors in Nain and Hopedale could have potentially been higher if Seniors had been asked the food (in)security module survey questions in a way that considered their mobility constraints in addition to their financial constraints.

Furthermore, given the possible role mobility issues plays among food insecure Seniors who are also reporting needing help with groceries, this could explain why results show an association between food (in)security and interest in a hot meals program. Specifically, Seniors interested in a free hot meals program were *more* likely ($p = 0.00$, $\varphi_c = 0.45$) to also be food insecure (74.2%) than those not interested (29.5%). Seniors interested in paying for a hot meals program were also *more* likely ($p = 0.00$, $\varphi_c = 0.28$) to be food insecure (62.5%) than those not interested in paying for a meal (34.9%). Thus, a meals-on-wheels program would likely be well received and utilized by Seniors in Nain and Hopedale.

Lastly, since the association between health status and food security status determined by a chi-square test of independence in this study does not provide

information about the direction for the association, an equally likely interpretation of the finding is that food insecurity leads to an increased likelihood of poor health among Seniors. This potential finding corresponds with many studies that have demonstrably linked food insecurity with poor health outcomes (McLeod & Veall, 2006) and increased mortality (Men & Tarasuk, 2021). Even marginal food insecurity – i.e., worrying about food access – is associated with lower diet quality and diet-related health among Seniors (Leung & Wolfson, 2021).

Personal income and household financial situation

Contrary to most food (in)security studies and to what regional experts had expected, personal income was not significantly associated with binary food security status among Seniors in Nain and Hopedale ($p = 0.425$, $\varphi_c = 0.09$). However, a measure of self-assessed household financial situation was associated with food security status ($p = 0.000$, $\varphi_c = 0.43$). Specifically, Seniors who said that their household runs out of money before or on payday (73%) were more likely to be food insecure ($p = 0.000$, $\boldsymbol{\varphi_c} = 0.46$) than those that can save (26.9%). Similarly, Seniors who said their households spend more than they can get through borrowing and loaning (66.1%) were more likely to be food insecure ($p = 0.003$, $\boldsymbol{\varphi_c} = 0.33$) than those that can save (26.9%). These associations were significant among younger Seniors 55–64-year-old ($p = 0.000$) as well as older Seniors above 65 years ($p = 0.027$).

Many population studies on food (in)security – in Canada and internationally – show evidence that income plays a direct role in ensuring food access, including among Seniors. For example, a multinational analysis of elderly persons in 48 developed countries highlighted that among the many combined factors affecting food insecurity,

financial resources were the most significant risk factors at both the individual and community levels (Park et al., 2019). In Canada, a recent study on Senior participants using CCHS data explained that lower household income generally predicted higher odds of experiencing food insecurity (Kansanga et al., 2021), which is a finding consistent with previous studies with Seniors in Canada (McIntyre et al., 2016; Leroux et al., 2018; Men & Tarasuk, 2020). Tarasuk et al. (2019) added and demonstrated that the risk of income-related food insecurity is higher among the same subgroups that have also shown to have the greatest vulnerability (e.g., Indigenous populations, households reliant on social assistance, and residents of Northern territories). Men & Tarasuk, (2020) highlighted that low income is seen to compound the effect of food insecurity among older adults, leading to even poorer health outcomes and financial resources needed to afford health care costs and specialized diets.

In food (in)security studies with Inuit communities in Nunavut – however not exclusively with data from Inuit Seniors – limited access to income combined with unemployment and high market food prices have shown to be a barrier to accessing store-bought food (Lardeau et al., 2011). More specifically, households whose primary income was income support predicted higher use of food support programs like food banks and soup kitchens, compared to households whose income came from employment (Statham et al., 2015). In Nunatsiavut, higher income earning households were more likely to be food secure than households with a lower income (Nunatsiavut Government, 2017).

Associations between low income and food insecurity are to be expected, as the survey instrument (i.e., the USDA Household Food Security Survey Module) which was also used in this study was designed to assess food access in the context of limited financial resources (Bickel et al., 2000). This survey instrument focuses on financial

constraints to food access which makes sense in a market system where money is necessary for food access. However, this survey instrument does not consider non-financial barriers to food access, such as mobility, and does not consider food access through non-monetary means such as hunting, trading, sharing. According to regional experts, such means for food access are important components of the Inuit food system and need to be considered in the measurement and understanding of food insecurity in the region (Nuesslein et al., 2021).

An exploratory food (in)security study conducted in Nunatsiavut in 2013-14 highlights the importance of non-monetary means of food access in the region. Survey results showed that households with at least one member who regularly harvests wild foods (i.e., hunts, fish, collects, picks) were more likely to be food secure than households that did not have any members who regularly harvest (Nunatsiavut Government, 2017). These results corroborate previous observations made in Inuit food (in)security studies where income levels were one of the barriers to food security, where the absence of a hunter increased vulnerability to food insecurity (Chan et al., 2006; Ford & Beaumier, 2011; Huet et al., 2012) and where the presence of at least one fisher and hunter in the household decreased the likelihood of the household being classified as food insecure (Teh et al., 2017).

There are several potential explanations for why personal income was not statistically significantly associated with food security status, whereas a self-assessed measure of household financial status was. One potential and likely explanation relates to the limitations of the sampling design, the other to the limitations of the measure.

First, caution needs to be applied when drawing conclusions based on results connected to the ‘personal income’ variable. This is because potential missingness for the

personal income data is noticeable when reviewing patterns of non-response in the entire dataset. It appears that those respondents with lower income and who are female were more likely to have not responded to the personal income survey question, indicating that personal income data in this dataset may be biased and not representative of all Seniors' income situations.

Second, as regional experts highlighted in the focus group, the measure of personal income of one member of the household may inaccurately reflect their access to that income for food. This may especially be true in households where Seniors are not the head of their household, in households with a history of Seniors' abuse, and in households where financial resources are unequally distributed which often leads to unequal access to food (Nuesslein et al., 2021). These observations were made by regional experts, who also suggested that a personal income measure for Seniors may not accurately capture if the income is sufficient relative to the number of individuals (i.e., children and grandchildren) who are dependent on this income for food access. As such, a qualitative household financial situation indicator that measures sufficiency and how much money is left after paying for essential expenses could be a better proxy for assessing financial status in food (in)security studies, rather than a quantitative measure of the personal income of a single member of a household.

Bivariable analyses, such as those conducted in this study, are insufficient in explaining the association between personal income and Seniors' food security status. While an association between food security status and household financial situation was seen both among younger Seniors aged 55-64 and older Seniors aged 65 and older (see Table 10 and 11), bivariable analyses are insufficient for explaining whether such associations are a phenomenon specific to Inuit Seniors, a phenomenon that is shared

more generally in the regional population, or perhaps characteristic of all Seniors or anyone who is characterized as having low-income.

Regardless of whether this finding is a Seniors-specific phenomenon or one that is shared by everyone in the Nunatsiavut and Inuit food system, this finding likely represents a complex picture of several factors, including income, that influence food (in)security. Multivariate analyses are needed to assess whether individual or household financial status better determines Seniors' food (in)security in the Northern food system, especially when considering covariates like household size, how many individuals are dependent on Seniors for food access – regardless of if they live in the same house –, and the presence or absence of an active hunter in the household.

Multivariate analyses with a larger dataset that includes representative data of more than one subgroup of the population are needed to improve our intersectional understanding of this topic. Such analyses would delineate which groups of variables explain food (in)security in the entire population and – by comparison – which variables uniquely combined to be explicitly influential among specific subgroups, such as Seniors.

Household size and crowding

Among bivariable analyses conducted between household characteristics and food security status, household size was associated with food security status while household crowding – as determined by a common overcrowding measure of more than one person-per-bedroom (PPB) (Blake, Kellerson & Simic, 2007) – was not. These findings raise new questions about which factors of the household environment have the biggest influence on Seniors' food insecurity. Specifically, a Senior living alone (52%) was more likely ($p = 0.001$, $\varphi = 0.3$) to be food insecure compared to four people living in a

household (21.6%). When looking at this association among younger and older Seniors, it only showed to be significant among older Seniors above 65. This is consistent with the Seniors' food (in)security literature in Canada (Kansanga et al., 2021), the United States (Lee & Frongillo, 2001) and internationally (Park et al., 2019).

In terms of crowding, regional experts expected to see a strong link between Seniors' food insecurity and household overcrowding, because descriptive statistics showed that 38% of Seniors in Nain and Hopedale live in overcrowded homes and that among Seniors in overcrowded homes, 55.8% were estimated to be food insecure. Their expectations align with results from other food (in)security studies conducted with Inuit communities, such as work by Huet et al. (2012) and Ruiz-Castell et al. (2015) who saw this association be especially strong among households with lower socioeconomic status.

One explanation for why crowding was not associated with food security status in this study relates to the limitations of bivariable analyses which look at crowding in isolation of other important household characteristics like household composition (i.e., number of Seniors, adults, and children). Ruiz-Castell et al. (2015) shed some light on the role household composition plays on food insecurity by looking at households with and without children in Nunavik. Those results showed that in households with school-aged children, crowding conditions increased the likelihood that the size of children's meals was reduced. Similar results were seen in Nunatsiavut where food insecurity levels in households with children were slightly higher compared to the average of all households (Nunatsiavut Government, 2017). These results suggest that household composition, the number of children, and possibly the number of non-wage-earning members – compared to financially-contributing members of the household – influence the severity of food insecurity in a household.

While household size and composition are important for contextualizing the impact of crowding on Seniors' food security status, regional experts attributed Seniors' food insecurity in Inuit communities more to the high number of people that are dependent on Seniors for income and food access. This could include grandchildren as well as adult members of the family regardless of whether they live in the same home (Nuesslein et al., 2021). This insight by regional experts suggests that a measure of dependency is needed in future research on Seniors' food (in)security in the region, and that household size and crowding variables used in this analysis may not be a good indicator or proxy for measuring dependency. In fact, a measure of dependency may be more important than a measure of household size especially in this socio-cultural context where – according to regional experts – the concept of a household is more fluid than in other parts of Canada and where it is common to have dependents that don't live in the same home (Nuesslein et al., 2021). International literature on Seniors' social positioning in living arrangements (e.g., a study by Schatz et al., 2015) may offer helpful ideas for how to measure whether a Senior is dependent on others in their household or is being depended on as a financial caregiver or food provider. Another benefit of using a measure of dependency is that it offers a more nuanced perspective of potential facilitators and barriers to food within the household for Inuit Seniors compared to other common theories that exist around protective living arrangements, such as theories of the role spousal support plays in buffering food insecurity among Seniors.

The potential influencing role of dependency in understanding household characteristics of food-insecure Seniors could be one explanation for why marital status (i.e., married/in a relationship versus not married/not in a relationship) was not associated with Seniors' food security status in this study. In this study, for example, marital status

was not statistically associated with food security status. This finding is unlike other studies that attribute spousal support to be critical in improving Seniors' access to resources for obtaining and preparing food in the right quantity and quality (Gajda & Jeżewska-Zychowicz, 2021; Ishikawa et al., 2016 in Kansanga et al., 2021), and for providing the companionship and emotional support necessary for regular eating (Wolfe et al., 1996; Dean et al., 2011 in Kansanga et al., 2021). Studies have shown that the buffering role of spousal support on food insecurity for elderly people is seen to be even more pronounced in situations of functional impairment (Unger et al., 1999 in Kansanga et al., 2021).

Multi-variate analyses are needed to assess whether and how a measure of dependency and Seniors' social positioning in the household determines Seniors' food (in)security in the socio-cultural context of Inuit communities, especially when considering covariates like socioeconomic positioning of the household, household size, household composition, crowding, marital status, household financial status and mobility issues.

Community differences

Results of bivariable analyses showed that Nain and Hopedale are not the same in terms of food security status among Seniors ($p = 0.000$, Table 14). In Hopedale, more Seniors are estimated to be food insecure (71.4%) compared to Nain (42.7%). Looking more closely at the distribution of all four food (in)security levels, more Seniors are estimated to be moderately food insecure in Hopedale (47.6%) compared to Nain

(26.7%). Similarly, more Seniors are estimated to be severely food insecure in Hopedale (15.9%) compared to Nain (4.0%).

These results may, in part, be explained by the differences in sociodemographic composition in both communities (i.e., differences in employment status and educational status as described in Table 12), such as Hopedale having a higher proportion of Seniors that report being employed, having schooling, and speaking English in their household compared to Nain (see Table 13).

At first glance, seeing community differences in food (in)security levels was surprising to both researchers and regional knowledge users (Nuesslein et al., 2021). This finding was unexpected because data from Nain and Hopedale had intentionally been combined into one sample for analyses based on theoretical and statistical reasons. The main reason was the premise that the food systems of both communities, their challenges with and resources for food access are more similar than different compared to the rest of Canada. This premise was informed by evidence from a previous study conducted by Furgal et al. (2017) in the region, which showed similarly high food insecurity levels in Nain and Hopedale (Nunatsiavut Government, 2018). Further, combining both communities into one sample increased statistical power, which was important for the analysis of a small dataset.

Regional experts indicated in the focus group discussing preliminary study results that they appreciated that community differences were explored in this study (Nuesslein et al., 2021). This information will encourage them and other knowledge users to tailor Seniors' food security programming for both communities.

Multivariate analyses are needed to better understand how community differences in socio-demographic composition and in characteristics of the food environment impact

food insecurity among Seniors – compared to other subgroups and all households in a community. However, the overall finding of community differences illustrates the importance of collecting community-specific and community-representative data to inform food security programming and policy, even among seemingly comparable or similar populations. In fact, any marked differences seen between communities within the same region provide important nuanced information that can easily get lost when only reporting regional averages.

Strengths and Limitations

While the discussion of findings yielded insightful and valuable, there are several strengths and weaknesses important to keep in mind in the interpretation of the results of this study. This section first presents strengths of the project and is then followed by a presentation and discussion of challenges or limitations.

Strengths

A principal strength of this study was the collaborative and knowledge-user-involved nature of this project because it allowed the research to be responsive to Inuit health priorities using a dataset that was already collected and was specific to two priority communities in the case study region of Nunatsiavut. This study intended that the results could be directly applicable and meaningful to decision-makers and program developers at Nunatsiavut Government's Department of Health and Social Development.

The collaborative and knowledge-user-engaged nature of this project also yielded to a strong research relationship. This was another strength of this study. It allowed the second focus group to be held over Zoom when Covid-19 pandemic restrictions made travel to the region impossible, and which will likely increase the relevancy and uptake of results.

A third strength of this study was the approach followed to adjusting the sample to make it more representative of the population of interest. Specifically, we were able to provide more accurate population estimates of the extent and severity of the issue in Nain and Hopedale than if the sample had not been weighted to represent the distribution of Seniors between the two communities and had not been adjusted with a finite population correction.

We believe that this is the only complete – or among the first – community-representative food (in)security datasets that has been collected to date for a subgroup within the Inuit population in Canada.

Overall, the findings from this study have important theoretical and applied implications and provide a first glance at Inuit Seniors' food (in)security. Little analysis has been conducted to date on Seniors' food (in)security in Nunatsiavut; consequently, any insight on this topic was deemed valuable to our community research partner. The analysis of this dataset also provided an opportunity to identify gaps in understanding as well as identify what type of data is needed to better understand the issue.

Limitations

A few theoretical and methodological challenges influenced our efforts to gain insights into which variables are most critical in understanding Inuit Seniors' food (in)security. This section presents an overview of limitations specific to the statistical analysis and the dataset used for this study. All limitations combined provide a rationale for why it was a methodologically better and a more ethical choice in this study to run descriptive analyses and multiple independent bivariable analyses instead of building a multivariate, predictive model about Inuit Seniors' food (in)security.

Limitations of using a secondary data source

Since this study involved the analysis of an existing dataset, we were not able to shape the survey design, the sampling strategy, the survey content, how questions were asked and what response options were available.

Regarding survey design – Ideally, this project would have been designed in a way where outcomes of the literature review could have informed the survey design directly. This would have ensured that variables mentioned as important in the literature could have been collected in the survey. This approach to survey design, however, would not have been feasible or necessary and we opted for a less intrusive project design by using an existing dataset provided by our community research partner. Seniors' food insecurity had not yet been analyzed in the region, and as such this secondary analysis provided an opportunity and value-added analysis for our regional community research partner.

Regarding survey content, how questions were asked and what response options were available – While the survey asked questions in a very user-friendly way, it did not appear to have been designed with statistical analysis in mind. Most questions were collected as multiple choice, select all that apply questions with categorical response options. From an analysis perspective, it would have been preferable if response options had been designed to be mutually exclusive as this would have made re-coding questions and computation of new variables easier. Additionally, it would have been preferable if response options had been designed to provide continuous or interval-ratio data rather than categorical or ordinal data. Access to continuous or interval-ratio data would have improved options for parametric analyses instead of the less common non-parametric analyses.

Regarding non-sampling error – One potential source of non-sampling error is that the survey was administered on paper. This increased the likelihood for respondents to skip or miss questions. Data was then transferred and input manually into a computerized survey tool. Manual data entry introduced another opportunity for potential human error. Additionally, many questions did not include a "no response" option, so if left blank it was inconclusive whether questions were left blank intentionally or unintentionally. Theoretically, there is a difference between not answering questions intentionally or unintentionally; as a result, we had to label both scenarios as missing data and were unable to make non-response weighting adjustments.

Lacking model specificity/issues with variable selection and availability of relevant variables: While the dataset included Seniors' responses to the food security

module, the survey had not been designed as a food security study. It was designed to better understand Seniors' housing needs and interests. As a result, the dataset did not include many variables that are generally understood to be particularly important and relevant for measuring food (in)security in a Northern context (e.g., key food security variables that measure hunting/harvesting success or access to a hunter in the household). Lacking important variables undermines the assumption that a statistical model needs to be correctly specified. Logistic regression, the model we had anticipated to build and run, is very sensitive to model specification. Consequently, we chose an exploratory instead of an explanatory approach to the analysis using the few relevant variables available in this dataset.

Limitations of chosen analyses

***Limitations of observational data*:** Although our hypotheses tested through multiple comparisons were theoretically sensitive in that they were based on several sources of knowledge (i.e., insights from a focus group held with regional experts, the Seniors' food (in)security literature and the Inuit food (in)security literature), no causality can be assigned to the observed associations. This is primarily due to the observational nature of this dataset and the exploratory approach to data analysis. As a result, associations between variables and Seniors' food (in)security can only be speculated. A different study design and several studies are needed before assigning causality in associations.

***Limitations of small sample size*:** While a decent proportion of the population of interest was sampled (49.7%) the sample is small (n=146, N=294). Low counts in many

categories due to missingness in the dataset prevented us from running several chi-square tests of independence because low counts violated the assumption of expected values. This included having to make the choice of running bivariable analyses using the binary food (in)security variable (i.e., food secure versus food insecure) instead of the more nuanced 4-point food (in)security variable (i.e., food secure, marginally food insecure, moderately food insecure, severely food insecure).

Limitations of bivariable analyses: While running a series of independent bivariable analyses was the best analytical choice for the nature of this dataset, we cannot interpret results as providing definitive and explanatory information on risk factors of food insecurity. Another limitation of running a series of independent bivariable analyses is that associations with the variable of interest can appear weak independently but could contribute significantly if they were combined in a model. This is because food (in)security is complex, and it is not possible to fully understand food (in)security through bivariable analyses alone. To provide explanations for food (in)security outcomes, a predictive multivariate model is needed that takes into account several variables at the same time as well as possible confounding or interaction effects.

Likely non-independence of data: Caution must be applied to the interpretation of results because this dataset likely violates 'independence of observation', which is a basic assumption of a chi-square test of independence. Typically, analyses assume independence between research participants or, if independence is not possible, that dependence between participants is accounted for in a multi-level model. Accounting for dependence is important because provides more accurate readings of statistical

significance and as such increases confidence in the results. There are two common criteria of independence: One criterion is that each single participant occurs only once in the array used for each analysis. Another criterion is that each single participant provides a unique piece of statistical information that is unrelated to the information provided by other individuals in the dataset, i.e., from living in the same household. This criterion is important for predictive models and to ensure that the prediction holds true for individuals that are unrelated to one another. While our dataset meets the first criterion, it potentially violates the second criterion. This is because among those eligible to participate in the survey up to 30% could have come from shared households, and the information to match household ID with participant ID could not be provided to us.

In the absence of being able to match household ID with participant ID, we were not able to build a predictive multi-level statistical model that accounts for statistical dependence. Instead, we explored the dataset through a series of bivariable analyses and added caution to our interpretation of results. Statistical dependence violates the assumption of non-independence, leading to biased estimated of the standard errors, inaccurate readings of statistical significance and incorrect statistical conclusions (O'Dwyer & Parker, 2014).

Recommendations

While this case study has provided insights about Inuit Seniors' food insecurity, it has also identified research gaps and, as a result, opportunities for further inquiry, policy, and programming.

Recommendations for Action

At the level of policy and programming, results from this study could be translated in the following concrete ways:

1. To increase the likelihood of equitable access to food resources in the region, it is recommended that Seniors be considered among the priority groups in the regional food security strategy currently under development.
2. To improve opportunities for food access for younger Seniors aged 55-64, it is recommended that the nature, format, and timing of current food programming for Seniors and programming frequently attended by Seniors be reviewed and then adjusted if it is clear that it is difficult for individuals in that age group to participate in them.
3. To continue removing barriers to food access for Seniors with mobility issues, it is recommended that programming be offered that assists Seniors with accessing grocery stores, community freezers or food-related programs (e.g., continuation of the Senior's van program) and that delivers food services (e.g., meals-on-wheels program).
4. To better assess what programming exists for Seniors as well as to be able to monitor participation and program outcomes, it is recommended that a regional definition of Seniors (e.g., defined by age threshold and/or other characteristics) be clarified or refined.
5. To better understand why food insecurity levels, especially moderate and severe food insecurity, differ between communities (i.e., levels being higher in Hopedale

compared to Nain), it is recommended that further information is gathered about the food system of both communities and included in future analysis of food security among this age group to garner why those differences may exist.

Recommendations for Research

The following recommendations for further research could bring clarity to the intersectional understanding of Seniors' food (in)security within the Inuit population:

1. To improve model specificity, access to a larger dataset is needed that includes more variables that are generally understood to be particularly important and relevant for measuring food (in)security in a Northern context (e.g., a measurement of hunting / harvesting success or access to a hunter in the household) and Seniors (e.g., measure of dependency in households).
2. Multivariate statistical analyses are needed to determine whether an association between individual and household characteristics and food insecurity will persist among Seniors after simultaneous consideration of other regional and community-level characteristics of the food system that may affect all age groups.
3. To inform variable selection for and interpretation of multivariate statistical analyses, comprehensive context-sensitive theory is needed. Mental model interviews with regional experts, for example, could support the development of a comprehensive Nunatsiavut-specific mental model of the network of variables influencing food insecurity.

4. To understand subgroup vulnerability to food insecurity (i.e., for Seniors) a larger dataset inclusive of several subgroups and a comprehensive list of variables important to northern food systems is needed. Such a comprehensive dataset would make it possible to delineate which variables explain the biggest variance in determining food insecurity among subgroups, including Seniors, relative to other subgroups.
5. To improve assessment of food (in)security among Seniors, it is recommended that future research consider using measurement tools that take into account mobility-related barriers.
6. To improve interpretations of estimated food (in)security levels among Inuit Seniors in Nunatsiavut, it is recommended that further research be conducted on the perception of food insecurity and tolerance of food insecurity among Seniors in the region. Insight from such research would provide important context and aid with better understanding if estimates currently available for Seniors are over- or underestimated.

Conclusions

The aim of this study was to respond to a knowledge gap that existed on variables associated with food (in)security in a subgroup of the Inuit population. Through strong collaboration with regional experts and knowledge users at the Nunatsiavut Government, findings were also meant to provide insights that could translate into program development for Seniors in the region and direct further research.

The topic was explored by estimating prevalence levels of Inuit Seniors' food (in)security in case study communities – Nain and Hopedale of Nunatsiavut – and by providing quantitative estimates of variables that are associated with food (in)security among Inuit Seniors.

Findings showed that about half of all Seniors either worry about running out of food, compromise the quality or quantity of food, or have had to skip meals. This reflects a serious public health issue, an indicator of poor health or barriers to health in this subgroup, and a major compromise to the human right to adequate food, begging the question about what systematic barriers exist in the Nunatsiavut food system and policy landscape that have led to such health inequities.

Further, findings showed a marked difference in the distribution of food (in)security levels between Senior age groups and between communities, and that different sets of characteristics are associated with younger and older Seniors. These findings provide a nuanced picture of food (in)security among a subgroup within a population that is already experiencing a disproportionate burden of food insecurity.

This picture shows that food insecure Seniors lack more than food and financial resources. Findings suggest a need to pay attention to other socio-economic factors such as age, mobility issues, health, and living arrangement in programming that aims to address Seniors' food insecurity.

Overall, findings contribute to the food (in)security literature in several ways. Primarily, they support existing theories around variables influencing food (in)security and add nuance to the scholarly Seniors' food (in)security literature in Canada and Inuit food (in)security literature. Specifically, findings contribute to the Seniors' food (in)security literature in Canada by providing evidence from a group that is seen to

represent at least two layers of vulnerability – Indigenous identity and Northern residence – and adding sociocultural-specific interpretations of associations from experts in the case study region. Findings also contribute to the Inuit food (in)security literature by being the first study focused solely on Inuit Seniors' food (in)security and by providing quantitative estimates of associations based on expert-directed and theoretically sensitive variable selection. Findings from this study are valuable especially in a context where the nature of the published literature on this topic is both scare and disparate, and in a context where growing evidence shows the need for individual-level data on food insecurity – as opposed to household-level data which is often misreported or simplified in ways that neglect important nuances of the data collection and inferences possible from the analysis.

This study lays the foundation for future research needed to understand the intersectional nature of the issue of food (in)security in groups that represent several layers of vulnerability, to understand to what extent predicting variables differ between different subgroups (including Seniors) and to understand which predictors remain important for Seniors after simultaneous consideration of other regional and community-level characteristics of the food system that may affect all groups. This includes a better understanding of how policies and programs shape the food system.

While findings of this study only provide preliminary insights into the network of variables influencing Inuit Seniors' food (in)security, they are important in a context where previously gathered food (in)security datasets in the same region reflected less nuance and specificity about subgroup vulnerability in specific communities, and only provided regionally representative household data.

As such, the results of the analysis of this study using subgroup-specific variables from a community-representative dataset – which was directed by knowledge users and interpreted through context-specific theory – provides a degree of clarity to knowledge users to be able to use estimates to inform community programming to address food insecurity among Seniors.

Nuance and specificity that reflect the variability of food (in)security levels across subgroups are especially important for regional food security strategies, without which regional policies could miss to improve food access for specific groups, thereby limiting the entire population's potential to experience overall higher levels of food security.

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Appendices

Appendix A – Results from Literature Reviews

Table A1

Tabular Representation of Thirakul's (2019) Scoping Review Results on Seniors' Food Security Literature of North America (Canada and the US)

Theme	Variable	Relation	Food (In)Security
Age	Older age cohorts	facilitates	FI[1]
Gender	Women	facilitates	FI[1]
Race	Visible minority (Black, Indigenous, mixed-raced Seniors)	facilitates	FI[1]
Immigrant Status	Immigrant	facilitates	FI[1]
Heath Status	Poor health	facilitates	FI[1]
Homeownership	Renting a home	facilitates	FI[1]
Income (inconclusive)	Low income	facilitates	FI[1]
	Reliance on public pension (even when controlling for other sociodemographic factors)	facilitates / impedes	F(I)S[2]
Education (inconclusive)	Low educational attainment (US)	facilitates	FI[1]
	Higher education (because of its relationship with income earnings) (US)	facilitates	FS[3]
	Lower education (Canada)	facilitates	FS[3]
Social Capital	Low social support network / social isolation	facilitates	FI[1]
	Strong social network / spousal or family support	facilitates	FS[3]
Food Management Strategies	Food program engagement (community-based food programs such as food banks, congregate dining, home-delivered meals, and meal preparation support programs)	facilitates	FS[3]
Provinces and Territories	Residence in the Canadian territories or Atlantic promise	facilitates	FI[1]
Urban and Rural Communities	Living in rural and northern territories	facilitates	FI[1]

NOTES
[1] FI = Food Insecurity
[2] F(I)S = Food (In)Security
[3] FS = Food Security

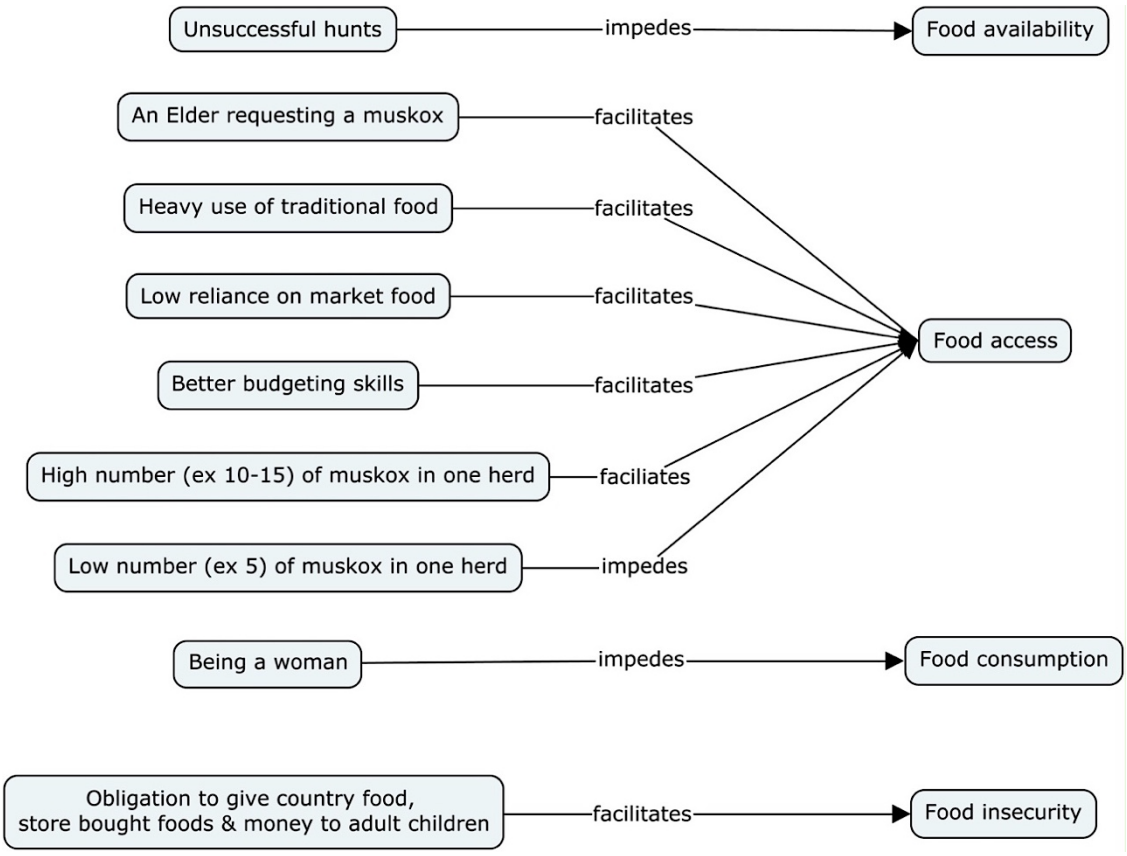
Table A2

Tabular Representation of Senior-Relevant Variables from the Inuit Food (In)Security Literature Identified by Curry-Sharples (In Progress)

Variable	Relation	Aspect of Food Security	Reference	Region
Unsuccessful hunts	impedes	Availability	Ford (2009)	Nunavut
There being a low number (ex 5) of muskox in one herd	impedes	Access (harvesting)	Tomaselli et al. (2018)	Nunavut
There being a high number (ex 10-15) of muskox in one herd	facilitates	Access (harvesting)	Tomaselli et al. (2018)	Nunavut
Better budgeting skills	facilitates	Access (not specified)	Chan et al. (2006)	Nunavut
Low reliance on market food	facilitates	Access (not specified)	Chan et al. (2006)	Nunavut
Heavy use of traditional food	facilitates	Access (not specified)	Chan et al. (2006)	Nunavut
Obligations to give country food, store bought food and occasionally money to adult children	facilitates	Food insecurity (in general, not specified)	Ready (2016)	Nunavik
Being a woman	impedes	Consumption	Beaumier & Ford (2010)	Nunavut
An Elder requesting a muskox	facilitates	Access (harvesting)	Tomaselli et al. (2018)	Nunavut

Figure A1

Mapped Representation of Senior-Relevant Variables from the Inuit Food (In)Security Literature Identified by Curry-Sharples (In Progress)



Appendix B – Food (In)Security Survey Module

Which of these statements best describes the food eaten in your household?

- ○ I have enough of the kinds of food I want to eat
- ○ I have enough but not always the kinds of food I want to eat
- ○ I sometimes do not have enough to eat
- ○ I often do not have enough to eat
- ○ Prefer not to say

If you answered that you sometimes/often did not have the kinds/enough food to eat please answer the following question.

Here are some reasons why people do not always have the kinds/enough food to eat. Please choose answers that apply to you.

- ○ This question does not apply to me, please move to question 50
- ○ Not enough money for food
- ○ Kinds of food are not available
- ○ Not enough time for shopping or cooking
- ○ Too hard to get to the store
- ○ On a special diet
- ○ No working stove available
- ○ Not able to cook or eat because of health problems
- ○ Other, please specify: _____

Food Security Scale

The following questions will better understand your personal food security. You may have answered similar questions in community surveys completed in 2013-2014 and/or the Inuit Health Survey in 2007-2008. Answering these questions will help us better understand your changing needs over time.

Question 1) In the last month, did <u>you</u> ever worry whether the food for you and your family/household would run out before you have money to buy more?

Please choose one answer.

- ○ Often
- ○ Sometimes
- ○ Never
- ○ I don't know
- ○ No response

Question 2) In the last month, were there times when the food for you and your family/household just did not last, and there was no money to buy more?

Please choose one answer.

- ○ Often
- ○ Sometimes
- ○ Never

- ○ I don't know
- ○ No response

Question 3) In the last month, were there times when you and your family/household could not afford to eat healthy food?
Please choose one answer.
- ○ Often
- ○ Sometimes
- ○ Never
- ○ I don't know
- ○ No response

Question 4) In the last month, did you or other adults in your household, ever cut the size of your meals or skip meals because there wasn't enough money for food?
Please choose one answer.
- ○ Does not apply to me, please move to the next question
- ○ Yes
- ○ No
- ○ I don't know
- ○ No response

Question 5) If you answered yes to the previous question: How often did this happen?
Please choose one answer.
- ○ Does not apply to me, please move to question 55
- ○ Almost every day of the month
- ○ About half the days during the month
- ○ A few days during the month
- ○ I don't know
- ○ No response

Question 6) In the last month, did <u>you</u> ever eat less than you felt you should because there wasn't enough money to buy food?
Please choose one answer.
- ○ Yes
- ○ No
- ○ I don't know
- ○ No response

Question 7) In the last month, were <u>you</u> ever hungry but didn't eat because you couldn't afford enough food?
Please choose one answer.
- ○ Yes
- ○ No
- ○ I don't know
- ○ No response

Question 8) In the last month, did <u>you</u> lose weight because you didn't have enough money for food?
Please choose one answer.

- ○ Yes
- ○ No
- ○ I don't know
- ○ No response

Question 9) In the last month, did you or other adults in your household ever not eat for a whole day because there wasn't enough money for food?
Please choose one answer.

- ○ Yes
- ○ No
- ○ I don't know
- ○ No response

Question 10) If you answered yes to the previous question, how often did this happen?
Please choose one answer.

- ○ Does not apply to me, please move to question 60
- ○ Almost every day of the month
- ○ About half the days during the month
- ○ A few days during the month
- ○ I don't know
- ○ No response

NOTE
Questions 1 to 10 in the food security survey module reflect questions 50 – 59 in the original survey.

Appendix C – Codebook

Primary variable of interest	Categorization
Binary food security status	Food secure
	Food insecure (incl. marginal, moderate & severe)
4-point food security status classification	Food secure
	Marginally food insecure
	Moderately food insecure
	Severely food insecure

Variables (Individual Characteristics)	Categorization
Age Groups	55 to 64 years old
	65 to 74 years old
	75+ years older
Gender	Female
	Male
Marital Status	Married or with common-law
	Not married or no common-law
Language Spoken in Household	About half and half – Inuttitut and English
	Mostly or only English
	Mostly or only Inuttitut
Educational Status	No schooling
	Less than secondary completed
	Secondary completed
	Beyond Secondary
Employment Status	Yes
	No
Number of Income Sources	1
	2
Personal Income	Less than $20,000
	$21,000 to $40,000
	$41,000 to $60,000
Self-Rated Physical Health	Poor
	Good
	Very Good
Self-Rated Mental Health	Poor
	Good
	Very Good

Mobility Issues	At least one mobility issue (e.g., difficulties with steps, walking, standing, sitting or kneeling)
	No mobility issues
Help Needed with Getting Groceries	Yes
	No
Who Prepares Most Meals	Myself
	My spouse / partner
	A family member
Number of Hot Meals a Day	Less than one
	On average, one hot meal per day
	Two or more
Where You Eat Most Meals	Own House
	Relatives' House
	Friends' House
Interest in a Free Hot Meals Program	Yes
	No
Interest in Paying for a Hot Meals Program	Yes
	No
Frequency of Meals for a Fee	Once per day, 5 days a week
	Once per day, 2 to 3 days a week
	Once per day, one day a week
Frequency of Free Hot Meals	Once per day, 5 days a week
	Once per day, 2 to 3 days a week
	Once per day, on one day per week

Variables (Household Characteristics)	**Categorization**
Household Financial Situation	Spend more money than we get
	Run out of money before or on pay day
	Money left each week, but we just spend it
	We can save
Number of People in the Household	1 person
	2 people
	3 people
	4 people
	5 plus people
Household Crowding	Overcrowding (> 1 person per bedroom)
	No Overcrowding
Homeownership	Renter
	Homeowner

Appendix D – Coding and Screening Approach for Categorizing Food (In)Security

Information from p. 36 in Bickel et al. (2000).

Question Number	Question	Affirmative Responses (Code = 1)	Non-affirmative Responses (Code = 0)	Don't Know (Code = 888)	Missing Data (Code = 999)
First level internal screen:					
1	Did you ever worry whether the food would run out?	Often; Sometimes	Never	I don't know	No response; Does not apply to me
2	Were there times when the food just did not last?	Often; Sometimes	Never	I don't know	No response; Does not apply to me
3	Were there times when you could not afford to eat healthy food?	Often; Sometimes	Never	I don't know	No response; Does not apply to me

→ *Only continue looking at responses to remaining questions if at least one affirmative response to questions 1 – 3. Otherwise, code remaining questions as non-affirmative.*

Second level internal screen:

4	Did you ever cut the size of your meals or skip meals?	Yes	No	I don't know	No response; Does not apply to me
5	How often did this happen?	Almost every day of the month; About half the days during the month	A few days during the month	I don't know	No response; Does not apply to me
6	Did you ever eat less than you felt you should?	Yes	No	I don't know	No response; Does not apply to me
7	Were you ever hungry but didn't eat?	Yes	No	I don't know	No response; Does not apply to me
8	Did you lose weight?	Yes	No	I don't know	No response; Does not apply to me

→ *Only continue looking at responses to remaining questions if at least one affirmative response to questions 4 – 8. Otherwise, code remaining questions non-affirmative.*

9	Did you ever not eat for a whole day?	Yes	No	I don't know	No response; Does not apply to me
10	How often did this happen?	Almost every day of the month; About half the days during the month	A few days during the month	I don't know	No response; Does not apply to me

Appendix E – Categorization of Food (In)Security Status

Binary classification	Food Secure	Food Insecure		
	No report of difficulties in accessing food in the last month	Any indication of worry about or difficulty in accessing enough food the last month		
4-point classification	Food Secure	Marginally Food (in)secure	Moderately Food Insecure	Severely Food Insecure
	No report of difficulties in accessing food in the last month	Reported some indication of worry about running out of food OR limited their food selection in the last month because of lack of money	Reported having compromised the quality and/or quantity of food eaten in the last month due to lack of money	Reported having disrupted eating patterns and reduced the size of meals, skipped meals or gone a while day(s) without eating in the last month due to lack of money

NOTE
This is the categorization used in this report. However, there are other categorization known and used in food security studies.

Coding of 10-item food security scale		Number of affirmative items after screening method has been applied
Secure		0
Insecure	Marginally insecure	No more than 1
	Moderately insecure	2 to 5
	Severely insecure	6 to 10

NOTE
This is the coding approach followed in this study. However, there are other coding approaches known and used in food security studies.

Appendix F – Consent Form

Participant Consent Form
Seniors' Food Security in Nunatsiavut
Data Analysis Group Discussion

Primary Contact ***Shirin Nuesslein, Student Researcher*** **Telephone:** 705-748-1011 ext 7604 **E-mail :** shirinnuessle@trentu.ca	**Trent University Ethics Board Contact** ***Jamie Muckle, Certifications and Regulatory Compliance Officer*** Trent University 1600 West Bank Drive Peterborough, ON, K9H 7B8 **Telephone:** 705-748-1011 ext. 7896 **E-mail:** jmuckle@trentu.ca
Secondary Contact ***Chris Furgal, Project Supervisor*** **Telephone:** 705-748-1011 ext 7953 **E-mail:** chrisfurgal@trentu.ca	

Purpose of the Study: The purpose of this project is to examine the status of and factors influencing Seniors' food security in two Nunatsiavut communities to support decision making, policy and action within the region on this topic. The study includes analysis and use of the existing database on Seniors' food security developed through the conduct of a community survey in Nain and Hopedale in 2017. It also includes the conduct of a facilitated group discussion on analytical and data needs on the topic and finally, interviews with key decision makers / knowledge holders on their interpretation / understanding of the findings of analysis of the database. ***Consent is currently being sought for participation in the facilitated group discussion on analytical and data needs.***

Participation and Length of Time: Your participation will consist of participating in one 60-120 minute facilitated group discussion with the researcher on the topic of analytical and data needs on Seniors' food security in Nunatsiavut. This information will be collected and recorded on a digital tape recorder (if you provide consent) or by personal note-taking.

	Yes	**No**
I give consent for my interview to be audio recorded.		

Possible Risks or Discomforts: It is intended that there is little risk in participating in this aspect of the project and you should feel comfortable with its nature at all times. It is not known whether your participation in this study will directly benefit you, however your participation is intendent to elicit data that will support your work in decision making, policy and action at the Department of Health, and Social Development.

By giving consent above you agree with the following:

Reporting and Results: I understand that the contents will be used in a Master's thesis report and other publications, which stem from this research. It is possible that media releases relating to the report may occur, but the information is not intended for any commercial use.

Conservation of Data: I understand that all data will be stored on an encrypted hard drive for the duration of the project, then transferred to the Nunatsiavut Government Department of Health and

Social Development for storage after the project's completion and completely removed from the researcher's hard drive. Under the responsibility of Shirin Nuesslein (student researcher) and Dr. Chris Furgal (Supervisor), all information will be stored under lock and key in encrypted format for seven years after publication at Trent University in Peterborough, Ontario. After such time, all materials will be transferred to the Nunatsiavut Government Department of Health and Social Development.

Privacy, Confidentiality and Anonymity: I understand that my confidentiality will be respected. No personal identifiers such as my name will be utilized and the information I provide will be used in a collective sense.

	Yes	**No**
I give consent for a direct quote from my participation in the facilitate group discussion to be used in any publication, as long as I have been given the opportunity to review the quote.		
If **yes**, I consent for my name to be associated with my quote.		
If **no**, I consent to pseudonyms (initials or 'Regional decision maker') used instead of my name.		

Voluntary Participation: I understand that my participation in this project is voluntary. I understand that, before or during the group discussion, I am free to withdraw from the project at any time, refuse to participate, and refuse to answer questions. I understand that my withdrawal will bear no consequences and no judgements or prejudice will be held against me. If I withdraw from the group discussion, the researcher will ask my permission to retain my data, but I can request that my data is removed from the study and not included in the analysis.

By signing below, I (_____) agree that I have been fully informed and understand the nature of the project, and agree to participate. Furthermore, I understand that this project entitled "Seniors' Food Security in Nunatsiavut" has been approved by the Trent University Research Ethics Board, the Trent Aboriginal Education Council, the Newfoundland and Labrador Health Research Ethics Board, and the Nunatsiavut Government Research Advisory Committee.

If I have any questions about the conduct of the research project, I understand that I may contact any of the research team members. I understand that I may also contact directly the Trent Research Ethics Board (Ethics and Compliance Officer at 1 (705) 748 1011 x 7896 or e-mail: jmuckle@trentu.ca).

_____ _____
Signature of Respondent Date

_____ _____
Signature of Researcher - Witness Date

Appendix G – Ethics Approvals

NUNATSIAVUT
kavamanga Government

Nunaliginikmik amma Nunamiutanik
Ujaganik Imaniklu
Lands and Natural Resources

May 25th, 2018

Ms. Shirin Nuesslein
Trent University
1600 West Bank Drive,
Peterborough, Ontario,
K9J 7B8

Re: Key-factors influencing food security status of vulnerable groups in Inuit communities: A case study of Seniors in Nunatsiavut

Dear Ms. Nuesslein,

Please accept this letter as confirmation of the Nunatsiavut Governments approval for the above research project as outlined in your application, subject to the following suggestions:

1. Please provide a scanned e-copy of the signed ethical approval letter from your university or institution for this project once you receive it.

2. We are pleased to see how closely you are working with the Department of Health and Social Development in designing this project. Please continue to consult with the Food Security Coordinator as you further develop the project to ensure that results will have maximum benefit for the region.

3. Pease provide copies of any reports, journal articles, papers, posters or other publications related to this project to the, Nunatsiavut Inuit Research Advisor upon completion of your work. A plain language summary detailing the work, translated into Labrador Inuttitut should also be provided.

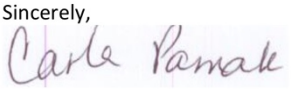
4. NG would appreciate copies of any photographs that you acquire during your research in the Nunatsiavut area as Nunatsiavut Government is developing a digital database of regional photos. Recognition will always be given to the photographer.

25 Ikajuktauvik Road, PO Box 70, Nain, NL, Canada A0P 1L0 Toll Free: 1.866.922.2942 Fax: 709.922.2931

www.nunatsiavut.com

Please note that if you are going to make any changes to your proposal, any such changes must be considered and supported by the NGRAC before they are implemented.

Sincerely,



Carla Pamak
Inuit Research Advisor
Nunatsiavut Government
P.O. Box 70

CHANIE WENJACK SCHOOL
FOR INDIGENOUS STUDIES

1600 West Bank Drive
Peterborough, ON Canada K9L 0G2

Telephone (705) 748-1011 ext. 7466
Facsimile (705) 748-1416
Email: indigenousstudies@trentu.ca
Web: www.trentu.ca/indigenousstudies

May 28, 2018

Shirin Nuesslein
Researcher, Trent University
1600 West Bank Drive
Peterborough, ON, K9H 7B8
Phone: (705) 758-1011 ext. 7242
Email: shirinnuessle@trentu.ca

Dear Ms. Nuesslein:

RE: AEC APPROVAL OF ETHICS APPLICATION #25238

Thank you for your response to the clarification point requested in our letter of May 27, 2018. On behalf of the AEC Ethics Review Committee, we are writing to approve your application=, with the following proviso:

Please inform participants that the results of this study will be shared with your research partners, but also with the study participants and quite likely the general public.

We are making this recommendation in keeping with the principle of Indigenous research related to reciprocity and benefit for communities.

We wish you every success with this research.

Yours sincerely,

Lynne Davis

Dr. Lynne Davis
Associate Professor
Chanie Wenjack School for Indigenous Studies
lydavis@trentu.ca

c.c. Chair, REB; Dr. Chris Furgal

Ethics Office
Suite 200, Eastern Trust Building
95 Bonaventure Avenue
St. John's, NL
A1B 2X5

August 15, 2018

Indigenous Environmental Studies Program
Trent University
1600 West Bank Drive
K9J 7B8
Peterborough, Ontario
CANADA

Dear Dr. Nuesslein:

Researcher Portal File # 20190498
Reference # 2018.154

RE: "Key-factors influencing food security status of vulnerable groups in Inuit communities: A case study of Seniors in Nunatsiavut "

This will acknowledge receipt of your correspondence dated August 14, 2018.

Your application was reviewed by the Health Research Ethics Board (HREB) at the meeting held on July 19, 2018. Your revised application has been reviewed by the [*Co-Chair under the direction of the HREB*.

Ethics approval of this research study is granted for one year effective August 15, 2018. This ethics approval will be reported to the HREB at the next scheduled meeting.

This is your ethics approval only. Organizational approval may also be required. It is your responsibility to seek the necessary organizational approval from the Regional Health Authority (RHA) or other organization as appropriate. You can refer to the HREA website for further guidance on organizational approvals.

This is to confirm that the HREB reviewed and approved or acknowledged the following documents (as indicated):

- Application, approved
- Research proposal, approved
- Data sharing agreement, acknowledged
- Consent form check list, approved
- Transcriber confidentiality agreement, acknowledged
- Interview guide, approved

Shirin Nuesslein
Sustainable Studies Program
GSC

June 22, 2018

File #: 25238
Title: Key-factors influencing food security status of vulnerable groups in Inuit communities: A case study of Seniors in Nunatsiavut

Dear Ms. Nuesslein,

The Research Ethics Board (REB) has given approval to your proposal entitled "Key-factors influencing food security status of vulnerable groups in Inuit communities: A case study of Seniors in Nunatsiavut".

The committee strongly suggests and encourages you to encrypt any data that is being collected that contains any personal or identifying information. Please add a statement to your consent form concerning this. For help with encryption services, please contact Trent's IT Department.

Please add a running footer to your consent form, with the date of Trent REB approval and consent revisions number (e.g., 01-Jan-12, Version 2), so that the consent form used can be easily identified in future.

When a project is approved by the REB, it is an Institutional approval. It does not undermine or replace any other community ethics process. Full approval depends upon the approval of all other bodies who are named as stakeholders in this research.

In accordance with the Tri-Council Guidelines (article D.1.6) your project has been approved for one year. If this research is ongoing past that time, submit a Research Ethics Annual Update form available online under the Research Office website. If the project is completed on or before that time, please email Karen Mauro in the Research office so the project can be recorded as completed.

Please note that you are reminded of your obligation to advise the REB before implementing any amendments or changes to the procedures of your study that might affect the human participants. You are also advised that any adverse events must be reported to the REB.

On behalf of the Trent Research Ethics Board, I wish you success with your research.

With best wishes,

Dr. Peri Ballantyne
REB Chair
Phone: (705) 748-1011 ext. 7813, Fax: (705) 748-1587
Email: periballantyne@trentu.ca

c.c.: Karen Mauro
Compliance Officer

Appendix H – Research Partner Support Letter

NUNATSIAVUT
kavamanga Government

Inosiksiagiktotitsigasuannimi amma
Nunalinnik Pivalliatiksigasuannimi
Health and Social Development

March 9, 2018

Trent University
160 West Bank Dr.
Peterborough, ON
K9H 7B8
Tel.: 705-748-7602

Dear Dr. Chris Furgal,

On behalf of the Department of Health and Social Development of the Nunatsiavut Government, I am pleased to provide support for Shirin Nuesslein's proposed Masters research project titled "Key-factors influencing the food security status of vulnerable groups in Inuit communities: A case study of Seniors in Nunatsiavut".

The Department has been engaged as a partner on the project since its inception, and Shirin has worked diligently with us to develop a project that will respond to a demonstrated need in our communities. Gaining a more nuanced understanding of seniors' food security in the region is an identified research priority for our department, and will provide us with very beneficial information that we can use to inform targeted program development as well as the creation of the regional food security strategy which is currently under development.

Over the past several months, Shirin has discussed the project with our department and she has traveled to the region to meet with DHSD staff. She has also made herself available to provide research support for activities that the department was undertaking. We have confidence in the ethical and successful completion of this project in a way that is responsive to the needs of the Department and of Nunatsiavut communities, knowing that it is guided by Dr. Chris Furgal who has established long-standing research relationships in the region.

For questions, please don't hesitate to contact me.
Sincerely,

Kristeen McTavish
Food Security Coordinator
Nunatsiavut Government
Department of Health and Social Development
25 Ikajuktauvik RoadP.O. Box 70, Nain NL, A0P 1L0
Telephone: (709) 922-2942 ext: 283
Email: kristeen.mctavish@nunatsiavut.com

Appendix I – Sample Characteristics

Table I1

Individual Sample Characteristics (Counts, Percentages, n = 146)

Characteristic	Response Option	Count	Percentage
Age Groups	55 - 64	95	65.1%
	65 - 74	37	25.3%
	75+	14	9.6%
	Blank responses	*0*	*0%*
	Total Respondents	*146*	*100.0%*
Gender	Female	70	47.9%
	Male	76	52.1%
	Total Respondents	*146*	*100.0%*
Marital Status	Single	27	18.5%
	Married/Common-law/Boyfriend/Girlfriend	91	62.3%
	Divorced	3	2.1%
	Widowed	21	14.4%
	Separated	1	0.7%
	Other	2	1.4%
	Prefer not to say	1	0.7%
	Blank responses	*0*	*0%*
	Total Respondents	*146*	*100.0%*
Educational Status	No formal schooling	8	5.5%
	Some years of elementary school	37	25.3%
	Elementary school completed	16	11.0%
	Some years of secondary/high school	27	18.5%
	Secondary/high school completed	23	15.8%
	Diploma or certificate from technical training: in a community college, a trade school or a private commercial college	15	10.3%
	Partial technical training: in a community college, a trade school or a private commercial college, a technical institute	4	2.7%
	Some university (not completed)	7	4.8%
	University degree(s): Certificate, Bachelor, Master's, PhD	3	2.1%
	Unsure	4	2.7%
	Prefer not to say	2	1.4%
	Total Respondents	*146*	*100.0%*
Employment Status	Yes	53	36.3%
	No	89	61.0%
	Prefer not to say	4	2.7%
	Total Respondents	*146*	*100.0%*
Total Number of Income Sources	1	112	76.7%
	2	28	19.2%

Characteristic	Response Option	Count	Percentage
	Blank Response	6	4.1%
	Total Respondents	*146*	*100.0%*
Personal Income	< $15,000	57	39.0%
	$16,000 to $20,000	22	15.1%
	$21,000 to $25,000	11	7.5%
	$26,000 to $40,000	11	7.5%
	$41,000 to $60,000	13	8.9%
	$61,000 or over	2	1.4%
	Prefer not to say	22	15.1%
	Unsure	7	4.8%
	Blank Response	1	0.7%
	Total Respondents	*146*	*100.0%*
Self-Rated Physical Health	Excellent	23	15.8%
	Very good	24	16.4%
	Good	52	35.6%
	Fair	39	26.7%
	Poor	8	5.5%
	Total Respondents	*146*	*100.0%*
Self-Rated Mental Health	Excellent	42	28.8%
	Very good	32	21.9%
	Good	55	37.7%
	Fair	16	11.0%
	Poor	1	0.7%
	Total Respondents	*146*	*100.0%*
Mobility Issues	No	95	65.1%
	Yes	51	34.9%
	Blank Responses	0	0%
	Total Respondents	*146*	*100%*
Help Needed with Getting Groceries	No	120	82.2%
	Yes	26	17.8%
	Blank Responses	0	0%
	Total Respondents	146	100.0%
Where You Eat Most Meals	Own House	121	82.9%
	Relatives House	9	6.2%
	Friend’s House	9	6.2%
	Other	6	4.1%
	Blank Response	1	0.7%
	Total Respondents	*146*	*100.0%*
Who Prepares Most Meals	Myself	53	36.3%
	My spouse / partner	53	36.3%
	A family member	35	24.0%
	Other	4	2.7%
	Total Respondents	*146*	*100.0%*
Number of Hot Meals a Day	Less than one	19	13.0%
	On average, one hot meal per day	29	19.9%
	Two or more	87	59.6%
	Prefer not to say	7	4.8%
	Blank Response	4	2.7%

Characteristic	Response Option	Count	Percentage
	Total Respondents	*146*	*100.0%*
Interest in a Free Hot Meals Program	Yes	76	52.1%
	No	54	37.0%
	Unsure	15	10.3%
	Blank Response	1	0.7%
	Total Respondents	*146*	*100.0%*
Frequency of Free Hot Meals	Once per day, 5 days a week	16	11.0%
	Once per day, 2 to 3 days a week	35	24.0%
	Once per day, on one day per week	27	18.5%
	Does not apply	63	43.2%
	Blank Response	5	3.4%
	Total Respondents	*146*	*100.0%*
Interest in Paying for a Hot Meals Program	Yes	72	49.3%
	No	52	35.6%
	Unsure	21	14.4%
	Blank Response	1	0.7%
	Total Respondents	*146*	*100.0%*
Frequency of Meals for a Fee	Once per day, 5 days a week	16	11.0%
	Once per day, 2 to 3 days a week	30	20.5%
	Once per day, one day a week	36	24.7%
	Does not apply	60	41.1%
	Blank Response	4	2.7%
	Total Respondents	*146*	*100.0%*

NOTE
Missing responses are included.

Table I2

Household Sample Characteristics (Counts, Percentages, n = 146)

Characteristic	Response Option	Count	Percentage
Household Financial Situation	There's some money left over each week but we just spend it	10	6.8%
	We are spending more money than we get (borrowing, credit and loans)	11	7.5%
	We can save a bit every now and then	38	26.0%
	We can save a lot	6	4.1%
	We have just enough money to get us through to the next pay day	29	19.9%
	We run out of money before payday	31	21.2%
	Prefer not to say	20	13.7%
	Blank Response	1	0.7%
	Total Respondents	*146*	*100.0%*
Number of People in Household	1	11	7.5%
	2	37	25.3%
	3	33	22.6%

Characteristic	Response Option	Count	Percentage
	4	25	17.1%
	5	23	15.8%
	6	4	2.7%
	7	3	2.1%
	8	1	0.7%
	11	1	0.7%
	12	1	0.7%
	Blank Response	7	4.8%
	Total Respondents	*139*	*100.0%*
Number of Bedrooms in Household	1	7	4.8%
	2	34	23.3%
	3	71	48.6%
	4	26	17.8%
	5	5	3.4%
	Blank Response	3	2.1%
	Total Respondents	*146*	*100.0%*

NOTE
Missing responses are included.

Table I3 further describes the sample by providing counts and percentages of responses to all individual food (in)security items from the food security survey module.

Table I3

Responses to Individual Food (In)Security Items (Counts and Percentages)

Question	Response Option	Count	Percentage
Did you ever worry whether the food would run out?	Affirmative	60	41.1%
	Non-affirmative	72	49.3%
	Missing	14	9.6%
	Total	*146*	*100.0%*
Were there times when the food just did not last?	Affirmative	58	39.7%
	Non-affirmative	73	50.0%
	Missing	15	10.3%
	Total	*146*	*100.0%*
Were there times when you could not afford to eat healthy food?	Affirmative	55	37.7%
	Non-affirmative	78	53.4%
	Missing	13	8.9%
	Total	*146*	*100.0%*
Did you ever cut the size of your meals or skip meals?	Affirmative	19	13.0%
	Non-affirmative	121	82.9%
	Missing	6	4.1%
	Total	*146*	*100.0%*
	Affirmative	21	14.4%

Question	Response Option	Count	Percentage
Did you ever eat less than you felt you should?	Non-affirmative	120	82.2%
	Missing	5	3.4%
	Total	*146*	*100.0%*
Were you ever hungry but didn't eat?	Affirmative	13	8.9%
	Non-affirmative	123	84.2%
	Missing	10	6.8%
	Total	*146*	*100.0%*
Did you lose weight?	Affirmative	10	6.8%
	Non-affirmative	130	89.0%
	Missing	6	4.1%
	Total	*146*	*100.0%*
Did you ever not eat for a whole day?	Affirmative	9	6.2%
	Non-affirmative	133	91.1%
	Missing	4	2.7%
	Total	*146*	*100.0%*

NOTE
Missing responses are included.

Appendix J – Characterizing Age Groups

Table J1

Individual Sample Characteristics for Two Age Groups (Counts, Percentages): Aged 55-64 (n = 95), Aged 65+ (n = 51)

Individual Characteristics	Response Option	Aged 55-64 (n = 95)		Aged 65+ (n = 51)	
		Count	%	Count	%
Gender	Female	46	48.4%	24	47.1%
	Male	49	51.6%	27	52.9%
	Total Respondents	*95*	*100.0%*	*51*	*100.0%*
Marital Status	Single	21	22.1%	6	11.8%
	Married/Common-law/Boyfriend/Girlfriend	65	68.4%	26	51.0%
	Divorced	3	3.2%	0	0.0%
	Widowed	6	6.3%	15	29.4%
	Separated	0	0.0%	1	2.0%
	Other	0	0.0%	2	3.9%
	Prefer not to say	0	0.0%	1	2.0%
	Blank responses				
	Total Respondents	*95*	*100.0%*	*51*	*100.0%*
Educational Status	No formal schooling	2	2.1%	6	11.8%
	Some years of elementary school	21	22.1%	16	31.4%
	Elementary school completed	9	9.5%	7	13.7%
	Some years of secondary/high school	21	22.1%	6	11.8%
	Secondary/high school completed	14	14.7%	9	17.6%
	Diploma or certificate from technical training: in a community college, a trade school or a private commercial college,	13	13.7%	2	3.9%
	Partial technical training: in a community college, a trade school or a private commercial college, a technical institute	3	3.2%	1	2.0%
	Some university (not completed)	7	7.4%	0	0.0%
	University degree(s): Certificate, Bachelor, Master's, PhD	3	3.2%	0	0.0%
	Unsure	1	1.1%	3	5.9%
	Prefer not to say	1	1.1%	1	2.0%
	Total Respondents	*95*	*100.0%*	*51*	*100.0%*
	Yes	45	47.4%	8	15.7%

Individual Characteristics	Response Option	Aged 55-64 (n = 95)		Aged 65+ (n = 51)	
		Count	%	Count	%
Employment Status	No	47	49.5%	42	82.4%
	Prefer not to say	3	3.2%	1	2.0%
	Total Respondents	*95*	*100.0%*	*51*	*100.0%*
Total Number of Income Sources	1	68	71.6%	44	86.3%
	2	21	22.1%	7	13.7%
	Blank response	6	6.3%	0	0.0%
	Total Respondents	*95*	*100.0%*	*51*	*100.0%*
Personal Income	< $15,000	35	36.8%	22	43.1%
	$16,000 to $20,000	13	13.7%	9	17.6%
	$21,000 to $25,000	7	7.4%	4	7.8%
	$26,000 to $40,000	9	9.5%	2	3.9%
	$41,000 to $60,000	10	10.5%	3	5.9%
	$61,000 or over	2	2.1%	0	0.0%
	Prefer not to say	13	13.7%	9	17.6%
	Unsure	5	5.3%	2	3.9%
	Blank response	1	1.1%	0	0.0%
	Total Respondents	*95*	*100.0%*	*51*	*100.0%*
Self-Rated Physical Health	Excellent	13	13.7%	10	19.6%
	Very good	17	17.9%	7	13.7%
	Good	36	37.9%	16	31.4%
	Fair	28	29.5%	11	21.6%
	Poor	1	1.1%	7	13.7%
	Total Respondents	*95*	*100.0%*	*51*	*100.0%*
Self-Rated Mental Health	Excellent	26	27.4%	16	31.4%
	Very good	21	22.1%	11	21.6%
	Good	34	35.8%	21	41.2%
	Fair	13	13.7%	3	5.9%
	Poor	1	1.1%	0	0.0%
	Total Respondents	*95*	*100.0%*	*51*	*100.0%*
Mobility Issues (Binary)	No	70	73.7%	25	49.0%
	Yes	25	26.3%	26	51.0%
	Missing	0	0.0%	0	0.0%
	Total Respondents	*95*	*100.0%*	*51*	*100.0%*
Help Needed With Getting Groceries	No	84	88.4%	36	70.6%
	Yes	11	11.6%	15	29.4%
	Blank responses				
	Total Respondents	*95*	*100.0%*	*51*	*100.0%*
Where You Eat Most Meals	Own House	79	83.2%	42	82.4%
	Relatives House	7	7.4%	2	3.9%
	Friend’s House	4	4.2%	5	9.8%
	Other	4	4.2%	2	3.9%
	Blank Response	1	1.1%	0	0.0%
	Total Respondents	*95*	*100.0%*	*51*	*100.0%*
Who Prepares Most Meals	Myself	31	32.6%	22	43.1%
	My spouse partner	39	41.1%	14	27.5%
	A family member	22	23.2%	13	25.5%
	Other	2	2.1%	2	3.9%

Individual Characteristics	Response Option	Aged 55-64 (n = 95)		Aged 65+ (n = 51)	
		Count	%	Count	%
	Blank response	1	1.1%	0	0.0%
	Total Respondents	*95*	*100.0%*	*51*	*100.0%*
Number of Hot Meals a Day	Less than one	14	14.7%	5	9.8%
	On average, one hot meal per day	19	20.0%	10	19.6%
	Two or more	52	54.7%	35	68.6%
	Prefer not to say	6	6.3%	1	2.0%
	Blank response	4	4.2%	0	0.0%
	Total Respondents	*95*	*100.0%*	*51*	*100.0%*
Interest in Free Hot Meals	Yes	58	61.1%	18	35.3%
	No	26	27.4%	28	54.9%
	Unsure	10	10.5%	5	9.8%
	Blank response	1	1.1%	0	0.0%
	Total Respondents	*95*	*100.0%*	*51*	*100.0%*
Frequency of Free Hot Meals	Once per day, 5 days a week	10	10.5%	6	11.8%
	Once per day, 2 to 3 days a week	29	30.5%	6	11.8%
	Once per day, on one day per week	19	20.0%	8	15.7%
	Does not apply	33	34.7%	30	58.8%
	Blank response	4	4.2%	1	2.0%
	Total Respondents	*95*	*100.0%*	*51*	*100.0%*
Interest in Meals for a Fee	Yes	53	55.8%	19	37.3%
	No	25	26.3%	27	52.9%
	Unsure	16	16.8%	5	9.8%
	Blank response	1	1.1%	0	0.0%
	Total Respondents	*95*	*100.0%*	*51*	*100.0%*
Frequencies of Meals for a Fee	Once per day, 5 days a week	11	11.6%	5	9.8%
	Once per day, 2 to 3 days a week	25	26.3%	5	9.8%
	Once per day, one day a week	27	28.4%	9	17.6%
	Does not apply	30	31.6%	30	58.8%
	Blank response	2	2.1%	2	3.9%
	Total Respondents	*95*	*100.0%*	*51*	*100.0%*

NOTE
Missing responses are included.

Table J2

Household Sample Characteristics for Two Age Groups (Counts, Percentages): Aged 55-64 (n = 95), Aged 65+ (n = 51)

Household Characteristics	Response Options	Aged 55-64 (n = 95)		Aged 65+ (n = 51)	
		Count	%	Count	%
Household Financial Situation	We are spending more money than we get (borrowing, credit and loans)	6	6.3%	5	9.8%
	We can save a bit every now and then	21	22.1%	17	33.3%
	We can save a lot	3	3.2%	3	5.9%
	We have just enough money to get us through to the next pay day	22	23.2%	7	13.7%
	We run out of money before payday	24	25.3%	7	13.7%
	Prefer not to say	12	12.6%	8	15.7%
	Blank response	1	1.1%	0	0.0%
	Total Respondents	*95*	*100.0%*	*51*	*100.0%*
Number of People in Household	1	5	5.3%	6	11.8%
	2	19	20.0%	18	35.3%
	3	25	26.3%	8	15.7%
	4	17	17.9%	8	15.7%
	5	15	15.8%	8	15.7%
	6	3	3.2%	1	2.0%
	7	3	3.2%	0	0.0%
	8	1	1.1%	0	0.0%
	11	1	1.1%	0	0.0%
	12	1	1.1%	0	0.0%
	Blank response				
	Total Respondents	*90*	*100.0%*	*49*	*100.0%*
Number of Bedrooms in Household	1	3	3.2%	4	7.8%
	2	19	20.0%	15	29.4%
	3	49	51.6%	22	43.1%
	4	19	20.0%	7	13.7%
	5	3	3.2%	2	3.9%
	Blank Response	2	2.1%	1	2.0%
	Total Respondents	*95*	*100.0%*	*51*	*100.0%*

NOTE
Missing responses are included.

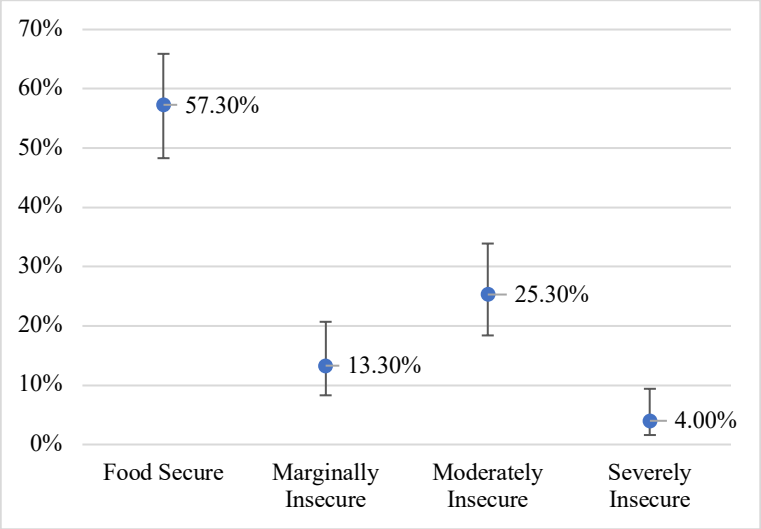
Appendix K – Results for Nain

Prevalence levels of Seniors' food (in)security in Nain

Figure K1 and Table K1 show the estimated prevalence of food security and insecurity with 95% confidence intervals. The estimated percentage of total food insecure Seniors (i.e., marginally + moderately + severely insecure) in Nain is 42.7%. This represents an estimated number of 81 Seniors of a total of 191 Seniors in Nain.

Figure K1

Prevalence and 95% Confidence Intervals of Food (In)Security in Nain (n = 75)



NOTE
Food (in)security could not be calculated for 1 case because of missing data.

Table K1

Estimated Population Size and 95% Confidence Intervals of Food Secure and Food Insecure Seniors in Nain

Food Security Status	Estimated Population Size	95% Confidence Interval		Sample Count
		Lower	Upper	
Food Secure	110	92	127	43
Marginally Insecure	25	14	37	10
Moderately Insecure	48	33	63	19
Severely Insecure	9	1	14	3
Total	191	187	195	75

NOTES
Food (in)security could not be calculated for 1 case because of missing data. All numbers in Table K1 are rounded to whole numbers.

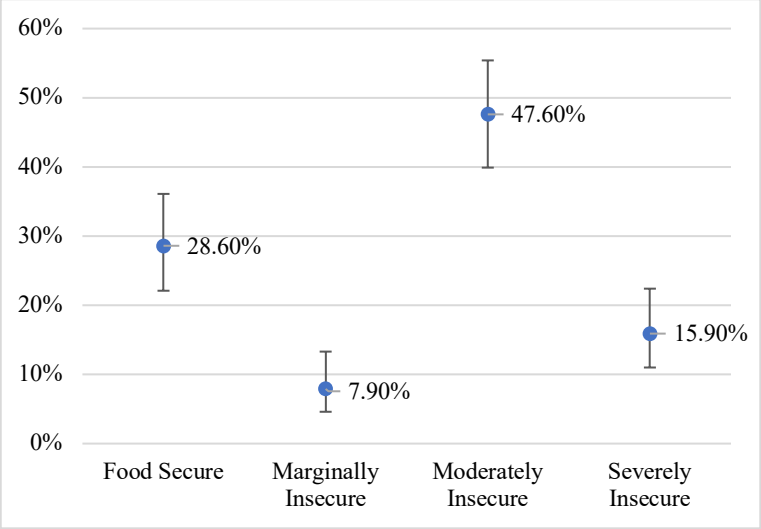
Appendix L – Results for Hopedale

Prevalence levels of Seniors' food (in)security in Hopedale

Figure L1 and Table L1 show the estimated prevalence of food security and insecurity in Hopedale. The estimated percentage of total food insecure Seniors (i.e., marginally + moderately + severely insecure) in Hopedale is 71.4%. This represents an estimated number of 73 Seniors of a total of 103 Seniors in Hopedale.

Figure L1

Prevalence and 95% Confidence Intervals of Food (In)Security in Hopedale (n = 63)



NOTE
Food (in)security could not be calculated for 7 cases because of missing data.

Table L1

Estimated Population Size and 95% Confidence Intervals of Food Secure and Food Insecure Seniors in Hopedale

Food Security Status	Estimated Population Size	95% Confidence Interval		Sample Count
		Lower	Upper	
Food Secure	30	22	37	18
Marginally Insecure	8	4	13	5
Moderately Insecure	49	41	57	30
Severely Insecure	16	10	22	10
Total	103	98	108	63

NOTES
Food (in)security could not be calculated for 7 cases because of missing data. All numbers in Table L1 are rounded to whole numbers.