

**Association of Housing Conditions and Social Determinants of Health with Chronic
Bronchitis among Seniors in Two Saskatchewan First Nation communities**

A Thesis Submitted to the College of Graduate Studies and Postdoctoral Studies

in Partial Fulfillment of the Requirements

for the Degree of

Master of Science

in the Department of Community Health and Epidemiology

University of Saskatchewan

Saskatoon

By

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ABSTRACT

Background: Respiratory illnesses are common in elderly populations and are strong predictors of death that increase with age. Chronic bronchitis is a common respiratory issue in the senior populations in Canada, with some indication that it may be more prevalent in the senior First Nation population. Poor housing conditions have been identified as a potential determinant of chronic bronchitis, with many reserves having a high proportion of such homes that are overcrowded, have issues with mold growth, and need major repairs. Additionally, other determinants of health such as income, unhealthy habits, and colonization could negatively impact respiratory health.

Methods: Multivariable logistic regression was used to analyze data collected during the First Nations Lung Health Project (2012-2018), which was conducted in collaboration with two First Nation communities in Saskatchewan. Participants completed household and individual health questionnaires. Household questionnaires collected information about housing condition, dampness, visible mold, and housing repairs due to water damage; individual questionnaires collected information regarding colonization, current health status, and income levels. Data for this thesis came from two cross-sectional studies, collected at two time points: once in 2012 and again in 2016, with 1318 participants overall. Of these 1318 participants, 168 were 55 years and older, which was the senior population from the two communities included in this study.

Results: The factors that emerged as significant to participants reporting chronic bronchitis or chronic bronchitis symptoms were having not enough or just enough income at the end of any given month, smoking status, people smoking in the house, and attending a residential school. Housing conditions were found to not have significant impact on participants reporting chronic bronchitis diagnosis or symptoms.

Public Health Implications: Research on the determinants and outcomes of the health of Indigenous seniors is limited but increasing in response to the recognition that this is a growing demographic about whom there is limited knowledge. This study contributes some information on associations between determinants of health and chronic bronchitis

in First Nation seniors living on reserve, particularly in identifying determinants that are amenable to intervention.

ACKNOWLEDGEMENTS

I would like to acknowledge the people who took time to teach and guide me through the process of being a graduate student. First, I would like to thank my supervisor, Dr. Sylvia Abonyi, who was nothing but supportive and educational throughout my entire thesis experience. Secondly, I would like to thank my committee member Dr. Punam Pahwa for taking the time to realize when I was struggling and find ways to help me understand the complexity of research. Thirdly, I would like to thank my committee member Dr. Chandima Karunanayake for painstakingly helping me grasp statistical analysis. Ultimately, I would not have survived my masters without these three powerful women.

I would like to acknowledge the First Nation Lung Health Project, the Department of Community Health and Epidemiology and the College of Medicine at the University of Saskatchewan for financial support throughout my time as a graduate student.

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DEFINITIONS OF TERMS

The communities and university campus that are a part of this study are located on Treaty 6 territory and homeland of the Métis. We pay our respects to the First Nations and Métis ancestors of this place and reaffirm our relationship with one another.

Aboriginal: The term “Aboriginal” refers to the first inhabitants of Canada, and includes First Nations, Inuit, and Métis peoples. This term came into popular usage in Canadian contexts after 1982, when Section 35 of the Canadian Constitution defined the term as such. Aboriginal is also a common term for the Indigenous peoples of Australia. When used in Canada, however, it is generally understood to refer to Aboriginal peoples in a Canadian context. This term is not commonly used in the United States (Indigenous Foundations, UBC, 2019). The term Aboriginal will be seen throughout the thesis as used by literary sources.

Indigenous: Indigenous is a term used to encompass a variety of Aboriginal groups. It is most frequently used in an international, transnational, or global context. This term came into wide usage during the 1970s when Aboriginal groups organized transnationally and pushed for greater presence in the United Nations (UN). (Indigenous Foundations, UBC, 2019). The term Indigenous will be seen throughout the thesis when in direct quotes from literary sources.

First Nations: First Nations is a broad term for the first peoples of Canada who are reserve or urban-based, rural, remote or northern dwellers, Status or non-Status members, treaty and non-treaty nations, traditional or non-traditional peoples. In Saskatchewan, this term is inclusive of all kinship patterns and all tribes and linguistic groups, whether they be of the Nehiyawak (Cree, Plains, Swampy, and Woodland), Nakawe (Saulteaux/Anishnaabe), Desuline, or Lakota, Dakota and Nakota decent (FSIN, 2013, p. 9) (Sasakamoose, J., 2017). The term First Nation will be used frequently throughout the thesis as the participants in this study are First Nations peoples living in two reserve communities.

Elder: Elder (*mitew* or *keh-teayak* (*Cree*)) is a culturally significant term. Elder, in the First Nation context, refers to a revered position in the community of those who are the knowledge keepers and educators. Elders gain their knowledge through life experiences and can then pass down their experiences to the younger generations and guide their communities.

Seniors: In this thesis, seniors are defined as people aged 55 and older.

Chronic Bronchitis (CB): A respiratory illness with symptoms that include having a chronic cough and chronic phlegm for three months at a time within a two-year period.

First Nation Lung Health Project (FNLHP): Two First Nation communities were partners in a CIHR funded study (CIHR MOP-246983-ABH-CCAA-11829) that produced the data used in this analysis. These communities are in Central Northern Saskatchewan and are rural communities that are within 100 kilometers of at least one city. They have elected to remain anonymous in this thesis and will be referred to as Community A and B.

CHAPTER 1: INTRODUCTION

Purpose and Research Questions

The senior population in Canada is the most rapidly growing demographic (Lanting, Crossley, Morgan, & Cammer, 2011). In the First Nations population, it has been seen that they are experiencing worsening health issues when they enter these senior years of life (55 years and older) (Wilson, Rosenberg, Abonyi, & Lovelace, 2010). One of the circumstances leading to these health issues could be that of inadequate housing, an issue on many First Nation reserves. Combining the housing and health issues is a topic that should be looked at particularly on First Nation reserves in Saskatchewan, as Saskatchewan has one of the highest proportion of First Nation populations that live on-reserve in Canada (Statistics Canada, 2016). Respiratory health is one of the major health issues that can be exacerbated by inadequate housing. Chronic bronchitis (CB) can be a difficult health issue that has the potential to follow a person throughout their life and lead to worsening health problems such as chronic obstructive pulmonary disease (COPD), sleep apnea, respiratory health complications, and premature death (Pelkonen, Notkola, & Nissinen, 2008). The FNLHP conducted data collection in two First Nation communities in Saskatchewan to assess the relationship between individual and contextual determinants of health on lung health. Establishing associations between social determinants of health, including housing and CB in these populations, could influence policy and promote evidence-informed advocacy for improvements to housing quality. Research questions considered in this study are:

Among the participants aged 55 years and older and drawing from data available in the FNLHP:

1. What is the association between housing conditions, other social determinants of health, and **self-reported chronic bronchitis symptoms**, (i) chronic cough or chronic phlegm, and (ii) chronic cough and chronic phlegm?
 - i. What are the differences between men and women within both communities together?

- ii. What are the differences between young old (55-64) and older old (65+) within both communities together?
2. What is the association between housing conditions, other social determinants of health, and **doctor diagnosed chronic bronchitis**?
- i. What is the difference between men and women within both communities together?
 - ii. What are the differences between young old (55-64) and older old (65+) within both communities together?

Significance

Research on the determinants and outcomes of health of Indigenous seniors is limited but increasing in response to the recognition that this is a growing demographic. This study contributes some information on the determinants of chronic bronchitis in First Nation seniors living on reserve, particularly in identifying determinants that are amendable to intervention.

Organization of Thesis

This thesis is divided into five chapters. This first chapter introduces the thesis topic and the questions answered from the research. Chapter two examines the current literature in the field relevant to the thesis topic, providing the necessary background informing the context and significance of this study. Chapter three details the methodology used for this thesis, which includes a discussion of the First Nation Lung Health Project (2012-2018) as the source of data used in this thesis. Chapter four presents the data analysis and results. Chapter five discusses the importance of findings, the strengths and limitations surrounding this thesis, and future research directions are considered.

CHAPTER 2: LITERATURE REVIEW

This chapter provides an overview of literature in several topic areas relevant to this study. This chapter begins with an overview of the senior population (55 years and older) in Canada, with a specific focus on First Nation seniors. Following this will be a discussion of the social determinants of health in the context of Indigenous and western concepts of population health, which includes a consideration of colonization impacts such as the reserve system and residential schools. Finally, topics specific to the focus of this thesis (housing conditions, CB, symptoms of CB, and smoking within the homes) are considered.

2.1 Senior Population in Canada

The senior population is the most rapidly growing demographic in Canada (Lanting et al., 2011). This is due to the “baby boomer” generation reaching the senior years of their lives (Statistics Canada, 2017). Statistics Canada reports that from 2001 to 2006, the number of individuals aged 55-64 increased by 52.8 per cent and individuals over 65 years increased by 43.0 per cent (Statistics Canada, 2008). The trend is true when looking at both the First Nations population and the non-Indigenous population; however, the average age of the two groups differ. The average age of the non-Indigenous population is 40 years, compared to the First Nations population average age of 30.6 years (Statistics Canada, 2017). The First Nation population is a younger population mainly due to higher birth rates than the rest of the Canadian population (Adelson, 2005). As the rest of the Canadian population is expanding retirement homes, the Indigenous population is expanding their schooling and need for family housing (MacKinnon, 2005). Additionally, life expectancies between these two groups are different, with Aboriginal populations living on average five to twelve years less than non-Aboriginal populations (Crighton, Wilson, & Senecal, 2010). While the average age of the Aboriginal population is young, more Aboriginal people are living longer. At the same time, however, overall, they are experiencing more chronic health problems than their non-First Nation counterparts (Wilson et al., 2010). The needs, concerns, and aspirations of Indigenous seniors largely have not been considered (Buchignani & Armstrong- Esther, 1999, & Habjan, Prince, & Kelley, 2012). Ospina, Voaklander, and Stickland (2012) state that “Inequalities in health status occur when one group in the population experiences differences in health outcomes

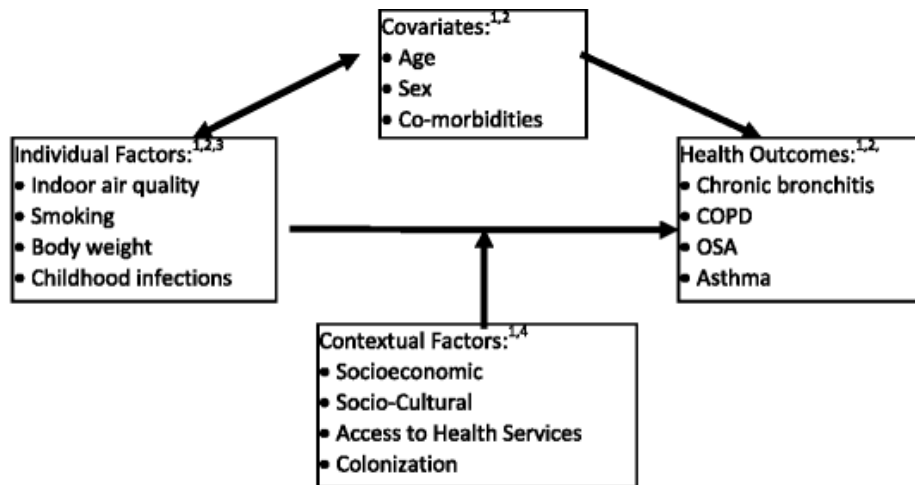
compared with another group that often result from social, cultural, economic, environmental, or geographical influences.” (Ospina, Voaklander, Stickland, & King, 2012, p.355). This statement applies to the First Nation population in Canada. The health risks faced by today’s Aboriginal population outlined by Furgal, Garvin, and Jardine (2010) included three main categories: disease, threats from changes in the environment, and the adoption of adverse lifestyle factors. The first category of disease includes illnesses such as, but not limited to, tuberculosis, diabetes, and respiratory diseases. Threats from changes in the environment includes the loss of traditional lifestyles, exposure to contaminants, the increased consumption of the typical “Western” diet, and climate change. Lastly, the adoption of adverse lifestyle factors is an issue for Indigenous and non-Indigenous populations alike, which include smoking, recreational drug use, and inactivity (Furgal, Garvin, & Jardine, 2010). These three categories are broad and can encapsulate many of the issues that are contributing factors to the outcome gap seen in the First Nations population of Canada. This gap in health between the Indigenous and non-Indigenous populations has been found to impact life expectancy and can further negatively impact the health of people, particularly those with respiratory diseases (Ospina, 2012). One of the more concerning factors regarding the lack of research with seniors is that some communities of Indigenous peoples, in Canada in particular, are among the unhealthiest communities in the country (Wilson et al., 2010). Research in the area of Indigenous health associates the conditions of communities as comparable to that of people living in developing countries (Kmetec, Reading, & Estey, 2008). Article 24 of the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) states: “Indigenous individuals have an equal right to the enjoyment of the highest attainable standard of physical and mental health. States shall take the necessary steps with a view to achieving progressively the full realization of this right.” (UNDRIP, 2007, para 13). This is a declaration that Canada has signed and to which it is accountable.

Cooke, Guimond, and McWhirter (2015) point out that the focus of program and policy intervention in Indigenous communities tends toward the younger population because the average population is much younger than that of the non-Indigenous population in Canada. However, there is increasing recognition that resources are also

needed to address the growing population of Indigenous seniors. First Nation seniors hold positions of respect in communities, with their knowledge and experience recognized as important to the community’s overall well-being. Habjan et al. (2012) explains that “The well-being of the individual, the community, and the broader society are interdependent and are influenced by the physical, social, and interpersonal environments” (Habjan et al., 2012). Putting resources into not only the younger population but also into the senior population can be a benefit for all generations of the community.

2.2 Canadian & Indigenous Concepts of Determinants of Health

The Public Health Agency of Canada (PHAC) and Health Canada recognize twelve determinants of health as important to Canadians (Government of Canada, 2019). Although PHAC’s and Health Canada’s approach is thorough and broad, it does not fully encompass First Nation understandings of health. The FNLHP adapted the Population Health Framework of Health Canada (PHFHC) (Figure 2.1).



Legend of Assessment Methods: 1. Survey questionnaire; 2 Clinical assessment ; 3. Environmental assessments; 4. Health care utilization records.

Figure 2.1: The FNLHP Framework (adaptation from the Population Health Framework of Health Canada) (Pickett W, Day L, Brison RJ, Marlenga BL, Pahwa P, Koehncke N, 2008).

In addition to highlighting determinants already reported in the literature as important

influences on lung health, the research team included colonization as a previously unexplored contextual factor in relation to lung health but of particular significance as a determinant of health for First Nations people who would be participating in the study. As will be elaborated below, while the PHFHC underpins the study from which the data for this thesis were drawn, I also endeavoured to draw from an Indigenous health framework for my study as well.

The term “health” is tied to a Western model of what health represents. As such, it has been argued that “health” does not fully represent the concept for First Nation populations. The Assembly of First Nations (AFN) explains that the term “wellness” is more appropriate and encompasses influences not captured in Western concepts of health (AFN, 2009). Given the diversity of First Nation communities, there is a wide range of perspectives on this concept, although, there is some consensus around the interconnectedness between four main domains that constitute wellness. These four domains are the physical, mental, emotional, and spiritual. It is a common understanding that to have a balance between all four allows for a person to be on the path of wellness (Yearington, T., 2010). These four domains include many of the PHAC’s determinants of health, with elaborations specific to First Nation populations. These include, for example, “environmental health, education, gender, income, meaningful access to culture and land, access to justice, and individual and community self-determination and more” (AFN, 2015). The First Nations Wholistic Policy and Planning Model (Figure 2.2), is an example of a model that incorporates the four domains of wellness and identifies determinants of health within each. The First Nations Wholistic Policy and Planning Model, therefore, also informed and inspired this thesis. An important distinction of this model is the placement of community at the center, as opposed to Euro-Western frameworks (such as the PHFHC) that tend to place the individual there. Additionally, this framework incorporates the medicine wheel, which is a symbolic and integrated part of some First Nation people’s health and lifestyle structure. Pace et al., (2016), explain that “Elders evaluate their health in relation to the wellness of the whole community. Thus, in order to support older peoples’ wellness, the health of the whole community must be addressed” (Pace et al., 2016). When individual people are unwell, it makes the

community unwell. The final part of the AFN model, the outermost ring, shows the importance of relationships. These relationships are comprised of groups within the community, between different First Nation and non-First Nation communities and outside communities such as government and institutions, signifying the importance of community-level interventions for health. The AFN (2007) report states:

“It seems logical to integrate Indigenous knowledge systems into advanced health policy development and research in an effort to combine scientific excellence with community relevance from project design to analysis, interpretation of results, and translation of knowledge to policy makers with the aim to improve health.”
(AFN, 2007: pg.3)

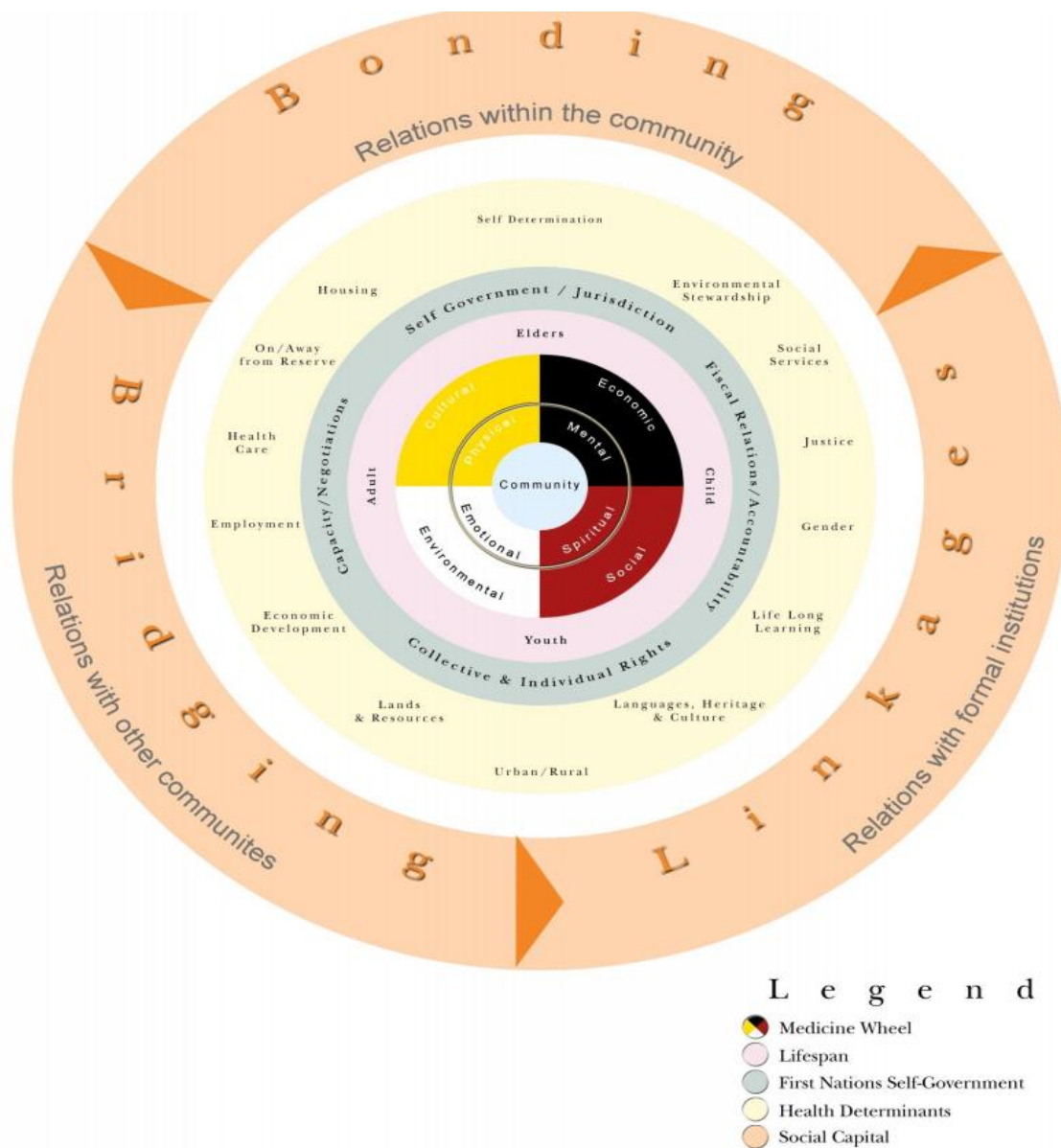


Figure 2.2: The First Nations Wholistic Policy and Planning Model (AFN, 2007: pg.3).

2.3 Colonization

Colonization continues to significantly impact First Nation wellness with policies of oppression and assimilation over the history of Canada, which include the Indian Act, Treaty negotiation, residential schools, the 60's scoop, and contemporary child welfare policies. The Royal Commission on Aboriginal Peoples (RCAP), the Truth and

Reconciliation Commission (TRC), and the National Inquiry into Missing and Murdered Indigenous Women (MMIW) have had mandates to move Canada towards redressing their structural injustices, but there has been little progress (Reading, et al. 2016). Colonization, therefore, remains an important determinant of health inequity experienced by Indigenous people in Canada.

2.4 Reserves

Colonization includes the creation of First Nation reserves. Reserves are parcels of land that were set aside for First Nation peoples who signed Treaties between 1701 and 1923 to accommodate European settlement and nation building. This resulted in First Nation peoples losing vast traditional lands to Canada (Government of Canada, 2018). It is widely recognized that reserves were an early attempt by colonizers to assimilate the First Nation people of Canada (Adelson, 2005). A Treaty is a formal agreement between two parties; the Treaties in Canada are formal agreements made between the Crown and First Nations, and the reasons for the treaties are different for both the Crown and First Nations. In the prairies, the Crown wanted access to resources and access to the West. First Nations were seeking a Treaty relationship in hopes of securing sustainable food sources since the buffalo population had drastically declined, and access to medicine since many European diseases were wiping out large numbers of First Nation peoples (Office of the Treaty Commissioner, 2019).

Reserves were what the Crown gave to First Nations in exchange for taking most of their traditional lands. These parcels of land that the First Nation communities received were often small, undesirable places for permanent settlement that were unsuitable for farming. Treaty rights are constitutionally protected under Section 35(1) of the Constitution Act (1982) and they are recognized by the courts throughout Canada (Sasakamoose, J., 2017). However, the Crown has not fully recognized the rights in some of the treaties and has created paternalistic legislation that has undermined the nation to nation relationship that was supposed to be created with the signing of the treaties (AFN, 2018). Today, funds are provided by the Federal Government from Indigenous Services Canada to the Band Councils on each First Nation reserve. While Bands determine the allocation of funds on

reserve, the federal government receives funding in envelopes which are allocated to specific areas and cannot be transferred at the Band level between portfolios, such as between health and housing. Reserves do not receive enough funding within each envelope to address all of the issues that are present, with one of the major needs for funding being to repair and build adequate housing. In 2015, the Standing Senate Committee on Aboriginal Peoples found that “The poor quality of housing and the overcrowding in many communities is a distressing situation” (AFN, 2018 para. 1). The AFN recognizes infrastructure and housing as an important issue that needs to be considered for policy reform, which would include more funding for housing and infrastructure. When there is not enough funding to the Band for housing, Band-owned housing cannot be adequately built, maintained, or repaired, and results in situations that can negatively affect the health of the occupants. The Assembly of First Nations states, “All First Nations members living on or away from their community have a right to shelter and must be provided with an opportunity to access safe, secure, adequate, and affordable housing” (AFN Housing Strategy, 2018 pg. 1). For First Nation communities, housing and the quality of housing are just some of the several influential determinants of Indigenous health.

2.5 Residential Schools

Residential schools are an important consideration in First Nation health, examining current seniors who were former students and also taking into account families and communities that are impacted laterally and intergenerationally. For most of the 20th century, across Canada, generations of First Nation children were forcibly separated from their families and communities and taken to boarding schools that were notoriously overcrowded, underfunded, and generally provided an unhealthy environment for young children (Truth and Reconciliation Council of Canada, 2012). The purpose of these schools was to educate and “civilize” Aboriginal children. The Canadian government ultimately failed to “provide the children with the education they needed and the care they deserved” (Truth and Reconciliation Council of Canada, 2012, p.1). Sasakamoose (2017) details the impact residential schools had on the culture and peoples that attended:

The trauma of colonization and the residential school system remains embedded in the lives of Indigenous Peoples through direct and intergenerational transmission. Without reparation and healing, such trauma is compounded by racism and inequity in health, education, governance, and policy systems. For Indigenous Peoples, endemic poverty and attitudes toward health further compound these barriers from the earliest age. (p.3).

Residential schools not only impacted those that attended but entire communities and families. Elders were unable to pass down traditions, languages began to be forgotten, and children did not return home the same as when they left (if they returned at all) (Truth and Reconciliation Council of Canada, 2012). Without the acknowledgement and healing by all communities, First Nation and non-First Nation, the trauma of colonization and residential schools is amplified by various forms of racism, inequity in health and healthcare, education, and the implementation and making of policies (Sasakamoose, J., 2017).

2.6 Housing

Housing conditions and the impact that they can have on the health of people, especially populations that have been living in poor housing conditions for many years, is an important topic. The Saskatchewan population of First Nations people (103,205) makes up 16% of the total population of the province (Statistics Canada, 2016). In Saskatchewan, the number of First Nation people living on reserves was 53% of the total First Nation population (Statistics Canada, 2016).

Connection to the land and home is significant and meaningful to First Nation communities, as reflected between the four domains of wellness articulated in the AFN Wholistic Planning Model. For First Nation people, reserves have significance as what is left of their land over which they can exercise autonomy. Wilson et al. (2003 pg. 83), explain, “The land does not just represent a physical space but rather, represents the interconnected physical, symbolic, spiritual and social aspects of First Nations cultures.” Housing is important for social, physical, and emotional health; it is the one place where people tend to spend most of their time. As Dunn (2006, pg. 11), points out, “housing is a crucial nexus for the operation of a wide range of socio-economic factors that fundamentally shape the character of everyday life for people across the socio-economic

spectrum.” Housing, particularly for seniors, is a crucial determinant of health. Seniors spend as much as 90% of their time indoors, which makes the environment of their house very important (AFN Environmental Stewardship Unit, 2009).

Many houses on First Nation reserves are below acceptable housing standards, and some do not have access to adequate services (Habjan, 2012 & Adelson, 2005). Housing conditions in First Nation communities are important influences on health outcomes. Problems of mold growth, smoking in the home, overcrowding, and housing in need of repairs are common issues that can lead to poor respiratory outcomes (Pahwa et al., 2015, and Carriere, Garner, & Sanmartin 2017). Many of the health issues First Nation people experience could potentially be a direct result of inadequate housing (Dunn, 2006). Weeks & LeBlanc (2010) noted from their study which looked at the housing conditions of vulnerable older Canadians that Aboriginal seniors wanted three things in their housing: that it meets their needs, does not negatively affect their health, and meets special health care needs that come with aging (Weeks & LeBlanc, 2010). Just like other older people in Canada, Aboriginal seniors want a say in their housing (Weeks & LeBlanc, 2010). The current reality on many reserves, however, is inadequate housing in need of frequent repairs, overcrowding, and mold growth.

2.7 Crowding

In this thesis, consistent with the FNLHP, crowding in the home is defined as more than one person per room in the home and is a common issue in First Nation homes (Pahwa, 2017, & Larcombe et al., 2011). There are several explanations for the high prevalence of crowding in these homes. In addition to insufficient housing stock, Larcombe et al., (2010) explain that homes on reserves may not be built for the size of First Nation families, which sometimes include multiple generations in the same house (Larcombe et al., 2010). Frequently, grandparents, uncles, and aunts live in the same house as parents and children. This may be because of cultural and/or economic reasons at the Band, family, and individual levels; limitation in housing stock; and the importance of extended family within First Nation homes (Statistics Canada, 2017). Commonly, crowding in homes could be a reason for the mobility of people within communities; people move

frequently to different houses within their family, sometimes multiple times a year. Larcombe et al., (2010) found that crowding in First Nation community houses in Manitoba increased in times of celebrations and holidays, but that at any given time of the year, there could be additional people living in homes for various reasons such as trapping seasons and children attending school.

While being around family can be beneficial for social health, it can have many negative impacts on physical health. Kovesi et al., (2007) found that crowding in northern Inuit homes can transmit infections from occupant to occupant and increase the likelihood of having an infected person in the home that could pass on illnesses and diseases (Kovesi et al., 2007 & Clark, Riben, & Nowegesic, 2002). Crowding in the home has been identified as a potential risk factor for respiratory infections such as chronic bronchitis and other contagious diseases such as tuberculosis and shigellosis (Clark et al., 2002). Crowding in the home may place those already suffering chronic conditions at a greater risk. Extra people in the home can have detrimental impacts on health if housing is not adequate to support extra guests or even just the large family that lives in the house year-round. Culturally appropriate and adequate housing is an important determinant of health and should be available to all people living in Canada (Oliver, Penney, & Peters, 2016).

2.8 Mold Growth and Dampness

A negative outcome of having too many people in one home is an increase in moisture, and an excess amount can lead to mold growth. The Institute of Medicine (2004) found that 20% of buildings in North America and Europe have one or more signs of dampness in them (Institute of Medicine, 2004., and Hernberg, Sripaiboonkij, Quansah, J. Jaakkola, & M. Jaakkola, 2014). Issues of dampness and mold can arise when homes are in need of repair or have poor ventilation. Multiple studies have found negative health effects attributed to mold in the home (Optis et al., 2012, and Hernberg et al., 2014, and Norback et al., 2011, and Larcombe et al., 2010, and Pahwa et al., 2012, and Pahwa et al., 2017). Exposure to harmful bacteria in mold can increase the likelihood of allergic reactions, respiratory complications, fatigue, and general weakness (Fisk, Eliseeva, & Mendell, 2010). Optis et al., (2012) looked at First Nation homes on reserves and found that they

were more susceptible to mold growth due to higher moisture levels than that of non-First Nation homes. The higher moisture levels were attributed to overcrowding in the homes, homes in need of repair, and insufficient ventilation within the homes (Optis et al., 2012).

2.9 Smoking & Smoking in the Home

One of the known causes of chronic bronchitis (CB) is smoking (Hewitt, 2008). Smoking is found to be a major factor in accelerating the decline in pulmonary function and increases with the amount of pack-years. Pelkonen et al., (2006) found that during the lifetime of smokers, 40% of them will develop CB, and approximately 25% can be affected by chronic obstructive pulmonary disease (COPD). CB is also a strong predictor of COPD and if not taken care of, can lead to COPD which has its own list of complications and dangers. It is well documented that smoking is a common habit of many Canadians with higher prevalence among First Nation people (Pelkonen et al., 2006).

Tobacco can be harmful to the person smoking it, and unfortunately, can also be harmful to those around tobacco smoke. Smoking inside the house can cause health problems for people living in the house, and the issue with having smoke in the home is the lack of ventilation that can prevent the smoke from leaving. Kovesi et al. (2007) report that Indigenous children living in the north experience severe respiratory infections more often than other populations. One of the contributing factors identified in the study is the issue of smoking in the home and overall poor air quality. Smoking has been identified to reduce the likelihood of First Nation people reporting good health when they rate their overall wellbeing (Richmond, Ross, & Egeland, 2007). Since the habit of smoking inside is not a new phenomenon, seniors in these communities could have decade's worth of in-house exposure to tobacco smoke, potentially leading to increasingly poor respiratory health outcomes as they age.

2.10 Respiratory Illnesses and Chronic Bronchitis

Respiratory function declines with age in everyone, even healthier individuals, and seems to accelerate after the age of 70 (Griffith et al., 2001). Respiratory illnesses are common in elderly populations and a strong predictor of death that increases with age (Hewitt et

al., 2005, and Pelkonen et al., 2008). Respiratory illnesses affect elderly more severely and have greater detrimental effects than on younger populations. The key is to minimize the decline of health for as long as possible. The Royal Commission on Aboriginal Peoples of Canada (RCAP, 1995) reported that 19% of Aboriginal people aged fifteen or older had a chronic respiratory health issue such as asthma, bronchitis, and emphysema (RCAP, 1995).

CB is a chronic pulmonary disease that causes a buildup of mucus in the bronchioles in the lungs. This excess mucus in the lungs reduces oxygen absorption and causes persistent coughing in the diagnosed (Pahwa et al., 2012). Lange's study described CB as "a marker of airway inflammation, most often triggered by exogenous stimuli and also as a marker of recurrent airway infection, perhaps related to bacterial colonisation of the airways" (2003:638). The general Canadian senior population has a prevalence rate of CB around 15%. Lange, Partner, Prescott, & Vestbo (2003) go on to state that chronic bronchitis may lead to an increased risk of chest infections, more rapid health decline, and increased mortality. Respiratory illnesses are common in elderly populations and a strong predictor of death that increases with age (Hewitt et al., 2005, and Pelkonen et al., 2008).

Summary

Although the First Nation population is younger on average than the non-Indigenous population in Canada, the First Nation senior population is growing. The health inequities that are being experienced in this demographic are only recently the focus of attention in research, program, and policy. Along with other social determinants of health, housing circumstances could play a significant role in the health outcomes of these seniors. Homes in First Nation communities experience overcrowding, mold growth, poor repairs, and may be an important source of exposure to tobacco smoke. These issues could negatively affect the health outcomes of those living in them, including a growing senior population.

CHAPTER 3: METHODOLOGY

This chapter describes the methodological process for this thesis. The chapter begins with an overview of the First Nation Lung Health Project (FNLHP) that produced the data used for this study. This is followed by a description of the overall approach and concludes with a description of the analysis process for this study.

3.1 Overview of the First Nation Lung Health Project (FNLHP, 2012-2018)

The FNLHP was conducted through a partnership between researchers at the University of Saskatchewan, the Canadian Centre for Health and Safety in Agriculture (CCHSA), and two Saskatchewan First Nation communities. The project was funded by a grant from the Canadian Institutes of Health Research (CIHR MOP-246983-ABH-CCAA-11829). The FNLHP “considers how individual and contextual factors influence adverse respiratory outcomes and aims to implement appropriate community-level (address) and policy-level (redress) interventions in two on-reserve First Nation communities in Saskatchewan” (Pahwa et al, 2015:2). The project, from inception to dissemination, was collaboratively designed and implemented in a manner consistent with *Chapter 9: Research Involving the First Nations, Inuit and Métis Peoples of Canada of the Tricouncil Policy Statement* (Pahwa et al, 2015, Government of Canada Panel on Research Ethics, 2018). Data for the FNLHP was generated via the administration of individual (Appendix A) and household (Appendix B) questionnaires, individual clinical assessments, and housing assessments. This study draws on data from the questionnaires. The questionnaires included questions that captured both individual and contextual factors and important covariates based on Health Canada’s Population Health Framework seen in the previous chapter (pg. 20).

Two questionnaires administered to adult participants were used in this thesis. Household questionnaires included questions about housing repairs needed, presence of mold (smell or sight), and dampness in the home or damage caused by dampness and smoking in the home. Individual questionnaires included questions about participant’s respiratory health, lifestyle factors (smoking and physical activity), alcohol consumption, important covariates (age, sex), along with other past and present health conditions.

The data collected in the FNLHP includes two cross-sectional surveys with an initial phase in 2012 (Phase 1) and follow-up in 2016 (Phase 2). The response rate for the

adult questionnaires was 55.7% for Phase 1 and 53.4% for Phase 2. The follow-up rate (participated in both phases) was 45.2%. The sample size that was used for this thesis was a combination of the two cross-sectional data sets from 2012 and 2016, where any duplicates from both sample points were removed. In 2012, there were 874 participants, and in 2016, there were 444 new participants and 395 follow-up participants from Phase 1. The 395 participants were removed because they had previously participated in the 2012 data collection and follow-up data was not considered in this thesis. A total of 1318 participants from both communities were available for analysis. Of the 1318 participants from both communities, 168 were aged 55 and older, and were therefore the sample for this study.

3.2 Collaborating Communities – Study Context

The two Saskatchewan First Nation communities involved in the study are distinct culturally, geographically, and differ somewhat in their health profiles, but they share common concerns for their individual and community health and their experience of colonization. Adelson (2005) explains “The key element that does bring them (Aboriginal population) together as a group, is the autochthonous status on this land and the subsequent historical relationship since contact that each and every Aboriginal person continues to have to the nation-state” (Adelson, 2005, pg.47). At their request, they are referred to as Community A and Community B in this thesis. This thesis presents a combined analysis of all seniors from Community A & B who completed questionnaires as part of the FNLHP study. Although 65 years and older is commonly used in Canada as defining a senior a previous study, research has suggested using 55 years and older for work with Aboriginal seniors, based on Wilson et al. findings (Wilson et al., 2010). There are a few reasons why 55 years and older are the base for defining Aboriginal seniors, with the first being that Aboriginal people in Canada experience more chronic conditions earlier in life such that the health profile at age 55-64 more closely resembles age 65-74 in the non-Aboriginal population. Second, life expectancy remains lower among Aboriginal people than among the non-Aboriginal population (Statistics Canada, 2017). The inclusion of participants aged 55-64 in the senior population for this study also increases the sample size available for analysis and may better reflect the “senior” population in these communities.

3.3 Data Collection Instruments and Variables

Data from the questionnaires were included in this project. The individual questionnaire obtained information concerning individual and contextual health determinants that could affect the respiratory health of the participants (e.g. smoking, home dampness, mold/mildew, etc.). Contextual determinants included socio-structural factors (education, lifestyle, income, colonization, and other factors such as occupational history).

Additionally, the individual questionnaire also included general questions on other health conditions to obtain a more complete overview of individual health. The household questionnaire obtained information specific to housing conditions such as the presence of mold/mildew/dampness, if the house needed repair, smoking in the house, and how many people occupied the house on a regular basis. One person per household filled out the questionnaire for the household.

Questionnaires were in English as most community members speak English in addition to Cree. Community member researcher staff were also able to help participants understand the meaning of a question to avoid confusion or misunderstanding.

3.4 Data accuracy

The researchers and community members who developed the household and individual questionnaires addressed the issues of data accuracy by considering non-sampling and sampling errors. The team worked on addressing these errors by having community involvement in every aspect of the project. Various meetings and consultations took place to approve appropriate and effective questionnaires, and they were pilot tested. Finally, community members that were bilingual were hired to administer the questionnaires. This allowed participants to feel comfortable in answering questions and allowed more community participation. Having community members involved also allowed participants that were uncomfortable with English to understand the questions to ensure they were not misunderstood and could give answers that were as accurate as possible.

3.5 Access to Data

The communities involved in the FNLHP co-own the data that was collected during the project. Any reports based on the results obtained from the analysis of the data are approved by community leaders prior to publication or any form of dissemination. The communities have each been provided the data and statistical software of their choosing

to facilitate their own analyses. The communities additionally have access to the data and analytical support whenever they like through the researcher team at the University of Saskatchewan.

3.6 Study Purpose and Research Questions

The objective of this study was to reveal relationships between health determinants of both chronic bronchitis and the symptoms of chronic bronchitis in First Nation seniors aged 55 years and older, residing in the two First Nation communities partnering in the FNLHP. Housing conditions as determinants of chronic bronchitis were of particular interest because of their known association with respiratory health outcomes and the generally poorer housing quality on reserves in Canada.

3.7 Research Questions

1. What is the association between housing conditions, other social determinants of health, and self-reported chronic bronchitis symptoms, (i) chronic cough or chronic phlegm, and (ii) chronic cough and chronic phlegm?
 - ii. What are the differences between men and women within both communities together?
 - iii. What are the differences between young old (55-64) and older old (65+), within both communities together?
2. What is the association between housing conditions, other social determinants of health and doctor diagnosed chronic bronchitis?
 - ii. What is the difference between men and women within both communities together?
 - iii. What are the differences between young old (55-64) and older old (65+), within both communities together?

3.8 Participants

All participants from both 2012 and 2016 in the FNLHP that were 55 years and older were included as a pooled sample to ensure adequate sample size for analysis. Repeated observations in Phase 2 were removed for this analysis to ensure only one observation per person was included. The sample size was n=168 of 55 years and older seniors.

3.9 Study Variables

Variables that were explored in this study were chronic bronchitis, housing conditions, sex, socioeconomic position, and age. These were selected based on the research literature that identifies them as substantively important and availability of variables in the database of questionnaire responses. Table 3.1 summarizes each variable, and Table 3.2 lists the questions that were used to generate variables for analysis.

Table 3.1: Population Characteristics of Study Population

Descriptive Characteristics	Number of Participants (%)
Sex	
Female	93 (55.3)
Male	75 (44.6)
Age	
>60	87 (51.7)
55-60	81 (48.2)
Body Mass Index (BMI)	
>30.0 (Obese)	84 (50.0)
25.0-29.9 (Overweight)	51 (30.3)
<25.0 (Normal and underweight)	27 (16.0)
Missing	6 (3.5)
Smoking Status	
Current	102 (60.7)
Ex	42 (25.0)
Never	24 (14.2)
Residential School Attendance (Self)	
Yes	90 (53.5)
No	75 (44.6)
Missing	3 (1.7)
Band-Owned House	
Yes	143 (85.1)
No	18 (10.7)
Missing	7 (4.1)
House Repairs	
Major/Minor	121 (72.0)
No	41(24.4)
Missing	6 (3.5)

Water/Dampness	
Yes	96 (57.1)
No	64 (38.0)
Missing	8 (4.7)
Damp Damage	
Yes	101 (60.1)
No	59 (35.1)
Missing	8 (4.7)
Mildew/Mold Smell	
Yes	104 (61.9)
No	52 (30.9)
Missing	12 (7.1)
Mold/Mildew Visible	
Yes	88 (52.3)
No	65 (38.6)
Missing	15 ((8.9)
People Smoke in House	
Yes	86 (51.1)
No	75 (44.6)
Missing	7 (4.1)
Crowding	
>1 People/room	39 (23.2)
<=1 People/room	122 (72.6)
Missing	7 (4.1)
Extra Money	
Not Enough	85 (50.5)
Just Enough	37 (22.0)
Some	39 (23.2)
Missing	7 (4.1)

It is important to point out that the descriptive analysis revealed a largely homogenous sample. We see, for example, that large proportions of the population report crowding, having just enough or not enough money, having a BMI that falls into the categories of overweight/obese, and attended a residential school. Sample homogeneity may present challenges for an analysis that aspires to disentangle the influence of determinants on health outcomes

3.10 Outcome Variables - Chronic Bronchitis (CB)

CB, the outcome of interest, is captured as self-reported doctor diagnosed or symptom-based CB. Doctor diagnosed CB was determined by a question on the adult

questionnaire that asked participants “Has a doctor ever said you had chronic (long lasting) bronchitis in your lifetime?” For symptom-based CB, this was determined if participants answered yes to “Do you usually have a cough on most days for 3 months in a row or more for at least 2 years?” and yes to “Do you bring up phlegm like this on most days for 3 months in a row or more for at least 2 years?”. If participants answered yes to both of those questions but answered no to having ever been diagnosed by a doctor, they were categorized as symptom-based CB. This is because CB is defined in the literature as chronic phlegm and chronic cough for three months at a time within a two-year period. Symptom-based CB was a variable of interest to determine if participants were living with undiagnosed CB and its association with housing and other social determinants of health. The individual symptoms of cough and phlegm were looked at separately as well to see if one symptom was more prevalent or had different outcomes than the other symptom.

3.11 Contextual Factors

3.11.1 Housing Conditions

Four characteristics were considered in the assessment of housing conditions: crowding, housing repairs needed, mold growth, and home ownership. Participants were asked about the number of rooms in their home and how many people were living in the home. For this project, more than one person per room in a house was defined as crowding as the Canadian National Occupancy Standard states that there should be a maximum of two persons per bedroom (Statistics Canada, Housing Suitability, 2017). House repair was captured as major, minor, or no repairs. Dampness in the house was reported on the damage it caused in the house and the presence of dampness/water in the house. Mold growth was reported by participants according to visual presence and odour. Home ownership distinguished between band-owned or participant-owned. Most houses on a reserve are band-owned and under band stewardship for repairs.

3.11.2 Socioeconomic Status

In the household questionnaire, participants were asked about socioeconomic status with questions about total household income, household income adequacy, and perceived financial strain. For this project, perceived income adequacy was chosen as a proxy for

socioeconomic status. Most participants in the study generally fell into a similar income bracket and were therefore not distinguishable from each other using household income.

3.12.3 Age

The senior population was separated into younger old (55-64 years) and older old (65+ years). This was done for two reasons: first, grouping the age in these two categories resulted in a balance of participants across categories, ensuring there were enough people in each for analysis feasibility. The 55 years and older category represented 10.1% of the total adult population of survey respondents. (Total number of individuals in two cross-sectional surveys = 1318 and total seniors = 131: $1318/131 = 10.1\%$). Second, as discussed earlier, the health outcomes of those aged 55-64 in Aboriginal populations is comparable to that of the 65-74-year-old non-Aboriginal population in Canada. Age was separated into a “younger old” and an “older old” category to reveal possible aging associations with health.

Table 3.2 *Questions included in FNLHP questionnaire that were used in analyses.*

Concept	Question presented in FNLHP questionnaire
Gender	Sex (Male/Female)
Age	“Age as of January 1, 2012” “Age as of January 1, 2016” Date of Birth (dd/mm/yy)
Body Mass Index (BMI)	“Height (in cm or ft and in.)” “Weight (in kg or lbs)”
Respiratory Health	“Do you usually have a cough?” (Yes/No) <ul style="list-style-type: none"> • If participant answered yes, they then answered: • “Do you usually cough like this on most days for 3 months in a row or more during the year?” (Yes/No) • “For how many years have you had this cough?” • “For how many months have you had this cough?” “Do you usually bring up phlegm from your chest?” (Yes/No) <ul style="list-style-type: none"> • If participant answered yes, they then answered: • “Do you bring up phlegm like this on most days for 3 months in a row or more during the year?” (Yes/No) • “For how many years have you had trouble with phlegm?” • “For how many months have you had trouble with phlegm?” “Has a doctor ever said you had any of the following chest illnesses:”

	<ul style="list-style-type: none"> Participants had to check yes/no to “during the past 12 months” or “ever in your life” to “Chronic (long lasting) bronchitis” from the list of chest illnesses.
Colonization	<p>“Did you attend a residential school?” (Yes/No)</p> <p>“Do you live in band owned housing?” (Yes/No/Don’t Know/Refused)</p>
Housing	<p>Crowding:</p> <p>“How many people usually live in your house?” (number)</p> <p>“How many rooms are there in your house?”</p> <p>Crowding (number of people/number of rooms) derived using above two questions</p> <p>Repairs:</p> <p>“Is this house in need of repairs?” (Yes, major repairs/ Yes, minor repairs/ No, only regular maintenance (upkeep) is required (painting, furnace)/ Don’t Know/ Refused)</p> <p>Mold/Dampness:</p> <p>“During the past 12 months, has there been water or dampness in your house from broken pipes, leaks, septic tanks, heavy rain, or floods?” (Yes/No/Don’t Know/Refused)</p> <p>“Does your house have any damage caused by dampness? (E.g. wet spots on walls, floors, ceilings)?” (Yes/No/Don’t Know/Refused)</p> <p>“Does your house (including basement) frequently have a mildew/moldy odor or musty smell?” (Yes/No/Don’t Know/Refused)</p> <p>“Are there signs of mold or mildew in any living areas in your house?” (Yes/No/Don’t Know/Refused)</p> <p>Smoke in Home:</p> <p>“Do any people who live in your house smoke in the house? (Yes/No/Don’t Know)</p>
Smoking	<p>Smoke in Home:</p> <p>“Do any people who live in your house smoke in the house? (Yes/No/Don’t Know)</p> <p>Smoking Status</p> <p>“Have you ever smoked cigarettes?” (Yes/No)</p> <p>“Do you smoke cigarettes now?” (Yes/No)</p>
Socioeconomic Status	<p>“At the end of the month, how much money do you have left over?” (Some Money/Just Enough Money/Not Enough Money)</p>

3.13 Ethics Approval

Research ethics approval for Phase One of the study was obtained in 2012 from the University of Saskatchewan’s Biomedical Research Ethic Board (Bio#: 12-189) and

approval for Phase Two of the study was obtained in 2016 through an amendment to the original FNLHP Certificate of Approval obtained from the University of Saskatchewan's Biomedical Research Ethics Board. My supervisor was a member of the FNLHP and introduced me at a weekly meeting to the team, which was followed by an approval from the team to become a student on the project. I began attending weekly team meetings, travelled with fellow researchers to one of the partner communities, and volunteered at a housing symposium organized by the FNLHP. In October 2018, findings from this thesis were presented in poster form during the poster competition at the Saskatchewan Epidemiology Association (SEA) Conference. I also attended various symposiums and conferences with members of the FNLHP and reported findings back to the FNLHP team from these conferences. Findings from this study were presented to the FNLHP team.

3.14 Statistical Analysis

Data analyses involved bivariate and multivariable logistic regression using the IBM Statistical Package for Social Sciences (SPSS) version 25.0.

Descriptive Analysis

Data analysis began with establishing prevalence of CB doctor diagnosed and symptom-based. Observed percentages and total percentages were obtained. This step was conducted to determine basic numbers of participants in each category and to see trends in the data.

Logistic Regression Analysis (GEE Method)

Univariable logistic regression analysis was the next step in the data analysis process. A multilevel logistic regression modelling approach using generalized estimating equations with individuals (1st level) nested within households (2nd level) was utilized. This accounts for the within household dependencies that occur due to multiple people from the same household. A series of multi-level models were fitted to determine the potential risk factors, confounders, and interactions contributing to the outcome of interest. In the bi-variable analysis, variables significance was set at <0.25 for inclusion in the multivariable analysis. This p-value was chosen as the level of significance for this data analysis as the sample size of the senior population in the two communities was small, with only 168 total seniors participating.

Along with factors that had p values of <0.25 , important literature informed contextual factors were also kept in the multivariable logistic regression analysis irrespective of their univariable significance level (Greenland, S., 1989, Mickey, R. M. & Greenland, S., 1989, Bursac, Z., 2008, Hosmer D.W., & Lemeshow, S., 2000). Significance in the multivariable model was set at a p-value of <0.10 . Results were presented as odds ratios (ORs) with 90% confidence intervals (CIs). In the multivariable analysis, interactions between variables and confounding were tested.

3.15 Analytical Approach to Each Research Question

1. What is the association between housing conditions and self-reported chronic bronchitis symptoms, (i) chronic cough or chronic phlegm, and (ii) chronic cough and chronic phlegm?
 - iii. What are the differences between men and women within both communities together?
 - iv. What are the differences between young old (55-64) and older old (65+), within both communities together?

Crosstabs determined the frequencies and percentages of seniors who were younger old (55-64 years) and older old (65 years and older) and the sex distribution in the sample. Univariable logistic regression analysis was used to discover the significant ($p<0.25$) variables related to the self-reported symptoms and housing conditions being analyzed. Finally, the multivariable regression analysis was used to determine the significant predictors and interactions, assess for potential confounders and make final conclusions on the data presented.

2. What is the association between housing conditions and doctor diagnosed chronic bronchitis?
 - i. What is the difference between men and women within both communities together?
 - iv. What are the differences between young old (55-64) and older old (65+) within both communities together?

Crosstabs determined the frequencies and percentages of seniors with either doctor diagnosed or symptom-based histories of chronic bronchitis and how that related to their housing conditions, socioeconomic status, and gender. Univariate logistic analysis was used to discover the significant ($p < 0.25$) variables related to the doctor diagnosed CB and housing conditions being analyzed. Finally, the multivariable logistic regression analysis was used to determine if any confounders or correlations were present between the significant variables and to make final conclusions on the data presented.

Summary

The next chapter examines the results from the data analysis conducted on the variables described in this chapter. Univariable and multivariable logistic regression analysis results are presented as frequencies and percentages, ORs, 90% CIs, and p values.

CHAPTER 4: RESULTS

This chapter provides the results based on crosstabs analysis and the results based on the univariable and multivariable logistic regressions using the FNLHP data, specifically the senior (55 years and older) population. The analysis was conducted using IBM Statistical Package for Social Sciences (SPSS) version 25.0. The presentation of results for each question begins with bivariate tables. Variables that were included in the multivariable analysis are bolded (level of significance at $\alpha = 0.25$, i.e. $p < 0.25$). The subsequent multivariate tables show the interactions that were examined and the variables that remained significant at $\alpha = 0.10$ level of significance ($p < 0.10$). The results of the analysis are outlined in this chapter, and the significance of the findings are discussed in the next chapter.

4.1 Self-Reported Doctor Diagnosed CB

Doctor diagnosed CB was established by a question on the individual questionnaire that asked participants “Has a doctor ever said you had chronic (long lasting) bronchitis?” The questionnaire asked for a time period of this diagnosis “During the past 12 months?” and/or “Ever in your life?” Both time periods were combined to create the doctor diagnosed CB variable. Descriptive analysis was conducted first to reveal the numbers of participants in each category and to begin establishing what variables may be associated with doctor diagnosed CB in participants. Results of univariable analysis are presented in Table 4.1. There were a few variables that stood out as significant at $p < 0.25$: residential school attendance ($p = 0.24$), water dampness ($p = 0.24$), people smoking in the home ($p = 0.21$), and the amount of money left at the end of the month ($p = 0.08$) were all found to be significant. Unexpectedly, water dampness in the home had an odds ratio (OR) of 0.57 ($p = 0.24$), meaning those reporting water dampness in the house were less likely to report doctor diagnosed CB than those reporting no water dampness. This contradicts previous research in the area of CB, and it was not included in the multivariable analysis (Pahwa et al., 2012, and Carriere et al., 2017, and Dunn et al., 2006). These significant variables were included in the multivariate analysis along with the contextual factors: age, sex, body mass index (BMI), and smoking status. These contextual factors were included in the multivariable analysis because they were common characteristics that

could possibly collaborate to influence the effectiveness of the outcomes. The selected contextual factors are determinants of health for the human population.

Following the bivariable analysis, a multivariable analysis was conducted. This analysis tested interactions of the factors that emerged as significant in bivariable analysis and determined the final models for each main variable.

Table 4.1: Results Based on Univariable Logistic Regression of the Prevalence: Doctor Diagnosed Chronic Bronchitis

Question	Yes	No	Odds Ratio (90% CI)	p-value
Age				
>60	12/21 (57.1%)	69/131 (52.7%)	1.20 (0.57, 2.51)	0.69
55-60 (ref)	9/21 (42.9%)	62/131 (47.3%)	1.00	
Sex				
Male	9/21 (42.9%)	59/131 (45.0%)	0.92 (0.41, 2.06)	0.86
Female (ref)	12/21 (57.1%)	72/131 (55.0%)	1.00	
Body Mass Index (BMI)				
>30.0	8/20 (40.0%)	65/127 (51.2%)	0.89 (0.27, 3.00)	0.88
25.0-29.9	9/20 (45.0%)	40/127 (31.5%)	1.64 (0.46, 5.80)	0.52
<25.0 (ref)	3/20 (15.0%)	22/127 (17.3%)	1.00	
Smoking Status				
Current	14/21 (66.7%)	79/131 (60.3%)	1.59 (0.48, 5.29)	0.52
Ex	5/21 (23.8%)	34/131 (26.0%)	1.31 (0.31, 5.50)	0.75
Never (ref)	2/21 (9.5%)	18/131 (13.7%)	1.00	
Residential School				
Yes	14/21 (66.7%)	66/129 (51.2%)	1.91 (0.82, 4.45)	0.21
No (ref)	7/21 (33.3%)	63/129 (48.8%)	1.00	
House Repairs				
Major/Minor	15/21 (71.4%)	93/125 (74.4%)	0.86 (0.38, 1.93)	0.76
No (ref)	6/21 (28.6%)	32/125 (25.6%)	1.00	
Water/Dampness				
Yes	10/21 (47.6%)	76/123 (61.8%)	0.57 (0.25, 1.27)	0.24
No (ref)	11/21 (52.4%)	47/123 (38.2%)	1.00	
Damp Damage				
Yes	11/20 (55.0%)	38/125 (62.4%)	0.74 (0.32, 1.69)	0.54
No (ref)	9/20 (45.0%)	47/125 (37.6%)	1.00	
Mildew/Mold Smell				
Yes	15/20 (75.0%)	78/122 (63.9%)	1.69 (0.69, 4.14)	0.33
No (ref)	5/20 (25.0%)	44/122 (36.1%)	1.00	

Mold/Mildew Visible				
Yes	11/19 (57.9%)	68/119 (57.1%)	1.03 (0.45, 2.34)	0.95
No (ref)	8/19 (42.1%)	51/119 (42.9%)	1.00	
People Smoke in House				
Yes	14/21 (66.7%)	65/124 (52.4%)	1.85 (0.83, 4.11)	0.21
No (ref)	7/21 (33.3%)	59/124 (47.6%)	1.00	
Crowding				
>1 People/room	7/21 (33.3%)	29/124 (23.4%)	1.64 (0.76, 3.55)	0.29
<=1 People/room (ref)	14/21 (66.7%)	95/124 (76.6%)	1.00	
Extra Money				
Not Enough	7/21 (33.3%)	67/124 (54.0%)	0.37 (0.14, 0.92)	0.08
Just Enough	6/21 (28.6%)	29/124 (23.4%)	0.72 (0.29, 1.80)	0.56
Some (ref)	8/21 (38.1%)	28/124 (22.6%)	1.00	

Odds ratios were adjusted for household clustering
Significance at $p=0.25$ level is highlighted in bold.

Following the multivariable analysis (Table 4.2), the final model showed that residential school attendance ($p=0.098$) and people smoking in the house ($p=0.048$) remained as significant predictors of doctor diagnosed CB ($p < 0.10$) and represented the final model after all other interactions were examined. The interactions of BMI and smoking in the house, BMI and sex, and finally residential school attendance and smoking in the house were tested. None of the interactions were significant at $\alpha=0.10$ and were left out of the final model.

Table 4.2: Results Based on Multivariable Logistic Regression of the Prevalence: Doctor Diagnosed Chronic Bronchitis

Question	Adjusted Odds Ratio (95% CI)	Adjusted Odds Ratio (90% CI)	p-value
Age:			
>60	0.84 (0.30,2.38)	0.84 (0.35,2.201)	0.74
55-60 (ref)	1.00	1.00	
Sex:			
Male	0.68 (0.26,1.80)	0.68 (0.30,1.54)	0.43
Female (ref)	1.00	1.00	
BMI:			
>30.0	0.87 (0.20,3.86)	0.87 (0.25,3.04)	0.86
25.0-29.9	1.75 (0.35,8.69)	1.75 (0.46,6.72)	0.49
<25.0 (ref)	1.00	1.00	
Residential School			
Yes	2.38 (0.85,6.66)	2.38 (1.00,5.64)	0.10 (0.098)
No (ref)	1.00	1.00	

People Smoke in House			
Yes	2.74 (1.01,7.43)	2.74 (1.18,6.33)	0.05 (0.048)
No (ref)	1.00	1.00	

Odds ratios were adjusted for household clustering.

Significance at $p=0.10$ level (10%) were highlighted in bold.

4.2 Self-Reported Chronic Phlegm

Phlegm in the analysis was determined from the answers to questions from the individual questionnaire that asked participants “Do you usually bring up phlegm from your chest?”, “Do you bring up phlegm like this on most days for 3 months in a row or more during the year?”, and then asked “For how many years have you had trouble with phlegm?” and “How many months have you had trouble with phlegm?”. As defined previously, chronic phlegm and chronic cough lead to a diagnosis of CB if they persist for more than three months in a two-year period. Phlegm was looked at separately to see if variables were more likely to cause excessive phlegm to be excreted from the lungs in participants. As shown in Table 4.3, living in a band-owned house ($p=0.20$), damage from dampness in the home ($p=0.04$), and the amount of money at the end of the month ($p=0.06$) were statistically significant at $p<0.25$. As for extra money, having not enough money or having just enough money at the end of a given month was strongly significant to be linked with phlegm. The significant variables were included in the multivariable analysis along with the contextual factors: age, sex, body mass index (BMI), and smoking status. These contextual factors were included in the multivariable analysis because they are characteristics relevant to the participants and the communities. The selected contextual factors are determinants of health for the human population.

Following the bivariate analysis, a multivariable analysis was conducted. This analysis tested interactions of the factors that emerged as significant in bivariate analysis and determined the final significant variables.

Table 4.3: Results Based on Univariable Logistic Regression of the Prevalence: Self-Reported Chronic Phlegm

Question	Yes	No	Odds Ratio (90% CI)	p-value
Age:				
>60	15/31 (48.4%)	72/137 (52.6%)	0.93 (0.53, 1.65)	0.84
55-60 (ref)	16/31 (51.6%)	65/137 (47.4%)	1.00	
Sex:				
Male	15/31 (48.4%)	60/137 (43.8%)	1.29 (0.74, 2.27)	0.45
Female (ref)	16/31 (51.6%)	77/137 (56.2%)	1.00	
BMI:				
>30.0	16/30 (53.3%)	68/132 (51.55)	1.03 (0.42, 2.54)	0.95
25.0-29.9	10/30 (33.3%)	41/132 (31.1%)	1.13 (0.42, 3.02)	0.84
<25.0 (ref)	4/30 (13.3%)	23/132 (17.4%)	1.00	
Smoking Status				
Current	17/31 (54.8%)	85/137 (62.0%)	1.40 (0.49, 3.97)	0.60
Ex	11/31 (35.5%)	31/137 (22.6%)	2.36 (0.76, 7.32)	
Never (ref)	3/31 (9.7%)	21/137 (15.3%)	1.00	
Residential School				
Yes	19/31 (61.3%)	71/134 (53.0%)	1.37 (0.76, 2.48)	0.38
No (ref)	12/31 (38.7%)	63/134 (47.0%)	1.00	
Band-Owned House				
Yes	26/27 (96.3%)	117/134 (87.3%)	3.13 (0.71, 13.69)	0.20
No (ref)	1/27 (3.7%)	17/134 (12.7%)	1.00	
House Repairs				
Major/Minor	20/27 (74.1%)	101/135 (74.8%)	0.96 (0.44, 2.09)	0.93
No (ref)	7/27 (25.9%)	34/135 (25.2%)	1.00	
Water/Dampness				
Yes	14/26 (53.8%)	82/134 (61.2%)	0.78 (0.38, 1.60)	0.57
No (ref)	12/26 (46.2%)	52/134 (38.8%)	1.00	
Damp Damage				
Yes	12/27 (44.4%)	89/133 (66.9%)	0.42 (0.21, 0.83)	0.04
No (ref)	15/27 (55.6%)	44/133 (33.1%)	1.00	
Mildew/Mold Smell				
Yes	15/26 (57.7%)	89/130 (68.5%)	0.68 (0.32, 1.45)	0.40
No (ref)	11/26 (42.3%)	41/130 (31.5%)	1.00	
Mold/Mildew Visible				
Yes	13/26 (50.0%)	75/127 (59.1%)	0.76 (0.38, 1.52)	0.51
No (ref)	13/26 (50.0%)	52/127 (40.9%)	1.00	
People Smoke in House				
Yes	15/25 (60.0%)	71/136 (52.2%)	1.45 (0.67, 3.11)	0.43
No (ref)	10/25 (40.0%)	65/136 (47.8%)	1.00	
Crowding				
>1 People/room	6/27 (22.2%)	33/134 (24.6%)	0.85 (0.36, 2.00)	0.75
<=1 People/room (ref)	21/27 (77.8%)	101/134 (75.4%)	1.00	

Extra Money				
Not Enough	17/27 (63.0%)	68/134 (50.7%)	3.87 (1.21, 12.42)	0.06
Just Enough	8/27 (29.6%)	29/134 (21.6%)	4.37 (1.24, 15.42)	0.05
Some (ref)	2/27 (7.4%)	37/134 (27.6%)	1.00	

Odds ratios were adjusted for household clustering.
Significance at p=0.25 level is highlighted in bold.

Following the multivariate analysis (Table 4.4), data showed that having just enough and not enough money at the end of the month were both significant (p=0.06 and p=0.05). The interactions between damage to the house and sex, damage to the house and age, damage to the house and extra money, and finally damage and smoking status were all checked for interactions. None of the interactions were significant at $\alpha=0.10$ significance level and were left out of the final model.

Table 4.4: Results Based on Multivariable Logistic Regression of the Prevalence: Self-Reported Chronic Phlegm

Question	Adjusted Odd Ratio (95%)	Adjusted Odds Ratio (90%)	p-value
Age			
>60	0.75 (0.36,1.57)	0.75 (0.41,1.39)	0.45
55-60 (ref)	1.00		
Sex			
Male	1.34 (0.62,2.88)	1.34 (0.70, 2.54)	0.46
Female (ref)	1.00	1.00	
Extra Money			
Not Enough	4.01 (0.96,16.84)	4.01 (1.20,13.37)	0.06
Just Enough	4.64 (0.99,21.82)	4.64 (1.27,17.01)	0.05
Some (ref)	1.00	1.00	

Odds ratios were adjusted for household clustering.
Significance at p=0.10 level (10%) is highlighted in bold.

4.3 Self-Reported Chronic Cough

Cough in the analysis was determined from the answer on the individual questionnaire that asked participants “Do you usually have a cough?”, “Do you usually cough like this on most days for 3 months in a row or more during the year?”, and then asked “For how many years have you had this cough?” and “How many months have you had this cough?”. As defined previously, chronic phlegm and chronic cough lead to a diagnosis of CB if they persist on for more than three months in a two-year period. A persistent cough

was looked at separately to see if variables were more likely to be associated with coughing to be exacerbated in participants. As shown in Table 4.5, smoking status, whether being a current or ex-smoker, was significant (p= 0.11 and 0.07) and people smoking in the house (p= 0.13) was statistically significant at p<0.25. These significant variables were included in the multivariate analysis along with the contextual factors: age, sex, body mass index (BMI), and smoking status. These contextual factors were included in the multivariable analysis because they are characteristics relevant to the participants and the communities. The selected contextual factors are determinants of health for the human population.

Following the bivariate analysis, a multivariate analysis was conducted. This analysis tested interactions of the factors that emerged as significant in bivariate analysis and then determined the final significant variables.

Table 4.5: Results Based on Univariable Logistic Regression of the Prevalence: Self-Reported Chronic Cough

Question	Yes	No	Odds Ratio (90% CI)	p-value
Age:				
>60	14/30 (46.7%)	73/138 (52.9%)	0.83 (0.44, 1.58)	0.64
55-60 (ref)	16/30 (53.3%)	65/138 (47.1%)	1.00	
Sex:				
Male	15/30 (50.0%)	60/138 (43.5%)	1.27 (0.67, 2.41)	0.54
Female (ref)	15/30 (50.0%)	78/138 (56.5%)	1.00	
BMI:				
>30.0	17/29 (58.6%)	67/133 (50.4%)	1.06 (0.43, 2.61)	0.92
25.0-29.9	7/29 (24.1%)	44/133 (33.1%)	0.67 (0.24, 1.89)	0.53
<25.0 (ref)	5/29 (17.2%)	22/133 (16.5%)	1.00	
Smoking Status				
Current	19/30 (63.3%)	83/138 (60.1%)	4.89(0.97, 24.71)	0.11
Ex	10/30 (33.3%)	32/138 (23.2%)	6.52(1.23, 34.65)	0.07
Never (ref)	1/30 (3.3%)	23/138 (16.7%)	1.00	
Residential School				
Yes	17/30 (56.7%)	73/135 (54.1%)	1.09 (0.55, 2.14)	0.84
No (ref)	13/30 (43.3%)	62/135 (45.9%)	1.00	
Band-Owned House				
Yes	25/27 (92.6%)	118/134 (88.1%)	1.70(0.54, 5.36)	0.45
No (ref)	2/27 (7.4%)	16/134 (11.9%)	1.00	
House Repairs				

Major/Minor	19/27 (70.4%)	102/135 (75.6%)	0.74 (0.34, 1.62)	0.53
No (ref)	8/27 (29.6%)	33/135 (24.4%)	1.00	
Water/Dampness				
Yes	14/27 (51.9%)	82/133 (61.7%)	0.65 (0.33, 1.29)	0.30
No (ref)	13/27 (48.1%)	51/133 (38.3%)	1.00	
Damp Damage				
Yes	15/27 (55.6%)	86/133 (64.7%)	0.67 (0.34, 1.34)	0.34
No (ref)	12/27(44.4%)	47/133 (35.3%)	1.00	
Mildew/Mold Smell				
Yes	17/27 (63.0%)	87/129 (67.4%)	0.82 (0.39, 1.68)	0.64
No (ref)	10/27 (37.0%)	42/129 (32.6%)	1.00	
Mold/Mildew Visible				
Yes	14/27 (51.9%)	74/126 (58.7%)	0.74 (0.38, 1.42)	0.45
No (ref)	13/27 (48.1%)	52/126 (41.3%)	1.00	
People Smoke in House				
Yes	17/26 (65.4%)	69/135 (51.1%)	1.96 (0.94, 4.09)	0.13
No (ref)	9/26 (34.6%)	66/135 (48.9%)	1.00	
Crowding				
>1 People/room	5/27 (18.5%)	34/134 (25.4%)	0.65 (0.27, 1.57)	0.43
<=1 People/room (ref)	22/27 (81.5%)	100/134 (74.6%)	1.00	
Extra Money				
Not Enough	16/27 (59.3%)	69/134 (51.5%)	1.91 (0.75, 4.87)	0.26
Just Enough	7/27 (25.9%)	30/134 (22.4%)	1.86 (0.64, 5.39)	0.34
Some (ref)	4/27 (14.8%)	35/134 (26.1%)	1.00	

Odds ratios were adjusted for household clustering.

Significance at p=0.25 level is highlighted in bold.

The results of the multivariable analysis as presented in Table 4.6, show that none of the variables met the statistical significance criterion ($p < 0.10$). The interactions of BMI and sex, BMI and smoking in the house, and BMI and age were tested for interactions. None of the variables were found to be significant at $\alpha = 0.10$ level. Sample size is a challenge throughout this study and may be a limitation in looking for associations between determinants and ‘cough’ as that outcome.

Table 4.6: Results Based on Multivariable Logistic Regression of the Prevalence: Self-Reported Chronic Cough

Question	Adjusted Odds Ratio (95% CI)	Adjusted Odds Ratio (90% CI)	p-value
Age:			
>60	0.68 (0.31,1.51)	0.68 (0.35, 1.33)	0.35
55-60 (ref)	1.00	1.00	

Sex:			
Male	1.52 (0.67,3.48)	1.52 (0.76, 3.04)	0.32
Female (ref)	1.00	1.00	
People Smoke in House:			
Yes	2.04 (0.85,4.91)	2.04 (0.98, 4.26)	0.11
No	1.00	1.00	

Odds ratios were adjusted for household clustering.
Significance at $p=0.10$ level (10%) is highlighted in bold.

4.4 Symptom Based CB – Cough & Phlegm

The final outcome that was investigated was symptom-based CB. This would be CB that was not diagnosed by a doctor, but the participants fit the definition of CB based on the constellation of symptoms reported. CB is the presence of persistent cough and phlegm for more than three months in a two-year period. For the analysis, chronic cough and chronic phlegm were combined to create a new variable: symptom-based CB. As shown in Table 4.7, current smoking status ($p=0.18$) and not having enough money at the end of the month ($p= 0.09$) were statistically significant at $p<0.25$. These two variables were included in the multivariate analysis along with the contextual factors. Additionally, water/dampness in the house ($p=0.16$), damage in the house due to dampness ($p=0.03$), and visible mold/mildew in the house ($p=0.10$), were significant. Remaining significant variables were included in the multivariable analysis along with the contextual factors: age, sex, body mass index (BMI), and smoking status. These contextual factors were included in the multivariable analysis because they are characteristics relevant to the participants and the communities. The selected contextual factors are determinants of health for the human population.

Following the bivariable analysis, a multivariate analysis was conducted. This analysis tested interactions of the factors that emerged as significant in bivariate analysis and then determined the final significant variables.

Table 4.7: Results Based on Univariable Logistic Regression of the Prevalence: Symptom-Based Chronic Bronchitis

Question	Yes	No	Odds Ratio (90% CI)	p-value
Age:				
>60	10/21 (47.6%)	77/147 (52.4%)	0.88 (0.44, 1.78)	0.77
55-60 (ref)	11/21 (52.4%)	70/147 (47.6%)	1.00	
Sex:				
Male	10/21 (47.6%)	65/147 (44.2%)	1.17 (0.57, 2.38)	0.73
Female (ref)	11/21 (52.4%)	82/147 (55.8%)	1.00	
BMI:				
>30.0	10/20 (50.0%)	74/142 (52.1%)	1.06 (0.43, 2.61)	0.92
25.0-29.9	6/20 (30.0%)	45/142 (31.7%)	0.67 (0.24, 1.89)	0.53
<25.0 (ref)	4/20 (20.0%)	23/142 (16.2%)	1.00	
Smoking Status				
Current	15/21 (71.4%)	87/147 (59.2%)	3.60 (0.75, 17.26)	0.18
Ex	5/21 (23.8%)	37/147 (25.2%)	2.72 (0.50, 14.73)	0.33
Never (ref)	1/21 (4.8%)	23/147 (15.6%)	1.00	
Residential School				
Yes	12/21 (57.1%)	78/144 (54.2%)	1.07 (0.50, 2.31)	0.88
No (ref)	9/21 (42.9%)	66/144 (45.8%)	1.00	
Band-Owned House				
Yes	18/18 (100.0%)	125/143 (87.4%)	-	-
No (ref)	0/18 (0.0%)	18/143 (12.6%)		
House Repairs				
Major/Minor	12/18 (66.7%)	109/144 (75.7%)	0.64 (0.25, 1.61)	0.43
No (ref)	6/18 (33.3%)	35/144 (24.3%)	1.00	
Water/Dampness				
Yes	8/18 (44.4%)	88/142 (62.0%)	0.50 (0.22, 1.13)	0.16
No (ref)	10/18 (55.6%)	54/142 (38.0%)	1.00	
Damp Damage				
Yes	7/18 (38.9%)	94/142 (66.2%)	0.33 (0.14, 0.77)	0.03
No (ref)	11/18 (61.1%)	48/142 (33.8%)	1.00	
Mildew/Mold Smell				
Yes	10/18 (55.6%)	94/138 (68.1%)	0.60 (0.26, 1.40)	0.32
No (ref)	8/18 (44.4%)	44/138 (31.9%)	1.00	
Mold/Mildew Visible				
Yes	7/18 (38.9%)	81/135 (60.0%)	0.44 (0.19, 0.99)	0.10
No (ref)	11/18 (61.1%)	54/135 (40.0%)	1.00	
People Smoke in House				
Yes	11/17 (64.7%)	75/144 (52.1%)	1.85 (0.73, 4.69)	0.28
No (ref)	6/17 (35.3%)	69/144 (47.9%)	1.00	
Crowding				
>1 People/room	4/18 (22.2%)	35/143 (24.5%)	0.84 (0.30, 2.35)	0.78
<=1 People/room (ref)	14/18 (77.8%)	108/143 (75.5%)	1.00	

Extra Money				
Not Enough	12/18 (66.7%)	73/143 (51.0%)	5.59 (1.08, 29.11)	0.09
Just Enough	5/18 (27.8%)	32/143 (22.4%)	5.32 (0.88, 32.02)	0.13
Some (ref)	1/18 (5.6%)	38/143 (26.6%)	1.00	

Odds ratios were adjusted for household clustering.

Significance at $p=0.25$ level is highlighted in bold.

The results of the multivariable analysis as presented in Table 4.8, show that not having enough and having just enough money at the end of the month ($p=0.08$ and $p=0.08$) are significant predictors of symptom-based CB. For the participants that did not have enough money or just enough money at the end of the month, the odds ratio was 5.25 and 6.01 (respectively). The interactions of BMI and sex, and damage and mold/mildew were tested for interactions and none of them were significant at $\alpha=0.10$ significance level.

Table 4.8: Results Based on Multivariable Logistic Regression of the Prevalence: Symptom-Based Chronic Bronchitis

Question	Odds Ratio (95% CI)	Odds Ratio (90% CI)	p-value
Age:			
>60	0.60 (0.26, 1.39)	0.60 (0.29, 1.22)	0.23
55-60 (ref)	1.00	1.00	
Sex:			
Male	1.65 (0.63, 4.33)	1.65 (0.73, 3.71)	0.31
Female (ref)	1.00	1.00	
People Smoke in House			
Yes	1.92 (0.62, 5.90)	1.92 (0.74, 4.92)	0.26
No (ref)	1.00	1.00	
Extra Money			
Not Enough	5.25 (0.81, 34.00)	5.25 (1.10, 25.18)	0.08
Just Enough	6.01 (0.82, 44.03)	6.01 (1.13, 31.97)	0.08
Some (ref)	1.00	1.00	

Odds ratios were adjusted for household clustering.

Significance at $p=0.10$ level (10%) is highlighted in bold.

Summary of Findings

Chronic Bronchitis and Housing Conditions

Housing conditions of people living in the two communities has been a focus of the larger project and was central to this study as well. Of the variables that were analysed for housing conditions, the one that was significant for both CB and the symptoms of CB, was smoking in the house.

Chronic Bronchitis and Other Determinants of Health

Other social determinants of health were also revealed as important in this thesis. Attending a residential school and no money leftover at the end of the month were both significantly associated with CB. These social determinants of health were significant in the bivariable and multivariable analysis for participants with doctor diagnosed CB. Having no extra money at the end of a given month was revealed to be most strongly associated with CB, whether doctor diagnosed CB, with chronic phlegm only, and with both phlegm and cough.

Chapter Summary

Data analysis found that the housing factors that were expected to be significantly associated with respiratory health were not as important as other determinants of health. These other determinants of health included attending a residential school, people smoking in the house, and not having enough money at the end of the month. Explanations for, and implications of these findings are considered in the next and final chapter of this thesis.

CHAPTER 5: DISCUSSION

Findings are interpreted in this chapter. This chapter proceeds with a consideration of the main themes that emerged from the data analysis, linking them to the research questions and determinants of health articulated by the Public Health Agency of Canada and Indigenous frameworks, such as the AFN's, with their significance elaborated in the literature review. The remainder of the chapter will present the strengths and limitations of the study and finish with conclusions and recommendations for future research in the area of First Nation senior respiratory health.

The primary interest of this study was to reveal associations between housing conditions and respiratory health, specifically chronic bronchitis among seniors (55+ years) in two Saskatchewan First Nation communities. To fully capture CB as comprehensively as possible, both doctor diagnosed and self-reported symptoms of CB were considered, which allowed a larger number of participants to be included in this study. The research questions included an examination of the differences between sexes and age groups, with no significant associations found. Even though sex and senior age distinctions were not revealed as significant determinant of CB outcome for this thesis, other determinants of health were significantly associated with CB in communities. Unexpectedly, housing conditions were not revealed to be as significantly associated with CB as other determinants. Significant associations with CB outcome are further elaborated in the paragraphs that follow.

5.1 Determinants of Health

The Public Health Agency of Canada has recognized twelve main determinants of individual and population health. They are income and social status, employment and working conditions, education and literacy, childhood experiences, physical environments, social supports and coping skills, healthy behaviours, access to health services, biology and genetic endowment, gender, culture, and finally race/racism (Statistics Canada, 2019). In this thesis, a few key determinants for which there was data available proved to be significantly associated with CB in the senior population.

5.1.1 Income and Social Status

A particular measure of income proved to be a significant predictor of CB in the senior population (55 years and older); participants were asked if they had some, just enough, or not enough money at the end of a given month. This question did not ask about how much money was available to the household, but rather, perceived sufficiency. Subjective indicators of income, like the one used here, may be stronger and more consistent when looking at health consequences in low-income populations (Tarasenko, & Schoenberg, 2017). This observation from the literature seems to have been borne out in this study. Not having enough money at the end of the month was significantly associated with having CB or some of the symptoms of CB. Not having enough money could mean participants have limited access to medicine, healthy foods, the ability to complete housing repairs/access to quality housing, and/or transportation to medical appointments and grocery stores (Stewart, Blisard, & Jolliffe, 2003).

5.1.2 Physical Environments (Housing Conditions)

Physical environment, in this thesis, is specific to the housing conditions. Having safe and adequate housing is an essential determinant of health. However, associations between housing quality/conditions and CB in this thesis were equivocal. The few variables that emerged as significant were associated with CB in the opposite direction than expected. Odds ratios suggest participants reporting dampness in the house or having mold in the house were less likely to report CB or symptoms of CB. There is significant evidence in the research literature associating dampness and mold in the house to poor health outcomes (Optis et al., 2012, Hernberg et al., 2014, Norback et al., 2011, Larcombe et al., 2010, Pahwa et al., 2012, and Pahwa et al., 2017). The counterintuitive finding in this thesis is troubling, with an explanation likely rooted in data issues (see limitations section), rather than substantive effect. For this reason, these variables on housing conditions were not included in final modeling.

5.1.3 Colonization

Colonization is not explicitly included in PHAC's social determinants of health, however, it is highly relevant for First Nations health, having long been recognized by scholars as

an important “determinant of determinants” (Jones et al, 2019). In this study, questionnaire participants were asked one question about whether or not they attended a residential school. This measure of colonization was significantly associated with CB among participant seniors. Following a life course perspective, the circumstances of residential school attendance may have had a substantively negative impact on child growth and development during critical and/or sensitive periods leading to lifetime poorer health outcomes for First Nation seniors, such as CB (Jones et al, 2019). More evidence of this comes from Mosby & Galloway’s (2017) research into how poor nutrition can lead to health deficiencies in adulthood. When children experience malnutrition, the negative effects that can persist into adulthood can impact the immune system, obesity, and development of type II diabetes. Further, the negative impacts that stunted growth has on individuals who are directly affected may play out intergenerationally through reproductive biology and epigenetic mechanism (Mosby, & Galloway, 2017). While this study did find residential school attendance significant for CB symptoms, Dyck et al. (2015) summed it up accurately in that “it is possible that the detrimental impact of residential schools on the health of individuals within First Nations communities is so pervasive that it is difficult to find a truly unexposed comparison group” (Dyck et al., 2015, pg. 10). Fully encompassing the impact that colonization and residential schools had on First Nation communities is a difficult and entangled matter.

5.1.4 Health Behaviours

In this study, measures of health behaviours included smoking status and exposure to tobacco smoking in the house. As explained in the literature review chapter, previous studies have shown that smoking in the home can cause poor air quality and can negatively affect residents’ respiratory health. While tobacco is a symbolic and important plant in some First Nations cultures, smoking tobacco when not for a ceremonial purpose is considered misuse and is prevalent in Aboriginal populations in Canada (Varcoe, Bottorff, Carey, Sullivan, & Williams, 2010). Exposure to tobacco smoke in the house was revealed as a significant predictor of CB in this study, while smoking status itself was not strongly associated. Vozoris & Lougheed (2008) looked at second-hand smoking connections to respiratory diseases in Canada and found that both never and ex-smokers

exposed to second-hand smoke had a fifty percent more chance of self-reporting chronic bronchitis than those not exposed to second-hand smoke. Unfortunately, this study included all places of exposure to second-hand smoke and not exclusively exposure to smoke in the house. This is where more research is needed, particularly as more and more public places in Canada have become smoke-free, but private houses are not. Exposure to environmental tobacco smoke in houses may be particularly significant for seniors, as they spend much of their time at home or visiting the homes of others in the community.

The FNLHP team partnered with researchers looking at eliminating exposure to tobacco smoke in the home. The Green Light Program encouraged people of the communities to keep their homes smoke-free (Ramsden et al., 2013). The project included an education campaign on the health impacts of exposure to tobacco smoke and provided people who agreed to make their homes smoke-free a green light for their front porches. This signals to neighbours, friends, and families that the air inside is free of tobacco smoke and that smoking takes place outside. The project has begun to see more green lights in the community, suggesting a reduction of smoking in homes. As of 2013, 60 communities in Saskatchewan were participating in the Green Light Program.

5.2 Study Design

Strengths

This thesis is part of a long-term multimethod, participatory collaboration study in two Saskatchewan First Nation communities. This collaboration is producing data sets that may address many research questions of interest to the communities, including this thesis. This research would not otherwise have been feasible for me as a Masters student. I was immersed in the FNLHP team and linked into already existing relationships, protocols, and procedures.

Community-based team members from both First Nation communities were consulted during study design and prior to dissemination of any results.

Limitations

There are a few important limitations to this study. First, sample homogeneity, as described in the methodology, does present challenges for seeing population differences in associations between specific determinants and outcomes. At issue here is that few (or none) are unexposed to either the deleterious or advantageous ends of the spectrum of interest. Residential school, for example, is a particular challenge. All of the First Nation population is exposed to this determinant either through having attended, or through the well-recognized intergenerational impacts discussed in the literature review for this thesis. Sample homogeneity was also identified for this dataset by Dyck et al., (2015) in their analysis of associations between residential school attendance and discrimination on diabetes risk. One suggestion for future research with samples like this is to use a comparison group that explicitly includes a more readily identifiable unexposed comparison group for determinants of interest.

Second, sample size proved to be a bigger challenge than anticipated. The sample size for the senior population participants in this study was small because overall, the population of seniors is small in First Nation communities (Statistics Canada, 2017). The study communities are no exception. The number of seniors in First Nation communities is increasing as they are living longer, however, they still make up a small proportion of the overall First Nation population (Statistics Canada, 2017). Small numbers of participants resulted in analytical and interpretive challenges, such that I was not able to undertake complex modeling. The p-value for significance in the bivariate and multivariate analysis was increased to accommodate the smaller sample size in order to have variables show significance for inclusion in modeling. This is frequently done in epidemiologic research to accommodate small sample sizes (Mickey, & Greenland, 1989, and Greenland, S., 1989). This strategy, however, resulted in statistical significance with counterintuitive odds ratios that are neither supported in the literature and for which no plausible pathways to outcome can be argued. With no satisfactory resolution, I left them out of final modeling. Unfortunately, this included some of the housing conditions variables in which I was most interested.

Third, Body Mass Index (BMI) was used as a proxy measure for body composition, and in particular for the assessment of normal, underweight, overweight, and obese. While BMI is a simple and inexpensive measure, there are some important limitations. Various factors can influence the outcome of BMI such as age, sex, pregnancy, ethnicity and muscle mass (Government of Canada, 2020). The formula for calculating BMI uses a ratio of only two measures, height and weight, and has no way of discriminating fat and muscle. With specific reference to the senior population, BMI may be an inaccurate measure as seniors tend to lose muscle mass over time and this would skew BMI measurements (Government of Canada, 2020). Unfortunately, this was the variable for me to use in this study.

Another limitation of the study is that the data are generated from self-reported information, which can be influenced by recall bias at the time questionnaires were administered. Informants may not remember or may not have a perfect understanding of past medical history. Even though self-reported questionnaires were used, there is some research that supports the use of questionnaires in CB research. Lange (2003) found that self-reported CB correlates well with actual sputum volume and can be a useful tool to use in epidemiology studies (Lange, 2003).

The final limitation to this thesis would be using data from a questionnaire that was not developed specifically for this thesis. I was restricted by the predominantly Health Canada Population Health orientation to population health that framed the design of the questionnaire, and even then, was not comprehensive in its coverage of determinants. I would have liked to see a stronger integration of First Nations designed population health frameworks that include domains, such as colonization, not present in other Euro-Western frameworks. In my study, I had only one indicator of colonization with which to work, residential school attendance, which was strongly associated with chronic bronchitis in seniors.

5.3 Next Steps

5.3.1 Knowledge Translation

The results from this study will be disseminated through peer-reviewed publication, conferences, presentations to colleagues, and as part of this graduate thesis. Additionally, and most importantly, the results will be disseminated to the two communities that were involved in the study and to the FNLHP team that includes some community members. Approval of all thesis presentations and dissemination have and will be approved by community members that have been a part of the FNLHP. Prior to completion of this thesis, some of the results were presented at the Saskatchewan Epidemiology Association (SEA) Symposium in Saskatoon on October 3, 2018 in the form of a poster presentation. Additionally, summary of the project and methodology of the thesis was presented at Community Health & Epidemiology Student Research Day in February 2018.

5.3.2 Future Research

Sample size was a significant limitation to this study and ultimately, I was not able to uncover expected associations between housing conditions and CB among seniors. This is because the overall population of both communities is not large, and the population of seniors is quite small. Even with good participation rates, it is difficult at the scale of one or two communities to generate a large enough sample for more nuanced analyses and for higher confidence in findings. The survey instruments used in this study could be implemented more broadly in additional or larger First Nation communities. Even given the survey limitations concerning its coverage of determinants of health consistent with Indigenous concepts of wellness and experience of colonization, the one measure I had with which to work (residential school attendance) was revealed as very significantly associated with CB outcome among seniors. This certainly merits further attention. The survey instruments could benefit from the inclusion of questions that are consistent with Indigenous concepts of wellness, such as the AFN Model (AFN, 2007).

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APPENDIX A

June 4, 2012

ADDRESSING RESPIRATORY HEALTH IN FIRST NATIONS PEOPLE Adult Baseline Survey

Interviewer:

Researchers at the University of Saskatchewan together with the _____ are conducting this project to learn more about the lung health of First Nations people in Saskatchewan. Individuals from the two First Nations involved are invited to participate.

I am _____ and I am a member of the research team. Thank you for coming today. Your support is very important to the success of this project.

This survey is about your health. Today we are asking you to join in the part of the study that deals your health especially your lung health. This survey will take you about 20 minutes to answer. After you complete the survey, if you choose to, you can have a breathing test. You can be confident that any information you provide to us will be kept completely confidential. Your name will not be used. Instead we will give you a study number so that the information you give us cannot be connected to your name. If at any time you decide to quit the study you can ask for this information back and we will return it to you. It will not be included in the study results. All the results from the study will be given as group statistics so no individual or house can be identified.

This survey has four parts:

Part one asks about general information.

Part two asks about your lung health.

Part three asks about your health history, lifestyle and work.

Part four asks about your access to health and social support

Please try to answer all of the questions but remember you don't have to answer any question if you choose not to.

Do you wish to take part in the study? YES NO

**Sponsored by the Institute of Aboriginal Peoples Health
Canadian Institutes of Health Research**

Interview Date _____ Interviewer ID _____
dd/mm/yyyy
Household ID _____ Person ID _____

DEMOGRAPHICS

This section is about general information.

Three initials of person _____ B-

1 Age as of January 1st, 2012: _____

B.2 Date of Birth _____

dd mm yy

B.3 Sex : Male Female

B.4 Highest level of education:

- Grade 8 or less
- Less than high school
- Completed high school
- Some university
- Completed university
- Completed technical school (e.g. SIAST/skills/trades/upgrading)
- Some technical school

(Research Assistants complete height / weight after completion of survey)

B.5 Height: _____cm. OR _____ft and _____in. B-6

Weight: _____Kg. OR _____lbs

B.7 What is your marital status? (married, common law, separated, single)

B.8 What are all the languages that you use?

Speak _____

Write _____

Read _____

B.9 Which language(s) do you use most in daily life?

Speak _____

Write _____

Read _____

B.10 How many months did you live on the reserve in the past year:

RESPIRATORY (LUNG) HEALTH

Now, the next section asks about your lung health.

COUGH

- B.11 Do you usually have a cough?
 Yes
 No → **If no, go to question B-14.**
- B.12 Do you usually cough like this on most days for 3 months in a row or more during the year?
 Yes
 No
- B.13 For how many years have you had this cough? _____ years
For how many months have you had this cough? _____ months

PHLEGM

- B.14 Do you usually bring up phlegm from your chest?
 Yes
 No → **If no, go to question B-17.**
- B.15 Do you bring up phlegm like this on most days for 3 months in a row or more during the year?
 Yes
 No
- B.16 For how many years have you had trouble with phlegm? _____ years
For how many months have you had trouble with phlegm? _____ months

WHEEZE

- B.17 Does your chest ever sound wheezy or whistling:
- | | Yes | No | | |
|----|--------------------------------|--------------------------|--------------------------|--------------------------|
| 1. | When you have a cold? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 2. | Occasionally apart from colds? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. | Most days? | <input type="checkbox"/> | <input type="checkbox"/> | |
| | OR nights? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 4. | Do you currently have wheeze? | <input type="checkbox"/> | <input type="checkbox"/> | |

If YES to any, for how many years has this been present?
_____ number of years _____ number of months

B.18 Have you ever had an attack of wheezing that has made you feel short of breath?

Yes

No

If YES, have you ever required medicine or treatment for the(se) attack(s)?

Yes

No

SHORTNESS OF BREATH

B.19 Are you troubled by shortness of breath when hurrying on level ground, floors, or walking up a slight hill?

Yes

No

B.20 Do you have to walk slower than people of your age because you are short of breath?

Yes

No

B.21 Do you ever have to stop for breath when walking at your own pace on the level ground or floor?

Yes

No

B.22 Do you ever have to stop for breath after walking about 100 yards/91.4 metres (or after a few minutes) on level ground or floors?

Yes

No

B.23 Are you too short of breath to leave the house or breathless when you are dressing or undressing?

Yes

No

ASTHMA

B.24 Did a doctor ever tell you that you had asthma?

Yes

No → **If no, go to question B-29.**

B-25 **If Yes to B-24:**

Do you still have it? Yes No

At what age did it start? _____age in years

B-26 Have you ever been hospitalized for asthma?

- Yes
- No

B.27 **If yes to B-26**, how many times have you required services for asthma from the following places during the past 12 months?

Hospital _____times (*means more than 24 hrs in hospital*)

inpatient:

Emergency room outpatient: _____times (*means less than 24 hours in hospital*)

Doctor's office: _____times

B.28 **If yes to B-24**, which of the following statements best describes your asthma medication use in the past 12 months:

- Never in the past 12 months
- At least once per month
- Every day

ALLERGIES

This next question is about allergies.

B.29 Have you ever had an allergic reaction to any of the following: (*Check all that apply*)

- 1. House Dust Yes No Doesn't know
- 2. Cats Yes No Doesn't know
- 2. Dogs Yes No Doesn't know
- 3. Grasses, pollens or trees Yes No Doesn't know
- 4. Molds Yes No Doesn't know
- 5. Farm animals Yes No

If YES, Please specify:_____

- 6. Tobacco smoke Yes No Doesn't know
- 5. Others, Yes No

If YES, Please specify:_____

MEDICAL HISTORY

The next questions are about your health history

B.30 In general would you say your physical health is:

- Excellent Very Good Good Fair Poor

B.31 In general would you say your mental health is:

- Excellent Very Good Good Fair Poor

B.32 Has a doctor or primary care giver ever said you have:

	Yes	No	Don't know
Diabetes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Heart problems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> If YES, did you have a heart attack? <input type="checkbox"/> Yes <input type="checkbox"/> No
Stroke	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Depression	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Kidney problems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Leg ulcers or amputations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Severe eyesight problems (not including a need for glasses)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cancer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> If YES, please specify:
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> If YES, please specify:

B.33 During the past twelve months, were you seen by a doctor or other primary care giver for:

	Yes	No	Don't know
heartburn?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
an ear infection?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
an injury?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

ILLNESSES

B.34 Has a doctor ever said you had any of the following chest illnesses:

Chest Illness	During the past 12 months		Ever in your life	
	Yes	No	Yes	No
Attack of bronchitis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pneumonia	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sinus trouble	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Chronic (long lasting) bronchitis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Emphysema	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sleep apnea (not breathing while asleep)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tuberculosis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

B.35 Has a doctor ever said you had COPD?
(chronic obstructive pulmonary disease, e.g. chronic bronchitis, emphysema)

- Yes **If YES**, when _____ (year)
- No
- Don't know

- B.36 How many times have you required services for COPD from the following places during the past 12 months?
- Hospital inpatient: _____times (*means more than 24 hrs in hospital*)
- Emergency room outpatient: _____times (*means less than 24 hours in hospital*)
- Doctor's office: _____times
- Health Clinic: _____times

REST AND SLEEP

The next group of questions is about how you rest and sleep.

- B.37 In a 24 hour period, how many hours of sleep do you typically get?
- more than 7 hours
 - 6 to 7 hours
 - 4 to 5 hours
 - less than 4 hours
- B.38 Do you snore?
- Yes
 - No → **If no, go to question B-40.**
 - Don't know
- B.39 If you snore, is your snoring:
- Louder than talking?
 - Softer than talking?
 - Very loud - can be heard in adjacent rooms?
 - Don't know.

B.40 *The next group of questions are about day time sleepiness. Please answer them according to your usual way of life in recent time. Even if you haven't done some of these things lately, try to explain how they would have affected you. Please pick the best answer for each question from the choices on this table.*

How likely are you to doze off or fall asleep in the situations described below, in contrast to just feeling tired?

SITUATION	RESPONSE CHOICES			
	0 Would never doze	1 Slight chance of dozing	2 Moderate chance of dozing	3 High chance of dozing
Sitting and reading	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Watching TV	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sitting, inactive in a public place (e.g., a theatre or a meeting)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
As a passenger in a car for an hour without a break	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lying down to rest in the afternoon when circumstances permit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sitting and talking to someone	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sitting quietly after lunch without alcohol	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
As a passenger in a car, while stopped for a few minutes in the traffic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

OCCUPATIONAL HISTORY

The next group of questions are about work.

B.41 What is your current employment status?

- | | |
|--|---|
| <input type="checkbox"/> Employed full time | <input type="checkbox"/> Unemployed |
| <input type="checkbox"/> Employed part time | <input type="checkbox"/> Retired |
| <input type="checkbox"/> Employed seasonally | <input type="checkbox"/> Homemaker |
| <input type="checkbox"/> Self-employed | <input type="checkbox"/> Disabled on Employment Insurance |
| <input type="checkbox"/> Student part time | <input type="checkbox"/> Student full time |

B.42 What work did you do the most in your life?

_____ for how long? _____

SMOKING

The next group of questions are about your life style.

- B.43 Have you ever smoked cigarettes?
(If you have smoked less than 20 packs of cigarettes in your lifetime, answer no.)
 Yes
 No → If no, go to question B-51.
- B.44 Do you now smoke cigarettes?
 Yes
 No
- B.45 How old were you when you first started regular cigarette smoking? _____ years old
- B.46 How many cigarettes do you smoke per day now? _____ cigarettes per day
- B.47 On the average of the entire time you smoked, how many cigarettes did you smoke per day? _____ cigarettes per day
- B.48 If you have stopped smoking cigarettes completely, how old were you when you stopped?
_____ age stopped
- B.49 If there have been periods when you quit smoking, indicate total years of that you quit smoking. _____ years
- B.50 Have you ever smoked a ceremonial pipe regularly and inhaled?
(Yes means more than 12 oz of tobacco in a lifetime)
 Yes
 No

PHYSICAL ACTIVITY

- B.51 Do you exercise?
 Yes → If yes, how many times a week? _____ times a week
 No → If no, proceed to question B-53
- B.52 How long do you usually exercise?
 Less than 15 minutes
 15 to 30 minutes
 31 to 60 minutes
 More than 60 minutes
 Don't know

ALCOHOL CONSUMPTION

- B.53 During the past 12 months, how often did you drink alcoholic beverages?
- Never
 - Less than once a month
 - Once a month
 - 2 to 3 times a month
 - Once a week
 - 2 to 3 times a week
 - 4 to 6 times a week
 - Every day
- B.54 How often in the past 12 months have you had 5 or more drinks on one occasion?
- Never
 - Less than once a month
 - Once a month
 - 2 to 3 time a month
 - Once a week
 - More than once a week

ACCESS TO HEALTH CARE

*The next group of questions are about access to health care.
(Read each item to respondent and ask them to answer 'yes' or 'no')*

B.55 Please think about your access to health care during the past 12 months and check your answer to each of the questions below.
(These questions are for the community and do not include services in Prince Albert ,
Saskatoon and Rosthern)

Access Barriers	Yes	No	Don't know	Refused	Does not apply
Was a doctor, nurse practitioner or nurse available in your area?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was there a health clinic available in your area?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was the waiting list is too long?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were you able to arrange transportation?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Did you have difficulty in getting traditional care (e.g. healer, elder)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Were you covered by non-insured Health Benefits (NIHB)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was prior approval of NIHB ever denied?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Could you afford transportation costs?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Could you afford childcare costs?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Did you feel the health care provided was adequate?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Did you feel the service was culturally appropriate?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Did you choose to see health care professional?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was service available in your area?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Note: NIHB or Non-Insured Health Benefits is the Health Canada program that provides support to help cover health care costs – medications, dental care, vision care, medical supplies/equipment, etc.

SOCIAL SUPPORT

The next group of questions are about social support.

B.56 In the past 12 months, did you ever struggle to meet basic living requirements? (i.e. food, housing, power, heating, water, clothing, etc.)

- Yes
- No

B.57 Have you ever experienced discrimination or racism, been prevented from doing something, or been hassled or made to feel inferior (badly) in any of the following situations because of your race, cultural group or color.

- | | |
|---|--|
| At school? | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Getting hired or getting a job? | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| At work? | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Getting housing? | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Getting medical care? | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Getting medicine at pharmacies? | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Getting service in a store or restaurant? | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Getting credit, bank loans or a mortgage? | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| On the street or in a public setting? | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| From the police or in the courts? | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Getting a cheque cashed? | <input type="checkbox"/> Yes <input type="checkbox"/> No |

B.58 For the purpose of the survey, the term 'residential schools' refers to the residential school systems attended by Aboriginal students. This includes residential schools run by religious orders, industrial schools, boarding schools, student residences, hostels and billets. The last residential school shut down in 1996.

- A) Did you attend a residential school?
 - Yes
 - No
 - Don't know
- B) Did either of your parents or grandparents attend a residential school?
 - Yes
 - No
 - Don't know

B.59 Do you take part in your local community's cultural events?

- Always/ almost always
- Sometimes
- Rarely
- Never
- Don't know
- Refused

B.60 What are the main strengths of your community (village)?

Check all that apply.

- Family values
- Awareness of First Nations culture
- Social connections (community working together)
- Traditional ceremonial activities (e.g. powwow)
- Low rates of suicide/crime/drug abuse
- Good leisure/recreation facilities, elders
- Use of First Nations language
- Education and training opportunities
- Natural environment
- Strong economy
- Strong leadership
- Other: _____

**THIS IS THE END OF THE SURVEY.
THANK YOU VERY MUCH FOR YOUR HELP!**

APPENDIX B

June 4, 2012

ADDRESSING RESPIRATORY HEALTH IN FIRST NATIONS PEOPLE Baseline Household Survey

Beardy's and Okemasis First Nations Montreal Lake Cree Nation

Interviewer:

Researchers at the University of Saskatchewan together with the _____ are conducting this project to learn more about the lung health of First Nations people in Saskatchewan. Families from the two First Nations involved are invited to participate.

I am _____ and I am a member of the research team. I am here today to ask you to participate in this important research project about the lung health of First Nations people.

This household survey is our first interview contact with your family. Today we are asking you to participate in the part of the study that deals with the conditions in the house that may be related to lung health. You can be confident that any information you provide to us will be kept completely confidential. Your name will not be used. Instead we will give you a study, number so that the information you give us cannot be connected to your name. If at any time you decide to quit the study you can ask for this information to be returned to you. It will not be included in the study results. All the results from the study will be given as group statistics so no individual or house can be identified.

Do you wish to take part in the study? YES NO

If YES:

We ask that one responsible person answer the survey questions. Please try to answer all of the questions, but remember you don't have to answer any particular question if you choose not to.

If NO:

Thank you for your time.

If DON'T KNOW:

Please take some time to think about joining our study. We will call back on _____. We will talk to you again soon. Thanks for your time.

**Sponsored by the Institute of Aboriginal Peoples Health
Canadian Institutes of Health Research**

1

Interview Date_____
_____ **dd/mm/yyyy**

Interviewer ID_ _____

Household ID _____

First there are a few questions about the people living in this house.

THE PEOPLE

- A.1 Are you the head of this household?
 Yes
 No
 Shared
- A.2 How many families live in this house?
_____Number
- A.3 How many people usually live in your house?
_____Number

Thank you. Now this part is about this house.

THE HOUSE

- A.4 What year was your house built (approximately)?
Year _____ Don't know
- A.5 How many rooms are there in your house?

Please include kitchen, bedrooms, living rooms and finished basement rooms. Do not count bathrooms, halls, laundry rooms and attached sheds.

- _____Number
- A.6 How many bedrooms do you have in your house?
_____Number
- A.7 Do you live in band owned housing?
 Yes
 No
 Don't know
 Refused

The next question is about repairs that may be needed in your house. By major repairs we mean things like faulty plumbing or electrical wiring, structural repairs to walls, floors, ceiling, doors, windows etc. By minor repairs we mean things like missing or loose floor tiles, bricks, shingles, defective steps, railings, siding, etc. Please check all that apply.

- A.8 Is this house in need of repairs?
- Yes, major repairs
 - Yes, minor repairs
 - No, only regular maintenance (upkeep) is required (painting, furnace)
 - Don't Know
 - Refused
- A.9 During the past 12 months, has there been water or dampness in your house from broken pipes, leaks, septic tank, heavy rain, or floods?
- Yes
 - No
 - Don't know
 - Refused
- A.10 Does your house have any damage caused by dampness (e.g., wet spots on walls, floors, ceilings)?
- Yes
 - No
 - Don't know
 - Refused
- A.11 Does your house (including basement) frequently have a mildew /moldy odor or musty smell?
- Yes
 - No
 - Don't know
 - Refused
- A.12 Are there signs of mold or mildew in any living areas in your house?
- Yes
 - No
 - Don't know
 - Refused

- A.13 What is the main fuel source used to heat your house? *Please choose one.*
- Natural gas
 - Propane
 - Electricity
 - Fuel oil
 - Wood
 - Other: If YES, Please specify_____
- A.14 Do you use a wood stove or wood to heat your house?
- Yes
 - No
- A.15 Does your heating system have a filter?
- Yes
 - No
 - Don't know
- A.16 Does your house have air conditioning?
- Yes
 - No
 - Don't know
- A.17 Is a humidifier (steamer) used in your house?
- Yes
 - No
 - Don't know
- A.18 Do you use a dehumidifier (appliance that reduces dampness) in your house?
- Yes
 - No
 - Don't know
- A-19 **In the past 12 months**, have you had any of the following pets living in your house?

Cat	<input type="checkbox"/> Yes <input type="checkbox"/> No
Dog	<input type="checkbox"/> Yes <input type="checkbox"/> No
Bird	<input type="checkbox"/> Yes <input type="checkbox"/> No
Any other pet	<input type="checkbox"/> Yes <input type="checkbox"/> No
If YES, specify:	

- A.20 Do any people who live in your house smoke in the house?
- Yes
 - No
 - Don't know

- A.21 How many people regularly smoke cigarettes in the house?
- _____number of persons who usually live in the house
- _____number of regular visitors

The next two questions are about household income.

- A.22 Please think of your total household income, before deductions from all sources last year. We are asking for the total amount of all the money you and the people in the household received in the last year.

<input type="checkbox"/> No income	<input type="checkbox"/> \$15,000-19,999	<input type="checkbox"/> \$40,000-49,999
<input type="checkbox"/> \$1-4,999	<input type="checkbox"/> \$20,000-24,999	<input type="checkbox"/> \$50,000-over
<input type="checkbox"/> \$5,000-9,999	<input type="checkbox"/> \$25,000-29,999	<input type="checkbox"/> Don't know
<input type="checkbox"/> \$10,000-14,999	<input type="checkbox"/> \$30,000-39,999	<input type="checkbox"/> Refusal

You may use monthly income if that is easier for you to estimate.

<input type="checkbox"/> No income	<input type="checkbox"/> \$1,250-1,667	<input type="checkbox"/> \$3,333-4,167
<input type="checkbox"/> \$83-416	<input type="checkbox"/> \$1,667-2,083	<input type="checkbox"/> \$4,167-over
<input type="checkbox"/> \$417-833	<input type="checkbox"/> \$2,083-2,500	<input type="checkbox"/> Don't know
<input type="checkbox"/> \$833-1,250	<input type="checkbox"/> \$2,500-3,333	<input type="checkbox"/> Refusal

- A.23 At the end of the month, how much money do you have left over?
Please check only one.
- Some money
 - Just enough money
 - Not enough money

ACCESS TO HEALTH CARE

The next group of questions are about the health care that you and your family receive.

A.24 Do you and your family members in your household have access to the following health care professionals?

Family Doctor	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Don't know
Doctor at clinic	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Don't know
Nurse Practitioner	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Don't know
Nurse	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Don't know

A.25 In the past 12 months did you ever experience any difficulties getting the routine (usual) or on- going care you or a family member in your household needed?

- Yes
- No
- Don't know

A.26 In the past 12 months, have you been required to visit a medical specialist (e.g. oncologist, allergy specialist, ears, eyes, nose and throat specialist) for a diagnosis or consultation for yourself or a family member in your household?

- Yes
- No
- Don't know

A.27 In the past 12 months did you ever experience any difficulty getting to see a medical or surgical specialist you needed for a diagnosis or consultation for you or another person in your household?

- Yes
- No
- Don't know

A.28 In the past 12 months, have you or a family member in your household required immediate 24 hour health care services for a medical emergency?

- Yes
- No
- Don't know

A.29 In the past 12 months, did you ever experience any difficulties getting immediate 24 hour health care services for a medical emergency for yourself or a family member in your household?

- Yes
- No
- Don't know

- A.30 How far do you travel to receive routine and ongoing medical care?
 _____Km _____miles (*PEOPLE MAY GIVE DRIVING TIME*)_____minutes
- A.31 How far do you travel to receive medical or surgical specialist services?
 _____Km_____miles_____minutes
- A.32 How far to do you travel to receive 24 hour emergency health care services?
 _____Km_____miles_____minutes
- A.33 On average, how long does it take for an ambulance to arrive at your house in an emergency? (*Research assistants will insert community distance to major health centres*)
 _____minutes Don't know

OUTDOOR ENVIRONMENT

The next questions are about the area around your house.

- A.34 Do you have an outdoor corral or feedlot located near your home?
 Yes → If Yes, how far? Within ¼ mile/.40k Greater than ¼ mile/.40k
 No
 Don't know
- A.35 Do you have a balestack or bales located near your home?
 Yes → If Yes, how far? Within ¼ mile/.40k Greater than ¼ mile/.40k
 No
 Don't know
- A.36 Do you have grain bins located near your home?
 Yes → If Yes, how far? Within ¼ mile/.40k Greater than ¼ mile/.40k
 No
 Don't know
- A.37 Do you have a sewage pond or manure lagoon located near your home?
 Yes → If Yes, how far? Within ¼ mile/.40k Greater than ¼ mile/.40k
 No
 Don't know

- A.38 Do you have a garbage dump located near your home?
- Yes → If Yes, how far? Within ¼ mile/.40k Greater than ¼ mile/.40k
- No
- Don't know

- A.39 Do you have a lumber yard, carpentry construction or sawmill located near your home?
- Yes → If Yes, how far? Within ¼ mile/.40k Greater than ¼ mile/.40k
- No
- Don't know

Please list all persons who use usually live here including yourself and describe their relationship to you.

Initials	Age	Sex	Relationship	Initials	Age	Sex	Relationship
		M <input type="checkbox"/> F <input type="checkbox"/>	Self			M <input type="checkbox"/> F <input type="checkbox"/>	
		M <input type="checkbox"/> F <input type="checkbox"/>				M <input type="checkbox"/> F <input type="checkbox"/>	
		M <input type="checkbox"/> F <input type="checkbox"/>				M <input type="checkbox"/> F <input type="checkbox"/>	
		M <input type="checkbox"/> F <input type="checkbox"/>				M <input type="checkbox"/> F <input type="checkbox"/>	
		M <input type="checkbox"/> F <input type="checkbox"/>				M <input type="checkbox"/> F <input type="checkbox"/>	
		M <input type="checkbox"/> F <input type="checkbox"/>				M <input type="checkbox"/> F <input type="checkbox"/>	

We wish to find out how housing conditions may affect the respiratory health of Aboriginal people. Therefore, the next part of this study deals with collecting information on the conditions in the house that may be related to lung health. We would like to get air and dust samples from inside of the house that would take no more than 30 minutes. Would you be willing to be contacted to collect air and dust samples in your house?

- Yes
- No
- Don't know

**THANK YOU VERY MUCH FOR THE EFFORT YOU HAVE MADE TO COMPLETE THIS SURVEY.
YOUR HELP IS VERY IMPORTANT TO THE SUCCESS OF THIS STUDY.**

PLEASE PROCEED TO PAGE 11 TO COMPLETE THE CONTACT INFORMATION.

CONTACT INFORMATION

Name: _____ Age: _____ Male Female
(Name of person completing the survey)

Address (number and street)

_____ , _____
Town Postal code

Home Reserve House number

Telephone Numbers (**check most preferred**):

Work _____

House _____

Cell _____

APPENDIX C

Research recently completed by the First Nations Lung Health Project of relevance to this thesis:

- Dosman, J. A., Karunanayake, C. P., McMullin, K., Abonyi, S., Rennie, D., ... Pahwa, P. (2019). Risk factors for snoring in two Canadian First Nations Communities. *Clocks & Sleep, 1*:117-125.
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- Janzen, B., Karunanayake, C., Rennie, D., Katapally, T., Dyck, R., ... Pahwa, P. (2017). Racial discrimination and depression among on-reserve First Nations people in rural Saskatchewan. *Canadian Journal of Public Health, 108*, 5-6.
- Katapally, T.R., Abonyi, S., Episkenew, J., Ramsden, V.R., Karunanayake, C., ... Pahwa, P. (2016). Catalyzing action on First Nations respiratory health through community-based participatory research: integrated knowledge translation to create and apply evidence-based models. *Engaged Scholar Journal, 2*:1, 57-70.
- Karunanayake, C. P., Albritton, W., Rennie, D. C., Lawson, J. A., McCallum, L., ... Pahwa, P. (2015). Ear Infection and its associated risk factors in First Nations and rural school-aged Canadian children. *International Journal of Pediatrics, 2016*, 1-10.
- Karunanayake, C.P., Dosman, J.A., Abonyi, S., Lawson, J., Rennie, D., ... The First Nations Lung Health Project Research Team. (2018). Incidence of daytime sleepiness and associated factors in two First Nations communities in Saskatchewan, Canada. *Clocks & Sleep, 1*, 13-15.
- Karunanayake, C.P., Rennie, D.C., Ramsden, V.R., Fenton, M., Kirychuk, S., ... The First Nations Lung Health Project Research Team. (2017). Bronchitis and its associated risk factors in First Nations Children. *Children, 4*:12, 103.
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- Marchildon, G. P., Katapally, T. R., Beck, C. A., Abonyi, S., Episkenew, J., ... Dosman, J.A. (2015). Exploring policy driven systemic inequities leading to differential access to care among Indigenous populations with obstructive sleep apnea in Canada. *International Journal for Equity in Health. 14*:148, 1-9.

- Pahwa, P., Karunanayake, C., Rennie, D., McMullin, K., Lawson, J., Dosman, J. (2014). Prevalence of chronic bronchitis in First Nations people. *Chest*, 145:3,
- Pahwa, P., Abonyi, S., Karunanayake, C., Rennie, D. C., Janzen, B., ... Dosman, J. A. (2015) A community-based participatory research methodology to address, redress, and reassess disparities, in respiratory health among First Nations.
- Soltanifar, M., Karunanayake, C., Khadko, R. H., Konehncke, N., Abonyi, S., ... Saskatchewan Rural Health Research. (2019). Is a body shape index (ABSI) predictive of lung functions? *Respiratory and Pulmonary Medicine*, 6.
- van der Spuy, I., Karunanayake, C.P., Dosman, J. A., McMullin, K., Zhao, G., ... Pahwa, P. (2017) Determinants of excessive daytime sleepiness in two First Nation Communities. *BMC Pulmonary Medicine*, 17:1, 192.