7-23-2019 1:00 PM

The Canadian Urban - Rural Health Disparity: The Role of Health Lifestyles and an Alternative Explanation for Rurality's Higher BMI Rates

Matthew J. Stackhouse, *The University of Western Ontario*

Supervisor: Willson, Andrea, *The University of Western Ontario*

A thesis submitted in partial fulfillment of the requirements for the Master of Arts degree in Sociology

Abstract

The Canadian urban - rural health disparity is concerning, as rural residents are more likely to experience deleterious health outcomes such as injuries, chronic conditions, obesity, and shorter life expectancy. There are several rural social-structural explanations for the disparity such as an aging population, less education attainment, greater unemployment rates, poorer working conditions, lack of health professionals, greater distance from quality health resource, and poorer health behaviours. Some of these findings have been linked to higher Body Mass Index (BMI) scores in rural areas. However, no study has considered the health lifestyle differences of urban - rural Canadians and how it can further explain negative health outcomes, like increased BMI rates.

Canadian research evaluates rural health behaviours and experiences as a mechanism for the health discrepancy. Yet, these studies treat health behaviours independently, thereby neglecting the behavioural patterns and how these patterns group to form unique health lifestyles. This thesis employs the health lifestyle framework, which proposes that health behaviours cluster within an individual and represent underlying lifestyles reflective of an individual or group's shared social environment. The study generates health lifestyle classes in Canada and examines its relationship along the urban – rural continuum. In addition, the health lifestyle framework is used to investigate the relationship between urban - rural residency and BMI scores, net of socioeconomic and sociodemographic indicators.

This thesis uses nationally representative data from the 2014 Canadian Community Health Survey (CCHS), and latent class analysis and regression models. It uncovers unique health lifestyles within urban and rural areas of Canada based on the following health-related indicators: fruit and vegetable intake, physical activity, smoking status, alcohol consumption, hazardous industry, health care use, and sense of community belonging. Overall, results indicate that the urban - rural health disparity exists between urban and the most remote Canadians. Health lifestyles are shown to provide some explanation for the BMI disparity, while socioeconomic and sociodemographic indicators further contextualize these findings.

Summary for Lay Audience

In general, rural Canadians are less healthy than urban Canadians. There is a lack of research investigating this issue. This study examines urban - rural residency and its relationship to health lifestyles (classification of grouped health behaviours). In addition, this study uses the health lifestyle classes to link urban - rural residency with BMI rates.

Acknowledgements

I would like to express my gratitude to the those who have helped me up until this point. First, Dr. Andrea Willson for being a tremendous supervisor and mentor the past 2 years. Your clarity of vision during clouded moments will always be appreciated. Thank you for introducing me to research that is both interesting and applicable. I also want to thank the University of Western Ontario for giving me the opportunity to grow and establish myself as a young academic. The level of professionalism and teaching is unmatched, and because of this, I am better academic and more importantly, a better person. It is a privilege to be a graduate student in this department.

To my beautiful girlfriend, you have been the most supportive person. I cannot begin to express how thankful I am for you during the best and worst times. That first year was very challenging for us both, but we made it out stronger. To my loved ones back home, thank you for supporting me in my journey.

Finally, I want to dedicate this thesis to my mother, Jennifer Stackhouse. Not that long ago, at the tender age of 3, I was sitting on your lap in Sociology classes and meeting Sociology professors. I am me because of you. You taught me to take the path less travelled and I will always be grateful for that. Thank you for watching over me. God bless.

Table of Contents

List of Tables

Chapter 1

1 Introduction

1.1 Canada's Urban - Rural Health Disparity

A large literature demonstrates people living in rural areas are less healthy than urban dwellers, based on measurements of life expectancy and chronic conditions (Pong et al., 1999; CIHI, 2006; Smith et al., 2008; Kulig & Williams, 2010; Matz, Stieb, & Brion, 2015). There are several explanations for the Canadian urban - rural health disparity, including poorer health behaviours among those living in rural locations (Mitura & Bolllman, 2003; CIHI, 2006; Desmeules et al., 2012), patterns of health service utilization (Allan & Cloutier-Fisher, 2006; McDonald & Conde, 2010; Health Council of Canada, 2010), greater concentration of hazardous industry work (Matz, Stieb, & Brion, 2015, Bollman & Reimer, 2009; Picket et al., 1999), and a higher likelihood of obesity (Mitura & Bollman, 2003). However, these studies tend to measure health behaviours and health-related indicators by utilizing additive scales or single health-related behaviours independent of other indicators and thus fail to account for survey respondents' patterns of health promoting behaviours and contexts. This approach creates a narrow interpretation of a population's health behaviours and is an insufficient representation of external structural forces that promote health choices (Frohlic et al., 2001; Saint Onge and Krueger, 2017; Lawrence et al., 2017; Mollborn and Lawrence, 2018).

1.2 Theoretical Framework

In order to address these issues, this study employs the health lifestyle theoretical framework. The core principle of a health lifestyle perspective is that collective patterns of health-related behaviours are based on choices made within structural contexts (Mollborn &

Lawrence, 2018). In fact, recent health lifestyle research encourages future work to consider an array of health behaviors based on the population's context (Saint Onge and Krueger, 2017; Lawrence et al., 2017; Mollborn and Lawrence, 2018). This thesis applies the health lifestyle framework to the Canadian urban and rural context and therefore makes use of existing literature on health-related structural differences between urban and rural Canadians, such as health behaviours, access to health services, hazardous work, and sense of community belonging.

In this study, the health lifestyle framework is grounded in the fundamental principles of Weber's (1946) lifestyle typology: Lebensstil (lifestyle), Lebensführung (life conduct), Lebenschancen (life chances). For example, in the urban - rural context, core health behaviours like dietary practices, physical activity, smoking, and alcohol consumption are best understood as Weber's life conduct. Whereas urban – rural structural differences like hazardous industry work, access to healthcare services, and sense of community belonging may be understood as Weber's life chances, as urban and rural Canadians social structural barriers may inhibit optimal health. Therefore, urban and rural health lifestyles are the byproduct of the individual's life conduct, or health behaviour choices, and life chances, or structural health-related implications.

In addition, this study employs a human capital perspective to further understand the urban - rural health disparity. Human capital is the collection of formal education, workplace training, and other investments that provide knowledge and experience in a specific field (Becker, 1964). It is well-established that rural residents are more likely to be unemployed, less educated, and experience greater concentration of unskilled labour work relative to their urban counterparts (Pong et al., 2000; Alasia & Magnusson, 2005; Kirby & LeBreton, 2002; CIHI, 2006). Based on the notion of human capital, urban Canadians have a greater stock of human capital than those residing in rural communities. This thesis proposes that there is a lack of

available human capital in rural Canada and it may contribute to poorer health lifestyles. As a consequence of less human capital, poorer working conditions and a lack of health literacy becomes a central attribute of rural living. Overall, this study's theoretical framework asserts that human capital is an explanation for the health lifestyles of rural persons. The potential negative health lifestyles of rural Canadians may explain the urban - rural health disparity.

1.3 Overview of Thesis

This thesis examines the distribution of health lifestyles across the Canadian urban - rural continuum, and how health lifestyles further explain the relationship between urban - rural residency and BMI scores.

Chapter 2 reviews the literature and presents a detailed discussion of the theoretical framework. Chapter 2 consists of two parts. Part 1 outlines the objectives for the thesis and transitions into classic sociological literature that pertains to social class and lifestyle. The classic concept of lifestyle is then united with health lifestyle literature and subsequently illustrates how human capital is associated with health lifestyles. Thereafter, Chapter 2 incorporates a discussion on preventive care in Canada and how health services relate to the health lifestyle framework. Finally, health lifestyles in Canada are conceptualized based on relevant literature on the urban - rural health disparity and how health lifestyles may be reflective of rural Canada's demographics. Part 2 reviews the literature on obesity in Canada and more specifically, rural Canada. According to Statistics Canada (2014), one in four Canadians are classified as obese, as measured by BMI scores of 30 or greater. Additional studies demonstrate the link between rurality and obesity (Shields & Tjepkema, 2006; CIHI, 2006; Chen et al., 2015), and how large urban Canadian cities experience lower obesity rates than the national average of 24.8% (Reeder et al., 1997; Shields & Tjepkema, 2006; Statistics Canada, 2014).

Chapter 3 presents the data, methods, and analyses in 2 parts. In part 1 of Chapter 3, the study employs data from the 2014 Canadian Community Health Survey (CCHS) and uses Latent Class Analysis (LCA) to generate health lifestyle classes based on respondents' observed patterns of health behaviours. Part 1 tests the relationship between the urban - rural continuum and health lifestyle classes, net of sociodemographic and socioeconomic indicators. In part 2, the study investigates whether the association between urban - rural residency and BMI rates is in part explained by the health lifestyle classes.

Chapter 4 concludes the thesis with a discussion on the results and how the findings contribute to the greater knowledge of the urban - rural health disparity, and more broadly, overweight and obesity rates across the Canadian urban - rural continuum. Moreover, Chapter 4 illustrates how the findings contribute to previous rural health and rural obesity research. The chapter reviews the study's limitations and asserts policy recommendations on how the health lifestyle framework can provide greater insight into a social group's daily health habits, routines, and patterns of behaviour.

The approach to this study was primarily inspired by Pong et al (1999), who stated that rurality must be analyzed as the central focus, rather than through anecdotal experiences or as a simple control variable. In addition, the widely cited CIHI (2006) research report displayed intriguing findings on health inequalities across Canada's urban - rural continuum, but lacked an in-depth consideration of the mechanisms in which the disparities transpire. Overall, the main objective for this study is to achieve a greater understanding of the urban - rural health disparity by incorporating the health lifestyle framework. The present study seeks to identify the health lifestyles that rural Canadians experience and engage in, relative to their urban counterparts, and

how the health lifestyle classes act as a mechanism of association between rural residency and greater BMI scores.

1.4 References

Allan, D., & Cloutier-Fisher, D. (2006). Health Service Utilization among Older Adults in British Columbia: Making Sense of Geography. *Canadian Journal on Aging / La Revue Canadienne Du Vieillissement, 25*(02), 219-32.

Alasia, A., & Magnusson, E. (2005). Occupational Skill Level: The Divide Between Rural and Urban Canada. Rural and Small Town. Canadian Annual Bulletin 6(2), 1-30.

Becker, G. S. 1964. *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education*. New York: Columbia Univ. Press.

Bollman, R. D., & Reimer, W. (2009). Demographics, Employment, Income, and Networks: Differential Characteristics of Rural Populations. *Journal of Agromedicine, 14*(2), 132-141.

Canadian Institute for Health Information (CIHI). (2006). *Improving the Health of Canadians.* Ottawa: CIHI. How Healthy Are Rural Canadians? An Assessment of Their Health Status and Health Determinants. Ottawa: CIHI.

Chen, Yue et al. (2015). Income Adequacy and Education Associated with the Prevalence of Obesity in Rural Saskatchewan, Canada. *BMC Public Health* 15(1), 1-7.

Desmeules, W. et al. (2012). Rural Health Status and Determinants in Canada. *Health in Rural Canada*.

Frohlich, Katherine L., Ellen Corin, and Louise Potvin. (2001). A Theoretical Proposal for the Relationship between Context and Disease. *Sociology of Health & Illness* 23(6), 776–97.

Health Canada. 2010. Canada Health Act Annual Report 2010 - 2011. https://www.canada.ca/en/health-canada/services/health-care-system/reports-publications/canada-health-act-annual-reports/report-2010-11.html

Kirby, M., and M. LeBreton. (2002). *The Health of Canadians: The Federal Role Volume 2: Recommendations for Reform*. Ottawa: Standing Senate Committee on Social Affairs, Science, and Technology.

Kulig, J. C., & Williams, A. M. (2011). *Health in rural Canada*. Vancouver: UBC Press.

Lawrence, Elizabeth M., Stefanie Mollborn, and Robert A. Hummer. (2017). Health Lifestyles across the Transition to Adulthood: Implications for Health. *Social Science & Medicine* 193, 23–32.

Matz, C. J., Stieb, D. M., & Brion, O. (2015). Urban-rural differences in daily time-activity patterns, occupational activity and housing characteristics. *Environmental Health,* 14(1).

McDonald, J. T., & Conde, H. (2010). Does Geography Matter? The Health Service Use and Unmet Health Care Needs of Older Canadians. *Canadian Journal on Aging / La Revue Canadienne Du Vieillissement.* 29(01), 23 - 37.

Mitura, V., Bollman, R.D. (2003). The health of rural Canadians: a rural–urban comparison of health indicators. Rural and Small Town Canada Analysis Bulletin 4(6), Catalogue No. 21-006-XIE.

Mollborn, Stefanie and Elizabeth Lawrence. (2018). Family, Peer, and School Influences on Children's Developing Health Lifestyles. *Journal of Health and Social Behavior* 59(1), 133–50.

Pickett, W., Hartling, L., Brison R.J., Guernsey, J.R. (1999). Fatal work-related farm injuries in Canada, 1991–1995. *CMAJ*. 160(13), 1843–8.

Pong, R.W., Atkinson, A.-M., Irvine, A., MacLeod, M., Minore, B., Pegoraro, A., Pitblado, J.R., Stones, M., Tesson, G. (1999). Rural Health Research in the Canadian Institutes of Health Research. Canadian Health Services Research Foundation

Reeder BA, Chen Y, Macdonald SM, Angel A, Sweet L. (1997). Regional and Rural-Urban Differences in Obesity in Canada. Canadian Heart Health Surveys Research Group. *CMAJ* 157, 10–16.

Saint Onge, J.M., Krueger, P.M. (2017). Health lifestyle behaviors among US adults. *Social Science Medicine and Population Health* 3, 89-98.

Shields M, Tjepkema M. (2006). Regional Differences in Obesity. *Health Reports* 17(3), 61–7.

Smith, K. B., Humphreys, J. S., & Wilson, M. G. (2008). Addressing the health disadvantage of rural populations: How does epidemiological evidence inform rural health policies and research? *Australian Journal of Rural Health, 16*(2), 56-66.

Statistics Canada. 2014. Overweight and Obese Adults (self-reported). https://www150.statcan.gc.ca/n1/pub/82-625-x/2015001/article/14185-eng.htm

Weber, Max. 1946. *From Max Weber: Essays in Sociology*. Translated and edited by Hans Gerth and C. Wright Mills. New York: Oxford University Press.

Chapter 2

2 Health Lifestyles of Rural Canadians

2.1 Introduction

Canada has become more urban as Canadians choose to live in larger urban areas. As of 2011, less than one in five Canadians (18.9%) resides in a rural area (Statistics Canada, 2011). Idyllic beliefs about the countryside and peaceful lifestyles are often a part of discussions on rural living, when in reality Canadian rural communities face demographic, economic, ecological, structural, and social challenges relating to geographical and social isolation (Pong et al., 1999). Rural communities experience chronic unemployment, lower formal education attainment, population aging, youth outmigration, Indigenous inequalities, and inadequate or deteriorating municipal structures (Pong et al., 2000; Kirby & LeBreton, 2002; CIHI, 2006; Reimer, 2007). This range of rural issues can pose deleterious implications for the health and well-being of rural Canadians.

The urban – rural health disparity is concerning. Past research by Robert Pampalon (1991) suggests that there is a progressive deterioration in health as one moves from suburban communities into the very remote hinterland. In fact, recent research demonstrates that the further Canadians live from urban centres the greater likelihood they will experience injuries, poisoning, circulatory diseases, hypertension, diabetes, arthritis, obesity, poorer health-related quality of life, and self-rated health (Lavergne & Kephart, 2012; CIHI, 2006; Mitura & Bollman, 2003). Furthermore, male life expectancy has been shown to significantly decrease with each degree of rurality, while disparities are more pronounced for rural men than rural women (CIHI, 2006; Mitura & Bollman, 2003).

Existing research identifies potential reasons for the urban – rural health disparity such as motor vehicle accidents (Warda et al., 1998; Kmet et al., 2003), suicide (Lenaars et al., 1998; Masecar, 1998), access to firearms (Judd, Cooper, Fraser, & Davis, 2006), and obesity (Mitura and Bollman, 2003). In addition, some health issues are associated with greater concentration of hazardous primary work in rural communities (Kulig and Williams, 2010; Pong et al., 1999). Other research has focused on health behaviours and lifestyles, such as smoking and physical inactivity, which is associated with rural populations (Mitura and Bollman, 2003). Despite universal healthcare, poorer access to health services is common in rural Canadian communities (du Plessis et al., 2001; Allen & Cloutier-Fisher, 2006; McDonald & Conde, 2010). Relative to urban centres, rural communities often face difficulty attracting and retaining primary healthcare providers including physicians, specialists, dentists, and nurses, and are more likely to experience longer travel distance for adequate healthcare, while facing the reality of community hospital closures (as cited by Pampalon et al., 2006). Finally, each of these health-related concerns are compounded by rural location based on the increased distance from large metropolitan centres and lack of high-quality health resources. Therefore, it is plausible to assume that rural Canadians face unique patterns of negative health-related behaviours and experiences that can add explanation to the urban – rural health disparity.

There is a growing body of American literature that employs health lifestyle theory to identify individuals' patterns of health promoting or risky health lifestyles (Chou, 2008; de Vries et al., 2008; Dodd et al., 2010; Leech et al., 2014; Saint Onge and Krueger, 2017; Lawrence et al., 2017; Mollborn and Lawrence, 2018). However, Canadian research has not focused on how patterns of health behaviours, experiences, and lifestyle characteristics cluster together to

develop distinct health lifestyles. Moreover, health lifestyle theory has yet to be applied in a rural and urban context or employed to investigate chronic conditions like obesity.

2.2 Objectives and Research Questions

In this study, I examine health lifestyles in Canada and their association across an urban – rural continuum. I use microdata from the 2014 Canadian Community Health Survey (CCHS) to develop health lifestyle classes based on various health-related characteristics of rural versus urban living like health behaviours, health service use, hazardous employment, and community belonging. Through the lens of health lifestyle theory, results obtained from this study will provide further insight into urban – rural health disparities and how constructed health lifestyles vary along the Canadian urban – rural continuum. Next, I examine the extent that these differing patterns of health lifestyles explain the relationship between urban - rural residency and Body Mass Index scores, net of sociodemographic and socioeconomic indicators. Results can support policy makers and practitioners who distribute services for rural Canada and seek additional understanding of rural persons' lifestyles, as well as a better understanding of greater BMI scores in rural Canada. Moreover, the present study will advance Canadian rural health research through its results and methodological approach.

This chapter conducts a thorough literature review on health lifestyle theory, urban - rural health and conceptualizes health lifestyles in the Canadian urban - rural context. Additionally, this chapter will review Canadian research on BMI, rurality and obesity, and health lifestyles of individuals with higher BMI scores. Thus, I ask the following research questions:

1. What are the health lifestyle patterns of Canadians?
2. How do these health lifestyles vary across the Canadian urban - rural continuum?

3. To what extent do sociodemographic and socioeconomic indicators explain the relationship between urban - rural residency and health lifestyles?

4. How do BMI scores distribute across the Canadian urban - rural continuum?

5. To what extent do health lifestyle classes explain the relationship between urban - rural residency and BMI scores, net of socioeconomic and sociodemographic variables?

2.3 Background

2.3.1 Theoretical Considerations

This study employs health lifestyle theory as the core theoretical framework to examine health behavioural differences across the Canadian urban – rural continuum. The following section will review the theoretical work on the long-established association between socioeconomic status and lifestyle. The discussion will move into the development of health lifestyle theory and a review of the current literature employing this theory, and how it applies to a study on the Canadian urban – rural health disparity. Finally, health lifestyle theory will be used to theoretically examine the relationship between rural Canadians and higher BMI scores.

2.3.1.1 Social Class and Lifestyles

An individual's social class has a powerful impact on their health and lifestyle choices (Cockerham, 2005). Max Weber's (1946) work demonstrated how distinct lifestyles varied across social classes. In a Weberian context, social class refers to individuals who share similar social environments, material circumstances, prestige, education, political influence and based on what an individual consumes (Cockerham 2017, pg. 154). Social class could be observed through lifestyle, which were social carriers that transmitted class-specific norms, values, religious ethics, and ways of life across generations (Kalberg, 1994).

Weber's concept of lifestyle was composed of three distinct terms: Lebensstil (lifestyle), Lebensführung (life conduct), and Lebenschancen (life chances). Life conduct and life chances are two distinct components that produce a unique lifestyle. Life conduct refers to individual lifestyle habits or choices, like smoking, but the potential for realizing that these habits are healthy or unhealthy is contingent on their life chances (Cockerham 2017, pg. 154). Life chances refer to the probability of accessing the desired lifestyle based on the individual's financial capital, status, social connections and rights that support the chosen lifestyle. This perspective is applicable to health lifestyles as an individual may not have the tangible resources, opportunity, or ability to acquire the proper knowledge to achieve a healthy lifestyle. For Weber, life chances are not based on pure chance, rather, an individual's life chances are socially determined based on their location in the social structure. Therefore, lifestyles are not based on random individual behaviours unrelated to social structure, but are routine habits influenced by the individual's probability for understanding their habits as healthy or unhealthy (Cockerham 2000, pg.161).

The work of Pierre Bourdieu extended the ethos of lifestyles in his 1984 *Distinction.* Accordingly, he found that opinions, attitudes, preferences, habits, and beliefs varied across stratified social classes. Bourdieu's main focus examined how individuals' routine practices were influenced by external structures and how these practices contributed to the maintenance of that structure (Jenkins, 2002). Bourdieu used food and sport preferences to illustrate how the habitus, a class-related set of dispositions practiced by the collective and embodied in the individual, formed health lifestyles (Bourdieu, 1984). He analyzed common characteristics of the working class, noting their attentiveness to the strength of a male rather than his aesthetic shape, and to prefer food that is cheap and nutritious. Conversely, the professional class preferred food with taste, health benefits, and fewer calories (Cockerham, 2005). Bourdieu's (1984) study noted that

upper-middle class lifestyle included more leisure time and participation in leisure activities like skiing, golfing, tennis, and horseback riding; whereas the working class faced economic barriers to participation and intangible barriers surrounding upper-class social queues. The economically privileged possessed more economic freedom that produced greater opportunity to develop and refine personal tastes and the lower social classes tended to adopt tastes that prioritized items of necessity and lived a minimalist lifestyle. From a Bourdieuan perspective, lifestyles not only reflect social differences in living, but also how experiencing these lifestyles can reproduce the lifestyle across generations.

The economic advantage that upper social classes have generates greater mobility and more opportunity to capitalize on health trends and health-related resources (Cockerham, 2005). Research from Link and Phelan (2000) finds that upper and upper-middle classes have more resources that increase their health literacy, including knowledge surrounding health risks and strategies to combat health risks. For instance, advantaged classes have more economic flexibility to adopt positive health behaviours such as low carbohydrate diets or hiring a personal trainer (Link and Phelan, 2000).

Although socioeconomic status is the greatest predictor of lifestyle practices, it is not the only predictor (Cockerham, 2013). More recent research has shown variation of social structural variables that help shape health lifestyles such as class conditions, age, gender, race/ethnicity, collectivities, and living conditions (Annadale, 2016; Idler, 2016; Missinne, Daenekindt, and Bracke, 2015; Mollborn et al., 2014; Saint Onge and Krueger, 2011; Pampel, 2009; Cockerham, 2010). The growing body of health lifestyle literature demonstrates the need to examine beyond socioeconomic status and consider other mechanisms that may influence health lifestyle

selection. I next review recent health lifestyle literature and how the health lifestyle theoretical framework differs from traditional health behaviour research.

2.3.1.2 Health Lifestyle Theory

Health lifestyles are health behavioural patterns that are the result of knowledge, beliefs, and norms about what constitutes healthy, stress-relieving, or pleasurable behaviours (Bourdieu 1984; Cockerham, 2005). Health lifestyle perspectives argue that individual health behaviours are influenced by social, cultural, and economic factors (Bourdieu, 1984). An individual's health lifestyle will often reflect their social classes health lifestyle as the individual is socialized by their environment and the people who occupy similar conditions within similar social spaces (Pinxten & Lievens, 2014). In other words, a health lifestyle perspective examines collective patterns of health-related behaviours based on choices made within structural contexts (Mollborn & Lawrence, 2018).

Previous research has focused on the significance of particular health behaviours, independent of other risk behaviours, despite recent research indicating that health behaviours coalesce and cluster within the individual (Adams and Colner, 2008; Chou, 2008; de Vries et al., 2008; Dodd et al., 2010; Leech et al., 2014). However, most of these studies only examine a limited number of behaviours such as dietary practices, physical activity, alcohol consumption, and smoking. Recent empirical work that employs health lifestyle theory suggests that focusing on single behaviours or small subsections of risky behaviours produces a limited understanding of a group's health behaviour patterns (Saint Onge and Krueger, 2017; Lawrence et al., 2017; Mollborn and Lawrence, 2018), and does not capture the broader social forces (Frohlic et al., 2001). Consequently, implementing interventions that target a particular health behaviour does little to challenge the broader health behaviour pattern (Spring, Moller, & Coons, 2011). Rather

than focusing on narrow domains of health behaviours, recent health lifestyle research suggests that researchers consider an array of other important health behaviours, such as health care utilization and working conditions (Saint Onge and Krueger, 2017; Lawrence et al., 2017). Said differently, conceptualizing behaviours and experiences from other health-related domains could provide a more complete illustration of the subject's health lifestyle patterns.

In contemporary society, health has become an achievement (Cockerham 2017, pg. 161). It is a personal responsibility for an individual to achieve and maintain a healthy state. However, some who desire a positive health lifestyle may face structural barriers that limits their ability to achieve their ideal lifestyle. For example, those of the lower social class have less financial capital to utilize for high-quality nutritious foods, gym memberships, personal trainers and supplements. It is plausible that individuals working industry and trades work are more likely to expend most of their physical energy at work than those working office jobs, making them less inclined to engage in additional physical leisure activity. It is also likely that inadequate living conditions make achieving a healthy lifestyle much less attainable and the more affluent classes have a greater monetary capacity to access the necessary resources to achieve their ideal lifestyle. But, an individuals' ability to acquire and interpret health knowledge and apply it to their daily routine rests on the laurels of education attainment.

2.3.1.2.1 Human Capital and Health Lifestyles

The sum of education, occupation prestige, and working conditions can be described as *human capital*, the collection of investments in formal education and experience in the workforce (Becker, 1964; Crook et al., 2011). Education is a mechanism for upward social mobility and subsequently a healthier lifestyle. Although, Cockerham (2005) notes that education is only one dimension of class memberships that enables higher social class people to be healthy. Human

capital, as seen through the collective process of obtaining work experience and education, is linked to better labour market outcomes, such as job consistency, as well as greater economic returns, safer working conditions, and enhanced mental health and overall well-being (Ross & Mirowsky, 2006; Ross & Wu, 1996). Human capital's role in the development of a positive health lifestyle is directly affiliated with the individual's socioeconomic status. That is, the more education and human capital an individual possesses, the more likely they are to practice a positive health lifestyle (Ross & Wu, 1996; Cockerham, 2005). It is plausible that the consequence of less human capital attainment is less financial capital, poorer working conditions, a less effective health lifestyle, and ultimately undesirable health outcomes (Link & Phelan, 2000).

Education's contribution to human capital has been demonstrated to influence the development of an individual's personal control (Ross & Mirowsky, 2005). Personal control is the embodiment of personal efficacy, self-autonomy, self-mastery, and self-directedness (Ross & Wu, 1996). Based on this understanding, personal control can influence an individual's choices, attitudes, and health behaviours. In the latter case, health behaviours are demonstrated as categories of individually constructed behaviours, with human capital representing a critical component of the individual's agency (Cockerham, 2005). However, it is crucial that sociologists consider the structural components that may inhibit individuals from improving their lifestyle. Structure represents regularities in social interaction (e.g., institutions, roles), systematic social relationships (e.g., group affiliations, class), and resources that propel behaviours in a positive or negative direction (e.g., choice) (Cockerham, 2005). In a rural context, those who work in unskilled occupations may smoke more than they would if they were not regularly exposed to other unskilled workers who engage in similar negative health behaviours. In the context of

urban and rural living, acquiring education and other forms of human capital is crucial for overcoming rural structural issues as it can help a rural resident find employment, migrate to an urban area (Dupuis, Meyer, and Morisette, 2000), and encourage the individual to establish a set of habits that can effectively propel them towards health (Mirowsky and Ross, 1998). Based on the literature, the combination of greater human capital stock and urban living would maximize an individuals' health returns through increased access to resources, knowledge, and quality of care, while maintaining their own health status through personal control, healthy habits, and routines.

2.3.2 Health Care Utilization and Preventive Care

Health lifestyles are generally perceived as outside of the healthcare institution as individuals experience and practice their lifestyle throughout their daily routines in a similar social environment (Cockerham, 2017). Although, examining health service use provides a more structural and holistic component to the conceptualization of health lifestyles because accessing health services is a fundamental determinant of health outcomes (Federal Provincial and Territorial Advisory Committee on Population Health, 1999). Preventive health care refers to behaviours that intend to prolong a healthy life. Measurements of preventive care include having a family doctor, physical examinations, dental checkups, screenings, or other services that ensure good health, prevent disease, or minimize the effects of an illness or disease (Cockerham, 2017). In general, American research supports the notion that individuals believe in having a regular checkup with a physician and that the process is an intricate component for overall health (Oboler et al., 2002).

Despite universal healthcare, in Canada, access to screening services like mammograms, blood pressure and Papanicolaou (Pap) smear tests is associated with greater socioeconomic

status (Katz & Hofer, 1994; Mercer & Goel, 1997). A study by Qi and colleagues (2006) used Canadian data to examine screening service use along the socioeconomic gradient and found that greater socioeconomic status was associated with accessing mammograms and pap tests, but lower social class respondents were more likely to receive blood pressure tests.

American research from Snead and Cockerham (2002) found that the poor were least likely to use preventive care as measured by prenatal care, physical examinations, dental care, breast examinations, and childhood immunizations. Literature on health service use in Canada indicates greater family physician and hospital service use for those of poorer health in the lower social strata (Kephart et al., 1998; Dunlop et al., 2000; Alter, 2004). The relationship between socioeconomic status and heath may explain the Canadian increase in health service use for the lower social strata as people living with less income are less healthy, have more chronic conditions, illnesses and diseases than those with higher incomes (Mustard et al., 1995; Reutter, 2000). These contrasting findings illustrate the different healthcare systems in the United States and Canada. The lower social strata in Canada may have a greater need for health services and consequently benefit more from subsidized healthcare as there is no direct charge.

2.3.2.1 Dental Care in Canada

Studies on dental care suggest visiting the dentist at least once a year for optimal oral health (Muirhead et al., 2009). Oral health is an essential component of health-related quality of life (HRQoL), preventive care and an effective health lifestyle. People who routinely access a dentist are more likely to prevent serious and costly consequences including tooth loss, oral cancer and other oral related diseases (Thomson et al, 2010; Locker et al., 2011). Preventive dental care is one of many components linked to improving health within the general population (Huang et al., 2016). For instance, poor oral health has been associated with pancreatic cancer, respiratory and

cardiovascular diseases (Meurman & Sanz, 2004; Thomson et al., 2010; Griffin et al., 2012; Huang et al., 2016)

Unlike the Canadian healthcare system, dental healthcare is not publicly funded or universal. Instead dental care is covered through employment insurance, out-of-pocket payments or government assistance for those in the lower social strata. Thomson and colleagues (2010) found that individuals with lower incomes and without insurance were four times more likely to not visit a dentist due to financial costs and barriers. This is similar to other developed nations such as some European countries and the United States, where lower class people have been found to access dental services much less frequently than higher income counterparts (Thomson et al., 2010; Listl, Moeller & Manski, 2013).

2.3.3 Conceptualizing Health Lifestyles in Rural Canada

Next, I will explore Canadian literature that provides potential explanations for the urban - rural health disparity. Although research on health lifestyles has not yet examined differences in an urban and rural context, this section will cover the predominant health lifestyle differences between urban and rural Canadians by considering their health behaviours, activities, and experiences.

2.3.3.1 Health Lifestyles in Rural Canada

There is reason to believe that rural Canadians engage in more unhealthy lifestyles than urban dwellers and that this disparity is further contextualized through the role of social class, status, and human capital. For example, it is well-established that relative to urban Canada, rural Canada is less educated, experiences higher unemployment rates and consequently works in more hazardous occupations (Pong et al., 1999; CIHI, 2006). Rural location itself does not necessarily lead to poor health (Lavergne & Kephart, 2012), but various components of rural

living may explain the rural – urban health disparity. This disparity could be further attributed to rurality's association with the aging population, socioeconomic disadvantage, greater concertation of hazardous occupations, environmental conditions, lower class indigenous populations, distance from quality healthcare centres, poorer health service availability, and lack of quality physicians (Pong, 1999; Mitura & Reimer, 2003; Smith, Humphreys, and Wilson, 2008). Following the recommendation of Smith and colleagues (2008), as well as Lawrence et al., (2017), this study considers health behaviours from a rural-specific contextual perspective. That is, this paper defines rural lifestyles based on the documented health-related characteristics of rural living and the standard measurements of health behaviours.

2.3.3.2 Canadian Rural Demographics

Canada's rural demographic characteristics are distinctly different from those of the Canadian urban population. Rural regions have greater proportions of dependents, both children and elderly, but lower proportions of working aged residents (CIHI, 2006; Dandy & Bollman, 2009; Desmeules et al., 2012). There are fewer single and divorced people in rural areas, which is partially explained by these subgroups migrating to urban areas (Romans, Cohen, and Forte, 2011). Rural communities experience greater proportions of youth outmigration to more populated areas (Corbett, 2005). Young people migrate to urban areas mainly because their home community cannot fiscally support higher education or high-quality employment opportunities. Consequently, youth outmigration is normalized and is therefore viewed as an inevitable aspect of rural living (Foster & Main, 2017), and may also contribute to rural communities' lower educational attainment, lower average income, and higher unemployment rates (du Plessis et al., 2001; CIHI, 2006; DesMeules, 2012). A lack of immigration to rural areas combined with fewer visible minorities makes rural communities less ethnically diverse relative to urban areas (Kulig

& Williams, 2011). Sexual minorities may experience less acceptance in rural environments due to traditional religious values and politically conservative ideologies (Warren et al., 2014). In sum, a lack of high-paying occupations and educational opportunities can prevent an individual from migrating to a rural area, while simultaneously pushing ambitious young people out of the community to seek greater opportunities.

2.3.3.2.1 Indigenous Populations in Rural Canada

It is well-documented that a majority of the Canadian Indigenous populations reside in rural or remote areas of the country, and are likely to experience higher rates of chronic ailments, suicide, and diabetes (Health Canada, 2005; Martens et al., 2005). Moreover, rural Indigenous Canadians are significantly more likely to experience less education and annual income, as well as higher unemployment rates (The Rural Secretariat, 2001). In general, Canadian Indigenous communities face distinct inequalities such as history of colonisation, loss of language and culture, and disassociation from their land (King, Smith & Gracey, 2009). Much of the inequality that Indigenous people face will vary by the Indigenous culture, urban - rural living, or residence location. For instance, some studies have found that Indigenous populations in northern Ontario were less likely to experience hypertension than other Canadians, but the Cree and Ojibwa natives were more likely to experience hypertension, relative to the general Canadian population (Young, 1991). These disparities could be indicative of the community they belong to or the impact that colonisation had on their ancestors. Because of these complexities, some scholars suggest that research priorities concerning Indigenous health should be informed and interpreted by Indigenous people themselves (MacMillan et al., 1996), as they are in tune with their culture's experiences with health and lifestyle. Furthermore, Indigenous persons should be examined as the focal point for the study.

2.3.3.3 Hazardous Industry as a Consequence of Lower Human Capital in Rural Canada

There is less human capital stock in Canadian rural communities' relative to urban areas. Rural members share common socioeconomic characteristics such as lower educational levels, higher unemployment rates, greater concentration of unskilled work, hazardous working conditions and greater dependency on government transfer payments (CIHI, 2006; Alasia & Magnusson; Kirby & LeBreton, 2002; Pong et al., 2000). As a result, there is evidence for a wage disparity between urban and rural residents, indicating that as the degree of rurality increases the average earnings of a rural resident decreases (CIHI, 2006; Bollman & Reimer, 2007). Type of employment is a concern for rural communities. du Plessis and colleagues (2001) found that there is little variation in the proportion of rural residents employed in manufacturing industries relative to urban residents, and a study from Alasia and Magnusson (2005) demonstrated a greater concentration of unskilled labour and jobs in rural areas. This labour market pattern is engrained in the social fabric of Canadian history.

Employment opportunities in rural areas are often reliant on natural resources and primary industry, such as manufacturing, agriculture, fishing, mining, forestry, and logging (Matz, Stieb, & Brion, 2015, Bollman & Reimer, 2009; Kulig and Williams 2011; Peek-Asa, 2004; Pickett et al., 1999). Consequently, higher rates of long-term disability and chronic illness in rural areas have been partially attributed to hazardous occupations like agriculture, mining, fishing, and forestry (CIHI, 2006; Matz, Stieb, & Brion, 2015; Kulig & Williams, 2002; Pong et al., 2000). In addition, research suggests that rural residents have a heightened risk of suffering disease and illness as a result of hazardous work, but also risky behaviours (Schouten, Meijer, Huveneers, & Kiemeney, 1996; Pong et al., 1999; Matz, Stieb, & Brion, 2015). Findings from

Matz and colleagues (2015) indicate that the Canadian rural employed populations were more likely to work outdoors in unskilled, primary industry jobs. This makes rural residents more vulnerable to ambient air pollutions, which is associated with many adverse health effects such as cardiovascular and respiratory diseases (Cakmak et al, 2014). Finally, primary industry workers are more likely to engage in negative health behaviours, like cigarette smoking than white collar counterparts (Sorensen et al., 1996; Bang & Kim, 2001; Lee et al., 2007). Stressful and poor working conditions may contribute to these increased smoking rates and additional research finds that smoking may be a short-term coping mechanism for primary industry workers who are stressed or physically overworked (Sorenson et al., 2004; Radi et al., 2007; Peretti-Watel et al., 2009).

Based on the literature, the negative health effects from hazardous industry work are indicative of less human capital stock - the sum of education and relevant training - in rural Canada. In other words, lower socioeconomic standing and social status in rural Canada is associated with poorer health outcomes like long-term disability, but this relationship may be explained by rural areas' greater concentration of primary industry work. For many non-urban Canadians, this type of occupation is a critical component of their daily routines, experiences and activities. In general, primary work can present undesirable health implications but for many rural people it is an established aspect of their lifestyle.

2.3.3.4 Rural Health Behaviours

Rural populations are often characterized by poor health literacy and health behaviours (Smith, Humphreys, and Wilson, 2008). Although Canadian research on rural health behaviours is limited, some studies have identified health behaviours such as physical inactivity, elevated smoking rates, and less favourable dietary choices (Mitura & Bolllman, 2003; CIHI, 2006;

Desmeules et al., 2012) as more prevalent in rural Canadians than among their urban counterparts. This may reflect the socioeconomic disadvantage of rural communities and lower levels of human capital (Adler & Newman, 2002; Lavergne & Kephart, 2012). However, a study by Plotnikoff, Bercovitz, and Loucaides (2004) found no significant difference in physical activity between urban and rural youth. Moreover, work done by Pampalon and colleagues (1990, 1995) demonstrated that excessive alcohol consumption was greater in urban Quebec than the province's rural areas.

Other health behaviours have been associated with rural living. For example, the US Department of Health and Human Services (2000) reported that rural residents were less likely to use preventive screening services or wear safety belts, which can result in poorer health outcomes and disability-related injuries. Other studies allude to greater risk-taking behaviours in rural communities, such as increased access to firearms and its association with higher suicide rates (Booth, Briscoe, and Powell, 2000). The inflation of rural suicide rates may reflect the combination of stoic masculine attitudes, poor health-service availability, and greater access to firearms (Judd, Cooper, Fraser, & Davis, 2006).

2.3.3.5 Rural Patterns of Health Service Utilization

Research on rural communities' access to health services has received the most attention from scholars, researchers, policymakers, and planners (Pampalon et al., 2006). This is because rural Canadians represent approximately 19 percent of the Canadian population (Statistics Canada, 2011), but the percentage of available physicians and other health services in rural communities has drastically fallen (McDonald & Conde, 2010). In fact, it is estimated that the number of physicians per 1,000 rural Canadians will fall from 0.79 in 1999 to 0.53 in 2021 (Laurent, 2002).

Despite the fact that the Health Canada Act promises reasonable health care service and delivery to all Canadians, small rural communities face difficulties providing health services to their citizens. Some research attributes this issue to rural Canada's dispersed and low-density populations (Liu et al., 2001).

In general, urban Canadians experience greater accessibility to health services such as family doctors, general practitioners and specialists (Allan & Cloutier-Fisher, 2006; McDonald & Conde, 2010; Kulig & Williams, 2011; Wade, Bourgeault & Neiterman, 2016). This problem forces rural dwellers to travel longer distances for adequate health care (Health Council of Canada, 2010; Health Canada, 2010), particularly in the case of receiving care or treatment from a specialist (Mattson, 2010; Karunanayake et al., 2015). Rural communities struggle to provide adequate health care services because of population dispersion and distance from urban centres but also because of limited tax bases and shrinking local economies (Cloutier–Fisher & Joseph, 2000; Liu, Hader, Brossart, White & Lewis, 2001). For instance, the majority of acute and specialist care services are located in more urbanized areas (Centre for Health Services and Policy Research, 2002). Additional factors explaining the health service disparity include lifestyle and the nature of work in a rural setting, which is considered to be poorer quality; rapid population change and a greater degree of medical expertise in urban centres (Wade, Bourgeault & Neiterman, 2016). Government funding reductions and downsizing may contribute to a lack of adequate health care services for vulnerable populations, including those residing in rural Canada (Cloutier-Fisher & Joseph, 2000).

While the majority of health service research relating to urban - rural residency examines the aging population and is often limited to specific provinces (Cloutier-Fisher & Joseph, 2000; Liu et al., 2001; Peterson, Shapiro & Roos, 2005; Allan & Cloutier-Fisher, 2006), McDonald and

Conde (2010) examined health service use and unmet healthcare needs at the national level to examine whether rural Canadians experience more difficulty accessing health services than urban counterparts. In their study, they found that rural Canadians aged 55 or older were less likely to have a general practitioner, specialist, or dentist and had less visits a year to each medical service than urban counterparts. These findings are alarming based on research that indicates health services as a fundamental determinant for various health outcomes (Federal Provincial and Territorial Advisory Committee on Population Health, 1999).

2.3.3.6 Rural Canada's Sense of Community Belonging

Social isolation can lead to adverse health outcomes, while community belonging and attachment can yield positive health outcomes and reduce mortality risk (Holt-Lunstad et al., 2010). Social belonging, as understood through the development of mutual trust, respect and increased self-esteem, has been demonstrated to promote health (Shields, 2008). Studies show that rural Canadians report a greater sense of belonging relative to their urban counterparts (Turcotte, 2005; CIHI, 2006). Sense of belonging is documented as the most notable strength of a rural community because the average resident is more likely to know and trust their neighbour, and receive local assistance during times of need (Turcotte, 2005; Wiesinger, 2007). It must be noted that this 'strength' can often be a threat to the growth of rural communities and minority members in the community. For instance, a study by Dax and Machold (2003) found that those who did not conform to local social norms or refused to participate in local events or religious congregations often faced exclusion. Although rural communities are often cited as providing social support during troubling times, small communities are likely to lack confidentiality and anonymity, which could inhibit a rural resident from seeking medical services (Bourke et al., 2004).

Research suggests that the relationship between reporting a strong sense of community belonging and mortality is comparable to the association between smoking cessation and mortality, and that this relationship is stronger than the association between physical inactivity and mortality (Holt-Lunstad et al. 2010). Based on this understanding, sense of community belonging is a social-structural health behaviour that can attribute to both positive health outcomes, but also to negative health outcomes through social isolation. Therefore, it is essential to consider this component when examining health lifestyle differences between urban areas and rural communities.

2.4 Summary

The health lifestyle perspective examines collective patterns of health-related behaviours based on choices made within structural contexts (Mollborn & Lawrence, 2018). Additionally, recent health lifestyle research encourages the consideration of an array of health behaviors based on the population being studied. Therefore, this thesis applies the health lifestyle framework to the urban and rural context and makes use of existing literature on health-related and structural differences along the Canadian urban - rural continuum.

The health lifestyle framework for this study is guided by the fundamental principles of Weber's lifestyle typology Lebensstil (lifestyle), Lebensführung (life conduct), Lebenschancen (life chances), and considers Mollborn and Lawrence's (2018) suggestion to examine collective patterns of health-related behaviours based on choices made within structural contexts. In the urban - rural context, core health behaviours like dietary practices, physical activity, smoking and alcohol consumption are considered. This component is best understood as Weber's life conduct. Yet, this study also examines health-related behaviours based on urban – rural structural differences like hazardous industry work, healthcare access and sense of community belonging.

The structural component of this health lifestyle framework is equivalent to Weber's life chances as urban and rural Canadians attempt to achieve and maintain a healthy state but may face structural barriers that inhibit their health chances. Therefore, this thesis conceptualizes the urban - rural health lifestyle as the byproduct of the individual's life conduct, or health behaviour habits, and their life chances, social structure.

2.5 Rurality, Obesity, and Health Lifestyles

Next, I will discuss the relationship between obesity, typically measured using Body Mass Index, and urban - rural residency. The first part of this section will review literature on obesity in Canada and how BMI scores vary between urban and rural areas. Also, I will discuss how poorer health lifestyles related to rural living may contribute to the areas' increased obesity rates.

2.5.1 BMI Trends in Canada

Obesity is a condition whereby excess body fat accumulates to the extent that the person's health may be threatened (World Health Organization, 2018). Throughout the past three decades, the prevalence of obesity has increased in Canada, as defined by the body mass index (BMI) measurement of 30 or greater (Katzmarzyk & Mason, 2006; Statistics Canada, 2010). For instance, in 2011 - 2012, Statistics Canada found that among Canadians age 18 or older, 24.8% were obese. In other words, one in four Canadians are obese, which is a 17.5% increase from 2003 (Statistics Canada, 2014). Obesity has become one of the greatest threats to an individual's health and jeopardizes the life expectancy increase made throughout the 20th century (Wall et al., 2012; Kitahara et al., 2014).

Obesity is linked to several negative health, economic, and public health concerns. Obese persons face a greater risk for several chronic diseases such as hypertension, type 2 diabetes, sleep apnea, cancer (Bray, 2004; Luo et al., 2008), premature death (Popkin et al.,

2006), and poor quality of life (Kolotkin et al., 2001). In addition, obesity is associated with decreased productivity (Ricci & Chee, 2005; Frone, 2008) and greater healthcare utilization (Withrow & Alter, 2011). In fact, obesity's financial toll has previously been estimated to cost Canadian healthcare anywhere from $4.6 to $7.1 billion annually (PHAC & CIHI, 2011). Furthermore, research from Jia and Lubetkin (2010) suggests that obesity could contribute as much as, if not more than, smoking to the onset of disease.

Measurement of obesity is often grouped into classes based on BMI scores to reflect the increasing health risk of excess weight (Twells et al., 2014). Class I (BMI 30.0 - 34.9), class II (35.0 - 39.9) and class III (BMI ≥ 40.0) (Health Canada, 2003). Class II and class III are associated with greater levels of morbidity, premature death, and greater demands on the healthcare system (Orpana et al., 2010; Flegal et al., 2013). Moreover, as noted above, these two classes have increased at an alarming rate in Canada (Katzmarzyk & Mason, 2006; PHAC & CIHI, 2011).

2.5.2 Obesity, Rurality, and Geographic Variation in Canada

In Canada, the geographic location of an individual is significantly associated with greater obesity rates (Shields & Tjepkema, 2006; Statistics Canada, 2014). There are two layers to this phenomenon: provincial and urbanity - rurality. Obesity prevalence rates in the Atlantic provinces (32.3% - 35.2%) and the Prairies (27.7% - 31.6%) are higher than the national average of 25% (Statistics Canada, 2014). Using 2004 community health data, Shields and Tjepkema (2006) note that these regions, excluding Nova Scotia, had obesity rates significantly higher than the national average and rising. Interestingly, the Atlantic provinces and the Prairies have a greater share of rural residents than the national average (Statistics Canada, 2011). In 2011, the national rurality rate was 18.9% and the rate for Atlantic provinces was between 41% in

Newfoundland and 53% in Prince Edward Island. The prairies had a rurality rate of 28% in Manitoba and 33% in Saskatchewan (Statistics Canada, 2011). In addition, Chen and colleagues (2015) found that the obesity prevalence rate of rural residents in Saskatchewan was greater than the national average. These findings suggest a link between highly rural concentrated provinces and higher BMI scores.

Little research has examined the relationship between obesity and rurality in Canada beyond rural Canada's higher rates (Shields & Tjepkema, 2006; CIHI, 2011; Statistics Canada, 2014; Chen et al., 2015). Conversely, the three largest Canadian cities, Montreal, Toronto and Vancouver have been demonstrated as having lower obesity levels than the national average (Reeder et al., 1997; Shields & Tjepkema, 2006; Statistics Canada, 2014).

2.5.3 Health Lifestyles and Obesity in Rural Canada

Several studies have linked poor socioeconomic status and lifestyle indicators to obesity (McLaren, 2007; Ali & Crowther, 2009; Malik, Willett & Hu, 2012). Different measurements of SES are important to consider when analyzing health outcomes, in particular, obesity. For instance, educational attainment can help individuals gain a greater ability to acquire and apply health knowledge to construct their health lifestyles or to simply maintain their healthy lifestyle (Chen et al., 2015). However, personal income may be a better marker for analysing an individuals' resources and ability to purchase more nutritious foods, personal trainers or other health enhancing commodities. It is well-established that SES in rural Canada, as measured through educational attainment and income, is lower than urban Canada (Desmeules, 2001; CIHI, 2006; Desmeules, 2012). Based on the existing literature, the Canadian urban - rural BMI disparity may be partially explained by health lifestyles, as it is well-documented that SES is the

greatest predictor of a healthy lifestyle. The link between lower SES and negative health lifestyles may be stronger in a rural setting.

2.5.4 Summary

The prevalence of obesity is increasing and has become a threat to the overall health of Western civilization. Several chronic conditions can arise from obesity as well as decreased productivity and economic constraints. It is plausible that the prevalence of obesity in Canada is inflated by the high proportion of rural residents, particularly in provinces with a high concentration of rural areas and communities. If rural Canadians are more likely to be obese than urban Canadians then it is necessary to investigate the socioeconomic and demographic mechanisms that contribute to this relationship. More specifically, and as consequence of social status, the health lifestyles of rural Canadians may further illustrate rurality's association with greater BMI scores and obesity.

2.5.5 Hypotheses

In the first part of this study I use Latent Class Analyses (LCA) to generate distinct health lifestyle categories within the general Canadian population. I then test variation in the health lifestyle categories across the Canadian urban - rural continuum, net of sociodemographic and sociodemographic indicators.

Based on the literature, in part 1 of the analysis I expect the following:

1. There are distinct health lifestyles that can be empirically identified from respondents behaviours, healthcare utilization, daily activities and experiences.
2. The more rural a Canadian is across the urban - rural continuum the more likely they are to engage in a negative health lifestyle. Urban respondents are more likely to experience a positive health lifestyle. In addition, health lifestyles that represent positive healthcare practices will be more prevalent in urban centres than in rural communities.

3. Socioeconomic and demographic indicators will help explain the health lifestyle disparity across the Canadian urban - rural continuum.

In the second part of this study, I explore how urban - rural residency predicts BMI differences. I will include the health lifestyle latent classes established in Part 1 and various socioeconomic and sociodemographic characteristics in a nested model. Based on the reviewed literature, I anticipate:

4. The prevalence of Body Mass Index and obesity will increase with each degree of rurality.

5. Health lifestyle latent classes will explain some of the association.

6. Socioeconomic and sociodemographic characteristics will further contextualize the relationship between rurality and obesity, net of health lifestyles.

2.6 References

Adams, Troy B. and Willa Colner. (2008). The Association of Multiple Risk Factors With Fruit and Vegetable Intake Among a Nationwide Sample of College Students. *Journal of American College Health* 56(4), 455–61.

Adler, Nancy E. and Katherine Newman. (2002). Socioeconomic Disparities in Health: Pathways And Policies. *Health Affairs* 21(2), 60–76.

Alasia, A., & Magnusson, E. (2005). Occupational Skill Level: The Divide Between Rural and Urban Canada. Rural and Small Town. Canadian Annual Bulletin 6(2), 1-30.

Alberta Alcohol and Drug Abuse Commission. (2005). Preventing heavy episodic drinking among youth and young adults: A literature review. Edmonton, Alta.

Ali, At., & Crowther, NJ. (2009). Factors Predisposing to Obesity: A Review of the Literature. *South African Family Practice* 52(3), 193–97.

Allan, D., & Cloutier-Fisher, D. (2006). Health Service Utilization among Older Adults in British Columbia: Making Sense of Geography. *Canadian Journal on Aging / La Revue Canadienne Du Vieillissement, 25*(02), 219-32.

Alter, David. (2004). Socioeconomic Status, Service Patterns, and Perceptions of Care Among Survivors of Acute Myocardial Infarction in Canada. *Jama* 291(9), 1100.

Annandale, Ellen. (2016). Health Status and Gender. *The New Blackwell Companion to Medical Sociology* 97–112.

Bang, Ki Moon and Jay H. Kim. (2001). Prevalence of Cigarette Smoking by Occupation and Industry in the United States. *American Journal of Industrial Medicine* 40(3), 233–39.

Becker, G. S. (1964). Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education. New York: Columbia Univ. Press.

Bollman, R. D., & Reimer, W. (2009). Demographics, Employment, Income, and Networks: Differential Characteristics of Rural Populations. *Journal of Agromedicine, 14*(2), 132-141.

Booth N, Briscoe M, Powell R. (2000). Suicide in the farming community: methods used and contact with health services. *Occupational and Environmental Medicine,* 57(9), 67–73.

Booth, Frank W., Christian K. Roberts, and Matthew J. Laye. (2012). Lack of Exercise Is a Major Cause of Chronic Diseases. *Comprehensive Physiology*. 2(2), 1143-1211.

Bray, GA. (2004). Medical Consequences of Obesity. *Journal of Clinical Endocrinology & Metabolis.* 89, 2583-9.

Bourdieu, P., Nice, R., Bennett, T. 1984. Distinction: a social critique of the judgement of taste. London: Routledge.

Bourke, Lisa et al. (2004). Developing a Conceptual Understanding of Rural Health Practice. *Australian Journal of Rural Health* 12(5), 181–86.

Cakmak, S., Kauri, L., Shutt, R., Liu, L., Green, M. S., Mulholland, M., . . . Dales, R. (2014). The association between ambient air quality and cardiac rate and rhythm in ambulatory subjects. *Environment International 73*, 365-371.

Canadian Institute for Health Information (CIHI). (2006). *Improving the Health of Canadians.* Ottawa: CIHI. "How Healthy Are Rural Canadians? An Assessment of Their Health Status and Health Determinants." Ottawa: CIHI.

Centre for Health Services and Policy Research. (2002). The British Columbia health atlas (1st ed.). Vancouver.

Chen, Yue et al. (2015). Income Adequacy and Education Associated with the Prevalence of Obesity in Rural Saskatchewan, Canada. *BMC Public Health* 15(1), 1-7.

Chou, K. (2008). The prevalence and clustering of four major lifestyle risk factors in Hong Kong Chinese older adults. *Journal of Aging Health* 20 (7), 788-803.

Cloutier-Fisher, D., & Joseph, A.E. (2000). Long-term care restructuring in rural Ontario: Retrieving community service user and provider narratives. *Social Science and Medicine* 50, 1037–1045.

Cockerham, William C. (2005). Health Lifestyle Theory and the Convergence of Agency and Structure. *Journal of Health and Social Behavior* 46 (1), 51–67.

Cockerham, William C. (2010). Health Lifestyles: Bringing Structure Back. *The New Blackwell Companion to Medical Sociology* 159–83.

Cockerham, William C. 2017. *Medical Sociology*. New York, NY: Routledge.

Cowell, A. J. (2006). The relationship between education and health behavior: Some empirical evidence. *Health Economics, 15*(2), 125-146.

Crook, T. R., Todd, S. Y., Combs, J. G., Woehr, D. J., & Ketchen Jr., D. J. (2011). Does Human Capital Matter? A Meta-Analysis of the Relationship between Human Capital and Firm Performance. *Journal of Applied Psychology*, *96*(3), 443–456.

Danaei, Goodarz et al. (2011). Correction: The Preventable Causes of Death in the United States: Comparative Risk Assessment of Dietary, Lifestyle, and Metabolic Risk Factors. *PLoS Medicine* 8(1).

Dandy, Kimberley and Bill Reimer. (2008). Seniors in Rural Canada. *Rural and Small Town Canada* 7(8), 1–56.

Dax, TH., Machold I. (2003). Voices of Rural Youth. A Break with Traditional Patterns? Policies and Young People in Rural Development. Bundesanstalt für Bergbauernfragen, Wien.

Desmeules, W. et al. (2012). Rural Health Status and Determinants in Canada. *Health in Rural Canada*.

De Vries, H., Riet, J.V., Spigt, M., Metsemakers, J., Akker, M., Vermunt, J.K., Kremers, S. (2008). Clusters of lifestyle behaviors: results from the Dutch SMILE study. Prev. Med. 46 (3), 203-208.

Dodd, L.J., Al-Nakeeb, Y., Nevill, A., Forshaw, M.J. (2010). Lifestyle Risk Factors of Students: A Cluster Analytical Approach. Prev. Med. 51(1), 73-77.

Doescher, Mark P., J. Elizabeth Jackson, Anthony Jerant, and L. Gary Hart. (2006). Prevalence and Trends in Smoking: A National Rural Study. *The Journal of Rural Health* 22(2), 112–18.

du Plessis, V., R. Beshiri, R. Bollman, and H. Clemenson. (2001). Definitions of Rural. *Rural and Small Town Canada Analysis Bulletin* 3 (3), 1-43. Catalogue No. 21-006- XIE. Ottawa: Statistics Canada, http://www.statcan.ca/.

Dunlop, Sheryl, Peter C. Coyte, and Warren Mcisaac. (2000). Socio-Economic Status and the Utilisation of Physicians Services: Results from the Canadian National Population Health Survey. *Social Science & Medicine* 51(1), 123–33.

Federal, Provincial and Territorial Advisory Committee on Population Health. (1999). *Toward a healthy future: second report on the health of Canadians. Report prepared for the Meeting of the Ministers of Health: Charlottetown, P.E.I. September, 1999*. Ottawa, ON: Health Canada.

Finer, Lawrence B., Jacqueline E. Darroch, and Susheela Singh. (1999). Sexual Partnership Patterns as a Behavioral Risk Factor for Sexually Transmitted Diseases. *Family Planning Perspectives* 31(5), 228.

Flegal KM, Kit BK, Orpana H, et al. (2013). Association of all-cause mortality with overweight and obesity using standardized body mass index categories. A systematic review and meta-analysis. JAMA 309, 71-82.

Foster, Karen and Hannah Main. (2017). Finding A Place in the World: Understanding Youth Outmigration from Shrinking Rural Communities. 1–75.

Frohlich, Katherine L., Ellen Corin, and Louise Potvin. (2001). A Theoretical Proposal for the Relationship between Context and Disease. *Sociology of Health & Illness* 23(6),776–97.

Frone, M.R., (2008). Obesity and Absenteeism Among U.S. Workers: Do Physical Health and Mental Health Explain the Relation? *Journal of Workplace Behavioral Health* 22, 65-79.

Gochman, David S. (1997). Health Behavior Research, Cognate Disciplines, Future Identity, and an Organizing Matrix: An Integration of Perspectives. Pp. 395–425 in *Handbook of Health Behavior,* vol. 4, edited by David Gochman. New York: Plenum.

Griffin SO, Jones JA, Brunson D, Griffin PM, Bailey WD. (2012). Burden of oral disease among older adults and implications for public health priorities. *American Journal of Public Health* 102(3), 411–8.

Hanson H. Meth abuse a smoldering crisis. (2005). *The Rural Monitor* 12, 1-5.

Harris, D., & Helfat, C. (1997). Specificity of CEO Human Capital and Compensation. *Strategic Management Journal 18*(11), 895–920.

Health Canada, 2003. Canadian guidelines for body weight classifications in adults. Ottawa (ON): Cat no H49-179/2003E.

Health Canada, 2005. A Statistical Profile on the Health of First Nations in Canada for the Year 2000. Ottawa. Available from URL: http://www.hc-sc.gc.ca/fnih-spni/pubs/gen/stats_profile.html

Health Canada. 2010. Canada Health Act Annual Report 2010 - 2011. https://www.canada.ca/en/health-canada/services/health-care-system/reports-publications/canada-health-act-annual-reports/report-2010-11.html

Health Council of Canada. 2010. Report on the State of Public Health in Canada. Growing Older - Adding Life to Years. Toronto: Health Council of Canada. www.healthcouncilcanada.ca

Holt-Lunstad, J., Smith, T. B., & Layton, J. N. (2010). Social relationships and mortality risk: A meta analytic review. *PLoS Med* 7(7)

Huang J, Roosaar A, Ax Ell T, Ye WA. (2016). Prospective cohort study on poor oral hygiene and pancreatic cancer risk. *International Journal of Cancer* 138(1), 340–7.

Idler, Ellen L. (2016). Health and Religion. *The New Blackwell Companion to Medical Sociology* 133–58.

Jenkins, Richard. 2002. *Pierre Bourdieu*. London: Routledge.

Jia H., Lubetkin E. (2010). Trends in quality adjusted life years lost contributed by smoking and obesity. *Am J Prev Med* 38(2), 138-44.

Judd J, Cooper A-M, Fraser C, Davis J. (2006). Rural suicide- people or place effects? *Australian and New Zealand Journal of Psychiatry* 40(3), 208–216.

Kalberg, Stephen. (1994). Max Weber's Comparative- Historical *Sociology*. Chicago, IL: University of Chicago Press.

Karunanayake, Chandima et al. (2015). Access to Specialist Care in Rural Saskatchewan: The Saskatchewan Rural Health Study. *Healthcare* 3(1), 84–99.

Katz SL, Hofer, TP, (1994). Socioeconomic disparities in preventive care persist despite universal coverage. Breast and cervical cancer screening in Ontario and the United States. *Journal of the American Medical Association*, 272(7), 530-4.

Kephart, G., V. S. Thomas, and D. R. Maclean. (1998). Socioeconomic Differences in the Use of Physician Services in Nova Scotia. *American Journal of Public Health* 88(5), 800–803.

King, Malcolm, Alexandra Smith, and Michael Gracey. (2009). Indigenous Health Part 2: The Underlying Causes of the Health Gap. *The Lancet* 374(9683), 76–85.

Kirby, M., and M. LeBreton. (2002). The Health of Canadians: The Federal Role Volume 2: Recommendations for Reform. Ottawa: Standing Senate Committee on Social Affairs, Science, and Technology.

Kitahara CM, et al. (2014). Association between Class III Obesity (BMI of 40–59 kg/m) and Mortality: A Pooled Analysis of 20 Prospective Studies. PLOS Medicine.

Kitchen, Peter, Allison Williams, and James Chowhan. (2011). Sense of Community Belonging and Health in Canada: A Regional Analysis. *Social Indicators Research* 107(1), 103–26.

Kmet, L., Brasher, P., Macarthur, C. (2003). A Small Area Study of Motor Vehicle Crash Fatalities in Alberta, Canada. *Accident Anal Preview* 35, 177–182.

Kolotkin RL, Meter K, Williams GR. (2001). Quality of Life and Obesity. *Obesity Review* 2, 219-29.

Krueger, Patrick M., Tajudaullah Bhaloo, and Pauline Vaillancourt Rosenau. (2009). Health Lifestyles in the United States and Canada: Are We Really So Different? *Social Science Quarterly* 90(5), 1380–1402.

Kulig, J. C., & Williams, A. M. (2011). *Health in rural Canada*. Vancouver: UBC Press.

Lambert, David, John A. Gale, and David Hartley (2008). Substance Abuse by Youth and Young Adults in Rural America. *The Journal of Rural Health* 24(3), 221–28.

Laurent, S., (2002). Rural Canada: Access to health care. Ottawa: Parliamentary Research Branch Occasional Paper. Government of Canada. Retrieved from http://dsp-psd. pwgsc.gc.ca

Lavergne MR, Kephart G. (2012). Examining variations in health within rural Canada. *Rural Remote Health* 12, 1848.

Lawrence, Elizabeth M., Stefanie Mollborn, and Robert A. Hummer. (2017). Health Lifestyles across the Transition to Adulthood: Implications for Health. *Social Science & Medicine* 193, 23–32.

Lee DJ, Fleming LE, Arheart KL, LeBlanc WG, Caban AJ, Chung-Bridges K, Christ SL, McCollister KE, Pitman T. (2007). Smoking Rate Trends in U.S. Occupational Groups: The 1987 to 2004 National Health Interview Survey. *J Occup Environ Med*. 49(1), 75–81.

Leech, R.M., McNaughton, S.A., Timperio, A. (2014). The Clustering of Diet, Physical Activity and Sedentary Behavior in Children and Adolescents: a review. *Int. J. Behav. Nutr. Phys. Act.* 11(4), 4.

Leenaars, A.A., Wenckstern, S., Sakinofsky, I., Dyck, R.J., Kral, M.J., Bland, R.C. (1998). Suicide in Canada. University of Toronto Press, Toronto.

Li, Guangwei et al. (2008). The Long-Term Effect of Lifestyle Interventions to Prevent Diabetes in the China Da Qing Diabetes Prevention Study: a 20-Year Follow-up Study. *The Lancet* 371(9626). 1783–89.

Liu, L., Hader, J., Brossart, B., White, R., & Lewis, S. (2001). Impact of rural hospital closures in Saskatchewan, Canada. *Social Science and Medicine*, 52(12), 1793–1804.

Link, Bruce and Jo Phelan. (2000). Evaluating the Fundamental Cause Explanation for Social Disparities in Health. *Handbook of Medical Sociology*, 33–47. Upper Saddle River, NJ: Prentice-Hall.

Lindstrom, J. et al. (2006). High-Fibre, Low-Fat Diet Predicts Long-Term Weight Loss and Decreased Type 2 Diabetes Risk: *The Finnish Diabetes Prevention Study*. *Diabetologia* 49(5), 912-20.

Locker D, Maggirias J, Quiñonez C. (2011). Income, Dental Insurance Coverage, and Financial Barriers to Dental Care Among Canadian Adults. J Public Health Dent. 71(4), 327–34.

Listl, Stefan, John Moeller, and Richard Manski. (2013). A Multi-Country Comparison of Reasons for Dental Non-Attendance. *European Journal of Oral Sciences* 122(1), 62–69.

Luo W, Morrison H, de Groh M, et al. (2007). The Burden of Adult Obesity in Canada. *Chronic Dis Can* 27(4),135-44.

MacMillan, Harriet L., Angus B. MacMillan, David R. Offord, and Jennifer L. Dingle. (1996). Aboriginal Health. *Canadian Medical Association* 155(11), 1569-78.

Malik, Vasanti S., Walter C. Willett, and Frank B. Hu. (2012). Global Obesity: Trends, Risk Factors and Policy Implications. *Nature Reviews Endocrinology* 9(1), 13–27.

Mattson, J. W. (2010). Aging and Mobility in Rural and Small Urban Areas: A Survey of North Dakota. *Journal of Applied Gerontology* 30(6), 700–718.

Matz, C. J., Stieb, D. M., & Brion, O. (2015). Urban-rural differences in daily time-activity patterns, occupational activity and housing characteristics. *Environmental Health, 14*(1), 88.

Martens PJ, Sanderson D, Jebamani LS. (2005). Mortality comparisons of First Nations to all other Manitobans. *Canadian Journal of Public Health* 9(1), 33–38.

Martin, S. L., et al. (2005). Urban, Rural, and Regional Variations in Physical Activity. *Journal of Rural Health* 21(3), 239–44.

McDonald, J. T., & Conde, H. 2010. Does Geography Matter? The Health Service Use and Unmet Health Care Needs of Older Canadians. *Canadian Journal on Aging / La Revue Canadienne Du Vieillissement.* 29(01), 23 - 37.

McLaren L. (2007). Socioeconomic Status and Obesity. *Epidemiological Review* 29, 29-48.

McNivens, C., H. Puderer, & Janes, D. (2000). Census Metropolitan Area and Census Agglomeration Influenced Zones (MIZ): A Description of the Methodology Ottawa: Statistics Canada.

Mercer, SL., Goel, V. (1997). Factors associated with the use of mammography: the Ontario Health Survey. Cancer Prevention & Control 1, 144-51.

Meurman JH, Sanz M. (2004). Oral health, atherosclerosis, and cardiovascular disease. *Critical Review Oral Biological Medicine* 15, 403–13.

Missinne, Sarah, Stijn Daenekindt, and Piet Bracke. (2015). The Social Gradient in Preventive Healthcare Use: What Can We Learn from Socially Mobile Individuals? *Sociology of Health & Illness* 37(6), 823–38.

Mitura, V., Bollman, R.D. (2003). The health of rural Canadians: a rural–urban comparison of health indicators. Rural and Small Town Canada Analysis Bulletin 4(6), Catalogue No. 21-006-XIE.

Mokdad, Ali H., Marks, James S., Stroup, Donna F., & Gerberding, Julie L. (2004). Actual Causes of Death in the United States. *Journal of the American Medical Association* 291(10), 1238–1245.

Mollborn, Stefanie, Laurie James-Hawkins, Elizabeth Lawrence, and Paula Fomby. (2014). Health Lifestyles in Early Childhood. *Journal of Health and Social Behavior* 55(4), 386–402.

Mollborn, Stefanie and Elizabeth Lawrence. (2018). Family, Peer, and School Influences on Children's Developing Health Lifestyles. *Journal of Health and Social Behavior* 59(1), 133–50.

Mitchell, Jonathan A. et al. (2010). The Impact of Combined Health Factors on Cardiovascular Disease Mortality. *American Heart Journal* 160(1), 102–8.

Muirhead VE, Quiñonez C, Figueiredo R, Locker D. (2009). Predictors of Dental Care Utilization Among Working Poor Canadians. Community Dent Oral Epidemiology 37, 199–208.

Mustard C, Derkson S, Berthelot J-M, Wolfson M, Roos LL, Carriere KC, Zierler A. (2009). Socioeconomic Gradients in Mortality and the Use of Health Care Services at Different Stages in the Life Course. Winnipeg: Manitoba Centre for Health Policy.

Oboler, Sylvia K., Allan V. Prochazka, Ralph Gonzales, Stanley Xu, and Robert J. Anderson. (2002). Public Expectations and Attitudes for Annual Physical Examinations and Testing. *Annals of Internal Medicine* 136(9), 652-9.

O'rand, A. (2006). Stratification and the Life Course. Life Course Capital, Life Course Risks, and Social Inequality. *Handbook of Aging and the Social Sciences* 145–62.

Orpana HM, Berthelot JM, Kaplan MS, et al. (2010). BMI and Mortality: Results From a National Longitudinal Study of Canadian Adults. *Obesity* 18(1), 214-8.

Pampalon, R., Gauthier, R., Raymond, G., Beaudry, D. (1990). La sante a la carte. Ministere de la Sante´ et des Services sociaux, Les Publications du Quebec, Quebec.

Pampalon, R. (1991). Health Discrepancies in Rural Areas in Quebec. *Social Science and Medicine* 33,

355–360.

Pampalon, R., Loslier, L., Raymond, G., Provencher, P., Sante Quebec. 1995. Variations geographiques de la sante. Rapport de l'Enqueˆte sociale et de sante´ 1992–1993, vol. 3. Ministere de la Sante et des Services sociaux, Montreal.

Pampel, Fred C. (2009). The Persistence of Educational Disparities in Smoking. *Social Problems* 56(3), 526–42.

Pampel, Fred C. (2012). Does Reading Keep You Thin? Leisure Activities, Cultural Tastes, and Body Weight in Comparative Perspective. *Sociology of Health Illness* 34(3), 396–411.

Parks, S. E. (2003). Differential Correlates of Physical Activity in Urban and Rural Adults of Various Socioeconomic Backgrounds in the United States. *Journal of Epidemiology & Community Health* 57(1), 29–35.

Peek-Asa, C., Zwerling, C., & Stallones, L. (2004). Acute Traumatic Injuries in Rural Populations. *American Journal of Public Health 94*(10), 1689-93.

Peretti-Watel P, Constance J, Seror V, Beck F. (2009). Working Conditions, Job Dissatisfaction and Smoking Behaviours Among French Clerks and Manual Workers. *Journal of Occupational and Environmental Medicine* 51(3), 343–350.

Pickett, W., Davison, C., Torunian, M., McFaull, S., Walsh, P., & Thompson, W. (2012). Drinking, substance use and the operation of motor vehicles by young adolescents in Canada. *PloS One*, 7(8).

Pickett, W., Hartling, L., Brison R.J., Guernsey, J.R (1999). Fatal work-related farm injuries in Canada, 1991–1995. *CMAJ* 160(13), 1843–8.

PHAC, CIHI, (2011). Obesity in Canada. A joint report from the Public Health Agency of Canada and the Canadian Institute for Health Information. Ottawa, ON.

Plotnikoff, Ronald C., Alain Mayhew, Nicholas Birkett, Constantinos A. Loucaides, and George Fodor. (2004). Age, Gender, and Urban–Rural Differences in the Correlates of Physical Activity. *Preventive Medicine* 39 (6),1115–25.

Pong, R.W., Atkinson, A.-M., Irvine, A., MacLeod, M., Minore, B., Pegoraro, A., Pitblado, J.R., Stones, M., Tesson, G. (1999). Rural Health Research in the Canadian Institutes of Health Research. Canadian Health Services Research Foundation.

Popkin, B.M., Kim, S., Rusev, E.R., Du, S., Zizza, C. (2006). Measuring the Full Economic Costs of Diet, Physical Activity and Obesity-Related Chronic Diseases. *Obesity reviews: social journal of the International Association for the Study of Obesity* 7(3), 271-293.

Radi S, Ostry A, Lamontagne AD. (2007). Job stress and other working conditions: Relationships with

smoking behaviors in a representative sample of working Australians. *American Journal of Industrial Medicine*. 50(8), 584–596.

Reeder BA, Chen Y, Macdonald SM, Angel A, Sweet L. (1997). Regional and Rural-Urban Differences in Obesity in Canada. Canadian Heart Health Surveys Research Group. CMAJ 157, 10–16.

Reimer, Bill. (2007). "Immigration in the New Rural Economy." *Our Diverse Cities* 3–41.

Reutter L. (2000). Socioeconomic determinants of health. In: Stewart MJ, editor. Community nursing: promoting Canadians' health. 2nd ed. Toronto: W.B. Saunders.

Ricci, J.A., Chee, E. (2005). Lost productive time associated with excess weight in the U.S. workforce. *Journal of occupational and environmental medicine / American College of Occupational and Environmental Medicine* 47(12), 1227-1234.

Robertson, E. B. (1997). Introduction to mental health service delivery in rural areas. Rural substance abuse: State of knowledge and issues (National Institute on Drug Abuse Monograph 168, NIH Pub. No. 97-4177, pp. 413-417). Washington, DC: Government Printing Office.

Romans, Sarah, Marsha Cohen, and Tonia Forte. (2010). Rates of Depression and Anxiety in Urban and Rural Canada. *Social Psychiatry and Psychiatric Epidemiology* 46(7), 567–75.

Ross, Catherine E. and Chloe E. Bird. (1994). Sex Stratification and Health Lifestyle: Consequences for Men's and Women's Perceived Health. *Journal of Health and Social Behavior* 35(2), 161–78.

Ross, C. E., & Mirowsky, J. (2006). Sex Differences in the Effect of Education on Depression: Resource Multiplication or Resource Substitution? *Social Science & Medicine* 63(5), 1400-1413.

Ross, Catherine and John Mirowsky. (2005). Education, Learned Effectiveness, and Health. *London Review of Education* 3(3), 205–20.

Ross, C. E., & Wu, C. (1996). Education, Age, and the Cumulative Advantage in Health. *Journal of Health and Social Behavior 37*(1), 104.

Rural Secretariat, The. (2001). *The Rural Annual Report at a Glance: Enhancing the Quality of Life for Rural Canadians*. Ottawa: Government of Canada.

Saint Onge, Jarron M., & Krueger, Patrick M. (2011). Education and race/ethnic differences in types of exercise in the United States. *Journal of Health and Social Behavior* 52(2), 197–211.

Saint Onge, J.M., Krueger, P.M. (2017). Health lifestyle behaviors among US adults. *Social Science Medicine Population* Health 3, 89-98.

Schouten, L. J., H. Meijer, J. A. M. Huveneers, and L. A. L. M. Kiemeney. (1996). Urban-Rural Differences in Cancer Incidence in The Netherlands, 1989–1991. *International Journal of Epidemiology* 25(4), 729–36.

Sharkey, Josephr., Cassandram. Johnson, and Wesley. Dean. (2011). Less-Healthy Eating Behaviors Have a Greater Association with a High Level of Sugar-Sweetened Beverage Consumption among Rural Adults than among Urban Adults. *Food & Nutrition Research* 55(1), 5819.

Shields M, Tjepkema M. (2006). Regional Differences in Obesity. *Health Reports* 17(3), 61–7.

Shields, M. (2008). Community Belonging and Self-Perceived Health. *Health Reports* 19(2), 51-60.

Skalamera, Julie and Robert A. Hummer. (2016). Educational Attainment and the Clustering of Health-Related Behavior among U.S. Young Adults. *Preventive Medicine* 84, 83–89.

Smith, K. B., Humphreys, J. S., & Wilson, M. G. (2008). Addressing the health disadvantage of rural populations: How does epidemiological evidence inform rural health policies and research? *Australian Journal of Rural Health 16*(2), 56-66.

Snead, M. Christine and William C. Cockerham. (2002). Health Lifestyles and Social Class in the Deep South. *Research in the Sociology of Health Care Social Inequalities, Health and Health Care Delivery* 107–22.

Sorensen, Glorian et al. (1995). A Model for Worksite Cancer Prevention: Integration of Health Protection and Health Promotion in the Well Works Project. *American Journal of Health Promotion* 32(1), 55–62.

Sorensen G, Barbeau E, Hunt MK, Emmons K. (2004). Reducing social disparities in tobacco use: A social-contextual model for reducing tobacco use among blue-collar workers. *American Journal of Public Health* 94(2), 230–239.

Spring, Bonnie, Moller, Arlen C., & Coons, Michael J. (2012). Multiple health behaviors: overview and implications. *Journal of Public Health* 34(1), 3–10.

Statistics Canada. 2011. "Canada's Rural Population since 1851." *Statistics Canada: Canada's National Statistical Agency / Statistique Canada : Organisme Statistique National Du Canada*. https://www12.statcan.gc.ca/census-recensement/2011/as-sa/98-310-x/98-310-x2011003_2-eng.cfm

Statistics Canada. 2014. "Overweight and Obese Adults (self-reported), 2014." https://www150.statcan.gc.ca/n1/pub/82-625-x/2015001/article/14185-eng.htm

The Rural Secretariat. 2001. Enhancing the Quality of Life for Rural Canadians. Ottawa: Agriculture and Agriculture Food Canada

Thomson WM, Williams SM, Broadbent JM, Poulton R, Locker D. (2010). Long-term Dental Visiting Patterns and Adult Oral Health. *J Dent Res* 89(3), 307–11.

Turcotte, M. (2005). Social engagement and civic participation: Are rural and small town populations really at an advantage? *Rural and Small Town Canada Analysis Bulletin* 6(4).

Twells LK, Bridger T, Knight JC, et al. (2010). Obesity predicts primary health care visits: a cohort study. *Popul Health Manage* 15(1), 29-36.

US Department of Health and Human Services. (2000). *Healthy People 2010: Understanding and Improving Health*, 2nd edn. Washington, DC: Department of Health and Human Services (US).

Walls, Helen L., Kathryn Backholer, Joseph Proietto, and John J. Mcneil. 2012. Obesity and Trends in Life Expectancy. *Journal of Obesity* 1-4.

Wade, Terrance J., Ivy Lynn Bourgeault, and Elena Neiterman. (2016). *The Social Dimensions of Health and Health Care in Canada*. Toronto: Pearson.

Warda, L., Klassen, T.P., Buchan, N., Zierler, A. (1998). All-terrain vehicle ownership, use, and self-reported safety behaviours in rural children. *Injury Prevention* 4(1), 44–49.

Weaver, Kathryn E., Nynikka Palmer, Lingyi Lu, L. Douglas Case, and Ann M. Geiger. (2013). Rural–Urban Differences in Health Behaviors and Implications for Health Status among US Cancer Survivors. *Cancer Causes & Control* 24(8), 1481–90.

Weber, Max. 1946. *From Max Weber: Essays in Sociology*. Translated and edited by Hans Gerth and C. Wright Mills.

Wiesinger, G. (2007). The importance of social capital in rural development, networking and decision-making in rural areas. *Revue De Géographie Alpine* 95(4), 43-56.

Wilcox, S. (2000). Determinants of Leisure Time Physical Activity in Rural Compared with Urban Older and Ethnically Diverse Women in the United States. *Journal of Epidemiology & Community Health* 54(9), 667–72.

Withrow D, Alter DA. (2011). Economic burden of obesity worldwide: a systematic review of the direct costs of obesity. Obesity Review 12,131-41.

Young, TK. (1991). Prevalence and Correlates of Hypertension in a Subarctic Indian Population. *Preview Medicine* 20(4), 474-85.

Chapter 3

3 Health Lifestyles Across Canada's Urban - Rural Continuum

3.1 Introduction

In this chapter, I conduct two separate analysis in Part 1 and Part 2. In Part 1, I first estimate health lifestyle classes and then test the relationship between health lifestyles and Canada's urban - rural continuum using a nationally representative dataset. In Part 2, I use the same dataset, measurements, and analytic sample to test the relationship between urban - rural residency and Body Mass Index (BMI), net of health lifestyle classes, sociodemographic and socioeconomic indicators. The inclusion of health lifestyle classes may demonstrate how health lifestyles explain the relationship between geographic residency and BMI.

3.2 Data

To examine health lifestyle differences between urban and rural Canadians this study uses data from the 2014 Canadian Community Health Survey (CCHS). The CCHS is a nationally representative cross-sectional survey that collects information related to health status, health care utilization, and health determinants for the Canadian population. The microdata's raw sample size is composed of 63,964 respondents and includes Canadians aged 12 and older who live in private dwellings in all provinces and territories, excluding those living on First Nation Reserves, Crown Land or private institutions, and members of the Armed Forces. The survey is administered by Statistics Canada and has been collected annually since 2007. It is important to note that all survey answers are based on self-reports from the respondents.

3.3 Analytic Sample & Strategy

The CCHS asks all survey participants 'core content' questions, which include geographic location, sociodemographic characteristics, socioeconomic indicators, as well as select health service, social well-being, and health behaviour indicators. The analytic sample is limited to respondents age 25 through 64 to allow enough time for students to obtain postsecondary education, including a four-year university degree, as well as capturing respondents in the workforce (N= 34,851). Due to social, cultural, economic, and structural heterogeneity from other rural Canadians, respondents identifying as Indigenous were not included in the analytic sample (N=33,164). This is important to mention as a large proportion of the Canadian rural population is Indigenous (Kulig & Williams, 2010). In addition, all survey participants who reside in a territory and the northern areas of Canada were dropped from the sample based on social, cultural and ecological differences relative to the rest of Canada (Lehti et al., 2009) (N=31,793). Respondents who were missing on any of the variables included in the analysis were excluded (27,142). Lastly, 7.3% of the original sample is missing data and respondents who did not report their income accounted for 54% of the missing data. After the purposive exclusions and consideration of missing data on the variables included in the analysis, the final sample size is 27,142 respondents.

The analysis occurs in two main steps. First, in Part 1, I use latent class analysis (LCA) to identify latent health lifestyle categories (Collins & Lanza, 2010). LCA uses observed indicators to uncover population subgroups that are homogenous in their patterns of health behaviour responses (Collins & Lanza, 2010). LCA identifies unique health lifestyle categories based on the health-related indicators. Latent classes are generated based on the association across various health-related indicators that are subsequently sorted into mutually exclusive and exhaustive latent classes where the probability of health-related indicators is highest (Collins & Lanza,

2010; Shuey & Willson, 2017). The next step in LCA is to include covariates into the model to predict class membership. My conceptual model, which suggests that health lifestyles differ along the Canadian urban – rural continuum, includes 4 measurements of geographic location, and controls for sociodemographic and economic indicators. I use multinomial regression to estimate the relative risk ratio (RRR) for urban and rural respondents engaging in one of six health lifestyles. In the second part of the study, I use the latent health lifestyle categories as an independent variable to predict BMI patterns along the Canadian urban – rural continuum. All analyses in this study are weighted using Statistic Canada's weight variable. Lastly, this study uses STATA 15 and the LCA Stata Plugin version 1.2.1 (LCA Stata Plugin, 2015; Lanza et al., 2015).

3.4 Part 1: Health Lifestyles

3.4.1 Measures

3.4.1.1 Dependent Variable: Health Lifestyle Indicators

Based on the reviewed literature, I define health lifestyles as the activities, choices, and habits that an individual engages with that influence their health. Core health behaviours routinely included in the literature are leisure time physical activity, dietary practices, smoking, and alcohol consumption. In addition to these behaviours, I incorporate structural health-related indicators that literature cites as influencing health and that may differ by urban – rural residency. These health-related indicators include health service utilization, employment in a hazardous industry, and sense of community belonging. The following variables were dichotomized into binary indicators identifying whether the individual engages in a Negative Health Lifestyle (coded=1) or a Positive Health Lifestyle (coded=2).

Dietary consumption of fruits and vegetables is based on a derived variable that asks survey participants to self-identify their daily consumption of fruit and vegetables. The variable

asks whether participants consume less than 5 servings, between 5 to 10, or more than 10 servings of fruits and vegetables per day. I created a binary indicator that identifies respondents as (1) consuming 'less than 5 servings' and (2) 'more than 5 servings per day'.

Physical (in)activity is based on participants' self-reported frequency of leisure physical activity. A derived variable was generated based on the respondent's frequency of physical activity and categorized into the following: very active, moderately active, somewhat active, and sedentary. I generated a binary indicator (1) sedentary and collapsed all active respondents into (2) active.

Substance use is measured through respondents' smoking and alcohol consumption habits. Respondents who identify as an occasional or regular smoker were combined into the (1) 'smoker' category, while those who never smoke were coded as (2) 'non-smoker'. Alcohol consumption is based on respondents' self-reported drinking habits: regular, occasional, and never. Because this question does not capture binge drinking, I kept (1) 'regular drinkers' and recoded occasional and non-drinkers into (2) 'non-regular drinkers' to identify those who occasionally drink or practice abstinence from alcohol.

Measures of *employment in a hazardous occupation, health service use, and sense of community belonging* are structural health-related indicators, all of which have health implications in rural communities (CIHI, 2006; Kulig & Williams, 2010; Matz, Stieb, & Brion, 2015). All survey participants were asked to identify their industry type: 'management', 'business and administration', 'sales and services', 'trades, transport, and equipment', and 'industrial and manufacturing'. Respondents working in 'trades, transport, and equipment' or 'industrial and manufacturing' were merged into the (1) 'hazardous industry' group, based on the likelihood of workplace injury or fatality occurring in primary industry jobs (Pong et al., 1999;

Matz, Stieb, & Brion, 2015; CAIR, 2016). All other occupation groups were coded as (2) 'non-hazardous industry'.

Following Lawrence et al. (2017), health service use includes visits with a family doctor and a dentist. Respondents were asked if they have consulted with a family doctor or general practitioner in the past 12 months and were coded as (1) "no" and (2) "yes". In addition, visits with a dentist in the past 12 months were coded as (1) "no" and (2) "yes".

Sense of community belonging is a characteristic of dissimilarity between rural and urban lifestyles (Turcotte, 2005; CIHI, 2006). Sense of community belonging can help identify the respondent's opinion of social belongingness and isolation. Respondents were asked how they would describe their sense of belonging to the local community: 'very strong', 'somewhat strong', 'somewhat weak', or 'very weak'. Observations were collapsed into binary indicators and coded as (1) "weak" and (2) "strong".

3.4.1.2 Independent Variable: Measuring Rurality

I use the derived variable *metropolitan influence zone* (MIZ), which measures the Canadian population residing outside the commuting zone of a larger urban center: census metropolitan area (CMA) or census agglomerations (CA), defined as an area with a population exceeding 10,000 (Statistics Canada, 2011). Based on this definition, a rural person is someone who does not live in a CMA or CA, in other words, in an area with a population of less than 10,000. In addition to this distinction, MIZ measures the community's degree of integration and connectivity with larger urban centres (Pitblado & Pong, 1999; McNivens et al., 2000; du Plessis, 2001; Allan & Cloutier-Fisher, 2006; McDonald & Conde, 2010; Lavergne & Kephart, 2012). MIZ does not simply measure the community's proximity to urban centers, but is based on the proportion of employed residents who commute from their residence to the nearby urban

center (Statistics Canada, 2011). The MIZ measurement categorizes rural communities into heterogeneous zones of metropolitan influence based on the rural area's employed labor force commuting flows to nearby urban areas (Lavergne & Kephart, 2012). This measurement distinguishes rural communities with greater access to urban resources from rural communities with less access. Strong MIZ indicates that 30 – 50% of the communities' labor force commutes to nearby urban centres, Moderate MIZ indicates 5 – 30%, and Weak MIZ indicates 0 – 5%. Areas identified as no MIZ have an employed labor force of less than 40 residents or no commuters to an urban area.

MIZ is a beneficial and practical measurement because it portrays an aggregation of rural individuals in similar labour markets, who live outside urban centers in the countryside or in small towns (du Plessis et al, 2001). The further the rural area is from an urban centre, the less likely members of the community benefit from urban institutions, resources, and infrastructure. Rural communities' distance from an urban area may restrict a resident's ability to access and contribute to high quality labour market opportunities; health services; network structures; and other infrastructures (Reimer, 2007; McDonald & Conde, 2010). It should be noted that a rural community's integration patterns imply distance from economic, social, and political power, which can conceive a lack of opportunity that is often cited as a central characteristic of rural living (du Plessis et al, 2001; Reimer, 2007).

3.4.1.3 Control Variables

This study included the following sociodemographic and socioeconomic variables in multivariate regression models: respondents' sex, age, marital status, region of residence, immigrant status, education attainment, employment status, occupation, and personal income. Sex is a binary indicator identifying whether the respondent is male or female. Age is a categorical variable that

captures respondents between the ages of 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-60 and 60-64. Marital status accounts for the married, separated/divorced/widowed, common-law, and never married. Region of residence is based on the geographic dispersion of Canadians and includes those residing in Atlantic Canada, Quebec, Ontario, the Prairies, and British Columbia. Immigrant status is a binary indicator that identifies whether the respondent is Canadian-born/Canadian citizen or is a landed immigrant within the past 10 years. Education attainment captures respondents' who have less than a high school education, a high school education, some post-secondary education, or a post-secondary education. Employment status considers those who are employed, not employed, or unable to work. In general, the 'not employed' category includes those who are officially unemployed, retired, students, caregiving, parental leave, and those who are unwilling to work. Occupation accounts for those working in management, business or administration, sales and services, trades and equipment, or industrial and manufacturing. Finally, personal income is a continuous variable (no income - $100,000 or more) and is presented as such in the regression models. In the descriptive table, personal income is shown incrementally for illustrative purposes.

3.4.2 Results

3.4.2.1 Descriptive Results

Table 3.1 presents weighted percent distributions of respondents' characteristics across the Canadian urban – rural continuum. Approximately 84% of the sample participants reside in urban areas of Canada and over 16% of respondents live in rural Canada. This corresponds with Statistics Canada estimates (2011), which shows approximately 18.9% of Canadians are rural. In general, rural Canadians are older than their urban counterparts; more likely to be married; less ethnically diverse; less educated; and more likely to be not employed. Rural Canadians are more

likely to be employed in trades or industrial work, while urban Canadians are more likely to work in management positions. Furthermore, there are no trends that indicate an income disparity across the continuum as annual personal income is consistent across geographic location.

Table 3.2 displays survey participants percent distributions for the health lifestyle indicators across the Canadian urban – rural continuum. There are no notable differences in the consumption of fruits and vegetables or physical activity, although respondents from strong influence MIZ appear more likely to exercise than other geographic areas. The more rural a respondent is the greater likelihood they smoke; however, non-drinkers are more likely to reside in the most rural parts of Canada. Hazardous work is more prominent in non-urban regions of Canada. Canadians from urban areas and the most rural communities are less likely to have a family doctor than those who live in strong or moderate MIZ regions. In addition, dentist visits become less prevalent the more rural the respondent is. Lastly, the more rural a respondent is the more likely they are to have a strong sense of community belonging.

Table 3.1 Percent distribution of respondent characteristics across the Canadian urban – rural continuum (N=27,142)

	CMA/CA	Strong Influence	Moderate Influence	Weak/No Influence
Weighted N	22,747	1,290	1,804	1,301
Sex				
Male	49.86	51.85	51.37	49.50
Female	50.14	48.15	48.63	50.50
Age				
25 - 29	12.81	10.08	9.70	9.53
30 - 34	12.43	9.61	10.31	10.07
35 - 39	13.36	10.78	9.42	8.76
40 - 44	13.00	12.64	12.58	12.06
45 - 49	11.50	9.46	10.97	10.83
50 - 54	13.32	16.28	14.19	16.21
55 - 59	13.23	16.28	15.68	16.37
60 - 64	10.33	14.73	17.12	16.14
Marital Status				
Married	55.87	56.59	57.36	58.78
Common-Law	13.98	21.71	13.19	15.45
Divorced/Separated/Widowed	10.99	9.30	11.19	11.99
Never Married	19.15	12.40	13.19	13.83
Region				
Atlantic	5.08	7.98	17.46	20.90
Quebec	23.42	31.71	34.64	16.67
Ontario	40.27	46.13	22.50	11.37
Prairies	17.68	10.78	17.40	37.27
British Columbia	13.54	3.41	7.98	13.68
Immigrant				
Yes	30.69	5.35	4.82	6.99
No	69.30	94.66	95.16	92.98
Post-Secondary Education				

Less than High School	3.16	5.04	7.32	7.15
Has High School	9.17	13.02	14.30	16.21
Has some Post-Secondary Education	3.13	3.49	3.49	2.61
Has Post-Secondary Education	84.54	78.38	75.43	74.00
Employment Status				
Employed	80.79	82.02	75.20	76.46
Not Employed	16.44	15.89	19.90	19.59
Unable	2.77	2.02	4.88	3.92
Industry				
Management	34.27	28.45	21.17	23.59
Business/Administration	15.90	14.03	10.59	11.14
Sales/Services	15.00	12.33	13.52	14.60
Trades/Equipment	10.97	17.13	16.96	14.22
Industrial/Manufacturing	4.65	10.08	12.97	12.99
Income				
Less than $10,000	9.34	6.74	11.69	9.37
$10,000 - $19,999	9.72	8.84	11.08	11.14
$20,000 - $39,999	22.44	27.21	27.43	25.97
$40,000 - $59,999	22.72	26.67	21.50	22.51
$60,000 - $79,999	15.24	12.17	14.41	11.83
$80,000 - $99,999	8.64	9.92	5.10	6.76
$100,000 and above	11.89	8.22	8.59	12.37

Table 3.1 (continued) Percent distribution of respondent characteristics across the Canadian urban – rural continuum (N=27,142)

	CMA/CA	Strong Influence	Moderate Influence	Weak/No Influence
Weighted N	22,747	1,290	1,804	1,301
Health Lifestyle Indicators				
Fruit & Vegetable Consumption				
< 5 servings a day	58.61	57.29	57.91	58.09
> 5 servings a day	36.93	37.37	36.85	36.42
Physical Activity				
Sedentary	16.33	13.88	16.13	16.52
Exercises	82.78	84.66	82.8	82.3
Smoker				
Yes	19.76	22.4	24.22	25.43
No	80.22	77.6	75.81	74.54
Regular Drinker				
Yes	65.85	73.65	68.11	60.48
No	33.78	26.05	31.59	31.97
Works in a Hazardous Industry				
Yes	15.62	27.21	29.93	27.2
No	84.38	72.79	70.05	72.77
Has a Family Doctor				
Yes	83.61	86.28	86.73	81.68
No	16.31	13.64	13.19	18.21
Contact with Dentist Past 12 Months				
Yes	70.73	65.27	61.68	61.01
No	29.18	34.65	38.3	38.96
Sense of Community Belonging				
Weak	36.87	34.03	29.82	24.9
Strong	61.49	63.57	68.61	73.31

3.4.2.2 Identifying Health Lifestyles

The first objective for this chapter is to identify mutually exclusive and exhaustive health lifestyle latent classes. The process used to identify the optimal number of latent classes is theoretically motivated and based on a combination of fit statistics, parsimony, and the interpretability of alternate estimated models (Collins & Lanza, 2010). First, 2 through 7 latent classes are estimated and model fit statistics are compared across the classes using Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), and Entropy. Lower values of AIC and BIC indicate better model fit, while an increase for AIC or BIC indicates poorer

Table 3.2 Fit statistics for class enumeration

# of Classes	AIC	BIC	Entropy
2	1479.318	1618.869	11742.269
3	751.844	965.275	15979.561
4	635.291	922.602	20570.626
5	501.878	863.068	24193.422
6	**416.314**	**851.384**	**26400.696**
7	366.101	875.051	26480.702

model fit. Entropy measures the variability in a randomly determined system (Celeux & Soromenho, 1996). Lower values of entropy demonstrate less variability within each number of classes, which indicates that the classes are more homogenous. Conversely, higher entropy scores indicate greater variability and heterogeneity. For the purposes of this analysis, I chose the 6-class model as best fit based on the fit statistics results. Albeit BIC increases moderately, AIC decreases and entropy increases likewise. However, the fit statistics for model 6 are consistent across all 3 test statistics, which suggests that the 6-class model is best fit. Based on the BIC's increase in a 7-class model, I chose the 6-class model.

Next, LCA generates item-response probabilities, the probability of a respondent practicing or experiencing a health-related behaviour in each latent class. The first column in Table 3.3, "Population Average" reports the overall sample mean of the eight indicators used in the latent classes. The following six columns show weighted item-response probabilities across latent classes, which can be interpreted as the percentage of respondents engaging in the health-related behaviour or activity (Lawrence et al., 2017). Class sizes are given in the row 'class membership prevalence'.

Each latent class is named after the behaviours that dominate the distinct class. To determine these patterns, the overall mean for each indicator in column 1 was compared to the item-response probability in each of the eight latent classes. Item-response probabilities in bold reflect behaviours that are *better* for health compared to the population average and underlining indicates the probability is *worse* for health. The latent class labeled *Positive Health Lifestyle* includes respondents who gave positive health-related responses across all indicators and is the largest class (45%). The *Negative Health Lifestyle* (18%) includes respondents with a very low probability of practicing positive diet habits and healthcare use, but a high probability of regular drinking, smoking, and working in a hazardous industry. *Negative Health Lifestyle, Non-Substance Users* (12%) represented respondents whose defining characteristic is that they do not smoke or consume alcohol. The *No Family Doctor* class (6%) is similar to the Positive Health Lifestyle class, however, respondents in this class are unlikely to have a regular family doctor. Respondents in the *Healthcare Use, Social Isolation* (10%) class report weak community belonging and have poor dietary habits but have high probability of having a family doctor and contacting a dentist in the past 12 months. Lastly, similar to the Negative Health Lifestyle class, the *Negative Health Behaviours and Healthcare Use* (10%) class exhibited a high probability of

engaging in negative health behaviours, including smoking; although, this class differed in two key respects: they are unlikely to work in a hazardous industry and they are very unlikely to have a doctor or visit a dentist.

Table 3.3 Item-response probabilities from latent class analysis (LCA) for health lifestyles (ages 25 - 64)

	Population Average	Positive Health Lifestyle	Negative Health Lifestyle	Negative Health Lifestyle, Non-Substance User	No Family Doctor	Negative Health Behaviours, Healthcare Use, Social Isolation	Negative Health Behaviours & Poor Healthcare Use
Class Membership Prevalence		45%	18%	12%	6%	10%	10%
Fruit & Vegetables (5+ servings)							
yes	0.37	**0.54**	0.22	0.39	**0.67**	0.13	0.11
no	0.58	0.46	0.78	0.61	0.33	0.87	0.89
Physical Activity							
yes (exercises)	0.83	**0.97**	**0.89**	0.67	**0.97**	0.62	0.60
no (sedentary)	0.16	0.03	0.11	0.33	0.03	0.38	0.40
Smoker							
yes	0.23	0.09	0.37	0.17	0.20	0.33	0.56
no	0.77	**0.91**	0.63	**0.83**	**0.80**	0.67	0.44
Alcohol Consumption							
yes (regular)	0.67	0.76	0.90	0.09	0.73	0.63	0.52
no (abstinence)	0.31	0.24	0.10	**0.91**	0.27	0.37	**0.48**
Hazardous Industry							
yes	0.16	0.08	0.57	0.12	0.14	0.16	0.23
no	0.84	**0.92**	0.43	**0.88**	**0.86**	0.84	0.77
Has a Regular Doctor							
yes	0.85	**0.96**	0.77	**0.92**	0.39	**0.89**	0.76
no	0.15	0.04	0.23	0.08	0.61	0.11	0.24
Dentist (visit last 12 months)							
yes	0.65	**0.87**	0.56	0.49	0.62	**0.92**	0.11
no	0.35	0.13	0.44	0.51	0.38	0.08	0.89
Sense of Community Belonging							
strong	0.67	**0.76**	0.69	0.69	0.52	0.43	0.51
weak	0.31	0.24	0.31	0.31	0.48	0.57	0.49

N = 27,143. Bolding means the probability is better for health compared to the population average and underlining indicates that the probability is worse for health.

3.4.2.3 Health Lifestyles Along the Canadian Urban - Rural Continuum

Table 3.4 presents percent distributions of the Canadian urban - rural continuum across health lifestyle classes. In general, a Positive Health Lifestyle is most common across all geographic regions, but there is a greater proportion of urban and strong MIZ dwellers in the Positive Health Lifestyle class compared to Moderate MIZ and Weak/No MIZ residents. Compared to those living in more urban areas, there is a greater proportion of rural respondents in the Negative Health Lifestyle latent class. Respondents from suburban (strong influence) communities were the least likely to engage in the Negative Health Lifestyle, Non-Substance User class relative to other geographic regions. This result is surprising as some work indicates greater prevalence of religiosity in rural parts of Canada (Kulig & Williams, 2010). Urban respondents are more likely to experience a No Family Doctor lifestyle, while suburban Canada is least likely. This could be attributed to a greater concentration of immigrants in urban Canada. Urban dwellers are more likely to belong to the Negative Health Behaviours, Healthcare Use, Social Isolation class relative to rural communities. Lastly, there is greater prevalence of Negative Health Behaviors and Healthcare Use in rural communities than their urban counterparts.

The next step is to test the relationship between the health lifestyle classes and the urban - rural continuum. Table 3.5 presents unadjusted coefficients and significance testing from multinomial logistic regression that predicts the association between health lifestyles and geographic residence. In this analysis, the outcome measured is a latent health lifestyle category, in which I will test this relationship. Positive Health Lifestyle is the reference category and each degree of rurality is relative to CMA/CA. Each coefficient will be interpreted through relative risk ratio (RRR). An RRR > 1, compared to the Positive Health Lifestyle, signifies that the risk of membership in a specific health lifestyle class is more likely than membership in the Positive

Health Lifestyle, whereas an RRR < 1 indicates that the risk of a specific health lifestyle is less likely than the risk of a Positive Health Lifestyle.

In the unadjusted model, there are several differences: the further a survey respondent lives from an urban center, the more likely they are to experience a Negative Health Lifestyle. In fact, the relative risk of engaging in this specific health lifestyle class over a Positive Health Lifestyle is 1.77 for moderate MIZ and 1.96 for weak/no MIZ relative to their urban counterpart. The relative risk of practicing a Negative Health Lifestyle, Non-Substance Use health lifestyle over a general Positive Health Lifestyle is .68 for suburban respondents' relative to urban respondents. In other words, suburban Canadians are less likely to practice this health lifestyle than they are to practice a Positive Health Lifestyle. Moreover, the relative risk of experiencing a No Family Doctor health lifestyle over a general Positive Health Lifestyle is .51 for suburban respondents' relative to urban respondents. That is, suburban Canadians are more likely to experience a Positive Health Lifestyle than they are to experience a No Family Doctor lifestyle. The relative risk for experiencing a Negative Health Behaviours, Healthcare Use, Social Isolation lifestyle over a Positive Health Lifestyle is .64 for the most rural (weak-no MIZ) respondents' relative to urban dwellers. So, the most rural communities are less likely to experience a Negative Health Behaviours, Healthcare Use, Social Isolation lifestyle than they are to engage in a Positive Health Lifestyle, relative to urban centres. Thus, urban dwellers are more likely than the most rural persons to engage in a lifestyle of Negative Health Behaviours, Healthcare Use, Social Isolation. Lastly, the relative risk for engaging in a lifestyle composed of Negative Health Behaviours and Healthcare Use over a Positive Health Lifestyle is 1.39 for moderate MIZ and 1.31 for the most rural respondents' relative to their urban counterparts.

Table 3.6 presents weighted coefficients and significance from multinomial logistic regression predicting health lifestyles in urban - rural Canada, adjusted for sociodemographic and socioeconomic indicators. In this model, there are few significant differences across the urban - rural continuum. Relative to urban respondents, the relative risk of engaging in a Negative Health Lifestyle over a Positive Health Lifestyle is 1.34 for the most rural respondents. Moreover, the relative risk of experiencing a Negative Health Behaviours, Healthcare Use, Social Isolation health lifestyle over a Positive Health Lifestyle is .77 for the most rural Canadians relative to urban centres.

Adjusting for sociodemographic and socioeconomic indicators reduced some of the previous relationships in Table 3.5 to non-significance. For example, the no longer significant relationship between strong and moderate MIZ respondents and the Negative Health Lifestyle category suggests that sociodemographic and socioeconomic indicators may mediate the relationship between these rural communities and a Negative Health Lifestyle. As an example, the relative risk of those with post-secondary education engaging in a negative health lifestyle over a positive health lifestyle is .55 compared to those with less than high school. Simply put, the more educated relative to less educated are more likely to practice a Positive Health Lifestyle than any alternative health lifestyle category. Overall, the significant relationship between the most rural areas and the Negative Health Lifestyle or Negative Health Behaviours, Healthcare Use, Social Isolation latent class suggests that distance and lack of urban integration contributes to adopting such health lifestyles. With respect to sociodemographic and socioeconomic controls, women are more likely than men to belong to the Positive Health Lifestyles class, as well as the older population, better educated, employed, and those with greater annual incomes.

Table 3.4 Percent distribution for health lifestyle prevalence along Canadian urban - rural continuum

	CMA/CA	Strong MIZ	Moderate MIZ	Weak/No MIZ
Positive Health Lifestyle	53%	52%	47%	47%
Negative Health Lifestyle	15%	23%	23%	26%
Negative Health Lifestyle, Non-Substance Users	12%	8%	12%	11%
No Family Doctor	5%	2%	3%	4%
Negative Health Behaviours, Healthcare Use, Social Isolation	8%	6%	5%	5%
Negative Health Behaviours and Healthcare Use	7%	9%	8%	8%

Table 3.5 Unadjusted weighted coefficients and significance from multinomial logistic regression predicting health lifestyles in urban - rural Canada

	Positive Health Lifestyle (ref)	Negative Health Lifestyle	Negative Health Lifestyle, Non-Substance Users	No Family Doctor	Negative Health Behaviours, Healthcare Use, Social Isolation	Negative Health Behaviours and Healthcare Use
	45%	18%	12%	6%	10%	10%
CMA/CA (ref)						
Strong MIZ		1.55 ***	0.68*	0.51*	0.80	1.37
Moderate MIZ		1.77 ***	1.18	0.73	0.75	1.39**
Weak/No MIZ		1.96 ***	1.08	1.00	0.64***	1.31*

* p <0.05; ** p <0.01; *** p < 0.001

Table 3.6 Weighted coefficients and significance from multinomial logistic regression predicting health lifestyles in urban - rural Canada adjusted for sociodemographic and socioeconomic indicators

	Positive Health Lifestyle (ref)	Negative Health Lifestyle	Negative Health Lifestyle, Non-Substance Users	No Family Doctor	Negative Health Behaviours, Healthcare Use, Social Isolation	Negative Health Behaviours and Healthcare Use
	45%	18%	12%	6%	10%	10%
Geographic Location						
CMA/CA (ref)						
Strong MIZ		1.13	0.92	0.65	0.59	0.96
Moderate MIZ		0.96	1.21	0.78	0.64	0.86
Weak/No MIZ		1.34**	1.12	1.12	0.77***	1.20
Sex						
Male (ref)						
Female		0.36***	1.01	0.59***	0.65***	0.37***
Age						
25 - 29 (ref)						
30 - 34		0.84	1.22	0.86	1.10	1.33
35 - 39		0.64**	1.03	0.65*	1.00	1.24
40 - 44		0.57***	1.18	0.45***	1.11	0.84
45 - 49		0.43***	0.78	0.44***	0.95	0.80
50 - 54		0.55***	1.04	0.26***	0.84	0.94
55 - 59		0.50***	0.98	0.24***	1.00	0.94
60 - 64		0.44***	0.94	0.24***	0.76	0.71
Marital Status						
Married (Ref)						
Common-Law		1.37***	0.68**	1.39*	1.59***	1.55**
Divorced/Separated/ Widowed		1.60***	1.19	1.62**	1.60***	2.56***

Never Married	1.83***	1.14	2.31***	1.57**	2.40***
Region					
Atlantic (ref)					
Quebec	1.54***	0.79	4.04***	1.06	1.08
Ontario	0.72**	0.54***	0.69	0.80	0.52***
Prairies	1.39*	0.78	2.77***	0.93	0.84
British Columbia	1.06	0.60***	1.83***	0.56***	0.42***
Immigrant					
Yes	0.87	3.55***	1.65***	1.52***	1.37*
Post-Secondary Education					
Less than High School (ref)					
Has High School	0.74	0.71	1.41	0.84	0.55**
Some Post-Sec Education	0.44***	0.37***	0.68	0.41**	0.36***
Has PS Edu	0.55***	0.46***	1.26	0.51***	0.28***
Employment Status					
Employed (ref)					
Not Employed	0.05***	0.33***	0.82	0.49**	0.18***
Unable	0.05***	0.84	0.41	1.09	0.48**
Industry					
Industrial Manufacturing (ref)					
Management	0.04***	0.27***	0.62	0.38***	0.13***
Business/Admin	0.05***	0.30***	0.63	0.54**	0.16***
Sales/Services	0.06***	0.50**	0.84	0.55**	0.25***
Trades/Equipment	1.21	1.08	1.42	1.60	1.02
Income					
Personal income	0.94***	0.84***	0.94*	0.91***	0.82***

Intercept	16.15***	3.97***	0.15*	1.30	12.64***

* p <0.05; ** p <0.01; *** p < 0.001

3.5 Part 2: BMI Variation Along the Canadian Urban - Rural Continuum.

The next section will analyze the relationship between urban - rural residency and BMI patterns, net of health lifestyle latent classes, sociodemographic and socioeconomic indicators. It will extend the analyses in Part 1 using the same analytic sample from the 2014 CCHS. Among the 27,142 CCHS respondents in the previous analytic sample, 1103 were missing on the BMI variable and excluded from the analysis. The analytic sample for the current study is 26,039. This section will examine how the health lifestyle latent classes explain BMI patterns along the Canadian urban - rural continuum.

3.5.1 Measures

3.5.1.1 Dependent Variable

The dependent variable in this analysis is body mass index (BMI). BMI classifies body weight according to health risk (Vanasse, Demers, Hemiari & Courteau, 2006) and is calculated based on a persons' weight in kilograms divided by their height in square meters. The CCHS collects this self-reported information and categorizes BMI into six distinct BMI categories based on World Health Organization and Health Canada guidelines (World Health Organization, 2000; Health Canada, 2003). Various health risks are related to each of the following BMI categories: under 18.5 (underweight); 18.5-24.9 (normal weight); 25.0-29.9 (overweight); 30.0-34.9 (obese-Class I); 35.0-39.9 (obese-Class II); 40 or greater (obese - Class III). For the purposes of this study, I combined obese class I through III into one 'obese' category, which captures those who have a BMI of 30 or greater. BMI categories underweight, normal weight, and overweight were

included in the analysis for the purposes of examining BMI variation across the urban - rural continuum.

3.5.1.2 Independent Variable and Covariates

The independent variables, measured as they were in Part 1, are the urban-rural continuum and the six latent health lifestyle categories. In addition, the sociodemographic and socioeconomic controls sex, age, marital status, region, immigrant status, education, occupation, and income are included.

3.5.1.3 Method

This analysis will use multinomial regression to estimate the relative risk ratio of urban -rural respondents' BMI patterns. Using a stepwise approach, I introduce the latent health lifestyle categories as a covariate to further explain BMI patterns along the Canadian urban – rural continuum. All analyses in this study are weighted using Statistic Canada's weight variable. The analysis was conducted using STATA 15 and the LCA Stata Plugin version 1.2.1 (LCA Stata Plugin, 2015; Lanza et al., 2015).

3.5.2 Results

3.5.2.1 Descriptive Results for Urban - Rural and BMI

Table 3.7 presents descriptive results for BMI variation across the urban - rural continuum. Overall, each degree of rurality yields greater BMI rates, while urban Canadians are more likely to experience lower BMI rates. For instance, almost 28% of weak or no influenced rural Canadians are obese compared to 21% of CMACA residents. Likewise, 38.1% of weak or no influence respondents were classified as overweight, compared to their urban counterparts (34.3%). There is a progressive decrease of normal weight Canadians from urban areas to the most rural communities. Almost 43% of urban Canadians are normal weight compared to 33.2%

weak or no influence respondents. Lastly, 2% of urban respondents are classified as underweight compared to the most rural communities (.9%)

3.5.2.2 Health Lifestyles and Obesity

The highest rates of obesity are found in the Negative Health Lifestyle, Non-Substance class (29.9%) and the lowest are found in the No Family Doctor (13%). The overweight category is most likely to engage in a Negative Health Lifestyle (40.2%) and least likely to practice a No Family Doctor lifestyle (30.2%). Normal weight respondents are most likely to experience a No Family Doctor (52.8%) and a Positive Health Lifestyle (44.6%), and least likely to experience a Negative Health Lifestyle (34.2%). Lastly, the highest rates of the underweight classification are found in the No Family Doctor lifestyle (4%) and lowest are found in the Negative Health Lifestyle (1.3%).

3.5.2.3 Sociodemographic, Socioeconomic, and BMI

In general, the highest rates of obesity are in found in males (23.6%) compared to females (20.2%). Accordingly, the highest rates of overweight classification are found among men (41.5%) compared to females (27.2%). There is a greater prevalence of normal weight females (49.6%) than males (34.1%). In addition, the highest rates of underweight classification are found in females (3%) compared to males (.8%). Age appears to be a determinant of BMI variation. For instance, the prevalence rate for underweight Canadians is greatest for those aged 25 through 44. This pattern is shown amongst normal weight Canadians, that is, the older a respondent is the less likely they are to be classified as normal weight. Moreover, there is a greater prevalence of overweight and obesity amongst middle-aged Canadians (age 40 - 64). The descriptive table shows that the highest obesity rates are found in the separated, divorced, and widowed (25.8%) and lowest among common-law (18.6%). However, the highest rates of

overweight Canadians are found among the married (37.3%) and lowest among the never married (27.8%). The highest rate of normal weight classification is found in the never married (47.1%) compared to the married (39.2%). The underweight are most likely to be never married (2.7%) compared to the separated, divorced, and widowed (1.5%). Region of Canada is a predictor of obesity (Statistics Canada, 2014). Typically, it is the Atlantic provinces and the Prairies who express the greatest prevalence of obesity. The descriptive results confirm this notion, as the highest rate of obesity is found among Atlantic regions (30.7%) and the Prairies (25.1%), compared to the lowest rate in Quebec (18.9%) and British Columbia (17.3%). The highest rates of overweight Canadians are also found in Atlantic Canada (37.5%) and the lowest in British Columbia (32.2%). British Columbia has the greatest prevalence of normal weight Canadians (48.4%) compared to Atlantic Canada (30.8%). Lastly, the greatest prevalence of underweight Canadians is in Quebec (2.5%) and the lowest in Atlantic Canada (1.1%). Comparing immigrants to the Canadian-born, the highest rate of obesity is found in the Canadian born (23.8%) compared to immigrants (16.7%). Likewise, 35.4% of Canadian born are overweight compared to 32.3% of immigrants. 48.3% of immigrants are classified as normal weight, while 39.3% of the Canadian belong to the normal weight category. The highest rate of underweight is found in immigrants (2.8%) compared to the Canadian born (1.5%).

Turning our attention to socioeconomic indicators and BMI. Underweight Canadians are likely to be a post-secondary graduate (2%) or have less than high school (1.8%). Normal weight Canadians are also most likely to be a post-secondary graduate (42.9%). Overweight Canadians are most likely to be a high school graduate (37.2%). Obese respondents most likely have some post-secondary education (28.1%), but only 20.9% of obese Canadians are post-secondary graduates. Underweight (4.2%) and obese (30.2%) Canadians are most likely unable to work.

Normal weight respondents are equally as likely to be employed or unemployed (41.7%, 41.8%), while overweight Canadians are most likely employed (35%).

Looking at the occupation group, underweight Canadians are most likely unable to work (2.3%) or work in management (2.1%). Likewise, underweight Canadians are most likely to work in management (45.6%). Overweight (42.8%) and obese (25.3%) Canadians are most prevalent in trades and equipment occupations. Finally, underweight respondents were most likely to have no income or make less than $10,000 (3.7%). Normal weight Canadians are equally likely to be in the No Income - $9,999 category and $20,000 - $39,999 (45.7%). Overweight Canadians are most likely to make at least $100,000 annually (42.8%), while obese Canadians are most likely to make between $80,000 and $99,999 (24.2%).

Table 3.7 Descriptive statistics for BMI categories across the Canadian urban - rural continuum (26,039)

	Underweight	Normal Weight	Overweight	Obese
Weighted N	489	10847	8993	5710
Degree of Rurality				
CMACA	2.0	42.7	34.3	21.0
Strong Influence	1.3	39.5	34.9	24.2
Moderate Influence	1.2	36.4	34.9	27.5
Weak No Influence	0.9	33.2	38.1	27.8
Health Lifestyles				
Positive Health Lifestyle	1.6	44.6	34.2	19.6
Negative Health Lifestyle	1.3	34.2	40.2	24.3
Negative Health Lifestyle, Non-Substance	2.3	36.7	31.1	29.9
No Family Doctor	4.0	52.8	30.2	13.0
Negative Health Behaviours, Healthcare Use, Social Isolation	1.9	39.6	33.2	25.3
Negative Health Behaviours and Negative Healthcare	3.5	39.9	33.2	23.4
Sex				
Male	0.8	34.1	41.5	23.6

Female	3.0	49.6	27.2	20.2
Age				
Age 25-29	2.8	54.5	26.3	16.3
Age 30-34	2.7	44.9	32.9	19.6
Age 35-39	2.4	45.2	30.9	21.4
Age 40-44	2.1	42.7	35.1	20.2
Age 45-49	1.1	40.5	35.9	22.5
Age 50-54	1.1	35.3	38.8	24.9
Age 55-59	1.5	37.8	35.8	25.0
Age 60-64	1.5	33.3	40.3	24.9
Marital Status				
Married	1.6	39.2	37.3	21.9
Common Law	2.3	44.6	34.6	18.6
Separated/Divorced/Widowed	1.5	41.3	31.5	25.8
Never Married	2.7	47.1	27.8	22.4
Region				
Atlantic	1.1	30.8	37.5	30.7
Quebec	2.5	44.5	34.1	18.9
Ontario	1.7	40.7	35.3	22.3
Prairies	1.7	39.2	34.1	25.1
British Columbia	2.0	48.4	32.2	17.3
Immigrant Status				
Canadian Born	1.5	39.3	35.4	23.8
Immigrant	2.8	48.3	32.3	16.7
Education				
Less than High School	1.8	36.5	34.3	27.5
Has High School	1.3	34.9	37.2	26.6
Some Post-Secondary Edu	1.2	37.2	33.5	28.1
Post-Secondary Edu	2.0	42.9	34.3	20.9
Employment Status				
Employed	1.8	41.7	35.0	21.4
Not Employed	1.9	41.8	33.3	23.0
Unable	4.2	38.4	27.2	30.2
Occupation				
Management Position	2.1	45.6	32.9	19.3
Business	1.6	43.5	33.0	21.9
Sales & Services	1.9	42.0	33.3	22.8
Trades & Equipment	0.9	31.0	42.8	25.3
Industrial Manufacturing	2.0	36.9	40.3	20.8
No Job/Unable	2.3	41.3	32.5	24.0

Income				
No Income - $9,999	3.7	45.7	30.9	19.7
$10,000 - $19,999	2.9	39.4	34.0	23.7
$20,000 - $39,999	1.8	45.7	30.9	21.5
$40,000 - $59,999	1.9	41.9	34.2	22.1
$60,000 - $79,999	1.4	39.6	36.6	22.4
$80,000 - $99,999	1.1	40.1	34.6	24.2
$100,00 and above	0.9	35.8	42.8	20.5

3.5.3 Regression Results

3.5.3.1 Geographic Residence and BMI

Table 3.8 presents unadjusted results from multinomial logistic regression that predicts the association between urban - rural geographic location and BMI classes. Although there are no significant differences in the likelihood of being underweight based on level of rurality, the relative risk for being classified overweight as opposed to normal weight is 1.19 for respondents who reside in a moderately influenced rural community and 1.25 for respondents in the most rural areas of Canada, as compared to their urban counterparts. Moreover, the relative risk of being obese compared with normal weight is 1.53 for moderately influenced rural residents and 1.25 for respondents from weak and no influence rural communities in relation to urban Canadians.

3.5.3.2 Health Lifestyles as Covariate

Table 3.9 presents a nested model for weighted results from multinomial logistic regression predicting BMI. In the first model, I controlled for health lifestyle classes. After including the health lifestyle classes, the significant relationship between moderate influence rural communities and overweight category becomes insignificant. This suggests that the association between moderately influenced rural residents and being overweight is explained by their health

lifestyle. Despite accounting for health lifestyle classes, the significant relationship between the most rural communities and being classified as overweight remains. The inclusion of health lifestyle classes did not disrupt the significant relationship of being obese compared with normal weight for the moderately (1.47) and weak or no (1.65) influenced rural residents, relative to their urban counterparts.

Incorporating the health lifestyle classes into this model also provides more insight into the lifestyle decisions of those who are underweight, overweight, and obese, relative to the normal weight category. First, Negative Health Lifestyle, Non-Substance Use are 1.76 times more likely to be underweight compared to those who engage in a Positive Health Lifestyle. Respondents in the Negative Health Behaviours and Healthcare Use class are over 2.5 times more likely to be underweight than normal weight. Moving on to the overweight BMI classification, the relative risk for respondents engaging in a Negative Health Lifestyle vs. Positive Health Lifestyle relative to normal weight respondents is 1.51. Interestingly, those who experience a No Family Doctor lifestyle are less likely to be overweight or obese (.75 and .56, respectively) compared to the Positive Health Lifestyle class. Otherwise, the relative risk of obesity is higher for those in all other health lifestyle classes compared to those in the Positive Health Lifestyle.

3.5.3.3 Controlling for Sociodemographic and Socioeconomic Indicators

In model 2, I introduce the sociodemographic and socioeconomic variables. Upon including these indicators, the significant relationship in Model 1 between moderate influence zones and obesity is no longer significant. This suggests that socioeconomic and sociodemographic indicators explain the relationship between this level of rurality and obesity. Despite the inclusion of socioeconomic and sociodemographic indicators, the association between the most

rural communities and overweight or obesity remains. In fact, the relative risk for the most rural communities belonging to the overweight or obese class compared with normal weight is 1.19 and 1.28 relative to urban counterparts.

There are several changes to the significance level of the health lifestyle classes as well. The association between underweight and the Negative Health Lifestyle, Non-Substance Use is no longer significant; however, the relationship between Negative Health Behaviours and Healthcare Use and the underweight category remained significant from model 1. In model 1, overweight was significantly related to No Family Doctor and Negative Health Lifestyles, however, Model 2 suggests these relationships are explained by socioeconomic and sociodemographic variables. Upon controlling for the aforementioned, the relative risk for those who engage in Negative Health Lifestyle, Non-Substance Use being overweight over normal weight becomes significant and is 1.27 relative to those who practice a Positive Health Lifestyle.

The remaining relationships between health lifestyles and obesity remained the same, and in some cases, they increase in magnitude. For instance, the relative risk of obesity for individuals who live a health lifestyle composed of Negative Health Lifestyle, Non-Substance Use over a Positive Health Lifestyle increases to 2.24, the highest among the health lifestyle categories. To illustrate the influence of the sociodemographic and socioeconomic variables, women are almost three times more likely than men to be underweight, and less likely than men to be overweight or obese. Immigrants follow this pattern as well compared to Canadian citizens. Older individuals compared to younger are more likely to be overweight and obese. Findings suggest that the married and Atlantic Canadians are more likely to be overweight, relative to their counterparts. Interestingly, the relative risk of the not employed respondents being obese over normal weight is 1.44 relative to the employed, while the relative risk of business and

administration, sales and services, and trades workers being obese over normal weight is greater when compared to industrial and manufacturing Canadians.

Table 3.8 Unadjusted weighted coefficients and significance from multinomial logistic regression predicting BMI scores

	Underweight	Normal Weight (ref)	Overweight	Obese
Degree of Rurality				
CMACA (ref)				
Strong Influence	0.72		1.10	1.25
Moderate Influence	0.70		1.19*	1.53***
Weak/No Influence	0.56		1.25***	1.25***

* = <.1; **=<.05; ***=<.01

Table 3.9 Adjusted weighted coefficients and significance from multinomial logistic regression predicting BMI scores, net of health lifestyle classes, sociodemographic and socioeconomic indicators

	Model 1				Model 2			
	Underweight	Normal Weight (ref)	Overweight	Obese	Underweight	Normal Weight (ref)	Overweight	Obese
Degree of Rurality								
CMACA (ref)								
Strong Influence	0.74		1.06	1.23	0.80		0.88	1.01
Moderate Influence	0.70		1.15	1.47***	0.71		0.97	1.19
Weak No Influence	0.56		1.38***	1.65***	0.62		1.19**	1.28***
Health Lifestyles								
Positive Health Lifestyle (ref)								
Negative Health Lifestyle	1.14		1.51***	1.56***	1.45		1.18*	1.40**
Negative Health Lifestyle, Non-Substance Use	1.76**		1.10	1.85***	1.33		1.27**	2.24***
No Regular Family Doctor	2.14		0.75**	0.56***	1.90		0.87	0.68**
Negative Health Behaviours, Healthcare Use, Social Isolation	1.33		1.10	1.47***	1.25		1.09	1.47**
Negative Health Behaviours and Healthcare Use	2.55***		1.08	1.32**	2.55**		0.97	1.18
Sex								
Male (ref)								
Female					2.91***		0.45***	0.57***
Age								
25 - 29 (ref)								
30-34					1.24		1.42**	1.50**
35-39					1.19		1.33**	1.68***
40-44					1.14		1.61***	1.68***
45-49					0.64		1.74***	2.01***
50-54					0.76		2.10***	2.33***
55-59					0.96		1.77***	2.12***
60-64					1.12		2.30***	2.38***

Marital Status			
Married (ref)			
Common-Law	1.23	0.85*	0.82**
Separated/Divorced/Widowed	0.80	0.80**	1.01
Never Married	1.39	0.69***	0.97
Region			
Atlantic (ref)			
Quebec	1.36	0.70***	0.51***
Ontario	1.00	0.81**	0.72***
Prairies	1.12	0.77**	0.77**
B.C.	1.07	0.59***	0.45***
Immigrant			
Canadian Citizen (ref)			
Yes	1.49**	0.69***	0.51***
Education			
Less than High School (ref)			
Has High school	0.93	1.10	1.11
Some Post-Secondary Education	0.83	1.08	1.39
Post-Secondary Graduate	1.30	0.90	0.88
Employment Status			
Employed (ref)			
Not Employed	0.45*	1.08	1.44**
Unable	1.35	0.77	1.37
Occupation			
Industrial Manufacturing (re)			
Management	0.73	0.97	1.21
Business/Administration	0.49	1.14	1.52**
Sales/Services	0.57	1.11	1.43**
Trades/Equipment	0.67	1.19	1.43**

Income				0.93*	1.01	1.01
Intercept	0.04***	0.75***	0.41***	0.03***	1.16	0.45**

* = <.1; **=<.05; ***=<.01

3.6 Summary

In general, the urban - rural health lifestyle disparity exists between urban Canada and the most rural parts of Canada. As expected, the Positive Health Lifestyle class was most prominent in urban Canada, whereas Negative Health Lifestyles were more prevalent in rural regions of Canada. The unadjusted model in Table 3.5 demonstrates this significant association, however in this model, urban respondents were also more likely to experience health lifestyles that consist of Negative Health Lifestyle, Non-Substance Use, No Family Doctor, and Healthcare Use, but Social Isolation relative to some rural areas.

Regarding BMI, the study confirms that obesity, and in general, higher BMI scores, are geographically and spatially distributed. Underweight and normal weight respondents are most likely to reside in an urban area and less likely to live in a rural community, whereas overweight and obese respondents are more likely to live in a rural region. Results from the unadjusted model in Table 3.8 presented significant relationships between the moderately rural and the most rural communities and higher BMI rates, measured as overweight and obesity. Overall, this indicates that rural respondents are more likely to experience greater BMI than normal weight, relative to urban Canadians. These findings align with previous work on this topic. Using a stepwise approach in Table 3.9, it was found that the relationship between overweight BMI categorization and moderately rural residency was explained by a health lifestyle, namely the Negative Health Lifestyle class. In table 3.7, overweight respondents were most likely to engage in Negative Health Lifestyles rather than any other health lifestyle class. This finding may suggest that the relationship between moderately rural influenced Canadians and overweight BMI categorization is mediated by a Negative Health Lifestyle. The significant relationship

between the most rural regions and higher BMI scores remained after the inclusion of health lifestyle classes, as well as socioeconomic and sociodemographic indicators.

Despite controlling for social indicators, underweight Canadians remained significantly more likely to experience a Negative Health Behaviours and Healthcare Use lifestyle. Canadians classified as overweight were more likely to practice Negative Health Lifestyles, including a Negative Health Lifestyle but No Substance Use. Finally, obese Canadians were shown to be more likely to practice a general Negative Health Lifestyle, a Negative Health Lifestyle, No Substance Use, and positive Healthcare Use, Social Isolation. In addition, normal weight Canadians were demonstrated as more likely to experience a No Family Doctor lifestyle than their obese counterparts.

These findings produce a greater understanding of urban - rural health lifestyles and how it may contribute to increased BMI scores in rural Canada. However, based on these findings, the disparity is between the most rural parts of Canada and large urban centres, rather than amongst degrees of rurality.

3.7 References

Allan, D., & Cloutier-Fisher, D. (2006). Health Service Utilization among Older Adults in British Columbia: Making Sense of Geography. *Canadian Journal on Aging / La Revue Canadienne Du Vieillissement, 25*(02), 219 - 32.

Canadian Institute for Health Information (CIHI). (2006). *Improving the Health of Canadians.* Ottawa: CIHI. "How Healthy Are Rural Canadians? An Assessment of Their Health Status and Health Determinants." Ottawa: CIHI.

Celeux, G., & Gilda, S. (1996). An Entropy Criterion for Assessing the Number of Clusters in a Mixture Model. *Journal of Classification* 13(2), 195–212.

Collins, Linda M. and Stephanie T. Lanza. 2010. Latent Class and Latent Transition Analysis: with Applications in the Social, Behavioral, and Health Sciences. Hoboken, NJ: Wiley.

du Plessis, V., R. Beshiri, R. Bollman, and H. Clemenson. 2001. "Definitions of Rural." *Rural and Small Town Canada Analysis Bulletin* 3, 3: 1-43. Catalogue No. 21-006- XIE. Ottawa: Statistics Canada.

Health Canada, 2003. Canadian guidelines for body weight classifications in adults. Ottawa (ON): Cat no H49-179/2003E.

Kulig, J. C., & Williams, A. M. (2011). *Health in rural Canada*. Vancouver: UBC Press.

Lavergne MR, Kephart G. (2012) Examining variations in health within rural Canada. Rural Remote Health 12, 1848.

Lawrence, Elizabeth M., Stefanie Mollborn, and Robert A. Hummer. (2017). Health Lifestyles across the Transition to Adulthood: Implications for Health. *Social Science & Medicine* 193, 23–32.

LCA Stata Plugin (Version 1.2) [Software]. (2015). University Park: The Methodology Center, Penn State. Retrieved from methodology.psu.edu

Lehti, Venla, Solja Niemelä, Christina Hoven, Donald Mandell, and Andre Sourander. (2009). Mental Health, Substance Use and Suicidal Behaviour among Young Indigenous People in the Arctic: A Systematic Review. *Social Science & Medicine* 69(8), 1194–1203.

Matz, C. J., Stieb, D. M., & Brion, O. (2015). Urban-rural differences in daily time-activity patterns, occupational activity and housing characteristics. *Environmental Health,* 14(1).

McDonald, J. T., & Conde, H. (2010). Does Geography Matter? The Health Service Use and Unmet Health Care Needs of Older Canadians. *Canadian Journal on Aging / La Revue Canadienne Du Vieillissement, 29*(01), 23-37.

McNivens, C., H. Puderer, & Janes, D. (2000). Census Metropolitan Area and Census Agglomeration Influenced Zones (MIZ): A Description of the Methodology Ottawa: Statistics Canada.

Pong, R.W., Atkinson, A.-M., Irvine, A., MacLeod, M., Minore, B., Pegoraro, A., Pitblado, J.R., Stones, M., Tesson, G. (1999). Rural Health Research in the Canadian Institutes of Health Research. Canadian Health Services Research Foundation

Reimer, Bill. (2007). "Immigration in the New Rural Economy." *Our Diverse Cities* 3–41.

Shuey, Kim M. and Andrea E. Willson. (2017). "Trajectories of Work Disability and Economic Insecurity Approaching Retirement." *The Journals of Gerontology: Series B*.

Statistics Canada. 2011. "Canada's Rural Population since 1851." *Statistics Canada: Canada's National Statistical Agency / Statistique Canada : Organisme Statistique National Du Canada*. Retrieved November 7, 2018 (https://www12.statcan.gc.ca/census-recensement/2011/as-sa/98-310-x/98-310-x2011003_2-eng.cfm).

Statistics Canada. 2014. "Overweight and Obese Adults (self-reported), 2014." https://www150.statcan.gc.ca/n1/pub/82-625-x/2015001/article/14185-eng.htm

Turcotte, M. (2005). Social engagement and civic participation: Are rural and small town populations really at an advantage? *Rural and Small Town Canada Analysis Bulletin* 6(4).

Vanasse, A., M. Demers, A. Hemiari, and J. Courteau. (2006). Obesity in Canada: Where and How Many? *International Journal of Obesity* 30(4), 677–83.

World Health Organization. 2000. *Obesity: Preventing and Managing the Global Epidemic: Report of a WHO Consultation*. Geneva: WHO.

Chapter 4

4 Conclusion

4.1 Study Objectives

This thesis made use of the health lifestyle theoretical framework to examine Canadian urban - rural health lifestyle differences and to assess the health disparity, measured through Body Mass Index, between urban and rural Canadians. The health lifestyle framework has yet to be used within Canadian health research and has not been used to examine urban - rural health disparities. In fact, many studies use additive scales or single health-related indicators, thereby failing to examine patterns of health behaviours. This approach neglects the notion that health behaviours cluster within the individual (Adams and Colner, 2008; Chou, 2008; de Vries et al., 2008; Dodd et al., 2010; Leech et al., 2014), and that these patterns will vary based on the social status of the individual. Thus, no study has examined how health behaviours and experiences coalesce in the Canadian population to form health lifestyles, and how they vary across geographic location. This provides a more complete approach to investigating individual or population patterns that reflect the social patterns of a group in a similar social structure (Cockerham, 2017). Therefore, in this study, the selection of health lifestyle indicators was based on well-established urban - rural health-related differences.

Throughout the study, the health lifestyle latent classes were used for two purposes. First, to test how the health lifestyles varied across the Canadian urban - rural continuum and second, to analyze how the health lifestyles explained the relationship between geographic residence and BMI. This approach was intended to provide greater insight into the urban and rural BMI disparity, while advancing the understanding of the health lifestyles that underweight, normal weight, overweight, and obese Canadians experience. Results broadly contribute to our current

understanding of urban - rural health, and the impact of rural living on higher BMI scores. Furthermore, we have greater insight into the health lifestyles of Canadians across all BMI categories.

4.2 Discussion of Major Findings

The Canadian urban - rural health disparity is well-documented however, no research has made use of the health lifestyle approach. Based on the literature, it is plausible that rural Canadians' health lifestyles are a result of less human capital stock coupled with greater distance from urban centres that possess greater health resources, knowledge, power, and infrastructure (Pong et al., 1999; CIHI 2006; Kulig & Williams, 2010; Lavergne & Kephart, 2012). As consequence of poor health lifestyles, rural Canadians are more likely to experience higher BMI scores than their urban counterparts. The following section will discuss the six major findings from Chapter 3 as related to the hypotheses put forward in Chapter 2.

First, there are six distinct health lifestyles that were empirically identified based on Canadians' health behaviours, healthcare use, daily activities, and experiences. The complex variety of the health lifestyle classes identified in this study represent underlying Canadian lifestyles and demonstrate both the patterns and the inconsistency of some health behaviours and experiences. For example, the majority of Canadians engage in a Positive Health Lifestyle and consume some alcohol, while others practice a Negative Health Lifestyle, but Non-Substance Use. Moreover, respondents who engage in negative health behaviours also experience positive and negative patterns of healthcare use as demonstrated between the Negative Health Behaviours, Healthcare Use, Social Isolation and Negative Health Behaviours and Healthcare Use classes.

Second, these unique patterns of health behaviours and experiences represent respondents from diverse social, economical, ecological, and cultural backgrounds. In the context of this

study, the health lifestyles represent a variety of underlying lifestyles for Canadians residing along the urban - rural continuum. The general finding in the unadjusted model (Table 3.5) asserts that each degree of rurality will increase the likelihood of experiencing a negative health lifestyle. As predicted, urban Canadians are more likely to engage in a positive health lifestyle than more rural respondents, and they were also more likely to experience positive patterns of health behaviours such as non-substance use and positive healthcare practices relative to some rural areas. However, they are also vulnerable to experiencing select patterns of negative health behaviours, in particular, no family doctor and social isolation. Suburban (strong MIZ) residents were significantly less likely to experience a Negative Heath Lifestyle, Non-Substance Use or No Family Doctor lifestyle than urban residents. The former relationship illustrates that suburban Canadians are less likely to live a Negative Health Lifestyle coupled with no smoking and alcohol consumption habits. Urban Canadians are more likely to experience poor dietary habits and a lack physical activity during leisure time, but are also more willing to reject smoking and alcohol as part of their overall lifestyle. The association between suburban respondents and the No Family Doctor lifestyle suggests that urban Canadians are less likely to have a regular family doctor relative to the suburban counterparts. The aforementioned findings are likely associated with a greater immigrant population in urban Canada.

The unadjusted model demonstrated that when comparing urban residents with the most rural Canadians, urban respondents were more likely to experience a health lifestyle composed of positive healthcare use, as expressed through both dental visits and access to a regular family doctor, as well as social isolation than the most rural. This is in accordance with health service research done by Allan and Cloutier-Fisher (2006) and McDonald and Conde (2010), as well as sense of community belonging work conducted by Turcotte (2005) and CIHI (2006).

Third, social factors may contribute to the significant relationships between some health lifestyles and rurality. For example, the association between the strong and moderate influence zones and the Negative Health Lifestyle class and the moderately, weak or no influenced rural communities and a Negative Health Behaviour and Healthcare Use lifestyle are likely explained by human capital. From the human capital perspective, those with some post-secondary or with a post-secondary degree are less likely to practice a Negative Health Lifestyle, relative to those with no high school education. Greater levels of educational attainment in strong or moderately rural regions may also explain this association except in the most rural communities, supporting the notion of less human capital stock in rural Canada (Desmeules, 2012).

The relationship between suburban residency and the health lifestyle Negative Health Lifestyle, Non-Substance Use and No Family Doctor may in part reflect the greater concentration of immigrant Canadians in urban centres and common-law Canadians in suburban communities, both with high rates of these lifestyle classes, rather than simply place of residence.

The relationship between weak or no influence rural regions and Negative Health Lifestyles remained significant, suggesting that for the most rural areas, socioeconomic and demographic characteristics do not further explain the relationship and that there are unaccounted characteristics for the most rural areas that contribute to a respondents' engagement in Negative Health Lifestyles. These unique attributes may include and are not limited to population density, distance from larger urban centres, lack of integration, access, political authority, conservative or traditional values, poor infrastructure, and community collectivity. In addition, the most rural Canadians remained less likely to experience the health lifestyle class Healthcare Use, Social Isolation relative to urban Canadians, confirming that urban Canadians

are more likely to experience a health lifestyle composed of positive healthcare practices and social isolation.

Fourth, part 2 of Chapter 3 analyzed BMI variation across Canada's urban - rural continuum, net of health lifestyle classes, socioeconomic and sociodemographic indicators. Following CIHI (2006), I anticipated that the prevalence of higher BMI scores and obesity will increase with each degree of rurality. Table 3.8 showed a significant relationship between moderate MIZ and the BMI classes overweight and obese. Likewise, there was a significant association between the most rural communities and higher BMI categories.

Health lifestyle classes were introduced as covariates to examine whether these classes explain the previous significant relationships. The only loss of significance was shown in the relationship between the moderately rural and overweight category. So, the results do suggest that health lifestyles are a mechanism in the relationship between rurality and higher BMI scores. In other words, moderately rural communities possess a greater concentration of the Negative Health Lifestyle, which may contribute to higher rates of overweight classification.

Finally, a main finding of this study is the demonstrated health disparity between urban and the most rural regions of Canada, as the most rural communities are more likely to engage in a Negative Health Lifestyle and experience greater BMI scores. The rural sub-population experiences patterns of poor health behaviours, healthcare use and activities such as lack of fruits and vegetables, smoking, alcohol consumption, hazardous work, no family doctor or dentist. This could be attributed to an unmeasured source like culture, traditional belief system, or collectivity, but may also suggest the lack of health-bolstering resources in rural communities such as fitness facilities, nutrition options, outdoor infrastructure, or simply general awareness and knowledge surrounding healthy living. In general, the structural circumstances of rural living

appear to be the driving factor for rurality's association with a Negative Health Lifestyle. Regardless of health lifestyle class, socioeconomic and sociodemographic indicators, the most rural Canadians remained more likely to experience obesity over a normal weight, compared to urban Canadians. These findings are interesting based on the demographics of obesity and rural residency (Statistics Canada, 2014; Williams & Kulig, 2010), as obesity is most prevalent among the aging population, and in highly concentrated rural regions of Canada such as the Maritimes or the Prairies. In addition, rural areas have a greater saturation of married couples, which is linked to higher BMI scores, but a lack of ethnic diversity in rural communities, linked to lower BMI scores. These facts might explain some of the urban - rural BMI disparity. Moreover, the most rural regions have the lowest human capital stock as measured through education, employment status, industry, and income. Based on descriptive table 3.1 and 3.7, it is plausible to assume that lower social class in rural communities creates an environment where a 'negative health lifestyle' is acceptable or unchallenged. Although these indicators were included in the regression models, it was not possible to measure the intergenerational transmission of health lifestyles, values, and beliefs.

4.3 Additional Findings

This study advances knowledge surrounding BMI and health lifestyles. In Model 1 of Table 3.9, underweight Canadians were significantly associated with two health lifestyles - Negative Health Lifestyle, Non-Substance Use and Negative Health Behaviours and Healthcare Use. Based on Model 1, it appears that underweight Canadians engage in more negative health lifestyles, generally, than a positive health lifestyle. The association between being underweight and the Negative Health Behaviours and Healthcare Use lifestyle remains significant upon controlling for several social indicators in model 2. Despite accounting for significant sociodemographic

indicators related to underweight, like gender and immigrant status, this finding suggests that underweight Canadians are generally experiencing a health lifestyle oriented around negative health behaviours, like lack of adequate fruits and vegetables, smoking, and poor healthcare use.

Overweight was shown to be significantly related to Negative Health Lifestyles and a No Family Doctor lifestyle. However, upon controlling for sociodemographic and socioeconomic indicators, the relationship with No Family Doctor became insignificant and in turn, overweight Canadians were significantly associated with the Negative Health Lifestyle, Non-Substance Use. The gain of significance, in this case, may suggest that one or more of the social indicators are suppressor variables. So, it may be that immigrant status is significantly associated with the Negative Health Lifestyle, Non-Substance Use class and thus initiates the significant relationship. Yet, the relationship between the overweight class and the Negative Health Lifestyle category remained significant throughout the process, therefore indicating the general health lifestyle of overweight Canadians. Lastly, in model 1 of Table 3.9, all alternative health lifestyles were significantly related to the obese class. The negative health lifestyles, or the classes that possess negative health-related attributes, were more likely to be practiced by obese respondents relative to Positive Health Lifestyle class. The No Family Doctor class, which possesses the same characteristics of the Positive Health Lifestyle class but no Doctor, was less likely to be associated with obesity. Incorporating social indicators only changed the significance for one health lifestyle, Negative Health Behaviours and Healthcare Use, but did not change the significant relationships with other health lifestyle classes.

4.4 Limitations

Although results from this study contribute to ongoing discussions surrounding urban - rural health and how rural residency is related to increased BMI, there are several limitations that need to be considered.

First, the data used for this study presented several limitations. The initial objective of this study was to conduct a nation-wide analysis on the health lifestyles differences across the Canadian urban - rural continuum. The 2014 CCHS dataset core content used for this study contained useful health-related indicators, however, some questions regarding more specific health behaviours like seatbelt safety, sleep time, and drug use were only asked in select provinces (e.g. Alberta, Newfoundland, and Prince Edward Island) and thus, could not be used as a metric for national-level health research. Furthermore, this study made use of 2014 data rather than the recently released CCHS datasets, 2015 through 2017. The reason for this decision was based on measurement inconsistencies in the CCHS. For example, the 'family doctor' healthcare indicator was non-existent in the 2015 through 2017 datasets. Instead, the physician indicator was a derived variable from respondents who reported 'visiting the emergency room in the past 12 months' and therefore excluding all other Canadians who may or may not have a family doctor but did not visit the ER. Overall, the 2014 CCHS healthcare measurement was much more useful than the most recent datasets.

This study used STATA 15 and the LCA Stata Plugin version 1.2.1 (LCA Stata Plugin, 2015; Lanza et al., 2015). The plugin performed the latent class analysis and limits the health lifestyles indicators to binary variables. This explains, for instance, why the alcohol consumption indicator was dichotomized into 'yes' or 'not at all'. Albeit, the eight indicators used plus a variation of three to four options per indicator would have over-complicated the class interpretation process. In addition, the plugin was unable to include covariates into the model without locking respondents into the latent class where they had the highest probability of experiencing.

Second, the covariates used throughout the study are primarily sociodemographic and socioeconomic. The 'employment status' variable has groups of the 'employed', 'not employed' and 'unable'. The not employed consisted of those who were unemployed but actively seeking work, retired, students, or unwilling to work. This variable may also be composed of those receiving social assistance or government transfers. In a similar fashion, the majority of the unable category is composed of a disabled population, but there may be several other reasons an individual is unable to work such as recent diagnosis of a terminal illness. Future research that examines health lifestyles or general nation-wide health studies should consider identifying heterogeneity across these socioeconomic indicators.

4.5 Future Directions

Future studies on Canada's urban - rural health disparity should consider a dedicated analysis for the Indigenous population. The present study chose to exclude this population because their economic, cultural, and contextual experiences are varied and may be vastly different from the non-indigenous Canadian population. Like rural people in general, Indigenous people should not be used as a simple control variable and generalized without grounded knowledge in their rituals, history, culture, and lived-experience. Furthermore, as suggested by MacMillan and colleagues (1996), these studies should be conducted by Indigenous scholars who know the fundamental principles of Indigenous culture. Moreover, this study employed Statistics Canada's MIZ variable to measure degree of rurality. Future studies should also employ this metric, as it captures the level of integration these community members have with urban areas. However, this approach should be used to examine urban - rural health disparities within specific regions or at the provincial level in Canada. For example, and as seen throughout this study, rural health in the Atlantic region differs from the rural health of other regions and

provinces. So, the researcher must consider the unique characteristics of Atlantic Canada's economy, culture, and concentration of rural residents.

Lastly, the health lifestyle framework demonstrates the pattern of health promoting behaviours an individual exudes. However, this approach is underutilized in Canadian health research and should be considered in future research in order to provide a holistic perspective on the population's overall lifestyle. Single health indicators and additive scales do not have the same impact and consequently neglect the patterns of health-related engagement from a population.

4.6 Concluding Remarks

Empirical evidence from this study demonstrates how rural Canadians are less likely to engage in a positive health lifestyle than their urban counterparts, and are consequently at a greater risk for deleterious health outcomes. Previous studies have examined the urban - rural health disparity through the lens of independent health behaviours (Pampalon 1990, 1995; Mitura & Bolllman, 2003; CIHI, 2006; Desmeules et al., 2012). This paper approached the urban - rural health disparity through the lens of health lifestyle theory. Investigating the health lifestyles of the Canadian population and how it is distributed across an urban - rural continuum illustrates how health may be obstructed in certain social-structural environments, like rural residency. Furthermore, it is clear that obesity is a significant contributor to the urban - rural health disparity, and part of this relationship is explained through the negative health lifestyles that rural residents experience.

The health lifestyle approach to understanding health disparities provides significant value to policy development. Health lifestyles reflect the social and structural space of individuals, as demonstrated throughout this paper. The response patterns of individuals located

in similar geographic areas provides a holistic perspective of the population's health experiences. Like research, health-related policy development should target the issue in its entirety, rather than implementing programs that will only address a specific health behaviour.

4.7 References

Adams, Troy B. and Willa Colner. (2008). The Association of Multiple Risk Factors With Fruit and Vegetable Intake Among a Nationwide Sample of College Students. *Journal of American College Health* 56(4), 455–61.

Allan, D., & Cloutier-Fisher, D. (2006). Health Service Utilization among Older Adults in British Columbia: Making Sense of Geography. *Canadian Journal on Aging / La Revue Canadienne Du Vieillissement 25*(02), 219.

Canadian Institute for Health Information (CIHI), 2006. *Improving the Health of Canadians.* Ottawa: CIHI. "How Healthy Are Rural Canadians? An Assessment of Their Health Status and Health Determinants." Ottawa: CIHI.

Chou, K. (2008). The prevalence and clustering of four major lifestyle risk factors in Hong Kong Chinese older adults. *Journal of Aging Health* 20(7), 788-803.

Cockerham, William C. 2017. *Medical Sociology*. New York, NY: Routledge.

Desmeules, W. et al. 2012. "Rural Health Status and Determinants in Canada." *Health in Rural Canada*.

De Vries, H., Riet, J.V., Spigt, M., Metsemakers, J., Akker, M., Vermunt, J.K., Kremers, S. (2008). Clusters of lifestyle behaviors: results from the Dutch SMILE study. *Prev. Med.* 46(3), 203-208.

Dodd, L.J., Al-Nakeeb, Y., Nevill, A., Forshaw, M.J. (2010). Lifestyle Risk Factors of Students: A Cluster Analytical Approach. *Prev. Med.* 51(1), 73-77.

Griffin SO, Jones JA, Brunson D, Griffin PM, Bailey WD. (2012). Burden of ral disease among older adults and implications for public health priorities. *Am J Public Health*. 102(3), 411–8.

Holt-Lunstad, J., Smith, T. B., & Layton, J. N. (2010). Social relationships and mortality risk: A meta analytic review. *PLoS Med* 7(7).

Huang J, Roosaar A, Ax Ell T, Ye WA. (2016). Prospective cohort study on poor oral hygiene and pancreatic cancer risk. *Int J Cancer* 138(2), 340–7.

Kulig, J. C., & Williams, A. M. 2011. *Health in rural Canada*. Vancouver: UBC Press.

Lavergne MR, Kephart G. (2012). Examining variations in health within rural Canada. Rural Remote Health 12, 1848.

Lawrence, Elizabeth M., Stefanie Mollborn, and Robert A. Hummer. (2017). Health Lifestyles across the Transition to Adulthood: Implications for Health. *Social Science & Medicine* 193, 23–32.

Leech, R.M., McNaughton, S.A., Timperio, A. (2014). The Clustering of Diet, Physical Activity and Sedentary Behavior in Children and Adolescents: a review. *Int. J. Behav. Nutr. Phys. Act.* 11 (4), 4.

MacMillan, Harriet L., Angus B. MacMillan, David R. Offord, and Jennifer L. Dingle. (1996). Aboriginal Health. *Canadian Medical Association* 155(11), 1569-78.

McDonald, J. T., & Conde, H. (2010). Does Geography Matter? The Health Service Use and Unmet Health Care Needs of Older Canadians. *Canadian Journal on Aging / La Revue Canadienne Du Vieillissement.* 29(01), 23-37.

Meurman JH, Sanz M. (2004). Oral health, atherosclerosis, and cardiovascular disease. *Critical Review Oral Biological Medicine* 15, 403–13.

Mitura, V., Bollman, R.D. (2003). The health of rural Canadians: a rural–urban comparison of health indicators. Rural and Small Town Canada Analysis Bulletin 4(6), Catalogue No. 21-006-XIE.

Pampalon, R., Gauthier, R., Raymond, G., Beaudry, D. (1990). La sante a la carte. Ministere de la Sante´ et des Services sociaux, Les Publications du Quebec, Quebec.

Pampalon, R., Loslier, L., Raymond, G., Provencher, P., Sante Quebec. 1995. Variations geographiques de la sante. Rapport de l'Enqueˆte sociale et de sante´ 1992–1993, vol. 3. Ministere de la Sante et des Services sociaux, Montreal.

Pong, R.W., Atkinson, A.-M., Irvine, A., MacLeod, M., Minore, B., Pegoraro, A., Pitblado, J.R., Stones, M., Tesson, G. 1999. Rural Health Research in the Canadian Institutes of Health Research. Canadian Health Services Research Foundation

Saint Onge, J.M., Krueger, P.M. (2017). Health lifestyle behaviors among US adults. *Soc. Sci. Med.-Pop.* Health 3, 89-98.

Shields M, Tjepkema M. (2006). Regional Differences in Obesity. *Health Reports* 17(3), 61–7.

Statistics Canada. 2014. "Overweight and Obese Adults (self-reported), 2014." https://www150.statcan.gc.ca/n1/pub/82-625-x/2015001/article/14185-eng.htm

Thomson WM, Williams SM, Broadbent JM, Poulton R, Locker D. (2010). Long-term Dental Visiting Patterns and Adult Oral Health. *J Dent Res* 89(3), 307–11.

Turcotte, M. (2005). Social engagement and civic participation: Are rural and small town populations really at an advantage? *Rural and Small Town Canada Analysis Bulletin* 6(4).

Wade, Terrance J., Ivy Lynn Bourgeault, and Elena Neiterman. 2016. *The Social Dimensions of Health and Health Care in Canada*. Toronto: Pearson.

Wiesinger, G. (2007). The importance of social capital in rural development, networking and decision-making in rural areas. *Revue De Géographie Alpine* 95(4), 43-56.

Withrow D, Alter DA. (2011). Economic burden of obesity worldwide: a systematic review of the direct costs of obesity. Obesity Review 12,131-41.

STACKHOUSE, MATTHEW

Date of Revision: August 1st, 2019

Curriculum Vitae

Surname: **Stackhouse** Given Name: **Matthew**

EDUCATION HISTORY

2019-2023: The University of Western Ontario, London

(forthcoming) Degree: *PhD* Sociology: Social Science and Health Research

2017-2019: The University of Western Ontario, London

Degree: *Master of Arts* Sociology: Social Science and Health Research

Title of degree thesis: "Canada's Urban - Rural Health Disparity: The Role of Health Lifestyles and an Alternative Explanation for Rurality's Higher BMI Rates".

Research Areas: Quantitative methods, Medical Sociology, Health Behaviours

2013 – 2017: University of New Brunswick, Fredericton

Degree: *Bachelor of Arts* "First Class Honours" in Sociology

Title of degree thesis: "The persistent effect of social class on academic achievement: The role of concerted cultivation".

EMPLOYMENT HISTORY

(Contains relevant work to academia)

2019: TA for Research Methods 2206

Teacher Assistant: Lead class tutorials, advise, mark essays and assignments.

2018: TA for Introduction to Sociology 1021E

Teacher Assistant: Develop lesson plans and class discussions for tutorials, teach basic sociological perspectives, teach undergraduate essay writing, evaluate undergraduate's essays and other assignments.

2018: Research Assistant for Dr. Lucia Tramonte

Dataset Development: Compile data from the DHS and create larger dataset.
Research: Social vulnerability in developing nations.

2017: Research Assistant for Dr. David Hofmann

Research: The Study of Terrorist Leadership

2016: Joint Economic Development Initiative (JEDI), Fredericton

Communications Assistant: Worked in economic development and exposed to inequalities in Indigenous communities.

2016: David Coon's Constituency Office, Fredericton

Intern: Social inequalities in local region, exposure to governmental institutions.

AWARDS & SCHOLARSHIPS

2019: Ontario Graduate Scholarship

2017: Canadian Sociological Association (CSA) award for Academic Excellence

2017: Sandra Budovitch Memorial Prize

2017: The Barbara Pepperdine Essay Prize

2017: Dean's Scholar

2013 – 2017: Ward Chipman Founder's Scholarship

2014 - 2017: Dean's List

2016 – 2017: Edwin Jacob Special University Scholarship

2016 – 2017: Department of Sociology Prize

2015 – 2016: Nels Anderson Prize in Sociology

CONFERENCES

- Sociology Graduate Student Conference (2019): Health Lifestyles Across Canada's Urban - Rural Continuum

- Arts Matters Conference (2017): Sociological Research at the Undergraduate Level

- Sociology Honours Thesis (2017): The Persistent Effect of Social Class on Academic Achievement. The Role of Concerted Cultivation.