EQUITY IN HEALTHCARE UTILIZATION IN CANADA: 2000-2014

by

Laura Hirello

Submitted in partial fulfillment of the requirements
for the degree of Master of Health Administration

at

Dalhousie University
Halifax, Nova Scotia
December 2020

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

Equity in healthcare utilization is a globally accepted measurement of the effectiveness of a healthcare system. Equity is included as a policy goal in the federal health legislation that governs healthcare systems in Canada. This study used ten cycles of the Statistics Canada Canadian Community Health Survey (CCHS) to examine the income-related equity of healthcare utilization in Canada from 2000 to 2014. The horizontal inequity (HI) index was used to quantify and assess trends in the equity in healthcare utilization for general practitioner (GP) visits, specialist physician (SP) visits and hospital admissions (HA) nationally, in urban and rural areas, and for all provinces. Nationally, GP and SP visits show pro-rich inequity, while HA demonstrates pro-poor inequity. This pattern is consistent in the provincial and urban and rural area results. Trend analysis demonstrates inequality of HA use became less pro-poor from 2000 to 2014, while inequity of GP use became more pro-poor in New Brunswick, but more pro-rich in Prince Edward Island and Quebec. All other trends indicate that inequity of healthcare utilization was consistently present from 2000 to 2014. These results demonstrate that despite the inclusion of equity as a policy goal, inequity of utilization remains a persistent issue in the Canadian healthcare system.

LIST OF ABBREVIATIONS USED

AB	Alberta
BC	British Columbia
CC	Concentration Curve
CCHS	Canadian Community Health Survey
CHA	Canada Health Act
CI	Concentration Index
EU	European Union
GP	General Practitioner
HA	Hospital Admissions
HI	Horizontal Inequity Index
MB	Manitoba
NB	New Brunswick
NL	Newfoundland
NS	Nova Scotia
OECD	Organization for Economic Co-operation and Development
OLS	Ordinary Least Squares
ON	Ontario
PE	Prince Edward Island
QC	Quebec
SDH	Social Determinants of Health
SES	Socioeconomic Status
SK	Saskatchewan
SP	Specialist Physician
WHO	World Health Organization

ACKNOWLEDGEMENTS

I would like to thank my supervisor Dr. Mohammad Hajizadeh for providing the opportunity to do this work. In addition to your expertise and guidance, your continued support and advocacy amid a global pandemic were invaluable to the completion of this project. I would like to thank my readers Drs Catherine Mah and Jeanna Parsons Leigh, and my external examiner, Dr. Daniel Dutton, for their valuable comments and suggestions on my thesis.

I would also like to thank Dr. Mohammad Pulok for his assistance and insights into this project. Specifically, your support in data cleaning and analysis was incredibly helpful. Also, I would like to thank Statistics Canada and their Atlantic Research Data Centre (ARDC) staff for providing access and assistance with the data used in this work. I would also like to thank all the organizations that provided me with financial support during this project, including the Dalhousie division of Division of Emergency Medical Services for their paramedic post graduate bursary, Research Nova Scotia for their Scotia Scholar award and Dalhousie University for their program continuation scholarship.

Finally, I would be remiss if I did not mention my husband's role in my completion of this project. Justin, your unwavering and profoundly enthusiastic support for all I do continues to provide me the solid foundation necessary for me to achieve my goals.

CHAPTER 1 INTRODUCTION

1.1 Motivation

Increasingly, equity is used as a measure of the overall performance of healthcare systems (Frenz & Vega, 2010; Smith & Papanicolas, 2013; World Health Organization, 2014). Equity measurements evaluate the access and delivery of healthcare systems, regardless of the system's maturity or a country's income level. Equity measures of healthcare give insight into how healthcare is distributed within a country (World Health Organization, 2014). Because equity of healthcare measurements quantify fairness and identify areas with unequal distribution of care, equitable healthcare is a common policy goal for many countries, Canada included (World Health Organization, 2013, 2017).

Equitable healthcare encompasses barrier free access to healthcare services that are utilized based on an individual's need (Culyer & Wagstaff, 1993). This broad definition is generally broken down into two distinct equity principles: equity of healthcare financing and equity of healthcare utilization (O'Donnell, van Doorslaer, Wagstaff, & Lindelow, 2008; Wagstaff, van Doorslaer, & Paci, 1989). Equity of healthcare financing focuses on how healthcare is funded and considers how to protect individuals from catastrophic payments. Equity of healthcare utilization focuses on ensuring individuals have barrier-free access to services, and the ability to receive an appropriate amount of care given their health need (O'Donnell et al., 2008; Wagstaff et al., 1989). Both principles are imperative to equity in healthcare, however, this study focuses on the equity of healthcare utilization.

While there is still debate over an exact definition, equity in healthcare utilization is a measurement akin to fairness. As such, equitable utilization is present when individuals receive equal access to healthcare services for equal need (Wagstaff et al., 1989; World Health Organization, 2014). The concept of equity in healthcare is rooted in social justice, where every individual uses an appropriate amount of healthcare given their underlying health status, regardless of their income or ability to pay. This ensures all

individuals have the opportunity to achieve the highest level of health (Culyer & Wagstaff, 1993). Potential barriers to equity in healthcare utilization involve issues of access. Lack of access can be either due the structure of the healthcare system or greater social issues (Solar & Irwin, 2010). Geography specifically creates healthcare access challenges in remote and rural areas, due to the interaction of both distance and ability to maintain healthcare infrastructure and personnel (Romanow, 2002a). In order to achieve equity of healthcare utilization, systems must not only have staff, infrastructure and governance to deliver care, but must exist in an environment with adequate social support to ensure individuals have the opportunities to seek the care they require (Birch & Gafni, 2005; Solar & Irwin, 2010).

The World Health Organization (WHO) deems health to be a fundamental human right, with governments held responsible for ensuring health through the appropriate provision of care (World Health Organization, 1946, 1978). This obligation to provide care has led to the global adoption of equity as a measure of a government's ability to fulfill this responsibility (Smith & Papanicolas, 2013; World Health Organization, 2000). While there is no explicit mention of equity in the legislation that governs Canada's healthcare system, the conceptual basis exists through the program criteria defined in the Canada Health Act (CHA) (Canada Health Act, 1984). The CHA establishes the federal and provincial jurisdictional relationships for healthcare, with the defined program criteria providing aspirational direction for healthcare delivery in each province. In addition to a legislative precedent, the egalitarian nature of Canadian society and government creates a moral imperative for equitable healthcare, solidifying its importance in the Canadian context (Martin et al., 2018; Romanow, 2002a).

In Canada, there exists a healthcare system that delivers hospital and physician services without payments required at the point of use (Marchildon, 2014; Romanow, 2002b). As there are no co-payments or other direct financial barriers to use these services, the presence of inequity in utilization represents issues of access. These access barriers can be structural in nature, due to lack of infrastructure or providers; or societal, due to issues of income, transportation or employment challenges (Allin, 2008; Birch & Gafni, 2005; Marchildon & Allin, 2016).

Income-related inequity in healthcare utilization signifies unfair distributions of healthcare within populations. This results in an individual's socioeconomic status (SES) influencing their healthcare utilization, rather than use being driven by their actual health need (Birch & Gafni, 2005; Marchildon & Allin, 2016; Mikkonen & Raphael, 2010). The ability of income to determine or modulate the amount of healthcare an individual receives, regardless of that individual's health status, is a clear example of social injustice that is incompatible with Canadian values (Martin et al., 2018; Romanow, 2002a). Further, more equitable healthcare utilization improves the overall health of population (OECD, 2019). Reduction of income-related inequities in healthcare utilization can be achieved through targeting groups most vulnerable to utilization inequality (Solar & Irwin, 2010). In order for these measures to successfully reduce inequity, they must not only be implemented by the appropriate level of government, but also address the relevant issues affecting the inequity of healthcare utilization in Canada.

The responsibility of funding and delivery of healthcare in Canada is divided between federal and provincial governments, respectively. Section 92 of the *Constitution Act* of 1867 deems "The establishment, maintenance, and management of hospitals" as well as "generally all matters of a merely local or private nature in the province" to be the responsibility of each individual province (Constitution Act, 1867, p. 29). It is widely accepted that these provincial responsibilities encompass not just hospitals, but whole healthcare systems (Marchildon, 2014; Romanow, 2002a). Section 91 of the same act gives the federal government the responsibility of a "system of taxation" (Constitution Act, 1867, p. 26). In 1984, the federal CHA was established with the primary objective to "protect, promote and restore" the health of Canadian citizens, as well as to "facilitate reasonable access to health services without financial or other barriers" (Canada Health Act, 1984, p. 5). The CHA legislation deems hospitals and physicians that operate within a publicly funded healthcare system may not charge users for medically necessary services. To accomplish this, federal health funding is available to provincial healthcare systems that satisfy a set of five criteria. The five program criteria are: public administration, comprehensiveness, universality, portability and accessibility (Canada Health Act, 1984); the provincial healthcare systems that operate based on these criteria are collectively referred to as 'Medicare'. If a province's healthcare system does not meet

these criteria, the federal government has the ability to penalize that province through reduction or total withdrawal of their funding (Canada Health Act, 1984; Romanow, 2002a). However, to date the federal government has never exercised this right (Martin et al., 2018).

Of the five healthcare system criteria, two are specifically relevant to equity in healthcare utilization. Universality dictates that all persons covered under Medicare are entitled to receive healthcare, with no additional conditions applied to a single person or group. Accessibility ensures that all persons have the ability to reasonably access healthcare services without direct or indirect impediment (Canada Health Act, 1984; Martin et al., 2018). Together, these criteria create the legal basis for equity of healthcare utilization in Canada at the federal level. However, it remains the responsibility of each province to ensure that their healthcare system is providing equitable care. This division of responsibility and delegation of operations to each province creates the potential for different levels of effectiveness in each provincial system. These potential differences in the equity of healthcare utilization by province are further accentuated by the limited number of services included in the CHA, and thus subject to the five criteria.

Despite issues of equity in healthcare being of global importance, little work has been done on the topic within a Canadian context. A significant portion of the work about income-related inequities in healthcare utilization in Canada has been conducted as part of larger global comparisons, resulting in cross-sectional information that only encompass a single year and takes an exclusively national perspective (Devaux & de Looper, 2012; Frenz & Vega, 2010; OECD, 2019; van Doorslaer, Koolman, & Puffer, 2002). While it is useful to see where Canada stands in comparison with other high-income countries, these studies do not provide clear insight into the true nature and patterns of equity in healthcare utilization within Canada. Given the independence of each province in the structure and delivery of healthcare, there is significant value to be gained from examination of the equity of healthcare utilization within provinces. This is underscored by the geographical challenges that Canada faces, with healthcare access and delivery in rural and remote communities remaining a longstanding national issue (Romanow, 2002a; Sibley & Weiner, 2011).

The existing works that take a Canada-specific focus shed some light on provincial and geographical trends; however, they only represent a single cross section in time (Allin, 2008; Asada & Kephart, 2007; Jimenez-Rubio, Smith, & van Doorslaer, 2008). This thesis explores trends of income-related inequities in healthcare utilization in Canada, with analysis based on national, provincial and geographical population density. The trend analysis provides important information to decision makers about the performance of the Canadian healthcare system that will inform policy and improve the equity of healthcare utilization in the future.

1.2 Equity in Canada's Healthcare System

The Canadian arrangement of Medicare is often viewed as a single, cohesive system. However, the reality is a patchwork of provincial systems that cover a variety of healthcare services. Provincial governments possess the jurisdiction to operate and maintain their healthcare systems, giving each the freedom to control how health services are structured and delivered (Constitution Act, 1867; Marchildon, 2014; Romanow, 2002a). The conditions set out in the CHA act as the only common set of criteria for all provincial systems (Canada Health Act, 1984). Aside from ensuring all physician and hospital services are free at the point of use, the coverage of any other services is left to the discretion of the province (Marchildon, 2014). The result is a 'narrow but deep' basket of publicly administered and fully funded services common to every province. All other care varies between provinces in its provision and financing (Martin et al., 2018).

Outside of hospital and physician services, all other healthcare is financed through a combination of public and private funding (Marchildon & Allin, 2016; Martin et al., 2018). Medicare accounts for only 70.9% of healthcare expenditure in Canada. The remainder is split between a mixture of public/private funding and exclusively private funding (Marchildon & Allin, 2016; Martin et al., 2018). Each province determines what services will be publicly funded, and to what degree, creating differences and gaps between systems within the country. Services offered outside of Medicare create issues of equity in healthcare utilization in both direct and indirect ways. Any additional out-of-pocket costs required for healthcare creates an obvious barrier to equity of use. Indirectly,

if persons do not have access to services outside of Medicare (due to financial, social or other barriers), it can lead to an increased use of Medicare services, further contributing to inequity (Marchildon & Allin, 2016). Lack of prescription coverage, for example, may lead to rationing and underdosing of medication, which in turn leads to hospitalization that would not have been necessary with the appropriate pharmaceutical treatment. At this time, no work exists quantifying or detailing how a province's coverage of services outside of Medicare effect the equity of Medicare covered services. In order to provide more insight into how the complexities of healthcare financing and system design affect utilization, more information is required about the inequities in healthcare utilization that exist in the current system.

The WHO has a model for assessing the coverage of universal healthcare systems that considers three dimensions, each an axis that together forms a cube (Figure 1.1).

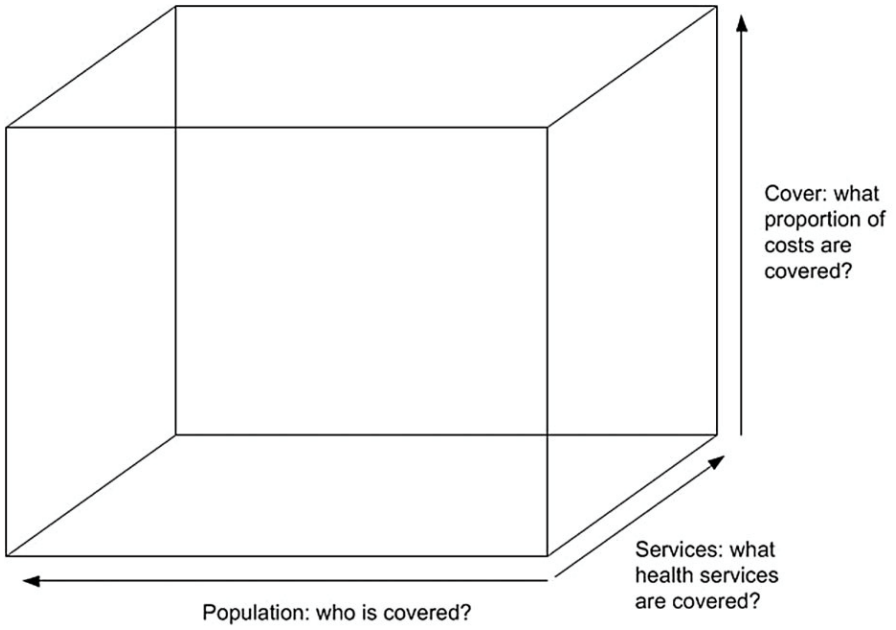

Figure 1.1. World Health Organization dimensionality model of universal healthcare systems (World Health Organization, 2010)

The dimensions are: 1) the population that is covered, 2) the services offered, and 3) the proportion of costs covered (World Health Organization, 2010). This model allows for assessment of the healthcare systems of any country to determine what is truly meant by 'universal' coverage, and where any potential gaps may exist. As universal healthcare

systems progress and grow to meet the health needs of a population, changes and evolutions are made to any combination of these dimensions to ensure adequate and ongoing health improvement (World Health Organization, 2014). If this model is applied to Canadian health policy, the result is a thin square prism. The CHA has a criterion of universality, dictating all citizens and permanent residents are covered (Canada Health Act, 1984). The CHA also specifies that physician and hospital services are financed completely, creating a square. The extent of what is covered, however, is limited just to physician and hospital services, making the square of universal coverage relatively thin. In reality, the Canadian model of healthcare leaves many services outside the scope of full or partial public coverage. It also assumes no barriers to access or utilization of physician and hospital services exist. Given the structure and funding of health care systems in Canada, this thesis will focus only on analysis of income-related inequities in the utilization of physician and hospital services. As these services are publicly funded, subject to the criterion of universality and free at the point of use, in principle it is expected that little to no income-related inequity exists in their use. The presence of income-related inequity of utilization in hospital and physician services signals the existence of barriers to care that are not being addressed by current healthcare policy. The legislation that governs healthcare systems in Canada has been in place and largely unchanged for over three decades. This time period has given all provinces the opportunity to ensure they satisfy the program criteria required to qualify for funding, which they all receive. The presence of inequity in healthcare utilization thus represents an issue that must be addressed through both healthcare legislation and broader social policies. Analysis of the trends in the equity of healthcare utilization provides evidence as to whether systems have adapted and evolved to reduce inequities as their population's demographics and health needs have changed over time.

1.3 Objective and Contributions of this Thesis

The purpose of this thesis is to assess trends in how an individual's income relates to healthcare utilization in Canada while controlling for an individual's need. Specifically, using data from the Statistics Canada Canadian Community Health Survey (CCHS) this thesis assesses trends in income-related inequities in healthcare utilization from 2000 –

2014, inclusive. As the delivery of healthcare varies across provinces and has longstanding challenges in rural areas, equity trends are measured nationally, provincially, and geographically based on urban/rural designations.

The healthcare utilization types being examined are physician and hospital services. These services are subject to policy that dictates equity as a key component of service provision. The presence of income-related inequities in the utilization of Medicare covered services demonstrates the need for policy to address issues of inequity in healthcare utilization in Canada, both within healthcare systems and more broadly in society. Despite the clear importance of this topic, most empirical works to date have focused on a single type of healthcare use, geographical area, or cross section of time (Allin, 2008; Asada & Kephart, 2007; Bartram, 2019; Grignon, Hurley, Wang, & Allin, 2010). This thesis includes multiple service types covered under Medicare; national, provincial and urban/rural level analysis; and spans a fifteen-year time period to provide comprehensive analysis of the income-related inequity of healthcare utilization. As provinces are responsible for the operation and maintenance of their healthcare systems, this thesis will provide valuable information about the effectiveness of each provincial system. Additionally, the focus on income-related inequity of healthcare utilization in urban and rural areas will give information about how an individual's geography interacts with SES in accessing healthcare. The multi-year scope will reveal patterns in healthcare distribution and identify regions with pervasive and consistent equity issues. This study analyzes how income-related inequities in healthcare utilization have changed over time. The timescale analysis and national, provincial and urban/rural breakdown of results allow for the emergence of patterns, providing more robust conclusions than previously explored.

1.4 Organization of the Thesis

This thesis consists of 7 chapters. Chapter 2 elaborates on the concepts of equity in health and healthcare, and equity in the context of the Canadian healthcare system. Chapter 3 reviews empirical works on equity in healthcare both globally and within Canada. Chapter 4 reviews the methods of measuring equity in healthcare utilization. Chapter 5

describes the data, variables and methods used in this study. Chapter 6 presents the results. Finally, Chapter 7 discusses and concludes the findings.

CHAPTER 2 EQUITY IN HEALTH AND HEALTHCARE

This chapter explains the differences between equity in health and equity in healthcare. It discusses different avenues of addressing and measuring equity in healthcare. This chapter also provides the theoretical basis for measuring equity in healthcare that will be expanded in Chapter 4.

2.1 What is Equity in Health?

The WHO's classification of health as a fundamental human right is based on the egalitarian principle that all people are equal (Frenz & Vega, 2010; World Health Organization, 1946). Egalitarianism dictates that discrimination based on a person or population's characteristics is morally wrong and fundamentally unjust. It instead values collectivist principles like citizenship and social unity (Wagstaff et al., 1989). In an egalitarian society, governments and organizations must create policies to ensure that services do not systemically discriminate against people or populations. Instead, governments must provide services that are equally available to all who require them. Given the majority of high-income countries espouse egalitarian values (Wagstaff et al., 1989), the public services in these countries must exist free from prejudice. This is especially true of health, as not only has health long been considered a fundamental human right (World Health Organization, 1946), but the possession and maintenance of health is an issue of fairness and justice (Braveman & Gruskin, 2003).

While most people are familiar with the concept of equality, equity is less commonly understood. Equity is similar to equality, but more nuanced in its definition. Equality, as it relates to political philosophy, is the normative notion that everyone receives the same treatment or service and thus all are treated fairly (Wagstaff et al., 1989). This sameness of treatment is consistent regardless of the individual characteristics of the person who is receiving the treatment or service. While equity has the same philosophical origin as equality–that everyone be treated fairly–it takes the person or population's relative position into account (Culyer & Wagstaff, 1993). There are many ways to define equity as it relates to health (Braveman & Gruskin, 2003; CSDH, 2008; Frenz & Vega, 2010; Mooney, 2009). The most widely accepted is less concerned with the amount of health

services or treatment a person or population receives. Instead it focuses on an individual's opportunity to preserve and increase their health status, as well as the subsequent maximization of an individual's health that results from the presence of organized services and behaviors (Braveman & Gruskin, 2003; Whitehead & Dahlgren, 2006). Following this definition, while inequalities in health refer to mere differences, inequities in health refer to differences that arise from unjust or unfair policies and circumstances (Asada, Hurley, Norheim, & Johri, 2014). This distinction underscores the importance of equity measurements for governments and organizations as they work to establish and maintain social justice.

A difference in the health of an individual or group moves from an inequality to an inequity when the cause of the difference is considered to be avoidable, unnecessary or unfair (Daniels, Kennedy, & Kawachi, 1999). This means that in order to measure and discern inequities of health, judgements must be made about what constitutes as unfair, as opposed to merely unfortunate or unavoidable. Because health equity is normative in nature, it is subject to interpretation based on the context and society in which it is being measured (Mooney, 2009). However, in order for global comparisons of health equity to be meaningful, there exists a widely accepted operational definition of health equity. By this definition, health equity constitutes a lack of intrinsic differences in health between societal groups that possesses different levels of wealth or status (Braveman & Gruskin, 2003). In a society with equitable health, an individual from an otherwise marginalized population would have no repercussions to their mental or physical health as a result of being part of that marginalized population. Thus, health equity refers to the distribution of health that exists in a population and the systemic factors that influence that distribution (Braveman & Gruskin, 2003).

2.2 What is Equity in Healthcare?

While health refers to an individual's state of being, healthcare refers to the organized system of services that are designed to prevent illness and bolster wellbeing. The equity of a healthcare system is an overall measurement of the system's functional ability to provide opportunity and services to improve and maintain the health of individuals. The

presence of a functional healthcare system is only one of the factors that contributes to an individual's health (World Health Organization, 2014). Other social determinants of health (SDH) including living conditions, employment status, and food insecurity, also play a role in health equity (Braveman & Gruskin, 2003; Mikkonen & Raphael, 2010), however this thesis will focus specifically on how healthcare relates to health equity.

While the specific organization of healthcare in each country is different, healthcare systems are generally financed through some amount of public funding and subject to policies that dictate minimum standards and resource allocation (Smith & Papanicolas, 2013). The involvement of government and public funding in the financing and delivery of healthcare differentiates it from health. Health is a personal resource everyone possesses that allows an individual to engage in daily life, while healthcare refers to a system within society that has the ability to contribute to an individual's health (World Health Organization, 1946, 1986). This difference makes healthcare a social determinant of health rather than an inherent feature of society (Braveman & Gruskin, 2003). Despite this distinction between health and healthcare, both are still subject to the philosophical principles and values of the societies in which they exist, and thus must exist equitably.

As healthcare is only one of many social determinants, any measurements of equity in healthcare must take into account the effects of the other social determinants and resultant unequal distribution of health within a population (Braveman & Gruskin, 2003; Mikkonen & Raphael, 2010; Solar & Irwin, 2010). Accordingly, as a normative concept, equity in healthcare assumes that services are used based on health need and financed based on ability to pay. Measurements of equity in healthcare can be used as a proxy for equity in health, as healthcare represents one of the avenues through which the resource of health is gained by an individual (Culyer & Wagstaff, 1993). This relationship between healthcare and health allows for relatively accessible measurements of health equity through the measurement of healthcare equity.

Quantitative analysis of equity in healthcare systems have two major foci: financing and utilization (Wagstaff et al., 1989). While financing and utilization can be approached from many perspectives, equity research addresses them at the level of an individual.

Therefore, equity of healthcare financing is specifically concerned with an individual's ability to pay. In a healthcare system with equitable financing, individuals contribute pre-payments based on their relative income level, and are protected against catastrophic payments for healthcare services (World Health Organization, 2010). Equity in healthcare utilization addresses an individual's ability to use the system rather than a healthcare system's operation and care delivery. As this work solely focuses on the equity of healthcare utilization, equity in healthcare financing will not be discussed. When framed in the specific context of healthcare utilization, equality measurements concentrate on the amount and type of healthcare a person or population receives, regardless of their underlying health condition. Comparatively, measurements of equity in healthcare utilization focus on the amount of healthcare a population or person uses in order to increase or maintain their health resources at an optimal level (Kawachi, Subramanian, & Almeida-Filho, 2002). Equity in healthcare utilization takes the underlying health status and condition of the person into account when measuring treatment and services used. By considering the underlying health status, as well as the unavoidableness of their conditions, inequity in healthcare measurements identify issues of social justice and biases in healthcare systems (Whitehead & Dahlgren, 2006). As social justice is viewed as an essential prerequisite of health, equity in healthcare utilization measurements provide valuable information about the health of individuals (World Health Organization, 1986).

The differences between measuring equality versus equity in healthcare utilization become more meaningful when differences in an individual's characteristics are examined critically. There are differences in individuals that affect healthcare utilization amounts. Some of these differences are unchangeable inherent characteristics, like age, sex, and co-morbid conditions. Other differences are changeable, and the result of historical, social and chance factors, like education level and income (Wagstaff et al., 1989). Differences in the amount of healthcare used in order to achieve the optimal level of health that occur due to unchangeable, or non-choice-based factors, are considered by society to be just causes for utilization differences (Braveman & Gruskin, 2003; Daniels et al., 1999; Mooney, 2009). Thus, these types of differences are deemed need-based variables and include differences like age and sex (van Doorslaer et al., 1992).

Alternatively, when changeable, or choice-based factors, result in differences in healthcare utilization, these are considered to be unjust causes of utilization differences. As a result, these types of differences are deemed non-need-based variables and include differences like income and location (O'Donnell et al., 2008; van Doorslaer et al., 1992).

There is a large body of evidence demonstrating how social determinants affect health (Marmot, 2005; Mikkonen & Raphael, 2010). Social determinants vary by country and location; the model adopted for the Canadian context includes variables that fall into both the need (unchangeable, non-choice based) and non-need (changeable, choice based) categories. One of the most impactful SDH is income and the distribution of income within a society (Mikkonen & Raphael, 2010). Income not only has an effect on health behaviors but also modulates other social determinants like housing and food security. The connection between income and health is further strengthened by the existence of a societal health gradient that mirrors income gradients (Willson, 2009). This gradient demonstrates that those with higher income also have higher levels of health, and *vice versa* (Willson, 2009). Other SDH that are non-need based include education, housing, and employment status. While measurements of equality in healthcare utilization can help identify whether need or non-need variables are affecting health, measurements of equity can quantify the degree to which a social determinant affects health.

The alterable factors that unjustly affect healthcare utilization are often the subject of policy and legislation (Marmot, 2005). It is important to emphasize that unjust healthcare utilization factors are amenable to policy, and thus can be reduced. To ensure governments and organizations are appropriately addressing the correct issues requires identification of key factors that underlie these issues. Each province has their own policies and strategies for reducing inequities in a way that addresses the challenges faced by that province. Provincial level analysis of the inequity of healthcare utilization gives information about the overall effectiveness of a province's efforts to reduce inequity (Allin, 2008). Additionally, remote and rural areas face key challenges in the equity of healthcare use. Individual's living in rural areas often have to overcome issues of distance, travel costs and provider shortages. Approximately 95% of Canada's landmass is rural, housing roughly 20% of Canada's population (Martin et al., 2018). Specific

healthcare utilization challenges in rural areas are unique to each local community, but the overall concern of access to remote areas is common across Canada (Romanow, 2002a; Young, Chatwood, Ng, Young, & Marchildon, 2019). Therefore, to give a comprehensive view of the equity of healthcare utilization in Canada, analysis based on urban and rural geography must be included. This work will explore the income-related inequity of healthcare utilization in Canada, nationally, provincially and for urban/rural areas, from 2000 to 2014, to determine how equity of healthcare utilization has changed over time.

2.2.1 Horizontal & Vertical Healthcare Equity

Equity of healthcare utilization can be broken down into two different but complementary measurements: horizontal and vertical equity. In measurements of horizontal equity, comparisons of equality are made between two groups that are equal in the area of interest (Wagstaff et al., 1989). Measurements of vertical equity compare the proportional difference of two groups who are proportionally different in the area of interest. Put another way, horizontal equity measures the similarity of treatment for individuals who have the same level of justified need, while vertical inequity measures the proportionally different treatment of individuals who have proportionally different levels of justified need (Pulok et al., 2019). When these concepts are applied to the healthcare utilization context, horizontal inequity measures the differences in treatment received by high- and low-income persons with the same healthcare need. Vertical healthcare utilization inequity measures the differences in the proportion of healthcare that two individuals with proportionally different needs but the same income status would receive (Culyer & Wagstaff, 1993).

While either horizontal or vertical equity could be used to measure both equity in healthcare financing and equity in healthcare utilization, equity in healthcare utilization literature primarily focuses on horizontal inequity, while equity in healthcare financing literature assesses vertical inequity (O'Donnell et al., 2008; Wagstaff et al., 1989). This distinction is due to the nature of the variables used for each type of equity in healthcare measurement. Equity in healthcare financing studies use income, a continuous variable,

as a measure of ability-to-pay. As individuals' ability-to-pay and healthcare spending are easy to measure, it is possible to calculate how much individuals pay to the healthcare system based on different level of ability-to-pay (O'Donnell et al., 2008). On the other hand, studies on equity of healthcare utilization focuses on horizontal inequity because it is difficult to assess the appropriate level of unequal treatment. Equity of healthcare utilization standardizes the population of interest based on healthcare need and quantify horizontal inequity by matching up high- and low-income individuals with the same self-identified level of need and comparing the amount of healthcare used (Pulok et al., 2019).

2.3 Health Care Equity in the Context of Canadian Healthcare

Medicare is a key part of Canada's national identity (Martin et al., 2018). However, the provincial jurisdiction over healthcare operations and delivery creates a complicated patchwork of organizations rather than a single cohesive healthcare system (Martin et al., 2018; Romanow, 2002a). The CHA outlines the federal and provincial jurisdictions in the financing and delivery of healthcare. Financing is the responsibility of both federal and provincial governments, while the actual operation and maintenance of healthcare systems falls under the jurisdiction of the provinces. Each province must meet the same five program criteria to remain eligible for federal funding contributions, but under the *Constitution Act* the structure and care provision of the healthcare system fall solely under provincial authority (Canada Health Act, 1984; Constitution Act, 1867; Romanow, 2002a). The *Constitution Act* has no constraints or requirements of healthcare systems, giving provinces flexibility in how they provide services. The program criteria in the CHA are the only consistent national attributes each provincial healthcare system must satisfy to maintain federal healthcare funding.

The federal program criteria are universality, accessibility, portability, comprehensiveness, and public administration (Canada Health Act, 1984). The criteria of universality dictates that all persons who qualify for Medicare are entitled to the same medical services with identical terms and conditions given their health state. The criteria of accessibility states all persons who receive Medicare have reasonable access to services, without financial or other barriers (Canada Health Act, 1984; Martin et al.,

2018). The condition of receiving an appropriate amount of care for an individual's health status and the absence of barriers that may impede the receiving of care equate to the principle of equity in healthcare utilization. This concept of equity as equal utilization for equal need has been a defining feature of Canadian policy, exemplifying the national valuation of social justice and inclusion (Nixon et al., 2018). However, there is much discussion that surrounds Canadian Medicare and questions whether it succeeds in embodying its five defining criteria (Marchildon, 2014; Marchildon & Allin, 2016; Martin et al., 2018; Romanow, 2002a).

While the provincial jurisdiction over healthcare operations in Canada allows for provinces to develop and adapt to the needs of their regions, it also introduces gaps in coverage. The CHA states that all insured health services, including physician and hospital services, be fully covered and have no costs to the individual at the point of use (Canada Health Act, 1984). However, beyond these specifications, provinces are free to determine the specific services and funding models of all other healthcare provision. This model allows provinces to tailor their healthcare coverage to provide the most needed services to the largest population. However, this model can easily allow for already vulnerable groups to be further marginalized through lack of comprehensive, accessible healthcare (Marchildon & Allin, 2016). For example, healthcare access and delivery to individuals living in rural and remote communities, has remained an ongoing challenge for many provinces (Young, Chatwood, & Marchildon, 2016; Young et al., 2019). Provincial delivery of healthcare also means measurements of national equity may not be representative of provincial equity (Allin, 2008). To determine trends of equity of healthcare utilization in Canada, measurements must include analysis of national, provincial, and urban and rural areas.

Health and the provision of healthcare is an area of international concern. Governments are responsible for ensuring the healthcare access of their citizens, and thus must operate and maintain high performing healthcare systems (World Health Organization, 1978). Equity in healthcare is a method of measuring the quality and competency of a nation's healthcare system (Frenz & Vega, 2010). While equity in healthcare can be assessed from multiple aspects, this work will focus on utilization, and therefore employ measurements

of horizontal inequity. In Canada, the importance of equity in healthcare is underscored by national policy (Nixon et al., 2018). Measurements and trends in the income-related inequity of healthcare utilization are of great importance to policy makers, as they work to ensure the ongoing accessibility and comprehensiveness of healthcare in Canada.

CHAPTER 3 LITERATURE REVIEW

The purpose of this chapter is to review the relevant empirical literature on the equity of healthcare utilization. This chapter first reviews literature and empirical findings in the equity of healthcare utilization from the Organization for Economic Cooperation and Development (OECD) countries to provide an international context. The second part of this chapter focuses on literature and empirical findings in the equity of healthcare utilization in Canada.

3.1 Empirical Evidence from OECD countries

Most of the OECD countries possess universal and comprehensive healthcare systems. Given the geographical, population, fiscal and cultural differences of nations, each has their own operational design and delivery of healthcare (World Health Organization & The World Bank, 2015). These systems claim to be universal; therefore, it is reasonable to expect little to no inequity to be present in the healthcare utilization of their populations. The presence of inequity in a healthcare system can therefore be related to a healthcare system's structure and delivery rather than its overall objective. Accordingly, equity measurements comment on the effectiveness of a healthcare system. Knowledge of equity in healthcare utilization in OECD countries therefore gives context for trends and findings in Canada. This highlights the importance of equity studies, and their ability to help shape healthcare policy towards solutions that will create truly universal healthcare coverage, regardless of unique national challenges (World Health Organization & The World Bank, 2015).

There are two types of works that examine equity of income-related healthcare utilization. The first type tests for the existence of inequity in healthcare through regression analysis of income and healthcare utilization. The second type quantifies the amount of inequity present in healthcare system utilization. Within the latter category, there are two approaches to quantify the equity in healthcare: horizontal and vertical. Horizontal equity refers to persons receiving equal treatment for equal amounts of need, while vertical equity refers to persons with unequal need receiving proportionally unequal treatment (Cullis & West, 1979; West, 1981). As healthcare need is inherently subjective

and challenging to proportionally compare, the equity of healthcare utilization literature focuses on detection and measurement using the Horizontal Inequity (HI) index. Robust techniques for quantifying inequity through the calculation of the HI index of healthcare utilization were developed in the second half of the 20th century. The calculation of the HI index is preceded by the construction of the Concentration Curve (CC) and Concentration Index (CI). The CC is a graphical depiction of inequality that plots the cumulative share of a population's healthcare use against the cumulative share of individuals in the population ranked by income. The Concentration Index (CI) is the quantification of the amount of inequality in healthcare utilization. These techniques have been refined over the past few decades as access to national survey data and technology has increased (O'Donnell et al., 2008). As the objective of this thesis is to compare equity over time, the primary focus of the analysis is the calculation of the HI index. As such, this chapter focuses on studies that use the HI index to quantify inequity in healthcare utilization. Further description of the specific procedures for calculating the CC, CI and HI_{wv} are discussed in Chapter 4.

The first study to make international comparisons of equity in healthcare utilization was conducted by Wagstaff, van Doorslaer and Paci in 1989. Due to considerations of data availability, their study focused on Italy, Britain and the Netherlands. Health need was based on the self-reported health status and presence of chronic conditions. The CI for health status in Britain, the Netherlands and Italy were all negative, indicating lower health status in lower SES groups. However, the magnitude of the CIs varied, with Britain's being the largest, followed by the Netherlands and then Italy. Healthcare utilization was measured through inpatient days, general practitioner (GP) use and outpatient visits. The calculated HI compared actual healthcare utilization for an income group with need-based expected utilization. Overall, they found pro-poor inequity in the Netherlands, but pro-rich inequity in Britain and Italy, with Britain's HI being the largest in magnitude (Wagstaff et al., 1989). However, this early method did not account for variations of health within groups, assuming all persons had equal levels of poor health. It also ignored the fact that lots of healthcare utilization is preventative rather than reactionary to illness (Wagstaff et al., 1989). Despite these limitations, this work

demonstrated how the CC, CI and HI can be used to evaluate and compare healthcare systems between nations.

An updated approach to measuring the HI was proposed by Wagstaff, van Doorslaer and Paci in 1991. Consistent with their earlier work, lower SES groups in both Italy and the Netherlands had higher rates of illness. However, the updated method for calculating the HI led to the opposite finding of pro-poor inequity for Italy. The overall HI findings for the Netherlands were again pro-poor, and the magnitude of inequity was less for the Netherlands than Italy (Wagstaff, van Doorslaer, & Paci, 1991). The updated methodology used for this study reduced bias towards the pro-rich; however, it still made assumptions about how to measure healthcare need and raised questions about how to quantify and describe inequity when both pro-rich and pro-poor inequity of healthcare utilization exist within a country (Wagstaff, van Doorslaer, et al., 1991).

In 1992, inequity in healthcare utilization was examined in a study of eight countries: Denmark, Ireland, Italy, the Netherlands, Spain, Switzerland, UK and the USA. Wherever possible based on data availability, multiple indicators of health need (medical, functional and subjective), rather than a single indicator were utilized. Types of healthcare utilization were also expanded from previous works to include not only GP and inpatient care, but also specialist physician (SP) visits (van Doorslaer et al., 1992). For chronic sickness and self-assessed health, the HI showed pro-poor inequities in all cases except four: Spain for chronic sickness, and Spain, the Netherlands and the UK for self-assessed health (van Doorslaer et al., 1992). When chronic sickness and self-assessed health were combined, overall the HIs were higher than when a single need indicator was used. In all countries except Denmark, income did not affect the probability of seeking care, only the amount of care received (van Doorslaer et al., 1992). This study's inclusion of multiple need variables represents an improvement in methodology. However, it was still limited by the need for aggregated data, challenging computational models, and assumptions of within-group need agreement (Pulok et al., 2019). As technology has improved, aggregated data and assumptions of consistent within-group need are no longer required. This allows for the increased insight into an individual's income-related healthcare utilization, as is performed in this study.

A revised version of the HI that used indirect standardization was put forward by Wagstaff and van Doorslaer in 2000, deemed $HI_{wv.}$ The development of the HI_{wv} simplified the mathematical calculations, allowed for use of both individual and group data, and included non-need variables (van Doorslaer et al., 2000). This method was demonstrated with data from 11 different countries: Belgium, Denmark, Finland, East & West Germany, Ireland, Netherlands, Sweden, Switzerland, UK and the USA. The data used varied based on survey availability for each country, with survey dates ranging from 1987 to 1996. Need was measured through age, gender, self-assessed health status and presence of chronic conditions, while healthcare utilization was accounted for through hospitalizations and GP and SP visits (van Doorslaer et al., 2000). All countries showed pro-poor inequity for all measures of healthcare except Denmark for specialist use and Sweden for all physician use. The amount of pro-poor utilization varied widely based on both country and type of service used. After adjusting for chronic conditions, the HI_{wv} for Belgium, Ireland and Switzerland remained pro-poor, while all other countries were positive or insignificant. When both self-assessed health status and chronic conditions are accounted for, Finland, East Germany, the Netherlands, Sweden and the USA had significant pro-rich inequity. In countries that distinguished physician visits based on type (Belgium, Denmark, Finland, Ireland, the Netherlands, UK), GP utilization was equitable except for Ireland and Belgium which were pro-poor, while specialist use was pro-rich in all countries except the UK and Ireland (van Doorslaer et al., 2000). The inequity differences between countries coincided with the delivery of healthcare in each country. Finland, Sweden, the US and the UK all have supplementary private insurance, while the Netherlands, Ireland, Germany, Switzerland and the UK allow for higher billing of high-income patients. Both Belgium and Ireland waive co-payments for the utilization of GPs for low-income groups, accounting for their pro-poor GP inequity. This association between healthcare delivery and inequity of utilization demonstrates the relationship between policy and equity in healthcare. The exact cause of pro-rich SP use in this study is less obvious, as there is no common healthcare system feature of the countries demonstrating pro-rich specialist use (van Doorslaer et al., 2000).

Following the development of indirect standardization techniques, the HI_{wv} became the dominant measurement of equity in healthcare utilization. Multiple international

empirical works on the equity of healthcare utilization followed, however few of them included Canada. These studies and their results are summarized in Table 3.1

Table 3.1. Summary of empirical work using HI_{wv} to assess equity of healthcare utilization.

Authors	Countries	Type of Utilization	Pattern of Utilization	Significant findings
van Doorslaer, Koolman & Puffer (2002)	14 OECD Countries	GP visits, SP visits, total physician visits	Number of visits	GP visits were pro-poor for 4 countries. SP visits were pro-rich for 12 countries. All physician visits were pro-rich for 4 countries.
van Doorslaer, Koolman, Jones (2004)	12 EU Countries	GP visits, SP visits	Probability of use, conditional use, total number of physician visits	Probability of GP visits was pro-poor for Spain and Germany, pro-rich for the Netherlands, the UK and Belgium. Conditional and total GP visits were both pro-poor for 8 of the 12 countries. Probability of SP visits were pro-rich for all countries except Denmark. Conditional SP visits were pro-rich for 4 countries and pro-poor for 1. Total SP visits were pro-rich for 10 of the 12 countries.
van Doorslaer, Masseria & the OECD Health Equity Research Group (2004)	21 OECD Countries	GP visits, SP visits, all physician visits, inpatient nights, dental visits.	Probability of use, total number of visits	Probability of all physician use was pro-rich for 9 countries. Total physician use was pro-rich for 7 countries and pro-poor for one. Total GP visits were pro-poor for 9 countries and pro-rich for one. Probability of GP visits was pro-poor for 3 countries and pro-rich for 3 countries. Total SP visits were pro-rich for 14 countries. Probability of SP visits were pro-rich for 16 countries. Total inpatient nights were each pro-poor and pro-rich for 1 country. Probability of inpatient nights were pro-poor for 4 countries and pro-rich for 2 countries. Total dental visits were pro-rich for 14 countries; probability of a dental visit was pro-rich for 17 countries.
Bago D'Uva, Jones, van Doorslaer (2009)	10 EU Countries	GP visits, SP visits	Number of visits, timescale analysis over 8 years to give short- and long-range measures of inequity	GP visits for both short- and long-range inequity calculations were pro-rich for 3 countries and pro-poor for the remaining 7. SP visits for both short- and long-range inequity calculations were pro-rich for all countries.

Devaux, Looper (2012)	19 OECD Countries	GP visits, SP visits, total physician visits, dental visits, breast and cervical cancer screenings	Probability of visits, total number of visits	Probability of total physician visits was pro-rich for 13 countries while total number of physician visits was pro-rich for 6 countries and pro-poor for 1. Probability of a GP visit was pro-rich for 5 countries, pro-poor for 1. Total GP visits was pro-poor for 6 countries. Probability of a SP visit was pro-rich for 12 countries, while total number of SP visits were pro-rich for 8 countries. Probability of a dental visit was pro-rich for all countries, while total number of dental visits was pro-rich for 10 countries. Probability of breast cancer screening was pro-rich for 8 countries while cervical cancer screening was pro-rich for all countries.
Devaux, Looper (2015)	18 OECD Countries	Any physician visit, GP visit, SP visit, dental visit, breast and cervical cancer screening	Probability of visit	Probability of any physician visit is pro-rich for 14 countries. Probability of a GP visit is pro-rich for 10 countries. Probability of a SP visit is pro-rich for 12 countries. Probability of a dental visit is pro-rich for all countries. Probability of breast cancer screening is pro-rich for 12 countries, while probability for cervical cancer screening is pro-rich for 14 countries.
OECD (2019)	33 OECD countries	GP visits, SP visits, hospitalization, cancer screening, dental visits, flu vaccinations	Probability of a visit, total number of visits	Probability of GP use was pro-rich for 18 countries, pro-poor for 2. Number of GP visits was pro-rich for one country and pro-poor for 9. Probability of a SP visit was pro-rich for all but three countries. Number of SP visits was pro-rich for 11 and pro-poor for 2. The probability of hospitalization was pro-poor for 2 countries and pro-rich for 6. Cancer screenings, dental visits and flu vaccinations were almost exclusively pro-rich, apart from 2 countries that were pro-poor for colorectal cancer screenings and one country for flu vaccinations.

Decades of research into equity in healthcare utilization have revealed that income-related differences in use have remained consistent and pervasive in the healthcare systems of multiple countries, despite claiming universal health coverage. Works often identify differences between countries that have led to inequities (Bago d'Uva, Jones, & van Doorslaer, 2009; Devaux, 2015; OECD, 2019; van Doorslaer et al., 2002), however many of the individual causes of inequity are attributed to country-specific factors. Therefore, in order to address issues of equity for a specific country, examination must be done to quantify and determine the causes of inequity specific to that country.

3.2 Empirical Evidence from Canada

The first international equity in healthcare utilization study to include Canada was van Doorslaer's work (2002) on physician utilization equity. In this study, the CI demonstrated that low-income Canadians had more GP visits than high income. However, the HI_{wv} showed GP visits were pro-poor, while SP visits showed pro-rich inequity (van Doorslaer et al., 2002). Overall, physician visits in Canada also showed pro-rich inequity. When private insurance coverage was accounted for, it was found to contribute to more pro-rich inequities of GP visits, although the overall effect was small. Standardization for different geographical regions was also conducted, but found to make little contribution to physician utilization inequities (van Doorslaer et al., 2002).

Around this time, other works also focused on equity of healthcare utilization in Canada. Early studies had similar findings of pro-poor GP utilization and pro-rich SP utilization (Dunlop, Coyte, & McIsaac, 2000; Roos, Forget, Walld, & MacWilliam, 2004; Roos & Mustard, 1997; Veugelers & Yip, 2003). Some Canadian studies have found inconsistent results about the role income plays with respect to different types of healthcare utilization (Asada & Kephart, 2007; Finkelstein, 2001) However, the regions examined are inconsistent, often focusing on a single city (Demeter, Reed, Lix, MacWilliam, & Leslie, 2005; Roos et al., 2004; Roos & Mustard, 1997). Additionally, the methodology used in all these early Canadian studies is varied and focuses on the detection of inequity rather than quantification, so their results will not be examined in depth.

Following the 2004 finding by van Doorslaer et al. that inequity exists within countries and causes are nation specific, Allin (2008) examined the equity of healthcare utilization between Canadian provinces using the CI and HI_{wv}. This is the first study to look at inequity of healthcare utilization in Canada both nationally and provincially. She found significant pro-rich inequity in the probability of GP, SP and dentist visits in all provinces (Newfoundland and Labrador [NL], Prince Edward Island [PE], Nova Scotia [NS], New Brunswick [NB], Quebec [QC], Ontario [ON], Manitoba [MB], Saskatchewan [SK], Alberta [AB], British Columbia [BC]), except PE for GP visits. There was no significant inequity in the total number of GP visits in any province except MB which was pro-poor, however all provinces had significant pro-rich inequity in the total number of SP and dental visits (Allin, 2008). Finally, she found pro-poor inequity in the probability of hospital admissions for NS, QC, MB and NB, while the total number of inpatient nights showed pro-poor inequity for AB and Canada as a whole (Allin, 2008). This study exposes issues of healthcare utilization equity in Canada both overall and between provinces. Given the national sharing of resources and funding, these differences are significant, however they only represent inequity in Canada at a single point in time. More useful information about between-province differences in healthcare utilization equity could be gained through a timescale analysis of the trends. A second study built off of Allin's 2008 work, assessing whether inequity in healthcare utilization in Canada was a result of differences between or within the provinces (Jimenez-Rubio et al., 2008). This study examined GP and SP visits, as well as hospital admissions for each province. Results were similar to previous works, with hospital stays and GP visits demonstrating pro-poor inequity while SP utilization was pro-rich. (Jimenez-Rubio et al., 2008).

Some empirical works focus on quantifying inequity of healthcare utilization in specific provinces. A study from BC used a need-standardized CI to examine the provincial income-related inequity of physician, inpatient visits and surgical utilization for a ten-year period (McGrail, 2008). This study found results similar to previous national findings: GP utilization was equitable, SP and day surgery utilization showed pro-rich inequity, inpatient treatment showed pro-poor inequity. Notably, the pro-rich inequity in utilization of SP and day surgery had increased over the period studied (McGrail, 2008).

This finding underscores the importance of identifying trend in inequity in healthcare utilization.

There is some work on the equity of specific healthcare utilization types in Canada. Services partially covered or largely excluded from Canadian Medicare coverage have tended to be an area of focus. A study using HI to examine the effects of insurance coverage of prescription drugs on physician use in Canada found pro-rich inequity for the probability of GP and SP visits, as well as conditional number of SP visits. Pro-poor inequities existed for the conditional number of GP visits. (Allin & Hurley, 2009). In 2010, a Canadian study of the HI of dental service utilization demonstrated significant pro-rich inequity for both the probability of preventative dental visits and total dental visits (Grignon et al., 2010).

Another study from BC used the CI and HI to examine the equity of end of life healthcare spending as a proxy for utilization, as related to income (Cunningham, Hanley, & Morgan, 2011). While total end of life healthcare spending was equitable, when broken down into hospital costs, SP fees, GP fees, and prescription costs, inequity was present. Publicly funded hospital costs and GP services had pro-poor inequity, while specialist services and prescription drug costs showed pro-rich inequity (Cunningham et al., 2011).

In NS, a study of the HI for cancer care treatment showed no income-related inequity. However, this study did find inequity in care based on other variables including age, sex and geography (Maddison et al., 2012). A longitudinal study from AB using the CI found pro-rich inequality of eye examinations present and relatively unchanged over a fifteen-year period. The study used administrative data, and found considerable variations in equality between regions within the province (Hwang, Rudnisky, Bowen, & Johnson, 2017). The data used in the four provincially based studies discussed was from administrative databases, making the results dependant on the healthcare system of that province and the specific type of administrative information collected. These differences in data sources create challenges in making comparisons and generalizations between provinces. The province specific scope also ignores differences in population, geography

and economy between provinces. Therefore, the results of these studies are useful within their own provinces but give little information about national equity trends.

A 2018 Canadian study demonstrated that income-related inequality was present in wait times (Hajizadeh, 2018). The CI in this study used national survey data from 2000 to 2010 to quantify income-related inequality of wait times. In the study, long wait times referred to any instance where an individual felt they needed care but were unable to receive it due to the wait. Significant pro-rich inequality in long wait times was found for Canada, as well as in the provinces of NS, NB, QC, MB, SK and BC (Hajizadeh, 2018). This study demonstrates the presence of utilization barriers beyond issues of finance or access in the Canadian healthcare system.

Finally, in 2019, a study used the need-standardized CI to examine income-related inequity of mental health services access in Canada and Australia (Bartram & Stewart, 2019). Inequities in Canadian utilization were found based on provider type. Utilization of mental health services in Canada was pro-poor for GPs and psychiatrists, but pro-rich for psychologists. This pattern of inequity was thought to be the result of differences in funding, with medical services that are not included in the national universal coverage plan showing pro-rich inequity (Bartram & Stewart, 2019). The findings of this study demonstrate how policies can impact equity of healthcare utilization in Canada.

As the methodologies and techniques for measuring healthcare inequity have evolved, the literature has become clearer. Despite their status as ‘universal’ and ‘comprehensive’, many healthcare systems demonstrate income-related inequity of healthcare utilization (van Doorslaer & Jones, 2004; van Doorslaer et al., 2002). As this body of literature has grown, it is evident that the Canadian healthcare system has not escaped these issues of inequity in utilization (Allin, 2008; Jimenez-Rubio et al., 2008). While many works offer insights into areas of particular utilization types (Bartram & Stewart, 2019; Grignon et al., 2010), regions (Cunningham et al., 2011; Maddison et al., 2012) or spans of time (McGrail, 2008), to date no work gives a national, longitudinal view into the trends and patterns of equity in healthcare utilization in Canada. This thesis will fill this research gap through the analysis of the equity of healthcare utilization in Canada from 2000 to 2014.

Data will be analyzed nationally, in urban and rural areas and provincially to allow for the detection of inequity trends. As healthcare systems in Canada are operated at the provincial level, province-specific analysis gives information about the equity of healthcare utilization within Canada. Further, access and use of healthcare in rural areas has been an ongoing concern in Canada. Examination of the equity of healthcare utilization in urban and rural areas provides meaningful information about healthcare use challenges for these populations. Through measurements of inequity of healthcare utilization over time, as well as the factors that contribute to inequity, trends and patterns can be identified and addressed through policy changes and new healthcare system designs.

CHAPTER 4 MEASURING EQUITY IN HEALTHCARE UTILIZATION

This chapter reviews the methodological background for measuring equity of healthcare utilization in the literature. The empirical works that demonstrate the evolution and establishment of the current globally accepted techniques for measurement of equity in healthcare utilization are reviewed. Building on literature discussed in Chapter 3, this chapter provides the methodological basis used in this study and described in Chapter 5.

4.1 Empirical Work on the Equity of Healthcare Utilization

The first widely accepted equity of healthcare utilization measurement technique was developed by LeGrand (1978). This analysis involved comparing the proportion of persons in high and low SES groups with the respective proportion of both ill persons and healthcare expenditures for each group (Le Grand, 1987). Results from the highest and lowest SES groups were compared to give a measurement of inequity between populations on opposite ends of the wealth spectrum.

Following the development of early SES group comparisons, the first study to make international comparisons of the equity of healthcare utilization was conducted by Wagstaff et al., in 1989. Instead of using discrete categories based on SES, the population was ranked based on income, creating a continuous variable. Data about an individual's medical expenditures and presence of chronic conditions were used to measure an individual's healthcare utilization while standardizing for their underlying health need. The CC was then constructed, comparing the cumulative proportion of standardized medical expenditure to the cumulative proportion of the population, ranked by income. On the CC plot, a 45-degree diagonal (line of perfect equality) represents what the CC would look like for truly equal healthcare utilization. Twice the area between the CC curve and the line of perfect equality represents the CI, a quantification of the magnitude of inequality in a population. The HI index measurement was then found to be the CI of actual healthcare utilization minus the CI of healthcare need or expected utilization.

The HI index compares actual healthcare utilization for an income group with their need-based expected use. A negative (positive) value for the HI indicates lower (higher) income individuals used more healthcare than expected, after adjusting for health need. More utilization than expected is deemed pro-poor for lower income populations and pro-rich for high income populations (Wagstaff et al., 1989). While this early method established proof of concept for the HI index, it did not allow for within-group variation, resulting in the large assumption that all persons in poor health had an equal amount of illness. It also made the erroneous assumption that only ill persons use healthcare (Wagstaff et al., 1989). Despite these original limitations, the core principles and calculation of the CC, CI and the HI index remain as the cornerstone measurement for equity of healthcare utilization works.

A new approach to calculating the HI index was proposed by Wagstaff, van Doorslaer and Paci in 1991. This technique used direct standardization based on a structural rather than reduced form model in order to impose the same level of need to the entire population, and also allowed for multiple indicators of need to be included in the model (Wagstaff, Paci, & van Doorslaer, 1991). While this technique was an improvement from LeGrand's methods, it still had limitations, namely the requirement for aggregated data, complicated calculations, and lack of sensitivity to within-group need differences (Pulok et al., 2019).

An updated version of calculating the HI was suggested by Wagstaff and van Doorslaer in 2000. The method, deemed the HI_{wv}, used indirect standardization of need. This allowed for both individual and group data to be used. It simplified the methodology and included non-need variables in the calculation of HI (Wagstaff & van Doorslaer, 2000).

4.2 Indirect Standardization Method to Measure Horizontal Inequity in Healthcare Utilization

While other techniques for assessing healthcare utilization equity exist, many of these methodologies are limited to looking at differences between the extreme ends of the income spectrum or hierarchical rankings of healthcare utilization based on income group. The clear benefit of the CI and HI_{wv} approaches over other methods is the

inclusion of the entire income spectrum, giving a more complete picture of inequality and inequality, respectively, of healthcare utilization present in a whole population (Papanicolas & Smith, 2013).

4.2.1 The Concentration Index

The CI is based on the CC, which plots the cumulative percentage of the population by income on the x-axis against the cumulative percentage of healthcare utilization on the y-axis, creating a visual depiction of the inequality of healthcare utilization (Figure 4.1). A line of perfect equality runs diagonally from (0,0) to (1,1). The area above of the line of perfect inequality represents higher healthcare use among lower income individuals, while the area below represents higher healthcare use among higher income individuals. As such, a CC that lies above the line of perfect equality demonstrates pro-poor inequality, or more cumulative healthcare utilization by lower income individuals. Conversely, a CC that lies below the line of perfect equality demonstrates pro-rich inequality, or more cumulative healthcare utilization by higher income individuals. The further away the CC is from the line of perfect equality, the greater the magnitude of inequality that exists within the population.

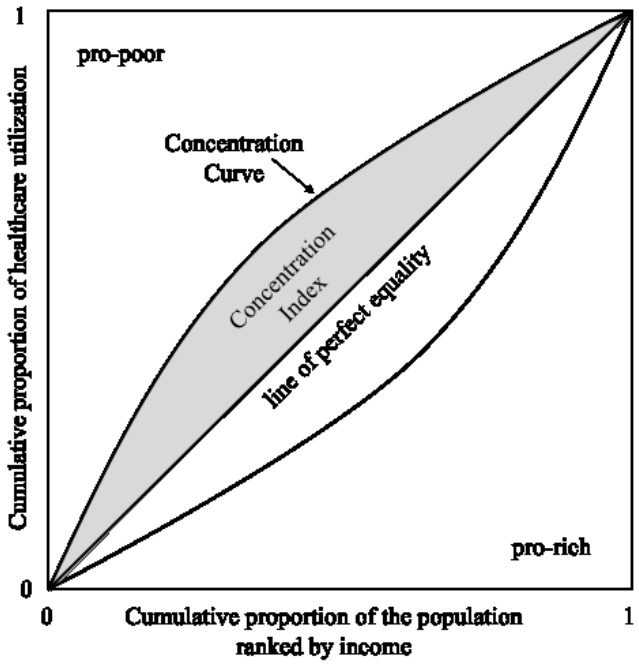

Figure 4.1. Example figure of a CC and resulting CI for the income-related inequality in healthcare utilization.

While the CC provides a visual depiction of the inequality in healthcare utilization present in a population, quantification of inequality is calculated through the CI. As a measure of the inequality of healthcare utilization, the CI is calculated as two times the area between the line of perfect inequality and the CC, or mathematically:

$$\mathrm{CI} = 1 - 2\int_0^1 L_h(p)dp \qquad (1)$$

The relationship between healthcare utilization and income is described by $L_h(p)$. Because this relationship only involves two variables, its ranges are from -1 to 1. A CI equal to zero indicates no inequality, while a positive (negative) value indicates pro-rich (pro-poor) inequality. The CI can also be described as the covariance between income and healthcare utilization:

$$\mathrm{CI} = \frac{2}{\mu}\mathrm{cov}(y_i, r_i). \qquad (2)$$

Where i represents an individual within the population and $r_i$represents that individual i's fractional rank within the population (i = 1 and n for the lowest income and highest income individuals, respectively), calculated as $r_i = i/n$. Healthcare utilization of an individual is measured by y, and μ is the mean healthcare utilization for the population. A different way of calculating the CI is through 'convenient regression' of the fractional ranking of healthcare utilization (O'Donnell et al., 2008; Pulok et al., 2019):

$$2\sigma^2\left(\frac{y_i}{\mu}\right) = \alpha + \beta r_i + \varepsilon_i. \quad (3)$$

In Equation 3, σ_r^2 represents the variance of r, the individual's income-related rank in the population. The CI is given by β, an ordinary least squares (OLS) estimate.

4.2.2 The Horizontal Inequity Index

While the CI give useful information about the equality of healthcare utilization and income, to determine the equity of utilization, individuals must be standardized to their level of need. Indirect standardization uses both individual and group level information to adjust the amount of healthcare utilization to the amount of healthcare need an individual demonstrates. The probability of healthcare utilization can then be determined through regression. Healthcare utilization is estimated through the following linear regression model:

$$y_i = \beta_0 + \beta_1 h_i + \beta_2 z_i + \varepsilon_i, \quad (4)$$

where y_i represents healthcare utilization by individual i, h_i represents need variables (eg. age, sex, self-assessed health) and z_i represents non-need variables (eg. income, education level). In Equation 4, β_1, and β_2 are the parameter vectors associated with the individuals need and non-need variables, respectively, while $\varepsilon_i$is an error term.

The need-predicted values of healthcare utilization are estimated by the following model:

$$\hat{y}_i = \hat{\beta}_0 + \hat{\beta}_1 h_i + \hat{\beta}_2 \bar{z}_i, \quad (5)$$

where $\hat{y}_i$ is the amount of medical care an individual would receive if they were treated the same as others with the same level of need. Non-need indicators are set equal to

average ($\bar{z}_i$), to allow for measurement of the ideal level of healthcare treatment an individual requires. To measure inequities in health, $\hat{\beta}_1$must be significantly different than zero. That is, there must be variation in the healthcare an individual receives based on that individual's need.

The HI_{WV} is the difference between the CI of actual healthcare utilization and the CI of expected utilization based on need (Figure 4.2).

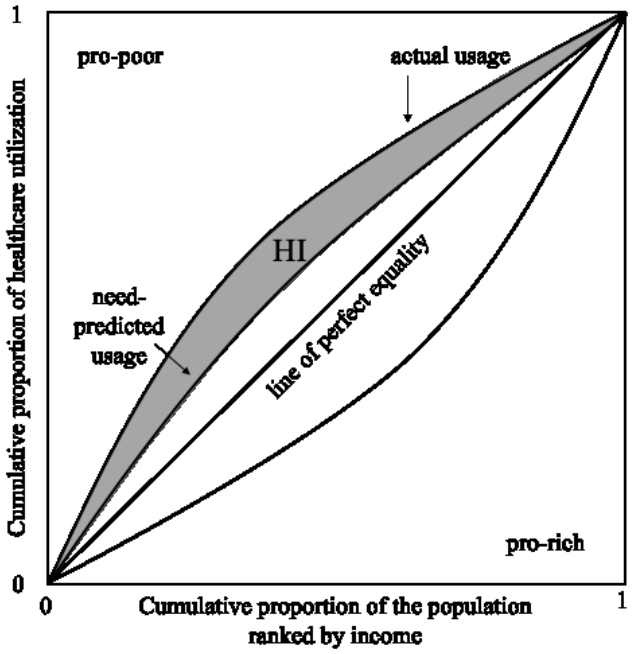

Figure 4.2. Example figure of actual and need-predicted healthcare utilization, and the resulting HI index of income-related healthcare utilization.

From Equation 3, the CI of actual healthcare utilization, $\mathrm{CI}_{\mathrm{M}} = \delta_1$, is estimated from the following equation:

$$2\sigma_R^2\left(\frac{y_i}{\mu}\right) = \alpha + \delta_1 r_i + \varepsilon_i \qquad (6)$$

In Equation 6, the fractional income rank of an individual is designated by r_i. To calculate the CI for the expected amount of healthcare utilized based on need, $\mathrm{CI}_{\mathrm{N}} = \delta_2$, the following model is used:

$$2\sigma_R^2\left(\frac{\hat{y}_i}{\mu}\right) = \alpha + \delta_2 r_i + \varepsilon_i \quad (7)$$

Equations 7 can then be subtracted from Equation 6 to give HI_{WV}.

$$\mathrm{HI}_{WV} = \hat{\delta}_1 - \hat{\delta}_2 \quad (8)$$

Alternatively, we can first calculate the indirectly need-standardized healthcare utilization (y_i^{IS}) for each individual by subtracting the need-predicted healthcare utilization ($\hat{y}_i$) from the actual healthcare utilization (y_i), and adding the sample mean of healthcare utilized ($\bar{y}$):

$$y_i^{\mathrm{IS}} = y_i - \hat{y}_i + \bar{y}. \quad (9)$$

We can then estimate the HI_{WV} by calculating the CI for the y_i^{IS} , δ_3, using Equation 10:

$$2\sigma_R^2\left(\frac{y_i^{IS}}{\mu}\right) = \alpha + \delta_3 r_i + \varepsilon_i \quad (10)$$

The range of HI_{WV} is from -1 to 1, with positive values indicating higher income individuals are utilizing more healthcare than low-income individuals with the same level of need, and *vice versa*. The magnitude of HI_{WV} indicates how much inequity exists, with larger magnitudes indicating higher levels of inequity. The steps in the calculation of HI_{WV} are largely consistent regardless of whether the regression model is linear or non-linear, however in non-linear models the mean of predicted use rather than actual use is used to calculate standardized utilization (O'Donnell et al., 2008). The ability to quantify inequity in healthcare utilization rather than just detect its presence makes HI_{wv} ideal for the analysis of inequity in healthcare utilization in Canada. Through measurement of HI_{wv} values nationally, provincially and for urban and rural areas, trends and patterns in the inequities of healthcare utilization can be observed. This allows for greater insight into inequities in healthcare utilization in the Canadian healthcare system.

CHAPTER 5 METHODS

This chapter describe the methodology used in this work. The first section discusses the data set, while the second section details the variables used for this study. Finally, section three explains the statistical analysis used in the study. This chapter builds on the methodology described in Chapter 4 and gives important context for the results reported in Chapter 6.

5.1 Data

This work uses data from the master files of the CCHS. The CCHS is a Statistics Canada cross-sectional survey that began in 2000. It collects information about the health status, health care utilization and SDH of Canadians (Statistics Canada, 2001). Originally conducted every two years, the CCHS changed to annual data collection prior to the 2006/2007 cycle. While the CCHS continues today, a significant redesign in 2015 changed the sampling methods and the procedure for collecting income data. As a result, comparisons between the pre-2015 and post-2015 surveys are not recommended for works using income variables (Statistics Canada, 2016). Accordingly, this study examined data from the 2000/2001 to 2014 cycles.

There are some exclusion criteria for the CCHS. Any person residing in Canada under the age of 13, persons living on Indigenous reserves, full time military personnel, persons living in institutions, foster children between the ages of 12 and 17, and persons living in Inuit and Cree regions of QC are excluded from the survey population. Despite these exclusion criteria, the CCHS is representative of 98% of Canadians over the age of 12 (Statistics Canada, 2001). The participant in the CCHS is completed through three strategies. The majority of households are selected through area framing based on health region. A smaller number of households are selected by list framing of telephone numbers, while the lowest number of households are selected through random digit dialing. The total sample numbers for each province is determined by the province's population, however sampling is carried out through multi-stage stratification to ensure all health regions within each province are sufficiently sampled (Statistics Canada, 2001). While CCHS data is collected for all provinces and territories, the territories are not

included in this study due to under-sampling of these regions (Allin, 2008; Statistics Canada, 2001). As such, the sampling strategies specific to the territories are not discussed.

The majority of CCHS respondents are selected through from area framing. For the area framing, methodology based on urbanization level is used to stratify households by geography and SES. Strata are then broken down further into smaller clusters of dwellings, from which households are randomly chosen. For health regions that could not be adequately sampled with area-framing strategies alone, list framing of telephone numbers is used. Telephone numbers are mapped to the health region based on the postal code associated with the number. Telephone numbers are randomly selected from the list for each health region. Random digit dialing is also used as a sampling strategy, again using postal codes to link telephone numbers with health regions to ensure adequate sampling within each region (Statistics Canada, 2001). The number of respondents selected for each household is determined based on household composition, while the actual respondents for each household are chosen randomly. The CCHS combined response rates of selected households and individuals for the cycles used are consistently between 68% and 84%. To minimize sampling errors, non-responses are accounted for in sample weighting (Statistics Canada, 2020). The large sample size allows the CCHS to be representative of the Canadian population, making the results of this study generalizable to Canada (Statistics Canada, 2001).

5.1 Variables

The existing equity of healthcare utilization literature was first reviewed to identify commonly used variables. Then, variables were checked to ensure they were included and consistent in wording in all 10 of the CCHS cycles used. To maintain consistency of underlying health need, only respondents aged 18 and older are included in the analysis. Any respondents with observations that lacked a definitive response for any of the variables chosen in this study were excluded from the entire data set. This includes responses that were missing, or where the respondent did not know or refused to answer. These respondents accounted for 13.8% of the overall sample. The number of dropped

observations due to missing values is within the documented 10% to 15% range of missing data for surveys (Moore & Loomis, 2001; Moore, Stinson, & Welniak, 2000). Subsequently, the 2011 CCHS cycle is excluded in entirety as the key outcome variables used in this study are not included in the common survey content for that cycle and therefore missing for a very high proportion of respondents. Sample sizes for each cycle used in this work are listed in Table 5.1. A table of the original sample size, sample size of respondents 18 years of age and older, and the final sample size used in this analysis for each cycle is listed in Appendix 1.

Table 5.1. Final CCHS sample sizes used in analysis for cycles from 2000 to 2014.

Cycle	Final Sample Size
00/01	101,318
02/03	98,302
04/05	99,084
2007	48,690
2008	55,012
2009	51,932
2010	52,859
2012	51,380
2013	53,169
2014	52,802
Total	664,548

Outcome variables of interest include questions about the utilization of GP services, SP services or hospital admissions (HA) over the previous 12 months. As eye specialists are not included in Medicare, CCHS questions about the use of eye specialists were not included in the SP use variable. Control variables are categorized as need and non-need. Need variables included health-related factors associated with increased healthcare needs, like age, sex and self-reported health status. Non-need variables are chosen based on factors unrelated to medical need previously shown to affect healthcare utilization, like income, geography and education level (Aday & Andersen, 1981) as well as those commonly used in the equity in healthcare utilization field.

Due to the confidential nature of income-related questions, a significant number of CCHS respondents gave an income range instead of a numerical estimate. To ensure minimal reduction of the sample size due to missing values, incomes are calculated for these cases by taking the median value of the given income range. Consistent with OECD publications (OECD, 2008, 2011), household income is adjusted for household size using the following calculation: income divided by the square root of household size. A complete list of variable definitions is shown in Table 5.2.

Table 5.2. Description of all variables used in analysis.

Variables	Description
Outcome Variables	
General Practitioner Use (GP)	1 = if respondent has seen or talked to their family physician or general practitioner in the last 12 months, 0 otherwise
Specialist Use (SP)	1 = if respondent has seen or talked to a specialist physician in the last 12 months, 0 otherwise
Hospital Admissions (HA)	1 = if respondent has been a patient overnight in the hospital in last 12 months, 0 otherwise
Need Variables	
Demographic variables	
Age	
18-25 (*Ref.*)	1 = if respondent is between 18-25 years old, 0 otherwise
26-35	1 = if respondent is between 26-35 years old, 0 otherwise
36-45	1 = if respondent is between 36-45 years old, 0 otherwise
46-55	1 = if respondent is between 46-55 years old, 0 otherwise
56-65	1 = if respondent is between 56-65 years old, 0 otherwise
66-75	1 = if respondent is between 66-75 years old, 0 otherwise
>75	1 = if respondent is >75 years old, 0 otherwise
Sex	
Male (*Ref.*)	1 = if respondent is male, 0 otherwise
Female	1 = if respondent is female, 0 otherwise
Health care variables	
Pregnant	1 = if respondent is pregnant, 0 otherwise
Self-Assessed health status	
Excellent (*Ref.*)	1 = if respondent rates health as excellent, 0 otherwise
Very good	1 = if respondent rates health as very good, 0 otherwise
Good	1 = if respondent rates health as good, 0 otherwise
Fair	1 = if respondent rates health as fair, 0 otherwise
Poor	1 = if respondent rates health as poor, 0 otherwise
Chronic Conditions	
Asthma	1 = if respondent has asthma, 0 otherwise
Arthritis	1 = if respondent has arthritis, 0 otherwise
Back problems	1 = if respondent has back problems, 0 otherwise
High blood pressure	1 = if respondent has high blood pressure, 0 otherwise
Migraine	1 = if respondent has migraine, 0 otherwise
Diabetes	1 = if respondent has diabetes, 0 otherwise
Heart disease	1 = if respondent has heart disease, 0 otherwise
Cancer	1 = if respondent has cancer, 0 otherwise

Ulcers	1 = if respondent has ulcers, 0 otherwise
Stroke	1 = if respondent has stroke, 0 otherwise
Bowel disease	1 = if respondent has bowel disease, 0 otherwise
Non-Need Variables	
Socioeconomic Variables	
Equivalized household income	Household income divided by the square root of the household size
Education level	
No secondary education (*Ref.*)	1 = if respondent has not completed secondary education, 0 otherwise
Secondary education	1 = if respondent has completed secondary education, 0 otherwise
Some post-secondary education	1 = if respondent has completed some post-secondary education, 0 otherwise
Completed post-secondary education	1 = if respondent has completed a post-secondary degree/diploma, 0 otherwise
Employment status	
Out of labor force (*Ref.*)	1 = if respondent is not in labor force, 0 otherwise
Unemployed	1 = if respondent is unemployed, 0 otherwise
Employed	1 = if respondent is employed, 0 otherwise
Immigration status	
Canadian (*Ref.*)	1 = if respondent is Canadian born, 0 otherwise
≤ 10 years	1 = if respondent migrated to Canada within the last 10 years, 0 otherwise
> 10 years	1 = if respondent migrated to Canada more than 10 years ago, 0 otherwise
Homeowner	1 = if respondent or someone in the household owns their dwelling, 0 otherwise
Geographical Variables	
Geographical region	
Urban	1 = if respondent resides in an urban area, 0 otherwise
Rural (*Ref.*)	1 = if respondent resides in a rural area, 0 otherwise
Province	
Newfoundland and Labrador (NL)	1 = if respondent resides in Newfoundland and Labrador, 0 otherwise
Prince Edward Island (PE)	1 = if respondent resides in Prince Edward Island, 0 otherwise
Nova Scotia (NS)	1 = if respondent resides in Nova Scotia, 0 otherwise
New Brunswick (NB)	1 = if respondent resides in New Brunswick, 0 otherwise
Quebec (QC)	1 = if respondent resides in Quebec. 0 otherwise
Ontario (ON) (*Ref.*)	1 = if respondent resides in Ontario, 0 otherwise
Manitoba (MB)	1 = if respondent resides in Manitoba, 0 otherwise
Saskatchewan (SK)	1 = if respondent resides in Saskatchewan, 0 otherwise
Alberta (AB)	1 = if respondent resides in Alberta, 0 otherwise
British Columbia (BC)	1 = if respondent resides in British Columbia, 0 otherwise
Other Non-need variables	
Marital Status	
Married (*Ref.*)	1 = if respondent is married. 0 otherwise
Widowed, separated, divorced	1 = if respondent is widowed, separated or divorced, 0 otherwise
Single	1 = if respondent is single, 0 otherwise

Ref reference category in regression models.

5.2 Statistical Analysis

To first demonstrate the existence of inequity of healthcare utilization in Canada, logistic regression is conducted on the pooled data set. The CI and HI_{wv} index value are used to quantify income-related inequality and inequity of healthcare utilization, respectively. Data is analyzed nationally, provincially and for urban and rural areas, with the CI and HI_{wv} generated by geographical division and cycle for each outcome variable. Robust standard error and confidence intervals are calculated, with P-value < 0.05 considered significant. Binary outcome variables in the CI analysis create minimum and maximum values bounded by the positive and negative mean, rather than the (-1, +1) range. To overcome this issue, the CI can be normalized by multiplying it by 1/(1-mean) (Wagstaff, 2005). Since the outcome variables for this study are all binary measures of the probability of use, all reported CI and HI_{wv} index values are normalized. Trend analysis to detect the presence of income-related inequity of utilization over time is also conducted. This was done by regressing the CI and HI_{wv} values for each outcome variable on time (10 points corresponding to the CCHS cycles from 2000 to 2014). As the outcome variables are binary, logistic regression is used in all analyses. Since linear regression approach can also be used to measure the HI_{wv} (O'Donnell et al., 2008; Pulok et al., 2019), the HI_{wv} were also measured using OLS regression model as a robustness check to the main findings. No significant differences were found between the estimated HI_{wv} using linear and non-linear regression models (See Appendix 2). Each cycle of the data set is weighted based on weight values provided by Statistics Canada for that cycle. Consistent with Statistics Canada recommendations, for the analysis of the pooled data set, the sampling weight is adjusted based on the number of cycles included in the study (Thomas & Wannell, 2009). All analysis performed in STATA 15 (StataCorp. 2017. *Stata Statistical Software: Release 15*. College Station, TX: StataCorp LLC.).

CHAPTER 6 RESULTS

This chapter presents the results of the study. In the first two sections, descriptive statistics and healthcare utilization values are reported. The results of logistic regression for GP, SP and HA use are reviewed in the third section. Finally, the remaining three sections present the equity of utilization result for GP visits, SP visits and HA.

6.1 Descriptive Statistics

Table 6.1 reports weighted descriptive statistics for variables from the pooled data set (n=664,548). Values are reported as the proportion (%) of the total pooled data set, except for equivalized household income, for which the mean value is reported. The proportion of individuals who visited a GP in the last 12 months is 77.77%, SP visits has a proportion of 30.23% while the proportion of individuals with a HA is 8.13%. The average age is 45.89 (SD= 17.08 years), however for analysis age is broken down into seven categories, listed in Table 5.8. The sample is equally split between males and females, with most respondents either married or in common law relationships (64.65%), followed by being single (22.47%).

The average equivalized household income from 2000 to 2014 is $33,980 (SD= $26,082). Most respondents completed post-secondary education (57.62%), with the next-highest level being completion of secondary education (18.34%), followed by some secondary education (16.14%) and some post-secondary education (7.9%). The highest proportion of respondents are employed (67.20%), followed by unemployed (24.75%) and out of the labour force (8.05%). Persons born in Canada account for 77.18% of respondents, followed by 16.61% for persons who immigrated to Canada more than 10 years ago and 6.22% who immigrated to Canada within the last 10 years. 73.74% of respondents owned their own home or lived with someone who owned the dwelling.

Only 1.04% of respondents were pregnant at the time they were surveyed. The highest proportion of respondents rated their own health as very good (37.60%), followed by good (28.60%), and excellent (22.38%), with only 8.67% as fair and 2.75% as poor. Ten different chronic conditions are included in the data set, with prevalence ranging from

20.7% (back pain) to 1.09% (stroke). In addition to back pain, arthritis, high blood pressure and migraines all have a prevalence of >10%. The prevalence of cancer, ulcers, stroke and bowel disease are all <5%. Finally, most respondents live in urban areas, with rural geography accounting for only 18.87% of respondents.

Table 6.1. Descriptive statistics for pooled data set.

Variables	Proportion (%)/mean	Standard Deviation
Outcome Variables		
General Practitioner Use (GP)	77.77	41.58
Specialist Use (SP)	30.23	45.93
Hospital admissions (HA)	8.13	27.33
Need Variables		
Demographic variables		
Age	45.89	17.08
18-25 (*Ref.*)	13.41	34.08
26-35	17.84	38.29
36-45	20.54	40.40
46-55	19.32	39.48
56-65	14.31	35.01
66-75	8.87	28.43
>75	5.72	23.23
Sex		
Male (*Ref.*)	49.60	50.00
Female	50.40	50.00
Health care need variables		
Pregnant	1.04	10.15
Self-Assessed health status		
Excellent (*Ref.*)	22.38	41.68
Very good	37.60	48.44
Good	28.60	45.19
Fair	8.67	28.14
Poor	2.75	16.36
Chronic Conditions		
Asthma	7.89	26.97
Arthritis	16.68	37.28
Back problems	20.07	40.05
High blood pressure	16.81	37.39
Migraine	10.33	30.43
Diabetes	5.81	23.39
Heart disease	5.12	22.04
Cancer	1.90	13.66
Ulcers	3.04	17.16
Stroke	1.09	10.39
Bowel disease	3.94	19.46
Non-Need Variables		
Socioeconomic Variables		
Equivalized household income†	33,980	26,082

Education level		
No secondary education (*Ref.*)	16.14	36.79
Secondary education	18.34	38.70
Some post-secondary education	7.90	26.97
Completed post-secondary education	57.62	49.42
Employment status		
Out of labor force (*Ref.*)	8.05	27.20
Unemployed	24.75	43.16
Employed	67.20	46.95
Immigration status		
Canadian (*Ref.*)	77.18	41.97
≤ 10 years	6.22	24.14
> 10 years	16.61	37.22
Homeowner	73.74	44.01
Geographical Variables		
Geographical region		
Urban	81.93	38.47
Rural (*Ref.*)	18.07	38.47
Province		
Newfoundland and Labrador (NL)	1.67	12.82
Prince Edward Island (PE)	0.43	6.55
Nova Scotia (NS)	2.94	16.89
New Brunswick (NB)	2.34	15.12
Quebec (QC)	24.13	42.78
Ontario (ON) (*Ref.*)	38.97	48.77
Manitoba (MB)	3.41	18.14
Saskatchewan (SK)	2.91	16.81
Alberta (AB)	10.25	30.33
British Columbia (BC)	12.95	33.58
Other Non-Need Variables		
Marital Status		
Married (*Ref.*)	64.65	47.81
Widowed, separated, divorced	12.88	33.49
Single	22.47	41.74

† In analysis the ln transformed equivalized household income was used. The mean of the ln-transformed variable was 10.43, the standard deviation was 0.77.
Ref reference category in regression models.

6.2 Trends in the utilization of GP, SP and HA in Canada

Table 6.2 shows the proportion (%), standard deviation and trend coefficients of all three outcome variables for Canada and urban and rural areas by cycle. The trend coefficients of GP visits for Canada and urban and rural areas are negative. This indicates proportion of individuals visiting a GP within the last 12 months has decreased overall from 2000 to 2014. However, only the results for Canada and urban areas are significant (Coefficient= -0.201, P-value<0.01; Coefficient= -0.233, P-value<0.01; respectively). The trend coefficient for SP visits is positive and significant for Canada and in urban and rural areas (Coefficient= 0.296, P-value: 0.001; Coefficient= 0.279, P-value< 0.01; Coefficient=

0.372, P-value<0.01; respectively). This indicates the proportion of Canadian adults visiting a specialist in the last 12 months has increased from 2000 to 2014, regardless of the geographical density. The proportion of individuals experiencing hospital admissions in the last 12 months shows little variability over the 2000 to 2014 time period nationally and for both geographical densities. This is demonstrated by trend coefficients that are not statistically significant (Coefficient= -0.018; Coefficient= -0.015; Coefficient= -0.034; respectively).

Table 6.2. Trends in the utilization of GP, SP and HA in Canada from 2000 to 2014.

	GP			SP			HA		
	Canada	**Urban**	**Rural**	**Canada**	**Urban**	**Rural**	**Canada**	**Urban**	**Rural**
Year	**Proportion (%) (SD)**	**Proportion (%) (SD)**	**Proportion (%) (SD)**	**Proportion (%) (SD)**	**Proportion (%) (SD)**	**Proportion (%) (SD)**	**Proportion (%) (SD)**	**Proportion (%) (SD)**	**Proportion (%) (SD)**
00/01	79.06 (40.69)	79.39 (40.45)	77.57 (41.71)	29.62 (45.66)	30.12 (45.88)	27.33 (44.57)	8.52 (27.92)	8.34 (27.64)	9.36 (29.12)
02/03	78.12 (41.34)	78.48 (41.09)	76.51 (42.39)	28.37 (45.08)	28.98 (45.37)	25.67 (43.68)	8.30 (27.59)	8.18 (27.41)	8.82 (28.35)
04/05	78.65 (40.98)	78.94 (40.77)	77.30 (41.89)	28.28 (45.04)	28.70 (45.24)	26.35 (44.06)	7.79 (26.80)	7.61 (26.51)	8.61 (28.05)
2007	77.30 (41.89)	77.58 (41.71)	76.04 (42.68)	30.15 (45.89)	30.41 (46.00)	28.96 (45.36)	8.20 (27.44)	8.08 (27.26)	8.73 (28.23)
2008	77.68 (41.64)	77.97 (41.44)	76.35 (42.49)	30.44 (46.02)	30.81 (46.17)	28.79 (45.28)	7.95 (27.05)	7.76 (26.76)	8.77 (28.28)
2009	78.23 (41.27)	78.52 (41.07)	76.86 (42.17)	30.64 (46.10)	31.21 (46.34)	28.01 (44.90)	7.96 (27.07)	7.76 (26.75)	8.88 (28.45)
2010	78.52 (41.07)	78.62 (41.00)	78.07 (41.38)	31.61 (46.50)	32.06 (46.67)	29.52 (45.61)	8.15 (27.36)	8.21 (27.45)	7.87 (26.93)
2012	75.57 (42.96)	75.55 (42.98)	75.67 (42.91)	31.94 (46.63)	32.10 (46.69)	31.24 (46.35)	8.13 (27.32)	8.01 (27.14)	8.65 (28.12)
2013	76.03 (42.69)	75.72 (42.88)	77.45 (41.79)	32.87 (46.97)	33.06 (47.04)	31.98 (46.64)	8.15 (27.36)	7.96 (27.06)	9.04 (28.68)
2014	76.30 (42.53)	76.46 (42.43)	75.59 (42.96)	32.12 (46.70)	32.60 (46.87)	30.04 (45.84)	8.00 (27.13)	7.88 (26.95)	8.52 (27.92)
Trend Coefficients (p-values)	-0.201 (0.007)	-0.233 (0.005)	-0.059 (0.359)	0.296 (0.001)	0.279 (0.001)	0.372 (0.001)	-0.018 (0.222)	-0.015 (0.380)	-0.034 (0.236)

Note: SD = Standard Deviation

Table 6.3 shows the proportion (%) and standard deviation of GP visits in the last 12 months by province. All provinces followed the national trend of GP visits, showing decreases from 2000 to 2014. The exception is QC, which stayed relatively consistent over the ten cycles. These results are reflected in the trend coefficients, with all coefficients negative and significant except for QC, that showed a positive non-significant trend (Coefficient= 0.059), and MB that showed a negative but non-significant trend (Coefficient = -0.164). The proportion (%) of GP visits in the last 12 months for Canada and urban and rural areas are shown in Figure 6.1. Figure 6.2 shows the proportion (%) of GP visits in the last 12 months for Canadian provinces.

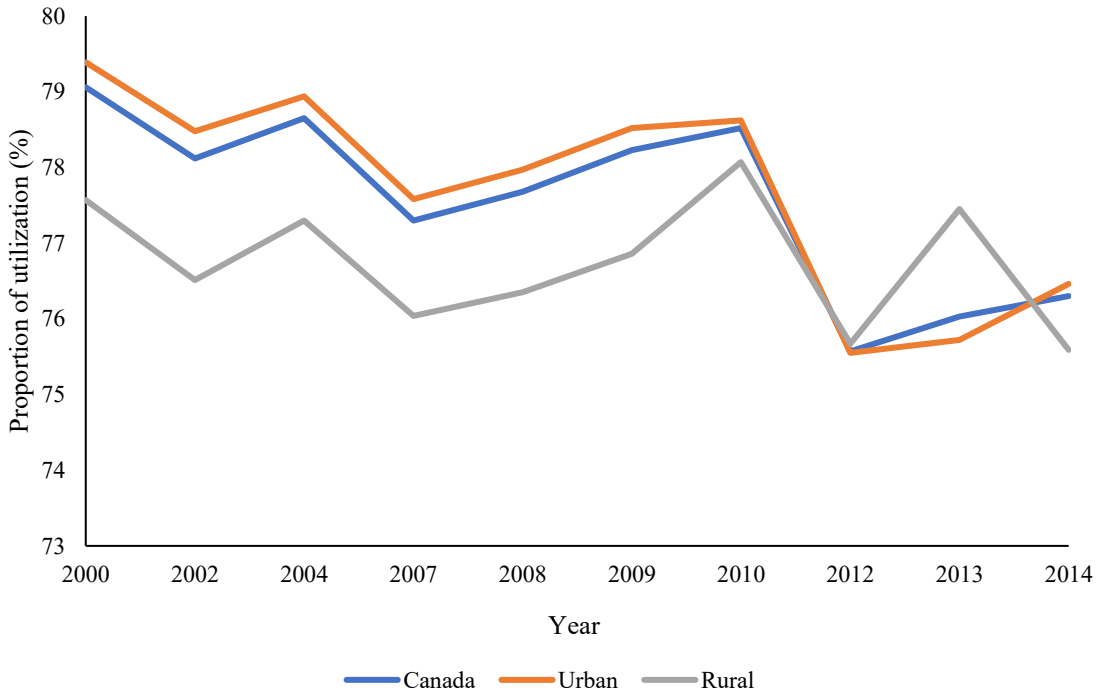

Figure 6.1. The proportion (%) of GP visits in Canada and urban and rural areas from 2000 to 2014.

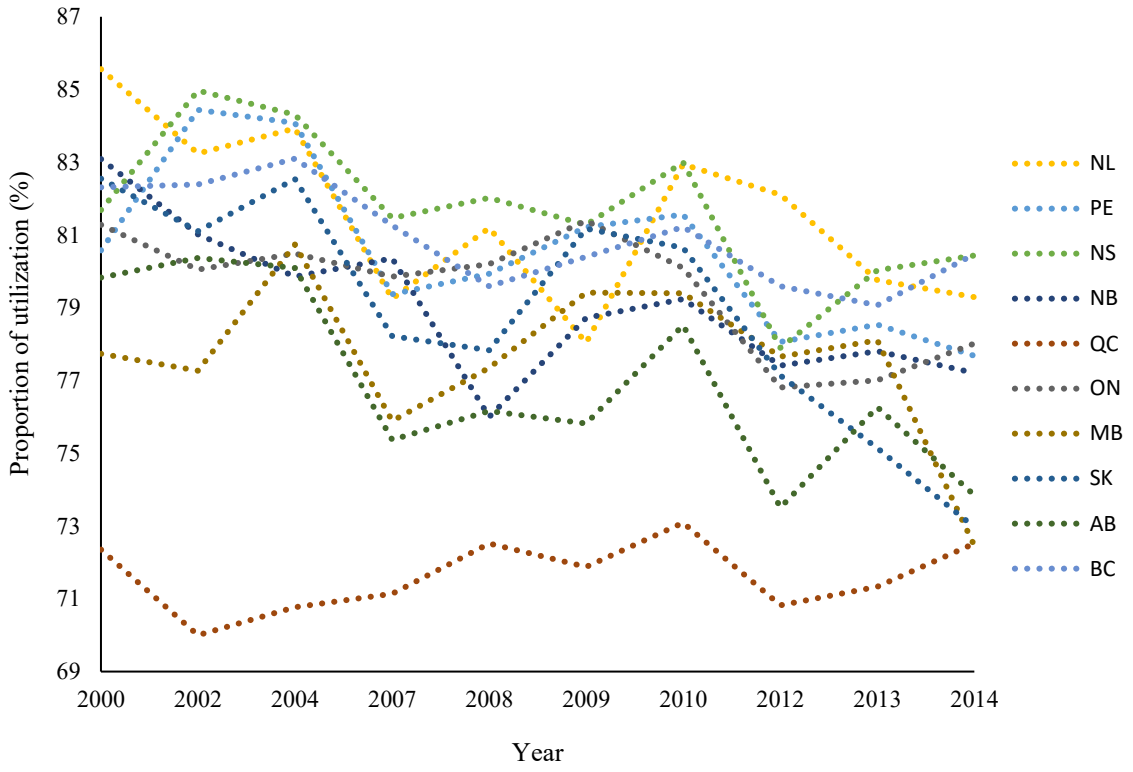

Figure 6.2. The proportion (%) of GP visits by provinces from 2000 to 2014.

Table 6.3. Trends in the utilization of GP in Canadian provinces from 2000 to 2014.

	NL	**PE**	**NS**	**NB**	**QC**
Year	**Proportion (%) (SD)**	**Proportion (%) (SD)**	**Proportion (%) (SD)**	**Proportion (%) (SD)**	**Proportion (%) (SD)**
00/01	85.56 (35.16)	80.58 (39.56)	81.69 (38.68)	83.09 (37.49)	72.35 (44.73)
02/03	83.24 (37.36)	84.44 (36.26)	84.97 (35.74)	81.02 (39.22)	70.00 (45.83)
04/05	83.93 (36.73)	84.08 (36.60)	84.31 (36.38)	79.86 (40.11)	70.77 (45.48)
2007	79.25 (40.57)	79.37 (40.48)	81.47 (38.86)	80.36 (39.74)	71.14 (45.31)
2008	81.19 (39.09)	79.94 (40.07)	82.02 (38.41)	76.00 (42.72)	72.52 (44.64)
2009	78.04 (41.41)	81.22 (39.08)	81.28 (39.02)	78.72 (40.94)	71.88 (44.96)
2010	82.94 (37.62)	81.56 (38.81)	83.00 (37.57)	79.24 (40.57)	73.09 (44.35)
2012	82.11 (38.34)	78.06 (41.41)	77.90 (41.50)	77.41 (41.82)	70.82 (45.46)
2013	79.76 (40.19)	78.54 (41.08)	80.03 (39.78)	77.81 (41.56)	71.33 (45.22)
2014	79.29 (40.53)	77.68 (41.66)	80.44 (39.67)	77.21 (41.96)	72.52 (44.64)
Trend Coefficients (P-value)	-0.354 (0.028)	-0.357 (0.019)	-0.295 (0.033)	-0.364 (0.004)	0.059 (0.429)
	ON	**MB**	**SK**	**AB**	**BC**

Year	Proportion (%) (SD)	Proportion (%) (SD)	Proportion (%) (SD)	Proportion (%) (SD)	Proportion (%) (SD)
00/01	81.28 (39.01)	77.74 (41.61)	82.55 (37.96)	79.83 (40.13)	82.31 (38.16)
02/03	80.05 (39.96)	77.27 (41.91)	81.11 (39.14)	80.37 (39.72)	82.39 (38.09)
04/05	80.49 (39.63)	80.74 (39.44)	82.54 (37.97)	80.09 (39.93)	83.10 (37.48)
2007	79.86 (40.11)	75.89 (42.78)	78.22 (41.28)	75.37 (43.09)	81.26 (39.03)
2008	80.20 (39.85)	77.35 (41.86)	77.83 (41.54)	76.16 (42.62)	79.59 (40.31)
2009	81.39 (38.92)	79.42 (40.43)	81.18 (39.09)	75.82 (42.82)	80.40 (39.70)
2010	80.09 (39.93)	79.40 (40.45)	80.65 (39.51)	78.52 (41.07)	81.22 (39.06)
2012	76.81 (42.20)	77.66 (41.66)	77.14 (42.00)	73.51 (44.13)	79.59 (40.31)
2013	77.01 (42.08)	78.11 (41.36)	75.14 (43.23)	76.27 (42.55)	79.07 (40.69)
2014	78.02 (41.41)	72.46 (44.68)	72.97 (44.42)	73.85 (43.95)	80.47 (39.65)
Trend Coefficients (P-value)	-0.256 (0.017)	-0.164 (0.336)	-0.563 (0.004)	-0.444 (0.004)	-0.232 (0.005)

Note: NL= Newfoundland and Labrador, PE=Prince Edward Island, NS=Nova Scotia, NB=New Brunswick, QC=Quebec, ON=Ontario, MB=Manitoba, SK=Saskatchewan, AB=Alberta, BC=British Columbia; SD = Standard Deviation

Table 6.4 reports the proportion (%) and standard deviation of SP visits in the last 12 months by province. Consistent with the national data, all provinces show increases from 2000 to 2014. These results are reflected in the trend coefficients, with all coefficients having a positive value. The coefficients for all provinces except NB, QC and SK are significant. The proportion (%) of SP visits in the past 12 months in Canada and urban and rural areas from 2000 to 2014 are shown in Figure 6.3. The proportion (%) of SP visits in the past 12 months by province from 2000 to 2014 are shown in Figure 6.4.

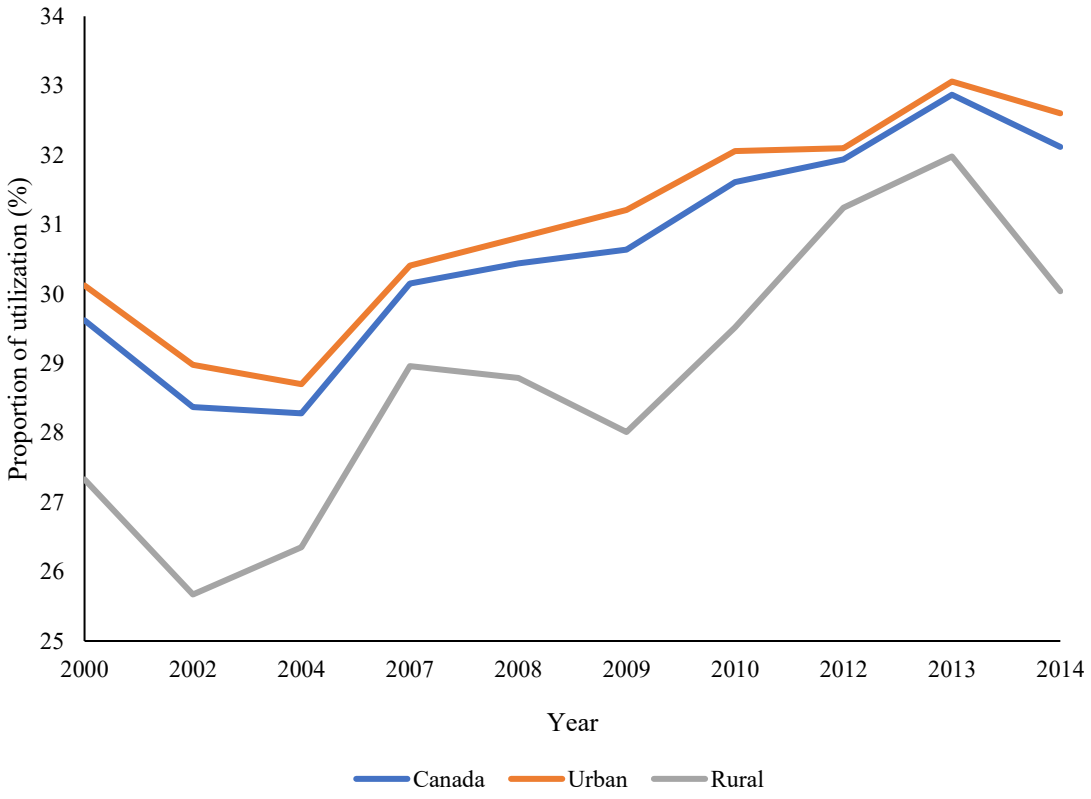

Figure 6.3. The proportion (%) of SP visits in Canada and urban and rural areas from 2000 to 2014.

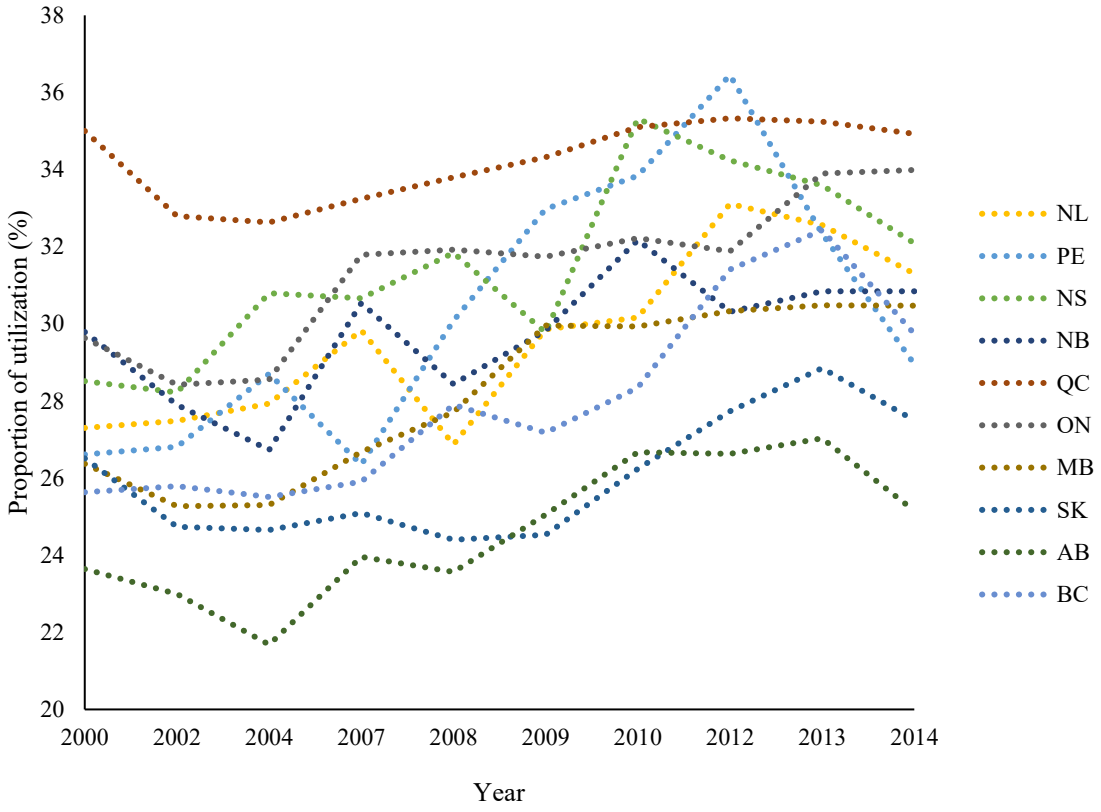

Figure 6.4. The proportion (%) of SP visit by province from 2000 to 2014

Table 6.4. Trends in the utilization of SP in Canadian provinces from 2000 to 2014.

	NL	**PE**	**NS**	**NB**	**QC**
Year	**Proportion (%) (SD)**	**Proportion (%) (SD)**	**Proportion (%) (SD)**	**Proportion (%) (SD)**	**Proportion (%) (SD)**
00/01	27.30 (44.56)	26.61 (44.20)	28.51 (45.15)	29.79 (45.74)	35.00 (47.70)
02/03	27.48 (44.65)	26.81 (44.31)	28.22 (45.01)	27.90 (44.86)	32.79 (46.95)
04/05	27.93 (44.87)	28.70 (45.25)	30.79 (46.17)	26.73 (44.26)	32.63 (46.89)
2007	29.83 (45.77)	26.35 (44.07)	30.66 (46.12)	30.54 (46.07)	33.24 (47.11)
2008	26.87 (44.34)	30.08 (45.89)	31.84 (46.60)	28.44 (45.12)	33.80 (47.31)
2009	29.86 (45.78)	32.98 (47.04)	29.77 (45.73)	29.82 (45.76)	34.32 (47.48)
2010	30.16 (45.91)	33.84 (47.34)	35.32 (47.81)	32.17 (46.72)	35.10 (47.73)
2012	33.11 (47.08)	36.45 (48.16)	34.24 (47.46)	30.31 (45.97)	35.33 (47.80)
2013	32.56 (46.87)	32.34 (46.80)	33.59 (47.24)	30.84 (46.19)	35.24 (47.77)
2014	31.30 (46.38)	28.95 (45.38)	32.09 (46.69)	30.84 (46.20)	34.93 (47.68)
Trend Coefficients (P-value)	0.392 (0.003)	0.489 (0.036)	0.393 (0.008)	0.207 (0.065)	0.127 (0.084)
	ON	**MB**	**SK**	**AB**	**BC**

Year	Proportion (%) (SD)	Proportion (%) (SD)	Proportion (%) (SD)	Proportion (%) (SD)	Proportion (%) (SD)
00/01	29.63 (45.66)	26.37 (44.07)	26.51 (44.14)	23.64 (42.49)	25.63 (43.66)
02/03	28.42 (45.10)	25.27 (43.46)	24.74 (43.16)	22.99 (42.08)	25.79 (43.75)
04/05	28.55 (45.16)	25.30 (43.48)	24.65 (43.10)	21.68 (41.21)	25.51 (43.59)
2007	31.79 (46.57)	26.68 (44.24)	25.09 (43.36)	23.96 (42.69)	25.91 (43.82)
2008	31.92 (46.62)	27.71 (44.76)	24.40 (42.96)	23.57 (42.45)	27.90 (44.85)
2009	31.74 (46.55)	29.96 (45.81)	24.53 (43.03)	25.05 (43.33)	27.18 (44.49)
2010	32.22 (46.73)	29.93 (45.80)	26.24 (44.00)	26.67 (44.23)	28.35 (45.07)
2012	31.88 (46.60)	30.33 (45.98)	27.73 (44.77)	26.63 (44.20)	31.41 (46.42)
2013	33.90 (47.34)	30.48 (46.04)	28.85 (45.31)	27.03 (44.42)	32.43 (46.81)
2014	33.99 (47.37)	30.47 (46.04)	27.50 (44.66)	25.15 (43.39)	29.74 (45.72)
Trend Coefficients (P-value)	0.377 (0.000)	0.423 (0.000)	0.196 (0.078)	0.291 (0.009)	0.454 (0.002)

Note: NL=Newfoundland and Labrador, PE=Prince Edward Island, NS=Nova Scotia, NB=New Brunswick, QC=Quebec, ON=Ontario, MB=Manitoba, SK=Saskatchewan, AB=Alberta, BC=British Columbia; SD = Standard Deviation

Table 6.5 shows the proportion (%), standard deviation and trend coefficients of HA in the last 12 months by province. Most provinces showed relatively consistent utilization from 2000 to 2014, with only ON and SK having trend coefficients that are significant. The coefficients for ON and SK are both negative (Coefficient= -0.055, P-value<0.05; Coefficient= -0.099, P-value<0.05; respectively), indicating a decrease in utilization from 2000 to 2014. The proportion (%) of HA in the past 12 months for Canada and urban and rural areas from 2000 to 2014 are shown in Figure 6.5. The proportion (%) of HA in the past 12 months by province from 2000 to 2014 are shown in Figure 6.6.

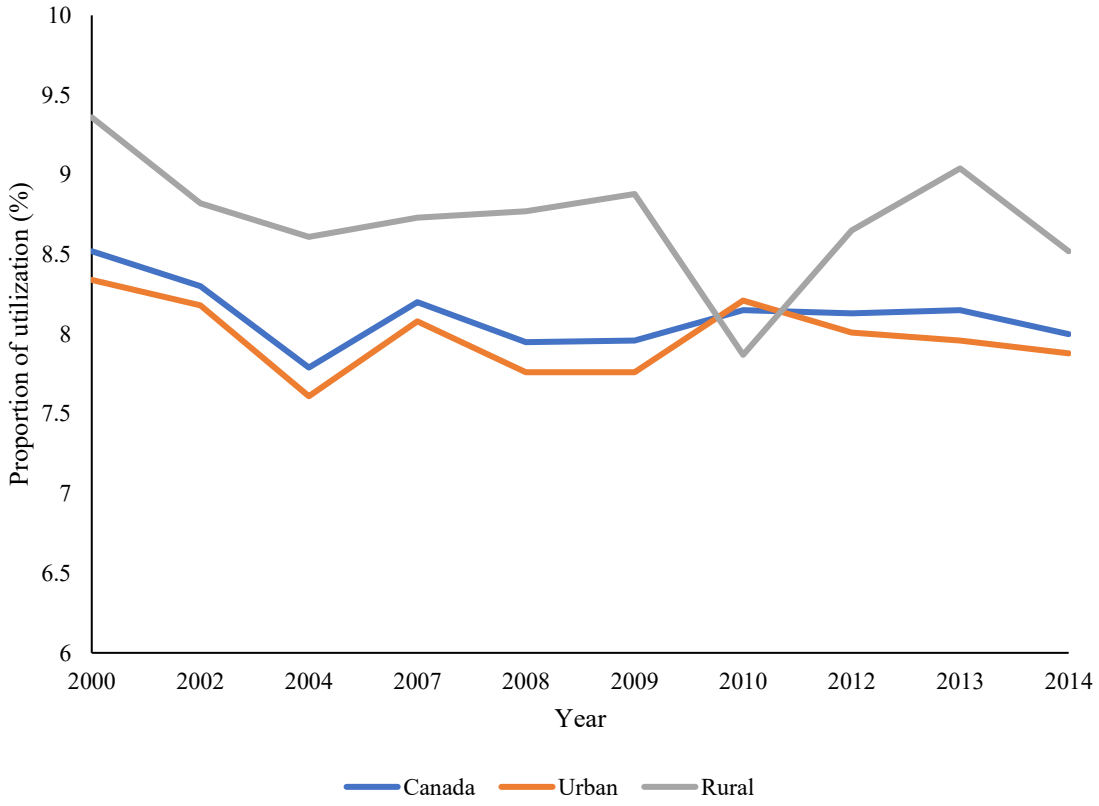

Figure 6.5. The proportion (%) of HA in Canada and urban and rural areas from 2000 to 2014.

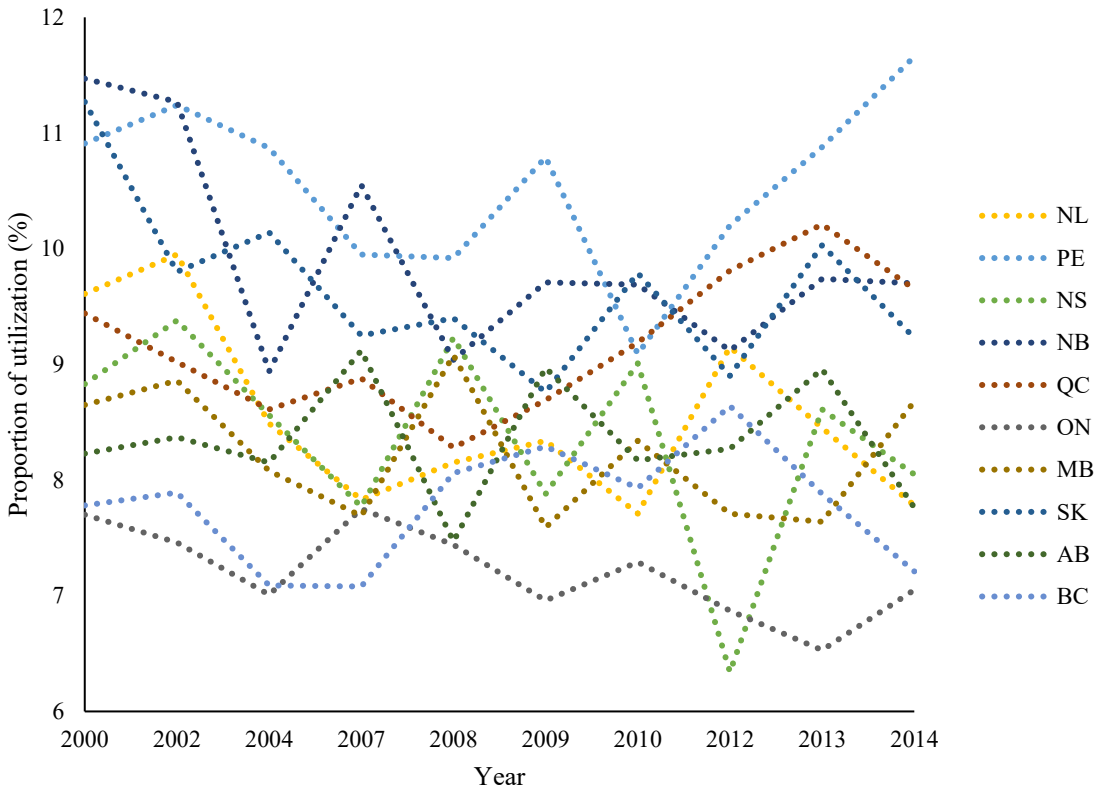

Figure 6.6. The proportion (%) of HA by province from 2000 to 2014.

Table 6.5. Trends in the utilization of HA in Canadian provinces from 2000 to 2014.

	NL	**PE**	**NS**	**NB**	**QC**
Year	**Proportion (%) (SD)**	**Proportion (%) (SD)**	**Proportion (%) (SD)**	**Proportion (%) (SD)**	**Proportion (%) (SD)**
00/01	9.61 (29.48)	10.91 (31.19)	8.83 (28.38)	11.47 (31.87)	9.44 (29.24)
02/03	9.95 (29.94)	11.24 (31.60)	9.38 (29.16)	11.27 (31.63)	9.02 (28.65)
04/05	8.49 (27.88)	10.87 (31.14)	8.56 (27.99)	8.94 (28.54)	8.61 (28.05)
2007	7.83 (26.87)	9.95 (29.94)	7.77 (26.77)	10.55 (30.73)	8.88 (28.45)
2008	8.15 (27.37)	9.92 (29.91)	9.23 (28.95)	9.04 (28.68)	8.28 (27.55)
2009	8.34 (27.66)	10.79 (31.04)	7.88 (26.94)	9.71 (29.61)	8.69 (28.16)
2010	7.71 (26.68)	9.09 (28.76)	9.01 (28.64)	9.69 (29.58)	9.19 (28.90)
2012	9.15 (28.84)	10.20 (30.28)	6.34 (24.37)	9.12 (28.79)	9.81 (29.74)
2013	8.45 (27.82)	10.88 (31.16)	8.61 (28.06)	9.74 (29.66)	10.21 (30.28)
2014	7.78 (26.79)	11.66 (32.12)	8.05 (27.21)	9.70 (29.60)	9.65 (29.53)
Trend Coefficients (P-value)	-0.103 (0.055)	-0.017 (0.765)	-0.090 (0.169)	-0.117 (0.058)	0.058 (0.189)
	ON	**MB**	**SK**	**AB**	**BC**

Year	Proportion (%) (SD)	Proportion (%) (SD)	Proportion (%) (SD)	Proportion (%) (SD)	Proportion (%) (SD)
00/01	7.70 (26.65)	8.65 (28.10)	11.27 (31.63)	8.23 (27.48)	7.78 (26.79)
02/03	7.46 (26.27)	8.86 (28.42)	9.80 (29.73)	8.37 (27.69)	7.89 (26.96)
04/05	7.01 (25.53)	8.08 (27.25)	10.14 (30.18)	8.15 (27.36)	7.09 (25.67)
2007	7.75 (26.74)	7.69 (26.64)	9.25 (28.97)	9.12 (28.79)	7.08 (25.65)
2008	7.44 (26.23)	9.08 (28.73)	9.40 (29.18)	7.47 (26.30)	8.06 (27.22)
2009	6.96 (25.45)	7.59 (26.48)	8.76 (28.27)	8.97 (28.57)	8.29 (27.58)
2010	7.29 (25.99)	8.34 (27.65)	9.79 (29.71)	8.17 (27.38)	7.93 (27.02)
2012	6.87 (25.30)	7.71 (26.67)	8.90 (28.48)	8.27 (27.54)	8.64 (28.10)
2013	6.53 (24.69)	7.64 (26.57)	10.03 (30.04)	8.96 (28.56)	7.88 (26.94)
2014	7.05 (25.59)	8.68 (28.15)	9.23 (28.94)	7.76 (26.76)	7.21 (25.86)
Trend Coefficients (P-value)	-0.055 (0.035)	-0.044 (0.296)	-0.099 (0.048)	0.002 (0.969)	0.021 (0.602)

Note: NL=Newfoundland and Labrador, PE=Prince Edward Island, NS=Nova Scotia, NB=New Brunswick, QC=Quebec, ON=Ontario, MB=Manitoba, SK=Saskatchewan, AB=Alberta, BC=British Columbia; SD = Standard Deviation

6.3 Determinants of GP visits, SP visits and HA

Table 6.6 reports the average marginal effects obtained from logistic regression models of the pooled data set. Consistent with Statistics Canada recommendations, the sampling weight for the pooled data set is adjusted based on the number of cycles included (Thomas & Wannell, 2009). As reported in the table, females are significantly more likely to visit a GP (67.8%), SP (47.0%) or have a HA (38.1%) than their male counterparts. As expected, likelihood of GP and SP use, as well as HA increases as self-assessed health status declines and increases in the presence of chronic disease, except for HA in persons with arthritis or back problems.

Equivalized household income is positively associated with the GP and SP use while negatively associated with HA. Higher levels of educational attainment lead to increased probability of GP and SP utilization, but the same pattern is not present for HA. Employed or unemployed respondents have a lower probability of GP, SP and HA use compared to individuals outside of the labour market. Persons who immigrated to Canada in the last ten years have a lower probability of GP, SP and HA use than persons born in Canada. Compared to Canadian born individuals, established immigrants (immigrated to Canada more than ten years ago) have a higher probability of GP utilization but lower

probability of SP and HA use. The probability of GP use is higher among homeowners while the probability of HA has a negative association with home ownership. Persons who are widowed, separated, divorced or single have a significantly lower probability of GP and SP use and HA compared to people who are married.

Persons living in urban areas have a higher probability of GP (13.9%) and SP (17.6%) use but a lower probability of HA (5.3%). Compared to ON residents, those who are living in NL, PE, NS, and BC have a higher probability of GP use while QC, MB and SK have a lower probability of GP use. Compared to those living in ON, residents of all provinces, except QC and PE, have a lower probability of SP use. Compared to ON residents, the probability of HA use is higher for all other province's residents, except those living in NS.

Table 6.6. Marginal effects obtained from logistics regression: Results from the pooled CCHS 2000-2014

Variables	GP	SP	HA
Need Variables			
Demographic variables			
Age			
26-35	-0.049**	0.079***	0.079**
36-45	-0.016	0.007	-0.573***
46-55	0.069***	0.030	-0.827***
56-65	0.311***	0.105***	-0.744***
66-75	0.511***	0.106***	-0.695***
>75	0.309***	-0.512***	-0.770***
Sex			
Female	0.678***	0.470***	0.381***
Health care need variables			
Pregnant	0.566***	0.982***	-0.087
Self-Assessed health status			
Very good	0.214***	0.225***	0.112***
Good	0.301***	0.465***	0.460***
Fair	0.504***	0.837***	0.929***
Poor	0.712***	1.210***	1.383***
Chronic Conditions			
Asthma	0.413***	0.202***	0.213***

Arthritis	0.379***	0.315***	0.028
Back problems	0.311***	0.221***	0.029
High blood pressure	0.748***	0.085***	0.079***
Migraine	0.306***	0.211***	0.124***
Diabetes	0.594***	0.217***	0.218***
Heart disease	0.483***	0.733***	0.820***
Cancer	0.384***	1.464***	0.963***
Ulcers	0.353***	0.192***	0.285***
Stroke	0.265***	0.082**	0.500***
Bowel disease	0.559***	0.566***	0.359***
Non-Need Variables			
Socioeconomic Variables			
Equivalized household income	0.126***	0.163***	-0.059***
Education level			
Secondary education	0.121***	0.225***	-0.001
Some post-secondary education	0.288***	0.413***	-0.078**
Completed post-secondary education	0.313***	0.478***	0.041*
Employment status			
Unemployed	-0.378***	-0.420***	-0.304***
Employed	-0.369***	-0.568***	-0.732***
Immigration status			
≤ 10 years	-0.137***	-0.257***	-0.291***
> 10 years	0.046**	-0.061***	-0.166***
Homeowner	0.116***	0.023*	-0.062***
Geographical Variables			
Geographical region			
Urban	0.139***	0.176***	-0.053***
Province			
Newfoundland and Labrador (NL)	0.149***	-0.072***	0.080**
Prince Edward Island (PE)	0.098***	-0.033	0.337***
Nova Scotia (NS)	0.107***	-0.055**	0.000
New Brunswick (NB)	-0.032	-0.094***	0.172***
Quebec (QC)	-0.409***	0.245***	0.257***
Manitoba (MB)	-0.104***	-0.128***	0.150***
Saskatchewan (SK)	0.001	-0.255***	0.300***
Alberta (AB)	-0.090***	-0.333***	0.225***
British Columbia (BC)	0.125***	-0.164***	0.103***
Other Non-Need Variables			
Marital Status			

Widowed, separated, divorced	-0.138***	-0.138***	-0.080***
Single	-0.204***	-0.121***	-0.498***
Time fixed effects			
02/03	-0.128***	-0.116***	0.002
04/05	-0.134***	-0.151***	-0.054**
2007	-0.228***	-0.064***	0.007
2008	-0.243***	-0.083***	-0.073**
2009	-0.191***	-0.043**	-0.034
2010	-0.187***	-0.015	-0.031
2012	-0.384***	-0.012	-0.026
2013	-0.366***	0.043*	-0.007
2014	-0.350***	-0.001	-0.027
n		664,548	

*** P-value<0.01, ** P-value<0.05, * P-value<0.1

6.4 Equity in the utilization of GP visits

Table 6.7 reports the CI for the probability of GP visits in Canada and urban and rural areas from 2000 to 2014. For both Canada and urban areas, only the first cycle shows a negative CI value. All other cycles are positive, suggesting pro-poor inequality in the first cycle, and pro-rich inequality in all others. The trend coefficient of the CI for Canada and urban areas (Coefficient=0.003, P-value<0.05; Coefficient=0.003, P-value<0.05; respectively) is negative, indicating a pro-rich inequality trend. The trend coefficient for rural areas is positive. However, the value is not statistically significant.

Table 6.7. The CI for GP visits in Canada and urban and rural areas from 2000 to 2014.

Year	Canada (95% Confidence Interval)	Urban (95% Confidence Interval)	Rural (95% Confidence Interval)
00/01	-0.0096 (-0.0189 to -0.0002)	-0.0097 (-0.0287 to 0.0093)	-0.0134 (-0.0396 to 0.0128)
02/03	0.0137 (-0.0042 to 0.0316)	0.0139 (-0.0043 to 0.0322)	0.0085 (-0.0165 to 0.0335)
04/05	0.0234 (0.0142 to 0.0326)	0.0285 (0.0099 to 0.0471)	0.0000 (-0.0259 to 0.0259)
2007	0.0220 (0.0048 to 0.0393)	0.0268 (0.0005 to 0.0530)	-0.0209 (-0.0536 to 0.0119)
2008	0.0314 (0.0138 to 0.0489)	0.0363 (0.0096 to 0.0630)	0.0000 (-0.0332 to 0.0332)

2009	0.0459 (0.0279 to 0.0639)	0.0559 (0.0285 to 0.0833)	-0.0086 (-0.0425 to 0.0252)
2010	0.0326 (0.0143 to 0.0508)	0.0327 (0.0052 to 0.0602)	0.0182 (-0.0265 to 0.0629)
2012	0.0205 (-0.0036 to 0.0445)	0.0245 (0.0005 to 0.0486)	0.0082 (-0.0321 to 0.0485)
2013	0.0334 (0.0088 to 0.0579)	0.0288 (-0.0035 to 0.0611)	0.0443 (0.0096 to 0.0791)
2014	0.0422 (0.0174 to 0.0670)	0.0552 (0.0302 to 0.0802)	-0.0164 (-0.0565 to 0.0238)
Trend Coefficients (P-value)	0.003 (0.010)	0.003 (0.020)	0.002 (0.339)

Table 6.8 reports the HI_{wv} index for the probability of GP visits in the last 12 months in Canada and urban and rural areas. Nationally and for both geographical densities, the HI_{wv} for the probability of GP visits is positive in all cycles. However, neither Canada (Coefficient=0.001) nor urban and rural areas (Coefficient=0.001; Coefficient=0.001, respectively) show a significant trend from 2000 to 2014. This suggests pro-rich inequity of GP utilization in Canada and in urban and rural areas that has remained consistently inequitable from 2000 to 2014. Figure 6.7 illustrates the HI_{wv} trends for GP utilization from 2000 to 2014 for Canada and urban and rural areas.

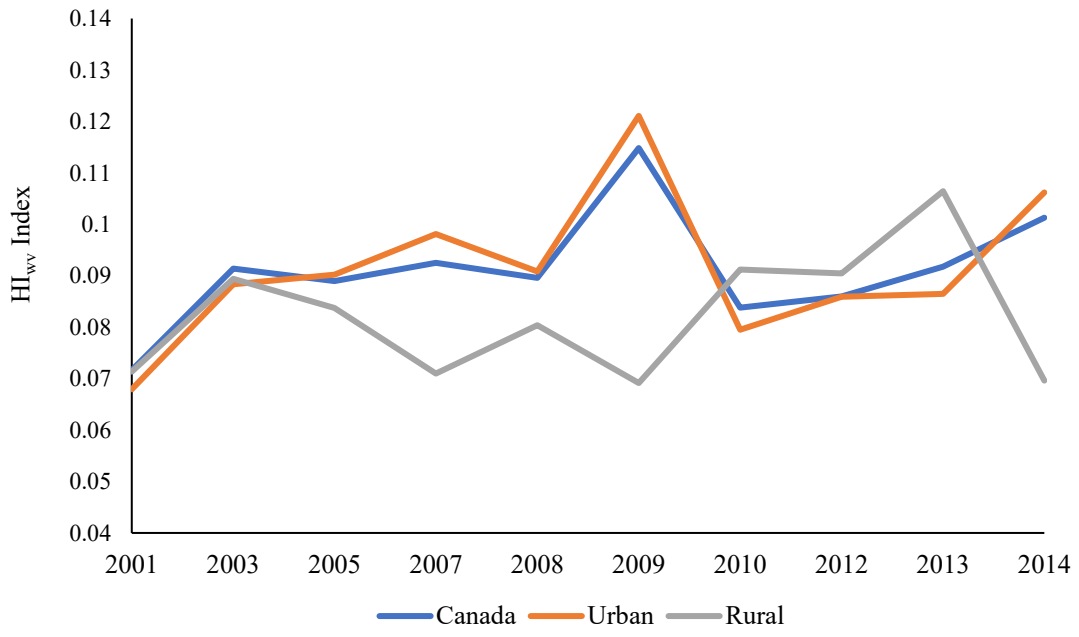

Figure 6.7. The HI_{wv} index for GP visits in Canada and urban and rural areas from 2000 to 2014.

Table 6.8. The HI_{wv} index for GP visits in Canada and urban and rural areas from 2000 to 2014.

Year	Canada (95% Confidence interval)	Urban (95% Confidence interval)	Rural (95% Confidence interval)
00/01	0.0716 (0.0623 to 0.0810)	0.0679 (0.0489 to 0.0869)	0.0713 (0.0539 to 0.0888)
02/03	0.0914 (0.0735 to 0.1093)	0.0883 (0.0701 to 0.1065)	0.0894 (0.0644 to 0.1144)
04/05	0.0890 (0.0798 to 0.0982)	0.0902 (0.0716 to 0.1089)	0.0837 (0.0578 to 0.1096)
2007	0.0925 (0.0753 to 0.1098)	0.0981 (0.0806 to 0.1156)	0.0710 (0.0382 to 0.1037)
2008	0.0896 (0.0720 to 0.1072)	0.0908 (0.0730 to 0.1086)	0.0804 (0.0472 to 0.1135)
2009	0.1148 (0.0968 to 0.1328)	0.1211 (0.0937 to 0.1484)	0.0691 (0.0353 to 0.1030)
2010	0.0838 (0.0655 to 0.1020)	0.0795 (0.0520 to 0.1070)	0.0912 (0.0555 to 0.1270)
2012	0.0860 (0.0619 to 0.1100)	0.0859 (0.0618 to 0.1100)	0.0904 (0.0502 to 0.1307)
2013	0.0918 (0.0672 to 0.1163)	0.0865 (0.0623 to 0.1107)	0.1064 (0.0717 to 0.1412)
2014	0.1013 (0.0764 to 0.1261)	0.1062 (0.0812 to 0.1312)	0.0696 (0.0375 to 0.1018)
Trend Coefficients (P-value)	0.001 (0.199)	0.001 (0.252)	0.001 (0.443)

Table 6.9 reports the CI of the probability of GP visits in the last 12 months by province from 2000 to 2014. The overall majority of CI are positive, indicating pro-rich inequality. The trend coefficients for provinces are all positive except for NB (Coefficient=-0.007, P-value< 0.05), suggesting unequal pro-rich GP utilization has increased from 2000 to 2014 in all provinces except NB. The trend coefficients for PE (Coefficient= 0.017, P-value<0.05), NB (Coefficient=-0.007, P-value< 0.05), QC (Coefficient= 0.006, P-value<0.01) and ON (Coefficient=0.003, P-value<0.05) are statistically significant.

Table 6.9. The CI for GP visits by province from 2000 to 2014.

Year	NL (95% Confidence Interval)	PE (95% Confidence Interval)	NS (95% Confidence Interval)	NB (95% Confidence Interval)	QC (95% Confidence Interval)
00/01	-0.0208 (-0.0886 to 0.0471)	-0.0309 (-0.1117 to 0.0499)	-0.0437 (-0.0972 to 0.0098)	0.0355 (-0.0225 to 0.0934)	-0.0217 (-0.0500 to 0.0067)
02/03	0.0239 (-0.0580 to 0.1057)	-0.1735 (-0.2868 to -0.0601)	-0.0200 (-0.1112 to 0.0713)	0.0632 (0.0013 to 0.1252)	-0.0100 (-0.0361 to 0.0161)
04/05	-0.0685 (-0.1417 to 0.0047)	-0.0188 (-0.1173 to 0.0797)	-0.0127 (-0.0877 to 0.0622)	0.0199 (-0.0385 to 0.0783)	0.0308 (0.0040 to 0.0576)
2007	0.0434 (-0.0605 to 0.1473)	0.1357 (0.0312 to 0.2402)	-0.0378 (-0.1435 to 0.068)	-0.0305 (-0.1104 to 0.0493)	0.0173 (-0.0234 to 0.0581)
2008	-0.0106 (-0.1044 to 0.0831)	0.0299 (-0.0873 to 0.1472)	0.0000 (-0.0872 to 0.0872)	-0.0042 (-0.0777 to 0.0693)	0.0691 (0.0263 to 0.1119)
2009	0.0046 (-0.1025 to 0.1116)	0.0692 (-0.0664 to 0.2049)	0.0427 (-0.0410 to 0.1265)	-0.0423 (-0.1252 to 0.0406)	0.0569 (0.0151 to 0.0987)
2010	0.0000 (-0.0919 to 0.0919)	0.1681 (0.0193 to 0.3169)	0.0235 (-0.0802 to 0.1273)	-0.0626 (-0.1571 to 0.0318)	0.0483 (0.0046 to 0.0920)
2012	0.0950 (-0.0145 to 0.2046)	0.0820 (-0.0698 to 0.2339)	-0.0407 (-0.1560 to 0.0746)	-0.0310 (-0.1351 to 0.0731)	0.0137 (-0.0333 to 0.0607)
2013	0.0395 (-0.0573 to 0.1364)	0.1584 (0.0214 to 0.2954)	0.0102 (-0.0794 to 0.0997)	0.0180 (-0.0703 to 0.1064)	0.0628 (0.0149 to 0.1106)
2014	-0.0097 (-0.1232 to 0.1039)	0.0672 (-0.0733 to 0.2077)	0.0102 (-0.0900 to 0.1104)	-0.0658 (-0.1604 to 0.0288)	0.0837 (0.0338 to 0.1336)
Trend Coefficients (P-value)	0.004 (0.242)	0.017 (0.021)	0.003 (0.166)	-0.007 (0.025)	0.006 (0.008)
Year	**ON (95% Confidence Interval)**	**MB (95% Confidence Interval)**	**SK (95% Confidence Interval)**	**AB (95% Confidence Interval)**	**BC (95% Confidence Interval)**
00/01	-0.016 (-0.0370 to 0.0049)	-0.0808 (-0.1337 to -0.028)	-0.0115 (-0.0564 to 0.0335)	-0.0446 (-0.0835 to -0.0058)	0.0170 (-0.0163 to 0.0502)

02/03	0.0150 (-0.0144 to 0.0445)	0.0044 (-0.0560 to 0.0648)	0.0159 (-0.0360 to 0.0678)	0.0102 (-0.0397 to 0.0601)	-0.0114 (-0.0559 to 0.0332)
04/05	0.0205 (0.0004 to 0.0406)	-0.0415 (-0.1026 to 0.0195)	0.0458 (-0.0103 to 0.1019)	0.0201 (-0.0193 to 0.0595)	-0.0414 (-0.0762 to -0.0066)
2007	0.0050 (-0.0340 to 0.0439)	0.0829 (0.0017 to 0.1642)	-0.0413 (-0.1133 to 0.0307)	0.0325 (-0.0312 to 0.0962)	-0.0053 (-0.0681 to 0.0574)
2008	0.0101 (-0.0295 to 0.0497)	-0.0088 (-0.0867 to 0.0691)	-0.0180 (-0.0888 to 0.0527)	0.0210 (-0.0366 to 0.0785)	0.0294 (-0.0186 to 0.0774)
2009	0.0215 (-0.0101 to 0.0531)	0.1021 (0.0068 to 0.1973)	0.0372 (-0.0461 to 0.1205)	0.0868 (0.0220 to 0.1517)	0.0204 (-0.0396 to 0.0804)
2010	0.0301 (-0.0092 to 0.0695)	-0.0922 (-0.1778 to -0.0066)	-0.0569 (-0.1480 to 0.0343)	0.0047 (-0.0592 to 0.0685)	0.0639 (-0.0092 to 0.1370)
2012	0.0431 (0.0009 to 0.0854)	0.0179 (-0.0874 to 0.1232)	0.0044 (-0.0814 to 0.0901)	0.0075 (-0.0664 to 0.0815)	0.0000 (-0.0768 to 0.0768)
2013	0.0043 (-0.0383 to 0.047)	0.0959 (-0.0026 to 0.1944)	-0.0080 (-0.0948 to 0.0787)	0.0421 (-0.0405 to 0.1247)	0.0382 (-0.0273 to 0.1038)
2014	0.0410 (-0.0036 to 0.0855)	-0.0726 (-0.1651 to 0.0199)	0.0703 (-0.0095 to 0.1501)	0.0497 (-0.0252 to 0.1247)	0.0358 (-0.0344 to 0.1061)
Trend Coefficients (P-value)	0.003 (0.038)	0.004 (0.547)	0.001 (0.691)	0.005 (0.083)	0.004 (0.131)

Note: NL= Newfoundland and Labrador, PE=Prince Edward Island, NS=Nova Scotia, NB=New Brunswick, QC=Quebec, ON=Ontario, MB=Manitoba, SK=Saskatchewan, AB=Alberta, BC=British Columbia.

Table 6.10 reports the HI_{wv} for GP visits in the past 12 months by province from 2000 to 2014. The majority of HI_{wv} are positive, with only PE, MB, and SK showing negative values for some cycles. This indicates widespread pro-rich inequity over the 2000 to 2014 period. Trend coefficient values are positive for all provinces except NB. The trend coefficients for PE, NB, and QC are statistically significant (Coefficient=0.028, P-value<0.05; Coefficient = -0.009, P-value<0.05; Coefficient = 0.004, P-value<0.05; respectively). These results suggest pro-rich inequity for GP utilization has increased from 2000 to 2014 in these provinces.

Table 6.10. The HI_{wv} Index for GP visits by province from 2000 to 2014.

Year	NL (95% Confidence Interval)	PE (95% Confidence Interval)	NS (95% Confidence Interval)	NB (95% Confidence Interval)	QC (95% Confidence Interval)
00/01	0.0969 (0.0291 to 0.1648)	0.0361 (-0.0346 to 0.1067)	0.0437 (-0.0098 to 0.0972)	0.1419 (0.0840 to 0.1999)	0.0651 (0.0438 to 0.0864)
02/03	0.1432 (0.0730 to 0.2133)	-0.2634 (-0.3894 to -0.1375)	0.1064 (0.0282 to 0.1847)	0.1844 (0.1224 to 0.2463)	0.0667 (0.0405 to 0.0928)
04/05	0.0560 (-0.0050 to 0.1170)	-0.2010 (-0.3118 to -0.0902)	0.0892 (0.0268 to 0.1517)	0.1142 (0.0655 to 0.1629)	0.0958 (0.0690 to 0.1226)
2007	0.1638 (0.0788 to 0.2489)	0.1939 (0.0989 to 0.2889)	0.0594 (-0.0358 to 0.1546)	0.0916 (0.0118 to 0.1715)	0.0936 (0.0596 to 0.1275)
2008	0.1063 (0.0230 to 0.1896)	0.1595 (0.0520 to 0.2670)	0.1057 (0.0185 to 0.1928)	0.0625 (-0.0028 to 0.1278)	0.1165 (0.0737 to 0.1592)
2009	0.1639 (0.0747 to 0.2531)	0.1278 (0.0026 to 0.2530)	0.1282 (0.0549 to 0.2014)	0.0564 (-0.0265 to 0.1393)	0.1351 (0.0933 to 0.1769)
2010	0.1349 (0.0544 to 0.2153)	0.2277 (0.1002 to 0.3553)	0.0706 (-0.0332 to 0.1744)	0.0674 (-0.0081 to 0.1430)	0.1041 (0.0604 to 0.1478)
2012	0.1901 (0.0805 to 0.2996)	0.1732 (0.0303 to 0.3162)	0.0362 (-0.0702 to 0.1427)	0.0797 (-0.0158 to 0.1752)	0.0822 (0.0352 to 0.1293)
2013	0.1384 (0.0512 to 0.2255)	0.2749 (0.1562 to 0.3937)	0.0660 (-0.0236 to 0.1556)	0.1217 (0.0422 to 0.2012)	0.1256 (0.0846 to 0.1666)
2014	0.0917 (-0.0029 to 0.1864)	0.1210 (0.0068 to 0.2351)	0.1483 (0.0681 to 0.2284)	0.0000 (-0.0860 to 0.0860)	0.1310 (0.0882 to 0.1738)
Trend Coefficients (P-value)	0.003 (0.416)	0.028 (0.032)	0.002 (0.559)	-0.009 (0.021)	0.004 (0.017)
Year	**ON (95% Confidence Interval)**	**MB (95% Confidence Interval)**	**SK (95% Confidence Interval)**	**AB (95% Confidence Interval)**	**BC (95% Confidence Interval)**
00/01	0.0587	0.0000	0.0630	0.0496	0.0848

	(0.0378 to 0.0797)	(-0.0440 to 0.0440)	(0.0181 to 0.1080)	(0.0107 to 0.0885)	(0.0515 to 0.1180)
02/03	0.0902	0.0704	0.0900	0.0815	0.0625
	(0.0706 to 0.1099)	(0.0187 to 0.1222)	(0.0381 to 0.1419)	(0.0416 to 0.1214)	(0.0291 to 0.0959)
04/05	0.0871	0.0467	0.1432	0.0904	0.0355
	(0.0670 to 0.1072)	(-0.0042 to 0.0976)	(0.0870 to 0.1993)	(0.0510 to 0.1298)	(0.0007 to 0.0703)
2007	0.0695	0.1452	0.0276	0.1137	0.0694
	(0.0403 to 0.0987)	(0.0639 to 0.2264)	(-0.0444 to 0.0996)	(0.0580 to 0.1694)	(0.0171 to 0.1217)
2008	0.0606	-0.0088	0.0767	0.0713	0.0980
	(0.0309 to 0.0903)	(-0.0867 to 0.0691)	(0.0148 to 0.1386)	(0.0220 to 0.1206)	(0.0500 to 0.1460)
2009	0.0914	0.1409	0.1222	0.1447	0.0817
	(0.0598 to 0.1230)	(0.0552 to 0.2267)	(0.0493 to 0.1951)	(0.0799 to 0.2096)	(0.0316 to 0.1317)
2010	0.0804	-0.0243	-0.0155	0.0326	0.1065
	(0.0410 to 0.1197)	(-0.1099 to 0.0614)	(-0.0966 to 0.0655)	(-0.0222 to 0.0874)	(0.0439 to 0.1692)
2012	0.1078	0.0537	0.1006	0.0717	0.0588
	(0.0740 to 0.1416)	(-0.0428 to 0.1502)	(0.0234 to 0.1778)	(0.0051 to 0.1383)	(-0.0084 to 0.126)
2013	0.0609	0.1142	0.0563	0.0843	0.0812
	(0.0183 to 0.1035)	(0.0247 to 0.2037)	(-0.0225 to 0.1352)	(0.0017 to 0.1669)	(0.0250 to 0.1374)
2014	0.1001	0.0182	0.1332	0.0956	0.0819
	(0.0644 to 0.1358)	(-0.0530 to 0.0893)	(0.0607 to 0.2057)	(0.0356 to 0.1556)	(0.0217 to 0.1421)
Trend Coefficients (P-value)	0.001 (0.328)	0.001 (0.782)	0.000 (0.924)	0.001 (0.674)	0.001 (0.493)

Note: NL= Newfoundland and Labrador, PE=Prince Edward Island, NS=Nova Scotia, NB=New Brunswick, QC=Quebec, ON=Ontario, MB=Manitoba, SK=Saskatchewan, AB=Alberta, BC=British Columbia.

6.5 Equity in the utilization of SP visits

Table 6.11 reports the CI for SP visits in the past 12 months in Canada and urban and rural areas from 2000 to 2014. Similar to GP utilization, the majority of values are positive, indicating pro-rich inequality. Trend coefficients for Canada and urban and rural areas are all positive, indicating pro-rich inequality has increased over the 2000 to 2014 period. However, no trend coefficients are statistically significant.

Table 6.11. The CI for SP visits in Canada and urban and rural areas from 2000 to 2014.

Year	Canada (95% Confidence Interval)	Urban (95% Confidence Interval)	Rural (95% Confidence Interval)
00/01	0.0014 (-0.0097 to 0.0126)	0.0014 (-0.0126 to 0.0155)	-0.0083 (-0.0298 to 0.0133)
02/03	0.0140 (0.0003 to 0.0276)	0.0113 (-0.0053 to 0.0278)	0.0108 (-0.0156 to 0.0371)
04/05	0.0014 (-0.0095 to 0.0123)	0.0028 (-0.0109 to 0.0166)	-0.0190 (-0.0430 to 0.0049)
2007	-0.0014 (-0.0211 to 0.0182)	0.0000 (-0.0197 to 0.0197)	-0.0099 (-0.0430 to 0.0233)
2008	0.0129 (-0.0068 to 0.0327)	0.0116 (-0.0111 to 0.0342)	0.0154 (-0.0176 to 0.0485)
2009	-0.0058 (-0.0255 to 0.014)	-0.0102 (-0.0301 to 0.0098)	0.0069 (-0.0257 to 0.0396)
2010	0.0336 (0.0136 to 0.0537)	0.0383 (0.0152 to 0.0614)	0.0128 (-0.0234 to 0.0489)
2012	0.0073 (-0.0128 to 0.0275)	0.0044 (-0.0216 to 0.0304)	0.0233 (-0.0138 to 0.0603)
2013	0.0194 (-0.0011 to 0.0398)	0.0194 (-0.0040 to 0.0428)	0.0221 (-0.0125 to 0.0566)
2014	0.0103 (-0.0099 to 0.0305)	0.0134 (-0.0099 to 0.0366)	-0.0100 (-0.0464 to 0.0264)
Trend Coefficients (P-value)	0.001 (0.347)	0.001 (0.351)	0.001 (0.238)

Table 6.12 reports the HI_{wv} indices for SP visits in the past 12 months in Canada and urban and rural areas from 2000 to 2014. All values were positive, suggesting pro-rich inequity of specialist utilization over the study period. The trend coefficients nationally and for urban and rural areas are all at or near zero. This suggests that the amount of inequity has remained relatively consistent in the 2000 to 2014 period. A visualization of

the HI_{wv} index for SP visits in Canada and urban and rural areas from 2000 to 2014 is shown in Figure 6.8.

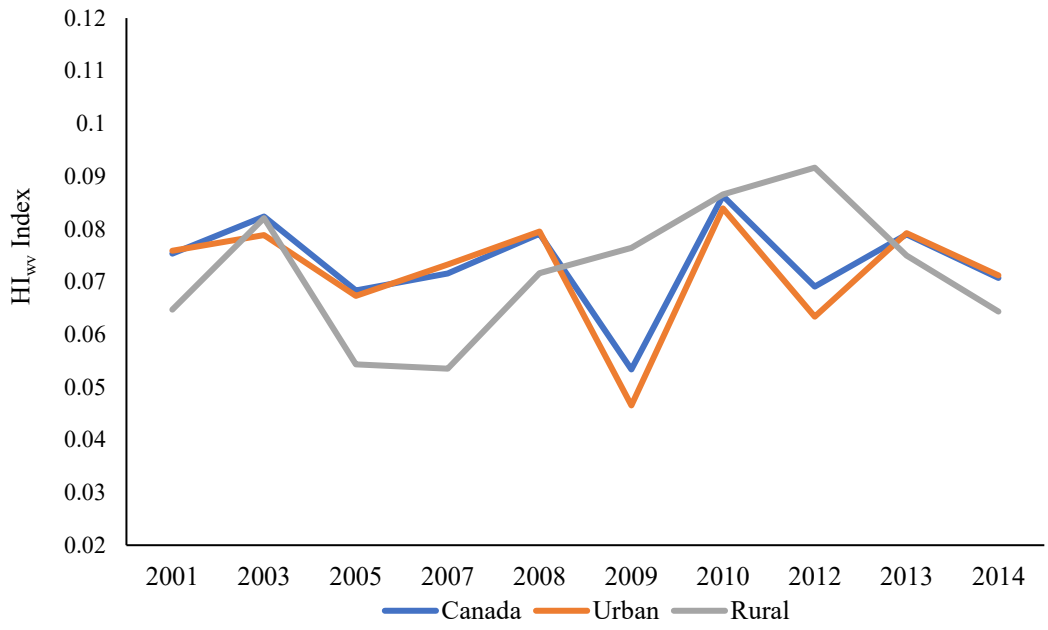

Figure 6.8. The HI_{wv} for SP visits in Canada and urban and rural areas from 2000 to 2014.

Table 6.12. The HI_{wv} Index for SP visits in Canada and urban and rural areas from 2000 to 2014.

Year	Canada (95% Confidence Interval)	Urban (95% Confidence Interval)	Rural (95% Confidence Interval)
00/01	0.0753 (0.0642 to 0.0865)	0.0758 (0.0646 to 0.0871)	0.0647 (0.0458 to 0.0836)
02/03	0.0824 (0.0714 to 0.0933)	0.0789 (0.0651 to 0.0927)	0.0821 (0.0583 to 0.1058)
04/05	0.0683 (0.0574 to 0.0793)	0.0673 (0.0536 to 0.0811)	0.0543 (0.0330 to 0.0756)
2007	0.0716 (0.0547 to 0.0884)	0.0733 (0.0536 to 0.0930)	0.0535 (0.0231 to 0.0838)
2008	0.0791 (0.0622 to 0.0960)	0.0795 (0.0597 to 0.0993)	0.0716 (0.0413 to 0.1019)
2009	0.0533 (0.0364 to 0.0703)	0.0465 (0.0266 to 0.0665)	0.0764 (0.0464 to 0.1063)
2010	0.0863 (0.0691 to 0.1035)	0.0839 (0.0637 to 0.1041)	0.0865 (0.0560 to 0.1171)
2012	0.0691 (0.0489 to 0.0892)	0.0633 (0.0402 to 0.0864)	0.0916 (0.0574 to 0.1258)
2013	0.0790 (0.0614 to 0.0965)	0.0792 (0.0587 to 0.0997)	0.0750 (0.0433 to 0.1067)
2014	0.0707 (0.0534 to 0.0880)	0.0712 (0.0509 to 0.0916)	0.0643 (0.0307 to 0.0979)

Trend Coefficients (P-value)	0.000 (0.75)	0.000 (0.725)	0.001 (0.386)

Table 6.13 reports the CI for SP visits in the past 12 months by province from 2000 to 2014. NB, SK, AB and BC demonstrate more cycles with negative values than with positive values, indicating an overall balance of pro-poor inequality from 2000 to 2014. QC shows positive values for every cycle, while the remaining provinces show generally positive values, indicating an overall balance of pro-rich inequality. The only province with a significant trend coefficient is ON (Coefficient=0.003, P-value<0.05), demonstrating increasingly pro-rich inequality over the study period.

Table 6.13. The CI for SP visits by province from 2000 to 2014.

Year	NL (95% Confidence Interval)	PE (95% Confidence Interval)	NS (95% Confidence Interval)	NB (95% Confidence Interval)	QC (95% Confidence Interval)
00/01	0.0179 (-0.0360 to 0.0718)	0.0232 (-0.0409 to 0.0873)	0.0210 (-0.0256 to 0.0676)	-0.0356 (-0.0803 to 0.0091)	0.0492 (0.0251 to 0.0733)
02/03	0.0703 (0.0001 to 0.1406)	-0.0041 (-0.0871 to 0.0789)	0.0139 (-0.0516 to 0.0795)	-0.0583 (-0.1126 to -0.0039)	0.0387 (0.0095 to 0.0678)
04/05	0.0402 (-0.0223 to 0.1028)	-0.0351 (-0.1148 to 0.0447)	0.0087 (-0.0451 to 0.0625)	-0.0218 (-0.0753 to 0.0317)	0.0549 (0.0316 to 0.0782)
2007	0.0556 (-0.0254 to 0.1366)	0.0190 (-0.0768 to 0.1148)	-0.0087 (-0.0821 to 0.0648)	-0.0878 (-0.1556 to -0.0201)	0.0105 (-0.0306 to 0.0516)
2008	0.0123 (-0.0708 to 0.0954)	-0.0386 (-0.1536 to 0.0763)	0.0440 (-0.0279 to 0.1159)	-0.0419 (-0.1077 to 0.0238)	0.0514 (0.0129 to 0.0898)
2009	-0.0071 (-0.0966 to 0.0823)	0.0328 (-0.0783 to 0.1440)	0.0157 (-0.0625 to 0.0938)	-0.0584 (-0.131 to 0.0142)	0.0335 (-0.0083 to 0.0753)
2010	-0.0501 (-0.1259 to 0.0257)	0.0393 (-0.0822 to 0.1608)	0.0618 (-0.0230 to 0.1467)	0.0177 (-0.0545 to 0.0899)	0.0986 (0.0563 to 0.1409)
2012	0.1076 (0.0080 to 0.2073)	0.0519 (-0.0714 to 0.1753)	0.0335 (-0.0589 to 0.1259)	-0.0258 (-0.1074 to 0.0557)	0.0418 (-0.0037 to 0.0872)
2013	0.0430 (-0.0471 to 0.1331)	0.0192 (-0.0996 to 0.1380)	0.0422 (-0.0316 to 0.1159)	-0.068 (-0.1445 to 0.0086)	0.0201 (-0.0223 to 0.0624)
2014	0.0568 (-0.0317 to 0.1452)	-0.0661 (-0.182 to 0.0497)	0.0618 (-0.0161 to 0.1398)	-0.0289 (-0.1026 to 0.0448)	0.0092 (-0.0329 to 0.0514)
Trend Coefficients (P-value)	0.001 (0.800)	0.000 (0.934)	0.003 (0.053)	0.001 (0.741)	-0.001 (0.505)
Year	**ON (95% Confidence Interval)**	**MB (95% Confidence Interval)**	**SK (95% Confidence Interval)**	**AB (95% Confidence Interval)**	**BC (95% Confidence Interval)**
00/01	-0.0114 (-0.0309 to 0.0081)	0.02440 (-0.0208 to 0.0697)	-0.0136 (-0.0563 to 0.0291)	-0.0196 (-0.0581 to 0.0189)	0.0054 (-0.0236 to 0.0344)

02/03	0.0265 (0.0046 to 0.0485)	0.0228 (-0.0350 to 0.0805)	-0.0053 (-0.0548 to 0.0442)	-0.0091 (-0.0549 to 0.0367)	-0.0040 (-0.0410 to 0.0329)
04/05	-0.0042 (-0.0261 to 0.0177)	0.0013 (-0.0511 to 0.0538)	0.0133 (-0.0335 to 0.0601)	-0.0255 (-0.0681 to 0.0170)	-0.0362 (-0.0678 to -0.0047)
2007	0.0088 (-0.0199 to 0.0375)	0.0586 (-0.0215 to 0.1388)	-0.0107 (-0.0761 to 0.0547)	-0.0079 (-0.0672 to 0.0514)	0.0162 (-0.0314 to 0.0638)
2008	0.0220 (-0.0125 to 0.0566)	0.0885 (0.0126 to 0.1644)	-0.0093 (-0.0715 to 0.0530)	-0.0052 (-0.0668 to 0.0563)	-0.0291 (-0.0753 to 0.0171)
2009	0.0015 (-0.0273 to 0.0302)	0.1542 (0.0758 to 0.2325)	-0.0570 (-0.1219 to 0.008)	-0.0640 (-0.1268 to -0.0013)	-0.0206 (-0.069 to 0.0279)
2010	0.0236 (-0.0082 to 0.0554)	-0.0514 (-0.1409 to 0.0381)	-0.0258 (-0.0975 to 0.0460)	0.0518 (-0.0043 to 0.1080)	0.0223 (-0.0324 to 0.0770)
2012	0.0352 (0.0007 to 0.0698)	0.0531 (-0.0369 to 0.1431)	-0.0346 (-0.1132 to 0.0441)	-0.0014 (-0.0762 to 0.0734)	-0.0700 (-0.1271 to -0.0128)
2013	0.0439 (0.0113 to 0.0765)	0.0144 (-0.0702 to 0.0990)	-0.0801 (-0.1600 to -0.0002)	0.0630 (-0.0068 to 0.1329)	-0.0015 (-0.0595 to 0.0565)
2014	0.0182 (-0.0145 to 0.0508)	0.0101 (-0.0717 to 0.0918)	0.0414 (-0.0316 to 0.1144)	0.0254 (-0.0401 to 0.0909)	0.0441 (-0.0117 to 0.0999)
Trend Coefficients (P-value)	0.003 (0.045)	0.000 (0.973)	-0.002 (0.571)	0.005 (0.114)	0.001 (0.843)

Note: NL= Newfoundland and Labrador, PE=Prince Edward Island, NS=Nova Scotia, NB=New Brunswick, QC=Quebec, ON=Ontario, MB=Manitoba, SK=Saskatchewan, AB=Alberta, BC=British Columbia.

Table 6.14 reports the HI_{wv} for SP visits in the past 12 months by province from 2000 to 2014. All provinces except SK, AB and BC show positive values in every cycle, suggesting pro-rich inequity of specialist use. However, the majority of HI_{wv} results from SK, AB and BC are negative as well, demonstrating SP use is generally pro-rich in these provinces. None of the provinces showed significant trend in the inequity of SP visits.

Table 6.14. The HI_{wv} Index for SP visits by province from 2000 to 2014.

Year	NL (95% Confidence Interval)	PE (95% Confidence Interval)	NS (95% Confidence Interval)	NB (95% Confidence Interval)	QC (95% Confidence Interval)
00/01	0.1018 (0.0506 to 0.1530)	0.0831 (0.0270 to 0.1392)	0.1091 (0.068 to 0.1502)	0.0641 (0.0222 to 0.1060)	0.1092 (0.0881 to 0.1303)
02/03	0.1462 (0.0840 to 0.2083)	0.0929 (0.0233 to 0.1625)	0.1170 (0.0624 to 0.1716)	0.0693 (0.0231 to 0.1156)	0.0997 (0.0734 to 0.1259)
04/05	0.1207 (0.0609 to 0.1805)	0.0168 (-0.0574 to 0.0910)	0.0881 (0.0372 to 0.1391)	0.0601 (0.0119 to 0.1082)	0.1113 (0.0881 to 0.1346)
2007	0.1625 (0.0898 to 0.2351)	0.0842 (0.0043 to 0.1640)	0.0937 (0.0316 to 0.1559)	0.0029 (-0.0620 to 0.0678)	0.0614 (0.0262 to 0.0966)
2008	0.0889 (0.0165 to 0.1612)	0.0029 (-0.1065 to 0.1122)	0.1188 (0.0527 to 0.1850)	0.0307 (-0.0295 to 0.0910)	0.1042 (0.0687 to 0.1398)
2009	0.0442 (-0.0368 to 0.1252)	0.0910 (-0.0084 to 0.1905)	0.0982 (0.0285 to 0.1680)	0.0413 (-0.0229 to 0.1056)	0.0929 (0.0571 to 0.1287)
2010	0.0515 (-0.0130 to 0.1161)	0.1058 (0.0051 to 0.2065)	0.1221 (0.0524 to 0.1918)	0.1076 (0.0441 to 0.1712)	0.1464 (0.1071 to 0.1857)
2012	0.2033 (0.1096 to 0.2971)	0.1637 (0.0465 to 0.2809)	0.1293 (0.0458 to 0.2127)	0.0890 (0.0158 to 0.1621)	0.0881 (0.0457 to 0.1306)
2013	0.1335 (0.0492 to 0.2177)	0.0517 (-0.0468 to 0.1502)	0.1084 (0.0435 to 0.1733)	0.0434 (-0.0190 to 0.1057)	0.0803 (0.044 to 0.1166)
2014	0.0975 (0.0148 to 0.1803)	0.0380 (-0.0613 to 0.1373)	0.1193 (0.0471 to 0.1914)	0.0549 (-0.0102 to 0.1201)	0.0661 (0.0299 to 0.1022)
Trend Coefficients (P-value)	0.000 (0.983)	0.001 (0.860)	0.001 (0.298)	0.000 (0.87)	-0.002 (0.350)
Year	**ON (95% Confidence Interval)**	**MB (95% Confidence Interval)**	**SK (95% Confidence Interval)**	**AB (95% Confidence Interval)**	**BC (95% Confidence Interval)**
00/01	0.0739	0.0856	0.0680	0.0432	0.0807

	(0.0544 to 0.0934)	(0.0430 to 0.1282)	(0.0280 to 0.1080)	(0.0073 to 0.0791)	(0.0543 to 0.1070)
02/03	0.0978	0.0843	0.0558	0.0506	0.0620
	(0.0786 to 0.1170)	(0.0319 to 0.1368)	(0.0089 to 0.1027)	(0.0074 to 0.0939)	(0.0277 to 0.0963)
04/05	0.0686	0.0495	0.0889	0.0294	0.0389
	(0.0494 to 0.0878)	(0.0023 to 0.0968)	(0.0473 to 0.1305)	(-0.0082 to 0.0669)	(0.0100 to 0.0679)
2007	0.0894	0.1241	0.0441	0.0710	0.0864
	(0.0636 to 0.1153)	(0.0573 to 0.1909)	(-0.0187 to 0.1068)	(0.0220 to 0.1200)	(0.0441 to 0.1287)
2008	0.0881	0.1439	0.0423	0.0458	0.0430
	(0.0593 to 0.1169)	(0.0761 to 0.2116)	(-0.0147 to 0.0994)	(-0.0081 to 0.0997)	(-0.0005 to 0.0865)
2009	0.0645	0.2056	-0.0013	-0.0187	0.0357
	(0.0386 to 0.0903)	(0.1328 to 0.2783)	(-0.0585 to 0.0558)	(-0.0736 to 0.0362)	(-0.0074 to 0.0788)
2010	0.0752	0.0471	0.0244	0.1036	0.0488
	(0.0463 to 0.1042)	(-0.0284 to 0.1226)	(-0.0420 to 0.0908)	(0.0555 to 0.1518)	(-0.0004 to 0.0981)
2012	0.0998	0.1105	0.0346	0.0395	-0.0015
	(0.0682 to 0.1315)	(0.0346 to 0.1865)	(-0.0413 to 0.1105)	(-0.0326 to 0.1116)	(-0.0472 to 0.0443)
2013	0.1074	0.0101	-0.0309	0.0959	0.0562
	(0.0778 to 0.1371)	(-0.0632 to 0.0834)	(-0.1025 to 0.0407)	(0.0342 to 0.1577)	(0.0069 to 0.1055)
2014	0.0803	0.0489	0.1035	0.0935	0.0925
	(0.0506 to 0.1100)	(-0.0272 to 0.1250)	(0.0359 to 0.171)	(0.0359 to 0.1511)	(0.0451 to 0.1399)
Trend Coefficients (P-value)	0.001 (0.409)	-0.002 (0.626)	-0.003 (0.361)	0.003 (0.261)	-0.001 (0.569)

Note: NL= Newfoundland and Labrador, PE=Prince Edward Island, NS=Nova Scotia, NB=New Brunswick, QC=Quebec, ON=Ontario, MB=Manitoba, SK=Saskatchewan, AB=Alberta, BC=British Columbia.

6.6 Equity in the utilization of HA

Table 6.15 reports the CI for HA in the past 12 months in Canada and urban and rural areas from 2000 to 2014. All values reported are negative, indicating pro-poor inequality from 2000 to 2014. The trend coefficient for Canada and both geographical densities is positive. This suggests that while the HA is concentrated among the poor, the magnitude of inequality in HA decreased from 2000 to 2014. However, the trend coefficient was only significant for rural areas (Coefficient=0.00, P-value<0.05)

Table 6.15. The CI for HA in Canada and urban and rural areas from 2000 to 2014.

Year	Canada (95% Confidence Interval)	Urban (95% Confidence Interval)	Rural (95% Confidence Interval)
00/01	-0.1771 (-0.1942 to -0.1599)	-0.1778 (-0.1992 to -0.1564)	-0.1699 (-0.2023 to -0.1375)
02/03	-0.1679 (-0.1893 to -0.1466)	-0.1656 (-0.1912 to -0.1399)	-0.1766 (-0.2131 to -0.1400)
04/05	-0.1670 (-0.1861 to -0.1479)	-0.1667 (-0.1879 to -0.1455)	-0.1630 (-0.2016 to -0.1244)
2007	-0.1732 (-0.2031 to -0.1433)	-0.1719 (-0.2060 to -0.1378)	-0.1742 (-0.2257 to -0.1227)
2008	-0.1521 (-0.1798 to -0.1244)	-0.1442 (-0.1761 to -0.1123)	-0.1798 (-0.2335 to -0.1260)
2009	-0.1391 (-0.1668 to -0.1114)	-0.1355 (-0.1674 to -0.1036)	-0.1471 (-0.1922 to -0.1019)
2010	-0.1655 (-0.1975 to -0.1335)	-0.1689 (-0.2052 to -0.1326)	-0.1520 (-0.2030 to -0.1009)
2012	-0.1654 (-0.1996 to -0.1313)	-0.1674 (-0.2079 to -0.1269)	-0.1565 (-0.2188 to -0.0943)
2013	-0.1339 (-0.1681 to -0.0998)	-0.1391 (-0.1774 to -0.1007)	-0.1099 (-0.1724 to -0.0474)
2014	-0.1859 (-0.2221 to -0.1497)	-0.1976 (-0.2380 to -0.1571)	-0.1410 (-0.2053 to -0.0767)
Trend Coefficients (P-value)	0.001 (0.474)	0.000 (0.858)	0.003 (0.022)

Table 6.16 reports on the HI_{wv} for HA in the past 12 months in Canada and urban and rural areas from 2000 to 2014. These values are negative, indicating pro-poor inequity in all three areas. None of the trend coefficients of HA for Canada and urban and rural areas

are significant. A visualization for the HI_{wv} for HA in Canada and urban and rural areas from 2000 to 2014 are illustrated in Figure 6.9.

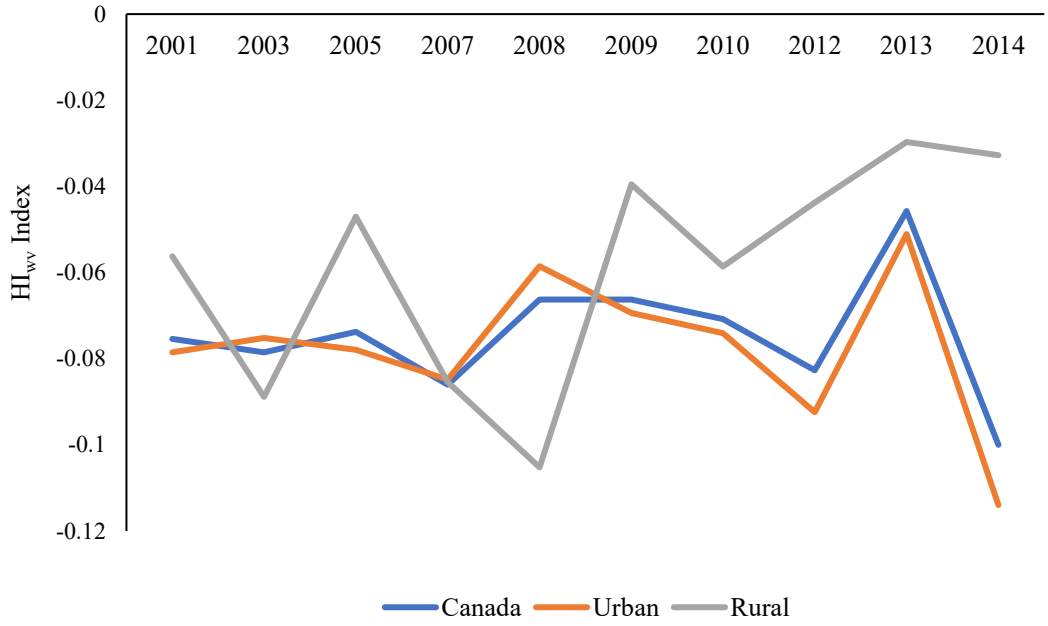

Figure 6.9. The HI_{wv} index for HA in Canada and urban and rural areas from 2000 to 2014.

Table 6.16. The HI_{wv} Index for HA in Canada and urban and rural areas from 2000 to 2014.

Year	Canada (95% Confidence Interval)	Urban (95% Confidence Interval)	Rural (95% Confidence Interval)
00/01	-0.0754 (-0.0926 to -0.0583)	-0.0785 (-0.0978 to -0.0593)	-0.0563 (-0.0865 to -0.0260)
02/03	-0.0785 (-0.0978 to -0.0593)	-0.0752 (-0.0986 to -0.0517)	-0.0888 (-0.1211 to -0.0566)
04/05	-0.0737 (-0.0907 to -0.0567)	-0.0779 (-0.0991 to -0.0567)	-0.0471 (-0.0792 to -0.0149)
2007	-0.0861 (-0.1138 to -0.0583)	-0.0849 (-0.1168 to -0.0529)	-0.0855 (-0.1327 to -0.0382)
2008	-0.0663 (-0.0918 to -0.0407)	-0.0585 (-0.0883 to -0.0288)	-0.1052 (-0.1568 to -0.0537)
2009	-0.0663 (-0.0918 to -0.0407)	-0.0694 (-0.0991 to -0.0396)	-0.0395 (-0.0804 to 0.0014)
2010	-0.0708 (-0.0985 to -0.0430)	-0.0741 (-0.1061 to -0.0421)	-0.0586 (-0.1075 to -0.0097)

2012	-0.0827 (-0.1169 to -0.0486)	-0.0924 (-0.1329 to -0.0519)	-0.0438 (-0.0974 to 0.0099)
2013	-0.0457 (-0.0756 to -0.0159)	-0.0511 (-0.0873 to -0.0149)	-0.0297 (-0.0836 to 0.0242)
2014	-0.1000 (-0.1341 to -0.0659)	-0.1140 (-0.1523 to -0.0757)	-0.0328 (-0.0885 to 0.0229)
Trend Coefficients (P-value)	0.000 (0.962)	-0.001 (0.603)	0.003 (0.136)

Table 6.17 reports the CI for HA in the past 12 months by province from 2000 to 2014. All the CI values reported in this table are negative except for a single positive cycle in NS. This suggests HA demonstrates pro-poor inequality. None of the provincial trend coefficients are significant.

Table 6.17. The CI for HA by province from 2000 to 2014.

Year	NL (95% Confidence Interval)	PE (95% Confidence Interval)	NS (95% Confidence Interval)	NB (95% Confidence Interval)	QC (95% Confidence Interval)
00/01	-0.1505 (-0.2285 to -0.0724)	-0.1280 (-0.2204 to -0.0356)	-0.1470 (-0.2158 to -0.0782)	-0.2033 (-0.2653 to -0.1413)	-0.1601 (-0.1969 to -0.1233)
02/03	-0.2543 (-0.3436 to -0.1651)	-0.1014 (-0.2273 to 0.0245)	-0.2637 (-0.3481 to -0.1794)	-0.2626 (-0.3399 to -0.1853)	-0.1913 (-0.2365 to -0.1460)
04/05	-0.2076 (-0.2997 to -0.1155)	-0.2581 (-0.3702 to -0.1459)	-0.1619 (-0.2390 to -0.0847)	-0.2405 (-0.3158 to -0.1652)	-0.1937 (-0.2344 to -0.1529)
2007	-0.1779 (-0.3098 to -0.0461)	-0.3298 (-0.4691 to -0.1905)	-0.2093 (-0.3134 to -0.1051)	-0.2146 (-0.3198 to -0.1095)	-0.1767 (-0.2391 to -0.1143)
2008	-0.0817 (-0.1969 to 0.0336)	-0.2786 (-0.4375 to -0.1198)	0.0055 (-0.1154 to 0.1264)	-0.1968 (-0.2873 to -0.1063)	-0.1603 (-0.2201 to -0.1004)
2009	-0.2989 (-0.4272 to -0.1706)	-0.1558 (-0.3272 to 0.0156)	-0.2030 (-0.3243 to -0.0817)	-0.2093 (-0.3027 to -0.1160)	-0.1270 (-0.185 to -0.0691)
2010	-0.3120 (-0.4373 to -0.1868)	-0.1243 (-0.3248 to 0.0762)	-0.2253 (-0.3589 to -0.0917)	-0.2237 (-0.3235 to -0.1238)	-0.1024 (-0.1672 to -0.0377)
2012	-0.1640 (-0.315 to -0.0130)	-0.1693 (-0.4093 to 0.0708)	-0.1965 (-0.3346 to -0.0583)	-0.1551 (-0.3169 to 0.0066)	-0.1752 (-0.2578 to -0.0926)
2013	-0.2217 (-0.3502 to -0.0933)	-0.2424 (-0.4029 to -0.0818)	-0.2265 (-0.3316 to -0.1214)	-0.1584 (-0.2779 to -0.0390)	-0.1125 (-0.1780 to -0.0470)
2014	-0.2158 (-0.3561 to -0.0755)	-0.0691 (-0.2443 to 0.1062)	-0.2817 (-0.3989 to -0.1644)	-0.2702 (-0.3700 to -0.1704)	-0.1782 (-0.2498 to -0.1066)
Trend Coefficients (P-value)	-0.003 (0.651)	0.001 (0.888)	-0.005 (0.450)	0.002 (0.441)	0.003 (0.270)
Year	**ON (95% Confidence Interval)**	**MB (95% Confidence Interval)**	**SK (95% Confidence Interval)**	**AB (95% Confidence Interval)**	**BC (95% Confidence Interval)**
00/01	-0.1712 (-0.2052 to -0.1372)	-0.2102 (-0.2724 to -0.1480)	-0.2164 (-0.2716 to -0.1612)	-0.2234 (-0.2789 to -0.1679)	-0.1139 (-0.1585 to -0.0692)

02/03	-0.1135	-0.2085	-0.1851	-0.1506	-0.1650
	(-0.1537 to -0.0732)	(-0.2880 to -0.1289)	(-0.2569 to -0.1134)	(-0.2190 to -0.0822)	(-0.2161 to -0.1140)
04/05	-0.1495	-0.1708	-0.0857	-0.0936	-0.1905
	(-0.1832 to -0.1158)	(-0.2476 to -0.0940)	(-0.1598 to -0.0115)	(-0.1491 to -0.0381)	(-0.2411 to -0.1399)
2007	-0.1734	-0.2524	-0.1543	-0.1574	-0.1227
	(-0.2244 to -0.1225)	(-0.3883 to -0.1165)	(-0.2579 to -0.0506)	(-0.2566 to -0.0581)	(-0.1944 to -0.0510)
2008	-0.1340	-0.1496	-0.2230	-0.2021	-0.1468
	(-0.1827 to -0.0853)	(-0.2531 to -0.0461)	(-0.3008 to -0.1451)	(-0.2911 to -0.1131)	(-0.2214 to -0.0722)
2009	-0.1311	-0.0638	-0.1534	-0.1835	-0.1254
	(-0.1796 to -0.0827)	(-0.1656 to 0.0380)	(-0.2351 to -0.0718)	(-0.2631 to -0.1038)	(-0.2087 to -0.0420)
2010	-0.1640	-0.1975	-0.1474	-0.2123	-0.1977
	(-0.2210 to -0.1069)	(-0.3236 to -0.0713)	(-0.2517 to -0.0431)	(-0.3148 to -0.1099)	(-0.2828 to -0.1125)
2012	-0.1611	-0.1658	-0.2272	-0.1428	-0.1521
	(-0.2179 to -0.1042)	(-0.3378 to 0.0062)	(-0.3370 to -0.1175)	(-0.2326 to -0.0531)	(-0.2337 to -0.0706)
2013	-0.1059	-0.1473	-0.2668	-0.0461	-0.2290
	(-0.1667 to -0.0451)	(-0.2640 to -0.0305)	(-0.3888 to -0.1448)	(-0.1538 to 0.0615)	(-0.3163 to -0.1418)
2014	-0.1980	-0.1314	-0.1454	-0.1984	-0.1164
	(-0.2675 to -0.1284)	(-0.2387 to -0.0241)	(-0.2707 to -0.0202)	(-0.3089 to -0.0879)	(-0.1903 to -0.0425)
Trend Coefficients (P-value)	-0.001 (0.743)	0.006 (0.157)	-0.002 (0.637)	0.003 (0.541)	-0.002 (0.527)

Note: NL= Newfoundland and Labrador, PE=Prince Edward Island, NS=Nova Scotia, NB=New Brunswick, QC=Quebec, ON=Ontario, MB=Manitoba, SK=Saskatchewan, AB=Alberta, BC=British Columbia.

Table 6.18 reports the HI_{wv} for HA in the past 12 months by province from 2000 to 2014. The the HI_{wv} for NB, QC, ON, MB and BC all have negative values for all cycles. NL, PE, NS, SK and AB shows most cycles have positive values. These findings suggest HA is largely pro-poor in all provinces. None of the provincial trend coefficients are significant.

Table 6.18. The HI_{wv} Index for HA by province from 2000 to 2014.

Year	NL (95% Confidence Interval)	PE (95% Confidence Interval)	NS (95% Confidence Interval)	NB (95% Confidence Interval)	QC (95% Confidence Interval)
00/01	-0.0288 (-0.1025 to 0.045)	-0.0269 (-0.1083 to 0.0545)	-0.0186 (-0.0788 to 0.0416)	-0.0779 (-0.1355 to -0.0204)	-0.0420 (-0.0766 to -0.0073)
02/03	-0.1099 (-0.1883 to -0.0316)	0.0124 (-0.0914 to 0.1162)	-0.1457 (-0.2192 to -0.0721)	-0.1589 (-0.2296 to -0.0882)	-0.0923 (-0.1354 to -0.0492)
04/05	-0.1060 (-0.1895 to -0.0225)	-0.1784 (-0.2861 to -0.0706)	-0.0437 (-0.1123 to 0.0248)	-0.1263 (-0.1930 to -0.0596)	-0.0941 (-0.1306 to -0.0576)
2007	-0.0477 (-0.1626 to 0.0671)	-0.2399 (-0.3726 to -0.1071)	-0.0737 (-0.1694 to 0.0219)	-0.0727 (-0.1603 to 0.0150)	-0.1010 (-0.1590 to -0.0429)
2008	0.0065 (-0.1066 to 0.1196)	-0.1821 (-0.3170 to -0.0472)	0.0617 (-0.0614 to 0.1848)	-0.0649 (-0.1403 to 0.0106)	-0.0589 (-0.1123 to -0.0055)
2009	-0.1811 (-0.2966 to -0.0656)	-0.1278 (-0.2948 to 0.0392)	-0.0749 (-0.1792 to 0.0294)	-0.0930 (-0.1777 to -0.0084)	-0.0602 (-0.1139 to -0.0066)
2010	-0.1387 (-0.2406 to -0.0368)	0.0044 (-0.1530 to 0.1618)	-0.1022 (-0.2185 to 0.0141)	-0.0742 (-0.1610 to 0.0126)	-0.0363 (-0.0989 to 0.0263)
2012	-0.0616 (-0.1997 to 0.0764)	-0.0223 (-0.2296 to 0.1851)	-0.1623 (-0.3046 to -0.0200)	-0.0033 (-0.1241 to 0.1175)	-0.1120 (-0.1924 to -0.0316)
2013	-0.0426 (-0.1539 to 0.0687)	-0.1055 (-0.2308 to 0.0199)	-0.1422 (-0.2430 to -0.0414)	-0.0321 (-0.1342 to 0.0699)	-0.0345 (-0.0956 to 0.0266)
2014	-0.0694 (-0.1842 to 0.0454)	0.0023 (-0.1819 to 0.1864)	-0.1577 (-0.2600 to -0.0554)	-0.1362 (-0.2230 to -0.0494)	-0.0941 (-0.1570 to -0.0312)
Trend Coefficients (P-value)	0.000 (0.938)	0.002 (0.786)	-0.008 (0.153)	0.004 (0.253)	0.000 (0.934)
Year	**ON (95% Confidence Interval)**	**MB (95% Confidence Interval)**	**SK (95% Confidence Interval)**	**AB (95% Confidence Interval)**	**BC (95% Confidence Interval)**
00/01	-0.0791	-0.0963	-0.1240	-0.1210	-0.0282

	(-0.1109 to -0.0472)	(-0.1521 to -0.0405)	(-0.1770 to -0.0710)	(-0.1722 to -0.0697)	(-0.0707 to 0.0143)
02/03	-0.0313	-0.0955	-0.0610	-0.0731	-0.0858
	(-0.0673 to 0.0047)	(-0.1664 to -0.0245)	(-0.1262 to 0.0042)	(-0.1373 to -0.0089)	(-0.1347 to -0.0368)
04/05	-0.0624	-0.1131	0.0211	-0.0065	-0.1012
	(-0.0940 to -0.0308)	(-0.1856 to -0.0406)	(-0.0443 to 0.0866)	(-0.0577 to 0.0447)	(-0.1497 to -0.0527)
2007	-0.0683	-0.1809	-0.1080	-0.0715	-0.0463
	(-0.1150 to -0.0216)	(-0.3062 to -0.0556)	(-0.2117 to -0.0043)	(-0.1621 to 0.0191)	(-0.1138 to 0.0212)
2008	-0.0605	-0.0946	-0.1291	-0.1394	-0.0522
	(-0.1071 to -0.0139)	(-0.1938 to 0.0046)	(-0.1962 to -0.0621)	(-0.2220 to -0.0568)	(-0.1226 to 0.0181)
2009	-0.0548	-0.0108	-0.0943	-0.1164	-0.0458
	(-0.0991 to -0.0106)	(-0.1041 to 0.0825)	(-0.1694 to -0.0191)	(-0.1897 to -0.0432)	(-0.1227 to 0.0311)
2010	-0.0561	-0.1571	-0.0410	-0.1165	-0.1064
	(-0.1047 to -0.0075)	(-0.2790 to -0.0352)	(-0.1301 to 0.0481)	(-0.2083 to -0.0247)	(-0.1831 to -0.0298)
2012	-0.0655	-0.0585	-0.1504	-0.0654	-0.0952
	(-0.1160 to -0.0150)	(-0.1944 to 0.0774)	(-0.2601 to -0.0407)	(-0.1487 to 0.0179)	(-0.1768 to -0.0137)
2013	-0.0235	-0.0996	-0.1945	0.0604	-0.1324
	(-0.0802 to 0.0331)	(-0.2057 to 0.0065)	(-0.3100 to -0.0790)	(-0.0322 to 0.1530)	(-0.2069 to -0.0580)
2014	-0.1183	-0.0756	-0.0925	-0.1041	-0.0323
	(-0.1816 to -0.0551)	(-0.1764 to 0.0253)	(-0.2178 to 0.0327)	(-0.2082 to 0.0000)	(-0.0999 to 0.0353)
Trend Coefficients (P-value)	-0.001 (0.644)	0.002 (0.589)	-0.005 (0.273)	0.003 (0.541)	-0.002 (0.451)

Note: NL= Newfoundland and Labrador, PE=Prince Edward Island, NS=Nova Scotia, NB=New Brunswick, QC=Quebec, ON=Ontario, MB=Manitoba, SK=Saskatchewan, AB=Alberta, BC=British Columbia.

CHAPTER 7 DISCUSSION AND CONCLUSION

7.1 Discussion

This study examines trends in income-related inequities in healthcare utilization in Canada through analysis of three different measures of healthcare use: GP visits, SP visits and HA. Equity in healthcare utilization is assessed for all of Canada, urban and rural areas and provincially.

The descriptive results suggest that 77.77% of Canadian used GP services in the previous 12-months over the period between 2000 and 2014. Trend results of national GP use demonstrate that the proportion of GP visits for all of Canada decreased from 2000 to 2014. GP utilization in urban areas followed the national trend but demonstrated slightly higher utilization for most cycles. GP utilization in rural areas also follows the national trend but is generally below national levels. NL, PE, NS, ON, and BC all show GP utilization that is consistently higher than national from 2000 to 2014. QC demonstrates lower mean GP visits than national, urban and rural and provincial use in all but one cycle from 2000 to 2014. The proportion of Canadians using SP services within 12 months is 30.23%. National trend results of SP visits within the previous 12 months demonstrate an overall increase in use from 2000 to 2014. SP visits in both urban and rural areas follow the national trend, however, similar to GP use, SP use in urban areas is consistently higher than national levels, while the utilization in rural areas is consistently lower. Provincially, the western provinces (MB, SK, AB, and BC) all demonstrate consistently lower than national SP utilization from 2000 to 2014. Again, QC is anomalous in its utilization compared to other provinces, demonstrating consistently higher SP utilization. The proportion of national HA in the previous 12 months is 8.13%, demonstrating much less variation than GP and SP utilization from 2000 to 2014 and showing no significant trend. Rural areas show higher than national HA, while urban HA use is lower than national levels. PE, NB, QC and SK all show consistently higher HA than national levels, while ON is the only province to demonstrate consistently lower than national HA use.

Overall the healthcare utilization rates found in this study are generally consistent with findings for Canada in both Canadian and international works (Allin, 2008; Asada & Kephart, 2007; OECD, 2019). Rural areas demonstrate lower utilization of physician services, but a higher proportion of HA compared to national rates. This pattern of utilization in rural areas has been observed in other studies (Allan, Funk, Reid, & Cloutier-Fisher, 2011; Young et al., 2019). Lower physician utilization in rural areas has been connected to the lack of access to physicians. Recently a Canadian study found that lack of access to physician in rural areas resulted in increased HA for conditions normally treated through ambulatory care (Young et al., 2019). The comparatively low GP and high SP use in QC is documented in previous Canadian studies. This utilization pattern is suggested to result from the lack of requirement for a GP referral for SP utilization. It has also been attributed to the prevalence of community-based health centres that utilize a wider variety of allied healthcare providers (Sibley & Weiner, 2011; Talbot, Fuller-Thomson, Tudiver, Habib, & Mcisaac, 2001).

The HI_{wv} of GP use in Canada demonstrates pro-rich inequity from 2000 to 2014. Consistent pro-rich inequity is also present in both urban and rural areas. Provincial trend analysis of the HI_{wv} for PE and QC demonstrates a significant pro-rich trend for GP use from 2000 to 2014. The pro-rich trend in QC persists despite lower overall GP utilization compared to other provinces. The HI_{wv} trend for NB demonstrates GP use is becoming increasingly pro-poor. However, the HI_{wv} for NB in the first two cycles used are the highest of all the geographical divisions, while later cycles are closer to national levels. This suggests that despite the pro-poor trend there is still pro-rich inequity in GP use present in NB. All other provinces demonstrate consistent pro-rich inequity of GP use from 2000 to 2014. Although other studies have reported no inequity of GP use in Canada (Jimenez-Rubio et al., 2008; McGrail, 2008), the pro-rich HI_{wv} results for probability of GP visits in this study are in agreement with some other studies of inequity in healthcare utilization in Canada (Allin, 2008; Allin & Hurley, 2009; OECD, 2019). The HI_{wv} for GP use found in this study are of a consistently higher magnitude than previous studies.

Similar to GP use, the national and urban and rural HI_{wv} for SP utilization demonstrate pro-rich inequity. All provinces also demonstrate consistent pro-rich inequity of SP use. Provincially, NL, PE and NS show SP utilization greater than national levels in all cycles with significant HI_{wv} values. Despite the high SP utilization in QC, the HI_{wv} values demonstrate pro-rich inequity is present to a similar degree as in other provinces. The findings for HI_{wv} in this study are consistent with Canadian and international works about equity in Canada (Allin, 2008; Allin & Hurley, 2009; Asada & Kephart, 2007; OECD, 2019).

For HA, the HI_{wv} for Canada and urban and rural areas demonstrated significant pro-poor inequity in all cycles. The HI_{wv} for HA in rural areas is lower in magnitude than national and urban HI_{wv} values from 2009 to 2014, indicating relatively less pro-poor utilization. All provinces demonstrated consistent pro-poor inequity of HA use from 2000 to 2014. If only the cycles with significant HI_{wv} values are considered, NL, PE, NS, NB, MB, SK, and BC all demonstrate higher magnitudes than national levels. The pro-poor inequity results found in this study are consistent with both international and some national studies of the HI_{wv} of HA in Canada (Allin, 2008; OECD, 2019). However, a study by Asada and Kephart (2007) showed no inequity of HA use in Canada (Asada & Kephart, 2007).

Compared to other OECD countries, Canada demonstrates a different pattern of inequity in healthcare use. Many other high-income countries with purportedly universal healthcare systems demonstrate pro-rich inequity of SP use and pro-poor inequity of HA. However, most other OECD countries have levels of inequity of GP use that are either near zero or considerably lower than that of SP use (Devaux, 2015; Devaux & de Looper, 2012; OECD, 2019). Contrastingly, results from this study demonstrate that pro-rich inequity of GP use in Canada is present at the same levels as pro-rich inequity of SP use.

These results suggest that despite the espoused principles of the CHA, income-related healthcare utilization in Canada is not equitable. This result remains consistent for all three outcome variables, however the direction of the inequity varied based on outcome type, with physician-related utilization tending to be pro-rich while hospital utilization is generally pro-poor. Eastern provinces generally demonstrated larger magnitudes in their

HI_{wv} values as compared to national values and more western provinces. This pattern of utilization and inequity is best illustrated in GP use in PE. These results indicate that utilization in these areas is concentrated among high-income individuals rather than high-need individuals. The geography of this region may contribute to this finding. NL, PE, NS and NB have comparatively few urban areas compared to more central and western provinces, while PE, NS and NB are significantly smaller in land size than all other provinces. Despite the low rates GP use, the HI_{wv} for GP visits in QC shows a similar amount of inequity as national levels. The presence of inequities in the utilization of different measures of healthcare utilization in all regions, and over a 15-year time span demonstrate the need for changes to the current healthcare policy in Canada.

The HI_{wv} results for GP use are particularly concerning. GPs are largely responsible for delivering primary healthcare. Primary healthcare is not only the entry point into the Canadian healthcare system for many individuals, but includes a significant amount of preventative care and health promotion (Romanow, 2002a; World Health Organization, 2008). The HI_{wv} values for GP utilization are near to or greater than the HI_{wv} for SP use in all cycles. This result is opposite to the findings from previous national and international works on equity in healthcare utilization in Canada (Allin, 2008; OECD, 2019; van Doorslaer et al., 2002). This difference may be due to the exclusion of eye specialist in the SP use variable in this study, or to this study uses a 12 month rather than 4-week time period to measure healthcare utilization. In the recent OECD publication of equity in healthcare for 19 different countries, the only country to demonstrate this pattern of inequity for GP and SP use was Cyprus. Notably, Canada is included in this OECD study, however only data from a single CCHS cycle was used (OECD, 2019).

The HI_{wv} of SP visits in QC is higher than national levels, but similar to the levels in eastern provinces. These findings are consistent with other Canadian works on equity in healthcare, and are considered to be the result of increased access to SP services and lack of requirement for a GP referral (Allin, 2008; Talbot et al., 2001). The HI_{wv} for SP use in western provinces (BC, AB, SK) is relatively similar to other regions.

The findings of pro-rich inequity in healthcare utilization for physician services demonstrates the presence of barriers to use. As physician services are included in Medicare, and thus free at the point of care, these barriers are not directly related to the cost of received healthcare services. However, there are additional costs to financial and other resources that are associated with healthcare utilization. These barriers are present both within the healthcare services that exist outside of Medicare, and as part of the larger costs associated with accessing healthcare. Within the healthcare system, anything not covered under the CHA has the potentially to create a financial barrier to use. For example, prescription drug costs are known to increase inequity in healthcare use, as low income individuals are less likely to seek care if they are unable to afford the treatment costs (Gemmill, Thomson, & Mossialos, 2008). There are also costs associated with accessing healthcare. These include considerations like time away from work, transportation, and childcare (Levesque, Harris, & Russell, 2013). Additionally, when discussing utilization barriers, there are psychosocial and behavioural considerations. Individuals who do not trust the healthcare system, have a history of negative healthcare interactions, or are unfamiliar with the structure and language of the Canadian healthcare system may not seek care even though it is medically appropriate (Tang, Browne, Mussell, Smye, & Rodney, 2015). The high levels of pro-rich inequity in the utilization of both GP and SP in Canada are likely the result of a combination of these factors, with unique considerations for individuals and specific populations. Further research is needed to better understand the causes of the observed pro-rich inequities in physician use in Canada. The magnitude of pro-rich inequity in GP utilization is very similar to the level of inequity in SP utilization. This specific finding is concerning as GPs often act as an entry point into the healthcare system and are providers of a significant amount of preventative care.

The HI_{wv} of HA in rural areas is relatively lower in magnitude, and therefore less pro-poor, than national and urban levels from 2009 to 2014. Individuals living in remote and rural areas are more likely to have to travel further to access hospital services. The opportunity costs of HA for rural residents, including expenses of transportation, missed wages, and time away from daily responsibilities are higher than similar costs for their

urban counterparts. This interaction between geography and SES explains the lower utilization of HA among low SES individuals living in remote and rural areas.

While some studies have reported similar pro-poor inequity for HA (Allin, 2008; OECD, 2019), others report equitable HA across the income spectrum (Asada & Kephart, 2007). One of the factors thought to be affecting the differences in these results are the number and type of variables used to quantify healthcare need (Asada & Kephart, 2007). It is possible that the inclusion of more healthcare need variables in the latter study would have resulted in equitable HA use. The decision to use physician services tends to be both patient- and illness-driven while HA are generally illness-driven. As a result, the more need variables that are included in a study, the more likely HA use is to be equitable.

This study is subject to some important limitations that must be kept in mind when interpreting the results. First, the analysis only includes the probability of health utilization rather than the intensity of use. In other words, transformation of utilization into a binary variable creates the assumption that all persons who use healthcare use an equal amount of healthcare. In other words, probability of use gives no information about which individuals make up the highest overall proportion of users. A second limitation are the variables used to determine healthcare need. The selection of these variables was limited based on CCHS content common across the ten cycles analysed and is therefore non-exhaustive in terms of capturing healthcare needs. Most need-based variables rely on subjective self-report of health and medical information, making them subject to reporting and recall bias. Additionally, the chronic conditions included in the need variables are based on a medical diagnosis. Individuals that are less likely to have used healthcare are also less likely to have a formal medical diagnosis, despite the presence of an underlying chronic condition. Finally, the outcome variables used in this study are also subject to recall bias, as they asked about healthcare utilization in the past 12 months. This long timespan also increases the likelihood of self-reporting errors.

Despite these limitations, the results of this work have important policy implications. Knowledge about the inequity in healthcare utilization helps leaders and decision makers set priorities to address such inequities. Results demonstrates that despite the goals of the

CHA, there exist pro-rich inequities in the utilization of in Medicare services in Canada. As GP and SP visits and HA are free at the point of care, these findings indicate the presence of indirect financial barriers and opportunity costs in accessing care. Policy makers should address healthcare utilization barriers both within and outside of the healthcare sector. Within healthcare, legislation that expands the services covered will reduced financial barriers to treatment, reducing disincentives of seeking care (Gemmill et al., 2008). Outside of healthcare, policy makers should focus on addressing non-financial barriers to use like childcare and wages missed while accessing treatment (Ruckert & Labonté, 2014). Through the collaboration of decision makers within and outside of the healthcare system, inequity in healthcare utilization can be reduced.

Overall, the results of this study demonstrate that despite the universality and accessibility program criteria included in the CHA, healthcare utilization in Canada has demonstrated consistent income-related inequity from 2000 to 2014. It is noteworthy that the healthcare services used as outcomes in this study are free at the point of use. Therefore, the presence of income-related inequities for these services can be due to larger issues of healthcare systems operations, delivery and coverage; as well as societal opportunity costs of healthcare utilization, rather than from the financial costs associated with services received.

7.2 Conclusions

In spite of the disagreement on the definition of equity in healthcare sector (Culyer & Wagstaff, 1993), there is broad agreement among policy makers and the general public that healthcare should be utilized based on need and financed based on ability to pay (Wagstaff & van Doorslaer, 1992). This study provides insight into whether healthcare utilization in Canada is dispersed according to need through measurement and assessment of trends in income-related inequities in healthcare utilization during the period between 2000 and 2014. Results suggest that both GP and SP use were generally pro-rich from 2000 to 2014 nationally, in urban and rural areas and provincially. Notably, the amount of inequity of GP use was consistently near or greater than that of SP use. In contrast, HA demonstrates generally pro-poor inequity nationally, in urban and rural areas and

provincially. When equity trends from 2000 to 2014 were analysed, PE and QC both showed significant pro-rich trends in GP use.

Previous work (Edmonds & Hajizadeh, 2019) demonstrated the presence of inequity in the financing of the Canadian healthcare system and this study reveals the existence of income-related inequities of healthcare utilization in Canada. Thus, in order to ensure healthcare systems in Canada fulfill their legislative goals of equitable healthcare, both how healthcare systems are financed and utilized must be addressed. As inequity is contrary to two of the five program criteria of the CHA(1984) *viz.* universality and accessibility, action must be undertaken to reduce and eliminate inequity in healthcare financing and utilization in Canada, thus fulfilling the objectives of this legislation. This study provides evidence to help initiate this process and establishes a starting point from which future works can build.

This work gives a broad picture of the equity trends of healthcare utilization in Canada. However, more work must be done to investigate the extent and causes of inequity in the Canadian healthcare system. Further quantitative research into inequities associated with frequency of use, as well as decomposition of inequities trends to determine causes would expand insights of utilization inequity patterns in the Canadian healthcare system. This should be complemented by qualitative works that help describe the lived experiences of populations subject to inequity in healthcare utilization. Together, these studies would provide essential information that could be used to create effective policy that improves the equity of healthcare in Canada.

References

Allan, D. E., Funk, L. M., Reid, R. C., & Cloutier-Fisher, D. (2011). Exploring the influence of income and geography on access to services for older adults in British Columbia: A multivariate analysis using the Canadian community health survey (Cycle 3.1). *Canadian Journal on Aging*, *30*(1), 69–82. https://doi.org/10.1017/S0714980810000760

Allin, S. (2008). Does Equity in Healthcare Use Vary across Canadian Provinces? *Healthcare Policy*, *3*(4), 83–99. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/19377331

Allin, S., & Hurley, J. (2009). Inequity in publicly funded physician care: What is the role of private prescription drug insurance? *Health Economics*, *18*(10), 1218–1232. https://doi.org/10.1002/hec.1428

Asada, Y., Hurley, J., Norheim, O. F., & Johri, M. (2014). A three-stage approach to measuring health inequalities and inequities. *International Journal for Equity in Health*, *13*(98). https://doi.org/10.1186/s12939-014-0098-y

Asada, Y., & Kephart, G. (2007). Equity in health services use and intensity of use in Canada. *BMC Health Services Research*, *7*(41), 41. https://doi.org/10.1186/1472-6963-7-41

Bago d'Uva, T., Jones, A. M., & van Doorslaer, E. (2009). Measurement of horizontal inequity in health care utilisation using European panel data. *Journal of Health Economics*, *28*(2), 280–289. https://doi.org/10.1016/j.jhealeco.2008.09.008

Bartram, M. (2019). Income-based inequities in access to mental health services in Canada. *Canadian Journal of Public Health*, *110*(4), 395–403. https://doi.org/10.17269/s41997-019-00204-5

Bartram, M., & Stewart, J. M. (2019). Income-based inequities in access to psychotherapy and other mental health services in Canada and Australia. *Health Policy*, *123*, 45–50. https://doi.org/10.1016/j.healthpol.2018.10.011

Birch, S., & Gafni, A. (2005). Achievements and challenges of medicare in Canada: Are we there yet? Are we on course? *International Journal of Health Services*, *35*(3), 443–463. https://doi.org/10.2190/RWA1-C3PB-0KY4-HBUT

Braveman, P., & Gruskin, S. (2003). Defining equity in health. *J Epidemiol Community Health*, *57*, 254–258. https://doi.org/10.1136/jech.57.4.254

Canada Health Act (1984). Canada.

Constitution Act (1867). Canada. Retrieved from http://publications.gc.ca

CSDH. (2008). *Closing the gap in a generation: Health equity through action on the social determinants of health*. Geneva, Switzerland.

Cullis, J., & West, P. A. (1979). *The Economics of Health: An Introduction*. Oxford: Martin Robertson. https://doi.org/10.1017/S0047279400010552

Culyer, A. J., & Wagstaff, A. (1993). Equity and equality in health and health care. *Journal of Health Economics*, *12*, 431–457.

Cunningham, C. M., Hanley, G. E., & Morgan, S. G. (2011). Income inequities in end-of-life health care spending in British Columbia, Canada: A cross-sectional analysis, 2004-2006. *International Journal for Equity in Health*, *10*(12). https://doi.org/10.1186/1475-9276-10-12

Daniels, N., Kennedy, B. P., & Kawachi, I. (1999). Why justice is good for our health: The social determinants of health inequalities. *Daedalus*, *128*(4), 215.

Demeter, S., Reed, M., Lix, L., MacWilliam, L., & Leslie, W. D. (2005). Socioeconomic status and the utilization of diagnostic imaging in an urban setting. *CMAJ*, *173*(10), 1173–1177. https://doi.org/10.1503/cmaj.050609

Devaux, M. (2015). Income-related inequalities and inequities in health care services utilisation in 18 selected OECD countries. *European Journal of Health Economics*, *16*(1), 21–33. https://doi.org/10.1007/s10198-013-0546-4

Devaux, M., & de Looper, M. (2012). *Income-Related inequalities in Health service utilisation in 19 OECD Countries, 2008-2009* (Health Working Papers No. 58). Paris, France.

Dunlop, S., Coyte, P. C., & McIsaac, W. (2000). Socio-economic status and the utilisation of physicians' services: Results from the Canadian National Population Health Survey. *Social Science and Medicine*, *51*(1), 123–133. https://doi.org/10.1016/S0277-9536(99)00424-4

Edmonds, S., & Hajizadeh, M. (2019). Assessing progressivity and catastrophic effect of out-of-pocket payments for healthcare in Canada: 2010–2015. *European Journal of Health Economics*, *20*(7), 1001–1011. https://doi.org/10.1007/s10198-019-01074-x

Finkelstein, M. M. (2001). Do factors other than need determine utilization of physicians' services in Ontario? *CMAJ*, *165*(4), 565–570.

Frenz, P., & Vega, J. (2010). *Universal health coverage with equity: what we know, don't know and need to know*. *Global Symposium on Health Systems Research*. Montreux, Switzerland. Retrieved from www.hsr-symposium.org

Gemmill, M. C., Thomson, S., & Mossialos, E. (2008). What impact do prescription drug charges have on efficiency and equity? Evidence from high-income countries. *International Journal for Equity in Health*, *7*, 13–16. https://doi.org/10.1186/1475-9276-7-12

Grignon, M., Hurley, J., Wang, L., & Allin, S. (2010). Inequity in a market-based health system: Evidence from Canada's dental sector. *Health Policy*, *98*(1), 81–90. https://doi.org/10.1016/j.healthpol.2010.05.018

Hajizadeh, M. (2018). Does socioeconomic status affect lengthy wait time in Canada? Evidence from Canadian Community Health Surveys. *European Journal of Health Economics*, *19*, 369–383. https://doi.org/10.1007/s10198-017-0889-3

Hwang, J., Rudnisky, C., Bowen, S., & Johnson, J. A. (2017). Measuring socioeconomic inequalities in eye care services among patients with diabetes in Alberta, Canada,

1995–2009. *Diabetes Research and Clinical Practice*, *127*, 205–211. https://doi.org/10.1016/j.diabres.2017.02.024

Jimenez-Rubio, D., Smith, P. C., & van Doorslaer, E. (2008). Equity in health and health care in a decentralised context: Evidence from Canada. *Health Economics*, *17*(3), 377–392. https://doi.org/10.1002/hec.1272

Kawachi, I., Subramanian, S. V., & Almeida-Filho, N. (2002). A glossary for health inequalities. *Journal of Epidemiology and Community Health*, *56*(9), 647–652. https://doi.org/10.1136/jech.56.9.647

Le Grand, J. (1987). Inequalities in health. Some international comparisons. *European Economic Review*, *31*(1–2), 182–191. https://doi.org/10.1016/0014-2921(87)90030-4

Levesque, J. F., Harris, M. F., & Russell, G. (2013). Patient-centred access to health care: Conceptualising access at the interface of health systems and populations. *International Journal for Equity in Health*, *12*(1), 1–9. https://doi.org/10.1186/1475-9276-12-18

Maddison, A. R., Asada, Y., Urquhart, R., Johnston, G., Burge, F., & Porter, G. (2012). Inequity in access to guideline-recommended colorectal cancer treatment in Nova Scotia, Canada. *Healthcare Policy*, *8*(2), 71–87. Retrieved from http://www.longwoods.com/content/23131%0Ahttp://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=emed14&NEWS=N&AN=366291672

Marchildon, G. P. (2014). The three dimensions of universal Medicare in Canada. *Canadian Public Administration*, *57*(3), 362–382. https://doi.org/10.1111/capa.12083

Marchildon, G. P., & Allin, S. (2016). The Public-Private Mix in the Delivery of Health-Care Services: Its Relevance for Lower-Income Canadians. *Global Social Welfare*, *3*(3), 161–170. https://doi.org/10.1007/s40609-016-0070-4

Marmot, M. (2005). Social determinants of health inequalities. *Lancet*, *365*(9464), 1099–

1104. https://doi.org/10.1016/S0140-6736(05)71146-6

Martin, D., Miller, A. P., Quesnel-Vallée, A., Caron, N. R., Vissandjée, B., & Marchildon, G. P. (2018, April 28). Canada's universal health-care system: achieving its potential. *The Lancet*. Lancet Publishing Group. https://doi.org/10.1016/S0140-6736(18)30181-8

McGrail, K. M. (2008). Income-related inequities: Cross-sectional analyses of the use of medicare sorvices in British Columbia in 1992 and 2002. *Open Medicine*, *2*(4), e91-8. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/21602958

Mikkonen, J., & Raphael, D. (2010). *Social Determinants of Health: The Canadian Facts*. Toronto. Retrieved from http://www.thecanadianfacts.org/

Mooney, G. (2009). Is it not time for health economists to rethink equity and access? *Health Economics, Policy and Law*, *4*(2), 209–221. https://doi.org/10.1017/S1744133109004848

Moore, J. C., & Loomis, L. S. (2001). *Reducing Income Nonresponse in a Topic-Based Interview*. *Paper prepared for the 2001 AAPOR Meetings*. Montreal, CA. Retrieved from https://www.census.gov/library/working-papers/2002/adrm/rsm2002-06.html

Moore, J. C., Stinson, L. L., & Welniak, E. J. (2000). Income Measurement Error in Surveys: A Review. *Journal of Offcial Statistics*, *16*(4), 331–361.

Nixon, S. A., Lee, K., Bhutta, Z. A., Blanchard, J., Haddad, S., Hoffman, S. J., & Tugwell, P. (2018). Canada's global health role: supporting equity and global citizenship as a middle power. *The Lancet*, *391*(10131), 1736–1748. https://doi.org/10.1016/S0140-6736(18)30322-2

O'Donnell, O., van Doorslaer, E., Wagstaff, A., & Lindelow, M. (2008). *Analyzing Health Equity Using Household Survey Data*. *A Guide to Techniques and Their Implementation*. Washington DC: The World Bank. https://doi.org/10.2471/BLT.08.052357

OECD. (2019). *Health for Everyone?: Social Inequalities in Health and Health Systems*. Paris. https://doi.org/10.1787/3c8385d0-en

Papanicolas, I., & Smith, P. C. (2013). *Health System Performance Comparison: An agenda for policy, information and research*. Maidenhead, UK. Retrieved from www.openup.co.uk

Pulok, M. H., van Gool, K., Hajizadeh, M., Allin, S., & Hall, J. (2019). Measuring horizontal inequity in healthcare utilisation : a review of methodological developments and debates. *The European Journal of Health Economics*. https://doi.org/10.1007/s10198-019-01118-2

Romanow, R. J. (2002a). *Commission on the future of health care in Canada. Building on values: the future of health care in Canada*.

Romanow, R. J. (2002b). *The Canada Health Act*. Retrieved from www.healthcarecommission.ca.

Roos, N. P., Forget, E., Walld, R., & MacWilliam, L. (2004). Does universal comprehensive insurance encourage unnecessary use? Evidence from Manitoba says "no." *Cmaj*, *170*(2), 209–214.

Roos, N. P., & Mustard, C. A. (1997). Variation in Health and Health Care Use by Socioeconomic Status in Winnipeg, Canada: Does the System Work Well? Yes and No. *The Milbank Quarterly*, *75*(1), 89–111.

Ruckert, A., & Labonté, R. (2014). The global financial crisis and health equity: Early experiences from Canada. *Globalization and Health*, *10*(2). https://doi.org/10.1186/1744-8603-10-2

Sibley, L. M., & Weiner, J. P. (2011). An evaluation of access to health care services along the rural-urban continuum in Canada. *BMC Health Services Research*, *11*(20). https://doi.org/10.1186/1472-6963-11-20

Smith, P. C., & Papanicolas, I. (2013). *Health system performance comparison: an*

agenda for policy, information and research. *POLICY SUMMARY* (Vol. 4). Maidenhead, UK. Retrieved from http://www.euro.who.int/pubrequest

Solar, O., & Irwin, A. (2010). *A Conceptual framework for action on the social determinants of health*. *Social Determinants of Health Discussion Paper 2 (Policy and Practice)*. Retrieved from https://www.who.int/sdhconference/resources/ConceptualframeworkforactiononSDH_eng.pdf

Statistics Canada. (2001). CCHS Cycle 1.1 (2000-2001) Public Use Micro File Documentation. Ottawa, Canada.

Talbot, Y., Fuller-Thomson, E., Tudiver, F., Habib, Y., & Mcisaac, W. J. (2001). Canadians without regular medical doctors: Who are they? *Canadian Family Physician*, *47*, 58–64.

Tang, S. Y., Browne, A. J., Mussell, B., Smye, V. L., & Rodney, P. (2015). "Underclassism" and access to healthcare in urban centres. *Sociology of Health and Illness*, *37*(5), 698–714. https://doi.org/10.1111/1467-9566.12236

Thomas, S., & Wannell, B. (2009). Combining cycles of the Canadian Community Health Survey. *Health Reports*, *20*(1), 53–58. Retrieved from www.statcan.gc.ca,

van Doorslaer, E., & Jones, A. M. (2004). Income-related inequality in health and health care in the European Union. *Health Economics*, *13*(7), 605–608. https://doi.org/10.1002/hec.917

van Doorslaer, E., Koolman, X., & Puffer, F. (2002). Equity in the use of physician visits in OECD Countries: Has equal treatment for equal need been acheived? In *Measuring Up: Improving the Performance of Health Systems in OECD COuntries* (pp. 225–248). Ottawa, Canada.

van Doorslaer, E., Wagstaff, A., Calonge, S., Christiansen, T., Gerfin, M., Gottschalk, P., … Nolan, B. (1992). Equity in the delivery of health care: some international comparisons. *Journal of Health Economics*, *11*(4), 389–411.

https://doi.org/10.1016/0167-6296(92)90013-Q

van Doorslaer, E., Wagstaff, A., Van Der Burg, H., Christiansen, T., De Graeve, D., Duchesne, I., … Winkelhake, O. (2000). Equity in the delivery of health care in Europe and the US. *Journal of Health Economics*, *19*(5), 553–583. https://doi.org/10.1016/S0167-6296(00)00050-3

Veugelers, P. J., & Yip, A. M. (2003). Socioeconomic disparities in health care use: Does universal coverage reduce inequalities in health? *J Epidemiol Community Health*, *57*, 424–428. Retrieved from www.jech.com

Wagstaff, A., Paci, P., & van Doorslaer, E. (1991). On the measurement of inequalities in health. *Social Science and Medicine*, *33*(5), 545–557. https://doi.org/10.1016/0277-9536(91)90212-U

Wagstaff, A., & van Doorslaer, E. (1992). Equity in the finance of health care: Some international comparisons. *Journal of Health Economics*, *11*(4), 361–387. https://doi.org/10.1016/0167-6296(92)90012-P

Wagstaff, A., & van Doorslaer, E. (2000). Income inequality and health: What Does the Literature Tell Us? *Annual Review of Public Health*, *21*, 543–567. Retrieved from www.annualreviews.org

Wagstaff, A., van Doorslaer, E., & Paci, P. (1989). Equity in the finance and delivery of health care: Some tentative cross-country comparisons. *Oxford Review of Econonic Policy*, *5*(1), 89–112.

Wagstaff, A., van Doorslaer, E., & Paci, P. (1991). On the measurement of horizontal inequity in the delivery of health care. *Journal of Health Economics*, *10*(2), 169–205. https://doi.org/10.1016/0167-6296(91)90003-6

West, P. A. (1981). Theoretical and practical equity in the national health service in England. *Social Science and Medicine. Part C Medical Economics*, *15*(2), 117–122. https://doi.org/10.1016/0160-7995(81)90025-3

Whitehead, M., & Dahlgren, G. (2006). *Concepts and principles for tackling social inequities in health: Levelling up Part 1*. Retrieved from www.euro.who.int

Willson, A. E. (2009). `Fundamental Causes' of Health Disparities: A comparative analysis of Canada and the United States. *International Sociology*, *24*(1), 93–113. https://doi.org/10.1177/0268580908099155

World Health Organization. (1946). *Constitution of the World Health Organization*. New York, New York, USA.

World Health Organization. (1978). *Declaration of Alma-Ata*. USSR.

World Health Organization. (1986). *Ottawa Charter for Health Promotion*. Ottawa, Canada.

World Health Organization. (2000). *Health Systems: Improving Performance*. *The World Health Report*.

World Health Organization. (2008). *Primary Health Care (Now more than ever)*. Geneva, Switzerland.

World Health Organization. (2010). *Health systems financing: The path to universal coverage*. Geneva, Switzerland.

World Health Organization. (2013). *Handbook on health inequality monitoring: with a special focus on low- and middle-income countries*. Geneva, Switzerland: WHO Press.

World Health Organization. (2014). *Making fair choices on the path to universal health coverage. Final report of the WHO Consultative Group on Equity and Universal Health Coverage*. Geneva, Switzerland: WHO Press.

World Health Organization. (2017). *World Health Statistics 2017: Monitoring health for the SDGs*. Geneva, Switzerland.

World Health Organization, & The World Bank. (2015). *Tracking Universal Health*

Coverage: First Global monitoring report. Geneva, Switzerland.

Young, T. K., Chatwood, S., & Marchildon, G. P. (2016). Healthcare in Canada's north: Are we getting value for money? *Healthcare Policy*, *12*(1), 59–70. https://doi.org/10.12927/hcpol.2016.24776

Young, T. K., Chatwood, S., Ng, C., Young, R. W., & Marchildon, G. P. (2019). The north is not all the same: comparing health system performance in 18 northern regions of Canada. *International Journal of Circumpolar Health*, *78*(1). https://doi.org/10.1080/22423982.2019.1697474

APPENDIX 1: CCHS Sample sizes from 2000 to 2014

Cycle	Survey Sample size	Respondents >17 years old	Final Sample Size Used
00/01	131,535	118,336	101,318
02/03	135,573	121,300	98,302
04/05	132,947	120,559	99,084
2007	65,946	60,581	48,690
2008	66,013	60,257	55,012
2009	61,679	56,088	51,932
2010	63,191	57,708	52,859
2012	63,379	58,000	51,380
2013	64,346	59,224	53,169
2014	63,964	58,982	52,802
Total	848,573	771,035	664,548

APPENDIX 2: HI_{wv} – OLS RESULTS

Table A.2.1. The HI_{wv} index for GP visits in Canada and urban and rural areas from 2000 to 2014 calculated through OLS regression

Year	Canada (95% Confidence Interval)	Urban (95% Confidence Interval)	Rural (95% Confidence Interval)
00/01	0.0764 (0.0671 to 0.0858)	0.0728 (0.0538 to 0.0918)	0.0758 (0.0583 to 0.0933)
02/03	0.0914 (0.0735 to 0.1093)	0.0883 (0.0701 to 0.1065)	0.0937 (0.0686 to 0.1187)
04/05	0.0937 (0.0845 to 0.1029)	0.095 (0.0764 to 0.1136)	0.0925 (0.0666 to 0.1184)
2007	0.1013 (0.0841 to 0.1186)	0.1026 (0.0851 to 0.1201)	0.0710 (0.0382 to 0.1037)
2008	0.0941 (0.0765 to 0.1117)	0.0953 (0.0775 to 0.1131)	0.0804 (0.0472 to 0.1135)
2009	0.1194 (0.1014 to 0.1374)	0.1257 (0.0983 to 0.1531)	0.0735 (0.0396 to 0.1073)
2010	0.0885 (0.0702 to 0.1067)	0.0842 (0.0567 to 0.1117)	0.1003 (0.0646 to 0.1361)
2012	0.0860 (0.0619 to 0.1100)	0.0859 (0.0618 to 0.1100)	0.0904 (0.0502 to 0.1307)
2013	0.0918 (0.0672 to 0.1163)	0.0865 (0.0623 to 0.1107)	0.1153 (0.0805 to 0.1501)
2014	0.1055 (0.0807 to 0.1303)	0.1104 (0.0855 to 0.1354)	0.0737 (0.0336 to 0.1139)
Trend Coefficients (P-value)	0.001 (0.292)	0.001 (0.319)	0.001 (0.500)

Table A.2.2. The HI_{wv} index for GP visits by province from 2000 to 2014 calculated through OLS regression

Year	NL (95% Confidence Interval)	PE (95% Confidence Interval)	NS (95% Confidence Interval)	NB (95% Confidence Interval)	QC (95% Confidence Interval)
00/01	0.0969 (0.0291 to 0.1648)	0.0464 (-0.0243 to 0.1170)	0.0546 (0.0011 to 0.1082)	0.1537 (0.0958 to 0.2117)	0.0687 (0.0474 to 0.0900)
02/03	0.1730 (0.1028 to 0.2431)	-0.0514 (-0.1522 to 0.0493)	0.1198 (0.0415 to 0.1980)	0.1897 (0.1277 to 0.2516)	0.0667 (0.0405 to 0.0928)
04/05	0.0747 (0.0015 to 0.1479)	0.0503 (-0.0359 to 0.1364)	0.0892 (0.0268 to 0.1517)	0.1241 (0.0657 to 0.1825)	0.0992 (0.0724 to 0.1260)
2007	0.1783 (0.0933 to 0.2633)	0.2036 (0.1086 to 0.2986)	0.0594 (-0.0358 to 0.1546)	0.0865 (0.0067 to 0.1664)	0.1005 (0.0665 to 0.1344)
2008	0.1063 (0.0230 to 0.1896)	0.1595 (0.0423 to 0.2768)	0.1057 (0.0185 to 0.1928)	0.0792 (0.0138 to 0.1445)	0.1201 (0.0844 to 0.1558)
2009	0.1639 (0.0747 to 0.2531)	0.1384 (0.0132 to 0.2636)	0.1335 (0.0602 to 0.2068)	0.0564 (-0.0265 to 0.1393)	0.1422 (0.1004 to 0.1840)
2010	0.1407 (0.0488 to 0.2326)	0.2115 (0.0839 to 0.3390)	0.0941 (-0.0096 to 0.1979)	0.0723 (-0.0033 to 0.1478)	0.1152 (0.0715 to 0.1589)
2012	0.2068 (0.0973 to 0.3164)	0.1687 (0.0346 to 0.3027)	0.0407 (-0.0657 to 0.1472)	0.0797 (-0.0158 to 0.1752)	0.0857 (0.0387 to 0.1327)
2013	0.1581 (0.0710 to 0.2453)	0.2656 (0.1469 to 0.3843)	0.0660 (-0.0236 to 0.1556)	0.1307 (0.0512 to 0.2102)	0.1291 (0.0880 to 0.1701)
2014	0.0966 (0.0019 to 0.1912)	0.1165 (0.0023 to 0.2307)	0.1534 (0.0732 to 0.2335)	-0.0044 (-0.099 to 0.0902)	0.1346 (0.0919 to 0.1774)
Trend Coefficients (P-value)	0.003 (0.488)	0.016 (0.021)	0.001 (0.636)	-0.009 (0.018)	0.004 (0.018)

Year	ON (95% Confidence Interval)	MB (95% Confidence Interval)	SK (95% Confidence Interval)	AB (95% Confidence Interval)	BC (95% Confidence Interval)
00/01	0.0641 (0.0432 to 0.0850)	0.0045 (-0.0395 to 0.0485)	0.0688 (0.0238 to 0.1137)	0.0496 (0.0107 to 0.0885)	0.0904 (0.0572 to 0.1237)
02/03	0.0952 (0.0756 to 0.1149)	0.0880 (0.0363 to 0.1398)	0.1006 (0.0487 to 0.1525)	0.0866 (0.0467 to 0.1265)	0.0625 (0.0291 to 0.0959)
04/05	0.0871	0.0519	0.1546	0.1005	0.0355

	(0.0670 to 0.1072)	(0.0010 to 0.1028)	(0.0985 to 0.2107)	(0.0611 to 0.1399)	(0.0007 to 0.0703)
2007	0.0745	0.1534	0.0367	0.1218	0.0694
	(0.0453 to 0.1037)	(0.0722 to 0.2347)	(-0.0353 to 0.1087)	(0.0661 to 0.1775)	(0.0171 to 0.1217)
2008	0.0656	0.0442	0.0812	0.0839	0.1029
	(0.0360 to 0.0953)	(-0.0337 to 0.1220)	(0.0193 to 0.1431)	(0.0346 to 0.1332)	(0.0549 to 0.1509)
2009	0.0967	0.1458	0.1381	0.1530	0.0817
	(0.0651 to 0.1283)	(0.0601 to 0.2315)	(0.0652 to 0.2110)	(0.0963 to 0.2098)	(0.0316 to 0.1317)
2010	0.0904	-0.0146	-0.0103	0.0419	0.1065
	(0.0510 to 0.1298)	(-0.1002 to 0.0711)	(-0.0914 to 0.0707)	(-0.0129 to 0.0967)	(0.0439 to 0.1692)
2012	0.1078	0.0492	0.1006	0.0793	0.0588
	(0.0740 to 0.1416)	(-0.0473 to 0.1457)	(0.0234 to 0.1778)	(0.0127 to 0.1459)	(-0.0084 to 0.1260)
2013	0.0652	0.1279	0.0644	0.0843	0.0812
	(0.0226 to 0.1079)	(0.0384 to 0.2174)	(-0.0145 to 0.1432)	(0.0017 to 0.1669)	(0.0250 to 0.1374)
2014	0.1001	0.0145	0.1332	0.1071	0.0819
	(0.0644 to 0.1358)	(-0.0638 to 0.0928)	(0.0607 to 0.2057)	(0.0471 to 0.1671)	(0.0217 to 0.1421)
Trend Coefficients (P-value)	0.001 (0.351)	0.001 (0.880)	0.000 (0.980)	0.001 (0.608)	0.001 (0.610)

Note: NL=Newfoundland Labrador, PE=Prince Edward Island, NS=Nova Scotia, NB=New Brunswick, QC=Quebec, ON=Ontario, MB=Manitoba, SK=Saskatchewan, AB=Alberta, BC=British Columbia.

Table A.2.3. The HI_{wv} index for SP visits in Canada and urban and rural areas from 2000 to 2014 calculated through OLS regression

Year	Canada (95% Confidence Interval)	Urban (95% Confidence Interval)	Rural (95% Confidence Interval)
00/01	0.0725 (0.0613 to 0.0836)	0.0730 (0.0618 to 0.0842)	0.0605 (0.0417 to 0.0794)
02/03	0.0796 (0.0686 to 0.0905)	0.0774 (0.0636 to 0.0912)	0.0794 (0.0556 to 0.1031)
04/05	0.0641 (0.0532 to 0.0751)	0.0631 (0.0494 to 0.0769)	0.0502 (0.0263 to 0.0742)
2007	0.0687 (0.0519 to 0.0855)	0.0704 (0.0507 to 0.0901)	0.0479 (0.0175 to 0.0782)
2008	0.0762 (0.0593 to 0.0931)	0.0766 (0.0568 to 0.0964)	0.0674 (0.0371 to 0.0977)
2009	0.0505 (0.0335 to 0.0674)	0.0436 (0.0237 to 0.0636)	0.0736 (0.0437 to 0.1036)
2010	0.0833 (0.0661 to 0.1005)	0.0824 (0.0622 to 0.1026)	0.0823 (0.0517 to 0.1129)
2012	0.0676 (0.0474 to 0.0877)	0.0619 (0.0388 to 0.0849)	0.0902 (0.0560 to 0.1244)
2013	0.0775 (0.0599 to 0.0950)	0.0777 (0.0572 to 0.0982)	0.0735 (0.0418 to 0.1052)
2014	0.0678 (0.0504 to 0.0851)	0.0682 (0.0479 to 0.0886)	0.0615 (0.0278 to 0.0951)
Trend Coefficients (P-value)	0.000 (0.841)	0.000 (0.785)	0.001 (0.342)

Table A.2.4. The HI_{wv} index for SP visits by province from 2000 to 2014 calculated through OLS regression

Year	NL (95% Confidence Interval)	PE (95% Confidence Interval)	NS (95% Confidence Interval)	NB (95% Confidence Interval)	QC (95% Confidence Interval)
00/01	0.0990 (0.0478 to 0.1503)	0.0777 (0.0216 to 0.1337)	0.1049 (0.0638 to 0.146)	0.0598 (0.0179 to 0.1017)	0.1061 (0.0820 to 0.1303)
02/03	0.1434 (0.0813 to 0.2056)	0.0943 (0.0246 to 0.1639)	0.1156 (0.0610 to 0.1702)	0.0693 (0.0231 to 0.1156)	0.0982 (0.0720 to 0.1244)
04/05	0.1152 (0.0553 to 0.1750)	0.0112 (-0.0630 to 0.0854)	0.0852 (0.0343 to 0.1362)	0.0546 (0.0064 to 0.1027)	0.1069 (0.0836 to 0.1302)
2007	0.1525 (0.0771 to 0.2279)	0.0747 (-0.0078 to 0.1572)	0.0909 (0.0287 to 0.1530)	-0.0014 (-0.0663 to 0.0635)	0.0569 (0.0217 to 0.0921)
2008	0.0875 (0.0152 to 0.1599)	-0.0029 (-0.1122 to 0.1065)	0.1159 (0.0498 to 0.1820)	0.0279 (-0.0323 to 0.0882)	0.1027 (0.0672 to 0.1382)
2009	0.0385 (-0.0453 to 0.1223)	0.0791 (-0.0233 to 0.1814)	0.0911 (0.0214 to 0.1609)	0.0356 (-0.0286 to 0.0999)	0.0898 (0.0540 to 0.1256)
2010	0.0501 (-0.0144 to 0.1147)	0.1028 (0.0021 to 0.2035)	0.1206 (0.0509 to 0.1903)	0.1047 (0.0411 to 0.1682)	0.1433 (0.1040 to 0.1826)
2012	0.1973 (0.1036 to 0.2911)	0.1637 (0.0495 to 0.2778)	0.1277 (0.0413 to 0.2142)	0.0832 (0.0101 to 0.1564)	0.0850 (0.0426 to 0.1275)
2013	0.1305 (0.0462 to 0.2148)	0.0458 (-0.0556 to 0.1472)	0.1054 (0.0405 to 0.1703)	0.0419 (-0.0204 to 0.1043)	0.0787 (0.0424 to 0.1151)
2014	0.0917 (0.0090 to 0.1744)	0.0338 (-0.0655 to 0.1331)	0.1134 (0.0412 to 0.1855)	0.0521 (-0.0131 to 0.1172)	0.0645 (0.0284 to 0.1007)
Trend Coefficients (P-value)	0.000 (0.999)	0.001 (0.870)	0.001 (0.360)	0.000 (0.873)	-0.002 (0.371)

Year	ON (95% Confidence Interval)	MB (95% Confidence Interval)	SK (95% Confidence Interval)	AB (95% Confidence Interval)	BC (95% Confidence Interval)
00/01	0.0711 (0.0516 to 0.0906)	0.0829 (0.0403 to 0.1254)	0.0626 (0.0226 to 0.1026)	0.0393 (0.0034 to 0.0752)	0.0780 (0.0516 to 0.1043)
02/03	0.0964 (0.0772 to 0.1156)	0.0776 (0.0252 to 0.1301)	0.0478 (0.0010 to 0.0947)	0.0429 (-0.0004 to 0.0861)	0.0606 (0.0263 to 0.0950)
04/05	0.0672	0.0415	0.0863	0.0179	0.0349

	(0.0480 to 0.0864)	(-0.0057 to 0.0887)	(0.0446 to 0.1279)	(-0.0197 to 0.0554)	(0.0060 to 0.0638)
2007	0.0865	0.1228	0.0387	0.0631	0.0850
	(0.0606 to 0.1124)	(0.0559 to 0.1896)	(-0.0241 to 0.1015)	(0.0142 to 0.1121)	(0.0427 to 0.1274)
2008	0.0881	0.1328	0.0370	0.0432	0.0402
	(0.0593 to 0.1169)	(0.0623 to 0.2033)	(-0.0226 to 0.0967)	(-0.0107 to 0.097)	(-0.0033 to 0.0837)
2009	0.0630	0.2013	-0.0040	-0.0267	0.0316
	(0.0372 to 0.0888)	(0.1285 to 0.2741)	(-0.0611 to 0.0532)	(-0.0842 to 0.0308)	(-0.0115 to 0.0747)
2010	0.0738	0.0442	0.0244	0.0996	0.0461
	(0.0449 to 0.1027)	(-0.0313 to 0.1198)	(-0.0420 to 0.0908)	(0.0514 to 0.1477)	(-0.0032 to 0.0953)
2012	0.0984	0.1091	0.0318	0.0286	-0.0029
	(0.0667 to 0.1300)	(0.0331 to 0.1851)	(-0.0441 to 0.1078)	(-0.0435 to 0.1007)	(-0.0486 to 0.0428)
2013	0.1059	0.0101	-0.0436	0.0918	0.0548
	(0.0762 to 0.1356)	(-0.0632 to 0.0834)	(-0.1180 to 0.0308)	(0.0300 to 0.1536)	(0.0054 to 0.1041)
2014	0.0788	0.0446	0.1007	0.0882	0.0882
	(0.0491 to 0.1085)	(-0.0315 to 0.1207)	(0.0331 to 0.1683)	(0.0280 to 0.1484)	(0.0408 to 0.1357)
Trend Coefficients (P-value)	0.001 (0.383)	-0.002 (0.662)	-0.003 (0.389)	0.003 (0.274)	-0.001 (0.561)

Note: NL=Newfoundland Labrador, PE=Prince Edward Island, NS=Nova Scotia, NB=New Brunswick, QC=Quebec, ON=Ontario, MB=Manitoba, SK=Saskatchewan, AB=Alberta, BC=British Columbia.

Table A.2.5. The HI_{wv} index for HA in Canada and urban and rural areas from 2000 to 2014 calculated through OLS regression

Year	Canada (95% Confidence Interval)	Urban (95% Confidence Interval)	Rural (95% Confidence Interval)
00/01	-0.0656 (-0.0827 to -0.0484)	-0.0687 (-0.0880 to -0.0495)	-0.0441 (-0.0744 to -0.0139)
02/03	-0.0720 (-0.0912 to -0.0527)	-0.0664 (-0.0899 to -0.0430)	-0.0877 (-0.1200 to -0.0555)
04/05	-0.0651 (-0.0821 to -0.0481)	-0.0704 (-0.0894 to -0.0513)	-0.0372 (-0.0694 to -0.0050)
2007	-0.0817 (-0.1095 to -0.0539)	-0.0827 (-0.1147 to -0.0507)	-0.0734 (-0.1207 to -0.0262)
2008	-0.0576 (-0.0831 to -0.032)	-0.0499 (-0.0796 to -0.0201)	-0.0954 (-0.1448 to -0.0459)
2009	-0.0587 (-0.0842 to -0.0331)	-0.0629 (-0.0926 to -0.0331)	-0.0296 (-0.0705 to 0.0112)
2010	-0.0621 (-0.0898 to -0.0343)	-0.0654 (-0.0974 to -0.0333)	-0.0564 (-0.1054 to -0.0075)
2012	-0.0729 (-0.1071 to -0.0388)	-0.0826 (-0.1231 to -0.0421)	-0.0361 (-0.0898 to 0.0175)
2013	-0.0446 (-0.0766 to -0.0126)	-0.0478 (-0.0840 to -0.0116)	-0.0352 (-0.0891 to 0.0187)
2014	-0.0935 (-0.1276 to -0.0594)	-0.1064 (-0.1447 to -0.0681)	-0.0295 (-0.0852 to 0.0262)
Trend Coefficients (P-value)	0.000 (0.884)	-0.001 (0.517)	0.002 (0.229)

Table A.2.6. The HI_{wv} index for HA by province from 2000 to 2014 calculated through OLS regression

Year	NL (95% Confidence Interval)	PE (95% Confidence Interval)	NS (95% Confidence Interval)	NB (95% Confidence Interval)	QC (95% Confidence Interval)
00/01	-0.0232 (-0.0948 to 0.0483)	-0.0326 (-0.114 to 0.0489)	-0.0132 (-0.0734 to 0.0470)	-0.0621 (-0.1197 to -0.0046)	-0.0375 (-0.0722 to -0.0029)
02/03	-0.0955 (-0.1739 to -0.0171)	0.0056 (-0.0982 to 0.1094)	-0.1291 (-0.2027 to -0.0556)	-0.1522 (-0.2228 to -0.0815)	-0.0813 (-0.1223 to -0.0404)
04/05	-0.0973 (-0.1808 to -0.0137)	-0.1851 (-0.2973 to -0.0730)	-0.0295 (-0.0981 to 0.0391)	-0.1032 (-0.1678 to -0.0387)	-0.0908 (-0.1273 to -0.0544)
2007	-0.0347 (-0.1517 to 0.0822)	-0.2032 (-0.3294 to -0.0770)	-0.0791 (-0.1790 to 0.0207)	-0.0693 (-0.1591 to 0.0205)	-0.1185 (-0.1788 to -0.0583)
2008	0.0174 (-0.0978 to 0.1327)	-0.1743 (-0.3135 to -0.035)	0.0727 (-0.0482 to 0.1936)	-0.0506 (-0.126 to 0.0248)	-0.0512 (-0.1047 to 0.0022)
2009	-0.1778 (-0.2933 to -0.0624)	-0.1311 (-0.2981 to 0.0358)	-0.0499 (-0.1521 to 0.0522)	-0.0742 (-0.1567 to 0.0083)	-0.0548 (-0.1084 to -0.0011)
2010	-0.1354 (-0.2374 to -0.0335)	-0.0044 (-0.1769 to 0.1681)	-0.0934 (-0.2076 to 0.0207)	-0.0454 (-0.1322 to 0.0414)	-0.0286 (-0.0912 to 0.0340)
2012	-0.0605 (-0.2008 to 0.0797)	-0.0212 (-0.2307 to 0.1884)	-0.1794 (-0.3405 to -0.0182)	0.0099 (-0.1152 to 0.135)	-0.1120 (-0.1924 to -0.0316)
2013	-0.0393 (-0.1464 to 0.0677)	-0.0886 (-0.2118 to 0.0345)	-0.1422 (-0.2430 to -0.0414)	-0.0199 (-0.1198 to 0.0799)	-0.0412 (-0.1023 to 0.0199)
2014	-0.0520 (-0.1668 to 0.0627)	0.0023 (-0.1819 to 0.1864)	-0.1610 (-0.2675 to -0.0544)	-0.1218 (-0.2086 to -0.0350)	-0.1063 (-0.1713 to -0.0412)
Trend Coefficients (P-value)	-0.001 (0.908)	0.003 (0.689)	-0.009 (0.121)	0.005 (0.238)	-0.001 (0.672)
Year	**ON (95% Confidence Interval)**	**MB (95% Confidence Interval)**	**SK (95% Confidence Interval)**	**AB (95% Confidence Interval)**	**BC (95% Confidence Interval)**
00/01	-0.0683 (-0.1001 to -0.0364)	-0.0744 (-0.1302 to -0.0187)	-0.1307 (-0.1838 to -0.0777)	-0.1122 (-0.1635 to -0.0610)	-0.0184 (-0.0588 to 0.0219)
02/03	-0.0270 (-0.0630 to 0.0090)	-0.0944 (-0.1653 to -0.0234)	-0.0654 (-0.1306 to -0.0002)	-0.0808 (-0.1449 to -0.0166)	-0.0749 (-0.1217 to -0.0281)
04/05	-0.0505	-0.1229	0.0289	0.0000	-0.0829

	(-0.0822 to -0.0189)	(-0.1976 to -0.0483)	(-0.0343 to 0.0922)	(-0.0512 to 0.0512)	(-0.1314 to -0.0344)
2007	-0.0542	-0.1798	-0.1102	-0.0715	-0.0549
	(-0.1009 to -0.0075)	(-0.3072 to -0.0524)	(-0.2139 to -0.0065)	(-0.1621 to 0.0191)	(-0.1224 to 0.0126)
2008	-0.0540	-0.1001	-0.1269	-0.1308	-0.0424
	(-0.1027 to -0.0053)	(-0.1993 to -0.0009)	(-0.1962 to -0.0577)	(-0.2134 to -0.0482)	(-0.1149 to 0.0301)
2009	-0.0441	-0.0216	-0.1008	-0.1164	-0.0425
	(-0.0883 to 0.0002)	(-0.1213 to 0.0780)	(-0.1782 to -0.0235)	(-0.1897 to -0.0432)	(-0.1195 to 0.0344)
2010	-0.0529	-0.1604	-0.0244	-0.1132	-0.0858
	(-0.0994 to -0.0063)	(-0.2844 to -0.0364)	(-0.1091 to 0.0603)	(-0.2072 to -0.0193)	(-0.1603 to -0.0113)
2012	-0.0494	-0.0423	-0.1636	-0.0938	-0.0821
	(-0.0999 to 0.0011)	(-0.1782 to 0.0937)	(-0.2798 to -0.0474)	(-0.1835 to -0.0040)	(-0.1636 to -0.0006)
2013	-0.0203	-0.0823	-0.2945	0.0571	-0.1259
	(-0.0769 to 0.0363)	(-0.1884 to 0.0238)	(-0.4318 to -0.1573)	(-0.0398 to 0.154)	(-0.2025 to -0.0493)
2014	-0.1065	-0.0712	-0.1091	-0.1041	-0.0140
	(-0.1698 to -0.0432)	(-0.1720 to 0.0297)	(-0.2365 to 0.0183)	(-0.2103 to 0.0022)	(-0.0816 to 0.0536)
Trend Coefficients (P-value)	-0.001 (0.616)	0.002 (0.576)	-0.009 (0.208)	0.002 (0.668)	-0.002 (0.497)

Note: NL=Newfoundland Labrador, PE=Prince Edward Island, NS=Nova Scotia, NB=New Brunswick, QC=Quebec, ON=Ontario, MB=Manitoba, SK=Saskatchewan, AB=Alberta, BC=British Columbia.