DESCRIBING HEALTH INEQUALITIES WITHIN AND BETWEEN GROUPS

by

Adam J.W. Muir

Submitted in partial fulfillment of the requirements
for the degree of Master of Science

at

Dalhousie University
Halifax, Nova Scotia
April 2016

For my mom, fiancée, and family.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

Health inequality is an important health policy topic. Typically, health inequality is measured by comparing the average health between subgroups. However, there are also differences within subgroups. This thesis aimed to: (1) describe within- and between-subgroup health inequality by income and education, and (2) explore alternative multi-characteristic groups that have smaller within-subgroup inequality than income or education. Using the Canadian Community Health Survey, we measured health by the Health Utilities Index. We described health inequalities visually and quantified and decomposed into within- and between-subgroup inequality using the Theil index. We observed within-subgroup inequality was much larger (about 95%) than between-subgroup inequality (about 5%), regardless of group. Alternative multi-characteristic groups marginally reduce within-subgroup inequality compared to income or education alone. For a more comprehensive picture of health inequalities, it is essential to describe inequalities within and between subgroups.

LIST OF ABBREVIATIONS USED

HUI	Health Utility Index mark 3
SES	Socioeconomic status
PHAC	Public health agency of Canada
PUMF	Public use microdata file
CCHS	Canadian Community Health Survey
CI	Concentration Index
OLS	Ordinary least squares
CLAD	Censored least absolute deviations
NFLD	Newfoundland
PEI	Prince Edward Island
NS	Nova Scotia
NB	New Brunswick
QC	Quebec
ONT	Ontario
MB	Manitoba
SK	Saskatchewan
AB	Alberta
BC	British Columbia

ACKNOWLEDGEMENTS

First I would like to thank my supervisor and mentor Dr. Yukiko Asada and committee members Dr. George Kephart and Dr. Yoko Yoshida. They have guided me through the thesis process and have given so much of their time to the completion of this project. I have learned a great deal from them and I cannot thank them enough for everything they have taught me.

I would also like to thank the graduate coordinator Dr. Kathleen MacPherson and staff members Tina Bowdridge and Craig Gorveatt in the Department of Community Health and Epidemiology for their support and expertise throughout my Masters program.

Furthermore, I would like to thank my family who through example has instilled the importance of hard-work, dedication, and patience to overcome challenges and to persevere.

Finally, I would like to thank my fiancée, Haley Farrar, and my good friend Kevin Wilson for their intellectual insights and emotional support over the course of my Masters program. Late-night walks, phone calls, coffee breaks, and kitchen tea were essential throughout the process.

CHAPTER 1   INTRODUCTION

In many jurisdictions, including Canada, health inequality is an important health policy topic. Health inequalities have been described extensively in epidemiological literature and in health policy (1-11). Previous studies in Canada and abroad have described health inequality typically by group (e.g., income), more precisely, by comparing the average health between subgroups (e.g., low income group compared to high income group) (5-17). The choice of group characteristic is often based on historical, political, and social considerations, where differences in health by these group characteristics are implied as unjust (18).

Three issues emerge from this conventional approach of comparing the average health between subgroups (2-4). Firstly, and not surprisingly, individuals within the subgroup often report different health than the average health of the subgroup (19). By using subgroup averages, we do not pay attention to differences within subgroups. Secondly, some studies observe that health inequality within subgroups substantially overlap between subgroups and there are healthy and unhealthy individuals in each subgroup that are not visible when we use subgroup averages (19,20). For example, when individuals in a low income subgroup have lower average health than those in a high income subgroup, we are inclined to think that those in the low income subgroup are less healthy. A low income subgroup has a higher concentration of individuals with worse health that pulls down the average health, however, both income subgroups have healthy individuals (19). Thirdly, some studies have quantified health inequality within- and between-subgroups, and showed that the former is greater than the latter (20-22). By overlooking health inequality within subgroups we may be missing a greater amount of inequality that exists. If within-subgroup inequality captures more inequality than between subgroups, and/or within-subgroup inequality has considerable overlap between subgroups, then the group characteristic does not isolate the distribution of health clearly.

The overarching goal of this study was to provide a more comprehensive picture of health inequalities than the conventional comparison of subgroup average

health. This thesis explored one approach that might better describe health inequalities, creating an alternative multi-characteristic group (e.g. income-ethnicity, education-living status). When creating an alternative multi-characteristic group, group selection must consider historical, political and social importance of the group, alongside empirical evidence. We used the 2009/2010 Canadian Community Health Survey (CCHS) public use microdata file (PUMF) to acquire health, demographic, and socioeconomic status information from a nationally representative sample of Canadians (23). We measured health by the Health Utilities Index (HUI), a general measure of health.

The analysis followed two steps. First, we visually described and quantified within- and between-subgroup health inequalities using income and education, separately, which are commonly used group characteristics in the health inequality literature (6-11). Following previous health inequality literature, because health inequality may be different across different life stages and may be different for men and women, we stratified our health inequality analyses by age and sex (7,9,10,13,15,16,19,22). We used the Theil index, a well-established index of inequality, to quantify within- and between-subgroup health inequality (24). Second, we modeled HUI with demographic and socioeconomic group characteristics to explore alternative multi-characteristic groups. Group characteristics that were significantly associated with HUI were combined to create two-characteristic groups and inequalities in HUI by these selected two-characteristic groups were assessed in each age-sex stratum. For this study, the term multi-characteristic group is used to describe the two-characteristic groups within each age-sex stratum. To create the two-characteristic groups, we considered six group characteristics that are relevant to health policy considerations, including income, education, province, living status, immigrant status, and visible minority status. The two-characteristic groups we considered are: income-education, income-province, income-living status, education-province, immigrant status-living status, immigrant status-education. We then assessed within- and between-subgroup health inequality by the alternative multi-characteristic group using the Theil index. Within-subgroup inequality by the alternative multi-characteristic group was

compared to income and education alone. If an alternative multi-characteristic group had smaller within-subgroup health inequality relative to that of income and education, and if the alternative group is relevant to health policy, we considered it as a good group to measure health inequality. The alternate multi-characteristic group with the smallest within-subgroup inequality was examined further using hierarchical Theil index decomposition.

We observed that there was between-subgroup overlap in both income and education groups, and there were healthy individuals in every subgroup. Regardless of the group characteristic used, we observed that health inequality within-subgroups were larger (about 95%) than between-subgroups (about 5%). The alternative multi-characteristic group (income-province) had smaller within-subgroup health inequality than that of income and education alone, but the difference was marginal. Hierarchical decomposition of the income-province group showed that within-province health inequality by income was generally smaller in the middle age group for both sexes. Generally, there was smaller within-province health inequality by income for men compared to women in all age groups.

Through visually describing and quantifying inequality, this thesis supports previous observations reported in health inequality literature and expands on the implications of comparing health inequality simply comparing the average health between subgroups. The study fills a gap in the health inequality literature by supplementing the conventional, between-subgroup description of health inequality with within-subgroup description of health inequality. In addition, this study is useful for assessing how well the group characteristic describes health inequalities.

This thesis is arranged into seven chapters. In chapter two, we provide background information about health inequality and situate the issues emerging from the conventional approach to measuring health inequality. Chapter three outlines the objectives of the thesis. Chapter four covers the methodology of this project. Chapter five reports findings. Chapter six discusses the findings. Chapter seven is the conclusion of the thesis.

CHAPTER 2   BACKGROUND

2.1 The importance of health inequality

Health inequality is an important health policy topic in many jurisdictions. Health policy aimed at improving the health of a population often recognizes the importance of reducing health inequalities (1-5). Describing health inequalities means identifying differences in health between groups or individuals within a population, and by doing so over time, we can monitor changes in health inequalities (18,25). The World Health Organization (WHO) is one of the organizations that identify health inequality as a key health issue. Outlined in its 2008 report, the WHO Commission on Social Determinants of Health highlighted the importance of reducing health inequalities associated with unfair social conditions that place some groups at a disadvantage in health (4). The Commission also discussed the role of measuring health inequalities for the surveillance purpose (4).

Canada also recognizes reducing health inequalities is important to improve the health of the population. For example, Canada has emphasized its commitment to reducing health inequalities in many national and provincial health reports, including the *Healthy Canadian 2010*, and *Reducing Health Disparities – Roles of the Health Sector* (2,3) and *Trends in Income-Related Health Inequalities in Canada, 2015 Summary Report* (5). These Canadian reports describe the average health of Canadians and differences in health by various groups (2,3,5).

2.2 Health inequality in Canada

Researchers have described various health inequalities in Canada, including those by income, education, sex, Aboriginal status, immigrant status, and rural/urban residence (see Appendix B, Table 1.1). Depending on the group by which health inequality is measured, we obtain different information about the distribution of health (5,9,10).

In any population in which health inequalities are examined, income-related health inequality, education-related health inequality, and sex-related health inequality appear to exist (5-8,15-17,26) (Appendix B, Table 1.1). With most health

outcomes, we observe a positive gradient in the relationship between health and income or education (6,7,9,16). Those with lower income or education have worse health, and with increase in the level of income or education, health generally increases in a step-wise fashion. According to a recent summary report by Canadian Institute of Health Information, income-related health inequalities persist with little or no progress in closing the gap over the last decade (5). Differences in health also exist by sex (10,12,15,26). However, neither men nor women are consistently at a disadvantage across health measures. For example, women generally have a longer life expectancy than men, but men report better health than women (26,27).

In Canada, differences in health have also been reported by Aboriginal status, immigrant status, and urban/rural residence (15,26,28-32). Frohlich, Ross and Richmond (26) reviewed the Canadian health inequality literature published from 1974 to 2004 and observed that health inequality exists by Aboriginal status, favouring non-Aboriginals regardless of how health is measured. For example, in comparison to non-Aboriginals, Aboriginals have 8.9 years (men) and 8.4 years (women) shorter life expectancy, higher prevalence of chronic and infectious diseases, and higher infant mortality rate (26). Immigrants, in contrast, generally have better health than native-born Canadians. As the amount of time spent in Canada increases, however, immigrants' health becomes more similar to native-born Canadians (15,31,32). Few studies have investigated health inequality by rural/urban residence, yet the few available studies suggest that differences in health may exist (28-30). A 2006 summary report by the Public Health Agency of Canada (PHAC) shows that depending on the measure of health used, health inequalities may exist between individuals residing in urban and rural communities, favouring urban residents (30). For example, urban residents have lower all-cause mortality rates and lower prevalence of diabetes but higher prevalence of cancer and circulatory disease (30). Urban residents also exhibit more healthy behaviours than rural residents (30).

Descriptions of health inequalities not only vary across groups but also across health outcomes. Various measures of health have been used in describing heath inequality. For example, general health may be measured by self-rated health,

presence or absence of chronic conditions, life expectancy, mortality, and the Health Utility Index (HUI), and specific conditions (6-17) (Appendix B, Table 1.1). Each measure of health provides different information about the distribution of health. For example, James et al (10) observed that in Canada from 1971 to 1996, income-related inequalities in deaths that were amendable by medical care, such as asthma and cervical cancer, reduced, whereas income-related inequalities in deaths amendable by public health, such as liver cancer and lung cancer, remained unchanged. In addition, Safaei (9) described income-related health inequality in Canada stratified by province and sex using three measures of health: self-rated health, the HUI, and presence of chronic health conditions. He observed that income-related health inequality by sex and by province did not exist when measuring health as the presence of chronic illness. However, when measuring health using self-reported health or the HUI, he observed income-related health inequality in both sexes in almost every province.

2.3 Describing health inequality by group

Common to virtually all descriptive work on health inequalities in the epidemiological and public health literature is the examination of health inequalities by group. Typically, health inequality is assessed in relation to one group characteristic at a time, for example, income or education (6-9,12-14,16,17). The group selected to measure health inequality depends on many factors, including data availability and health policy and ethical consideration (11).

One common group characteristic used in the assessment of health inequality is socioeconomic status (SES). SES is most commonly measured by income or education, and, to a lesser degree, by occupation (11,13). In reality, income, education, and occupation are correlated. However, they measure different parts of the social structure and their relationships to health are different (13). For example, income represents purchasing power to acquire health through its determinants, such as housing and nutrition, whereas education can be a proxy for one's ability to acquire, understand, and apply health information (13,33).

6

One reason why many researchers have examined health inequalities by SES is likely that they consider differences in health by SES are unjust or inequitable (18,25,34). For example, Braveman and Gruskin (18) describe health equity as "...the absence of systematic disparities in health (or in the major social determinants of health) between social groups who have different levels of underlying social advantage/disadvantage – that is, different positions in a social hierarchy" (p254). Health inequity is a subset of health inequality (18). Health inequality means differences in health in a statistical sense, whereas health inequity is inequality that is deemed undesirable due to fairness considerations (18,25,34). In order to determine which health inequalities are inequitable, one must assess the underlying reason for the existence of health inequalities and have a normative position based on theories of justice inequalities (18). Although there is no clear consensus for the definition of health inequity, the view outlined by Braveman and Gruskin (18) is very common in the public health and epidemiology literatures (1-4,25,26,34).

2.3.1 Measuring health inequality between subgroups[1]

To describe health inequalities by group, researchers have typically compared subgroup averages (6-10,12-17). By comparing the average health between subgroups, we do not pay attention to within-subgroup inequality that most likely exists. For example, Figure 1 illustrates health across three income subgroups, representing the gradient discussed earlier. Income-related health inequalities are described by comparing the average health of each income subgroup (6-10,12-14,16,17). However, using the average health of subgroups to describe health inequalities, by definition, does not account for within-subgroup health inequality. Figure 2 demonstrates how using the average health of each subgroup does not explicitly show within-subgroup health inequality. Not surprisingly, not everyone within the subgroup is likely to have the same level of health. Figure 3 hypothetically illustrates the within-subgroup distribution of health

---

[1] The structure of this section follows Asada (35).

in the same three income subgroups as Figure 1 and Figure 2. The health of individuals in each subgroup is often different from what is suggested by the average health of the subgroup. The average health of the subgroup is sensitive to the distribution of health within subgroup, however, many different distributions have the same average health. Understanding the distribution of health within the subgroup offers additional information not easily visible when comparing the average health of the subgroup.

Not only does within-subgroup inequality exist, but also within-subgroup inequalities are likely overlapping across subgroups. For example, a study by Ferrer and Palmer (19) visually described health inequality both within and between five income subgroups, stratified by age. They used data from a community tracking study of a representative sample of the U.S. population in 1996-1997 (19). The authors observed that the within-subgroup inequality in health is less for every increase in income subgroup in a gradient fashion for every age group (Figure 4). The greater inequality in health within low income subgroups was due to a greater concentration of individuals with low health than in higher income subgroups. This pulls the average health down in low income subgroups. However, the authors report that the healthiest 25% in the lowest income subgroup was indistinguishable from the healthiest 25% in the highest income subgroup. They also observed that the interquartile ranges within each income subgroup were overlapping.

Furthermore, some studies quantified the amount of within- and between-subgroup inequalities and showed the former is larger than the latter (20-22). For example, compiling 9,053 life tables over two centuries of data from multiple databases, Smits and Monden (22) assessed inequalities in the length of life within and between 191 countries. To do so, they used the subgroup decomposition of the Theil index, in which the sum of within- and between-subgroup inequalities equals to total inequality (22). The authors observed that within-country health inequality contributes approximately 90% of total health inequality (22). In addition, using the Concentration Index, Wagstaff and van Doorslaer (20) described health inequality across nine income subgroups of over 16,000 adults in Canada using the HUI from the National Population Health Survey (NPHS) and across nine income subgroups of

8

over 5,000 children in Vietnam using a malnutrition measure of health from the Vietnam Living Standard Survey (VLSS). To examine inequality within and between nine income subgroups in Canada and Vietnam separately, the authors used subgroup decomposition of the Concentration Index (CI) (20). Unlike subgroup decomposition of the Theil index Smits and Monden (22) used, the CI decomposes total inequality into within-subgroup, between-subgroup, and group-overlapping inequality. The authors observed that 11% and 25% of health inequality was observed within and between subgroups, respectively, in Canada (20). The remaining 64% of income-related health inequality in Canada was explained by group-overlapping inequality (20). A similar quantity of health inequality between income subgroups was observed for Vietnamese children (20).

These studies suggest that measuring health inequality between subgroups only account for a fraction of overall health inequality that exists (19-22), and implies that failure to consider within-subgroup health inequality leads to a biased picture of the reality of health inequality. Moreover, if subgroup inequality in health extensively overlaps and/or within-subgroup inequality is larger than between-subgroup inequality, the group characteristic would not isolate the distribution of health clearly. This brings into question the usefulness of the group characteristic in describing the inequality of health.

2.3.2 Describing health inequality between and within subgroups

The aforementioned studies that examined within-subgroup inequality suggest the importance of assessing health inequalities both within and between subgroups. Information regarding between-subgroup inequality is critical, because policy often requires target populations (1-5,30). Furthermore, the choice of groups with which we assess health inequalities is often influenced by historical, political, and social considerations (11,13,18,26,33,34). It is assumed that commonly used group characteristics for measuring health inequality are essential for describing the experiences of individuals belonging to disadvantaged groups across many aspects of life (34). For example, in Canada, Aboriginal status has a historical, political, and social importance because Aboriginal Peoples have a long history of

9

being subject to economic and social exclusion in comparison to the rest of the Canadian population (26). For this reason, regardless of the size of within-subgroup inequality, we might wish to keep track of inequalities in health between Aboriginals and non-Aboriginals.

The selection of group characteristics is also an empirical question, and information regarding within-subgroup inequality may refine policies to reduce health inequalities. Recall the study by Ferrer and Palmer (19). This study showed that there are unhealthy individuals in high income subgroups who would benefit from interventions targeting to improve health, while there are healthy individuals in lower income subgroups who would not benefit from such interventions (19). An intervention target solely determined by income level may be less efficient and effective because we do not isolate unhealthy individuals within the income subgroups and thereby dedicate resources to improving the health of healthy individuals as well. Thus, it would be useful to examine within-subgroup inequality as well as between-subgroup inequality and identify group characteristics that retain historical, political, and social importance and result in smaller within-subgroup inequalities.

One approach that describes inequalities in greater detail is hierarchical decomposition. This approach developed by Akita and Miyata extends the subgroup decomposition of the Theil index, described above, to a nested two-stage design (36). To describe income inequality in Indonesia, Akita and Miyata (36) used a 2008 national socioeconomic survey of about 300,000 households and focused on two known contributing factors to income inequality: location (e.g. urban and rural) and education (e.g. primary, secondary, and tertiary). In the first stage, they decomposed total income inequality into within- and between-urban and rural locations. In the second stage, for each rural and urban location they further decomposed income inequality into within- and between-education subgroups. From the first stage, they observed that within-location income inequality contributed more to total income inequality (87%) than between-location income inequality (36). Furthermore, they observed that there was more within-urban income inequality than within-rural income inequality (36). After the second stage, they observed that income inequality

within-education subgroup was greater than between-education subgroup in both urban and rural locations (36). Within-education subgroup income inequality in urban locations was 78% of total income inequality and 91% in within-education subgroup income inequality in rural locations (36). The authors concluded that there were educational differences in income inequality by location, and that the hierarchical decomposition helped to describe these spatial differences in income inequality (36). Hierarchical decomposition may be a useful approach for examining health inequality by more than one group and exploring how multiple groups may reduce within-subgroup inequality.

"Eight Americas" by Murray, Kulkarni and Ezzati (37) was an effort to explore alternative multi-characteristic groups that are less likely to have subgroup overlap than a single group. They created multi-characteristic groups to examine health inequality. Using data on population density, homicide rate, and race-specific county-level per capita income from nearly 2,100 counties, they divided the United States into eight distinct groups (37). The resulting "Eight Americas" are primarily based on race, income and geography: Asians, White low-income rural Northland, Middle America, White poor Appalachia/Mississippi Valley, Western Native Americans, Black Middle America, Black poor rural South, and Black high-risk urban (37,38). The authors calculated life tables for each group between 1982-2001 using a national mortality database (37). They observed that the difference in life expectancy between Asians and Black high-risk urban groups was 6.2 years (men) and 4.5 years (women) larger than the difference in life expectancy between blacks and whites (37). Through creating multi-characteristic groups, they were able to go beyond traditional, race-related health inequality. Using multi-characteristic groups they were able to provide a better assessment of health inequality between-subgroups. However, they did not examine health inequality within-subgroups.

2.4 Summary

Studies often measure health inequality between subgroups and rarely report inequality within subgroups. However, some studies have begun to examine

the within subgroup component of health inequality and observed that inequality is often much larger within subgroups than between subgroups. This highlights potential limitations of describing health inequalities between subgroups and the potential value added by describing health inequalities within subgroups. Furthermore, it brings into question how well health inequalities are described by common groups, such as income and education. It is also intriguing from both scientific and health policy perspectives as efforts to measure health inequality typically rely on the groups we use. This study will augment recent developments in the field of health inequality to go beyond measuring health inequality between subgroups.

CHAPTER 3   OBJECTIVES

The overarching objective of the project is to provide a richer picture of health inequalities than comparing subgroup averages. Specific objectives are: (1) to describe within- and between-subgroup health inequality by income and education separately in Canada; and (2) to explore alternative multi-characteristic groups with which to describe health inequality that are socially and policy relevant and that have smaller within-subgroup health inequality than a single typical group such as income or education.

CHAPTER 4   METHODS

4.1 Overview

This study is a secondary analysis of a nationally representative sample of adult Canadians from the 2009/2010 Canadian Community Health Survey (CCHS) (23), using the Health Utility Index (HUI) as the measure of health.

To meet the first objective, we described within- and between-subgroup health inequality by income and education separately, stratifying by sex and age. We visually described within- and between-subgroup health inequality by income and education using box-and-whisker plots. We then quantified within- and between-subgroup health inequalities using the Theil index. To meet the second objective, we first modeled HUI by socially and policy relevant demographic, socioeconomic, and geographic variables using ordinary least squares regression. Based on the model, we explored two-characteristic groups by age and sex (from hereon referred to as "multi-characteristic group"). Similar to the procedure in the first objective, we quantified within- and between-subgroup health inequalities of each alternative multi-characteristic group using the Theil index. We then compared within- and between-subgroup inequality in HUI using income, education and the alternative multi-characteristic groups. We considered an alternative multi-characteristic group as better than income and education if it had less within-subgroup (and more between-subgroup) health inequality than income and education. We used the alternative multi-characteristic group with the smallest within-subgroup health inequality for hierarchical decomposition.

4.2 Data

The study used the 2009/2010 CCHS public use microdata file (PUMF). The CCHS is a cross-sectional survey conducted annually by Statistics Canada (23). The survey collects a nationally representative sample of the Canadian population. The CCHS collects information on health status, demographics, and socioeconomic status (39). The target population of the CCHS was the general Canadian population aged 12 years and older. The CCHS uses three sampling frames including an area frame, a

telephone list frame, and a random digit-dialing frame. Excluded from these sampling frames were persons who, at the time of data collection, were full-time members of the Canadian Forces, those residing in institutions, aboriginals residing on reserves, and those living in remote areas. The CCHS uses a complex survey design, consisting of multi-staged, stratified, and cluster sampling (23). Statistics Canada provides sampling weights in order to account for unequal probabilities of selection and non-response (23). The 2009/2010 CCHS PUMF has a total sample of 124,188 individuals across 121 health regions, which include all provinces and territories in Canada (23).

The CCHS is appropriate for this study. It collects a large nationally and provincially representative sample of the Canadian population. The CCHS also collects information on socioeconomic, demographic, and health status variables for describing health inequality in a Canadian context (23). We selected the 2009/2010 CCHS because it is the most recent cycle of the CCHS that includes health status measured by the HUI, the measure of health in this study, from the entire sample. The 2009/2010 CCHS combines two years of data, for a sample size of approximately 130,000 individuals (23). This large sample size is advantageous for exploring multi-characteristic groups to assess health inequalities across age and sex strata, which is one of the objectives of this study.

For this study, we excluded individuals under 25 years of age (17.1%) so that most individuals have completed schooling, and income is post-completion of schooling. Individuals under 25 years of age are often dependent on others for financial support and/or have not yet completed their education. In addition, individuals residing in the Territories were excluded because no income information was collected in these regions in the CCHS (2.3%). Among individuals 25 years of age and older, 15.4% did not report income and were excluded from this study. Statistics Canada has recently introduced multiple imputation of missing income values in more recent CCHS datasets (40), but this approach was not implemented in the 2009/2010 CCHS PUMF. Details regarding the variables used to impute values are also not available. Individuals missing income values were systematically different from those who did report their income (Appendix B, Table

3.1). However, a sensitivity analysis with a missing income subgroup in the income group obtained similar results. Among the remaining individuals, 2.6% were missing HUI scores and were also excluded from this study (Appendix B, Table 3.2). Furthermore, individuals with an HUI score equal to or less than 0 (0.7%) were excluded because the Theil index requires positive values. Finally, we dropped missing values for each group characteristic of interest, including education (0.3%), living status (0.5%), immigrant status (0.2%), and visible minority status (0.3%). After excluding all missing values (20.6%), 81,682 of the 102,915 individuals 25 years of age and older were included in this study.

4.3 Variables

4.3.1 Measure of health
The study used the Health Utilities Index Mark 3 (HUI) as the measure of health. The HUI is a multi-attribute Canadian preference-based measure of health that describes one's ability to function through an all-attribute (total) utility score (41-43). The HUI was developed by researchers at McMaster University (43). Mark 3 is the most recent version of the HUI and is used in the 2009/2010 CCHS (23,43). The HUI incorporates many aspects of health that encompass physical, mental, and emotional health status (42,43). Specifically, the HUI collects information on eight attributes, including vision, hearing, speech, ambulation, dexterity, emotion, cognition, and pain. For each attribute there are five or six levels. For example, the attribute of pain has five levels ranging from pain free, mild to moderate, moderate, moderate to severe, to severe pain. The total utility score ranges from -0.36 to 1 (perfect health), where 0 represents death. A difference in HUI of 0.03 is considered meaningful at both the population and individual level (41,43).

The HUI is a suitable measure of health for this study. The HUI is a preference-based measure that uses societal weights in scaling health states (42,43). Through using societal preference to weight health states, we remove individual preference and use a standard preference to compare health status across

individuals. Also, the HUI offers the ability to rank individuals on health, enabling us to compare differences in health status more precisely than an ordinal measurement (e.g. five categories of health status measured by self-reported health) (43). Also, it is a sensitive measure of health and measures health on a continuum from gravely sick to full health, mapping individuals with different disease (41-43). The HUI assesses several areas of health and provides information regarding multiple aspects that contribute to heath (42,43). Furthermore, the HUI's validity and reliability in measuring health have been consistently demonstrated in the literature (41-43). Finally, the HUI is a common measure of health used in the literature of the measurement of health inequality (Appendix B, Table 1.1).

The distribution of HUI is left skewed, with the concentration of the individuals close to 1. In the 2009/2010 CCHS approximately 40% of both men and women report an HUI score of 0.973 or greater, regardless of age (Appendix B, Figure 2.1, Figure 2.2, Figure 2.3 and Figure 2.4). As outlined in Section 4.2, we dropped individuals with HUI scores of 0 or less (0.7%), a requirement of the Theil index. Removing the unhealthiest individuals biased our sample toward healthier individuals; however, the influence was likely minor because of the small proportion of individuals dropped.

4.3.2 Selection of group characteristics

For the first objective, we used income and education as the group characteristics by which to measure health inequalities. These group characteristics are commonly used to describe health inequality in the epidemiological literature (6-10,12-14,16,17).

For the second objective, to explore alternative multi-characteristic groups we considered two-characteristic groups for each age-sex stratum using combinations of demographic (immigrant status, and visible minority status), socioeconomic (income, education, and living status), and geographic (province) variables. Because we considered two-group characteristics in addition to stratifying for age and sex, we use the term multi-characteristic group. There are many variables that could be used to explore alternative groups. We considered

these variables because they are known to be associated with health (6-10,12-17,26,28-32), and are socially and policy relevant (1-5,11,18). We limited our variable selection to those that are most commonly used in Canadian health inequality literature because it would be impractical for this project to consider all variables associated with health and explore all possible combinations of group characteristics. Below we explain each of these variables briefly. Appendix B (Table 1.2) lists these variables and additional detail.

Income

Income is measured by the total household income, adjusted for household size (39). In the CCHS, the distribution of household income is categorized into deciles according to the overall percent of total household income (39). In the study's sample, 15.4% of income values were missing. We excluded individuals missing income information from analyses. There is controversy in dropping missing values (44). Statistics Canada has recently imputed missing income values in CCHS datasets, however, this was not implemented until after the 2009/2010 CCHS year (23,40). The list of variables they used to impute missing income is not available and, therefore, we could not impute missing income values. We performed a sensitivity analysis that included a missing category in the income variable and obtained similar results.

Education

Education is measured according to the highest level of education achieved by each individual (39). This is an ordinal measurement and in three categories: less than high school graduation, high school graduate, and having some or have completed post-secondary education (39). Approximately 2.7% of individuals in the sample were missing responses for the education variable. We dropped individuals with missing data for the education variable from the analysis.

Living Status

        Living status was binary: living alone and not living alone (39). Approximately 0.5% of individuals in the sample were missing responses for the living status variable. We dropped individuals with missing data for the living status variable from the analysis.

Sex

        Sex is a nominal measurement with two categories: men and women (39). As discussed earlier in Section 2.2, health among men and women differ depending on the measure of health used, and it is important to examine them separately (26,27). In this study, all analyses were stratified by sex. No individuals in the sample were missing responses for the sex variable.

Age

        Age is an ordinal measurement with three categories: 25-44 years of age, 45-64 years of age, and 65+ years of age (39). Age is highly correlated with health, part of the natural aging process. Health inequality may be different across different life stages, and in this study we stratified analyses by age. No individuals in the sample were missing responses for the age variable.

Immigrant Status

        Immigrant status is defined as a composite measure comprising of three categories: non-immigrant, immigrant with 10-years or more in country, and immigrant with less than 10-years in country. According to the literature, health inequality exists by immigrant status and, therefore, was included in the study (15). Immigrants are healthier than the native born population upon arrival to country (healthy immigrant effect), and immigrant health regresses towards the health of the native born over time (15,31,32). In the CCHS, immigrant status is binary: immigrant and non-immigrant (39). To account for the healthy immigrant effect, we divided immigrants into two groups according to duration spent in the country.

Approximately 2.3% of the sample had missing values. We dropped individuals with missing responses for the immigrant status variable from the analysis.

Visible Minority Status

Visible minority status is a nominal measurement with two categories: white and visible minority (39). According to Statistics Canada, the 2009/2010 CCHS defines visible minorities as any ethnic or racial origin that is not white. Unlike their current definition of visible minority[2], in the 2009/2010 CCHS, aboriginals are included in the visible minority category (39,46,47). Approximately 2.4% of the sample had missing values. We dropped individuals with missing responses for the visible minority status variable from the analysis.

Province

Province is a nominal measurement with 10 categories: Newfoundland, Nova Scotia, Prince Edwards Island, New Brunswick, Quebec, Ontario, Manitoba, Saskatchewan, Alberta, British Columbia (39). All individuals in the sample reported their province.

4.4 Measure of Inequality

The Theil index

The study used the Theil index to measure health inequality. Developed by Henri Theil, the Theil index is a well-established measure of inequality that is used in the economic and epidemiological literature (22,24,48). The Theil index belongs to the general entropy class of measures of inequality, and measures the deviation away from perfect equality (49). The Theil index (T) is expressed as:

---

[2] As of June 2009, Statistics Canada changed their official definition of visible minorities to include all persons non-Caucasians or non-white in colour, and excluding Aboriginal peoples (45).

$$T = \sum_i \frac{1}{N} \left(\frac{y_i}{\bar{y}}\right) ln \left(\frac{y_i}{\bar{y}}\right)$$

where N is the number of individuals in the population, y_i is the health of individual i, and $\bar{y}$ is the average health of the population (24). The Theil index ranges from 0 to $ln(N)$, where 0 is perfect equality and $ln(N)$ is most unequal.

The natural log function of the Theil index requires that all health values must be greater than 0. Values of the HUI, the measure of health used in this study, range from -0.36 to 1.00. Therefore, we excluded individuals with the HUI equal to or less than zero from the study (0.7%).

Subgroup decomposition of the Theil index

One attractive feature of the Theil index is that it is additively decomposable, meaning that total inequality equals to the sum of within- and between-subgroup inequality (24). This is an advantage over other measures of inequality, such as the Concentration Index or the Gini coefficient, which are not additively decomposable (24). The decomposition of the Theil index can be seen below:

$$T = \sum_j \frac{1}{N} \left(\frac{y_{ij}}{\bar{y}_j}\right) ln \left(\frac{y_{ij}}{\bar{y}_j}\right) \ + \ \sum_j \frac{1}{N} \left(\frac{y_{ij}}{\bar{y}_j}\right) T_j$$

$Total\ health\ inequality \ = Between\ subgroup \ + \ Within\ subgroup$

where individuals are arranged into j groups and Tj is the individual difference in health within-subgroup j (24). The within-subgroup component is weighted by the share of the jth subgroup of the total health inequality.

Subgroup decomposition of the Theil index is sensitive to the number of subgroups included in the analysis (50). Generally, a greater number of subgroups lead to greater homogeneity within-subgroups. Where appropriate we collapsed group characteristics. For example, instead of using 10 provinces, we created four subgroups that included Atlantic, Central, Prairies, and Western Canada.

Hierarchical subgroup decomposition of the Theil index

Hierarchical subgroup decomposition of the Theil index is an extension of the subgroup decomposition of the Theil index explained above to a nested multi-stage subgroup decomposition (36,51). For this study, we used a nested two-stage subgroup decomposition. In the first stage of the two-stage decomposition, we decompose total inequality by variable *x* (If we stopped here, it would be the conventional Theil decomposition.). In the second stage, we stratify individuals by variable *x* and then decompose total inequality in each strata of *x* by variable *y*. For example, *x* is education and *y* is income (e.g. if the two-variable alternative group was income-education). We would first decompose total health inequality in the population into within- and between-education subgroups. Second, we would stratify the population by education subgroups and then decompose total health inequality of each education subgroup into within- and between-income subgroups. Akita (51) notes that the order of decomposition matters. Results might differ if we decompose *x* then *y* and decompose *y* and *x*. Therefore, we conducted nested two-stage hierarchical decompositions using both orders.

4.5 Analysis

4.5.1 Analysis for the first objective
The first objective: to describe visually and quantify within- and between-subgroup health inequality by income and education, separately in Canada

First, to describe visually health inequality by group, we followed the analysis procedure used by Ferrer and Palmer (19). We visually described health inequality by income and education, separately, stratifying by sex and age, using box-and-whisker plots. Figure 4 demonstrates how Ferrer and Palmer visually described age stratified health inequality by five income subgroups (19). In Figure 4, the middle line in the box is the median health of the subgroup, whereas the box

shows the 25th (bottom) and 75th (top) percentile. The closest whisker to the box is the 10th (bottom) and 90th (top) percentile, and the outer whiskers are the most extreme values after trimming values three standard deviations away from the subgroup mean. Similar to Ferrer and Palmer, we used box-and-whisker plots, showing the minimum, maximum, median, mean, and 10th, 25th, 50th, 75th, and 90th percentile for each income or education subgroup stratifying by sex and age.

Second, using the Theil index we quantified within- and between-subgroup health inequality by income and education.

4.5.2 Analysis for the second objective

The second objective: to explore alternative multi-characteristic groups with which to describe health inequality that are socially and policy relevant and that have smaller within-subgroup health inequality than a single typical group such as income or education

First, we identified variables that were statistically and clinically significant (i.e., a difference of 0.03 or greater in HUI) in association with the HUI, adjusting for age and sex (43). Socioeconomic and demographic variables listed in section 4.3.2 were used. We then examined the effect size of each variable singly.

Second, among variables that were statistically and clinically significant, we explored combinations of two-characteristic groups (e.g., income-province). We identified two-way interactions that were statistically significant. We then examined the size of the subgroups (e.g., Atlantic-poor, Ontario-rich, etc.) to ensure that they had sufficient sample size for analysis and considered if the two-variable group is meaningful from a health policy perspective. Subgroups with five or more individuals were considered to have a sufficient size. If subgroups had an insufficient number of individuals and if the subgroups could be reduced in a way that is meaningful from a policy perspective, we contrasted and collapsed subgroups with similar health. (e.g., from 10 to 3 income subgroups and from 10 provinces to 4 regions). This procedure was repeated for each two-characteristic group independently for each age-sex stratum.

There is no consensus on how to model the distribution of HUI. It is difficult to model HUI because it is left skewed with the majority of populations reporting close to perfect health (HUI=1). There have been numerous approaches to model the distribution of HUI including, ordinary least squares (OLS), two-part models, latent class models, censored least absolute deviations (CLAD), and Tobit (52,53). It is unclear if any of the approaches listed above are superior for modeling the distribution of HUI. In this study, following previous studies (6,8,16), we modeled HUI using OLS for its ease of interpreting clinical significance.

Third, we examined within- and between-subgroup inequality in the HUI using candidates of multi-characteristic groups determined by the process above. We followed a similar procedure as outlined in the analysis for the first objective for quantifying health inequality. Using the Theil index subgroup decomposition, we compared the relative contributions of within- and between-subgroup health inequality using income, education, and these candidates. The second and third steps to meet the second objective were iterative.

Fourth, we selected the alternative multi-characteristic group with the smallest within-subgroup inequality to visually describe inequality between-subgroups. We plotted the average HUI for each subgroup of group 1 by each subgroup of group 2, and then in reverse order. For example, if income-education was the alternative group selected we would plot the average HUI for the ten income subgroups for each of the three education subgroups (e.g. less than high school, high school graduate, and some or completed post secondary education), and then, in a separate graph, we would plot the average HUI for the three education subgroups for each of the ten income subgroups.

Fifth, using the alternative multi-characteristic group with the smallest within-subgroup health inequality, we conducted hierarchical decomposition using the Theil index. We ran a nested two-stage hierarchical decomposition twice. In the first stage we decomposed by group 1. In the second stage we decomposed group 2 in each subgroup of group 1. Then we repeated the procedure in the reverse order.

Survey weights were used for all analyses to account for unequal probability of selection and non-responses. Standard errors estimated for all analyses did not

account for a complex survey design of the CCHS because the information required for bootstrapping, a recommended method by Statistics Canada (23), is not available in the CCHS PUMF. Our standard errors are likely under-estimated. We considered $p < 0.05$ as statistically significant. With this p-value, we had a large pool of variables that were associated with HUI, which led to a large pool of candidates for an alternative two-characteristic group to be explored in each age-sex stratum. We used Stata 13 (54) for all analyses.

4.6 Ethics

According to Article 2.2 of the Tri-Council Policy Statement (55), research conducting secondary data analysis using publically accessible data is exempt from research ethics board review so long as no data linkage is performed. Ethical approval was not required for this thesis.

There are three microdata files created by the Statistics Canada: master file, share file, and PUMF. The 2009/2010 CCHS PUMF is the only publically available version of the dataset. The PUMF is derived from the master file to ensure a low risk of individual identification (23). If variables are deemed more likely to compromise individual confidentiality they are deleted or collapsed into broader categories in the PUMF. The PUMF is further reviewed by an executive committee at Statistics Canada to ensure that the file meets the confidentiality and security guidelines outlined in the Statistics Act.

CHAPTER 5   RESULTS

5.1 Sample characteristics

Average HUI depends on age, sex, and other characteristics examined in expected directions. Table 1 and Table 2 provide a description of the socioeconomic, demographic, and health characteristics of the sample by age group among men and women, respectively. In all age strata, average HUI was higher in higher income subgroups and higher education subgroups. Average HUI was lower for older age groups. The association between HUI and income was strongest in the middle age group compared to younger and older age groups. The sample was more concentrated on lower income subgroups than higher income subgroup for women, and the opposite was true for men. Generally, both men and women from Nova Scotia had lower HUI scores and individuals from Quebec had higher HUI scores, regardless age group. With these differences, it was very important to stratify the rest of the analyses by both age and sex.

Differences in health inequalities by sex were observed only where noted below.

5.2 Between- and within-subgroup health inequality by income and education

As expected, examining health inequalities both within and between subgroups provided more information on health inequality than focusing on between-subgroup inequalities alone. Results were similar regardless of how we combined subgroups of income; therefore, we only reported results for income deciles below.

There was larger health inequality within income subgroups than between subgroups. This was the case regardless of age-sex groups. Figure 5 shows the typical approach, observing between-subgroup inequalities (see Figure 6 for education). We observed a familiar gradient in the average HUI from the lowest to the highest income subgroups. By using box-and-whisker plots (means indicated by

"x"), Figure 7 adds information on within-subgroup inequality to the subgroup (see Figure 8 for education). First, we observed in Figure 7 that, the majority of inequality was observable within income- groups. Between-subgroup inequalities were small compared to within-subgroup inequalities. Second, the degree of within-subgroup inequality varied by income subgroup. Compared to lower income deciles, higher income deciles had smaller interquartile ranges and the 10th percentiles extended to a smaller range of HUI. Third, there were healthy individuals in every income decile and there were more unhealthy individuals in lower deciles. The 90th percentile of all income deciles reached the maximum HUI value (HUI = 1), however, lower deciles had lower means because of a greater number of individuals with low HUI. (See Appendix B, Figure 4.1 and 5.1 for unweighted estimates.)

Health inequality within income subgroups generally increased for older age groups compared to younger age groups. Figure 9 and 10 show box-and-whisker plots of income deciles across age groups, for men and women, respectively (see Figure 11 and Figure 12 for education in men and women, respectively). It was evident, by both the lengthening interquartile range and 10th percentile, that there was more within-subgroup health inequality as age increased. Health inequality within income subgroups greatly overlapped across subgroups for women in the oldest age group, whereas this observation was less pronounced for men in the oldest age group.

In all age and sex strata, most health inequality was observed within income subgroups. Table 3 shows the degree of total inequality and relative contribution of between- and within-subgroup inequality, by income and education, in each sex-age stratum, measured by the Theil index. The column titled *value* is the degree of total health inequality within each age-sex stratum measured by the Theil index. Within- and between-subgroup inequality is given by the percent relative contribution of the total health inequality. It was evident that the within subgroup contribution is consistently large across all age-sex strata (>95%). (See Appendix B, Table 6.1 for Theil decompositions of income and education using different number of subgroups.)

5.3 Health inequality by alternative multi-characteristic group

As an alternative method of describing inequality, we considered six variables: income, education, province, living status, immigrant status and visible minority status. Among these variables, we selected those that had statistically and clinically significant effects on health status in age-sex-adjusted HUI regression models. Of these variables, visible minority status was not statistically significantly associated with HUI (p>0.05), therefore, we excluded it from further analyses. From the remaining five variables, six two-variable alternative groups were selected to test for statistically and clinically significant interactions in each age-sex strata. The groups that were selected are income-education, income-province, income-living status, education-province, immigrant status-living status, and immigrant status-education. These combinations of variables were selected after confirming that they had sufficient sample size in subgroups and that they are of relevance according to health policy literature. The number of subgroups used in each group characteristic did not influence Theil decomposition results of alternative multi-characteristic groups. For this reason, we focused on only one set of subgroups for each variable in all analyses.

For each alternative multi-characteristic group examined, health inequality was much greater within-subgroups than between-subgroups. Table 4 shows total health inequality decomposed into within- and between-subgroup by each of the six alternative groups for each sex and age stratum. Reading from left to right, Table 4 shows the two-characteristic groups and, in brackets, the number of subgroups for each variable (e.g., *Income (10)* refers to income by decile). The second column from the left titled *number of subgroups* indicates how many subgroups were created when the two variables are combined to form the alternative group. Theil decompositions were not conducted on any alternative multi-characteristic group designated "NA" with or without asterisks. An alternative multi-characteristic group designated with NA and asterisks indicate that one or both variables are not significantly associated with HUI in the regression. Variables in an alternative multi-characteristic group with non-significant interactions in the regression on HUI were

designated NA without an asterisk. The contribution of within-subgroup health inequality is above 93% of total health inequality in any alternative groups. (See Appendix B, Table 6.2 for the same two-variable alternative groups but with fewer subgroups.)

Alternative groups that included the variable income had less within-subgroup health inequality than income and education alone, but the difference was marginal. As discussed above in Table 3, within-subgroup health inequality by income contributed to greater than 95% of total health inequality, depending on the age-sex strata. In contrast, it was evident that all alternative groups that included the variable income in Table 4 had within-subgroup health that inequality contributed to 93-97% of total health inequality. The alternative group that consisted of income-province was the only alternative group with variables that significantly interact in regressions on HUI in every age and sex strata ($p<0.05$). It was also the group that has the smallest within-subgroup health inequality of any group examined in every age and sex strata. At best, in the middle age group for males and females, it reduced the contribution of within subgroup health inequality to 93% of total health inequality.

5.4 Health inequality by income-province

As discussed, income-province has the smallest within-subgroup health inequality of the two-variable alternative groups explored. Examination of health inequality by income-province and by province-income visually and through the Theil hierarchical decomposition yielded similar results. Below we thus focus on the results for income-province.

5.4.1 Between-subgroup health inequality by income-province

In every province health inequalities existed between-income subgroups, however, inequalities in some provinces were much greater than others. Figure 13 and 14 show the mean HUI of income subgroups by province, stratified by age group, in men and women, respectively. Points along each connected line indicate

the mean HUI of each income subgroup within a province. Lower mean HUI typically represents health in lower income subgroups. By observing the mean health of income subgroups, it was evident that income-related health inequality existed in every province, but some provinces had less inequality than others. For men, Quebec and Ontario appeared to have smaller income-related health inequality compared to other provinces, while Manitoba and New Brunswick had larger income-related health inequality. In Figure 14, however, women had similar income-related health inequality within every provinces, with two exceptions: middle age women in Quebec and British Columbia both had noticeably smaller income-related health inequality compared to women in other provinces and age groups. For both sexes, the greatest income-related health inequality was observed in the middle age group. (See Appendix B, Figure 9.1 and Figure 9.2 for between-subgroup health inequality by province-income in men and women, respectively.)

5.4.2 Stage-one: Theil decomposition by province

As expected, the contribution of within-province inequality to total health inequality was much larger than the between-province contribution. Table 5 shows the Theil decompositions by province, age and sex. The column titled *value* is the degree of total, within, and between subgroup health inequality, in each age-sex stratum measured by the Theil index. Within- and between-province inequality is also given by the percent relative contribution of the total health inequality. Health inequality within-province explained nearly all health inequality (about 99%). (See Appendix B Table 10.1 for stage-one Theil index decomposition by income for the hierarchical decomposition of the province-income group.)

5.4.3 Stage-two: Theil decomposition by income within each province

Examining between- and within-income subgroup health inequality in each province provided a more comprehensive picture of inequalities than by income or education, alone. Table 6 reports the Theil index decomposition results, how much of total inequality observed in each province comes from both within- and between-income subgroups, stratified by sex and age (see Table 7 for Theil index

decomposition results of how much total inequality observed in each income-subgroup from both within- and between-province, stratified by sex and age). In every province it was evident that there was much more within-income subgroup health inequality than between-income subgroup inequality. For middle age men, the smallest within-income subgroup contribution was in Manitoba (84%) and New Brunswick (85%), while for middle age women inequality was smallest in Prince Edward Island (87%). In these provinces, the contributions of within-income subgroups to total health inequality were marginally smaller than the contribution of within-subgroup health inequality by income and education alone (95-99% and about 99%, respectively). (See Appendix B, Tables 7.1-7.6 for Theil decomposition results of health inequality within- and between income subgroups by province and each age-sex stratum.) (See Appendix B, Tables 8.1-8.6 for Theil decomposition results of health inequality within- and between provinces by income subgroup and each age-sex stratum.)

CHAPTER 6   DISCUSSION

The purpose of this study was to provide a more comprehensive description of health inequality than simply comparing subgroup averages. This project complements existing health inequality literature by describing within- and between-subgroup inequalities both visually and quantitatively. We observed that health inequality was much larger within subgroups than between subgroups, regardless of the group examined. Also, we were unable to create an alternative group that had substantially less within-subgroup health inequality than income or education alone. Using hierarchical decomposition with the best alternative group (income-province), we could marginally reduce within-subgroup health inequality compared to income or education.

This study supports findings of previous studies reporting larger health inequalities within subgroups than between subgroups (19-22). Using commonly used group characteristics such as income and education, we observed, visually and quantitatively, that health inequalities were much greater within-subgroups than between-groups. Our results were supported by the visual observations reported in Ferrer and Palmer (19), concluding that health inequalities overlap across income subgroups, regardless of age. Our results were also similar to another study by Wagstaff and van Doorslaer using Canadian data, the 1994 National Population Health Survey (20). They quantified health inequality by income and found that about 25% of inequality is between income subgroups (20). Comparably, our study suggests that between-subgroup health inequality may account for as much as 5% of total health inequality. Methodological differences may account for some discrepancies in these results (24). For example, Wagstaff and van Doorslaer conducted subgroup decomposition using the Concentration index (20), whereas our study used Theil index subgroup decomposition. The Concentration index decomposes inequality into within-, between- and overlapping-inequality, and the Theil index decomposes inequality within- and between-subgroup inequality (20,24). Even if we used the same dataset, these two decomposition methods could

provide different results. Attempts to reduce within-subgroup health inequality, compared to income and education alone, yielded similar results, including creating alternative multi-characteristic groups and hierarchical decomposition.

We obtained a richer picture of health inequalities by observing inequalities both within and between subgroups. We gained three insights by describing health inequalities within-subgroups. First, as we have discussed previously, we observed more health inequality within subgroups than between subgroups. Second, we observed that the magnitude of within-subgroup health inequality varies across subgroups. For example, within-subgroup inequality is wider in lower income subgroups than in higher income subgroups. This is important because many different distributions can have the same average health, which would not be observed if we only described health inequality between subgroups. Third, we observed that commonly used group characteristics, such as income and education, do not clearly isolate the distribution of health between subgroups. There is considerable overlap across income and education subgroups, and there are healthy and unhealthy individuals within every subgroup. It is evident in this study that by simply comparing averages and excluding within-subgroup health inequalities, we overlook some important information regarding health inequality.

While we were not successful in accounting for between-subgroup health inequality using multi-characteristic groups compared to common single characteristic groups, the information on the contribution of between-subgroup inequality to total inequality is still meaningful for health policy. For both multi- and single characteristic groups, we observed that between-subgroup health inequality accounts for approximately 5% of total health inequality. Despite this low relative contribution, reducing it would still greatly impact population health (10). However, our study suggests that regardless of the group characteristic used, the majority of inequality is within subgroups (about 95%) and to focus on reducing between-subgroup health inequality may not yield an intended result of reducing health inequality overall. Health policy makers may find our results useful when considering effective strategies and interventions to reduce health inequalities.

Despite difficulties in creating an alternative multi-characteristic group with less within-subgroup inequality than income and education, future health inequality research should continue to pursue describing inequality by group. In principle, by using more apt groups we can isolate healthy individuals from unhealthy individuals. This reduces within-subgroup health inequalities so that subgroup averages can be compared more meaningfully than by conventional groups. However, as we previously mentioned, we were generally unsuccessful at creating such alternative multi-characteristic groups with less within subgroup health inequality than income and education. Although, when we conducted hierarchical decomposition we found that we could marginally reduce health inequality within-subgroups in some strata. For example, men in Manitoba and New Brunswick have smaller health inequality within income subgroups (approximately 85%) in the middle age group compared to other provinces such as Ontario (approximately 95%). Creating alternative multi-characteristic groups using two-variable combinations for each age-sex stratum and using hierarchical decomposition were merely two ways to attempt to reduce health inequality within-subgroups. Although this project was unsuccessful at reducing within-subgroup health inequality compared to conventional groups, it does not mean that the pursuit of alternative groups with multiple group characteristics should be overlooked in future research.

This study has two primary strengths. First, the study used a large and nationally representative sample of Canadians to both visually and quantitatively describe health inequalities (23), applying well-validated measures of health (HUI) (41-43) and inequality (Theil index) (24). Second, the study used a hierarchical decomposition approach to further examine health inequality by using a combination of income and province group characteristics. Using this method we were able to observe provincial differences in health inequality by income. For some province we were able to marginally reduce within-income subgroup inequality compared to traditional single-stage decomposition.

The findings of the study should be viewed in context of its limitations. First, the Theil index has three caveats. The Theil index subgroup decomposition is sensitive to how individuals are categorized into subgroups (50). There are many

ways to group individuals when describing health inequalities and different strategies to group individuals will provide a different perspective of inequalities. The number of group characteristics and how individuals are grouped will affect homogeneity within subgroups and, therefore, may have influenced our results. Next, different inequality measures can result in different degrees of inequality (24). This means that our results may be different if we used another measure of inequality. Therefore, our results should be cautiously compared to other studies that use different measures of inequality. Lastly, because the Theil index requires positive values, those with negative HUI scores were dropped from this study. This biases our results by sampling from healthier participants. However, we expect that since less than 1% of the sample had HUI scores of 0 or less, it is unlikely that it would influence our conclusions.

Second, the study dropped a large number of individuals with no income information (about 15%). Those with no income information were systematically different than those who had reported their income in terms of demographic, socioeconomic, and health characteristics, for example, individuals missing income were less healthy than individuals who reported income. Therefore, our estimates of the degree of total inequality were likely underestimated, and our estimates of inequality between-subgroups were also likely underestimated. We performed a sensitivity analysis by including a missing income subgroup in the income group characteristic and we observed similar results to those reported in this study. Thus, we believe that if we included individuals with missing income our main findings would remain relatively unchanged. There are other approaches to managing missing data, such as multiple imputation. Imputation of missing income values would be a better approach, however, Statistics Canada has only recently started to impute missing income values for CCHS datasets and this was not until after 2009/2010 CCHS (40). Also, the variables Statistics Canada used in their imputations were not available for us to follow their procedure to impute values ourselves. We made a decision that imputing missing income was beyond the scope of this thesis.

Third, standard errors used in this study did not account for the complex survey design of the CCHS. Statistics Canada suggests bootstrapping for accurate standard errors, however, this information was not available in the CCHS PUMF (23). Our standard errors, without accounting for the complex survey design, are likely under-estimated. Using a lower p-value as a cut-off point for statistical significance was an option, however, for the purpose of exploring as many alternative multi-characteristic groups as possible, we decided to use a lenient, conventional, p<0.05.

Fourth, the study did not investigate alternative groups consisting of more than two-variables in each age-sex stratum. There are many ways to group individuals for describing health inequalities, and this will influence what is observed (50). Through increasing the number of variables included in multi-characteristic groups, this study may have further reduced within-subgroup inequalities. However, this should be approached with caution because as the complexity of the alternative group increases, it may become challenging from a policy perspective to utilize information from less intuitive but empirically better groups. Also, it is unclear how many variables should be included in creating multi-characteristic groups. Ultimately, if we created alternative groups using all available group characteristics in the data, we are creating subgroups with one individual in each subgroup and no within-subgroup inequality. While it makes sense empirically to reduce within-subgroup health inequality as much as possible, this would not make sense practically and for policy. Furthermore, there is a near infinite number of ways to group individuals. Examining inequalities according to all possible permutations was impractical for this project. Future research should consider these limitations when exploring alternative groups by which to measure health inequality.

CHAPTER 7   CONCLUSION

The primary conclusion of this thesis is that to understand health inequality we need to describe it using both within- and between-subgroups. The study offered the following observations. First, within-subgroup inequalities contribute much more to total health inequality than between-subgroup inequalities, regardless of the group characteristic across both sexes and age groups. Second, alternative two-characteristic groups can reduce within-subgroup health inequality compared to income and education, however, this was only observed for income-province, and the reduction was marginal. Third, hierarchical decomposition offered additional perspectives on health inequality by group. Through using hierarchical decomposition we observed provincial differences in health inequalities by income. These observations may be useful to future research investigating health inequities.

APPENDIX A: TABLES AND FIGURES

TABLES

Table 1. Socioeconomic, demographic, and health characteristics of men, stratified by age.

Characteristic	All Ages		25-44yrs		45-64yrs		65+yrs	
	N (%)	Mean HUI*	N (%)	Mean HUI*	N (%)	Mean HUI*	N (%)	Mean HUI*
Total	36 914 (100)	0.885	12 633 (34.2)	0.912	14 789 (40.1)	0.880	9492 (25.7)	0.828
Income								
Decile 1 (poorest)	2783 (7.5)	0.799	837 (6.6)	0.847	1249 (8.5)	0.753	697 (7.3)	0.782
Decile 2	3385 (9.2)	0.842	857 (6.8)	0.888	849 (5.7)	0.831	1679 (17.7)	0.802
Decile 3	3584 (9.7)	0.860	1010 (8.0)	0.903	977 (6.6)	0.858	1597 (16.8)	0.803
Decile 4	3386 (9.2)	0.879	1091 (8.6)	0.909	1116 (7.6)	0.877	1179 (12.4)	0.819
Decile 5	3550 (9.6)	0.884	1242 (9.8)	0.903	1349 (9.1)	0.876	959 (10.1)	0.853
Decile 6	3936 (10.7)	0.894	1441 (11.4)	0.917	1506 (10.2)	0.893	989 (10.4)	0.832
Decile 7	3887 (10.5)	0.897	1471 (11.6)	0.910	1664 (11.3)	0.895	752 (7.9)	0.857
Decile 8	3779 (10.2)	0.907	1493 (11.8)	0.936	1695 (11.5)	0.891	591 (6.2)	0.869
Decile 9	3974 (10.8)	0.912	1632 (12.9)	0.925	1851 (12.5)	0.908	491 (5.2)	0.856
Decile 10 (richest)	4650 (12.60)	0.927	1559 (12.3)	0.951	2533 (17.1)	0.923	558 (5.9)	0.872
Education								
Less than High School	6862 (18.6)	0.821	1014 (8.0)	0.843	2506 (17.0)	0.831	3342 (35.2)	0.795
High School Graduation	5607 (15.2)	0.889	2008 (15.9)	0.906	2430 (16.4)	0.883	1169 (12.3)	0.856
Some or Completed Post Secondary	24 445 (66.2)	0.896	9611 (76.1)	0.920	9853 (66.6)	0.888	4981 (52.5)	0.840
Living Status								
Living alone	10 554 (28.59)	0.856	2861 (22.7)	0.890	4654 (31.5)	0.841	3039 (32.0)	0.817
Not living alone	26 360 (71.4)	0.890	9772 (77.4)	0.916	10 135 (68.5)	0.887	6453 (68.0)	0.831
Immigrant Status								
Non-immigrant	31 209 (84.6)	0.882	10 779 (85.3)	0.910	12 779 (86.4)	0.874	7651 (80.6)	0.826
Immigrant (<10 years)	1017 (2.8)	0.930	816 (6.5)	0.932	174 (1.2)	0.930	27 (0.3)	0.892
Immigrant (=>10 years)	4688 (12.7)	0.884	1038 (8.2)	0.909	1836 (12.4)	0.895	1814 (19.1)	0.832
Visible Minority Status								
White	32 996 (89.4)	0.882	10 632 (84.2)	0.912	13 424 (90.8)	0.878	8940 (94.2)	0.827
Visible minority	3918 (10.6)	0.897	2001 (15.8)	0.912	1365 (9.2)	0.889	552 (5.8)	0.843
Province								
NFLD	1189 (3.2)	0.872	399 (3.2)	0.908	473 (3.2)	0.856	317 (3.3)	0.839
PEI	549 (1.5)	0.871	165 (1.3)	0.907	221 (1.5)	0.864	163 (1.7)	0.811
NS	1486 (4.0)	0.855	440 (3.5)	0.895	636 (4.3)	0.848	410 (4.3)	0.789
NB	1454 (3.9)	0.863	434 (3.4)	0.910	652 (4.4)	0.853	368 (3.9)	0.793
QC	7273 (19.7)	0.901	2470 (19.6)	0.916	3023 (20.4)	0.901	1780 (18.8)	0.864
ONT	12 618 (34.2)	0.879	4353 (34.5)	0.911	4893 (33.1)	0.869	3372 (35.5)	0.822
MB	2051 (5.6)	0.874	703 (5.6)	0.901	831 (5.6)	0.873	517 (5.5)	0.807
SK	2236 (6.1)	0.874	731 (5.8)	0.921	877 (5.9)	0.860	628 (6.6)	0.795
AB	3514 (9.5)	0.890	1509 (11.9)	0.916	1303 (8.8)	0.884	702 (7.4)	0.805
BC	4544 (12.3)	0.885	1429 (11.3)	0.907	1880 (12.7)	0.891	1235 (13.0)	0.819

* Mean HUI is weighted using sample weights provided in the CCHS 2009/10

Table 2. Socioeconomic, demographic, and health characteristics of women, stratified by age.

Characteristic		All Ages		25-44yrs		45-64yrs		65+yrs	
		N (%)	Mean HUI*	N (%)	Mean HUI*	N (%)	Mean HUI*	N (%)	Mean HUI*
Total		44 325 (100)	0.871	14 718 (33.2)	0.911	17 091 (38.6)	0.862	12 516 (28.2)	0.798
Income									
	Decile 1 (poorest)	5093 (11.5)	0.783	1514 (10.3)	0.839	1632 (9.6)	0.736	1947 (15.6)	0.748
	Decile 2	5916 (13.4)	0.817	1334 (9.1)	0.875	1378 (8.1)	0.793	3204 (25.6)	0.778
	Decile 3	4974 (11.2)	0.855	1288 (8.8)	0.905	1507 (8.8)	0.848	2179 (17.4)	0.799
	Decile 4	4302 (9.7)	0.869	1344 (9.1)	0.906	1573 (9.2)	0.859	1385 (11.1)	0.817
	Decile 5	4317 (9.7)	0.884	1512 (10.3)	0.927	1702 (10.0)	0.862	1103 (8.8)	0.822
	Decile 6	4264 (9.6)	0.890	1537 (10.4)	0.920	1776 (10.4)	0.879	951 (7.6)	0.830
	Decile 7	4141 (9.3)	0.898	1630 (11.1)	0.928	1818 (10.6)	0.891	693 (5.5)	0.811
	Decile 8	3724 (8.4)	0.905	1521 (10.3)	0.938	1753 (10.3)	0.889	450 (3.6)	0.835
	Decile 9	3786 (8.5)	0.911	1643 (11.2)	0.937	1819 (10.6)	0.899	324 (2.6)	0.828
	Decile 10 (richest)	3808 (8.6)	0.918	1395 (9.5)	0.947	2133 (12.5)	0.908	280 (2.2)	0.847
Education									
	Less than High School	8004 (18.1)	0.793	744 (5.1)	0.854	2449 (14.3)	0.806	4811 (38.4)	0.763
	High School Graduation	7325 (16.5)	0.859	1852 (12.6)	0.892	3363 (19.7)	0.854	2110 (16.9)	0.818
	Some or Completed Post Secondary	28 996 (65.4)	0.889	12 122 (82.4)	0.918	11 279 (66.0)	0.875	5595 (44.7)	0.818
Living Status									
	Living alone	15 279 (34.5)	0.827	2182 (14.8)	0.889	5682 (33.3)	0.826	7415 (59.2)	0.792
	Not living alone	29 046 (65.5)	0.881	12 536 (85.2)	0.914	11 409 (66.8)	0.870	5101 (40.8)	0.802
Immigrant Status									
	Non-immigrant	37 621 (84.9)	0.873	12 462 (84.7)	0.910	14 878 (87.1)	0.863	10 281 (82.1)	0.808
	Immigrant (<10 years)	1228 (2.8)	0.900	1042 (7.1)	0.918	152 (0.9)	0.832	34 (0.3)	0.761
	Immigrant (=>10 years)	5476 (12.4)	0.854	1214 (8.3)	0.909	2061 (12.1)	0.864	2201 (17.6)	0.771
Visible Minority Status									
	White	39 660 (89.5)	0.871	12 183 (82.8)	0.915	15 617 (91.4)	0.865	11 860 (94.8)	0.801
	Visible minority	4665 (10.5)	0.872	2535 (17.2)	0.901	1474 (8.6)	0.851	656 (5.2)	0.771
Province									
	NFLD	1492 (3.4)	0.855	494 (3.4)	0.920	607 (3.6)	0.820	391 (3.1)	0.796
	PEI	772 (1.7)	0.877	239 (1.6)	0.919	290 (1.7)	0.882	243 (1.9)	0.775
	NS	1801 (4.1)	0.851	536 (3.6)	0.896	731 (4.3)	0.841	534 (4.3)	0.778
	NB	1938 (4.4)	0.859	599 (4.1)	0.903	797 (4.7)	0.845	542 (4.3)	0.805
	QC	8664 (19.6)	0.890	2772 (18.8)	0.923	3509 (20.5)	0.888	2383 (19.0)	0.827
	ONT	15 458 (34.9)	0.861	5051 (34.3)	0.908	5835 (34.1)	0.851	4572 (36.5)	0.776
	MB	2435 (5.5)	0.856	805 (5.5)	0.913	903 (5.3)	0.820	727 (5.8)	0.808
	SK	2543 (5.7)	0.867	865 (5.9)	0.906	908 (5.3)	0.862	770 (6.2)	0.799
	AB	3961 (8.9)	0.871	1650 (11.2)	0.900	1394 (8.2)	0.864	917 (7.3)	0.794
	BC	5261 (11.9)	0.877	1707 (11.6)	0.912	2117 (12.4)	0.872	1437 (11.5)	0.810

* Mean HUI is weighted using sample weights provided in the CCHS 2009/10

Table 3. Theil decomposition of health inequality within- and between-subgroups by income and education, stratified by age and sex.

Group (Number of subgroups)	Number of Subgroups	25 - 44 yrs			45 - 64 yrs			65+ yrs		
		Value*	Within- subgroup % contribution ^	Between-subgroup % contribution ^	Value*	Within- subgroup % contribution ^	Between-subgroup % contribution ^	Value*	Within- subgroup % contribution ^	Between-subgroup % contribution ^
Men										
Income (10)	10	0.018	97.9	2.1	0.026	95.4	4.6	0.043	97.1	2.9
Education	3	0.018	98.6	1.4	0.026	99.1	0.9	0.043	99.1	0.9
Women										
Income (10)	10	0.017	96.4	3.6	0.032	94.9	5.1	0.056	98.9	1.1
Education	3	0.017	99.1	0.9	0.032	98.9	1.1	0.056	99.0	1.0

* Theil index value where 0 indicates that participants have equal HUI scores and 1 incidates completely inequal HUI scores.

^ The percent-relative contribution of the Theil indecies value attributed to within- and between-subgroups. A higher percentage indicates greater contribution to health inequality.

All analyses were weighted using sample weights provided in the CCHS 2009/10

Table 4. Theil decomposition of health inequality within- and between-subgroups by alternative multi-characteristic group, stratified by age and sex.

		25 - 44 yrs			45 - 64 yrs			65+ yrs		
Group (number of subgroups)	Number of subgroups	Value ~	Within- subgroup % contribution ^	Between-subgroup % contribution ^	Value ~	Within- subgroup % contribution ^	Between-subgroup % contribution ^	Value ~	Within- subgroup % contribution ^	Between-subgroup % contribution ^
Men										
Income (10) + Education	30	NA	NA	NA	NA	NA	NA	NA	NA	NA
Income (10) + Province (10)	100	**0.018**	**96.4**	**3.6**	**0.026**	**93.4**	**6.6**	**0.043**	**96.8**	**3.2**
Income (10) + Living Status	20	**0.018**	**97.2**	**2.8**	**0.026**	**94.8**	**5.2**	NA*	NA*	NA*
Education + Province (10)	30	NA	NA	NA	**0.026**	**98.2**	**1.8**	NA	NA	NA
Immigrant Status + Living Status	6	NA	NA	NA	NA	NA	NA	NA**	NA**	NA**
Immigrant Status + Education	9	NA	NA	NA	NA	NA	NA	NA***	NA***	NA***
Women										
Income (10) + Education	30	NA	NA	NA	NA	NA	NA	NA	NA	NA
Income (10) + Province (10)	100	**0.017**	**95.5**	**4.5**	**0.032**	**92.8**	**7.2**	**0.056**	**97.4**	**2.6**
Income (10) + Living Status	20	**0.017**	**95.8**	**4.2**	**0.032**	**94.3**	**5.7**	NA*	NA*	NA*
Education + Province (10)	30	**0.017**	**98.6**	**1.4**	NA	NA	NA	NA	NA	NA
Immigrant Status + Living Status	6	NA***	NA***	NA***	NA***	NA***	NA***	NA**	NA**	NA**
Immigrant Status + Education	9	NA***	NA***	NA***	NA***	NA***	NA***	NA***	NA***	NA***

~   Theil index value where 0 indicates that participants have equal HUI scores and 1 incidates completely inequal HUI scores.

^   The percent-relative contribution of the Theil indecies value attributed to within- and between-subgroups. A higher percentage indicates greater contribution to health inequality.

NA Interaction was not significant (p>0.05)

NA* Living status was not significantly related to HUI in unadjusted linear regression model.

NA** Immigrant status and living status was not sigificantly related to HUI in unadjusted linear regression model.

NA*** Immigrant status was not sigificantly related to HUI in unadjusted linear regression model.

All analyses were weighted using sample weights provided in the CCHS 2009/10

The column identifying the two-characteristics groups shows numbers in brackets. This refers to the number of subgroups belonging to one group characteristic. For example, Income (10) + Education has 10 income subgroups.

The column titled "number of subgroups" refers to the resulting number of subgroups afte combining two-characteristic groups. For example, Income (10)+ Education has 30 subgroups.

Table 5. Theil decomposition of health inequality within- and between province, stratified by age and sex.

	Theil Decomposition	Province	
		Value~	Contribution (%)^
Men			
25 - 44			
	Within-subgroup	0.0177	99.9
	Between-subgroup	<0.0001	0.1
	Total	0.0177	100
45 - 64			
	Within-subgroup	0.0262	99.4
	Between-subgroup	0.0002	0.6
	Total	0.0264	100
65+			
	Within-subgroup	0.0422	99.1
	Between-subgroup	0.0004	0.9
	Total	0.0426	100
Women			
25 - 44			
	Within-subgroup	0.0170	99.8
	Between-subgroup	<0.0001	0.2
	Total	0.0170	100
45 - 64			
	Within-subgroup	0.0314	99.2
	Between-subgroup	0.0002	0.8
	Total	0.0316	100
65+			
	Within-subgroup	0.0556	99.4
	Between-subgroup	0.0003	0.6
	Total	0.0559	100

~ Theil index value where 0 indicates that participants have equal HUI scores and 1 incidate completely inequal HUI scores.

^ The percent-relative contribution of the Theil indecies value attributed to within- and between-subgroups.

A higher percentage indicates greater contribution to health inequality

All analyses were weighted using sample weights provided in the CCHS 2009/10

Table 6. Theil decompositions of health inequality by income within each province, stratified by age and sex.

Age (yrs)	Theil Decomposition	NFLD Value ~	NFLD Contribution (%)^	PEI Value ~	PEI Contribution (%)^	NS Value ~	NS Contribution (%)^	NB Value ~	NB Contribution (%)^	QC Value ~	QC Contribution (%)^	ONT Value ~	ONT Contribution (%)^	MB Value ~	MB Contribution (%)^	SK Value ~	SK Contribution (%)^	AB Value ~	AB Contribution (%)^	BC Value ~	BC Contribution (%)^
Men																					
25 - 44																					
	Within-subgroup	0.0183	94.8	0.0145	96.9	0.0231	93.9	0.0172	91.3	0.0165	98.2	0.0175	96.0	0.0182	90.1	0.0131	90.7	0.0138	98.4	0.0195	98.1
	Between-subgroup	0.0010	5.2	0.0005	3.1	0.0015	6.1	0.0017	8.7	0.0003	1.8	0.0007	4.0	0.0020	9.9	0.0014	9.3	0.0002	1.6	0.0004	1.9
	Total	0.0193	100	0.0150	100	0.0246	100	0.0189	100	0.0168	100	0.0182	100	0.0202	100	0.0145	100	0.0140	100	0.0199	100
45 - 64																					
	Within-subgroup	0.0305	90.1	0.0272	93.9	0.0351	88.5	0.0306	85.1	0.0153	97.1	0.0316	95.8	0.0210	84.2	0.0252	94.3	0.0263	95.3	0.0190	88.6
	Between-subgroup	0.0033	9.9	0.0018	6.1	0.0046	11.5	0.0054	14.9	0.0005	2.9	0.0014	4.2	0.0039	15.8	0.0015	5.7	0.0015	4.7	0.0024	11.4
	Total	0.0338	100	0.0290	100	0.0397	100	0.0360	100	0.0158	100	0.0330	100	0.0249	100	0.0267	100	0.0278	100	0.0214	100
65+																					
	Within-subgroup	0.0401	94.4	0.0501	91.9	0.0572	97.2	0.0558	93.5	0.0293	98.8	0.0448	99.0	0.0494	92.8	0.0496	94.2	0.0479	95.9	0.0406	97.9
	Between-subgroup	0.0024	5.6	0.0044	8.1	0.0017	2.8	0.0039	6.5	0.0004	1.2	0.0004	1.0	0.0038	7.2	0.0031	5.8	0.0020	4.1	0.0009	2.1
	Total	0.0425	100	0.0545	100	0.0589	100	0.0597	100	0.0297	100	0.0452	100	0.0532	100	0.0527	100	0.0499	100	0.0415	100
Women																					
25 - 44																					
	Within-subgroup	0.0170	97.0	0.0165	97.7	0.0233	92.7	0.0159	93.7	0.0111	96.1	0.0171	94.8	0.0160	98.2	0.0226	94.5	0.0187	97.4	0.0184	97.1
	Between-subgroup	0.0005	3.0	0.0004	2.3	0.0018	7.3	0.0011	6.3	0.0004	3.9	0.0009	5.2	0.0003	1.8	0.0013	5.5	0.0005	2.6	0.0006	2.9
	Total	0.0175	100	0.0169	100	0.0251	100	0.0170	100	0.0115	100	0.0180	100	0.0163	100	0.0239	100	0.0192	100	0.0190	100
45 - 64																					
	Within-subgroup	0.0413	95.0	0.0254	87.2	0.0315	94.4	0.0338	92.8	0.0200	95.0	0.0337	92.0	0.0359	92.6	0.0316	94.9	0.0319	92.8	0.0289	97.1
	Between-subgroup	0.0020	5.0	0.0037	12.8	0.0019	5.6	0.0026	7.2	0.0010	5.0	0.0029	8.0	0.0029	7.4	0.0017	5.1	0.0025	7.2	0.0008	2.9
	Total	0.0413	100	0.0291	100	0.0334	100	0.0364	100	0.0210	100	0.0366	100	0.0388	100	0.0333	100	0.0344	100	0.0297	100
65+																					
	Within-subgroup	0.0427	97.7	0.0617	97.2	0.0663	95.6	0.0491	98.3	0.0452	98.5	0.0613	98.5	0.0416	94.5	0.0466	97.7	0.0629	96.5	0.0547	98.4
	Between-subgroup	0.0010	2.3	0.0020	2.8	0.0030	4.4	0.0009	1.7	0.0007	1.5	0.0009	1.5	0.0024	5.5	0.0011	2.3	0.0023	3.5	0.0009	1.6
	Total	0.0437	100	0.0637	100	0.0693	100	0.0500	100	0.0459	100	0.0622	100	0.0440	100	0.0477	100	0.0652	100	0.0556	100

~   Theil index value where 0 indicates that participants have equal HUI scores and 1 incidates completely inequal HUI scores.

^   The percent-relative contribution of the Theil indecies value attributed to within- and between-subgroups. A higher percentage indicates greater contribution to health inequality.

All analyses were weighted using sample weights provided in the CCHS 2009/10

Table 7. Theil decomposition of health inequality by province within each income decile, stratified by age and sex.

Age (yrs)	Theil Decomposition	Decile 1 Value ~	Decile 1 Contribution (%)^	Decile 2 Value ~	Decile 2 Contribution (%)^	Decile 3 Value ~	Decile 3 Contribution (%)^	Decile 4 Value ~	Decile 4 Contribution (%)^	Decile 5 Value ~	Decile 5 Contribution (%)^	Decile 6 Value ~	Decile 6 Contribution (%)^	Decile 7 Value ~	Decile 7 Contribution (%)^	Decile 8 Value ~	Decile 8 Contribution (%)^	Decile 9 Value ~	Decile 9 Contribution (%)^	Decile 10 Value ~	Decile 10 Contribution (%)^
Men																					
25 - 44																					
	Within-subgroup	0.0384	98.1	0.0227	98.0	0.0229	98.7	0.0164	99.4	0.0176	98.0	0.0140	98.6	0.0186	99.1	0.0092	98.4	0.0151	98.2	0.0065	99.5
	Between-subgroup	0.0007	1.9	0.0005	2.0	0.0003	1.3	0.0001	0.6	0.0004	2.0	0.0002	1.4	0.0002	0.9	0.0002	1.6	0.0003	1.8	<0.0001	0.5
	Total	0.0391	100	0.0232	100	0.0232	100	0.0165	100	0.0180	100	0.0142	100	0.0188	100	0.0094	100	0.0154	100	0.0065	100
45 - 64																					
	Within-subgroup	0.0756	95.9	0.0428	98.5	0.0328	98.3	0.0243	95.7	0.0300	98.0	0.0200	99.6	0.0173	98.7	0.0231	98.9	0.0128	98.8	0.0103	98.8
	Between-subgroup	0.0032	4.1	0.0007	1.5	0.0006	1.7	0.0011	4.3	0.0006	2.0	0.0001	0.4	0.0002	1.3	0.0003	1.1	0.0002	1.2	0.0001	1.2
	Total	0.0788	100	0.0435	100	0.0334	100	0.0254	100	0.0306	100	0.0201	100	0.0175	100	0.0234	100	0.0130	100	0.0104	100
65+																					
	Within-subgroup	0.0667	96.9	0.0501	97.6	0.0507	99.2	0.0430	98.3	0.0297	98.7	0.0382	99.1	0.0337	98.3	0.0253	98.4	0.0318	96.1	0.0285	98.0
	Between-subgroup	0.0021	3.1	0.0012	2.4	0.0004	0.8	0.0007	1.7	0.0004	1.3	0.0004	0.9	0.0006	1.7	0.0004	1.6	0.0013	3.9	0.0006	2.0
	Total	0.0688	100	0.0513	100	0.0511	100	0.0437	100	0.0301	100	0.0386	100	0.0343	100	0.0257	100	0.0331	100	0.0291	100
Women																					
25 - 44																					
	Within-subgroup	0.0402	98.9	0.0266	99.4	0.0196	99.0	0.0168	98.7	0.0105	98.9	0.0145	99.3	0.0106	99.1	0.0092	99.8	0.0080	98.9	0.0073	98.8
	Between-subgroup	0.0004	1.1	0.0002	0.6	0.0002	1.0	0.0002	1.3	0.0001	1.1	0.0001	0.7	0.0001	0.9	<0.0001	0.2	0.0001	1.1	0.0001	1.2
	Total	0.0406	100	0.0268	100	0.0198	100	0.0170	100	0.0106	100	0.0146	100	0.0107	100	0.0092	100	0.0081	100	0.0074	100
45 - 64																					
	Within-subgroup	0.0803	96.3	0.0611	96.3	0.0351	99.5	0.0295	99.0	0.0303	98.5	0.0239	98.8	0.0206	99.4	0.0194	97.1	0.0158	97.0	0.0137	99.0
	Between-subgroup	0.0031	3.7	0.0023	3.7	0.0002	0.5	0.0003	1.0	0.0005	1.5	0.0003	1.2	0.0001	0.6	0.0006	2.9	0.0005	3.0	0.0001	1.0
	Total	0.0834	100	0.0634	100	0.0353	100	0.0298	100	0.0308	100	0.0242	100	0.0207	100	0.0200	100	0.0163	100	0.0138	100
65+																					
	Within-subgroup	0.0763	99.1	0.0643	98.8	0.0519	98.7	0.0478	98.9	0.0471	98.7	0.0361	98.8	0.0457	98.3	0.0448	97.1	0.0435	94.8	0.0440	95.4
	Between-subgroup	0.0007	0.9	0.0008	1.2	0.0007	1.3	0.0005	1.1	0.0006	1.3	0.0004	1.2	0.0008	1.7	0.0013	2.9	0.0024	5.1	0.0021	4.6
	Total	0.0770	100	0.0651	100	0.0526	100	0.0483	100	0.0477	100	0.0365	100	0.0465	100	0.0461	100	0.0459	100	0.0461	100

~   Theil index value where 0 indicates that participants have equal HUI scores and 1 indicates completely inequal HUI scores.

^   The percent-relative contribution of the Theil indecies value attributed to within- and between-subgroups. A higher percentage indicates greater contribution to health inequality.

All analyses were weighted using sample weights provided in the CCHS 2009/10

FIGURES

Figure 1. Average health by three income subgroups
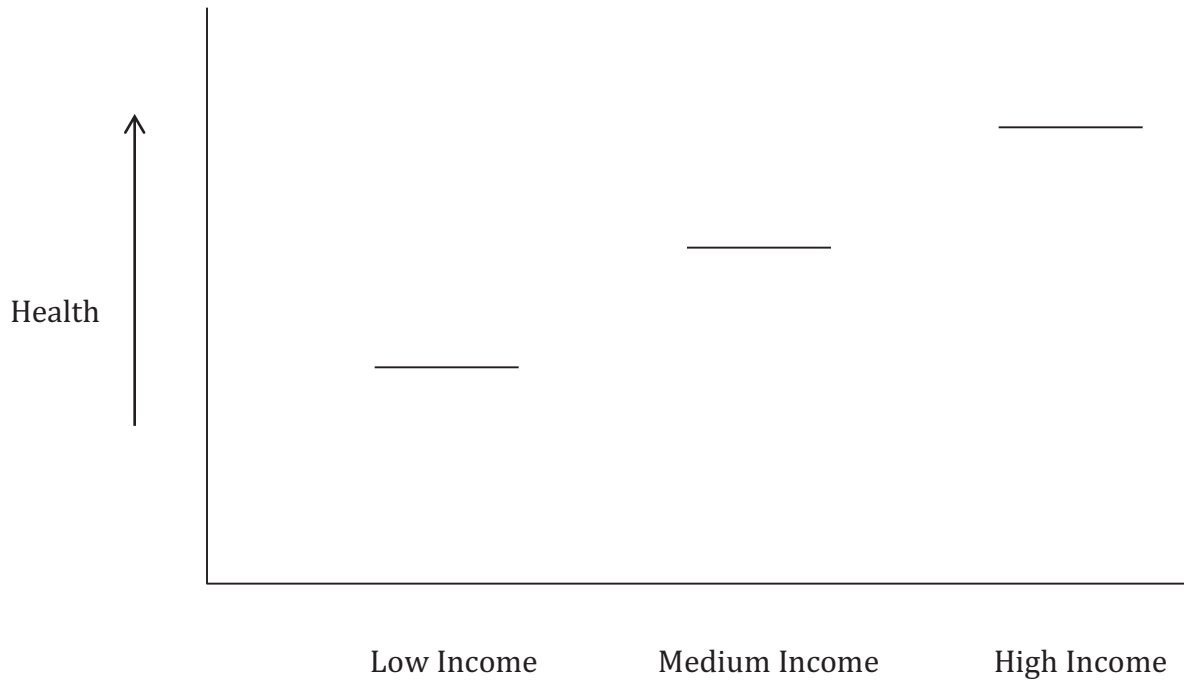
Figure 2. Within subgroup health inequality in three income subgroups

Health

Low Income   Medium Income   High Income

Figure 3. Within subgroup health inequality in three income subgroups
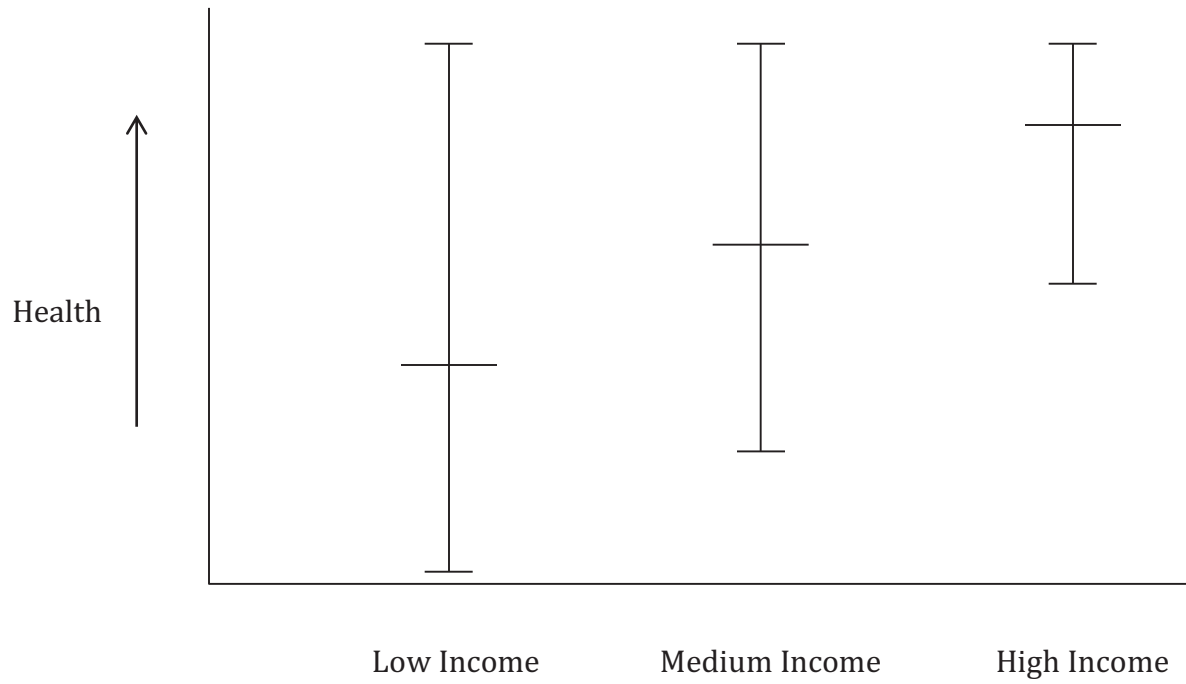
Figure 4. Between-, within-, and overlapping health inequality by Ferrer and Palmer
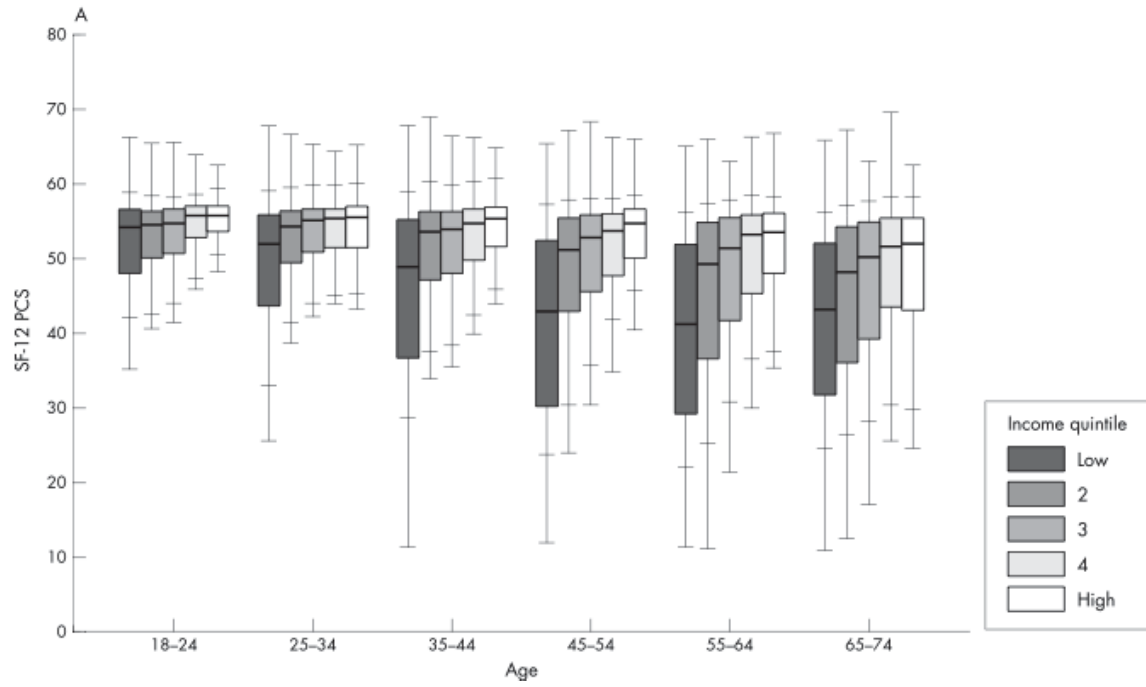
Source: Ferrer and Palmer (19)

Figure 5. Mean HUI with 95% confidence intervals by income, both sexes, all ages
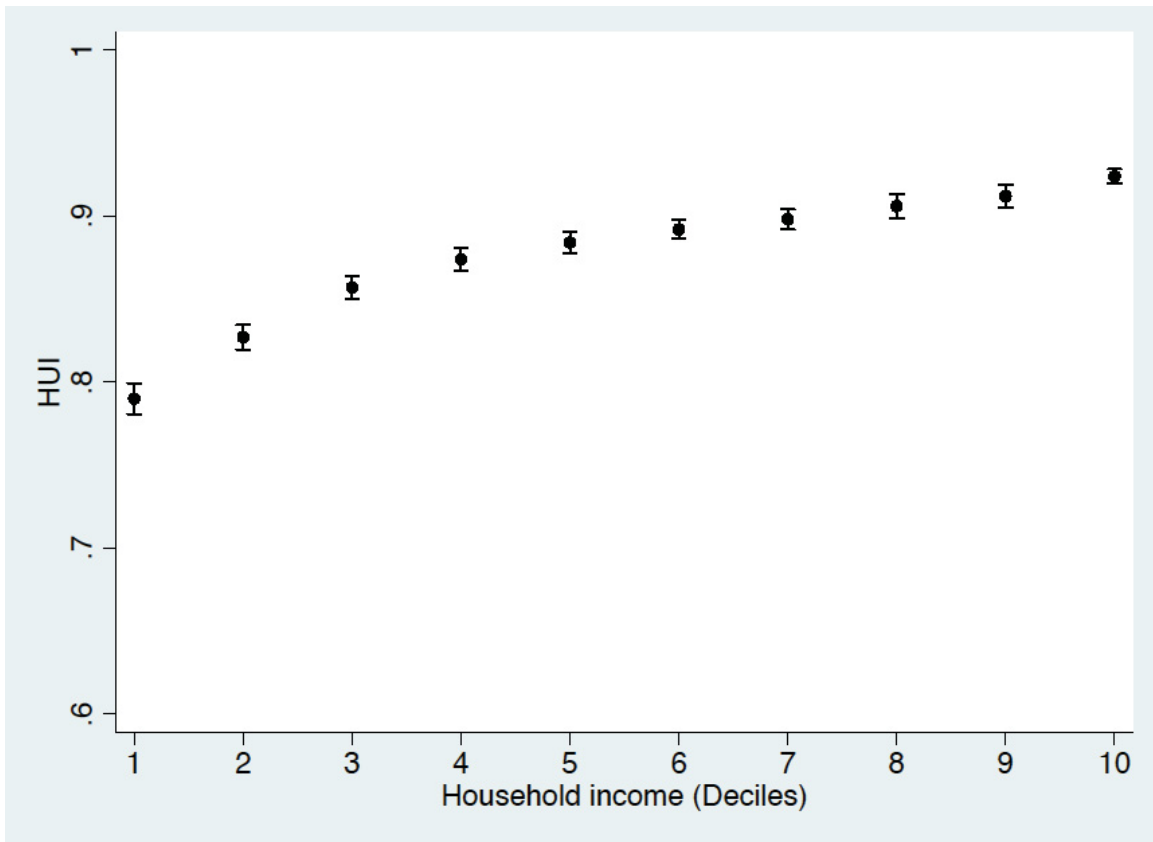
HUI: Health Utilities Index
Data source: 2009/10 Canadian Community Health Survey
Income decile 1 is the poorest and 10 is the richest.

Figure 6. Mean HUI with 95% confidence intervals by education, both sexes, all ages
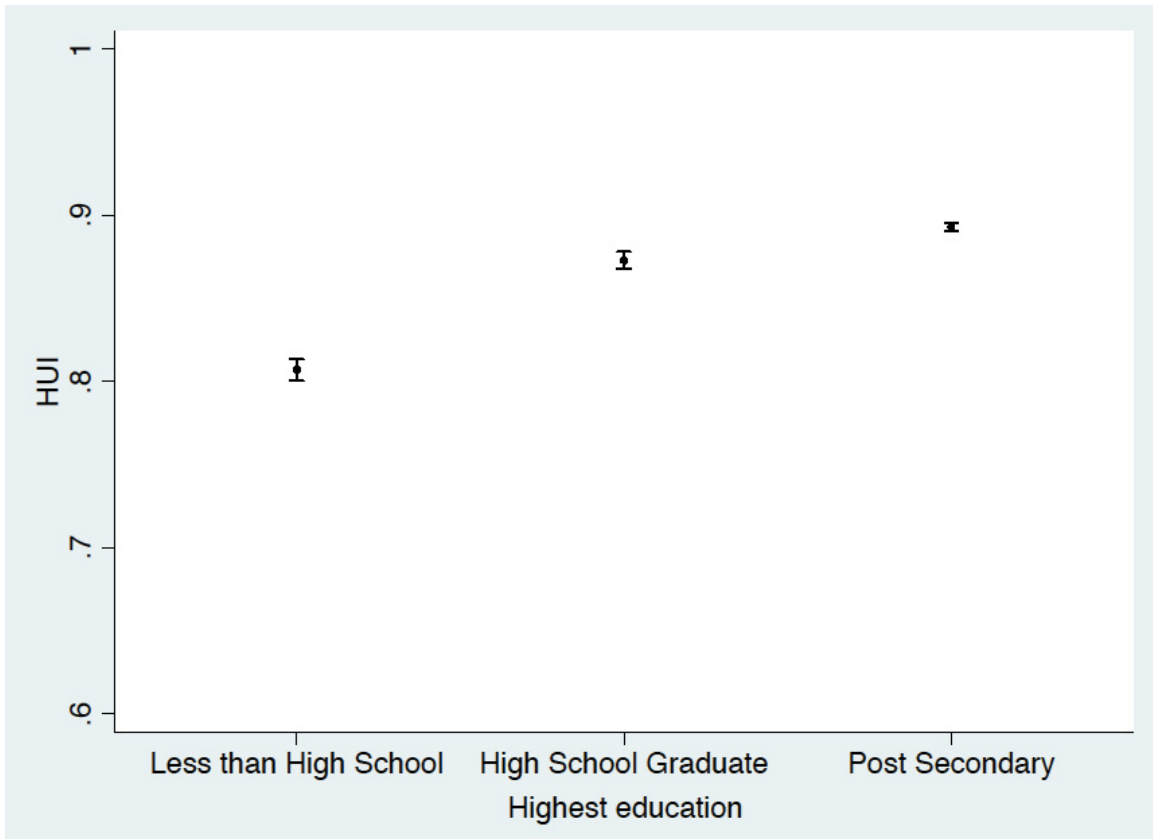
HUI: Health Utilities Index
Data source: 2009/10 Canadian Community Health Survey

Figure 7. Distribution of the HUI by income and sex, all ages
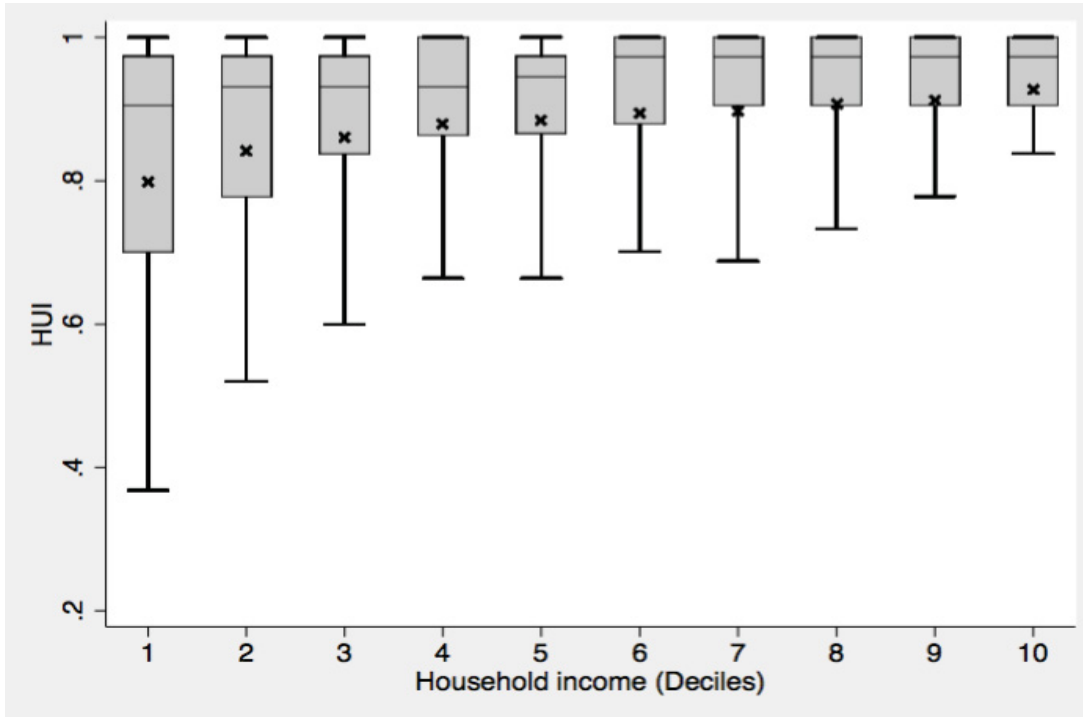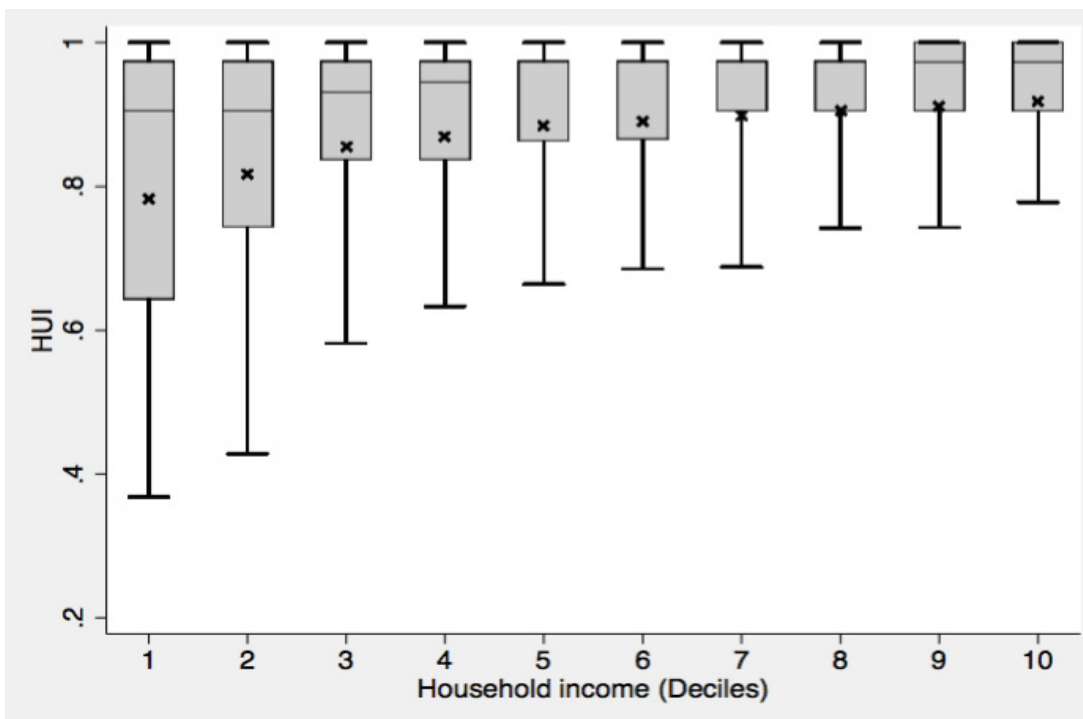
Men

Women

HUI: Health Utility Index
Data source: 2009/10 Canadian Community Health Survey
Boxes show the interquartile range and the whiskers show the 10th and 90th centiles.
The median value is indicated by the line, and the mean value is indicated by 'x'.
Income decile 1 is the poorest, and 10 is the richest.
All analyses were weighted using sample weights provided in the CCHS.

Figure 8. Distribution of the HUI by education and sex, all ages
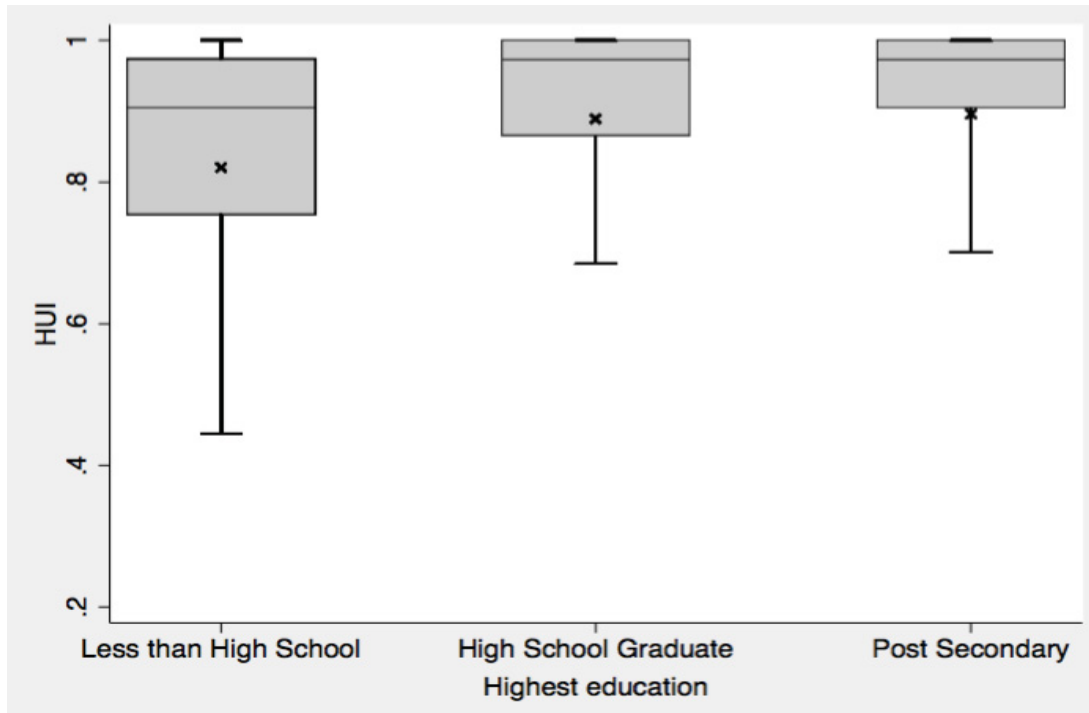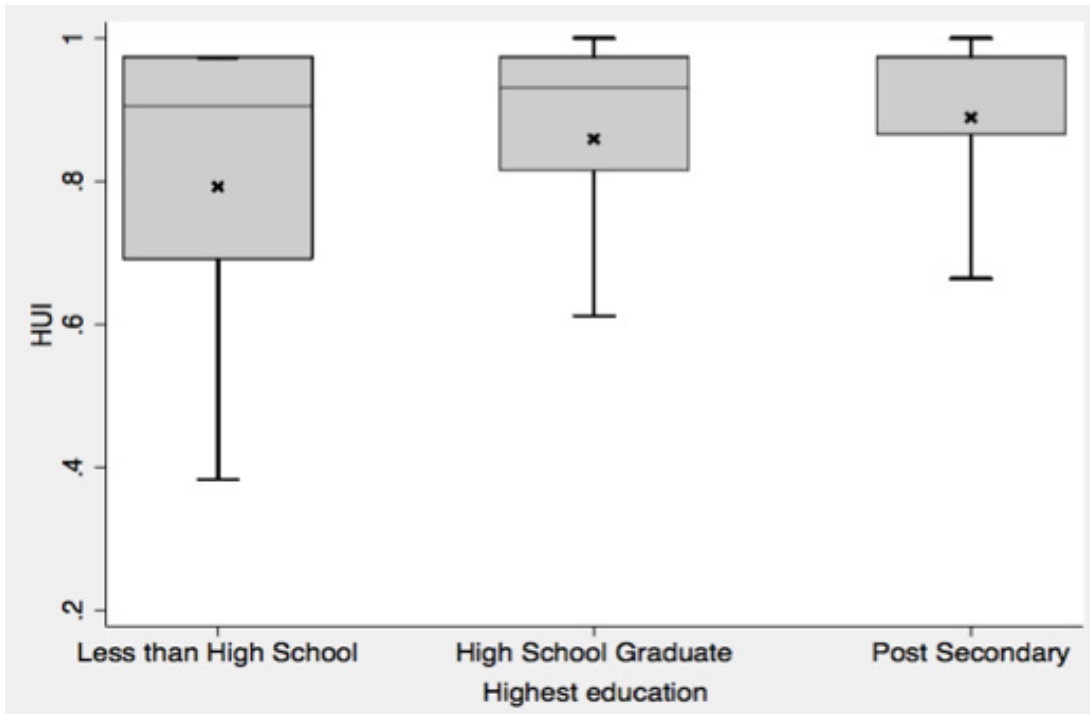
Men

Women

HUI: Health Utility Index
Data source: 2009/10 Canadian Community Health Survey
Boxes show the interquartile range and the whiskers show the 10th and 90th centiles. The median value is indicated by the line, and the mean value is indicated by 'x'.
All analyses were weighted using sample weights provided in the CCHS

Figure 9. Distribution of the HUI by income and age group: men

25-44 years
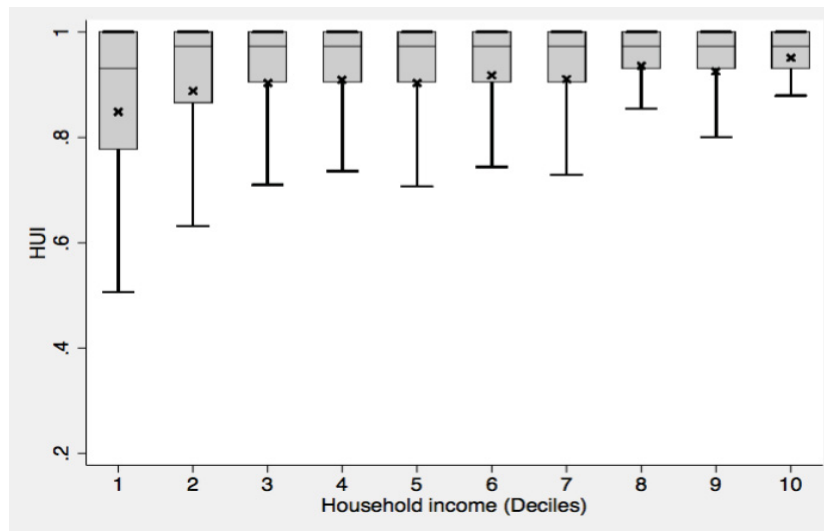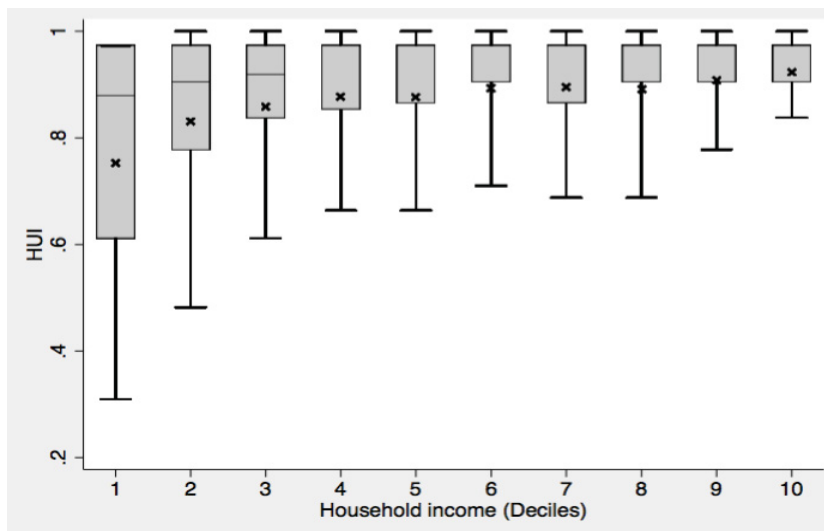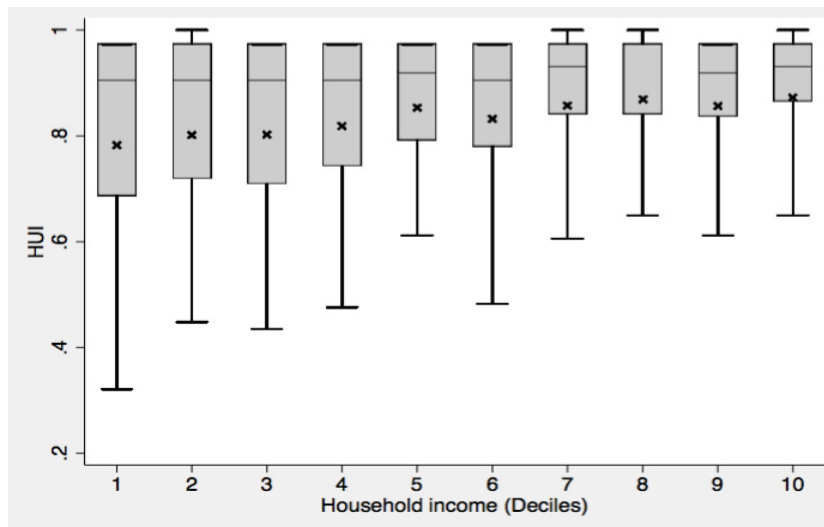
45-64 years

65+ years

HUI: Health Utility Index
Data source: 2009/10 Canadian Community Health Survey
Boxes show the interquartile range and the whiskers show the 10th and 90th centiles. The median value is indicated by the line, and the mean value is indicated by 'x'.
Income decile 1 is the poorest, and 10 is the richest.
All analyses were weighted using sample weights provided in the CCHS.

Figure 10. Distribution of the HUI by income and age group: women
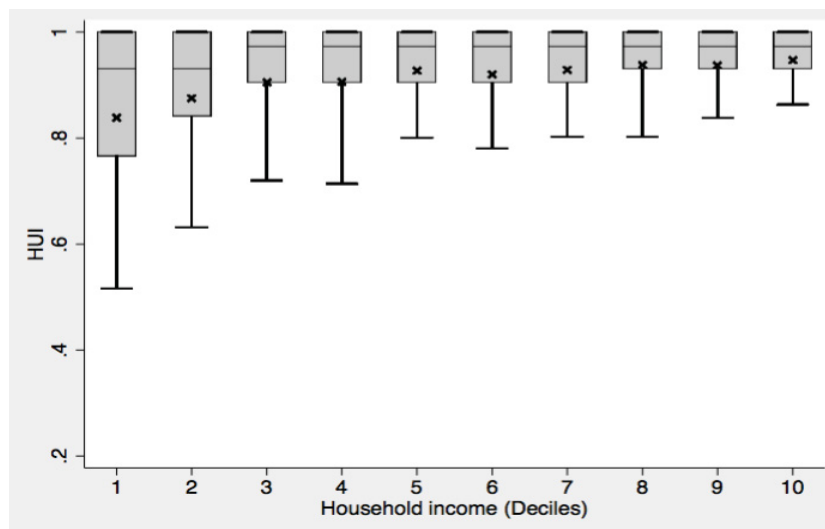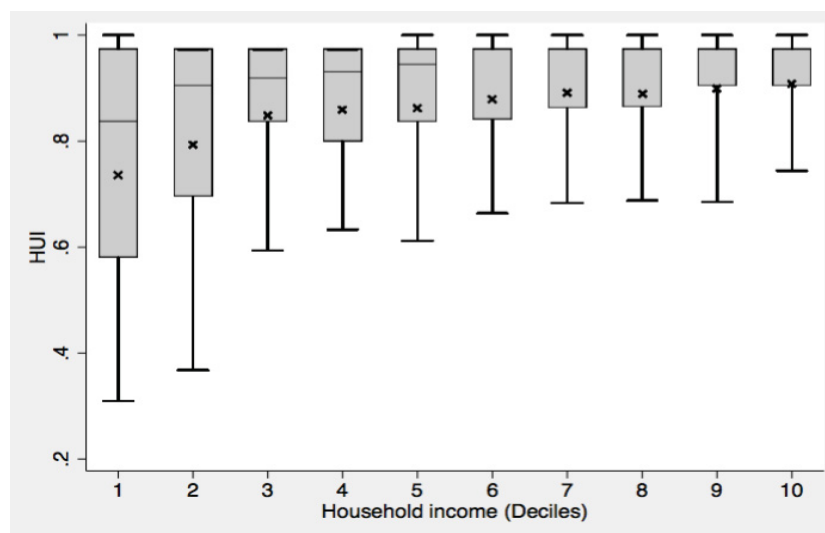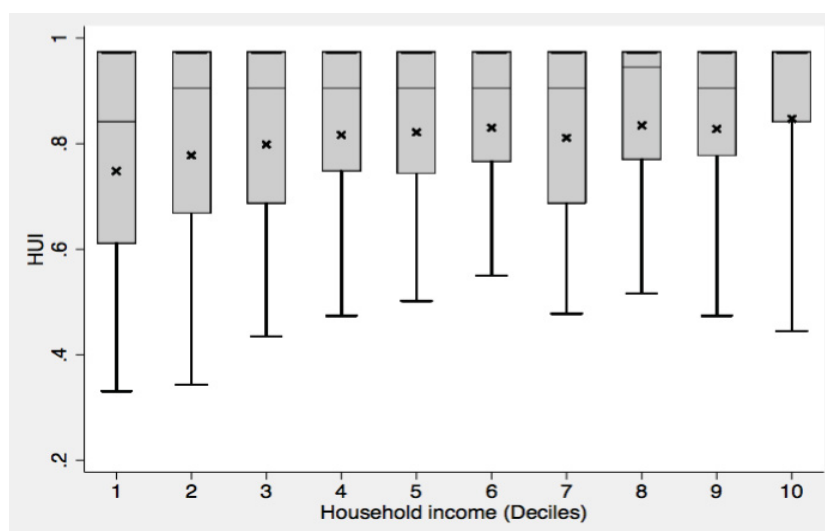
25-44 years

45-64 years

65+ years

HUI: Health Utility Index
Data source: 2009/10 Canadian Community Health Survey
Boxes show the interquartile range and the whiskers show the 10th and 90th centiles. The median value is indicated by the line, and the mean value is indicated by 'x'.
Income decile 1 is the poorest, and 10 is the richest
All analyses were weighted using sample weights provided in the CCHS.

Figure 11. Distribution of the HUI by education and age group: men
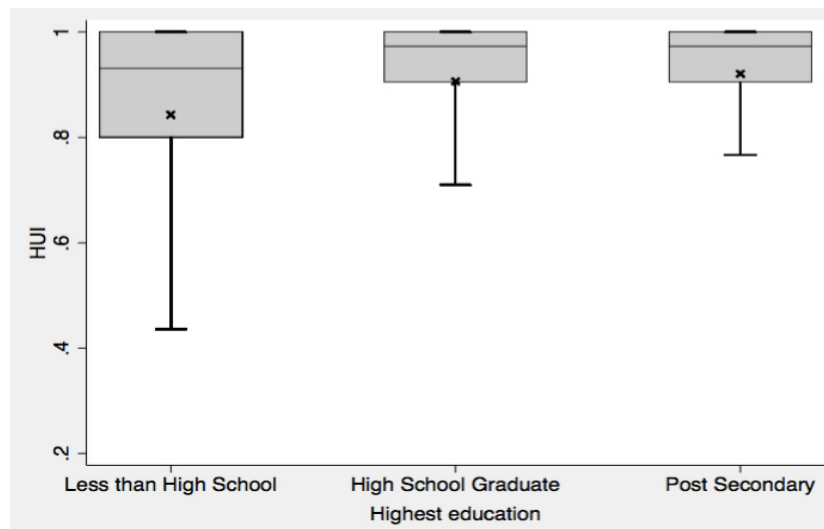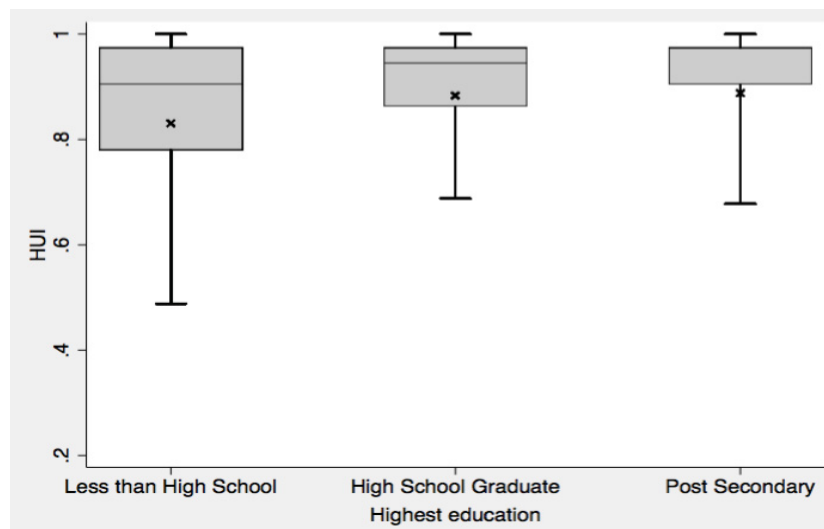
HUI: Health Utility Index
Data source: 2009/10 Canadian Community Health Survey
Boxes show the interquartile range and the whiskers show the 10th and 90th centiles.
The median value is indicated by the line, and the mean value is indicated by 'x.'
All analyses were weighted using sample weights provided in the CCHS.

Figure 12. Distribution of the HUI by education and age group: women
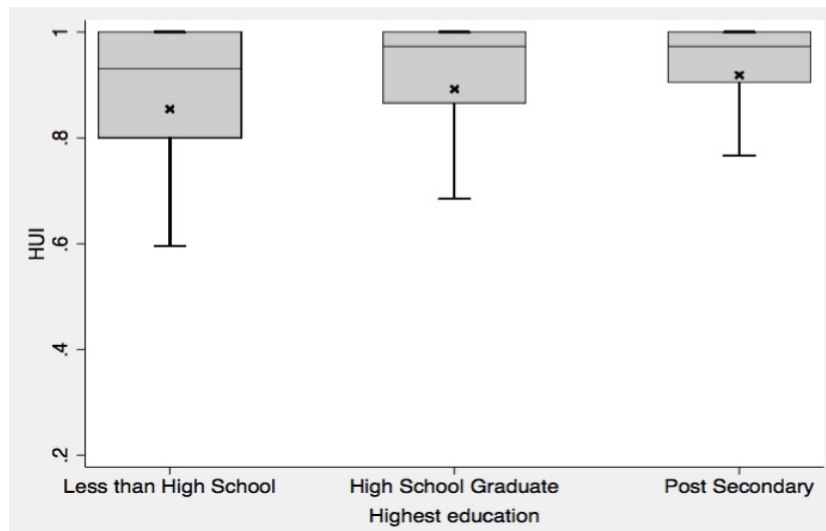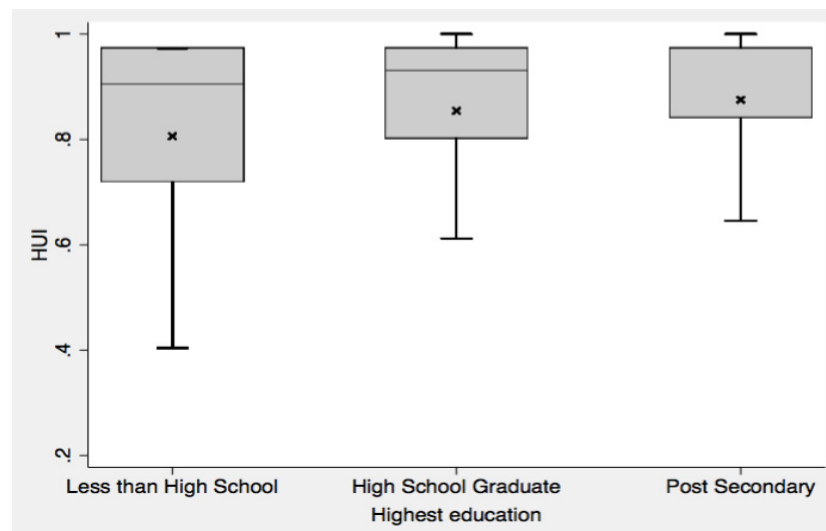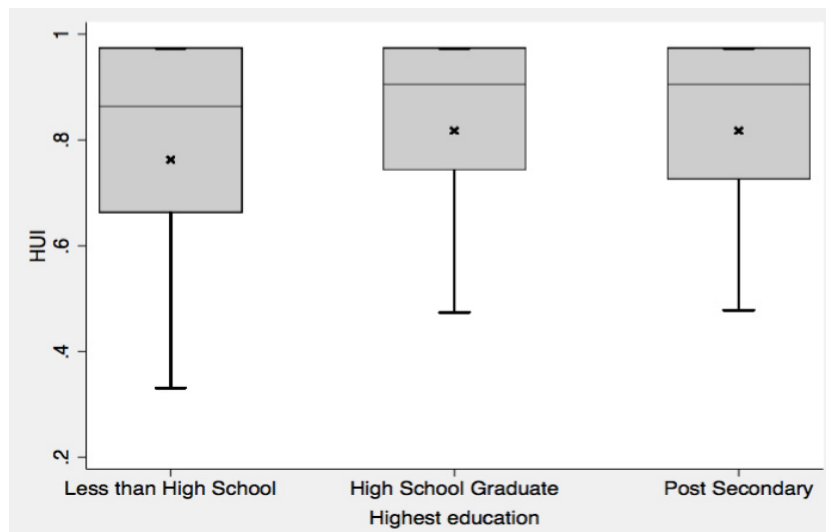
25-44 years

45-64 years

65+ years

HUI: Health Utility Index
Data source: 2009/10 Canadian Community Health Survey
Boxes show the interquartile range and the whiskers show the 10th and 90th centiles.
The median value is indicated by the line, and the mean value is indicated by 'x'.
All analyses were weighted using sample weights provided in the CCHS.

Figure 13. Mean HUI of income deciles within each province, stratified by age group: men

25-44 years
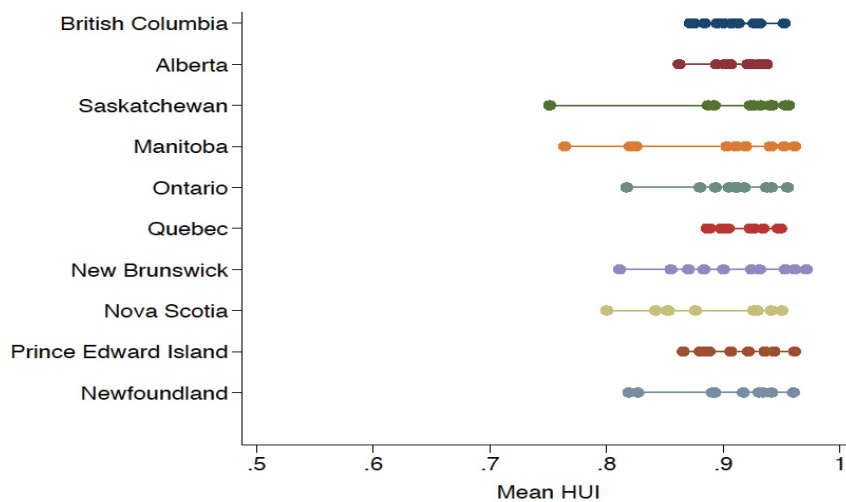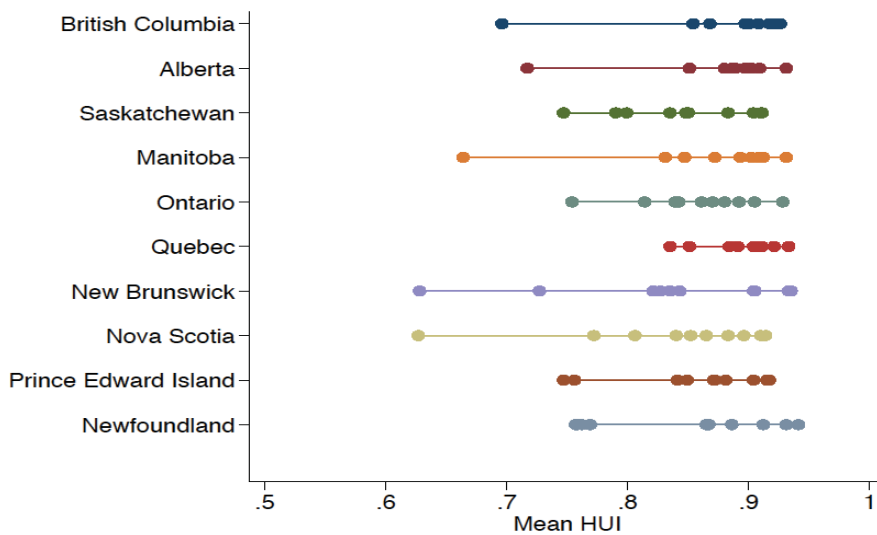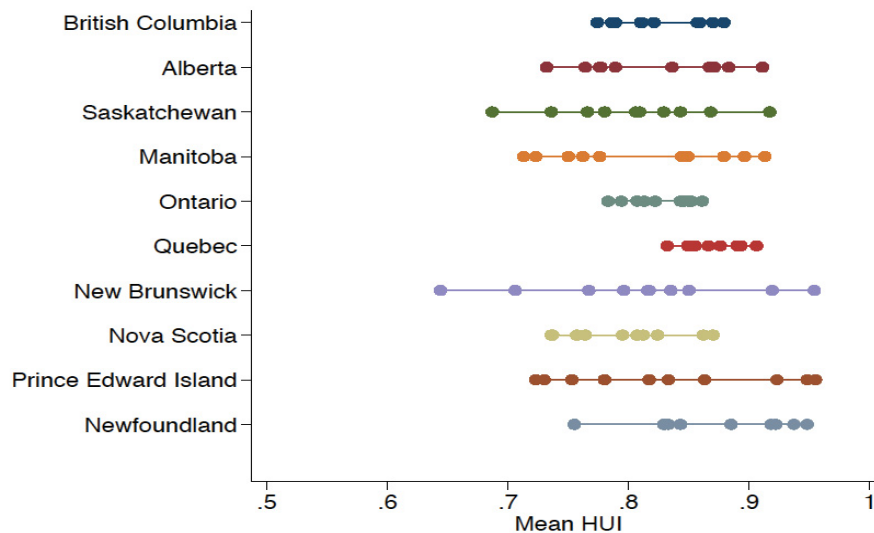
45-64 years

65+ years

HUI: Health Utility Index
Data source: 2009/10 Canadian Community Health Survey
Dots on lines show mean HUI by income group
All analyses were weighted using sample weights provided in the CCHS.

Figure 14. Mean HUI of income deciles within each province, stratified by age group: women
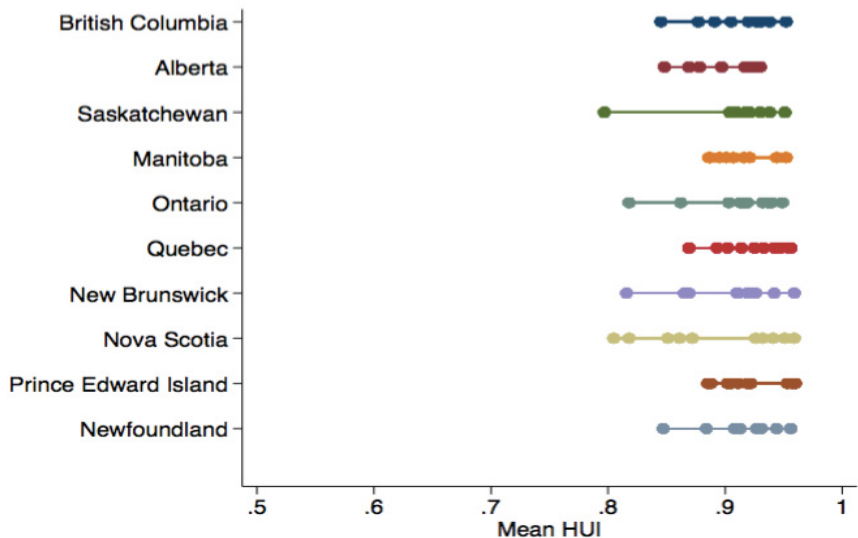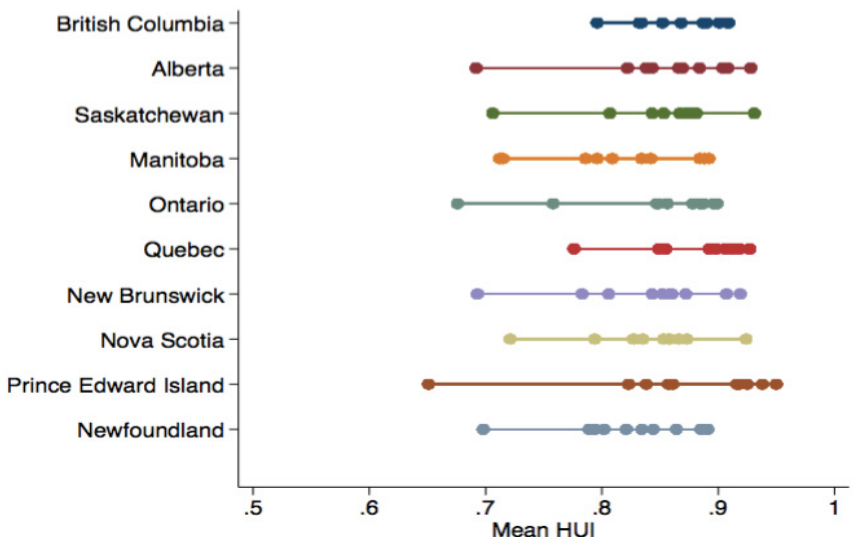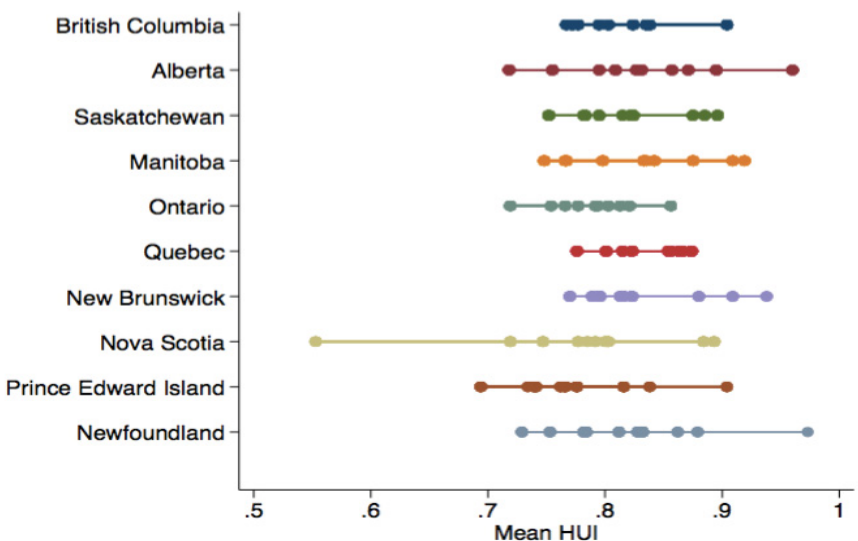
25-44 years

45-64 years

65+ years

HUI: Health Utility Index
Data source: 2009/10 Canadian Community Health Survey
Dots on lines show mean HUI by income group
All analyses were weighted using sample weights provided in the CCHS.

APPENDIX B: ADDITIONAL TABLES AND FIGURES

TABLE OF CONTENTS

8) 8. Theil decomposition of health inequality by income, and province by income decile, stratified by age and sex. All analyses below are weighted.
   a. Table 8.1. Theil decomposition of health inequality by income, and province by income decile: men 25-44 years old.
   b. Table 8.2. Theil decomposition of health inequality by income, and province by income decile: men 45-64 years old.
   c. Table 8.3. Theil decomposition of health inequality by income, and province by income decile: men 65+ years old.
   d. Table 8.4. Theil decomposition of health inequality by income, and province by income decile: women 25-44 years old.
   e. Table 8.5. Theil decomposition of health inequality by income, and province by income decile: women 45-64 years old.
   f. Table 8.6. Theil decomposition of health inequality by income, and province by income decile: women 65+ years old.
9) 9. Mean Health Utilities Index of provinces within each income decile, stratified by age and sex. All analyses below are weighted.
   a. Figure 9.1. Mean HUI of provinces within each income decile, by age group: men
   b. Figure 9.2. Mean HUI of provinces within each income decile, by age group: women
10) 10. Theil decomposition of health inequality within- and between income subgroups, stratified by age and sex.
   a. Theil decomposition of health inequality within- and between income subgroups, stratified by age and sex.

1. Background and Methods

Table 1.1 Describing health inequalities by group in epidemiological literature.

Author	Year	Title	Journal	Data	Measure of Health					Health Inequality by Group				Stratified					Adjusted				
					LE	HUI	SPH	CHC	Other	Income	Education	Sex	Other	Income	Education	Sex	Age	Other	Income	Education	Sex	Age	Other
McGrail et al. (15)	2009	Income-Related Health Inequalities in Canada and the United States: A Decomposition Analysis	American Journal of Public Health	JCUSH	x					x								Country		x	x	x	Marital status, race, smoking status, physicial activity, BMI, unmet needs, regular doctor, health insurance status
Safaei (8)	2007	Income and Health Inequality Across Canadian Provinces	Health and Place	NPHS	x	x	x			x						x		Province				x	
Safaei (8)	2007	Income and Health Inequality Across Canadian Provinces	Health and Place	NPHS	x	x	x			x								Province			x	x	
Roberge et al. (6)	1995	The Health Utility Index: Measuring Health Differences in Ontario by Socioeconomic Status	Statistics Canada Health Reports	OHS	x					x						x	x						
Roberge et al. (6)	1995	The Health Utility Index: Measuring Health Differences in Ontario by Socioeconomic Status	Statistics Canada Health Reports	OHS	x						x					x	x						
Roberge et al. (6)	1995	The Health Utility Index: Measuring Health Differences in Ontario by Socioeconomic Status	Statistics Canada Health Reports	OHS	x								Occupation			x	x						
Roberge et al. (6)	1995	The Health Utility Index: Measuring Health Differences in Ontario by Socioeconomic Status	Statistics Canada Health Reports	OHS	x								Socioeconomic Status			x	x						
Roberge et al. (6)	1995	The Health Utility Index: Measuring Health Differences in Ontario by Socioeconomic Status	Statistics Canada Health Reports	OHS	x								Marital status			x	x						
McIntosh et al. (16)	2009	Income Disparities in Health-Adjusted Life Expectancy for Canadian Adults, 1991 to 2001	Statistics Canada Health Reports	CCHS/Census 1991-2001	x				Health Adjusted Life-expectancy	x						x	x						
McIntosh et al. (16)	2009	Income Disparities in Health-Adjusted Life Expectancy for Canadian Adults, 1991 to 2001	Statistics Canada Health Reports	CCHS/Census 1991-2001	x				Health Adjusted Life-expectancy		x					x	x						
Trovato et al. (14)	2011	Sex Differences in Life Expectancy in Canada: Immigrant and Native-Born Populations	Journal of Biosocial Science	Statistics Canada Census 2001	x								Nativity			x	x						

Table 1.1 Describing health inequalities by group in epidemiological literature, continued…

Author	Year	Title	Journal	Data	Measure of Health					Health Inequality by Group				Stratified					Adjusted				
					LE	HUI	SPH	CHC	Other	Income	Education	Sex	Other	Income	Education	Sex	Age	Other	Income	Education	Sex	Age	Other
James et al. (9)	2007	Avoidable Mortality by Neighbourhood Income in Canada: 25 Years After the Establishment of Universal Health Insurance	Journal of Epidemiology and Community Health	Canadian Mortality Database					Avoidable Mortality	x							x	Disease				x	
Eng and Feeny (5)	2007	Comparing the Health of Low Income and Less well Educated Groups in the United States and Canada	Population Health Metrics	JCUSH	x					x								Whites vs everyone, Country		x	x	x	Proxy report, Marital status, BMI, Health insurance
Eng and Feeny (5)	2007	Comparing the Health of Low Income and Less well Educated Groups in the United States and Canada	Population Health Metrics	JCUSH	x						x							Whites vs everyone, Country	x		x	x	Proxy report, Marital status, BMI, Health insurance
Huguet, Kaplan, Feeny (7)	2008	Socioeconomic Status and Health-Related Quality of Life Among Elderly People: Results from the Joint Canada/United States Survey of Health	Social Science and Medicine	JCUSH	x					x								Country	x		x	x	Marital status, race, smoking status, physicial activity, BMI, chronic condition, has a regular doctor, prescription medication insurrance.
Humphries and Doorslaer (13)	2000	Income-Related Health Inequality in Canada	Social Science and Medicine	NPHS	x	x				x											x	x	
Prus (12)	2007	Age, SES, and Health: A Population Level Analysis of Health Inequalities Over the Lifecourse	Sociology of Health and Illness	NPHS	x					x								Age					
Prus (12)	2007	Age, SES, and Health: A Population Level Analysis of Health Inequalities Over the Lifecourse	Sociology of Health and Illness	NPHS	x						x							Age					
Prus (12)	2007	Age, SES, and Health: A Population Level Analysis of Health Inequalities Over the Lifecourse	Sociology of Health and Illness	NPHS	x								Univariate					Age					

Table 1.1 Describing health inequalities by group in epidemiological literature, continued…

Author	Year	Title	Journal	Data	Measure of Health					Health Inequality by Group				Stratified					Adjusted				
					LE	HUI	SPH	CHC	Other	Income	Education	Sex	Other	Income	Education	Sex	Age	Other	Income	Education	Sex	Age	Other
Prus (11)	2011	Comparing Social Determinants of Self-Rated Health Across the United States and Canada	Social Science and Medicine	JCUSH			x						Age					Country	x	x	x		Marital status, race, physical activity, BMI, type of smoker, life satisfaction, unmet needs, health insurance
Prus (11)	2011	Comparing Social Determinants of Self-Rated Health Across the United States and Canada	Social Science and Medicine	JCUSH			x					x						Country	x	x		x	Marital Status, race, physical activity, BMI, type of smoker, life satisfaction, unmet needs, health insurance
Prus (11)	2011	Comparing Social Determinants of Self-Rated Health Across the United States and Canada	Social Science and Medicine	JCUSH			x						Marital Status					Country	x	x	x	x	Race, physical activity, BMI, type of smoker, life satisfaction, unmet needs, health insurance
Prus (11)	2011	Comparing Social Determinants of Self-Rated Health Across the United States and Canada	Social Science and Medicine	JCUSH			x						Race					Country	x	x	x	x	Marital status, physical activity, BMI, type of smoker, life satisfaction, unmet needs, health insurance
Prus (11)	2011	Comparing Social Determinants of Self-Rated Health Across the United States and Canada	Social Science and Medicine	JCUSH			x			x								Country		x	x	x	Marital status, race, physical activity, BMI, type of smoker, life satisfaction, unmet needs, health insurance
Prus (11)	2011	Comparing Social Determinants of Self-Rated Health Across the United States and Canada	Social Science and Medicine	JCUSH			x				x							Country	x		x	x	Marital status, race, physical activity, BMI, type of smoker, life satisfaction, unmet needs, health insurance
Prus (11)	2011	Comparing Social Determinants of Self-Rated Health Across the United States and Canada	Social Science and Medicine	JCUSH			x						Physical Activity					Country	x	x	x	x	Marital status, race, BMI, type of smoker, life satisfaction, unmet needs, health insurance
Prus (11)	2011	Comparing Social Determinants of Self-Rated Health Across the United States and Canada	Social Science and Medicine	JCUSH			x						BMI					Country	x	x	x	x	Marital status, race, physical activity, type of smoker, life satisfaction, unmet needs, health insurance
Prus (11)	2011	Comparing Social Determinants of Self-Rated Health Across the United States and Canada	Social Science and Medicine	JCUSH			x						Type of Smoker					Country	x	x	x	x	Marital status, race, physical activity, BMI, life satisfaction, unmet needs, health insurance

Table 1.1 Describing health inequalities by group in epidemiological literature, continued…

Author	Year	Title	Journal	Data	Measure of Health					Health Inequality by Group				Stratified						Adjusted				
					LE	HUI	SPH	CHC	Other	Income	Education	Sex	Other	Income	Education	Sex	Age	Other	Income	Education	Sex	Age	Other
Prus (11)	2011	Comparing Social Determinants of Self-Rated Health Across the United States and Canada	Social Science and Medicine	JCUSH			x						Life Satisfaction					Country					Marital status, race, physical activity, BMI, type of smoker, unmet needs, health insurance
Prus (11)	2011	Comparing Social Determinants of Self-Rated Health Across the United States and Canada	Social Science and Medicine	JCUSH			x						Unmet Needs					Country					Marital status, race, physical activity, BMI, type of smoker, life satisfaction, health insurance
Prus (11)	2011	Comparing Social Determinants of Self-Rated Health Across the United States and Canada	Social Science and Medicine	JCUSH			x						Health Inusrance					Country					Marital status, race, physical activity, BMI, type of smoker, life satisfaction, unmet needs

64

Table 1.2. Independent variables in the Canadian Community Health Survey included in this study.

Variable	Description	CCHS variable name	Reference
Socioeconomic variables			
Income	Deciles of income of respondents adjusted for total household size	INCDRPR	McIntosh et al. 2009.
Education	Not completed high school; High school graduate; Some or completed post-secondary certificate/diploma	EDUDR04	McIntosh et al. 2009.
Living Status	Living alone; Not living alone	DHHGLVG	Westert et al. 2005
Demographic variables			
Sex	Male; Female	DHH_SEX	McIntosh et al. 2009.
Age	25-44; 45-64; 65+	DHHGAGE	McIntosh et al. 2009.
Immigrant Status	Immigrant long-term duration (10-years or more spent in Canada); Immigrant short-term duration (Less than 10 years spent in Canada); Not an immigrant	SDCFIMM, SDCGRES	Trovato et al. 2011
Visible Minority Status	White; Not white	SDCGCGT	Eng et al. 2007
Province	Each of the 10 Canadian provinces	GEOGPRV	Safaei 2007

2. Frequency distribution of the HUI by age and sex

Figure 2.1. Frequency distribution of the HUI, all ages: men
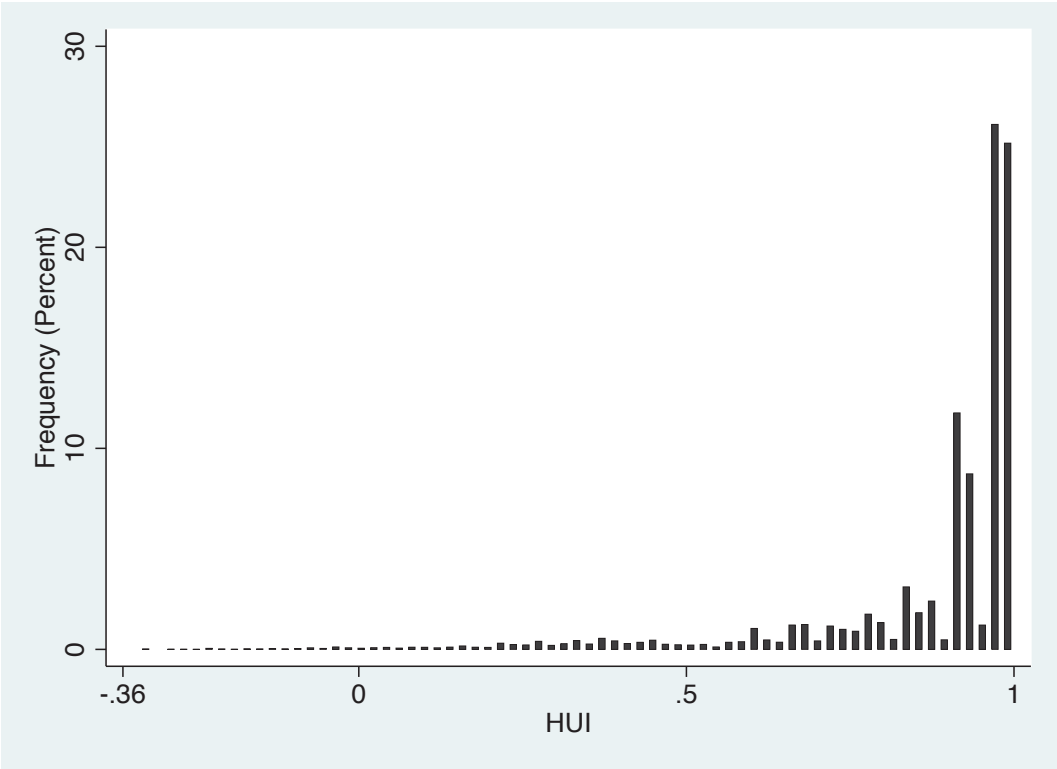
HUI: Health Utilities Index
Data source: 2009/10 Canadian Community Health Survey
All analyses were weighted

Figure 2.2. Frequency distribution of the HUI, all ages: women
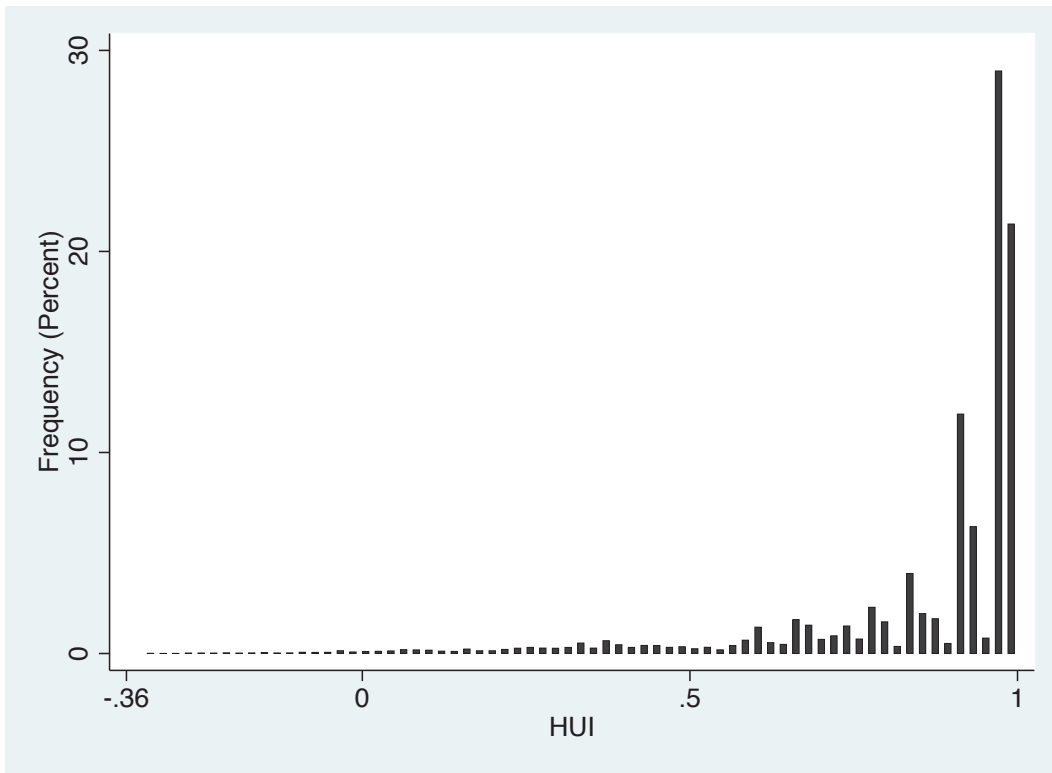
HUI: Health Utilities Index
Data source: 2009/10 Canadian Community Health Survey
All analyses were weighted

Figure 2.3. Frequency distribution of the HUI by age group: men

25-44 years
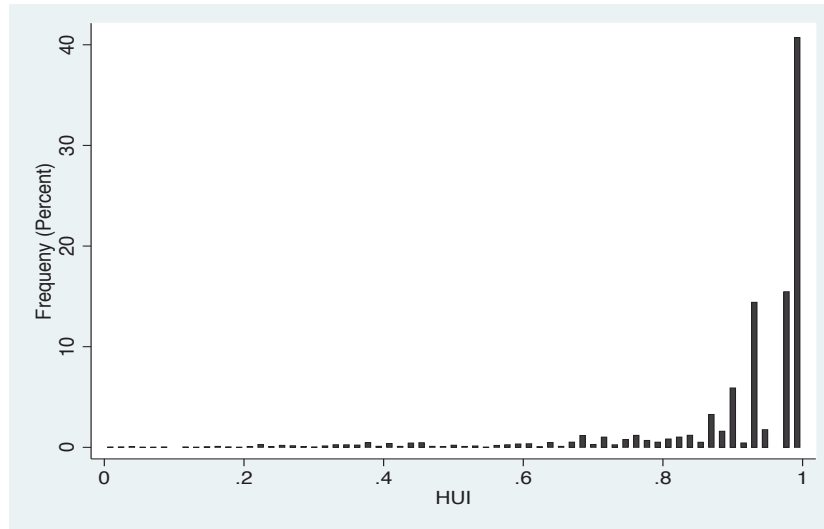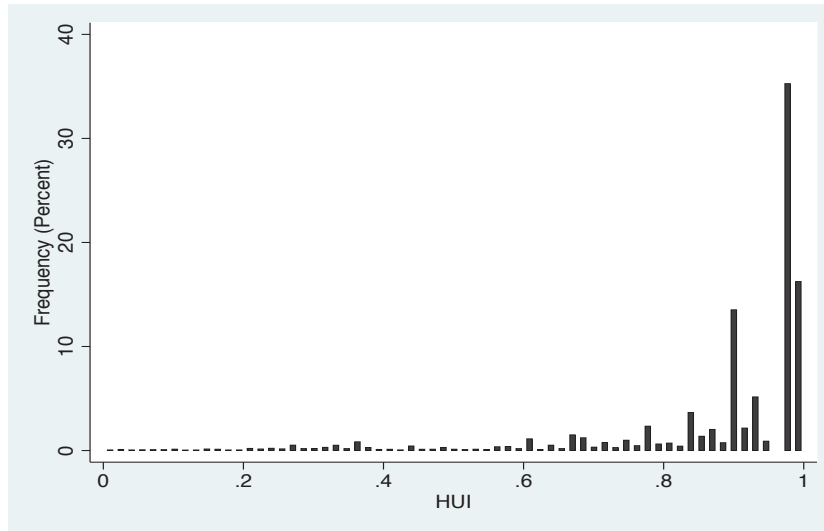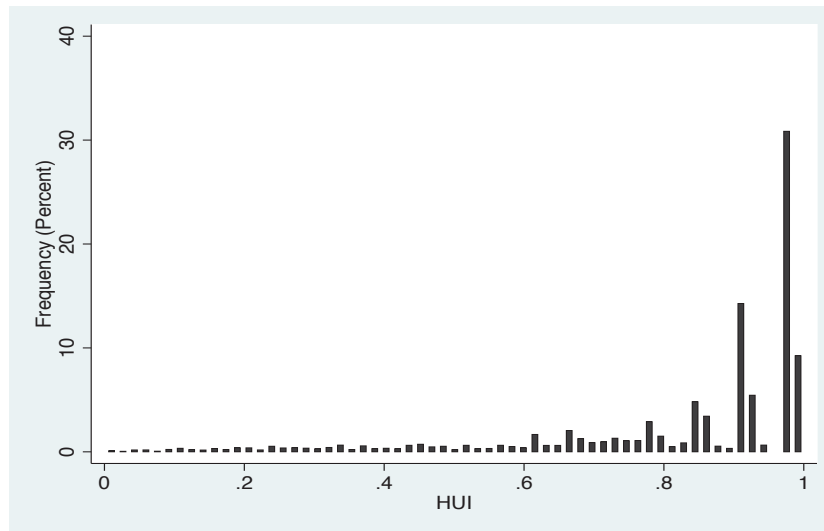
45-64 years

65+years

HUI: Health Utility Index
Data source: 2009/10 Canadian Community Health Survey
All analyses were weighted
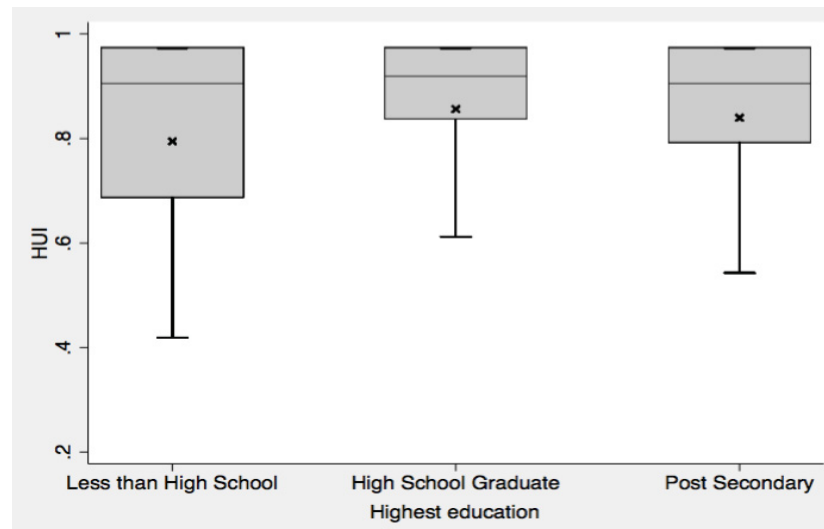
Figure 2.4. Frequency distribution of the HUI by age group: women
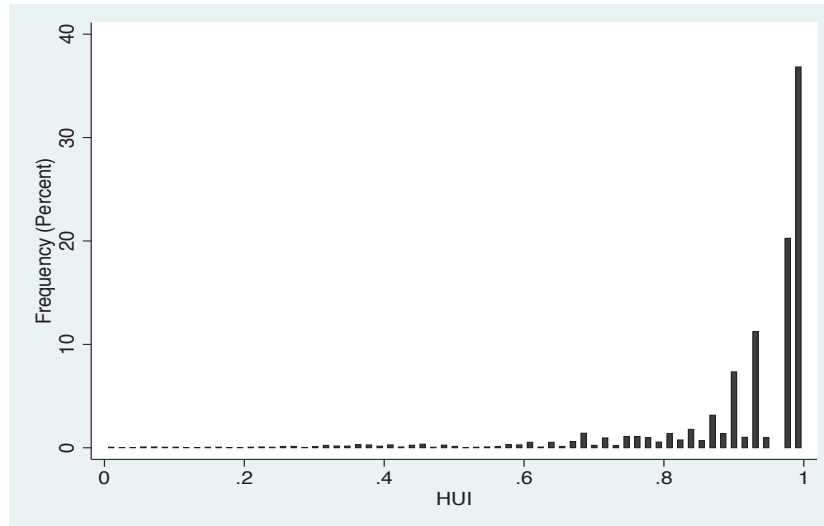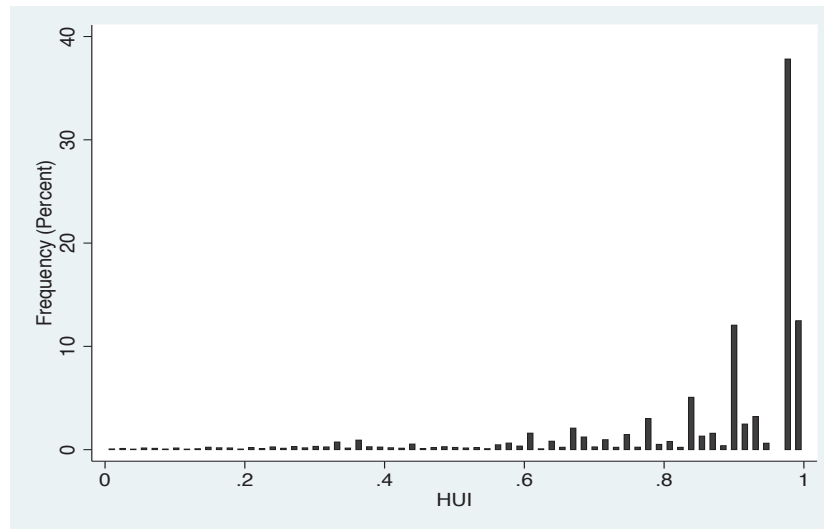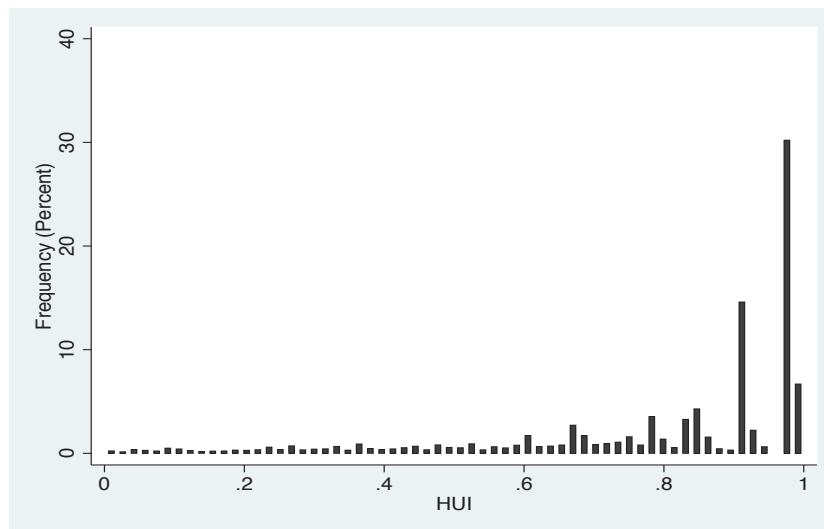
25-44 years

45-64 years

65+ years

HUI: Health Utility Index
Data source: 2009/10 Canadian Community Health Survey
All analyses were weighted

3. Socioeconomic, demographic, and health characteristics of respondents missing income, Health Utilities Index, or a Health Utilities score of 0 or less.

Table 3.1. Socioeconomic, demographic, and health characteristics of respondents not missing income and missing income.

| Characteristic		Total (%)	Income not missing (%)	Income missing (%)	Chi-square*
Total		100 566 (100)	85 077 (84.6)	15 489 (15.4)	
HUI					**p<0.001**
	Not Missing	97 541 (97.0)	82 895 (97.4)	14 646 (94.6)	
	Missing	3025 (3.0)	2182 (2.6)	843 (5.44)	
Self Preceived Health					**p<0.001**
	Excellent	18 454 (18.4)	15 810 (18.6)	2644 (17.1)	
	Very Good	35 721 (35.5)	30 863 (36.3)	4858 (31.4)	
	Good	30 204 (30.0)	25 186 (29.6)	5018 (32.4)	
	Fair	11 858 (11.8)	9730 (11.4)	2128 (13.7)	
	Poor	4201 (4.2)	3420 (4.0)	781 (5.0)	
	Missing	128 (0.1%)	68 (0.1)	60 (0.4)	
Age (years)					**p<0.001**
	25 to 44	31 855 (31.7)	28 115 (33.1)	3740 (24.2)	
	45 to 64	38 736 (38.5)	33 306 (39.2)	5430 (35.1)	
	65+	29 975 (29.8)	23 656 (27.8)	6319 (40.8)	
Sex					**p<0.001**
	Women	55 979 (55.7)	46 370 (54.5)	9609 (62.0)	
Education					**p<0.001**
	Less than High School	19 546 (19.4)	15 997 (18.8)	3549 (22.9)	
	High School Graduate	15 941 (15.9)	13 420 (15.8)	2521 (16.3)	
	Some or Completed Post Secondary	62 341 (62.0)	55 350 (65.1)	6991 (45.1)	
	Missing	2738 (2.7)	310 (0.4)	2428 (15.7)	
Living Status					**p = 0.005**
	Living alone	31 987 (31.8)	27 223 (32.0)	4764 (30.8)	
	Not living alone	68 113 (67.7)	57 470 (67.6)	10643 (68.7)	
	Missing	466 (0.5)	384 (0.5)	82 (0.5)	
Immigrant Status					**P<0.001**
	Non-immigrant	82 473 (82.0)	71 878 (84.5)	10 595 (68.4)	
	Immigrant (<10 years)	2794 (2.8)	2294 (2.7)	500 (3.2)	
	Immigrant (=>10 years)	12 986 (12.9)	10 709 (12.6)	2277 (14.7)	
	Missing	2313 (2.3)	196 (0.2)	2117 (13.7)	
Visible Minority Status					**P<0.001**
	White	87 207 (86.7)	75 707 (89.0)	11 500 (74.3)	
	Non-White	10 937 (10.9)	9062 (10.7)	1875 (12.1)	
	Missing	2422 (2.4)	308 (0.4)	2114 (13.7)	
Province					**P<0.001**
	NFLD	3164 (3.2)	2835 (3.3)	329 (2.1)	
	PEI	1601 (1.6)	1394 (1.6)	207 (1.3)	
	NS	4003 (4.0)	3491 (4.1)	512 (3.3)	
	NB	4097 (4.1)	3592 (4.2)	505 (3.3)	
	QC	18 845 (18.7)	16 500 (19.4)	2345 (15.1)	
	ONT	35 022 (34.8)	29 274 (34.4)	5748 (37.1)	
	MB	5660 (5.6)	4814 (5.7)	846 (5.5)	
	SK	6127 (6.1)	5041 (5.9)	1086 (7.0)	
	AB	9393 (9.3)	7831 (9.2)	1562 (10.1)	
	BC	12 654 (12.6)	10305 (12.1)	2349 (15.2)	

* Pearson's chi-square test between respondents with a reported income and respondents missing income

Table 3.2. Socioeconomic, demographic, and health characteristics of respondents not missing HUI, missing HUI, an HUI above 0, and an HUI of 0 or less.

Characteristic		Total (%)	HUI not missing (%)	HUI missing (%)	Chi-square*	HUI > 0 (%)	HUI =< 0 (%)	Chi-square**
Total		85 077 (100)	82 895 (97.4)	2182 (2.6)		82 318 (99.3)	577 (0.7)	
Self Preceived Health					p<0.001			***
	Excellent	15 810 (18.6)	15 653 (18.9)	157 (7.2)		15 647 (19.0)	6 (1.0)	
	Very Good	30 863 (36.3)	30 344 (36.6)	519 (23.8)		30 327 (36.8)	17 (3.0)	
	Good	25 186 (29.6)	24 468 (29.5)	718 (32.9)		24 423 (29.7)	45 (7.8)	
	Fair	9730 (11.4)	9211 (11.1)	519 (23.8)		9052 (11.0)	159 (27.6)	
	Poor	3420 (4.0)	3168 (3.8)	252 (11.6)		2820 (3.4)	348 (60.3)	
	Missing	68 (0.1)	51 (0.1)	17 (0.8)		49 (0.1)	2 (0.4)	
Age (years)					p<0.001			p<0.001
	25 to 44	28 115 (33.0)	27 862 (33.6)	253 (11.6)		27 777 (33.7)	85 (14.7)	
	45 to 64	33 306 (39.2)	32 489 (39.2)	817 (37.4)		32 257 (39.2)	232 (40.2)	
	65+	23 656 (27.8)	22 544 (27.2)	1112 (51.0)		22 284 (27.1)	260 (45.1)	
Sex					p=0.009			p=0.109
	Women	46 370 (54.5)	45 241 (54.6)	1129 (51.7)		44 907 (54.6)	334 (57.9)	
Income					p<0.001			p<0.001
	Decile 1 (poorest)	8578 (10.1)	8248 (10.0)	330 (15.1)		8078 (9.8)	170 (29.5)	
	Decile 2	10 000 (11.8)	9573 (11.6)	427 (19.6)		9448 (11.5)	125 (21.7)	
	Decile 3	9042 (10.6)	8743 (10.6)	299 (13.7)		8664 (10.5)	79 (13.7)	
	Decile 4	8041 (9.5)	7826 (9.4)	215 (9.9)		7782 (9.5)	44 (7.6)	
	Decile 5	8229 (9.7)	8006 (9.7)	223 (10.2)		7965 (9.7)	41 (7.1)	
	Decile 6	8512 (10.0)	8323 (10.0)	189 (8.7)		8275 (10.1)	48 (8.3)	
	Decile 7	8276 (9.7)	8147 (9.8)	129 (5.9)		8119 (9.9)	28 (4.9)	
	Decile 8	7732 (9.1)	7604 (9.2)	128 (5.9)		7586 (9.2)	18 (3.1)	
	Decile 9	7956 (9.4)	7846 (9.5)	110 (5.0)		7836 (9.5)	10 (1.7)	
	Decile 10 (richest)	8711 (10.2)	8579 (10.4)	132 (6.1)		8565 (10.4)	14 (2.4)	
Education					p<0.001			p<0.001
	Less than High School	15 997 (18.8)	15 277 (18.4)	720 (33.0)		15 043 (18.3)	234 (40.6)	
	High School Graduate	13 420 (15.8)	13 104 (15.8)	316 (14.5)		13 031 (15.8)	73 (12.7)	
	Some or Completed Post Secondary	55 350 (65.1)	54 245 (65.4)	1105 (50.6)		53 981 (65.6)	264 (45.8)	
	Missing	310 (0.4)	269 (0.3)	41 (1.9)		263 (0.3)	6 (1.0)	
Living Status					p<0.001			p<0.001
	Living alone	27 223 (32.0)	26 369 (31.8)	854 (39.1)		26 369 (31.8)	230 (39.9)	
	Not living alone	57 470 (67.6)	56 146 (67.7)	1324 (60.7)		56 146 (67.7)	342 (59.3)	
	Missing	384 (0.5)	380 (0.5)	4 (0.2)		375 (0.5)	5 (0.9)	
Immigrant Status					p<0.001			***
	Non-immigrant	71 878 (84.5)	70 032 (84.5)	1846 (84.6)		2269 (2.8)	3 (0.5)	
	Immigrant (<10 years)	2294 (2.7)	2272 (2.7)	22 (1.0)		10 308 (12.5)	92 (15.9)	
	Immigrant (=>10 years)	10 709 (12.6)	10400 (12.55)	309 (14.2)		69 552 (84.5)	480 (83.2)	
	Missing	196 (0.2)	191 (0.2)	5 (0.2)		189 (0.2)	2 (0.4)	
Visible Minority Status					p<0.001			***
	White	75 707 (89.0)	73 762 (89.0)	1945 (89.1)		73 260 (89.0)	502 (87.0)	
	Non-White	9062 (10.7)	8850 (10.7)	212 (9.72)		8779 (10.7)	71 (12.3)	
	Missing	308 (0.4)	283 (0.3)	25 (1.2)		279 (0.3)	4 (0.7)	
Province					p<0.001			p<0.001
	NFLD	2835 (3.3)	2743 (3.3)	92 (4.2)		2724 (3.3)	19 (3.3)	
	PEI	1394 (1.6)	1342 (1.6)	52 (2.4)		1332 (1.6)	10 (1.7)	
	NS	3491 (4.1)	3374 (4.1)	117 (5.4)		3343 (4.1)	31 (5.4)	
	NB	3592 (4.2)	3505 (4.2)	87 (4.0)		3476 (4.2)	29 (5.0)	
	QC	16 500 (19.4)	16 231 (19.6)	269 (12.3)		16 152 (19.6)	79 (13.7)	
	ONT	29 274 (34.4)	28 709 (34.6)	565 (25.9)		28 472 (34.6)	237 (41.1)	
	MB	4814 (5.7)	4592 (5.5)	222 (10.2)		4553 (5.5)	39 (6.8)	
	SK	5041 (5.9)	4846 (5.9)	195 (8.9)		4825 (5.9)	21 (3.6)	
	AB	7831 (9.2)	7556 (9.1)	275 (12.6)		7519 (9.1)	37 (6.4)	
	BC	10 305 (12.1)	9997 (12.1)	308 (14.1)		9922 (12.1)	75 (13.0)	

* Pearson's chi-square test between respondents with an HUI and respondents missing HUI
** Pearson's chi-square test between respondents with an HUI greater than 0 and respondents with an HUI of 0 or less
*** Pearson's chi-square test failed because of low sample size in cells

4. Distribution of the HUI by income and sex, all ages

Figure 4.1. Distribution of the HUI by income and sex, all ages
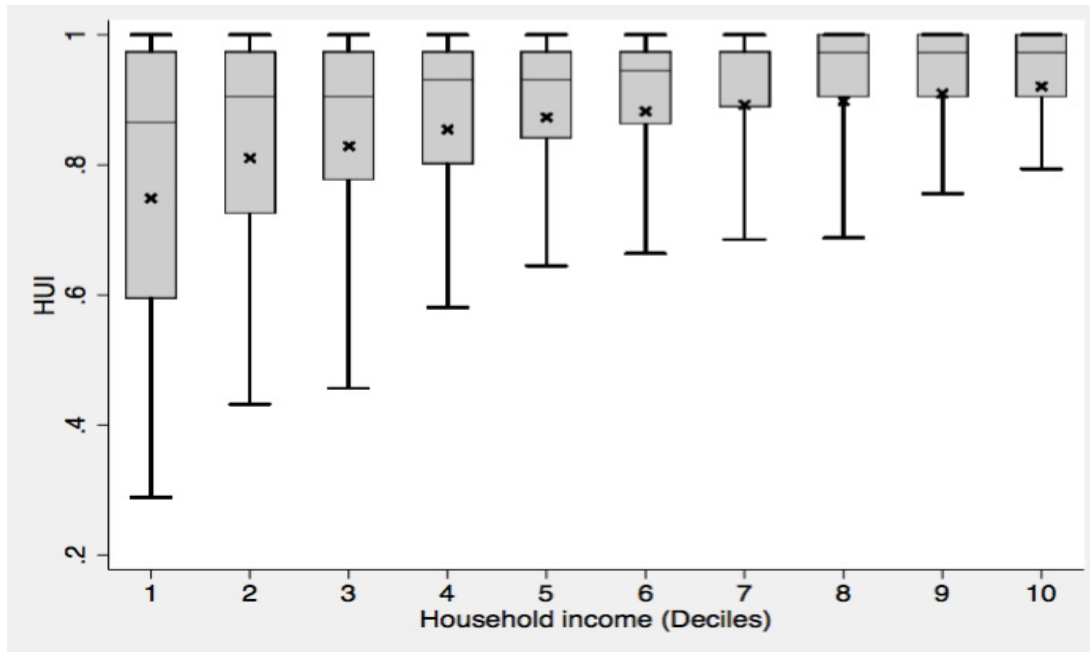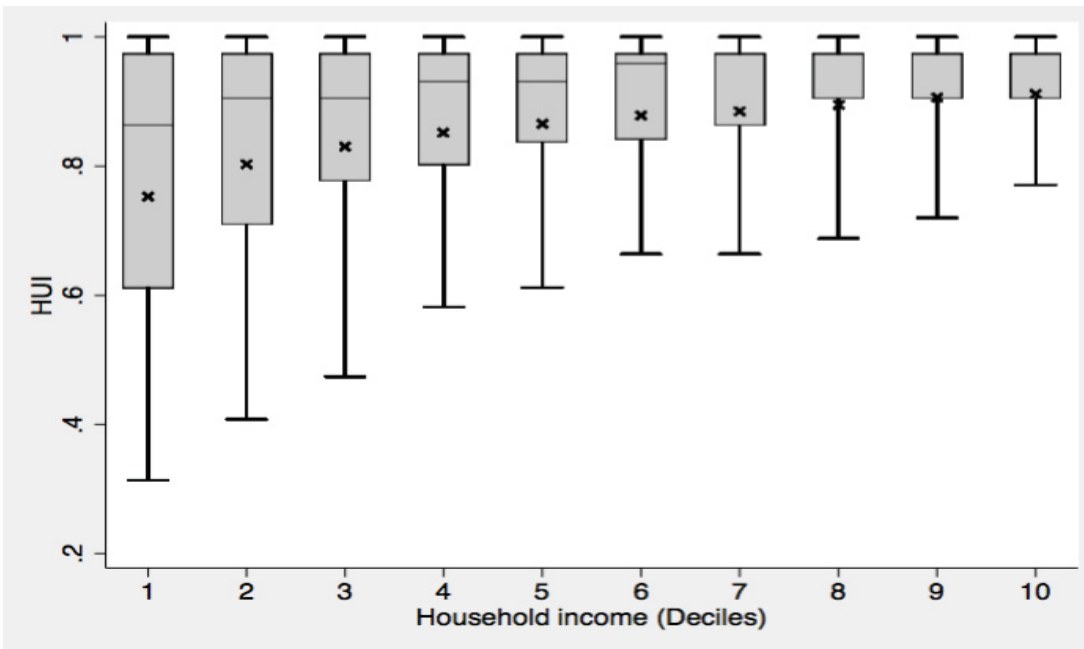
Men

Women

HUI: Health Utility Index
Data source: 2009/10 Canadian Community Health Survey
Boxes show the interquartile range and the whiskers show the 10th and 90th centiles.
The median value is indicated by the line, and the mean value is indicated by 'x'.
Income decile 1 is the poorest, and 10 is the richest.
All analyses were unweighted.

5. Distribution of the HUI by education and sex, all ages

Figure 5.1. Distribution of the HUI by education and sex, all ages
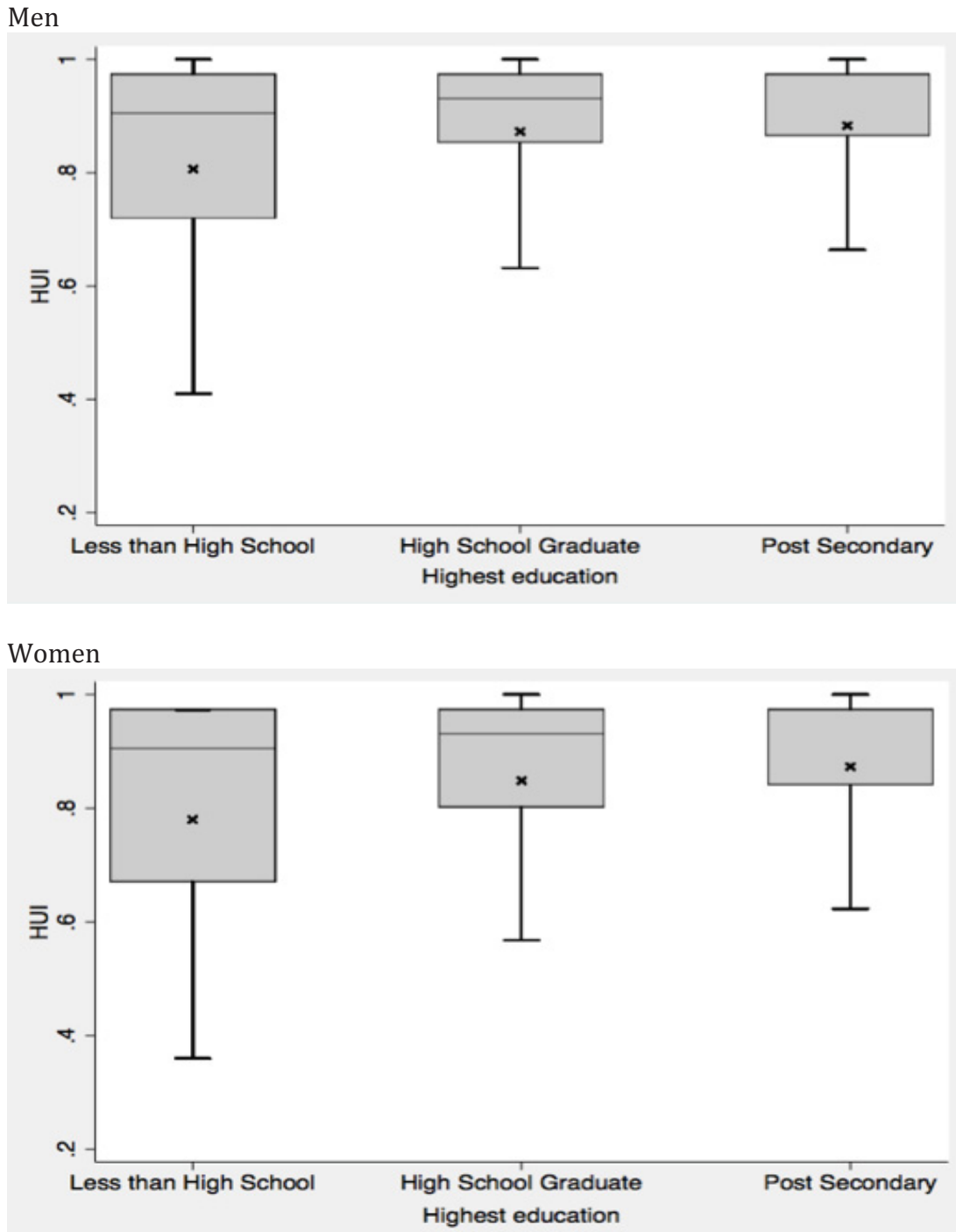
Men

Women

HUI: Health Utility Index
Data source: 2009/10 Canadian Community Health Survey
Boxes show the interquartile range and the whiskers show the 10th and 90th centiles.
The median value is indicated by the line, and the mean value is indicated by 'x'.
All analyses were unweighted.

6. Theil decomposition of health inequality within- and between subgroups by group, stratified by age and sex.

Table 6.1. Theil decomposition of health inequality within- and between-subgroups by income and education, stratified by age and sex.

Group (Number of subgroups)	Number of Subgroups	25 - 44 yrs			45 - 64 yrs			65+ yrs		
		Value*	Within- subgroup % contribution ^	Between-subgroup % contribution ^	Value*	Within- subgroup % contribution ^	Between-subgroup % contribution ^	Value*	Within- subgroup % contribution ^	Between-subgroup % contribution ^
Men										
Income (10)	10	0.018	97.9	2.1	0.026	95.4	4.6	0.043	97.1	2.9
Income (3)	3	0.018	98.5	1.5	0.026	96.8	3.2	0.043	98.8	1.2
Education	3	0.018	98.6	1.4	0.026	99.1	0.9	0.043	99.1	0.9
Women										
Income (10)	10	0.017	96.4	3.6	0.032	94.9	5.1	0.056	98.9	1.1
Income (3)	3	0.017	97.4	2.6	0.032	96.3	3.7	0.056	99.2	0.8
Education	3	0.017	99.1	0.9	0.032	98.9	1.1	0.056	99.0	1.0

* Theil index value where 0 indicates that participants have equal HUI scores and 1 indicates completely inequal HUI scores.

^ The percent-relative contribution of the Theil indecies value attributed to within- and between-subgroups. A higher percentage indicates greater contribution to health inequality.

All analyses were weighted using sample weights provided in the CCHS 2009/10

Table 6.2. Theil decomposition of health inequality within- and between-subgroups by alternative multi-characteristic group, stratified by age and sex.

Group (number of subgroups)	Number of subgroups	25 - 44 yrs			45 - 64 yrs			65+ yrs		
		Value ~	Within- subgroup % contribution ^	Between-subgroup % contribution ^	Value ~	Within- subgroup % contribution ^	Between-subgroup % contribution ^	Value ~	Within- subgroup % contribution ^	Between-subgroup % contribution ^
Men										
Income (10) + Education	30	NA	NA	NA	NA	NA	NA	NA	NA	NA
Income (3) + Education	9	NA	NA	NA	NA	NA	NA	NA	NA	NA
Income (10) + Province (10)	100	0.018	96.4	3.6	0.026	93.4	6.6	0.043	96.8	3.2
Income (10) + Province (4)	40	NA	NA	NA	0.026	94.4	5.6	NA	NA	NA
Income (3) + Province (10)	30	0.018	98.1	1.9	0.026	95.7	4.3	NA	NA	NA
Income (3) + Province (4)	12	0.018	98.3	1.7	0.026	96.3	3.7	NA	NA	NA
Income (10) + Living Status	20	0.018	97.2	2.8	0.026	94.8	5.2	NA*	NA*	NA*
Income (3) + Living Status	6	0.018	98.1	1.9	0.026	96.1	3.9	NA*	NA*	NA*
Education + Province (10)	30	NA	NA	NA	0.026	98.2	1.8	NA	NA	NA
Education + Province (4)	12	NA	NA	NA	NA	NA	NA	NA	NA	NA
Immigrant Status + Living Status	6	NA	NA	NA	NA	NA	NA	NA**	NA**	NA**
Immigrant Status + Education	9	NA	NA	NA	NA	NA	NA	NA***	NA***	NA***
Women										
Income (10) + Education	30	NA	NA	NA	NA	NA	NA	NA	NA	NA
Income (3) + Education	9	NA	NA	NA	NA	NA	NA	NA	NA	NA
Income (10) + Province (10)	100	0.017	95.5	4.5	0.032	92.8	7.2	0.056	97.4	2.6
Income (10) + Province (4)	40	NA	NA	NA	0.032	94.1	5.9	0.056	98.4	1.6
Income (3) + Province (10)	30	0.017	96.9	3.1	NA	NA	NA	NA	NA	NA
Income (3) + Province (4)	12	NA	NA	NA	0.032	96.0	4.0	NA	NA	NA
Income (10) + Living Status	20	0.017	95.8	4.2	0.032	94.3	5.7	NA*	NA*	NA*
Income (3) + Living Status	6	NA	NA	NA	0.032	95.9	4.2	NA*	NA*	NA*
Education + Province (10)	30	0.017	98.6	1.4	NA	NA	NA	NA	NA	NA
Education + Province (4)	12	NA	NA	NA	NA	NA	NA	NA	NA	NA
Immigrant Status + Living Status	6	NA***	NA***	NA***	NA***	NA***	NA***	NA**	NA**	NA**
Immigrant Status + Education	9	NA***	NA***	NA***	NA***	NA***	NA***	NA***	NA***	NA***

~ Theil index value where 0 indicates that participants have equal HUI scores and 1 incidates completely inequal HUI scores.

^ The percent-relative contribution of the Theil indecies value attributed to within- and between-subgroups. A higher percentage indicates greater contribution to health inequality.

NA Interaction was not significant (p>0.05)

NA* Living status was not significantly related to HUI in unadjusted linear regression model.

NA** Immigrant status and living status was not sigificantly related to HUI in unadjusted linear regression model.

NA*** Immigrant status was not sigificantly related to HUI in unadjusted linear regression model.

All analyses were weighted using sample weights provided in the CCHS 2009/10

The column identifying the two-characteristics groups shows numbers in brackets. This refers to the number of subgroups belonging to one group characteristic. For example, Income (10) + Education has 10 income subgroups.

The column titled "number of subgroups" refers to the resulting number of subgroups afte combining two-characteristic groups. For example, Income (10)+ Education has 30 subgroups.

7. Theil decomposition of health inequality by province, and by income within each province, stratified by age and sex. All analyses below are weighted.

Table 7.1. Theil decomposition of health inequality by province, and by income within each province: men 25-44 years old.

| | Decomposition by Province | | Decomposition by Income decile in Provinces | | | | | | | |
| | | | NFLD | | PEI | | NS | | NB | |
	Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^
NFLD	0.0003	1.5								
Decile 1			0.0024	12.2						
Decile 2			0.0001	0.6						
Decile 3			0.0017	8.9						
Decile 4			0.0015	8.0						
Decile 5			0.0039	20.2						
Decile 6			0.0017	8.6						
Decile 7			0.0009	4.6						
Decile 8			0.0036	18.8						
Decile 9			0.0021	10.7						
Decile 10			0.0004	2.1						
PEI	0.0001	0.3								
Decile 1					0.0006	3.8				
Decile 2					0.0003	2.3				
Decile 3					0.0012	8.3				
Decile 4					0.0041	27.0				
Decile 5					0.0018	12.3				
Decile 6					0.0023	15.3				
Decile 7					0.0014	9.4				
Decile 8					0.0022	14.7				
Decile 9					0.0005	3.1				
Decile 10					0.0001	0.7				
NS	0.0006	3.6								
Decile 1							0.0039	15.8		
Decile 2							0.0027	10.9		
Decile 3							0.0043	17.7		
Decile 4							0.0027	10.8		
Decile 5							0.0039	16.0		
Decile 6							0.0011	4.5		
Decile 7							0.0010	4.1		
Decile 8							0.0022	8.9		
Decile 9							0.0003	1.4		
Decile 10							0.0010	3.9		
NB	0.0004	2.2								
Decile 1									0.0023	12.1
Decile 2									0.0037	19.7
Decile 3									0.0006	3.4
Decile 4									0.0006	3.3
Decile 5									0.0016	8.6
Decile 6									0.0015	8.2
Decile 7									0.0044	23.5
Decile 8									0.0007	3.9
Decile 9									0.0011	6.0
Decile 10									0.0004	2.3
Within-group	0.0177	99.9	0.0183	94.8	0.0145	96.9	0.0231	93.9	0.0172	91.3
Between-group	<0.0001	0.1	0.0010	5.2	0.0005	3.1	0.0015	6.1	0.0017	8.7
Total	0.0177	100	0.0193	100.0	0.015	100	0.0246	100	0.0189	100

~   Theil index value where 0 indicates that participants have equal HUI scores and 1 incidates completely inequal HUI scores.

^   The percent-relative contribution of the Theil indecies value attributed to within- and between-subgroups. A higher percentage indicates greater contribution to health inequality.

Table 7.1. Theil decomposition of health inequality by province, and by income within each province: men, 25-44 years old, continued…

| | Decomposition by Province | | | Decomposition by Income decile in Provinces | | | | | |
| | | | | QC | | ONT | | MB | |
	Value~	Contribution (%)^		Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^
QC	0.0040	22.5							
			Decile 1	0.0021	12.3				
			Decile 2	0.0010	6.2				
			Decile 3	0.0028	16.5				
			Decile 4	0.0014	8.6				
			Decile 5	0.0009	5.5				
			Decile 6	0.0009	5.4				
			Decile 7	0.0014	8.1				
			Decile 8	0.0007	4.4				
			Decile 9	0.0046	27.1				
			Decile 10	0.0007	4.0				
ONT	0.0070	39.2							
			Decile 1			0.0034	18.8		
			Decile 2			0.0018	10.0		
			Decile 3			0.0015	8.3		
			Decile 4			0.0017	9.3		
			Decile 5			0.0018	9.7		
			Decile 6			0.0016	8.7		
			Decile 7			0.0032	17.4		
			Decile 8			0.0009	5.1		
			Decile 9			0.0009	5.1		
			Decile 10			0.0006	3.5		
MB	0.0007	4.1							
			Decile 1					0.0035	17.1
			Decile 2					0.0036	18.1
			Decile 3					0.0014	6.8
			Decile 4					0.0004	2.1
			Decile 5					0.0038	18.7
			Decile 6					0.0011	5.3
			Decile 7					0.0024	12.1
			Decile 8					0.0007	3.4
			Decile 9					0.0010	4.8
			Decile 10					0.0004	1.7
Within-group	0.0177	99.9		0.0165	98.2	0.0175	96.0	0.0182	90.1
Between-group	<0.0001	0.1		0.0003	1.8	0.0007	4.0	0.0020	9.9
Total	0.0177	100		0.0168	100	0.0182	100	0.0202	100

~ Theil index value where 0 indicates that participants have equal HUI scores and 1 incidates completely inequal HUI scores.
^ The percent-relative contribution of the Theil indecies value attributed to within- and between-subgroups.
A higher percentage indicates greater contribution to health inequality.

Table 7.1. Theil decomposition of health inequality by province, and by income within each province: men, 25-44 years old, continued...

| | Decomposition by Province | | | Decomposition by Income decile in Provinces | | | | | |
| | | | | SK | | AB | | BC | |
	Value~	Contribution (%)^		Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^
SK	0.0004	2.3							
			Decile 1	0.0034	23.7				
			Decile 2	0.0008	5.4				
			Decile 3	0.0020	13.9				
			Decile 4	0.0020	13.7				
			Decile 5	0.0009	6.0				
			Decile 6	0.0005	3.7				
			Decile 7	0.0011	7.4				
			Decile 8	0.0008	5.4				
			Decile 9	0.0010	6.9				
			Decile 10	0.0007	4.6				
AB	0.0018	10.1							
			Decile 1			0.0021	14.9		
			Decile 2			0.0014	9.7		
			Decile 3			0.0013	9.3		
			Decile 4			0.0013	9.4		
			Decile 5			0.0024	17.0		
			Decile 6			0.0014	9.9		
			Decile 7			0.0008	5.9		
			Decile 8			0.0008	5.5		
			Decile 9			0.0014	9.9		
			Decile 10			0.0010	6.9		
BC	0.0024	13.8							
			Decile 1					0.0028	14.3
			Decile 2					0.0013	6.6
			Decile 3					0.0023	11.6
			Decile 4					0.0014	7.2
			Decile 5					0.0017	8.5
			Decile 6					0.0036	18.1
			Decile 7					0.0023	11.4
			Decile 8					0.0021	10.3
			Decile 9					0.0013	6.5
			Decile 10					0.0008	3.8
Within-group	0.0177	99.9		0.0131	90.7	0.0138	98.4	0.0195	98.1
Between-group	<0.0001	0.1		0.0014	9.3	0.0002	1.6	0.0004	1.9
Total	0.0177	100		0.0145	100	0.014	100	0.0199	100

~   Theil index value where 0 indicates that participants have equal HUI scores and 1 incidates completely inequal HUI scores.

^   The percent-relative contribution of the Theil indecies value attributed to within- and between-subgroups.

A higher percentage indicates greater contribution to health inequality.

Table 7.2. Theil decomposition of health inequality by province, and by income within each province: men 45-64 years old.

| | Decomposition by Province | | | Decomposition by Income decile in Provinces | | | | | | | | |
| | | | | NFLD | | PEI | | NS | | NB | |
	Value~	Contribution (%)^		Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^
NFLD	0.0006	2.2									
			Decile 1	0.0047	14.0						
			Decile 2	0.0040	11.7						
			Decile 3	0.0056	16.7						
			Decile 4	0.0054	16.0						
			Decile 5	0.0040	11.9						
			Decile 6	0.0017	5.0						
			Decile 7	0.0024	7.0						
			Decile 8	0.0012	3.6						
			Decile 9	0.0008	2.3						
			Decile 10	0.0007	2.1						
PEI	0.0001	0.5									
			Decile 1			0.0034	11.9				
			Decile 2			0.0036	12.6				
			Decile 3			0.0028	9.7				
			Decile 4			0.0018	6.1				
			Decile 5			0.0008	2.9				
			Decile 6			0.0011	3.7				
			Decile 7			0.0027	9.2				
			Decile 8			0.0070	24.2				
			Decile 9			0.0010	3.5				
			Decile 10			0.0029	10.1				
NS	0.0011	4.1									
			Decile 1					0.0071	17.9		
			Decile 2					0.0019	4.8		
			Decile 3					0.0044	11.2		
			Decile 4					0.0045	11.4		
			Decile 5					0.0029	7.3		
			Decile 6					0.0021	5.2		
			Decile 7					0.0048	12.0		
			Decile 8					0.0035	8.8		
			Decile 9					0.0012	3.0		
			Decile 10					0.0027	6.9		
NB	0.0008	3.1									
			Decile 1							0.0068	18.8
			Decile 2							0.0073	20.3
			Decile 3							0.0039	10.7
			Decile 4							0.0018	4.9
			Decile 5							0.0027	7.6
			Decile 6							0.0032	8.8
			Decile 7							0.0017	4.7
			Decile 8							0.0019	5.4
			Decile 9							0.0005	1.3
			Decile 10							0.0009	2.5
Within-group	0.0262	99.4		0.0305	90.1	0.0272	93.9	0.0351	88.5	0.0306	85.1
Between-group	0.0002	0.6		0.0033	9.9	0.0018	6.1	0.0046	11.5	0.0054	14.9
Total	0.0264	100		0.0338	100	0.0290	100	0.0397	100	0.0360	100

~ Theil index value where 0 indicates that participants have equal HUI scores and 1 incidates completely inequal HUI scores.

^ The percent-relative contribution of the Theil indecies value attributed to within- and between-subgroups. A higher percentage indicates greater contribution to health inequality.

Table 7.2. Theil decomposition of health inequality by province, and by income within each province: men 45-64 years old, continued…

	Decomposition by Province			Decomposition by Income decile in Provinces					
				QC		ONT		MB	
	Value~	Contribution (%)^		Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^
QC	0.0041	15.5							
			Decile 1	0.0026	16.4				
			Decile 2	0.0014	9.0				
			Decile 3	0.0017	10.5				
			Decile 4	0.0009	5.9				
			Decile 5	0.0014	9.1				
			Decile 6	0.0017	10.9				
			Decile 7	0.0009	6.0				
			Decile 8	0.0021	13.2				
			Decile 9	0.0009	6.0				
			Decile 10	0.0016	10.0				
ONT	0.0122	46.3							
			Decile 1			0.0054	16.6		
			Decile 2			0.0036	10.8		
			Decile 3			0.0027	8.3		
			Decile 4			0.0025	7.7		
			Decile 5			0.0047	14.3		
			Decile 6			0.0022	6.8		
			Decile 7			0.0023	6.9		
			Decile 8			0.0047	14.2		
			Decile 9			0.0019	5.8		
			Decile 10			0.0014	4.3		
MB	0.0009	3.3							
			Decile 1					0.0065	26.2
			Decile 2					0.0008	3.3
			Decile 3					0.0022	8.8
			Decile 4					0.0029	11.5
			Decile 5					0.0028	11.2
			Decile 6					0.0009	3.5
			Decile 7					0.0015	6.2
			Decile 8					0.0012	4.7
			Decile 9					0.0010	4.1
			Decile 10					0.0012	4.8
Within-group	0.0262	99.4		0.0153	97.1	0.0316	95.8	0.021	84.2
Between-group	0.0002	0.6		0.0005	2.9	0.0014	4.2	0.0039	15.8
Total	0.0264	100		0.0158	100	0.0330	100	0.0249	100

~   Theil index value where 0 indicates that participants have equal HUI scores and 1 incidates completely inequal HUI scores.
^   The percent-relative contribution of the Theil indecies value attributed to within- and between-subgroups.
A higher percentage indicates greater contribution to health inequality.

Table 7.2. Theil decomposition of health inequality by province, and by income within each province: men 45-64 years old, continued...

| | Decomposition by Province | | | Decomposition by Income decile in Provinces | | | | | |
| | | | | SK | | AB | | BC | |
	Value~	Contribution (%)^		Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^
SK	0.0007	2.8							
			Decile 1	0.0017	6.3				
			Decile 2	0.0027	10.1				
			Decile 3	0.0008	3.1				
			Decile 4	0.0051	19.2				
			Decile 5	0.0009	3.4				
			Decile 6	0.0030	11.3				
			Decile 7	0.0044	16.6				
			Decile 8	0.0011	4.1				
			Decile 9	0.0040	15.0				
			Decile 10	0.0014	5.2				
AB	0.0028	10.6							
			Decile 1			0.0052	19.0		
			Decile 2			0.0015	5.4		
			Decile 3			0.0024	8.8		
			Decile 4			0.0009	3.2		
			Decile 5			0.0012	4.2		
			Decile 6			0.0038	13.9		
			Decile 7			0.0024	8.8		
			Decile 8			0.0033	12.0		
			Decile 9			0.0026	9.4		
			Decile 10			0.0029	10.6		
BC	0.0029	10.9							
			Decile 1					0.0061	28.6
			Decile 2					0.0018	8.6
			Decile 3					0.0011	5.0
			Decile 4					0.0015	6.8
			Decile 5					0.0020	9.2
			Decile 6					0.0006	2.9
			Decile 7					0.0010	4.9
			Decile 8					0.0014	6.7
			Decile 9					0.0015	6.8
			Decile 10					0.0020	9.3
Within-group	0.0262	99.4		0.0252	94.3	0.0263	95.3	0.019	88.6
Between-group	0.0002	0.6		0.0015	5.7	0.0013	4.7	0.0024	11.4
Total	0.0264	100		0.0267	100	0.0276	100	0.0214	100

~   Theil index value where 0 indicates that participants have equal HUI scores and 1 incidates completely inequal HUI scores.
^   The percent-relative contribution of the Theil indecies value attributed to within- and between-subgroups.
A higher percentage indicates greater contribution to health inequality.

Table 7.3. Theil decomposition of health inequality by province, and by income within each province: men 65+ years old.

| | Decomposition by Province | | | Decomposition by Income decile in Provinces | | | | | | | |
| | | | | NFLD | | PEI | | NS | | NB | |
	Value~	Contribution (%)^		Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^
NFLD	0.0008	1.9									
			Decile 1	0.0033	7.8						
			Decile 2	0.0182	42.9						
			Decile 3	0.0075	17.7						
			Decile 4	0.0048	11.4						
			Decile 5	0.0025	5.8						
			Decile 6	0.0028	6.5						
			Decile 7	0.0001	0.3						
			Decile 8	0.0003	0.7						
			Decile 9	0.0002	0.5						
			Decile 10	0.0003	0.7						
PEI	0.0003	0.6									
			Decile 1			0.0149	27.3				
			Decile 2			0.0071	13.1				
			Decile 3			0.0078	14.2				
			Decile 4			0.0046	8.5				
			Decile 5			0.0079	14.5				
			Decile 6			0.0006	1.0				
			Decile 7			0.0057	10.5				
			Decile 8			0.0014	2.6				
			Decile 9			0.0001	0.1				
			Decile 10			<0.0001	0.1				
NS	0.0019	4.4									
			Decile 1					0.0042	7.2		
			Decile 2					0.0133	22.6		
			Decile 3					0.0099	16.8		
			Decile 4					0.0115	19.6		
			Decile 5					0.0031	5.2		
			Decile 6					0.0041	6.9		
			Decile 7					0.0017	2.9		
			Decile 8					0.0030	5.1		
			Decile 9					0.0030	5.0		
			Decile 10					0.0033	5.7		
NB	0.0015	3.6									
			Decile 1							0.0055	9.2
			Decile 2							0.0176	29.5
			Decile 3							0.0117	19.7
			Decile 4							0.0035	5.8
			Decile 5							0.0042	7.0
			Decile 6							0.0055	9.2
			Decile 7							0.0052	8.8
			Decile 8							0.0024	4.1
			Decile 9							0.0001	0.1
			Decile 10							<0.0001	0.1
Within-group	0.0422	99.1		0.0401	94.4	0.0501	91.9	0.0572	97.2	0.0558	93.5
Between-group	0.0004	0.9		0.0024	5.6	0.0044	8.1	0.0017	2.8	0.0039	6.5
Total	0.0426	100		0.0425	100	0.0545	100	0.0589	100	0.0597	100

~ Theil index value where 0 indicates that participants have equal HUI scores and 1 incidates completely inequal HUI scores.

^ The percent-relative contribution of the Theil indecies value attributed to within- and between-subgroups. A higher percentage indicates greater contribution to health inequality.

Table 7.3. Theil decomposition of health inequality by province, and by income within each province: men 65+ years old, continued...

| | Decomposition by Province | | | Decomposition by Income decile in Provinces | | | | | |
| | Value~ | Contribution (%)^ | | QC | | ONT | | MB | |
				Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^
QC	0.0079	18.6							
			Decile 1	0.0020	6.8				
			Decile 2	0.0053	17.8				
			Decile 3	0.0080	27.1				
			Decile 4	0.0033	11.2				
			Decile 5	0.0028	9.4				
			Decile 6	0.0025	8.4				
			Decile 7	0.0013	4.4				
			Decile 8	0.0017	5.8				
			Decile 9	0.0006	2.1				
			Decile 10	0.0018	5.9				
ONT	0.0168	39.3							
			Decile 1			0.0043	9.5		
			Decile 2			0.0073	16.1		
			Decile 3			0.0083	18.4		
			Decile 4			0.0053	11.7		
			Decile 5			0.0031	6.9		
			Decile 6			0.0052	11.5		
			Decile 7			0.0038	8.4		
			Decile 8			0.0017	3.8		
			Decile 9			0.0022	4.8		
			Decile 10			0.0036	7.9		
MB	0.0018	4.2							
			Decile 1					0.0073	13.7
			Decile 2					0.0144	27.1
			Decile 3					0.0067	12.7
			Decile 4					0.0044	8.2
			Decile 5					0.0011	2.1
			Decile 6					0.0029	5.5
			Decile 7					0.004	7.6
			Decile 8					0.0028	5.3
			Decile 9					0.0049	9.1
			Decile 10					0.0007	1.3
Within-group	0.0422	99.1		0.0293	98.8	0.0448	99.0	0.0494	92.8
Between-group	0.0004	0.9		0.0004	1.2	0.0004	1.0	0.0038	7.2
Total	0.0426	100		0.0297	100	0.0452	100	0.0532	100

~   Theil index value where 0 indicates that participants have equal HUI scores and 1 incidates completely inequal HUI scores.

^   The percent-relative contribution of the Theil indecies value attributed to within- and between-subgroups.

A higher percentage indicates greater contribution to health inequality.

Table 7.3. Theil decomposition of health inequality by province, and by income within each province: men 65+ years old, continued...

| | Decomposition by Province | | | Decomposition by Income decile in Provinces | | | | | |
| | | | | SK | | AB | | BC | |
	Value~	Contribution (%)^		Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^
SK	0.0015	3.6							
			Decile 1	0.0096	18.3				
			Decile 2	0.0110	20.9				
			Decile 3	0.0063	11.9				
			Decile 4	0.0045	8.5				
			Decile 5	0.0025	4.7				
			Decile 6	0.0027	5.2				
			Decile 7	0.0056	10.7				
			Decile 8	0.0012	2.4				
			Decile 9	0.0012	2.3				
			Decile 10	0.0049	9.4				
AB	0.0040	9.3							
			Decile 1			0.0099	19.9		
			Decile 2			0.0130	26		
			Decile 3			0.0064	12.9		
			Decile 4			0.0059	11.8		
			Decile 5			0.0026	5.3		
			Decile 6			0.0018	3.6		
			Decile 7			0.0023	4.6		
			Decile 8			0.0007	1.4		
			Decile 9			0.0046	9.1		
			Decile 10			0.0007	1.4		
BC	0.0057	13.5							
			Decile 1					0.0046	11.1
			Decile 2					0.0071	17.1
			Decile 3					0.0063	15.2
			Decile 4					0.0062	15.0
			Decile 5					0.0033	8.0
			Decile 6					0.0053	12.9
			Decile 7					0.0021	5.1
			Decile 8					0.0022	5.2
			Decile 9					0.0013	3.2
			Decile 10					0.0021	5.2
Within-group	0.0422	99.1		0.0496	94.2	0.0479	95.9	0.0406	97.9
Between-group	0.0004	0.9		0.0031	5.8	0.002	4.1	0.0009	2.1
Total	0.0426	100		0.0527	100	0.0499	100	0.0415	100

~ Theil index value where 0 indicates that participants have equal HUI scores and 1 incidates completely inequal HUI scores.

^ The percent-relative contribution of the Theil indecies value attributed to within- and between-subgroups.

A higher percentage indicates greater contribution to health inequality.

Table 7.4. Theil decomposition of health inequality by province, and by income within each province: women 25-44 years old.

	Decomposition by Province			NFLD		PEI		NS		NB	
	Value~	Contribution (%)^		Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^
NFLD	0.0003	16.8									
			Decile 1	0.0023	13						
			Decile 2	0.0021	12.2						
			Decile 3	0.0005	2.9						
			Decile 4	0.0038	21.5						
			Decile 5	0.0009	5.3						
			Decile 6	0.0003	1.8						
			Decile 7	0.0017	9.9						
			Decile 8	0.0018	10.5						
			Decile 9	0.0029	16.4						
			Decile 10	0.0006	3.3						
PEI	0.0001	0.4									
			Decile 1			0.0025	14.6				
			Decile 2			0.0003	15.6				
			Decile 3			0.0003	16.6				
			Decile 4			0.0018	10.8				
			Decile 5			0.0028	16.5				
			Decile 6			0.0057	33.9				
			Decile 7			0.0008	4.9				
			Decile 8			0.0020	12.0				
			Decile 9			0.0002	1.0				
			Decile 10			0.0001	0.8				
NS	0.0007	4.2									
			Decile 1					0.0045	17.9		
			Decile 2					0.0025	10.1		
			Decile 3					0.0083	33.1		
			Decile 4					0.0029	11.7		
			Decile 5					0.0014	5.6		
			Decile 6					0.0012	4.9		
			Decile 7					0.0007	2.6		
			Decile 8					0.0005	2.1		
			Decile 9					0.0006	2.3		
			Decile 10					0.0006	2.4		
NB	0.0004	2.1									
			Decile 1							0.0049	28.7
			Decile 2							0.0012	7.2
			Decile 3							0.0010	6.1
			Decile 4							0.0027	15.7
			Decile 5							0.0013	7.7
			Decile 6							0.0016	9.3
			Decile 7							0.0008	4.5
			Decile 8							0.0010	6.0
			Decile 9							0.0013	7.6
			Decile 10							0.0002	1.0
Within-group	0.0170	99.8		0.0170	97.0	0.0165	97.7	0.0233	92.7	0.0159	93.7
Between-group	<0.0001	0.2		0.0005	3.0	0.0004	2.3	0.0018	7.3	0.0011	6.3
Total	0.0170	100		0.0175	100	0.0169	100	0.0251	100	0.0170	100

~   Theil index value where 0 indicates that participants have equal HUI scores and 1 incidates completely inequal HUI scores.

^   The percent-relative contribution of the Theil indecies value attributed to within- and between-subgroups. A higher percentage indicates greater contribution to health inequality.

Table 7.4. Theil decomposition of health inequality by province, and by income within each province: women 25-44 years old, continued...

| | Decomposition by Province | | | Decomposition by Income decile in Provinces | | | | | |
| | | | | QC | | ONT | | MB | |
	Value~	Contribution (%)^		Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^
QC	0.0027	16.1							
			Decile 1	0.0030	26.1				
			Decile 2	0.0021	17.8				
			Decile 3	0.0012	10.4				
			Decile 4	0.0011	9.3				
			Decile 5	0.0011	9.4				
			Decile 6	0.0010	8.4				
			Decile 7	0.0005	4.3				
			Decile 8	0.0007	6.4				
			Decile 9	0.0003	2.3				
			Decile 10	0.0002	1.9				
ONT	0.0070	41.3							
			Decile 1			0.0050	27.6		
			Decile 2			0.0029	16.2		
			Decile 3			0.0022	12.0		
			Decile 4			0.0012	6.6		
			Decile 5			0.0010	5.6		
			Decile 6			0.0013	7.3		
			Decile 7			0.0014	7.9		
			Decile 8			0.0008	4.6		
			Decile 9			0.0008	4.6		
			Decile 10			0.0005	2.5		
MB	0.0005	4.2							
			Decile 1					0.0020	12.1
			Decile 2					0.0020	12.3
			Decile 3					0.0015	9.3
			Decile 4					0.0026	16
			Decile 5					0.0025	15.1
			Decile 6					0.0020	12
			Decile 7					0.0003	2
			Decile 8					0.0009	5.8
			Decile 9					0.0019	11.6
			Decile 10					0.0003	2.1
Within-group	0.0170	99.8		0.0111	96.1	0.0171	94.8	0.0160	98.2
Between-group	<0.0001	0.2		0.0004	3.9	0.0009	5.2	0.0003	1.8
Total	0.0170	100		0.0115	100	0.018	100	0.0163	100

~   Theil index value where 0 indicates that participants have equal HUI scores and 1 incidates completely inequal HUI scores.
^   The percent-relative contribution of the Theil indecies value attributed to within- and between-subgroups.
A higher percentage indicates greater contribution to health inequality.

Table 7.4. Theil decomposition of health inequality by province, and by income within each province: women 25-44 years old, continued…

	Decomposition by Province			Decomposition by Income decile in Provinces						
				SK		AB		BC		
	Value~	Contribution (%)^		Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^	
SK	0.0006	3.8								
			Decile 1	0.0102	42.8					
			Decile 2	0.0010	4.0					
			Decile 3	0.0017	7.1					
			Decile 4	0.0010	4.0					
			Decile 5	0.0017	7.1					
			Decile 6	0.0016	6.8					
			Decile 7	0.0018	7.5					
			Decile 8	0.0010	4.1					
			Decile 9	0.0006	2.5					
			Decile 10	0.0021	8.6					
AB	0.0021	12.3								
			Decile 1			0.0031	16.2			
			Decile 2			0.0025	13.2			
			Decile 3			0.0018	9.6			
			Decile 4			0.0034	17.5			
			Decile 5			0.0012	6.1			
			Decile 6			0.0009	4.8			
			Decile 7			0.0016	8.5			
			Decile 8			0.0014	7.1			
			Decile 9			0.0012	6.4			
			Decile 10			0.0015	8.1			
BC	0.0025	14.7								
			Decile 1					0.0035	18.5	
			Decile 2					0.0025	13.3	
			Decile 3					0.0016	8.5	
			Decile 4					0.0021	10.9	
			Decile 5					0.0010	5.1	
			Decile 6					0.0034	17.9	
			Decile 7					0.0014	7.2	
			Decile 8					0.0009	4.9	
			Decile 9					0.0011	5.9	
			Decile 10					0.0009	4.9	
Within-group	0.0170	99.8		0.0226	94.5	0.0187	97.4	0.0184	97.1	
Between-group	<0.0001	0.2		0.0013	5.5	0.0005	2.6	0.0006	2.9	
Total	0.0170	100		0.0239	100	0.0192	100	0.019	100	

~ Theil index value where 0 indicates that participants have equal HUI scores and 1 incidates completely inequal HUI scores.

^ The percent-relative contribution of the Theil indecies value attributed to within- and between-subgroups.

A higher percentage indicates greater contribution to health inequality.

Table 7.5. Theil decomposition of health inequality by province, and by income within each province: women 45-64 years old.

| | Decomposition by Province | | | Decomposition by Income decile in Provinces | | | | | | | |
| | | | | NFLD | | PEI | | NS | | NB | |
	Value~	Contribution (%)^		Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^
NFLD	0.0008	2.4									
			Decile 1	0.0083	19.1						
			Decile 2	0.0044	10.2						
			Decile 3	0.0016	3.8						
			Decile 4	0.0041	9.4						
			Decile 5	0.0041	9.3						
			Decile 6	0.0016	3.5						
			Decile 7	0.0029	6.7						
			Decile 8	0.0072	16.5						
			Decile 9	0.0060	13.7						
			Decile 10	0.0011	2.6						
PEI	0.0001	0.4									
			Decile 1			0.0048	16.5				
			Decile 2			0.0027	9.4				
			Decile 3			0.0018	6.3				
			Decile 4			0.0036	12.2				
			Decile 5			0.0025	8.8				
			Decile 6			0.0004	1.3				
			Decile 7			0.0009	3.0				
			Decile 8			0.0067	23.0				
			Decile 9			0.0007	2.4				
			Decile 10			0.0012	4.2				
NS	0.0010	3.3									
			Decile 1					0.0050	15.1		
			Decile 2					0.0036	10.9		
			Decile 3					0.0016	4.9		
			Decile 4					0.0027	8.0		
			Decile 5					0.0028	8.4		
			Decile 6					0.0033	9.9		
			Decile 7					0.0025	7.4		
			Decile 8					0.0037	11.1		
			Decile 9					0.0050	15.1		
			Decile 10					0.0012	3.6		
NB	0.0009	2.8									
			Decile 1							0.0086	23.5
			Decile 2							0.0019	5.2
			Decile 3							0.0019	5.2
			Decile 4							0.0008	2.2
			Decile 5							0.0029	8.1
			Decile 6							0.0020	5.4
			Decile 7							0.0035	9.6
			Decile 8							0.0058	15.9
			Decile 9							0.0027	7.5
			Decile 10							0.0037	10.0
Within-group	0.0314	99.2		0.0413	95.0	0.0254	87.2	0.0315	94.4	0.0338	92.8
Between-group	0.0002	0.8		0.002	5.0	0.0037	12.8	0.0019	5.6	0.0026	7.2
Total	0.0316	100		0.0433	100	0.0291	100	0.0334	100	0.0364	100

~   Theil index value where 0 indicates that participants have equal HUI scores and 1 incidates completely inequal HUI scores.
^   The percent-relative contribution of the Theil indecies value attributed to within- and between-subgroups. A higher percentage indicates greater contribution to health inequality.

Table 7.5. Theil decomposition of health inequality by province, and by income within each province: women 45-64 years old, continued...

| | Decomposition by Province | | | Decomposition by Income decile in Provinces | | | | | |
| | | | | QC | | ONT | | MB | |
	Value~	Contribution (%)^		Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^
QC	0.0054	17.3							
			Decile 1	0.0047	22.3				
			Decile 2	0.0017	8.2				
			Decile 3	0.0030	14.2				
			Decile 4	0.0016	7.4				
			Decile 5	0.0019	9.1				
			Decile 6	0.0019	9.2				
			Decile 7	0.0014	6.7				
			Decile 8	0.0022	10.5				
			Decile 9	0.0006	3.0				
			Decile 10	0.0009	4.3				
ONT	0.0138	43.7							
			Decile 1			0.0075	20.4		
			Decile 2			0.0049	13.3		
			Decile 3			0.0032	8.7		
			Decile 4			0.0037	10.1		
			Decile 5			0.0031	8.4		
			Decile 6			0.0024	6.6		
			Decile 7			0.0026	7.2		
			Decile 8			0.0017	4.6		
			Decile 9			0.0024	6.5		
			Decile 10			0.0023	6.3		
MB	0.0013	4.0							
			Decile 1					0.0066	17.1
			Decile 2					0.0072	18.7
			Decile 3					0.0027	7.0
			Decile 4					0.0044	11.4
			Decile 5					0.0021	5.4
			Decile 6					0.0038	9.9
			Decile 7					0.0023	5.9
			Decile 8					0.0027	7.0
			Decile 9					0.0020	5.3
			Decile 10					0.0019	4.9
Within-group	0.0314	99.2		0.0200	95.0	0.0337	92.0	0.0359	92.6
Between-group	0.0002	0.8		0.0010	5.0	0.0029	8.0	0.0029	7.4
Total	0.0316	100		0.0210	100	0.0366	100	0.0388	100

~ Theil index value where 0 indicates that participants have equal HUI scores and 1 incidates completely inequal HUI scores.

^ The percent-relative contribution of the Theil indecies value attributed to within- and between-subgroups.

A higher percentage indicates greater contribution to health inequality.

Table 7.5. Theil decomposition of health inequality by province, and by income within each province: women 45-64 years old, continued...

	Decomposition by Province			Decomposition by Income decile in Provinces					
				SK		AB		BC	
	Value~	Contribution (%)^		Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^
SK	0.0009	2.9							
			Decile 1	0.0040	12				
			Decile 2	0.0036	10.8				
			Decile 3	0.0039	11.7				
			Decile 4	0.0045	13.4				
			Decile 5	0.0020	5.9				
			Decile 6	0.0024	7.2				
			Decile 7	0.0019	5.6				
			Decile 8	0.0052	15.5				
			Decile 9	0.0022	6.7				
			Decile 10	0.0020	6.1				
AB	0.0031	9.9							
			Decile 1			0.0034	9.8		
			Decile 2			0.0061	17.7		
			Decile 3			0.0017	4.8		
			Decile 4			0.0031	9.1		
			Decile 5			0.0076	22.0		
			Decile 6			0.0014	4.0		
			Decile 7			0.0030	8.7		
			Decile 8			0.0024	6.9		
			Decile 9			0.0009	2.7		
			Decile 10			0.0024	7.0		
BC	0.0040	12.5							
			Decile 1					0.0047	15.9
			Decile 2					0.0045	15.2
			Decile 3					0.0033	11.3
			Decile 4					0.0038	12.7
			Decile 5					0.0016	5.4
			Decile 6					0.0031	10.3
			Decile 7					0.0024	8.0
			Decile 8					0.0019	6.3
			Decile 9					0.0022	7.4
			Decile 10					0.0014	4.7
Within-group	0.0314	99.2		0.0316	94.9	0.0319	92.8	0.0289	97.1
Between-group	0.0002	0.8		0.0017	5.1	0.0025	7.2	0.0008	2.9
Total	0.0316	100		0.0333	100	0.0344	100	0.0297	100

~   Theil index value where 0 indicates that participants have equal HUI scores and 1 incidates completely inequal HUI scores.
^   The percent-relative contribution of the Theil indecies value attributed to within- and between-subgroups.
A higher percentage indicates greater contribution to health inequality.

Table 7.6. Theil decomposition of health inequality by province, and by income within each province: women 65+ years old.

| | Decomposition by Province | | | Decomposition by Income decile in Provinces | | | | | | | |
| | | | | NFLD | | PEI | | NS | | NB | |
	Value~	Contribution (%)^		Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^
NFLD	0.0008	1.4									
			Decile 1	0.0088	20.0						
			Decile 2	0.0131	30.0						
			Decile 3	0.0065	14.8						
			Decile 4	0.0035	8.1						
			Decile 5	0.0030	6.9						
			Decile 6	0.0020	4.6						
			Decile 7	0.0053	12.1						
			Decile 8	0.0002	0.4						
			Decile 9	0.0003	0.7						
			Decile 10	0	0						
PEI	0.0003	0.5									
			Decile 1			0.0123	19.3				
			Decile 2			0.0151	23.8				
			Decile 3			0.0042	6.6				
			Decile 4			0.0100	15.7				
			Decile 5			0.0082	12.9				
			Decile 6			0.0024	3.8				
			Decile 7			0.0046	7.3				
			Decile 8			0.0008	1.2				
			Decile 9			0.0040	6.3				
			Decile 10			0.0001	0.2				
NS	0.0020	3.5									
			Decile 1					0.0124	17.8		
			Decile 2					0.0197	28.5		
			Decile 3					0.0096	13.9		
			Decile 4					0.0066	9.5		
			Decile 5					0.0093	13.4		
			Decile 6					0.0012	1.8		
			Decile 7					0.0018	2.6		
			Decile 8					0.0010	1.5		
			Decile 9					0.0017	2.5		
			Decile 10					0.0029	4.2		
NB	0.0013	2.3									
			Decile 1							0.0054	10.7
			Decile 2							0.0158	31.7
			Decile 3							0.0084	16.9
			Decile 4							0.0085	16.9
			Decile 5							0.0029	5.8
			Decile 6							0.0025	5.1
			Decile 7							0.0047	9.5
			Decile 8							0.0003	0.7
			Decile 9							0.0005	0.9
			Decile 10							<0.0001	<0.1
Within-group	0.0556	99.4		0.0427	97.7	0.0617	97.2	0.0663	95.6	0.0491	98.3
Between-group	0.0003	0.6		0.0010	2.3	0.0020	2.8	0.0030	4.4	0.0009	1.7
Total	0.0559	100		0.0437	100	0.0637	100	0.0693	100	0.0500	100

~ Theil index value where 0 indicates that participants have equal HUI scores and 1 incidates completely inequal HUI scores.
^ The percent-relative contribution of the Theil indecies value attributed to within- and between-subgroups. A higher percentage indicates greater contribution to health inequality.

Table 7.6. Theil decomposition of health inequality by province, and by income within each province: women 65+ years old, continued...

	Decomposition by Province			Decomposition by Income decile in Provinces					
				QC		ONT		MB	
	Value~	Contribution (%)^		Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^
QC	0.0126	22.5							
			Decile 1	0.1218	26.6				
			Decile 2	0.0109	23.8				
			Decile 3	0.0076	16.5				
			Decile 4	0.0042	9.1				
			Decile 5	0.0029	6.2				
			Decile 6	0.0024	5.3				
			Decile 7	0.0025	5.4				
			Decile 8	0.0014	3.0				
			Decile 9	0.0006	1.2				
			Decile 10	0.0006	1.3				
ONT	0.0232	41.6							
			Decile 1			0.0093	15.0		
			Decile 2			0.0165	26.5		
			Decile 3			0.0104	16.7		
			Decile 4			0.0061	9.8		
			Decile 5			0.0053	8.5		
			Decile 6			0.0032	5.2		
			Decile 7			0.0039	6.3		
			Decile 8			0.0017	2.8		
			Decile 9			0.0031	5.0		
			Decile 10			0.0017	2.7		
MB	0.0015	2.7							
			Decile 1					0.0112	25.4
			Decile 2					0.0087	20.0
			Decile 3					0.0081	18.4
			Decile 4					0.0042	9.4
			Decile 5					0.0015	3.5
			Decile 6					0.0041	9.4
			Decile 7					0.0009	1.9
			Decile 8					0.0008	1.7
			Decile 9					0.0014	3.1
			Decile 10					0.0007	1.7
Within-group	0.0556	99.4		0.0452	98.5	0.0613	98.5	0.0416	94.5
Between-group	0.0003	0.6		0.0007	1.5	0.0009	1.5	0.0024	5.5
Total	0.0559	100		0.0459	100	0.0622	100	0.044	100

~ Theil index value where 0 indicates that participants have equal HUI scores and 1 incidates completely inequal HUI scores.
^ The percent-relative contribution of the Theil indecies value attributed to within- and between-subgroups.
A higher percentage indicates greater contribution to health inequality.

Table 7.6. Theil decomposition of health inequality by province, and by income within each province: women 65+ years old, continued…

	Decomposition by Province			Decomposition by Income decile in Provinces					
				SK		AB		BC	
	Value~	Contribution (%)^		Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^
SK	0.0015	2.6							
			Decile 1	0.0113	23.6				
			Decile 2	0.0119	24.9				
			Decile 3	0.0090	18.9				
			Decile 4	0.0044	9.2				
			Decile 5	0.0050	10.4				
			Decile 6	0.0027	5.8				
			Decile 7	0.0004	0.9				
			Decile 8	0.0008	1.7				
			Decile 9	0.0006	1.3				
			Decile 10	0.0006	1.2				
AB	0.0050	8.9							
			Decile 1			0.0145	22.1		
			Decile 2			0.0203	31.1		
			Decile 3			0.0079	12.1		
			Decile 4			0.0089	13.6		
			Decile 5			0.0056	8.6		
			Decile 6			0.0031	4.8		
			Decile 7			0.0007	1.0		
			Decile 8			0.0004	0.7		
			Decile 9			<0.0001	<0.1		
			Decile 10			0.0017	2.6		
BC	0.0074	13.3							
			Decile 1					0.0057	10.2
			Decile 2					0.0150	27.0
			Decile 3					0.0083	15.0
			Decile 4					0.0054	9.7
			Decile 5					0.0052	9.3
			Decile 6					0.0036	6.4
			Decile 7					0.0024	4.2
			Decile 8					0.0047	8.4
			Decile 9					0.0005	0.9
			Decile 10					0.0040	7.2
Within-group	0.0556	99.4		0.0466	97.7	0.0629	96.5	0.0547	98.4
Between-group	0.0003	0.6		0.0011	2.3	0.0023	3.5	0.0009	1.6
Total	0.0559	100		0.0477	100	0.0652	100	0.0556	100

~   Theil index value where 0 indicates that participants have equal HUI scores and 1 incidates completely inequal HUI scores.
^   The percent-relative contribution of the Theil indecies value attributed to within- and between-subgroups.
A higher percentage indicates greater contribution to health inequality.

8. Theil decomposition of health inequality by income, and province by income decile, stratified by age and sex. All analyses below are weighted.

Table 8.1. Theil decomposition of health inequality by income, and province by income decile: men 25-44 years old.

| | Decomposition by Income | | | Decomposition by Province in Income deciles | | | | | | | | | |
| | | | | Decile 1 | | Decile 2 | | Decile 3 | | Decile 4 | |
	Value~	Contribution (%)^		Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^
Decile 1	0.0029	16.2									
			NFLD	0.0005	1.2						
			PEI	<0.0001	0.1						
			NS	0.0014	3.5						
			NB	0.0007	1.7						
			QC	0.0067	17.1						
			ONT	0.0178	45.4						
			MB	0.0017	4.3						
			SK	0.0013	3.4						
			AB	0.0036	9.3						
			BC	0.0047	12.1						
Decile 2	0.0016	9.1									
			NFLD			<0.0001	0.1				
			PEI			<0.0001	0.1				
			NS			0.0010	4.3				
			NB			0.0011	4.8				
			QC			0.0036	15.3				
			ONT			0.0100	43.0				
			MB			0.0019	8.2				
			SK			0.0003	1.4				
			AB			0.0025	10.8				
			BC			0.0023	10.0				
Decile 3	0.0020	11.2									
			NFLD					0.0003	1.3		
			PEI					0.0001	0.3		
			NS					0.0013	5.7		
			NB					0.0002	0.7		
			QC					0.0077	33.4		
			ONT					0.0068	29.3		
			MB					0.0006	2.5		
			SK					0.0007	2.9		
			AB					0.0019	8.4		
			BC					0.0033	14.3		
Decile 4	0.0015	8.7									
			NFLD							0.0002	1.5
			PEI							0.0002	1.1
			NS							0.0007	4.5
			NB							0.0001	8.8
			QC							0.0037	22.3
			ONT							0.0070	42.1
			MB							0.0002	1.0
			SK							0.0006	3.7
			AB							0.0018	11.0
			BC							0.0019	11.4
Within-group	0.0173	97.9		0.0384	98.1	0.0227	98.0	0.0229	98.7	0.0164	99.4
Between-group	0.0004	2.1		0.0007	1.9	0.0005	2.0	0.0003	1.3	0.0001	0.6
Total	0.0177	100		0.0391	100	0.0232	100	0.0232	100	0.0165	100

~   Theil index value where 0 indicates that participants have equal HUI scores and 1 incidates completely inequal HUI scores.

^   The percent-relative contribution of the Theil indecies value attributed to within- and between-subgroups. A higher percentage indicates greater contribution to health inequality.

Table 8.1. Theil decomposition of health inequality by income, and province by income decile: men 25-44 years old, continued…

| | Decomposition by Income | | | Decomposition by Province in Income deciles | | | | |
| | | | | Decile 5 | | Decile 6 | | Decile 7 | |
	Value~	Contribution (%)^		Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^
Decile 5	0.0018	10.2							
			NFLD	0.0006	3.2				
			PEI	0.0001	0.4				
			NS	0.0010	5.7				
			NB	0.0003	1.9				
			QC	0.0022	12.2				
			ONT	0.0067	37.4				
			MB	0.0014	7.6				
			SK	0.0002	1.4				
			AB	0.0030	16.9				
			BC	0.0021	11.4				
Decile 6	0.0016	9.1							
			NFLD			0.0002	1.5		
			PEI			0.0001	0.6		
			NS			0.0003	1.8		
			NB			0.0003	2.0		
			QC			0.0019	13.4		
			ONT			0.0054	37.7		
			MB			0.0003	2.4		
			SK			0.0001	0.9		
			AB			0.0016	10.9		
			BC			0.0039	27.4		
Decile 7	0.0022	12.4							
			NFLD					0.0001	0.6
			PEI					<0.0001	0.3
			NS					0.0002	1.2
			NB					0.0008	4.1
			QC					0.0028	14.7
			ONT					0.0105	5.5
			MB					0.0008	4.0
			SK					0.0003	1.4
			AB					0.0009	4.7
			BC					0.0024	12.6
Within-group	0.0173	97.9		0.0176	98.0	0.0140	98.6	0.0189	99.1
Between-group	0.0004	2.1		0.0004	2.0	0.0002	1.4	0.0002	0.9
Total	0.0177	100		0.0180	100	0.0142	100	0.0191	100

~   Theil index value where 0 indicates that participants have equal HUI scores and 1 incidates completely inequal HUI scores.
^   The percent-relative contribution of the Theil indecies value attributed to within- and between-subgroups.
A higher percentage indicates greater contribution to health inequality.

Table 8.1. Theil decomposition of health inequality by income, and province by income decile: men 25-44 years old, continued...

| | Decomposition by Income | | | Decomposition by Province in Income deciles | | | | | |
| | | | | Decile 8 | | Decile 9 | | Decile 10 | |
	Value~	Contribution (%)^		Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^
Decile 8	0.0011	6.1							
			NFLD	0.0005	4.9				
			PEI	0.0001	0.8				
			NS	0.0005	5.3				
			NB	0.0001	1.4				
			QC	0.0015	16.3				
			ONT	0.0031	32.8				
			MB	0.0002	2.3				
			SK	0.0002	2.1				
			AB	0.0009	9.2				
			BC	0.0022	23.3				
Decile 9	0.0019	10.9							
			NFLD			0.0002	1.6		
			PEI			<0.0001	0.1		
			NS			0.0001	0.5		
			NB			0.0002	1.2		
			QC			0.0086	56		
			ONT			0.0028	18.3		
			MB			0.0003	1.8		
			SK			0.0002	1.5		
			AB			0.0014	9.1		
			BC			0.0013	8.2		
Decile 10	0.0007	3.9							
			NFLD					0.0001	0.8
			PEI					<0.0001	0.1
			NS					0.0002	3.6
			NB					0.0001	1.3
			QC					0.0015	22.9
			ONT					0.0023	35.2
			MB					0.0001	1.8
			SK					0.0002	2.7
			AB					0.0012	17.8
			BC					0.0009	13.2
Within-group	0.0173	97.9		0.0092	98.4	0.0151	98.2	0.0065	99.5
Between-group	0.0004	2.1		0.0002	1.6	0.0003	1.8	<0.0001	0.5
Total	0.0177	100		0.0094	100	0.0154	100	0.0065	100

~ Theil index value where 0 indicates that participants have equal HUI scores and 1 incidates completely inequal HUI scores.
^ The percent-relative contribution of the Theil indecies value attributed to within- and between-subgroups.
A higher percentage indicates greater contribution to health inequality.

Table 8.2. Theil decomposition of health inequality by income, and province by income decile: men 45-64 years old.

| | Decomposition by Income | | | Decomposition by Province in Income deciles | | | | | | | | |
| | | | | Decile 1 | | Decile 2 | | Decile 3 | | Decile 4 | |
	Value~	Contribution (%)^		Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^
Decile 1	0.005	18.8									
			NFLD	0.0013	1.6						
			PEI	0.0003	0.3						
			NS	0.0031	3.9						
			NB	0.0025	3.1						
			QC	0.0106	13.5						
			ONT	0.0321	40.7						
			MB	0.0036	4.5						
			SK	0.0007	0.9						
			AB	0.0084	10.7						
			BC	0.0130	16.5						
Decile 2	0.0025	9.6									
			NFLD			0.0012	2.6				
			PEI			0.0003	0.7				
			NS			0.0009	2.1				
			NB			0.0029	6.6				
			QC			0.0063	14.4				
			ONT			0.0227	52.2				
			MB			0.0005	1.1				
			SK			0.0013	2.9				
			AB			0.0026	6.0				
			BC			0.0042	9.7				
Decile 3	0.0023	8.7									
			NFLD					0.0014	4.2		
			PEI					0.0002	0.6		
			NS					0.0018	5.3		
			NB					0.0013	3.9		
			QC					0.0062	18.7		
			ONT					0.0147	44.1		
			MB					0.0011	3.3		
			SK					0.0003	1.0		
			AB					0.0036	10.8		
			BC					0.0021	6.3		
Decile 4	0.0021	7.8									
			NFLD							0.0012	4.5
			PEI							0.0001	0.4
			NS							0.0015	6.0
			NB							0.0005	2.0
			QC							0.0030	11.8
			ONT							0.0116	45.6
			MB							0.0012	4.8
			SK							0.0017	6.8
			AB							0.0011	4.3
			BC							0.0024	9.4
Within-group	0.0251	95.4		0.0756	95.9	0.0428	98.5	0.0328	98.3	0.0243	95.7
Between-group	0.0012	4.6		0.0032	4.1	0.0007	1.5	0.0006	1.7	0.0011	4.3
Total	0.0263	100		0.0788	100	0.0435	100	0.0334	100	0.0254	100

~   Theil index value where 0 indicates that participants have equal HUI scores and 1 incidates completely inequal HUI scores.

^   The percent-relative contribution of the Theil indecies value attributed to within- and between-subgroups. A higher percentage indicates greater contribution to health inequality.

Table 8.2. Theil decomposition of health inequality by income, and province by income decile: men 45-64 years old, continued…

| | Decomposition by Income | | | Decomposition by Province in Income deciles | | | | | | |
| | | | | Decile 5 | | Decile 6 | | Decile 7 | | |
	Value~	Contribution (%)^		Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^
Decile 5	0.0029	11							
			NFLD	0.0007	2.4				
			PEI	<0.0001	0.1				
			NS	0.0008	2.7				
			NB	0.0007	2.2				
			QC	0.0039	12.8				
			ONT	0.0185	60.4				
			MB	0.0010	3.3				
			SK	0.0002	0.9				
			AB	0.0013	4.1				
			BC	0.0028	9.1				
Decile 6	0.0020	7.7							
			NFLD			0.0003	1.4		
			PEI			<0.0001	0.2		
			NS			0.0006	2.8		
			NB			0.0007	3.6		
			QC			0.0044	21.8		
			ONT			0.0082	40.9		
			MB			0.0003	1.5		
			SK			0.0008	4.1		
			AB			0.0038	19.2		
			BC			0.0008	4.1		
Decile 7	0.0019	7.2							
			NFLD					0.0004	2.1
			PEI					0.0001	0.6
			NS					0.0012	6.9
			NB					0.0004	2.0
			QC					0.0022	12.8
			ONT					0.0078	44.6
			MB					0.0005	2.8
			SK					0.0011	6.4
			AB					0.0023	13.0
			BC					0.0013	7.4
Within-group	0.0251	95.4		0.0300	98.0	0.0200	99.6	0.0173	98.7
Between-group	0.0012	4.6		0.0006	2.0	0.0001	0.4	0.0002	1.3
Total	0.0263	100		0.0306	100	0.0201	100	0.0175	100

~   Theil index value where 0 indicates that participants have equal HUI scores and 1 incidates completely inequal HUI scores.
^   The percent-relative contribution of the Theil indecies value attributed to within- and between-subgroups.
A higher percentage indicates greater contribution to health inequality.

Table 8.2. Theil decomposition of health inequality by income, and province by income decile: men 45-64 years old, continued...

	Decomposition by Income			Decomposition by Province in Income deciles					
				Decile 8		Decile 9		Decile 10	
	Value~	Contribution (%)^		Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^
Decile 8	0.0031	11.8							
			NFLD	0.0002	0.7				
			PEI	0.0002	1.0				
			NS	0.0007	3.1				
			NB	0.0003	1.4				
			QC	0.0041	17.3				
			ONT	0.0131	56.0				
			MB	0.0003	1.3				
			SK	0.0002	1.0				
			AB	0.0025	10.9				
			BC	0.0015	6.2				
Decile 9	0.0016	6.2							
			NFLD			0.0001	0.8		
			PEI			<0.0001	0.3		
			NS			0.0003	2.0		
			NB			0.0001	0.7		
			QC			0.0019	14.8		
			ONT			0.0056	43.5		
			MB			0.0003	2.2		
			SK			0.0009	6.7		
			AB			0.0021	16.0		
			BC			0.0016	12.0		
Decile 10	0.0017	6.5							
			NFLD					0.0001	0.7
			PEI					0.0001	0.8
			NS					0.0005	4.4
			NB					0.0001	1.2
			QC					0.0025	23.7
			ONT					0.0032	30.6
			MB					0.0003	2.4
			SK					0.0002	2.2
			AB					0.0018	17.3
			BC					0.0016	15.5
Within-group	0.0251	95.4		0.0231	98.9	0.0128	98.8	0.0103	98.8
Between-group	0.0012	4.6		0.0003	1.1	0.0002	1.2	0.0001	1.2
Total	0.0263	100		0.0234	100	0.0130	100	0.0104	100

~   Theil index value where 0 indicates that participants have equal HUI scores and 1 incidates completely inequal HUI scores.

^   The percent-relative contribution of the Theil indecies value attributed to within- and between-subgroups.

A higher percentage indicates greater contribution to health inequality.

Table 8.3. Theil decomposition of health inequality by income, and province by income decile: men 65+ years old.

| | Decomposition by Income | | | Decomposition by Province in Income deciles | | | | | | | | |
| | | | | Decile 1 | | Decile 2 | | Decile 3 | | Decile 4 | |
	Value~	Contribution (%)^		Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^
Decile 1	0.0046	10.9									
			NFLD	0.0009	1.4						
			PEI	0.0011	1.5						
			NS	0.0020	2.9						
			NB	0.0021	3.0						
			QC	0.0080	11.7						
			ONT	0.0236	34.2						
			MB	0.0037	5.3						
			SK	0.0042	6.0						
			AB	0.0117	17.1						
			BC	0.0094	13.7						
Decile 2	0.0084	19.7									
			NFLD			0.0021	4.1				
			PEI			0.0002	0.4				
			NS			0.0026	5.1				
			NB			0.0028	5.3				
			QC			0.0086	16.8				
			ONT			0.0165	32.2				
			MB			0.0030	5.8				
			SK			0.0020	3.8				
			AB			0.0063	12.3				
			BC			0.0060	11.7				
Decile 3	0.0079	18.5									
			NFLD					0.0009	1.8		
			PEI					0.0002	0.5		
			NS					0.0021	4.0		
			NB					0.0019	3.8		
			QC					0.0139	27.2		
			ONT					0.0200	39.1		
			MB					0.0015	2.9		
			SK					0.0012	2.3		
			AB					0.0033	6.4		
			BC					0.0057	11.1		
Decile 4	0.0051	12									
			NFLD							0.0008	1.7
			PEI							0.0002	0.4
			NS							0.0032	7.2
			NB							0.0008	1.7
			QC							0.0076	17.3
			ONT							0.0170	38.4
			MB							0.0013	2.9
			SK							0.0011	2.5
			AB							0.0040	9.2
			BC							0.0074	16.9
Within-group	0.0420	98.6		0.0667	96.9	0.0501	97.6	0.0507	99.2	0.0430	98.3
Between-group	0.0006	1.4		0.0021	3.1	0.0012	2.4	0.0004	0.8	0.0007	1.7
Total	0.0426	100		0.0688	100	0.0513	100	0.0511	100	0.0437	100

~ Theil index value where 0 indicates that participants have equal HUI scores and 1 incidates completely inequal HUI scores.
^ The percent-relative contribution of the Theil indecies value attributed to within- and between-subgroups. A higher percentage indicates greater contribution to health inequality.

Table 8.3. Theil decomposition of health inequality by income, and province by income decile: men 65+ years old, continued...

| | Decomposition by Income | | | Decomposition by Province in Income deciles | | | | | |
| | | | | Decile 5 | | Decile 6 | | Decile 7 | |
	Value~	Contribution (%)^		Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^
Decile 5	0.0030	7.1							
			NFLD	0.0005	1.6				
			PEI	0.0004	1.2				
			NS	0.0010	3.3				
			NB	0.0011	3.5				
			QC	0.0075	24.8				
			ONT	0.0116	38.5				
			MB	0.0040	1.2				
			SK	0.0007	2.4				
			AB	0.0021	6.9				
			BC	0.0046	15.3				
Decile 6	0.0040	9.4							
			NFLD			0.0005	1.3		
			PEI			<0.0001	0.1		
			NS			0.0012	3.2		
			NB			0.0013	3.4		
			QC			0.0064	16.5		
			ONT			0.0185	48		
			MB			0.0010	24.8		
			SK			0.0008	19.8		
			AB			0.0014	3.6		
			BC			0.0071	18.4		
Decile 7	0.0028	6.6							
			NFLD					<0.0001	<0.1
			PEI					0.0003	1.0
			NS					0.0007	2.0
			NB					0.0016	4.8
			QC					0.0042	12.4
			ONT					0.0173	50.5
			MB					0.0017	4.9
			SK					0.0020	5.8
			AB					0.0023	6.6
			BC					0.0036	10.4
Within-group	0.0420	98.6		0.0297	98.7	0.0382	99.1	0.0337	98.3
Between-group	0.0006	1.4		0.0004	1.3	0.0004	0.9	0.0006	1.7
Total	0.0426	100		0.0301	100	0.0386	100	0.0343	100

~   Theil index value where 0 indicates that participants have equal HUI scores and 1 incidates completely inequal HUI scores.

^   The percent-relative contribution of the Theil indecies value attributed to within- and between-subgroups.

A higher percentage indicates greater contribution to health inequality.

Table 8.3. Theil decomposition of health inequality by income, and province by income decile: men 65+ years old, continued...

| | Decomposition by Income | | | Decomposition by Province in Income deciles | | | | | | |
| | | | | Decile 8 | | Decile 9 | | Decile 10 | | |
	Value~	Contribution (%)^		Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^
Decile 8	0.0018	4.2							
			NFLD	0.0001	0.3				
			PEI	0.0001	0.4				
			NS	0.0014	5.5				
			NB	0.0009	3.5				
			QC	0.0066	25.8				
			ONT	0.0092	35.7				
			MB	0.0014	5.4				
			SK	0.0005	2.0				
			AB	0.0008	3.1				
			BC	0.0043	16.8				
Decile 9	0.0019	4.4							
			NFLD			0.0001	0.2		
			PEI			<0.0001	<0.1		
			NS			0.0016	5.0		
			NB			<0.0001	0.1		
			QC			0.0029	8.6		
			ONT			0.0142	42.9		
			MB			0.0029	8.7		
			SK			0.0006	18.6		
			AB			0.0063	19.1		
			BC			0.0032	9.6		
Decile 10	0.0025	5.8							
			NFLD					0.0001	0.2
			PEI					<0.0001	<0.1
			NS					0.0013	4.3
			NB					<0.0001	<0.1
			QC					0.0055	18.9
			ONT					0.0155	53.4
			MB					0.0003	1.0
			SK					0.0017	5.8
			AB					0.0007	2.3
			BC					0.0035	12.0
Within-group	0.0420	98.6		0.0253	98.4	0.0318	96.1	0.0285	98.0
Between-group	0.0006	1.4		0.0004	1.6	0.0013	3.9	0.0006	2.0
Total	0.0426	100		0.0257	100	0.0331	100	0.0291	100

~   Theil index value where 0 indicates that participants have equal HUI scores and 1 incidates completely inequal HUI scores.
^   The percent-relative contribution of the Theil indecies value attributed to within- and between-subgroups.
A higher percentage indicates greater contribution to health inequality.

Table 8.4. Theil decomposition of health inequality by income, and province by income decile: women 25-44 years old.

| | Decomposition by Income | | | Decomposition by Province in Income deciles | | | | | | | | |
| | | | | Decile 1 | | Decile 2 | | Decile 3 | | Decile 4 | |
	Value~	Contribution (%)^		Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^
Decile 1	0.0041	24.2									
			NFLD	0.0004	0.9						
			PEI	0.0001	0.3						
			NS	0.0013	3.1						
			NB	0.0010	2.5						
			QC	0.0071	17.3						
			ONT	0.0192	47.1						
			MB	0.0007	1.6						
			SK	0.0027	6.6						
			AB	0.0034	8.2						
			BC	0.0046	11.3						
Decile 2	0.0025	14.6									
			NFLD			0.0004	1.4				
			PEI			<0.0001	<0.1				
			NS			0.0008	2.9				
			NB			0.0003	1.0				
			QC			0.0053	19.6				
			ONT			0.0123	46.0				
			MB			0.0007	2.7				
			SK			0.0003	1.0				
			AB			0.0030	11.2				
			BC			0.0036	13.4				
Decile 3	0.0019	11.3									
			NFLD					0.0001	0.4		
			PEI					<0.0001	0.1		
			NS					0.0024	12.2		
			NB					0.0002	1.1		
			QC					0.0029	14.8		
			ONT					0.0087	43.8		
			MB					0.0005	2.6		
			SK					0.0005	2.4		
			AB					0.0021	10.5		
			BC					0.0022	11.1		
Decile 4	0.0017	10.0									
			NFLD							0.0006	3.6
			PEI							0.0001	0.5
			NS							0.0008	4.9
			NB							0.0006	3.3
			QC							0.0025	14.8
			ONT							0.0047	27.4
			MB							0.0009	5.1
			SK							0.0003	1.5
			AB							0.0037	21.6
			BC							0.0027	16
Within-group	0.0164	96.4		0.0402	98.9	0.0266	99.4	0.0196	99.0	0.0168	98.7
Between-group	0.0006	3.6		0.0004	1.1	0.0002	0.6	0.0002	1.0	0.0002	1.3
Total	0.0170	100		0.0406	100	0.0268	100	0.0198	100	0.017	100

~ Theil index value where 0 indicates that participants have equal HUI scores and 1 incidates completely inequal HUI scores.

^ The percent-relative contribution of the Theil indecies value attributed to within- and between-subgroups. A higher percentage indicates greater contribution to health inequality.

Table 8.4. Theil decomposition of health inequality by income, and province by income decile: women 25-44 years old, continued…

| | Decomposition by Income | | | Decomposition by Province in Income deciles | | | | | |
| | | | | Decile 5 | | Decile 6 | | Decile 7 | |
	Value~	Contribution (%)^		Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^
Decile 5	0.0011	6.7							
			NFLD	0.0001	1.4				
			PEI	0.0001	1.1				
			NS	0.0004	3.5				
			NB	0.0003	2.4				
			QC	0.0024	22.6				
			ONT	0.0037	34.4				
			MB	0.0008	7.2				
			SK	0.0004	4.0				
			AB	0.0012	11.2				
			BC	0.0012	11.2				
Decile 6	0.0015	8.9							
			NFLD			0.0001	0.3		
			PEI			0.0002	1.7		
			NS			0.0003	2.3		
			NB			0.0003	2.2		
			QC			0.0022	15.3		
			ONT			0.0049	33.8		
			MB			0.0006	4.4		
			SK			0.0004	2.8		
			AB			0.0010	6.7		
			BC			0.0044	29.8		
Decile 7	0.0012	6.9							
			NFLD					0.0003	2.4
			PEI					<0.0001	0.3
			NS					0.0002	1.6
			NB					0.0001	1.4
			QC					0.0011	10.0
			ONT					0.0051	47.4
			MB					0.0001	1.0
			SK					0.0004	4.1
			AB					0.0016	15.3
			BC					0.0017	15.6
Within-group	0.0164	96.4		0.0105	98.9	0.0145	99.3	0.0106	99.1
Between-group	0.0006	3.6		0.0001	1.1	0.0001	0.7	0.0001	0.9
Total	0.0170	100		0.0106	100	0.0146	100	0.0107	100

~   Theil index value where 0 indicates that participants have equal HUI scores and 1 incidates completely inequal HUI scores.

^   The percent-relative contribution of the Theil indecies value attributed to within- and between-subgroups.

A higher percentage indicates greater contribution to health inequality.

Table 8.4. Theil decomposition of health inequality by income, and province by income decile: women 25-44 years old, continued...

| | Decomposition by Income | | | Decomposition by Province in Income deciles | | | | | |
| | | | | Decile 8 | | Decile 9 | | Decile 10 | |
	Value~	Contribution (%)^		Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^
Decile 8	0.0009	5.3							
			NFLD	0.0003	3.3				
			PEI	0.0001	1.0				
			NS	0.0001	1.6				
			NB	0.0002	2.4				
			QC	0.0018	19.3				
			ONT	0.0033	35.5				
			MB	0.0003	3.5				
			SK	0.0003	2.9				
			AB	0.0015	16.7				
			BC	0.0012	13.6				
Decile 9	0.0009	5.0							
			NFLD			0.0005	5.5		
			PEI			<0.0001	0.1		
			NS			0.0002	1.9		
			NB			0.0003	3.2		
			QC			0.0006	7.3		
			ONT			0.0031	38.3		
			MB			0.0006	7.5		
			SK			0.0002	1.9		
			AB			0.0013	15.7		
			BC			0.0014	17.4		
Decile 10	0.0006	3.7							
			NFLD					0.0001	1.5
			PEI					<0.0001	0.1
			NS					0.0002	2.7
			NB					<0.0001	0.6
			QC					0.0006	8.5
			ONT					0.0020	28.5
			MB					0.0001	1.8
			SK					0.0006	8.7
			AB					0.0020	27.0
			BC					0.0014	19.6
Within-group	0.0164	96.4		0.0092	99.8	0.0080	98.9	0.0073	98.8
Between-group	0.0006	3.6		<0.0001	0.2	0.0001	1.1	0.0001	1.2
Total	0.0170	100		0.0092	100	0.0081	100	0.0074	100

~   Theil index value where 0 indicates that participants have equal HUI scores and 1 incidates completely inequal HUI scores.
^   The percent-relative contribution of the Theil indecies value attributed to within- and between-subgroups.
A higher percentage indicates greater contribution to health inequality.

Table 8.5. Theil decomposition of health inequality by income, and province by income decile: women 45-64 years old.

| | Decomposition by Income | | | Decomposition by Province in Income deciles | | | | | | | |
| | | | | Decile 1 | | Decile 2 | | Decile 3 | | Decile 4 | |
	Value~	Contribution (%)^		Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^
Decile 1	0.0061	19.1									
			NFLD	0.0020	2.4						
			PEI	0.0003	0.4						
			NS	0.0022	2.6						
			NB	0.0028	3.4						
			QC	0.0168	20.1						
			ONT	0.0388	46.5						
			MB	0.0030	36.2						
			SK	0.0015	1.8						
			AB	0.0042	5.1						
			BC	0.0087	10.4						
Decile 2	0.0042	13.2									
			NFLD			0.0012	1.8				
			PEI			0.0002	0.3				
			NS			0.0017	2.7				
			NB			0.0007	1.1				
			QC			0.0068	10.7				
			ONT			0.0279	43.9				
			MB			0.0036	5.7				
			SK			0.0015	2.4				
			AB			0.0084	13.3				
			BC			0.0091	14.4				
Decile 3	0.0029	9.2									
			NFLD					0.0003	1.0		
			PEI					0.0001	0.3		
			NS					0.0006	1.7		
			NB					0.0006	1.6		
			QC					0.0094	26.6		
			ONT					0.0145	41.1		
			MB					0.0011	3.1		
			SK					0.0013	3.7		
			AB					0.0018	5.2		
			BC					0.0054	15.3		
Decile 4	0.0031	9.7									
			NFLD							0.0007	2.3
			PEI							0.0002	0.5
			NS							0.0008	2.7
			NB							0.0002	0.6
			QC							0.0039	13.1
			ONT							0.0135	45.2
			MB							0.0014	4.7
			SK							0.0012	4.0
			AB							0.0028	9.3
			BC							0.0049	16.4
Within-group	0.0300	94.9		0.0803	96.3	0.0611	96.3	0.0351	99.5	0.0295	99.0
Between-group	0.0016	5.1		0.0031	3.7	0.0023	3.7	0.0002	0.5	0.0003	1.0
Total	0.0316	100		0.0834	100	0.0634	100	0.0353	100	0.0298	100

~   Theil index value where 0 indicates that participants have equal HUI scores and 1 incidates completely inequal HUI scores.
^   The percent-relative contribution of the Theil indecies value attributed to within- and between-subgroups. A higher percentage indicates greater contribution to health inequality.

Table 8.5. Theil decomposition of health inequality by income, and province by income decile: women 45-64 years old, continued...

	Decomposition by Income			Decomposition by Province in Income deciles					
				Decile 5		Decile 6		Decile 7	
	Value~	Contribution (%)^		Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^
Decile 5	0.0030	9.4							
			NFLD	0.0007	2.4				
			PEI	0.0001	0.4				
			NS	0.0009	2.9				
			NB	0.0007	2.4				
			QC	0.0052	16.8				
			ONT	0.0120	39.0				
			MB	0.0007	2.3				
			SK	0.0006	1.8				
			AB	0.0071	23.1				
			BC	0.0022	7.3				
Decile 6	0.0024	7.4							
			NFLD			0.0003	1.2		
			PEI			<0.0001	0.1		
			NS			0.0010	4.3		
			NB			0.0005	2.0		
			QC			0.0052	21.5		
			ONT			0.0094	38.9		
			MB			0.0013	5.4		
			SK			0.0007	2.8		
			AB			0.0013	5.3		
			BC			0.0042	17.4		
Decile 7	0.0023	7.3							
			NFLD					0.0004	2.2
			PEI					<0.0001	0.2
			NS					0.0007	3.3
			NB					0.0008	3.6
			QC					0.0033	15.9
			ONT					0.0089	43.2
			MB					0.0007	3.3
			SK					0.0005	2.2
			AB					0.0024	11.7
			BC					0.0028	13.8
Within-group	0.0300	94.9		0.0303	98.5	0.0239	98.8	0.0206	99.4
Between-group	0.0016	5.1		0.0005	1.5	0.0003	1.2	0.0001	0.6
Total	0.0316	100		0.0308	100	0.0242	100	0.0207	100

~   Theil index value where 0 indicates that participants have equal HUI scores and 1 incidates completely inequal HUI scores.
^   The percent-relative contribution of the Theil indecies value attributed to within- and between-subgroups.
A higher percentage indicates greater contribution to health inequality.

Table 8.5. Theil decomposition of health inequality by income, and province by income decile: women 45-64 years old, continued…

| | Decomposition by Income | | | Decomposition by Province in Income deciles | | | | | |
| | | | | Decile 8 | | Decile 9 | | Decile 10 | |
	Value~	Contribution (%)^		Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^
Decile 8	0.0024	7.6							
			NFLD	0.0011	5.3				
			PEI	0.0003	1.3				
			NS	0.0010	4.8				
			NB	0.0012	5.8				
			QC	0.0048	24.0				
			ONT	0.0053	26.7				
			MB	0.0008	3.8				
			SK	0.0012	6.0				
			AB	0.0018	9.0				
			BC	0.0021	10.5				
Decile 9	0.0020	6.2							
			NFLD			0.0009	5.3		
			PEI			<0.0001	0.2		
			NS			0.0013	8.0		
			NB			0.0005	3.3		
			QC			0.0014	8.4		
			ONT			0.0075	45.8		
			MB			0.0006	3.5		
			SK			0.0005	3.1		
			AB			0.0007	4.3		
			BC			0.0024	15.0		
Decile 10	0.0018	5.7							
			NFLD					0.0002	1.1
			PEI					<0.0001	0.3
			NS					0.0003	2.1
			NB					0.0007	4.9
			QC					0.0018	13.1
			ONT					0.0067	48.4
			MB					0.0005	3.5
			SK					0.0004	3.1
			AB					0.0017	12.2
			BC					0.0014	10.3
Within-group	0.0300	94.9		0.0194	97.1	0.0158	97.0	0.0137	99.0
Between-group	0.0016	5.1		0.0006	2.9	0.0005	3.0	0.0001	1.0
Total	0.0316	100		0.0200	100	0.0163	100	0.0138	100

~ Theil index value where 0 indicates that participants have equal HUI scores and 1 incidates completely inequal HUI scores.
^ The percent-relative contribution of the Theil indecies value attributed to within- and between-subgroups.
A higher percentage indicates greater contribution to health inequality.

Table 8.6. Theil decomposition of health inequality by income, and province by income decile: women 65+ years old.

| | Decomposition by Income | | | Decomposition by Province in Income deciles | | | | | | | | |
| | | | | Decile 1 | | Decile 2 | | Decile 3 | | Decile 4 | |
	Value~	Contribution (%)^		Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^
Decile 1	0.0102	18.3									
			NFLD	0.0011	1.5						
			PEI	0.0004	0.5						
			NS	0.0026	3.4						
			NB	0.0011	1.4						
			QC	0.0252	32.8						
			ONT	0.0263	34.1						
			MB	0.0029	3.8						
			SK	0.0026	3.4						
			AB	0.0083	10.8						
			BC	0.0057	7.4						
Decile 2	0.0148	26.5									
			NFLD			0.0010	1.5				
			PEI			0.0003	0.5				
			NS			0.0024	3.8				
			NB			0.0018	2.8				
			QC			0.0132	20.2				
			ONT			0.0271	41.6				
			MB			0.0013	2.0				
			SK			0.0016	2.5				
			AB			0.0068	10.5				
			BC			0.0088	13.5				
Decile 3	0.0090	16.0									
			NFLD					0.0007	1.3		
			PEI					0.0001	0.2		
			NS					0.0016	3.0		
			NB					0.0013	2.5		
			QC					0.0122	23.1		
			ONT					0.0228	43.3		
			MB					0.0016	3.1		
			SK					0.0016	3.1		
			AB					0.0035	6.7		
			BC					0.0065	12.4		
Decile 4	0.0057	10.2									
			NFLD							0.0005	1.1
			PEI							0.0004	0.8
			NS							0.0016	3.3
			NB							0.0019	3.9
			QC							0.0098	30.2
			ONT							0.0194	40.2
			MB							0.0012	2.5
			SK							0.0011	2.4
			AB							0.0058	11.9
			BC							0.0062	12.7
Within-group	0.0553	98.9		0.0763	99.1	0.0643	98.8	0.0519	98.7	0.0478	98.9
Between-group	0.0006	1.1		0.0007	0.9	0.0008	1.2	0.0007	1.3	0.0005	1.1
Total	0.0559	100		0.0770	100	0.0651	100	0.0526	100	0.0483	100

~ Theil index value where 0 indicates that participants have equal HUI scores and 1 incidates completely inequal HUI scores.
^ The percent-relative contribution of the Theil indecies value attributed to within- and between-subgroups. A higher percentage indicates greater contribution to health inequality.

Table 8.6. Theil decomposition of health inequality by income, and province by income decile: women 65+ years old, continued…

	Decomposition by Income			Decomposition by Province in Income deciles						
				Decile 5		Decile 6		Decile 7		
	Value~	Contribution (%)^		Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^
Decile 5	0.0046	8.2							
			NFLD	0.0005	1.2				
			PEI	0.0004	0.8				
			NS	0.0027	5.7				
			NB	0.0079	1.7				
			QC	0.0082	17.2				
			ONT	0.0207	43.3				
			MB	0.0005	1.1				
			SK	0.0016	3.3				
			AB	0.0045	9.4				
			BC	0.0072	15.0				
Decile 6	0.0030	5.4							
			NFLD			0.0004	1.2		
			PEI			0.0001	0.4		
			NS			0.0004	1.1		
			NB			0.0008	2.2		
			QC			0.0082	22.4		
			ONT			0.0150	40.2		
			MB			0.0017	4.7		
			SK			0.0010	2.8		
			AB			0.0029	7.9		
			BC			0.0058	15.9		
Decile 7	0.0029	5.2							
			NFLD					0.0015	3.2
			PEI					0.0003	0.7
			NS					0.0008	1.8
			NB					0.0020	4.3
			QC					0.0110	23.6
			ONT					0.0236	50.7
			MB					0.0005	1.0
			SK					0.0002	0.4
			AB					0.0008	1.8
			BC					0.0051	10.9
Within-group	0.0553	98.9		0.0471	98.7	0.0361	98.8	0.0457	98.3
Between-group	0.0006	1.1		0.0006	1.3	0.0004	1.2	0.0008	1.7
Total	0.0559	100		0.0477	100	0.0365	100	0.0465	100

~   Theil index value where 0 indicates that participants have equal HUI scores and 1 incidates completely inequal HUI scores.
^   The percent-relative contribution of the Theil indecies value attributed to within- and between-subgroups.
A higher percentage indicates greater contribution to health inequality.

Table 8.6. Theil decomposition of health inequality by income, and province by income decile: women 65+ years old, continued...

| | Decomposition by Income | | | Decomposition by Province in Income deciles | | | | | |
| | | | | Decile 8 | | Decile 9 | | Decile 10 | |
	Value~	Contribution (%)^		Value~	Contribution (%)^	Value~	Contribution (%)^	Value~	Contribution (%)^
Decile 8	0.0018	3.3							
			NFLD	0.0001	0.2				
			PEI	0.0001	0.2				
			NS	0.0007	1.6				
			NB	0.0002	0.5				
			QC	0.0094	20.4				
			ONT	0.0163	35.4				
			MB	0.0007	1.4				
			SK	0.0006	1.4				
			AB	0.0008	1.8				
			BC	0.0158	34.3				
Decile 9	0.0016	2.9							
			NFLD			0.0002	0.3		
			PEI			0.0005	1.1		
			NS			0.0014	3.0		
			NB			0.0003	0.7		
			QC			0.0044	9.6		
			ONT			0.0330	71.9		
			MB			0.0013	2.9		
			SK			0.0005	1.1		
			AB			<0.0001	0.1		
			BC			0.0019	4.0		
Decile 10	0.0017	3.0							
			NFLD					0	0
			PEI					<0.0001	<0.1
			NS					0.0023	5.0
			NB					<0.0001	<0.1
			QC					0.0047	10.2
			ONT					0.0174	37.7
			MB					0.0007	1.6
			SK					0.0005	1.0
			AB					0.0036	7.7
			BC					0.0149	3.2
Within-group	0.0553	98.9		0.0448	97.1	0.0435	94.8	0.044	95.4
Between-group	0.0006	1.1		0.0013	2.9	0.0024	5.1	0.0021	4.6
Total	0.0559	100		0.0461	100	0.0459	100	0.0461	100

~ Theil index value where 0 indicates that participants have equal HUI scores and 1 incidates completely inequal HUI scores.

^ The percent-relative contribution of the Theil indecies value attributed to within- and between-subgroups.

A higher percentage indicates greater contribution to health inequality.

9. Mean Health Utilities Index of provinces within each income decile, stratified by age and sex. All analyses below are weighted.

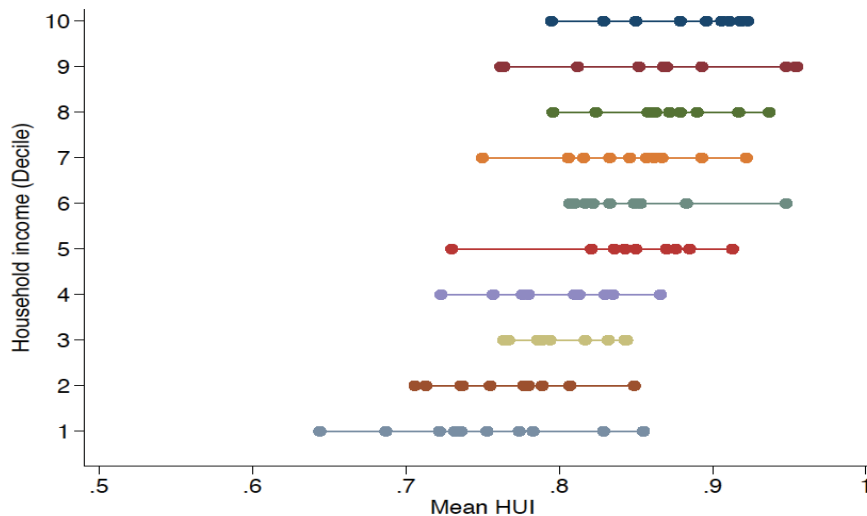Figure 9.1. Mean HUI of provinces within each income decile, by age group: men

25-44 years
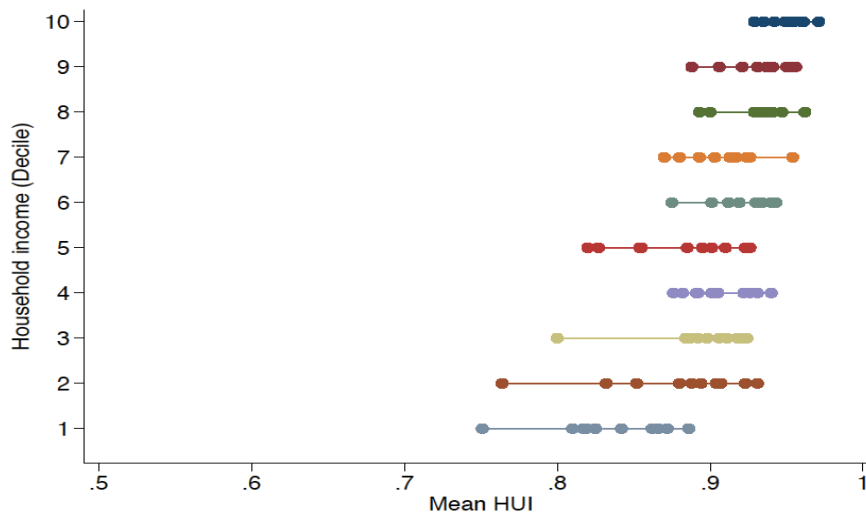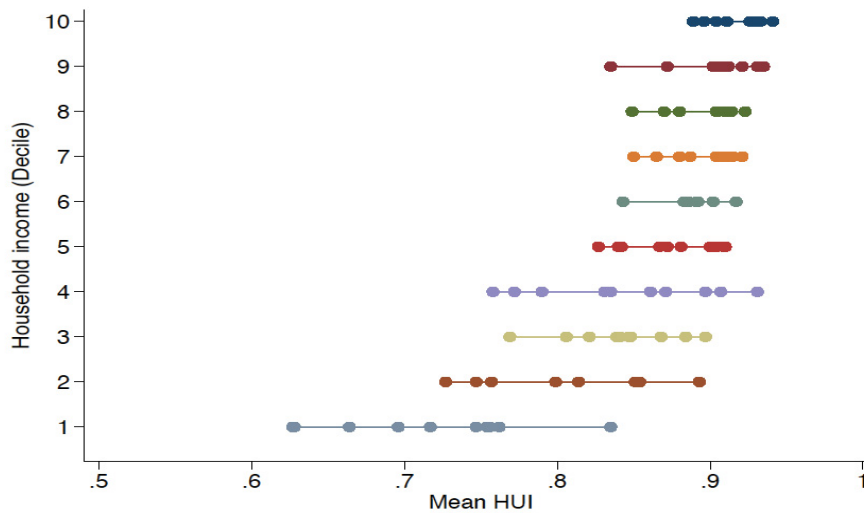
45-64 years
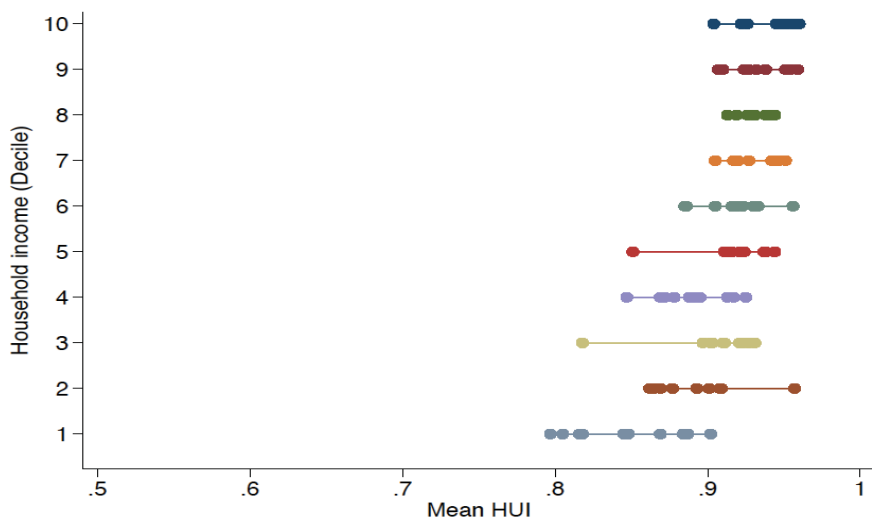

65+ years

HUI: Health Utility Index
Data source: 2009/10 Canadian Community Health Survey
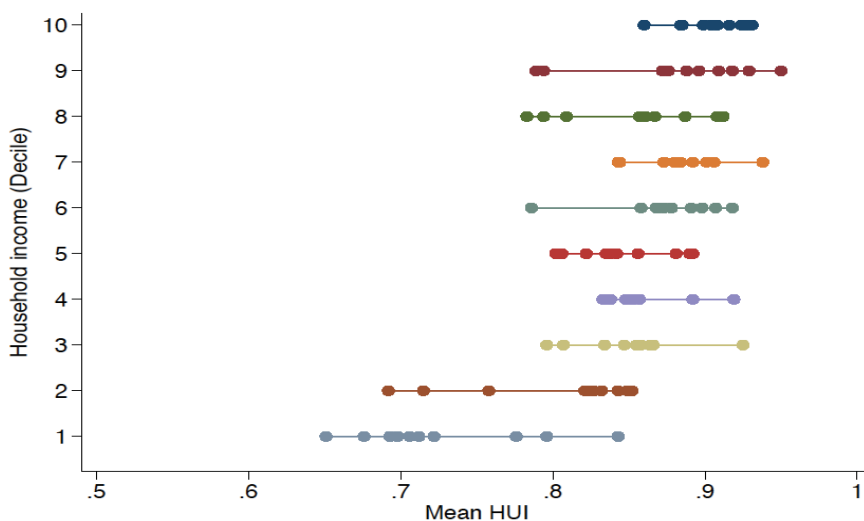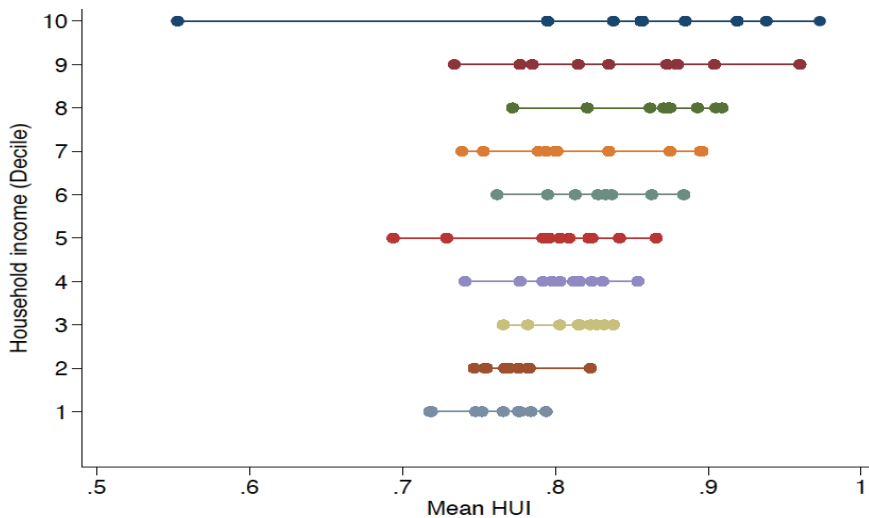Dots on lines show mean HUI by province
All analyses are weighted using survey weights provided by the CCHS.

Figure 9.2. Mean HUI of provinces within each income decile, by age group: women

25-44 years

45-64 years

65+ years

HUI: Health Utility Index
Data source: 2009/10 Canadian Community Health Survey
Dots on lines show mean HUI by income group
All analyses are weighted using survey weights provided by the CCHS.

113

10. Theil decomposition of health inequality within- and between income subgroups, stratified by age and sex.

10.1 Theil decomposition of health inequality within- and between income subgroups, stratified by age and sex.

	Theil Decomposition	Income Value~	Contribution (%)^
Men			
25 - 44			
	Within-subgroup	0.0173	97.9
	Between-subgroup	0.0004	2.1
	Total	0.0177	100
45 - 64			
	Within-subgroup	0.0251	95.4
	Between-subgroup	0.0012	4.6
	Total	0.0263	100
65+			
	Within-subgroup	0.0420	98.6
	Between-subgroup	0.0006	1.4
	Total	0.0426	100
Women			
25 - 44			
	Within-subgroup	0.0164	96.4
	Between-subgroup	0.0006	3.6
	Total	0.0170	100
45 - 64			
	Within-subgroup	0.0300	94.9
	Between-subgroup	0.0016	5.1
	Total	0.0316	100
65+			
	Within-subgroup	0.0553	98.9
	Between-subgroup	0.0006	1.1
	Total	0.0559	100

~   Theil index value where 0 indicates that participants have equal HUI scores and 1 incidate completely inequal HUI scores.
^   The percent-relative contribution of the Theil indecies value attributed to within- and between-subgroups.
A higher percentage indicates greater contribution to health inequality
All analyses were weighted using sample weights provided in the CCHS 2009/10

REFERENCES

1. Department of Health and Human Services. Healthy People 2010: General Data Issues: Center for Disease Control and Prevention; 2000. Available from: http://www.cdc.gov/nchs/data/hpdata2010/hp2010_general_data_issues.pdf. Retrieved June 12, 2014.

2. Strategic Policy Branch of the Applied Research and Analysis Directorate at Health Canada . Healthy Canadians 2010 – A Federal Report on Comparable Health Indicators. Health Canada; 2011. Available from: http://www.hc-sc.gc.ca/hcs-sss/pubs/system-regime/2010-fed-comp-indicat/index-eng.php. Retrieved June 21, 2014.

3. Health Disparities Task Group of the Federal/Provincial/Territorial Advisory Committee on Population Health and Health Security. Reducing health disparities – roles of the health sector: Discussion paper. Ottawa: Public Health Agency of Canada; 2004. Available from: http://www.phac-aspc.gc.ca/ph-sp/disparities/ddp-eng.php. Retrieved June 1, 2014.

4. WHO Commission on Social Determinants of Health. Closing the gap in a generation Health equity through action on the social determinants of health. Geneva: World Health Organization; 2008. Available from: http://www.who.int/social_determinants/thecommission/finalreport/en/. Retrieved November 1, 2014.

5. Trends in Income-Related Health Inequalities in Canada: A Summary Report. Canadian Institute for Health Information; 2015. Available from: https://www.cihi.ca/en/factors-influencing-health/health-inequalities/trends-in-income-related-health-inequalities-in. Retrieved January 1, 2016.

6. Eng K, Feeny D. Comparing the health of low income and less well educated groups in the United States and Canada. Popul Health Metr 2007, Oct;5(10):1-9. Available from: http://www.pophealthmetrics.com/content/5/1/10. Retrieved April 15, 2014.

7. Roberge R, Berthelot J-M, Wolfson M. The health utility index: Measuring health differences in Ontario by socioeconomic status. Health Reports 1995;7(2):25-32.

8. Huguet N, Kaplan MS, Feeny D. Socioeconomic status and health-related quality of life among elderly people: Results from the joint Canada/United States survey of health. Soc Sci Med 2008, Feb;66(4):803-10.

9. Safaei J. Income and health inequality across Canadian provinces. Health and Place 2007, Sep;13(3):629-38.

10. James PD, Wilkins R, Detsky AS, Tugwell P, Manuel DG. Avoidable mortality by neighbourhood income in Canada: 25 years after the establishment of universal health insurance. J Epidemiol Community Health 2007, Apr;61(4):287-96.

11. Braveman PA, Cubbin C, Egerter S, Williams DR, Pamuk E. Socioeconomic disparities in health in the United States: What the patterns tell us. Am J Public Health 2010;100(S1):S186-96.

12. Prus SG. Comparing social determinants of self-rated health across the United States and Canada. Soc Sci Med 2011, Jul;73(1):50-9.

13. Prus SG. Age, SES, and health: A population level analysis of health inequalities over the lifecourse. Sociol Health Illn 2007, Mar;29(2):275-96.

14. Humphries KH, van Doorslaer E. Income-related health inequality in Canada. Social Science & Medicine 2000;50(5):663-71.

15. Trovato F, Odynak D. Sex differences in life expectancy in Canada: Immigrant and native-born populations. J Biosoc Sci 2011, May;43(3):353-68.

16. McIntosh CN, Finès P, Wilkins R, Wolfson MC. Income disparities in health adjusted life expectancy for Canadian adults, 1991 to 2001. Statistics Canada 2009, Dec;20(4):55-64.

17. McGrail KM, van Doorslaer E, Ross NA, Sanmartin C. Income-related health inequalities in Canada and the united states: A decomposition analysis. Am J Public Health 2009, Oct;99(10):1856-63.

18. Braveman P, Gruskin S. Defining equity in health. J Epidemiol Community Health 2003;57(4):254-8.

19. Ferrer RL, Palmer R. Variations in health status within and between socioeconomic strata. J Epidemiol Community Health 2004, May;58(5):381-7.

20. Wagstaff A, van Doorslaer E. Overall versus socioeconomic health inequality: A measurement framework and two empirical illustrations. Health Econ 2004, Mar;13(3):297-301.

21. Asada Y. Assessment of the health of Americans: The average health-related quality of life and its inequality across individuals and groups. Popul Health Metr 2005;3(7):1-11. Available from: http://www.pophealthmetrics.com/content/3/1/7. Retrieved April 15, 2014.

22. Smits J, Monden C. Length of life inequality around the globe. Soc Sci Med 2009, Mar;68(6):1114-23.

23. Statistics Canada. Canadian Community Health Survey Annual Component User Guide 2010 and 2009-2010 Microdata Files; 2011. Available from: http://www23.statcan.gc.ca/imdb/p2SV.pl?Function=getSurvey&Id=81424. Retrieved January 1, 2014.

24. Harper S, Lynch J. Methods for measuring cancer disparities: Using data relevant to healthy people 2010 cancer-related objectives. Michigan: National Cancer Institute; 2005. Available from: http://seer.cancer.gov/archive/publications/disparities/measuring_disparities.pdf. Retrieved March 1, 2015.

25. Kawachi I, Subramanian SV, Almeida-Filho N. A glossary for health inequalities. J Epidemiol Community Health 2002;56(9):647-52.

26. Frohlich KL, Ross N, Richmond C. Health disparities in Canada today: Some evidence and a theoretical framework. Health Policy 2006, Dec;79(2-3):132-43.

27. Statistics Canada. Indicators of well-being in Canada. [Internet]. 2012. Available from: http://www4.hrsdc.gc.ca/.3ndic.1t.4r@-eng.jsp?iid=10. Retrieved March 28, 2015.

28. Lavergne MR, Kephart G. Examining variations in health within rural Canada. Rural and Remote Health 2012;12(1848):1-13.

29. Smith KB, Humphreys JS, Wilson MG. Addressing the health disadvantage of rural populations: How does epidemiological evidence inform rural health policies and research? Aust J Rural Health 2008, Apr;16(2):56-66.

30. Canada's Rural Communities research team. How healthy are rural Canadians? An assessment of their health status and health determinants. Ottawa: Public Health Agency of Canada; 2006. Available from:
https://secure.cihi.ca/free_products/rural_canadians_2006_report_e.pdf. Retrieved February 15, 2014.

31. Newbold KB. Chronic conditions and the healthy immigrant effect: Evidence from Canadian immigrants. Journal of Ethnic and Migration Studies 2006, Jul;32(5):765-84.

32. McDonald JT, Kennedy S. Insights into the 'healthy immigrant effect': Health status and health service use of immigrants to Canada. Soc Sci Med 2004, Oct;59(8):1613-27.

33. Oakes JM, Rossi PH. The measurement of SES in health research: Current practice and steps toward a new approach. Soc Sci Med 2003;56(4):769-84.

34. Murray CJL, Gakidou EE, Frenk J. Critical reflection-health inequalities and social group differences: What should we measure? Bulletin of the World Health Organization 1999;77(7):537-44.

35. Asada, Yukiko. A summary measure of health inequalities: Incorporating group and individual inequalities. In: Nir Eyal, Samia Hurst, Ole Norheim, and Dan Wikler, editors. *Inequalities in Health: Concepts, Measures, and Ethics.* Oxford University Press; 2002. p. 37-52.

36. Akita T, Miyata S. The roles of location and education in the distribution of economic well-being in Indonesia: Hierarchical and non-hierarchical inequality decomposition analyses. Letters in Spatial and Resource Sciences 2013;6(3):137-50.

37. Murray CJ, Kulkarni S, Ezzati M. Eight Americas: New perspectives on U.S. Health disparities. Am J Prev Med 2005, Dec;29(5S1):4-10.

38. Murray CJ, Kulkarni SC, Michaud C, Tomijima N, Bulzacchelli MT, Iandiorio TJ, Ezzati M. Eight Americas: Investigating mortality disparities across races, counties, and race-counties in the United States. PLoS Medicine 2006;3(9):1513-24. Available from:
http://www.plosmedicine.org/article/fetchObject.action?uri=info:doi/10.1371/journal.pmed.0030260&representation=PDF. Retrieved February 15, 2015.

39. Statistics Canada. Canadian Community Health Survey Annual Component 2010 Data Dictionary; 2011. Available from: http://www23.statcan.gc.ca/imdb/p2SV.pl?Function=getSurvey&SDDS=3226. Retrieved January 1, 2014.

40. Statistics Canada. Canadian Community Health Survey – Annual Component (CCHS) [Internet]. 2014. Available from: http://www23.statcan.gc.ca/imdb/p2SV.pl?Function=getSurvey&SDDS=3226. Retrieved February 1, 2016.

41. Grootendorst P, Feeny D, Furlong W. Health utilities index mark 3: Evidence of construct validity for stroke and arthritis in a population health survey. Medical Care 2000;38(3):290-9.

42. Feeny D, Furlong W, Torrance GW, Goldsmith CH, Zhu Z, DePauw S, Denton M, Boyle M. Multiattribute and single-attribute utility functions for the health utilities index mark 3 system. Medical Care 2002;40(2):113-28.

43. Horsman J, Furlong W, Feeny D, Torrance G. The health utilities index (HUI®): Concepts, measurement properties and applications. Health and Quality of Life Outcomes 2003, Oct;1(54):1-13. Available from: http://www.hqlo.com/content/1/1/54. Retrieved September 1, 2014.

44. Jones MP. Indicator and stratification methods for missing explanatory variables in multiple linear regression. Journal of the American Statistical Association 1996;91(433):222-30.

45. Statistics Canada. Visible minority of person [Internet]. 2015. Available from: http://www.statcan.gc.ca/eng/concepts/definitions/minority01. Retrieved February 2, 2016.

46. Statistics Canada. Canadian Community Health Survey User Annual Component – 2010 Questionnaire; 2011. Available from: http://www23.statcan.gc.ca/imdb-bmdi/instrument/3226_Q1_V7-eng.pdf. Retrieved January 1, 2014.

47. Statistics Canada. Canadian Community Health Survey User Annual Component – 2010 Derived variables; 2011. Available from: http://www23.statcan.gc.ca/imdb-bmdi/instrument/3226_Q1_V7-eng.pdf. Retrieved January 1, 2014.

48. Zhong H. The impact of decentralization of health care administration on equity in health and health care in Canada. International Journal of Health Care Finance and Economics 2010;10(3):219-37.

49. Bellù LG, Liberati P. Describing income inequality Theil index and entropy class indexes. EASYpol: Online Resource Materials for Policy-making 2006.

50. Novotný J. On the measurement of regional inequality: Does spatial dimension of income inequality matter? The Annals of Regional Science 2007;41(3):563-80.

51. Akita T. Decomposing regional income inequality in China and Indonesia using two-stage nested Theil decomposition method. The Annals of Regional Science 2003;37(1):55-77.

52. Li L, Fu AZ. Some methodological issues with the analysis of preference-based EQ-5D index score. Health Services and Outcomes Research Methodology 2009, Aug;9(3):162-76.

53. Huang IC, Frangakis C, Atkinson MJ, Willke RJ, Leite WL, Vogel WB, Wu AW. Addressing ceiling effects in health status measures: A comparison of techniques applied to measures for people with HIV disease. Health Serv Res 2008, Feb;43(1.1):327-39.

54. StataCorp. Stata statistical software: Release 13. College Station, TX: StataCorp LP; 2013.

55. Panel on Research Ethics. Scope and approach [Internet]. Ottawa: Secretariat on Responsible Conduct of Research; 2014. Available from: http://www.pre.ethics.gc.ca/eng/policy-politique/initiatives/tcps2-eptc2/chapter2-chapitre2/. Retrieved April 10, 2015.