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Impact of Universal Health Coverage on Health in Late Life

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DISSERTATION APPROVAL

The abstract and dissertation of Nathalie Huguet for the Doctor of Philosophy in Urban Studies were presented August 3, 2006, and accepted by the dissertation committee and the doctoral program.

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ABSTRACT

An abstract of the dissertation of Nathalie Huguet for the Doctor of Philosophy in Urban Studies, presented August 3, 2006.

Title: Impact of Universal Health Coverage on Health in Late Life

The growth of the elderly population is a major public concern in industrialized countries. Understanding the factors contributing to better health in late life is essential. Canadians appear to be healthier than Americans, yet concrete findings that determine whether older Canadians are healthier than older Americans are missing. The primary goal of this study is to examine the relative importance of the health care system in explaining why older Canadians may be healthier than older Americans. To achieve this goal, this study a) assessed if older Canadians are healthier than older Americans; b) investigated the impact of health care coverage among several cohorts in Canada and the United States; and c) explored what would be the effect of extending Medicare to a younger age.

The Joint Canada/United States Survey of Health (JCUSH), 2003 was used to determine the health differences between Canadians and Americans, and to understand the impact of universal health coverage on health. Health status differences between the two countries were assessed using self-rated health, number of chronic conditions, number of functional limitations, and Health Utility Index Mark 3 (HUI3) scores.

The Health and Retirement Survey (HRS) 1992-2002 was used to examine the health impact of Medicare coverage among previously uninsured people 55 to 64

years old. The HRS is a longitudinal study that was designed to follow working people as they reach retirement. Health status will be assessed using self-rated health.

The results from the JCUSH indicated that, overall, older Canadians were in better health, had healthier lifestyle and greater access to regular care than their American counterparts. The findings also showed that middle-aged insured Americans reported lower self-rated health and HUI3 than their Canadian counterparts. Finally, the results from the HRS indicated that the decline in health of people who where uninsured prior to Medicare eligibility age stabilized when they became Medicare beneficiaries.

This study concluded that U.S. Medicare is valuable for those without insurance, however; providing coverage to all would not be sufficient to ensure better health in late life. Policy makers should concentrate their efforts toward achieving universal, affordable, and stable coverage.

IMPACT OF UNIVERSAL HEALTH COVERAGE ON HEALTH IN LATE LIFE

by

NATHALIE HUGUET

A dissertation submitted in partial fulfillment of the
requirements for the degree of

DOCTOR OF PHILOSOPHY
in
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Portland State University

I dedicate this work to

Pat O'Hogan

and to

those who fall in the gaps.

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INTRODUCTION

This introduction presents the statement of the problem by first describing the increasing growth of the older population and its public health impact. Then, health differences between Canada and the United States using general health indicators are addressed. Next, potential reasons for the health differences between Canada and the United States are proposed. Finally, the key objectives of this study are presented and discussed.

1. Demography of Aging

Across the world, the elderly population is growing faster than the rest of the population. By the year 2050, older adults (aged over 60) in developed countries will represent 19% of the total population (Department of Economic and Social Affairs, 2001). Between 1950 and 2001, the population of older adults tripled, and is expected to more than triple again in the next 45 years. In 2000, one out of ten adults in the world was over 65 years old; by 2050, this rate is expected to increase to one out of six. In industrialized countries, this ratio will be even larger, with elders representing one out of four people.

In North America, the population over 65 is predicted to reach 21% of the population in 2050, compared to 12% in 2000 (Department of Economic and Social Affairs, 2001). In Canada, close to 4 million people were over 65 years old in 2001. This represented 12.7% of the total Canadian population. In 10 years, the proportion of older adults is projected to represent over 16%, and by 2030; the proportion of elderly will increase to 23%. At the same time, people over 80 will comprise the

greatest increase in this population, representing a 200% growth rate (Kinsella & Velkoff, 2001). The United States will follow a similar trend with an increase from 12.4% in 2000 to 13.0% in 2010 (Wan, Sengupta, Velkoff, & DeBarros, 2005). By 2030, this upward trend is expected to reach 19.6% (Wan et al., 2005). Moreover, similar to Canada, the oldest old in the United States (80 years and older) will grow faster than those between 65 and 84 years old. It is noteworthy that this trend will be similar not only in other developed countries but also in developing countries and will have a serious impact on health and long-term care services (Department of Economic and Social Affairs, 2001; Kinsella & Velkoff, 2001).

2. Public Health Impact of the Aging Population

The growth of the elderly population is a concern in every industrialized country. From a public health perspective, there is an urgent need to promote healthy lifestyles, reduce the negative physical and psychological effects of chronic diseases, improve independence, delay institutionalization in late life, and control the escalating cost of health care. With these objectives, understanding the factors contributing to better health in the elderly population is essential. Canadian and U.S. public health agencies concentrate on multiple priorities; some of them are dissimilar while others are shared. For example, in Canada, concerns include providing a supportive environment that promotes aging in place and financial security; whereas in the United States, the major concerns are health care spending and the impact of the aging

population on the society (Division of Aging and Seniors Health Canada, 2002; Centers for Disease Control and Prevention [CDC], 2003a). The similarities highlight a general concern to improve quality of life in late life by promoting healthy aging. This study addressed healthy aging in each of these countries. To do so, this study compared the older Canadian and U.S. populations, identified potential differences in health indicators between the two populations, and examined the reasons undermining these differences.

Canada was used as the comparison group for several reasons. Canada and the United States are simlar in their language, demographic, and economical conditions (OECD, 2006). For example, in 2004, the United States and Canada had comparable population growth rate, migration trend, gross domestic product per capita, inflation, consumer price, and employment rate. Although comparable in many ways, both countries have significant differences, specifically regarding social policies (Lipset, 1990). For instance, Canada has a more extensive welfare program compared to the United States (Lipset, 1990). Also, both countries have very different health care system. Currently, there is much discussion regarding the sustainability of health care systems in most industrialized countries (Akhter, 2003; Donelan, et al., 2000; Oberlander, 2002). Single-payer systems such as the one in Canada are often cited as models that the United States could adopt to reduce health care expenditures and eliminate the problem of uninsurance (Tooker, 2003; Oberlander, 2003). Health care access differences between the countries with universal coverage and the United States have been extensively studied. Several studies showed that countries with single-payer

systems provide greater access to care than the United States (Blendon, Schoen, DesRoches, et al., 2002; Anderson & Hussey, 2001; Anderson, 1998; Schoen, Blendon, DesRoches, & Osborn, 2002). Nonetheless, there are many unanswered questions concerning the impact of universal health care system on population health specifically regarding the elderly population. The present study addressed some of these questions using Canada as the referent group for single-payer system.

3. Health Indicators: Canada vs. United States

Health indicators, such as life expectancy or mortality, reveal that Canadians actually are healthier than Americans. Life expectancy in Canada is greater than in the United States both from birth and after 65 for both men and women. In Canada, at age 65, the life expectancy for men is 18.1 years compared to 16.4 years in the United States (Statistics Canada, 2001a; CDC, National Center for Health Statistics [NCHS], National Vital Statistics System, Grove, & Hetzel, 2003). Moreover, in 1997, the United States had a lower life expectancy free of disability[1] than Canada for both men and women (men: 67.4 vs. 70.0, women: 72.6 vs. 74.0; Anderson & Hussey, 2001).

Life expectancy is not the only indicator of health differences between the two countries. The United States has a greater infant mortality (6.8 vs. 5.2 per 1,000;

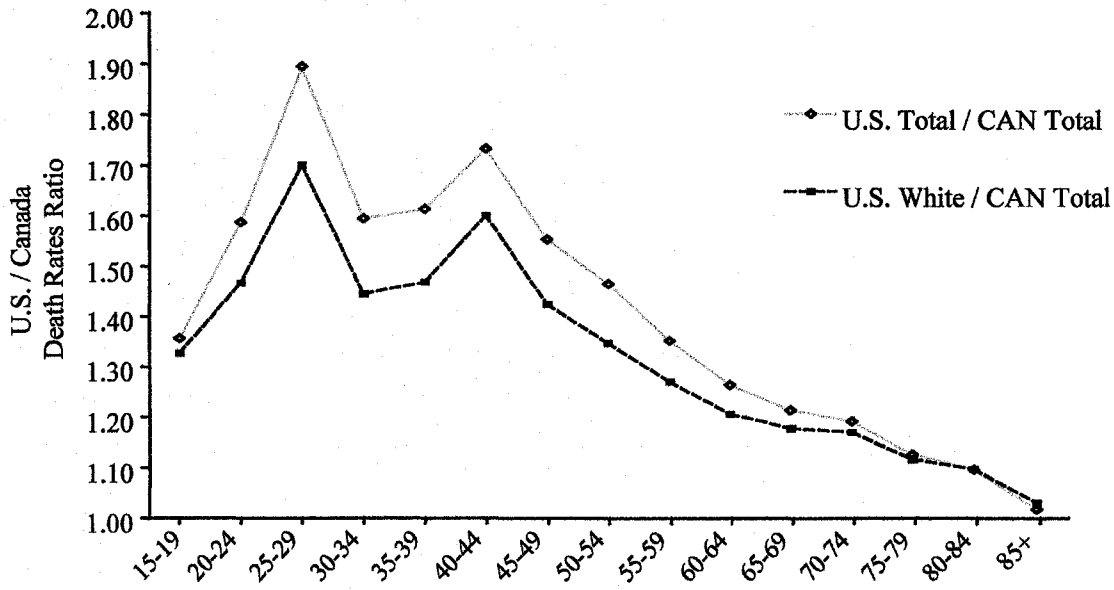
[1] The World Health Organization glossary (2001) defined life expectancy free of disability as life expectancy at birth adjusted for disability. More specifically, it is the value of the future years of life without disability that are lost due to premature death or disability occurring in a particular year.

Organization for Economy Co-operation and Development [OECD], 2004). Furthermore, in the United States, mortality rates are higher than in Canada across all ages (Torrey & Haub, 2004; Statistics Canada, 2004; Kochanek, Murphy, Anderson, & Scott, 2004). Kunitz and Pesis-Katz (2005) reported that Americans have had greater mortality rates than Canadians since the 1980s. Interestingly, as Kunitz and Pesis-Katz (2005) argued, differences in mortality rates between Canada and the United States have surfaced since the implementation of the universal health care system in Canada around 1985. Figure 1 displays the ratio of the 2002 U.S. death rates over the 2002 Canadian death rates. Death rates from both countries were extracted from their respective vital statistics (Statistics Canada, 2004; Kochanek et al., 2004). As seen in Figure 1, both the overall U.S. population and the white U.S. population under 65 years old had over 30% greater death rate than the Canadian population of the same age. In the United States, people aged 24 to 44 were over 60% more likely to die than Canadians. Interestingly, after age 44, the difference drops linearly to less than 15% among people aged 65 and over, suggesting that the elderly Canadian and American populations may be similar.

Differences in mortality rates may reflect the disparities in homicide, road fatalities, AIDS, or obesity rates. Data from the OECD showed that in 2004 Canada had a lower rate of road fatalities compared to the United States (86.7 vs. 145.2 per million). Moreover, the United States has much higher rate of crime specifically firearm related than Canada (Statistics Canada, 2001c). Furthermore, the United States had a higher rate of AIDS than Canada (.03% vs. .06%; WHO, 2004). Finally, Torey

and Haub (2004) argued that the epidemic of obesity might contribute to the differences in mortality rates between the two countries. For instance, the authors showed that U.S. males were two times more likely to be obese than Canadian males and U.S. females were three times more likely to be obese than Canadian females. Also, another study found that persons with excess weight had reduced life expectancy compared to those without weight problems, suggesting a higher risk for mortality associated with excess weight (Peeters, et al., 2003). The differences in these various rates are likely to contribute to the disparity in mortality rates between the two countries. In addition to the differences in mortality rates, other health measures have shown that Canadians are in better health than their American neighbors.

Figure 1. 2002 Death rates ratio U.S. over Canada



Source. United States: Death data for 2002, Canada: Statistics Canada, Canadian Vital Statistics, Birth and Death Databases, and Demography Division, retrieved May 8, 2005.

For several years, Canada has been one of the top ranked countries in overall health. Since 2000, Canada has ranked fourth in the Human Development Index[2] while the United States ranked eighth in 2004 (United Nations Development Programme, 2004). In addition, studies have shown that Americans of all ages report significantly poorer self-rated health (14.5% vs. 11.8%), greater functional limitations (5.7% vs. 4.0%), more obesity (20.6% vs. 15.3%), and higher rates of unmet health care needs (13.3% vs. 10.7%) than Canadians (Sanmartin, Ng, Blackwell, Gentleman, Martinez, & Simile, 2004; Kaplan, McFarland, Newsom, & Huguet, 2004). This

[2] The Human Development Index is a composite measure evaluating the average achievement of a country using life expectancy, adult literacy, and standard of living.

discrepancy is even greater when taking into account the diversity in the U.S. population such as lower income or people without health care coverage. For example, for every income increment, Americans reported poorer self-rated health and more functional limitations than Canadians. Similarly, people with no health insurance were four times more likely to report unmet health care needs compared to Canadians (40.0% vs. 10.7%). Interestingly, insured Americans did not report more unmet health care needs than Canadians (10.3% vs. 10.7%; Sanmartin et al., 2004).

In summary, the Canadian population appears to be healthier than the American population. Canadians experience a greater life expectancy and lower mortality rates as well as report better overall health status. What contributes to these differences?

4. Why Are Canadians Healthier than Americans?

Many factors may contribute to the health differences between the two countries. The following section argues that selective survival, ethnicity, social inequalities, and the health care system are potential reasons for the differences in health between Canada and the United States.

Selective survival

Selective survival implies that people who are unhealthy and/or socially disadvantaged will die sooner, and healthier people will survive. Hooyman and Kiyak

(2001) suggested that the survivors may have been healthier at birth and/or may have engaged in a healthier lifestyle throughout the life span. The authors argued that because of this phenomenon, the survivors might not be representative of the original cohort. This idea can be applied to the differences in mortality rates in Canada and the United States. That is, the apparent similarity in the mortality rates between the older populations, seen in Figure 1, could be attributed to selective survival where only the hardiest reached later life. An additional possibility for the reduced life span of the American population could be the ethnic diversity in the United States as compared to the relative ethnic homogeneity of the Canadian population.

Ethnicity

United States and Canadian ethnic diversity are quite different in several respects. One difference in diversity is that there is a higher percentage of whites in Canada than in the United States (86.8% vs. 75.1%, Bélanger, et al., 2005). Furthermore, most of the non-white population in Canada is Asian (9.1% vs. 3.6% in U.S.) whereas in the United States, African Americans and Hispanics dominate the racial diversity (12.3% and 12.5%, respectively; U.S. Census, 2002). Studies have shown that Asians have a greater life expectancy (Hooyman & Kiyak, 2001) and lower mortality rates than whites (282.8 vs. 474.5 per 100,000, 1994-96; Pamuk, Makue, Reuben, & Lochner, 1998). In comparison, African Americans and Hispanics in the United States appear to be sicker and less likely to reach later life. Moreover, African Americans and Hispanics are more likely to be disadvantaged economically as

opposed to the better economic situation of older Asian Americans. In 2002, 23.8% of elderly Black and 21.4% of older Hispanics were living in poverty compared to 8.4% and 8.3% of white and Asian older adults, respectively (NCHS, 2004). Based on these estimates, it appears that Canadians are more likely to have a healthier ethnic population than Americans and that the differences in mortality rates might be influenced by ethnic socioeconomic disparities. As seen in Figure 1, however, white Americans have greater rates of mortality than overall Canadians at all age groups. Consequently, it appears that ethnicity is only one of several factors that could explain the difference in overall death rates between Canada and the United States. Another potential factor influencing the health differences between the two countries is social inequality.

Social inequality

Canada has less economic disparity than the United States does. In 2000, the United States had higher rates of relative poverty, income inequality, and child poverty than Canada (see Table 1). Social inequality has been associated with poor health outcomes and mortality within and between countries (Marmot, 1999; Franks, Marthe, & Fiscella, 2003; Adler & Ostrove, 1999). Indeed, among lower income groups, the United States reported a higher rate of poor perceived health than Canada (Sanmartin et al., 2004). Furthermore, in contrast to the United States, there is no relationship between income inequality and mortality in Canada (Ross & Wolfson, 1999). Social inequality is highly influenced by the social policies of each country. For

example, the health care system is one of the major social policies that differ between Canada and the United States.

Table 1.

Social Inequalities Indicators in Canada and the United States, 2000

	Relative Poverty %	Income Inequality %	Child Poverty %
United States	17.1	35.7	21.7
Canada	10.3	30.1	13.6
OECD	10.2	30.8	12.1

Note. Relative poverty is the proportion of the population below 50% of median income poverty threshold. Income inequality is measured using the Gini coefficient, which is based on the comparison between the distribution of people and the distribution of income earned. The Gini coefficient ranges from 0 "perfect equality" to 100 "perfect inequality". Child poverty is the share of children 17 years and under living in households with disposable income less than 50% of median income.

Source. Organization for Economy Co-operation and Development (2005), Society at a Glance: OECD Social Indicators.

Health care system

Since 1985, health care in Canada has been covered through a universal system, which offers all the services provided by hospital and medical practitioners to all citizens of the provinces. In contrast, American's health care is a mix of public and

private coverage. Most Americans are covered through employer-sponsored programs or public programs and the remainder of the population is either not insured or covered through privately paid insurance. Unlike the Canadian system, the complexity of the United States health care system seems to contribute to the growth in health inequalities in the U.S. population.

Many studies using data from the OECD illustrate the benefits of universal coverage to health status (Blendon, Schoen, DesRoches, et al., 2002; Anderson & Hussey, 2001; Anderson, 1998; Schoen, Blendon, DesRoches, & Osborn, 2002). These benefits include reducing health spending, diminishing health inequalities, and offering higher quality in the delivery of health care. Countries with universal coverage ranked among the highest on indicators showing the overall performance of health care systems such as maximizing population health (responsiveness) and minimizing health care access inequalities (fairness) while market-based systems ranked poorly especially on fairness (World Health Organization [WHO], 2000). In the U.S. system, Americans have been shown to have greater difficulties in accessing care compared to residents of other members of the OECD.

A report using OECD data revealed that over one quarter of Americans with health problems reported difficulties in getting the proper care or follow-up care because of cost compared to one tenth of Canadians (Blendon, Schoen, DesRoches, Osborn, & Zapert, 2003). Because of this system, Americans are more at risk of having periods without coverage throughout their lives than Canadians. Overwhelming evidence, based on Americans without health insurance, underlines the

detrimental effects on health of either short or long term lack of health coverage (Institute of Medicine [IOM], 2002, 2003; Baker, Sudano, Albert, Borawski, & Dor, 2001). For example, the IOM estimated that uninsurance leads to 18,000 unnecessary deaths annually (IOM, 2003). An interesting study from Sudano and Baker (2003) used the longitudinal Health and Retirement Study 1992 to 1996 to examine the relationship between loss of insurance coverage and use of preventive health care. Not surprisingly, they found that people who were continuously uninsured (between 1992 and 1996) were less likely to have preventive care than those who were continuously insured. In addition, the authors found that previously uninsured people who acquire insurance were slightly more likely to receive preventive care than those who had been continuously lacking health coverage. Sudano and Baker (2003) argued that obtaining insurance does not result in immediate use of care. This result suggests that the lack of insurance affects health care utilization even after one is re-insured. This finding is important because it underscores the long-term effect of lacking coverage even after recovering insurance. It also suggests that stable coverage throughout life, as in the Canadian system, is an essential determinant of health. One must wonder if secure, stable health insurance throughout life contributes to the better health of Canadians.

In summary, several potential reasons explaining health differences between the United States and Canada have been suggested. First, ethnic distributions in both countries are different and minorities in the United States appear to be sicker than in Canada. Second, the correlation between social inequality and health disparities is greater in the United States than in Canada. Third, Canada and the United States have

different health care systems, and evidence suggests that the performance of the Canadian system has a more positive effect on population health than that of the U.S. system.

5. Statement of the Problem

Little attention has been given to the effect of health care coverage throughout the life-course on health. This effect can be studied as a determinant of better health by comparing the United States and Canada. Examining the impact of these health care systems throughout the life-course would add to the body of research on health predictors. Furthermore, it is essential to understand the role of the health care system as a determinant of better population health in Canada. Policy-makers in the United States could then apply this knowledge and develop policies aimed at improving the quality of life of older Americans. In addition, examining the impact of Medicare coverage among people who were previously without health coverage could be essential in determining the role of health care as a determinant of population health.

The primary goal of this study is to examine the relative importance of the health care system in explaining why older Canadians may be healthier than older Americans. Although many studies have identified the relationship between social determinants and health, the role of the health care system as a determinant of health is understudied. In order to achieve this goal, this study first assessed if older Canadians are healthier than older Americans. Second, this study investigated the impact of

health care coverage among several cohorts in Canada and the United States. Third, this study examined the differential effect on health, of being insured versus uninsured prior to and after Medicare enrollment. Although many studies have stressed the detrimental effect of losing or lacking medical coverage, none has examined the health impact of Medicare coverage among those who were uninsured prior to being covered under Medicare.

In summary, the primary objective of this study is to determine if lifelong health coverage could lead to healthier status in older adulthood. The secondary objective of this study is to assess if older Canadians are healthier than older Americans and to examine the role of health care as a determinant of health in the elderly population.

I. LITERATURE REVIEW

This chapter addresses in more detail the health differences in late life between Canada and the United States, and the potential explanations for these differences following a population health approach.

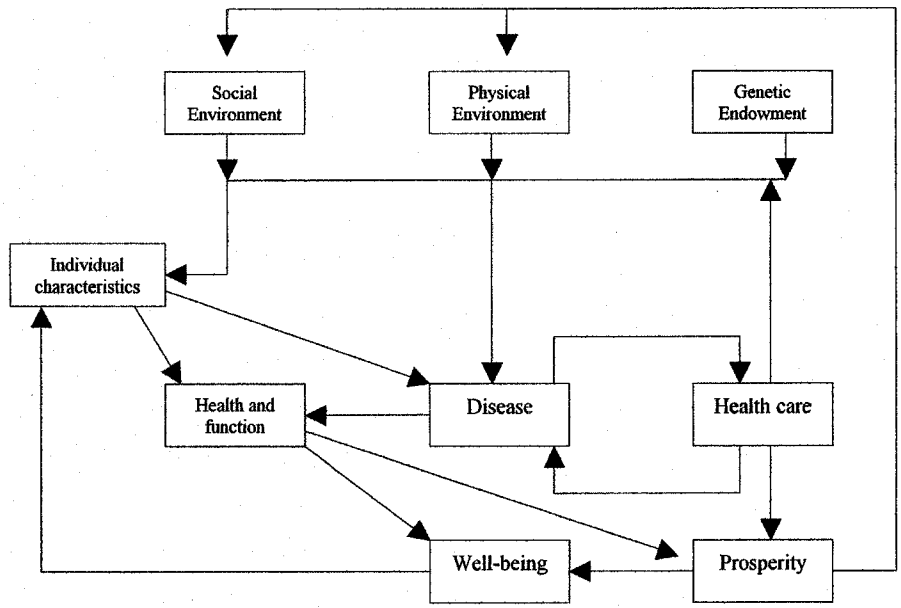
I.1. Population Health Approach

This study uses the population health approach to identify health determinants in Canada and the United States. The evolution of the population health approach predates the 1980s. In 1974, Lalonde, in *A New Perspective on the Health of Canadians*, introduced the notion of population health. He suggested that the health care system "is only one of many ways of maintaining and improving health" (Lalonde, 1974, p. 5). Lalonde argued that the study of health is in need of a conceptual framework that would divide the health field into manageable elements for analysis and evaluation. He proposed the following four elements: human biology, environment, lifestyle, and health care organization. Human biology conceptualized the physical and mental aspects of health from genetic makeup to morbidity. Environment is composed of elements external to the human body such as food, air, and social environment. Lifestyle includes behavioral habits of individuals. Health care organization refers to the health care system. Evans and Stoddart (1990) and Evans, Barer, and Marmor (1994) further examined the conceptualization of the

population health approach (Figure 2). They suggested that well-being is affected by many interrelated factors such as social and physical environment, genetic and individual characteristics, disease, health and function, health care services, and prosperity.

More recently, other researchers noted the lack of a general definition of population health (Kindig & Stoddart, 2003). They proposed this definition: "the overall goal of a population health approach is to maintain and improve the health of the entire population and to reduce inequalities in health between population groups" (Kindig & Stoddart, 2003, p. 1). Within this approach, a population is defined as a geographic area such as a country or a state and also as specific groups such as the elderly or women. This approach allows us to identify the determinants of health and can be used to explain why some people are healthier and others not. Using this approach, we can identify the factors determining healthy aging in Canada and the United States.

Figure 2. Population Health Framework



Source: Evans, et al. (1994). Why are some people healthy and others not?

The model proposed by Evans and collaborators (1994) suggests that genetic factors, social support, and the factors pertaining to physical environment are determinants of health. This is a broad general model, and it would be difficult to study all of the factors. Consequently, this study did not assess the psychosocial factors, genetic determinants, and physical environment. However, this study examined socioeconomic factors, individual characteristics, disease, health and function, and health care. The following sections present background information pertaining to the health differences between Canada and the United States associated with each of these health determinants, beginning with socioeconomic factors.

I.2. Socioeconomic Factors

The relationship between social inequalities and health has been well established. Within all industrialized countries, people with higher socioeconomic status (SES) report better health than do lower socioeconomic groups. SES is usually defined using an individual's income, education, and/or occupation. Research within both Canada and the United States has shown that income is predictive of health outcomes. In Canada, several studies found an association between lower education, lower income, and poverty, and various health outcomes (Dunlop, Peter, & McIsaac, 2000; Chen, Dales, & Krewski, 2001; Orpana & Lemyre, 2004; Wade & Cairney, 2000, Raphael, et al., 2005; Birch, Jerret, & Eyles, 2000; Dubois & Girard, 2001). Similarly, in the United States, education, income, and poverty have been associated with poorer self-rated health, more mental and physical morbidity, and health-related quality of life (NCHS, 1998; Everson, Maty, Lynch, & Kaplan, 2002; DeGarmo & Capaldi, 1999; Lantz, et al., 2001; CDC, 2005, 2003b, 2002). However, it is noteworthy that these studies focused on population of all ages; far fewer have looked at the relationship between SES and health in late life.

In the United States, most if not all studies have shown a gradient effect of SES on health outcomes at all ages, including in late life. Socioeconomic factors were associated with a greater likelihood of being obese, inequalities in medical treatments, and poor health (Grundy & Sloggett, 2003; Bassuk, Berkman, & Amick, 2002; Himes, 1999; Rao, Schulman, Curtis, Gersh, & Jollis, 2004). For example, Bassuk et al.

(2002) examined the relationship between income, education attainment, and mortality in late life in different regions of the United States. They found that lower income and education levels were associated with greater mortality.

In contrast to these findings, in Canada, very few studies have looked at this relationship in late life and the findings are contradictory. On the one hand, research using the Canadian National Population Health Survey noted that elderly with less education were more likely to have poorer health behaviors, less likely to engage in preventive care, and less likely to take action toward improving their health than those with higher education (Newsom, Kaplan, Huguet, & McFarland, 2004). On the other hand, another study, observing the relationship between income and self-rated health, heart disease, and respiratory disease, did not find lower education to be predictive of poor health outcomes (Cairney & Wade, 1998). Similarly, Mustard, Derksen, Berthelot, Wolfson, and Roos (1997) revealed that lower-income older Canadian adults were not at greater risk for mortality. Moreover, a recent study examining health differences between Canada and the United States in late life found that SES was significantly associated with health-related quality of life in the United States, but not in Canada (Huguet, Kaplan, & Feeny, 2006). The differences in the level of social inequality in Canada and the United States may explain these findings.

Indeed, numerous studies have found that the greater a country's income gap, the poorer the population's health (Wilkinson, 1997; Marmot, 2002, 1999; Kennedy, Kawachi, Glass, & Prothrow-Stith, 1998; Pampel, 2002). In this case, income inequality refers to the inequality in the distribution of income in a country. Judge,

Mulligan, and Benzeval (1998) reviewed the literature examining the relationship between inequalities in income distribution and population health across countries. They found that most of the studies revealed an association between income inequalities, and infant mortality and/or life expectancy. As previously noted, Canada has a lower Gini coefficient that the United States. The Gini coefficient is an indicator of income inequality within a country and can be used to compare countries. Based on the Gini coefficient, in the United States, the distribution of income is more skewed toward people with higher income than in Canada.

There is further evidence that the unequal distribution of income affects health differently in Canada and in the United States. Several studies have found no relationship between income inequality and mortality in Canada but have found a consistent association in the United States (Ross, Wolfson, Dumn et al., 2000; Canadian Institute for Health Information, 1999). For example, some studies revealed that cancer survival was related to income inequality in the United States but not in Canada (Gorey, Kliewer, Holowaty, Laukkanen, & Ng, 2003; Gorey, Holowaty, Fehringer et al., 1997). Gorey and colleagues (1997) compared the rate of 1 and 5-year cancer survival for Ontario, Canada, with the rates for Detroit, Michigan. They found that there were no differences in survival rates between areas with a greater proportion of higher income and those with lower income in Ontario. In contrast, in Detroit, as the proportion of higher income increased, the rate of survival increased as well. Furthermore, Ross and collaborators (Unpublished) examined income inequality and health at the city level, not only between Canadian and American cities, but also

among cities in several additional countries. Their findings revealed that cities in Canada, Sweden, Denmark, and Australia did not have a significant correlation between income inequality and health but the American and British cities did.

Several arguments have been proposed to explain what contributes to the country differences observed in the relationship between income inequalities and health. For instance, the importance of material deprivation such as lack of investment in education and poor transportation systems, health services, and recreational facilities is essential in reducing the distribution of income inequality (Lynch, et al., 2004). Another example refers to governmental policies, including those aimed at reducing income inequality, that are factors in the observed differences between countries. That is, countries in which the relationship was not observed might have social values such as intolerance of inequality and trust in government, which would contribute to a more egalitarian society with better health outcomes (Marmot, 2002, 1999; Wilkinson, 1997). These values may contribute to higher investment in education, health, and welfare. For example, contrary to the U.S. health care system, the Canadian national health care system may reduce social inequality across the age span.

In summary, numerous studies have identified a relationship between SES and health outcomes. It appears that the relationship between socioeconomic factors and health in late life is evident in the United States but no clear evident relationship was found in Canada. This evidence suggests that some of the differences in health

between the two countries can be explained by the differential effect of socioeconomic factors on health; however, further studies highlight the role of lifestyle choices.

I.3. Lifestyle Factors

What role do lifestyle factors play in the better health of Canadians? As seen in Figure 2, the population health approach does indeed emphasize the influential role of individual characteristics on well-being. This concept is based on people's lifestyle choices. Unhealthy lifestyles such as smoking, alcohol abuse, poor diet, and sedentary behaviors have been associated with increased morbidity and mortality across many populations including the elderly (Kaplan, Huguet, Newsom, McFarland, & Lindsay, 2003a; Kaplan, Huguet, Newsom, & McFarland, 2003b; Newsom et al., 2004).

Smoking has been linked with numerous negative health outcomes such as mortality and morbidity at all ages (Surgeon General, 2004). Reports from both countries showed that frequencies of daily smoking in Canada and the United States were similar. In 2000-2001, over 10% of elderly people in both countries were considered current smokers (Statistics Canada, 2001b; CDC, 2003c).

Another lifestyle factor of primary concern to public health agencies is physical activity. Exercise appears to be an essential contributor to better health. Many studies stress the importance of regular exercise in late life to help maintain mobility, independence, and to prevent or limit health problems such as arthritis or obesity. Despite the health benefit associated with regular exercise, in 2002 one third of U.S.

elderly were sedentary (CDC, 2004). Because Canada uses a different evaluation of physical activity (energy expenditure), comparing national statistics may not prove to be accurate. Based on data from the Center for Disease Control and Prevention (2004) and Statistics Canada (2005), it appears that older Canadians are more likely to be sedentary than older Americans. In 2000-2001, 56% of people aged 65 to 74 were sedentary in Canada as opposed to 46% in the United States. To determine accurately whether or not Canadians are more likely to be sedentary, elderly Canadians and Americans need to be evaluated using equivalent measures.

A final lifestyle factor contributing to unhealthy aging is poor diet resulting in obesity. The epidemic of obesity is a worldwide problem but is much more noticeable in the United States than in Canada. In 2002, data from the Behavioral Risk Factors Surveillance System (CDC, Behavioral Risk Factor Surveillance System [BRFSS], 2002) revealed that over 22% of Americans aged 18 and over were obese (Body Mass Index of 30.0 kg/m^2 or more). In contrast, for the same year, in Canada, 15% were obese.

Contrary to the benefit of exercising on health, obesity contributes to worse health outcomes such as increasing functional limitation (Himes, 2000). Obesity has also been shown to be a predictor of mortality (Flegal, Graubard, Williamson, & Gail, 2005). The problem of obesity in the United States could contribute to the smaller difference in mortality rates in later life. Indeed, following the selective survival theory, it could be argued that obese people are less likely to survive to old age. One could contend that looking at obesity in late life as an indicator of health difference

between the two countries is irrelevant because of the low likelihood that obese people will reach old age. The epidemic of obesity has not excluded the older population, however.

In the United States, obesity has gone from 12% in 1990 to 19% in 2002 among older adults (CDC, BRFSS, 2002). Obesity in the elderly was also higher in the United States than in Canada (14.7% vs. 12.8% in 1996-97; CDC, BRFSS, 2002; Kaplan et al., 2003a). Thus, despite the higher probability of dying at a younger age, comparing obesity in late life in Canada and the United States is important in determining if older Canadians are healthier than older Americans.

In summary, it is unclear if older Canadians have significantly different health behaviors than U.S. elderly, which would lead Canadians to have substantially better health. Indeed, except for the rate of obesity, Canadian and American elderly populations are not drastically different in either rates of smoking or exercising. The major limitation in examining these health behavior rates is that these national surveys did not account for socioeconomic factors, health care coverage, or other health determinants. Consequently, these prevalences may not accurately illustrate the health behavior differences between older Canadians and Americans. Therefore, further research controlling for the determinants of health is needed. If the health differences between the two countries are not due to lifestyle choices, could they be the results of differences in the prevalence of chronic disease?

I.4. Disease

This section first reviews the importance of chronic conditions as a determinant of health; second, examines the differences in morbidity between the two countries; third, explores possible explanations for the differences.

As people age, they are confronted with an increasing number of chronic illnesses that impair the quality of their lifes (CDC, 2004). Chronic diseases have been associated with decline in independence, increased functional limitation, debilitating pain, financial burden, and increased family strain (CDC, 2004). Not surprisingly, chronic diseases are the leading cause of death among people aged 65 and older in both the United States and Canada. The CDC, in 2003 (CDC, 2003a) reported that 80% of older Americans suffer from at least one chronic disease, and 50% suffer from two diseases. Similarly, in 1995, 82% of Canadians aged 65 and older reported one or more chronic conditions (National Advisory Council on Aging, 1999).

When looking at other estimates from studies in each country, older Canadians appear to have lower prevalence of chronic diseases. For example, in 1996, the prevalence of arthritis among elderly Americans was greater than that of older Canadians (53.0% and 42.4 %, respectively; Reese, et al., 2000; Kaplan et al., 2003b). In addition, preliminary analysis, using the Canadian National Population Health Survey 1998-99 and the U.S. National Health Interview Survey 1998, reveals that indeed older Canadians had fewer chronic diseases than their American counterparts. It is important to note that in these national surveys, respondents were asked if they

had been diagnosed with chronic illness as opposed to self-report. Table 2 suggests that older Americans have higher prevalence of chronic diseases than their Canadian counterparts. For example, more than 50% of older Americans reported being diagnosed with arthritis compared to less than 45% in Canada. Moreover, close to 51% of U.S. seniors were diagnosed with hypertension as opposed to 36% in Canada. It is unclear whether these differences between the United States and Canada could be attributed to social disparities, health care access, or other factors.

Table 2

Prevalence of Chronic Conditions in Canada and the U.S.

	United States %	Canada %
Arthritis	51.5	44.8
Hypertension	50.8	36.4
Heart Disease	17.0	17.5
Sinusitis	15.5	4.9
Ulcer	13.7	6.3
Diabetes	13.2	11.5
Stroke	8.3	4.4
Asthma	7.8	6.3
Bronchitis	6.3	5.9

Source. National Health Interview Survey, 1998; National Population Health Survey, 1998

As seen previously, the impact of social inequality on health appears to be greater in the United States than in Canada. However, studies from both the United States and Canada have shown that low SES people of all ages suffer from more chronic conditions than those with higher SES (Macintyre, McKay, & Ellaway, 2005; Everson et al., 2002; Michelson, Bolund, & Brandberg, 2001; Stronks, van de Mheen, & Machenbach, 1998; Center for Chronic Diseases Prevention and Control Health Canada, Canadian Cardiovascular Society, and Heart and Stroke Foundation of Canada, 2003). Therefore, the differences in chronic diseases between the two countries may not be related to social inequality.

Another potential explanation for the differences in prevalence of chronic disease between the United States and Canada is attributed to the health care system. It could be argued that one component of the Canadian health care system's contribution to the reduction of chronic conditions is the provision of medical care throughout the life span. Specifically, a regular physician is essential in dealing with chronic illnesses. A regular physician promotes the modification of unhealthy behaviors reducing the likelihood of developing chronic disease. Although older Americans do not face the difficulties in accessing regular care as younger Americans because of Medicare, chronic conditions are likely to develop before the age of Medicare; and thus, having a regular provider is important at all ages. Unfortunately, in the United States, the level of coverage determines the type of provider seen (IOM, 2002; Jackson, 2001; Petersen, Burstin, O'Neil, Orav, Brennan, 1998). For example, uninsured people are

more likely to use the emergency department as their regular provider and less likely to get the life long patient-provider relationship that one can develop in Canada (Menec, Sirski, Attawar, 2005).

Schoen and colleagues compared primary care experiences among adults 18 and older in five countries (Schoen et al., 2004). They used the 2004 Commonwealth Fund International Health Policy Survey in Australia, Canada, New Zealand, the United Kingdom, and the United States. The authors found that Americans were significantly more likely to report not having a usual doctor than any other country. In addition, 53% of Canadians as opposed to 37% of Americans reported having a long-term physician-patient relationship of more than five years. In fact, among all the countries except the United States, more than 50% of the respondents reported long-term relationships (over 5 years). Moreover, the authors examined the quality of these physician-patient relationships. U.S. respondents were less likely to be satisfied with the relationships they have with their doctors. They were more likely to rate negatively the quality of care received, the level of attention given by the physician, the clarity of treatment explanations from the doctor, and the time they were given during their appointment. A summary of these findings is presented in Table 3.

Table 3

Regular Doctor Canadians vs. Americans

	Canadians %	Americans %
5 years long term relationship with regular physician	53*	37
Quality of care received	68*	61
Physician always listens carefully	66*	58
Physician always explains in an understandable way	70*	58
Physician always spends enough time	55*	44
Treatments are always clearly explained	55*	45

Source. Schoen et al., (2004). Primary care and health system performance: adults' experiences in five countries. Asterisk denotes significant differences at $p < .05$ between United States and Canada.

Poor access to care not only affects the patient-physician relationship; it also results in inequalities in treatments, which increase the likelihood of developing other conditions throughout the life span (Hsia et al., 2000). For example, untreated diabetes can result in blindness or physical impairments. There is evidence that people without health insurance do not get the proper care when dealing with chronic diseases (Reed, Hargraves, & Cassil, 2003). Reed and collaborators reported that 27% of people without insurance did not receive the care needed for their conditions, compared with 8% among the privately insured. They also noted that 54% of patients delayed or postponed the care needed for their illnesses. With universal coverage, as in Canada,

major difficulties in accessing health care are minimized. This evidence suggests the importance of health insurance when dealing with chronic diseases. The inadequate care of chronic conditions in the United States could contribute to the health differences between Canadian and American older adults. Further research is needed to determine if not only having insurance, but also having stable insurance coverage (without the risk of being uninsured at any time) throughout the life span is beneficial when dealing with chronic conditions.

Also of interest is the quality of life of people living with chronic conditions. Do older Canadians with chronic conditions report better quality of life? As seen previously, approximately 80% of elderly persons in both countries suffer from at least one chronic condition. Not surprisingly, studies have shown that people with chronic conditions report poorer overall health, greater psychological distress, and lower health-related quality of life (James, Miller, Brown, & Weaver, 2005; Yabroff, Lawrence, Clauser, Davis, & Brown, 2004; Michelson et al., 2001). Michelson and collaborators (2001) studied the relationship between Health-Related Quality of Life (HRQL) and multiple chronic health problems in a Swedish population aged 18-79. They found that people with chronic illness reported significantly lower HRQL than those without health problems. It is evident that both Canadian and American elderly with chronic conditions have poorer health overall than those without; however, as opposed to Americans, Canadians with chronic conditions are more likely to receive stable care through their lives and despite their illnesses may experience better health-related quality of life than their American counterparts. It would be important to

identify if there are overall health-related quality of life differences between elderly Americans and Canadians with chronic disease and, if any, to determine the factors associated with "better health" among sick people.

In summary, the evidence suggests that older Canadians suffer from less morbidity than elderly Americans. Social inequality and health care systems are possible reasons for the country differences. Yet, concrete findings controlling for socioeconomic status and examining the effect of the health care system on disease management are needed to determine what contributes to the better health of older Canadians. Another health-related factor that could explain the disparities between the two countries is functional limitation.

I.5. Functional Limitations

The following section discusses the differences in functional status between Canada and the United States and stresses the need for additional research. When examining health in late life, it is important to take into consideration functional status. Functional limitations have been associated with lower quality of life (Hooyman & Kiyak, 2001). Elderly persons with functional limitations are faced with additional daily challenges. These challenges are associated with loss of independence, interference with social and personal lives, and increased need for assistance (Hooyman & Kiyak, 2001).

Do older Canadians report fewer functional limitations, and do older

Canadians with functional limitations report better health-related quality of life? Research comparing the prevalences of functional limitation in both countries is limited and outdated. A report from the Center for Disease Control and Prevention examined the prevalences of functional limitations in Canada and the United States (Kovar, Weeks, & Forbes, 1995). The objective of this report was to determine if there were differences in the prevalence of disabilities between the two countries. This report used the U.S. National Health Interview Survey 1984 and the Canadian General Social Survey 1985. The study examined instrumental activities of daily living (IADL) by country. Results showed that Canadians were less likely to experience some of the disabilities than Americans and had higher rates than the Americans in other disabilities. The major limitation of this study is that two different questionnaires were used, one for the United States and one for Canada. Consequently, the measures used to evaluate functional limitations were dissimilar and may have been interpreted differently by respondents, potentially leading to disparities between the United States and Canada due to measurement differences. For example, both the American and Canadian measures included a question assessing the ability to stand for long periods, but the U.S. measure specified standing for "2 hours," whereas the Canadian measure simply referred to standing "for long periods of time." Further studies using matched instruments are needed to examine the differences between Canada and the United States in functional limitation. Moreover, studies determining the factors associated with the differences, if any, between the two countries are needed. It would be interesting to examine if Canadian and U.S. elderly have the same level of functional

limitations. In addition to determining the differences in the prevalences of functional limitations between the two countries, it would be interesting to know whether older Americans with functional limitations report poorer health-related quality of life than their Canadian counterparts.

Functional impairment has been associated with poor health status, depression, and mortality (Trupin & Price, 1995; Greiner, P., Snowdon, & Greiner, L., 1996; Wangs, van Belle, Kukull, & Larson, 2002; Spiers, Jagger, & Michael, 1996). A Danish study showed that people who were limited in some activity of daily living were twice as likely to report poor health, and people with severe limitations were close to six times more likely to report poor health (Nybo et al., 2001). Additionally, people with activity limitations lacking health coverage are less likely to consult a physician when needed and are more likely to be discharged and have shorter hospital stays than disabled people with insurance (LaPlante, Rice, & Wenger, 1995). Once again, elderly may not experience difficulties in accessing care; however, they may have waited until reaching Medicare to care for their health problems (Cassel, 2005). Because of the differences in access to care throughout the life span between Canadians and Americans, it could be expected that older Americans with activity limitations would have poorer health-related quality of life than Canadians. The lack of stability of medical coverage and higher risk of being uninsured in the United States could result in unmet health care needs among people with functional limitations especially among the near-elderly persons. In contrast, because Canadians with activity limitations have easy and stable access to their physicians, they could have in

better overall health-related quality of life. What role would universal coverage play in preventing and managing late-life disability? Further investigation is needed to determine if older Canadians with functional limitations report better health-related quality of life than their American counterparts.

In summary, national trends imply that Canada and the United States have different prevalences of functional limitations. Yet, lack of matched measurements suggests a need for additional research. Functional limitation is an essential indicator of health-related quality of life in the older population and needs to be examined when exploring health differences between Canada and the United States. The management of functional limitations and chronic diseases is highly related to health care accessibility. Could the health differences between Canada and the United States be attributed to their health care systems?

II.6. Health Care Systems

The next sections describe the Canadian and American health care systems. Then, following the population health approach, this section reviews the differences in the two systems that could contribute to health disparities between the two countries.

The Canadian health care system

History

It took close to forty years to develop the Canada health care system, also known as the Canadian Medicare. In 1944, the province of Saskatchewan was first to implement universal hospital insurance for its residents. This plan was available for all of the residents, covered almost all of the hospital costs, and allowed portability from one hospital to another within the province. This hospital insurance was funded through general revenue funds, taxes, and a five-dollar premium per person with a maximum of twenty dollars per family (Mombourquette, 1991).

Saskatchewan's plan became a model for other provinces and facilitated the introduction by the federal government of the 1957 Hospital Insurance and Diagnostic Services Act. This act stipulated that the federal government would assume 50% of the hospital services costs if the provinces offered comprehensive and universal care (Maioni, 2002a). Under this act, the provinces had to provide hospital services to all of their residents (Choudhry, 1996).

With the availability of federal funds, Saskatchewan could move on to further health care reforms and in the 1960s proposed the Saskatchewan Medical Care Insurance Act, which added preventive care and treatment to the existing plans. In 1966, the federal government followed and enacted the Medical Care Act (Maioni, 2002a, 2002b). Under this act, health care was to be uniform, universal, portable, and comprehensive. Non-hospital care was added to the benefits covered. Funding would be the same as the hospital insurance act, with the cost shared fifty-fifty between

federal and provincial governments. The provinces were to be in charge of their health care programs, and the federal government would be in control of health care policies (Maioni, 2002a). By 1971, every province had implemented the Medical Care Act.

After several years, matching health care expenditures became a large financial burden for the federal government. In the mid 1970s, the federal government replaced the cost-sharing formula with a per capita cash and tax-point formula under the Federal-Provincial Fiscal Arrangements and Established Programs Financing Act (Maioni, 2002b; Choudhry, 1996). Tax-point transfers refer to a percentage of income tax transferred from the federal revenue to the provincial revenue. In other words, currently 13.5% of income taxes are collected by the provincial government instead of being collected by the federal government. This formula does not affect the tax-payers and generates revenue for the provinces without intervention of the federal government. By replacing the cost-sharing formula, the provinces became more responsible for their health expenditures. Because of growing health care spending, the provinces increased user fees and extra-billing endangering the viability of the public health insurance program (Taylor, 1987; Maioni, 2002b). Subsequently, in 1984, the government implemented the Canada Health Act.

The Canada Health Act

The Canada Health Act's primary objective is:

> To protect, promote, and restore the physical and mental well-being of residents of Canada and to facilitate reasonable access to health services

without financial or other barriers (Canada Health Act, 1984, c.6, s. 3, Canada Office Consolidation, 2001).

The Canada Health Act is administered at the provincial level. It stipulates that provincial health care is public, comprehensive, universal, portable, and accessible. In other words, health care coverage had to be a not-for-profit insurance, offering all the services provided by hospital and medical practitioners to all citizens of the provinces. Coverage also had to be easily transferable from one province to the others (portable). Finally, health care coverage had to be financially accessible to all. With this achievement, the Canadian health care system became equitable. This act ensured the coverage of hospital, physician, and surgical-dentist services defined as *medically necessary*. Surgical-dentist services refer to emergency dental care provided in a hospital setting. The insured hospital services included in and out-patient services such as patient accommodation, nursing, laboratory and diagnostics, medical and surgical equipment, radiotherapy, and physiotherapy. The insured physician services were determined by physicians and by what the provinces defined as medically necessary care. The surgical-dental services were dental services provided in hospital settings.

One important feature of this system is that provincial governments are responsible for health care (Maioni, 2002a). While the federal government develops policies to ensure health rights, the provinces are in control of the distribution of health care. The provincial governments decide what constitutes medically necessary services, resulting in differences in health coverage among the provinces. Further, the funding of this system is highly dependent on the wealth of the province. Up to 1995,

health care funding followed the Federal-Provincial Fiscal Arrangements and Established Programs Financing Act enacted in the 1970s. However, in 1995, federal funding was restructured into the Canada Health and Social Transfer (CHST), which combined the Federal-Provincial Fiscal Arrangements with the Canada Assistance Plan funding (funding the social services). Provinces underwent a reduction in funding because the combined amount was less than the sum of the individual amounts taken separately. In 2004, the CHST was again restructured and divided into the Canada Health Transfer (CHT) and the Canada Social Transfer (CST). The CHT refers to funding allocated toward health care, and the CST funds are for education, social assistance, and social services (Health Canada, 2005).

The CHT is only a portion of the total health care funding. First, in 2004-05, the federal government funded 33% of provincial health expenditures, through the CHT and the Health Reform Transfer. The Health Reform Transfer accounts, established in 2003, provide funding to the provinces to facilitate reforms in priority areas such as primary health care, home care, and catastrophic drug coverage (Health Canada, 2005). In addition, the federal government provides funding through equalization transfer. The objective of equalization payments is to reduce disparities between provinces to ensure that place of residence does not affect the amount of public services available. Equalization payments are determined based on the fiscal or revenue-raising capacity of each province. The fiscal capacity is based on the ability to generate revenue based on specific taxes such as income, property, or sales tax. A standard level is established based on the average fiscal capacity of five middle-

income provinces. In addition, a "floor" provision was established to protect against major decreases in payments from one year to the next. Provinces such as Alberta or Ontario, as of 2004-05, did not receive equalization transfers. All other provinces did, with the greatest amount being allocated to the Northern territories (i.e., Prince Edward Island). These transfers are not allocated for a specific policy and can be used freely by the province (Health Canada, 2005). On average, 39% of the equalization transfer is devoted to health care. With the equalization transfer, federal funds are estimated to represent 37% of the provincial health care spending (Department of Finance Canada, 2004).

Canadian health expenditures

The total Canadian health expenditure as a percentage of Gross Domestic Product (GDP) has increased since the implementation of the Canada Health Act from about 8% in 1985 to 10.1% in 2003. It was expected to rise to 10.4% in 2005. The largest portion of health expenditure in Canada has been attributed to hospital spending (30.3%), followed by drug spending (16.4%), and physician's expenditures (13.1%). Although the Canadian health care system is publicly funded, part of the health expenditure (29.8%) is financed by private funds. Private expenditures refer to out-of-pocket and private insurance spending. Private spending is mostly devoted to services from non-physician health care professionals such as dentists, optometrists, opticians, chiropractors, or physiotherapists, as well as to drug costs. Over 60% of

drug spending is financed by private funds, with 40% of this spending going toward prescribed medications (Canadian Institute for Health Information, 2005).

Advantages and disadvantages of the Canadian System

Good.

The Canadian Medicare is a source of national proud which has succeeded where others have failed. First, Canada achieved its goal to provide accessible and equitable health care to all. Second, Canadian health care is publicly funded through taxes; thus, the burden of health care spending is spread throughout the society. Third, in Canada, one's socioeconomic status does not affect one's access to health care services defined as medically necessary. Fourth, health care coverage is stable and available throughout people's lives.

Bad

Despite these achievements, as most if not all health care systems, the Canadian Medicare is faced with aging population in need of care and expensive advanced medical technology. Therefore, (1) health care spending has been growing since the early 1980s; thus, the federal government has decreased its direct involvement in health care funding. (2) The role of the federal government in cost containment exposes provinces to unscheduled health financing reforms, increasing inter-province conflict and hostility from the provinces against the federal government (Maioni, 2002a). (3) Due to limited public resources, Canadians face long waiting lists for some services as well as limited availability of advanced medical technology. (4)

Although 96% of Canadians overall are covered by a drug plan, drug coverage varies greatly across provinces (Kapur & Basu, 2005; Anis, Guh, & Wang, 2001). (5) Because not all health services are insured, Canadians enroll in private insurance and have increasing out-of-pocket expenditures, hence potentially generating health disparities between social classes.

Ugly

Because of these increasing expenditures, there is a growth of discussion around health care reforms resulting in political rivalries in which politicians argue for, as well as against, reforms. On the one hand, Roy J. Romanow, who was appointed by Prime Minister Chrétien in 2001 to review the Canadian health care system, proposed a set of recommendations aimed at preserving the publicly funded and universal system. Concerning the private vs. public health care debate, Romanow argued that private clinics take on a less demanding type of care because of limited resources, and therefore may appear to provide better quality of care. Public institutions have to deal with more intensive cases such as those requiring intensive-care, giving the perception of safer care in private clinics as compared to the public clinics. Romanow suggested, "the public system is required to provide a 'back-up' to the private facilities to ensure quality care (Romanow, 2002, p 7)." On the other hand, more recently, Alberta's Premier Klein argued that the Canadian health care system is not sustainable and proposed a "third way." Klein defined the third way as being "between a system that tries to provide all services to all people, and a system where money determines treatment (Klein, January 11 2005, p 3)." Klein proposed that it is

important to keep health care accessible to all. He suggested that there is a need for change in the publicly funded services and that privatization should be encouraged (Klein, January 11, 2005).

Klein's proposal created much debate in Canada around the privatization issue. In addition, in June 2005, the Supreme Court in Quebec ruled that banning private insurance was illegal when patients are suffering or dying because of waiting time (Steinbrook, 2006). Despite efforts of provinces to ensure the viability of the Canadian system, the future of the Canadian health care system is becoming uncertain.

In summary, Canada achieved universality and uniformity of health care in 1985. Over the years, Canadian Medicare has faced challenges and changes, mostly around funding issues. However, growing problems associated with long waiting times for major procedures have created uncertainty in the future of Canada's health care system. Despite these challenges, the Canadian system is much simpler than that of the United States.

The United States health care system

The following section first provides a detailed description of the Medicare program. Then, this section presents a quick review of the other health care programs found in the complex U.S. health care system. These include Medicaid, the military health care system, and employer-sponsored programs. The problem of uninsurance in the United States is discussed last.

Medicare history

Medicare was developed during a time when medical associations (e.g., the American Medical Association [AMA]), labor unions, and politicians opposed each other over national health care in the United States. After many failed attempts throughout the years, in the late 1940s, the Truman administration decided to propose that health insurance be made available to a specific group in the hope that it would grow to become national. This proposal was limited to the beneficiaries of Social Security payments for Old Age and Survivors Insurance, i.e., the elderly.

During this period, the elderly were portrayed as a vulnerable group with poorer health requiring increasing care. Having lost their employer-sponsored health coverage, they were unable to afford the high premiums required by private insurance providers. In the public's opinion, the elderly were not responsible for their lack of coverage. They had to rely on their children for coverage, which provided a politically appealing argument.

To avoid opposition from the AMA, the Medicare bill was first limited to hospital care in the hope that not offering a physician benefit would pacify the AMA. In 1957, Representative Aime Forand proposed the first Medicare bill, which would provide 60 days of hospital care, surgical care, and nursing home benefits to older people covered by Social Security (Oberlander, 2003). For the next several years, the AMA campaigned in opposition while labor unions and organizations of the aged rallied for Medicare. Following the Forand Bill came the 1960 Kerr-Mills bill targeting assistance for people over 65 with insufficient resources. This bill proposed

to cover physician services, dental care, hospitalization, prescribed drugs, and nursing home care. The benefits would be paid by income taxes and state funds. These benefits would be administrated at the state level. The bill passed in 1960 with the endorsement of the AMA (Oberlander, 2003).

In 1963, 32 states had implemented the program; however, five large states received most of the funds and only four states offered the full benefit package. In 1960, through the Kennedy administration, Senator Clinton Anderson and Representative Cecil King proposed a new bill to cover 90 days of hospitalization, 240 days of home services, 180 days of nursing care, and outpatient diagnostic services. Once again, political and AMA opposition countered the bill, which failed to pass. Throughout the remainder of the term, Kennedy's administration continued to work on implementing national insurance by slowly weakening the opposition. In 1964, political change ensured the success of Medicare. The Anderson and King bill was re-introduced.

Republicans, previously opposed to Medicare, developed their own voluntary program under the Byrnes bill, offering broader benefits to be paid for by income taxes and premiums. The AMA also proposed "eldercare," which was basically a mirror of the failed Kerr and Mill bill. When the different bills were submitted, Mills, the chair of the Ways and Means Committee, suggested consolidating the different bills into a single program. The new Mills bill combined the Byrnes bill, the current administration bill, and the AMA bill into hospital insurance (Part A), a voluntary program of physician insurance (Part B), and a program of federal assistance for state

medical services to the elderly poor (Medicaid). Although combining the different bills was an ingenious way to limit opposition and ensure the success of Medicare, it resulted in an extremely complex system. The Mills bill passed the House in April 1965, and after Senate revision passed both the House and Senate in July 1965. President Johnson signed the Medicare bill on July 30, 1965 (Marmor, 2000; Oberlander, 2003; Ball, 1995). The 1965 Medicare Benefits are presented in Table 4.

Table 4

Medicare Benefits in 1965

Part A: Hospitalization Insurance
60 days inpatient hospital services with $40 deductible
30 days of hospitalization
Up to 100 days of post-hospital extended care
Up to 100 days of post-hospital home health visits
Outpatient hospital diagnostic with 20% coinsurance
Lifetime maximum of 190 days of inpatient hospital psychiatric services
Part B: Supplementary Medical Insurance
80% of physician services after $50 deductible and 20% coinsurance
Up to 100 days a year of home services with 20% coinsurance
Outpatient psychiatric and mental health treatment with 50% coinsurance
X-ray and diagnostic laboratory tests
Ambulance services

Source. Oberlander, J. (2003). *The Political Life of Medicare.* Chicago, IL: The University of Chicago Press.

Over the years, Medicare coverage has changed little. In 1972, Medicare eligibility was extended to people with disabilities and end-stage renal disease patients. Hospice care for palliative care in the event of terminal illness was added in 1983. Since the implementation of Medicare, premiums have increased substantially

from 10$ per month in 1974 to 88$ per month in 2006. The most recent change to Medicare was the inclusion of Medicare part D (referring to prescription drug coverage). Medicare's current benefits and rules are presented in Table 30, Appendix A.

Medicare benefits, funding, and expenditures

Medicare has two components. Part A covers 99% of elderly Americans and pays for hospital care up to 90 days. It is funded through the Social Security pay roll tax. Part B is a supplemental insurance, which covers 97% of the elderly population. It includes a monthly premium and an annual deductible of $100. It covers 80% of physician and outpatient services and homecare diagnostics. It also covers 50% of outpatient mental health care (Shi & Singh, 2003).

Medicare is funded through taxes and premiums. First, Medicare Part A is funded mostly through matching payroll taxes (86.4% in 2000), interest from the trust fund, and a portion of tax from Social Security (The Century Foundation Task Force on Medicare Reform, Potetz, & Rice, 2001). Contrary to Social Security, the amount of benefits received depends on medical care needed. Because the financing is through payroll taxes, every employee pays the same fixed rate. In contrast, Medicare Part B and D are funded both through premiums (25%) and general revenue from the federal government (75%).

Since 1970, Medicare expenditures have grown from 0.7% of the Gross Domestic Product to 2.6% in 2004 and are projected to reach 3.3% in 2006 due to the

implementation of Medicare Part D. These expenses are expected to rise to 14% by 2080 (Boards of Trustees, Federal Hospital Insurance and Federal Supplementary Medical Insurance Trust Funds, 2005).

Since the implementation of Medicare, the ratio of the cost of Medicare Part A over the tax collected has increased from 1.69 in 1975 to 3.02 in 2004. In other words, Medicare Part A is continuously costing more than the revenue generated to pay the expenditure. This increase is due to the fact that medical care costs rose faster than the average earnings as well as to the decreasing ratio of workers over Medicare beneficiaries (close to 4:1 in 2004, estimated to be 2:1 in 2074). Since 1974, the premium cost for Medicare Part B among people over 65 has greatly increased, going from $10 to over $88 per month (Boards of Trustees, Federal Hospital Insurance and Federal Supplementary Medical Insurance Trust Funds, 2005). Even more alarming is that the premium for Medicare Part B has increased by 50% since 2003 ($58 in 2003 vs. $88 in 2006). Based on 2004 data, the increased spending is due to a raise of close to 12% in physician expenditures and nearly 14% in outpatient hospital expenditures. Part B expenditures as a percentage of the GDP are estimated to change from 1.2% in 2004 to 4.9% in 2080. Part D (prescription drug coverage) is also projected to represent .01% in 2005, rising to 3.37% in 2080 of GDP expenditures (Boards of Trustees, Federal Hospital Insurance and Federal Supplementary Medical Insurance Trust Funds, 2005).

In summary, Medicare currently covers less than 50% of the total health care expenditures faced by older Americans. The unpaid expenditures are covered either

with out-of-pocket money, through private insurance, or by other public programs. In addition, Medicare does not pay for the full amount charged; it covers at most 80% of the patient's cost (Shi & Singh, 2003). Consequently, most seniors have supplemental insurance to account for the uncovered expenditures. Elderly in lower socioeconomic groups, who are not eligible for Medicaid, may not be able to afford supplemental insurance. These disparities within the Medicare recipients may result in health differences.

Is Medicare a social health insurance?

Medicare is said to be a model of social health insurance in the U.S. because it is universal and equal (Smith, 2002). It is "a successful model for universal health coverage (Cassel, 2005, p.10)." But is Medicare really universal? Medicare could be said to be universal if it would cover all of the elderly population; however, following Social Security, Medicare covers only the elderly (and their spouses) who paid taxes toward Medicare throughout their life in the labor force for a specific length of time. Mold, Fryer, and Thomas (2004) used the 2000 National Health Interview Survey data to determine who the elderly persons without coverage are. They found that 1.1% of the U.S. elderly population was uninsured. These older adults were more likely to be the young old (less than 75 years old), widowed or never married, non-white, immigrants, and have lower income than those eligible for Medicare. In addition, these elderly were more likely to have needed medical care. Finally, the authors found that

over 50% of these uninsured seniors reported cost as a reason for not having health coverage.

Medicare is also not as comprehensive as other social health insurance such as the Canadian system. Indeed, Medicare covers less than 50% of the total health care expenditure faced by older Americans. Recent reports have shown the continuous increase of out-of-pocket expenditures for Medicare beneficiaries. In 2003, it was established that people over 65 with Medicare coverage spent $3,455 on average per year or 22% of their household income. Close to half of these expenditures are devoted to premiums and another quarter goes toward prescription drugs (Caplan, & Brangan, 2004). As could be expected, older seniors, women, elderly with low income, and those in poorer health status have the highest out-of-pocket expenditures. On a more positive note, it is expected that 3 out of 4 beneficiaries who enroll into Medicare Part D will save 37% of their out-of-pocket spending (Kaiser Family Foundation, 2004). In addition, this saving is expected to be greater among low-income beneficiaries. Nonetheless, it is unclear who will enroll into Part D and how prescription drug prices will affect these figures.

In this regard, the U.S. Department of Health and Human Services projected that over 90% of Medicare recipients would have prescription drug coverage in 2006, 67% through Medicare part D, and the rest via other plans. Yet, as of January 13, 2006, only 34% of Medicare beneficiaries have enrolled in Part D (Kaiser Family Foundation, 2006). As seen previously, an important part of the out-of-pocket expenses is associated with premiums for supplemental insurance covering non-

insured care. There are several types of supplemental insurance plans that Medicare beneficiaries can purchase. First, Medigap policies have been available since the implementation of Medicare and are sold by private insurance companies. The Medigap idea was developed to cover the "gaps" in Medicare coverage (Center for Medicare and Medicaid Services, 2006). Medigap policies include premium, co-pay, coinsurance, and deductibles. Second, other types of supplemental insurance can be obtained through the Managed Care Plans (Health Maintenance Organization plans [HMO], Preferred Provider Organization plans [PPO], Fee for Services plans [FFS]). In these plans, all of the Medicare-covered care is covered through the plan chosen. Medicare pays a fixed amount every month regardless of the services used. HMOs have more extensive benefits than Medigap at a lower cost. Finally, for people in poverty, Medicaid becomes the supplemental insurance.

Clearly, not everyone is enrolled in a supplemental insurance plan; for instance, disadvantaged groups have the lowest frequency of enrollment (Reed et al., 2003; Pourat, Rice, Kominski, & Snyder, 2000). Pourat and collaborators, using the 1996 Medicare Current Beneficiary Survey, examined the characteristics of people enrolled in these different plans. The authors revealed that elderly who were non-white, had low income or education, or in poor health were less likely to have supplemental insurance. Of those with supplemental insurance, lower income people were more likely to be enrolled in a HMO as opposed to Medigap plans. Moreover, a 2005 report showed that elders without supplemental coverage were more likely to delay their care than those with supplemental insurance (Wan et al., 2005). The

variability of coverage via these supplemental insurances keeps Medicare from being inequitable, which is one of the characteristics of social insurance.

Thus, the complexity and cost of Medicare coverage are factors in the health care inequalities and financial burdens of the elderly. Indeed, not all the seniors can afford the supplemental insurances; some may have difficulties paying the out-of pocket expenditures. Elderly facing these financial difficulties may have to delay their care. Similar to younger people with no insurance coverage, minorities and socioeconomically disadvantaged groups are more likely to encounter these health barriers (Eichner, & Vladeck, 2005).

Although having some insurance is better than none, it is unclear if Medicare contributes to equal health. Numerous studies and reports have shown that lack of insurance coverage is detrimental. Nonetheless, there is no evidence that Medicare reduces health inequalities in the U.S. elderly population as the Canadian system may. Many questions remain. Is Medicare keeping older Americans healthier as in the Canadian system? Does Medicare contribute reduces health inequalities in older adults because it has stable coverage? A recent study examined the impact of Medicare coverage and health care utilization (McWilliams, Zaslavsky, Meara, & Ayanian, 2003). Using the Health and Retirement Study, the authors found that the difference in health care utilization between people with and without insurance, prior to Medicare eligibility, was reduced by half when these people became Medicare recipients. These findings suggest the importance of coverage. As some propose to extend Medicare to the near elderly (Cassel, 2005), it is unclear if extending Medicare to a younger age

would contribute to the better health of the older population. Additional information is needed to understand the role of Medicare on health in late life.

Despite the negative picture portrayed here, Medicare has been an essential, unique program in United States health care. As Christine Cassel (2005) underlined:

> The apparent deficiencies of Medicare look less alarming when compared to the poor performance of the rest of the health-care system in the United States, which is reaching a crisis point in terms of both cost and access to care (p. 10).

In summary, Medicare is a public health insurance offering coverage to the elderly. Medicare provides coverage for a variety of health services and is funded through taxes and premiums. Medicare is only one of the elements making the U.S. health care system so complex.

Medicaid

Within the U.S. health care system, people of all ages can have medical insurance through Medicaid if they are eligible. Medicaid is a means-tested program that covers poor people fitting specific criteria. In other words, Medicaid does not insure every person in poverty. Eligibility depends on an interaction between the poverty level and/or the size of the family, the age of children in the family, and the level of illness. Medicaid eligibility and benefits vary greatly by state. Medicaid services include, for example: physician and hospital services; children's preventive care; and nursing homecare. Additional services such as prescribed drugs and prosthetic devices are available in some states (Shi & Singh, 2003).

Military health care system

Two other types of government-sponsored programs provide medical coverage to veterans and military personnel. The U.S. Department of Veterans Affairs (VA) offers health coverage to veterans. Many veterans are eligible to receive health benefits through the VA system if they were on active duty for at least 24 months. The majority of elderly veterans are covered under Medicare (Shen, Hendricks, Zhang, Kazis, 2003). The VA system provides a wide variety of benefits such as preventive care, ambulatory services, hospital care, and medications (U.S. Department of Veteran Affairs, 2005). Based on their levels of disabilities, income, and discharge reasons, veterans are placed in eight different groups from over 50% disabled to non-disabled. Each priority group determines the types of benefits and the co-payments, deductibles, and premiums. For example, priority group 1 does not have co-pay for inpatient and outpatient services, nor for medications (U.S. Department of Veteran Affairs, 2005).

The U.S. Department of Defense offers health coverage to military personnel and their dependents through TriCare. TriCare is a program delivering health care to active duty and retired military personnel and their families within military treatment facilities. TriCare is a complex system, which includes several different health plan options varying by costs, services, and enrollment policies (U.S. Department of Defense, 2005).

Employer-sponsored programs

Employer-sponsored health plans offer coverage to nearly 60% of the population under 65 (Stanton & Rutherford, 2004). The employer-sponsored coverage varies by employer. Every employer is free to choose a type of insurance; similarly, most employees can decide to be covered by this insurance or not. Usually, employees take on the insurance since it is less expensive and provides better benefits than private insurance. Employers and employees have a wide choice of insurance plans, such as health maintenance organizations, preferred provider organizations, point of services, and others. Each of these main categories is composed of multiple insurance programs. These insurance plans include restrictions such as full-time employment status and expenditures such as the premium paid by the employee. In 2005, for single individual, the premium averaged over $300 per month of which the worker paid 16% monthly (Kaiser Family Foundation, Health Research, & Education Trust, 2005).

Not every employee benefits from these insurance plans. Some companies do not provide insurance. For instance, some are too small to be able to afford the cost related to health plans. In 2004, over half of employers with 3 to 9 employees provided health benefits (Kaiser Family Foundation, Health Research, & Education Trust, 2004). Over the years, there has been a decrease in employer-sponsored health benefits from 65% in 2001 to 61% in 2004. People who are less likely to have employer-sponsored health benefits are employees in small companies, people with low wages, younger adults (19-24), minorities, near-elderly women, and retirees. Many of these employees have to obtain insurance on their own and cannot always

afford the high premiums of individually-purchased health plans. Garrett (2004) showed that 64% of uninsured workers lack coverage because their employers do not have insurance plans.

The uninsured problem

In the United States, 17% of the population is without health coverage (Hoffman, Carbaugh, & Cook, 2004). Lack of coverage affects mostly younger people aged 18 to 24; yet, there is a growing concern with the increasing number of near-elderly aged 55 to 64 without insurance. Lack of coverage in the near elderly was associated with poor physical and mental health (Holahan, 2004; Baker et al., 2001; Cassel, 2005). People without insurance were more likely to report a change toward poorer health over time (Baker et al., 2001). Cassel (2005) argued that near elderly adults ignore their health problems and delay their care until they reach the age of Medicare. Furthermore, the near elderly lacking coverage had fewer doctor visits and more unmet health care needs than privately or publicly insured groups. Losing coverage also reduces accessibility to preventive health care essential in later life to prevent treatable conditions (Sudano & Baker, 2003). In addition, as seen previously among near-elderly persons, recovering health insurance after a period without insurance did not result in immediate use of health care services (Sudano & Baker, 2003). As argued earlier, it appears that it is stability of health coverage across the life span that matters most.

As the population ages, the problem of near elderly lacking insurance will affect health in late life. This problem needs to be addressed. In general, the number of people without insurance decreases with age, even for low-income groups, since the number of private insurance and Medicare or Medicaid recipients increase. Not surprisingly, the rate of employment declines with health limitations, while the rate of coverage by federal programs increases (Johnson & Crystal, 1997). The near elderly, in most cases, have better coverage than younger people, but differences within this age group make the issue of medical coverage important (Holahan, 2004, Johnson & Crystal, 1997). Neuman (2004) suggested that the near elderly person can be classified into three groups: early retirees, disabled and sick, and employees.

Early retirees are usually in better health and have better economic situations than those who have not retired yet. The early retirees are covered either through their former employers or through private insurance. The disabled and sick near-elderly, who of course have poorer health, are often covered by public programs such as Medicare or Medicaid. That said, clearly not every disabled or sick near-elderly person is covered by public programs. Despite the federal programs, there is still a great percentage of seriously ill people not covered by a public program (Johnson & Crystal, 1997). For instance, among people with disabilities preventing them from working, adults were 50% more likely to be uninsured than people without disabilities. Finally, the majority of near-elderly persons belong to the employed group. Within the employed group there is an additional subdivision affecting the presence of coverage,

which is mostly based on income. One quarter of full-time employees with near minimum wage are uninsured (Johnson & Crystal, 1997).

Low-income non-retirees have a higher rate of non-coverage compared to the retired and the disabled (35% vs. 17% vs. 12%, respectively). The risk of lacking coverage among the near elderly is highest among women; the unmarried; people with lower education and income; Hispanics and African Americans; and people reporting poorer self-rated health, more chronic illness, and functional limitations (Baker et al., 2001; Johnson & Crystal, 1997).

Not all the near elderly without insurance work; growing numbers of early retirees are losing their employer-sponsored plans. Neuman (2004) described a trend toward cutting back the coverage offered by employers to early retirees and expressed concern about the near elderly of tomorrow. The author explained that early retirees who cannot benefit from employer-sponsored plans and are not eligible for Medicare have to choose private coverage. Also, this type of coverage is dependent on both medical problems and income. Some people, faced with health problems as common as arthritis, may be denied coverage because of their condition; alternatively, they may face extremely high premiums. The increasing trend toward cutting employer-sponsored plans for this age group could contribute to a significant increase in the number of near-elderly persons lacking coverage. Moreover, Monheit, Vistnes and Eidenberg (2001) looked at the change of coverage among near-elderly workers. They noted that the near elderly lacking coverage had greater difficulties in recovering insurance than younger groups. These difficulties in either recovering or obtaining

proper insurance among these older age groups contribute to negative health outcomes and reduced health care utilization. The growing concern with the increasing number of people lacking insurance suggests a need for health care reforms, such as extending the age of Medicare (Cassel, 2005). Extending Medicare coverage to the near elderly could be a solution to eliminate coverage gaps in late adulthood.

In summary, the U.S. health care system is a very complex system where coverage can be public or private. While most adults are covered through employer-sponsored programs, the current trend toward the decrease in the proportion of employers offering health coverage is fueling the uninsurance problem. As more Americans are confronted with medical debt, reforms are needed to provide affordable health care to all. We have seen that countries with national health insurance appear to have better population health overall. However, in addition to national health insurance, these countries also have a variety of social programs aimed at reducing overall social inequalities that may contribute to better population health. The question still remains, does health care matter in maintaining the health of populations?

I.7. Does Health Care Matter?

Following the population health approach, this section presents the role of the health care system as a determinant of health. Evans and Stoddart (1990) suggested that the health care system determines well-being but that other determinants of health, seen in the framework, have greater impact. The authors based their argument on the

general relationship between health care and disease. They noted that health could be defined as the absence of disease and that the health care role is to reduce or cure the disease to improve health. The authors stated that if the relationship between health care and disease was unique in improving health, then everyone who gets the same health care, with the same disease, would have the same health status. A direct relationship between health care and disease does not account for individual differences. Similarly, the reduction of childhood mortality rates between the mid 1800's and 1970 in England was attributed to the decrease in the number of children per household and not the provision of health care (Frank, 1995). This evidence suggests that medical care may not be the most salient contributor to better population health. As seen previously, individual economic and social disparities affect disease outcomes. Consequently, to capture why some people are healthier than others, Evans and Stoddart advised that researchers use a more complex framework, such as the population health approach, when investigating the determinants of health.

Evans and Stoddart (1990) proposed that one of the major problems of health care is its cost. They noted that health care spending affects health negatively. Their argument is that increased health care spending uses resources that would contribute to better health if applied to other non-medical needs. They gave the following example. In 1990, 9% of Canadians' income went toward health care, and thus, was not used toward other goals such as improving recreation areas to promote leisure time activity. Their point was that every additional dollar going toward the financing of health care is not spent on other, possibly more important, determinants of health. They suggested

that increasing health care expenditures would result in harming population health. Could the difference in health status between Canadians and Americans be attributed to the differences in health care spending?

It has been established that the United States has the highest spending on health care among industrialized countries. In 2002, Organization for Economic Co-operation and Development data showed that U.S. health care spending was 65% higher than Canada's health care spending (OECD, 2004). One possible reason for the greater spending is that part of the U.S. health care system is market-based, consequently exposing it to market fluctuation; while in Canada, the financing is through the government, which ensures more stability. Stone (2000) explains that the role of the government in health care delivery is essential. In the United States, the government has limited control over the delivery of health care. First, the government does not require people younger than 65 to acquire health insurance, resulting in many inequalities in access to health care. Second, government programs such as Medicaid are provided at the state level. Each state determines its own level of coverage and eligibility criteria contributing, once again, to inequalities. Third, the government has no control over employer-based health plans. As a result, over the last decade employer-sponsored health benefits have seen a decline in coverage and a rise in employees' shares of costs, leading to an increasing number of uninsured employees. The government tries to address the lack of insurance problem by implementing marginal programs at the federal and state levels such as the children's health insurance program, or expanding Medicaid coverage. Unfortunately, by doing so, the

states reduced their other programs to compensate for increasing spending, moving the problem from one group to another (Stone, 2000). This lack of control contributes to enormous administrative costs.

Administrative costs are a second reason for the greater health care spending in the United States. Woolhandler, Campbell and Himmelstein (2003) noted that administrative costs in the United States are much greater than those of Canada. They suggested that implementing a system similar to the Canadian health care system would reduce these costs. Higher costs, found in the United States, are associated partly with the multiple insurance systems and with more private coverage. Contrary to Canada, where providers send their bill to a single insurance entity, health care providers and recipients in the United States have to deal with many agencies. In Canada, the single insurer system results in reduced billing and less fragmented costs. Contrary to the U.S. health care system, the Canadian health care system is much more cost efficient. Moreover, greater cost is not systematically associated with better care and health outcomes (Blendon et al., 2002; Anderson & Hussey, 2001; Anderson, 1998; Schoen et al., 2002; Kaplan et al., 2004). Indeed, Kaplan and collaborators examined poor self-rated health in thirteen age groups in the United States, Canada, and Europe. They found that the United States had significantly higher prevalence of poor self-rated health than the other countries starting at age 30. Kaplan and colleagues (2004) noted that the United States also had the highest spending. The authors concluded that higher spending in the United States was not associated with better health. Yet, using OECD data, Anderson (1998) found that countries with lower

health care spending than Canada, such as the United Kingdom, also had lower life expectancy at 65 and lower life expectancy free of disability. This last finding suggests that the relationship between health care spending and health status is not linear and that it is not the only contributor to health differences among countries.

Evans and Stoddart (1990) argued that medical care is important in disease management but that other factors (e.g., socioeconomic disparities) have more powerful effects on health. For example, they explained that as women became more educated, they took control of their children's health, and consequently child mortality decreased without the help of health care policies. The health care system in Canada is not as significant as the other factors presented in the framework. Because the Canadian system provides equal care to all, it significantly reduces the influence of health care delivery on health differences. For example, if an employee with the lowest wages receives the same care as an employee with the highest wages, then any health differences between these two employees are unlikely to be due to the health care system. Conversely, in the United States, the same two employees would not receive the same care. First, it is likely that the lower-wage employee would not be offered health care coverage via his/her employer. Second, even if the lower-wage employee had health insurance, it is unlikely that the two employees would be covered under the same insurance plan. These insurance plans may be different in the type of benefits, copays, premiums, and deductibles, creating health care access inequalities between the two employees.

The argument that health care systems are inefficient in contributing to better population health seems highly contradicted by the systematically healthier status of the populations who adopted a universal health care system. In other words, if health care had a smaller influence than other factors on health outcome, as suggested by Evans and Stoddart (1990) then the type of health care system would not matter. Glouberman, Kisilevsky, Groff, and Nicholson (2000) stated the role of universal health coverage and proposed:

> As well as being measured in terms of productivity or the outcomes of health care interventions, the role of a publicly funded universally accessible health care system is to provide security to the effect that one will be cared for should one become ill. (p. 16)

In summary, health care might matters. Evidence suggests that countries with universal health care coverage have better overall health than countries without. Further research is needed to understand fully the unique impact of health care systems on health.

I.8. Research Questions

Studies examining health in late life in Canada and the United States suggest that older Canadians are healthier than older Americans, yet, concrete findings using comparable measurements and data are missing. Determining if Canadian seniors are healthier than U.S. elderly is important in understanding the determinants of health.

More specifically, identifying the role of the health care system as determinant of health in Canada and the United States will add to our ability to understand the factors associated with health outcomes in older adulthood. Understanding the determinants of health in late life is key to promoting healthy aging.

Are older Canadians healthier than older Americans? What is the role of health care in population health? Does universal coverage throughout the life span in Canada contribute to better health among seniors? What would be the effect of extending Medicare coverage to the near elderly? Answering these questions will add to our understanding of the determinants of health. The ultimate goal is for this research to assist politicians and policy makers in improving the health of older adults.

II. METHODOLOGY

This chapter provides a description of the methodology used to complete this study. First, a detailed description of the research questions and data sources is presented; then the measures and the data analyses proposed to test these research questions are described.

Research Question I: *Are older Canadians healthier than older Americans?*

The primary interest of the present study was to determine if older Canadians were healthier than older Americans. For this question, health status was measured using self-rated health, number of chronic diseases, number of functional limitations, and the Health Utilities Index Mark 3 (HUI3). In addition, health habits (smoking and exercising status, and weight problems) and health care access (having a regular doctor) were also examined. Three specific research questions were investigated: (1) do older Canadians report better health status, health habits and health care access than older Americans? (2) do older Canadians with chronic conditions report better health-related quality of life than older Americans? and (3) do older Canadians with functional limitations report better health-related quality of life than older Americans? All of these analyses adjust for gender, marital status, race, education, income, and regular doctor.

Research Question II: ***Are Canadians healthier than Americans?***

The next questions were used to determine the role of health care in population health by investigating: (1) do Canadians of all ages have better health status, health habits, and health care access than their American counterparts?, and (2) do Americans with health care coverage have poorer health status, health habits, and health care access than Canadians? For the following questions, health status was measured using self-rated health, number of chronic diseases, number of functional limitations, and HUI3. Health habits include smoking, Body Mass Index (BMI), and physical activity. Health care access refers to having a regular doctor. Also, these analyses controlled for gender, race, income, and education.

Research Question III: ***Does universal health coverage contribute to better health at all ages?***

This research question complemented the previous one and investigated if Canadians reported better health status than insured Americans at several ages, after controlling for gender, race, education, and income. For this research question, health status was measured by self-rated health and the HUI3. This topic was examined for two age groups: 18-44, 45-64. Functional limitations and chronic conditions were not included as an outcome because younger populations are less likely to suffer from disability or illness.

Research Question IV: ***Does health insurance prior to Medicare coverage affect the health of Medicare beneficiaries?***

This final question explored what would be the effect of extending Medicare coverage to a younger age, in the United States, by examining: (1) whether the change in health status prior to versus after Medicare enrollment differs; and (2) whether the change in health status over time varies depending on the respondent's insurance status prior to the Medicare eligibility age. This question examined health over time among near elderly Americans (55+). This age restriction was chosen based on several reasons. Near-elderly persons observe a rise on the prevalence of preventable disease such as high cholesterol, hypertension, and diabetes compared to younger age groups (BRFSS, 2005). In addition, compared to individuals 45 to 54, persons 55 years and older experience a steep increase in the prevalence of chronic diseases such as arthritis, cancer, or stroke (BRFSS, 2005; Powell-Griner, Bolen, & Bland, 1999). Therefore, near-elderly persons are more likely to need medical care services than younger age groups. However, as argued previously, near-elderly persons may experience difficulties keeping their health coverage. That is, there is an increasing number of near-elderly persons who are without health insurance or face high premiums and deductibles for privately own insurance. Lack of coverage may lead to reducing use of preventive services or delay of medical care until they receive Medicare (Lichtenberg, 2002). Some have argued that Medicare eligibility should be extended to those aged 55 to 64 (Davis, 2001; Cassel, 2005; Lambrew, Podesta, & Shaw, 2005), however, there is no empirical study examining what would be the effect

of extending Medicare coverage to those without health coverage in their later life. For this question, health status was measured by self-rated health and adjusted for gender, marital status, education, race, BMI, alcohol use, smoking status, and physical activity.

II.1. Data Sources

This study used two data sets to examine the research questions. First, the Joint Canada/United States Survey of Health, 2002-03 (JCUSH) was used to test the first three research questions; then, the last research question was explored using the Health and Retirement Study (HRS).

The JCUSH was used to determine if Canadians are healthier than Americans on a variety of health indicators. In addition, JCUSH allowed the examination of the relationship between health care systems and health at all ages and to draw conclusions about the impact of universal and uniform health care coverage on health status throughout the life course. The longitudinal Health and Retirement Study, 1992-2002 was used to examine the impact of lack health care coverage on health in late life.

Understanding the importance of equal care, as opposed to unstable and unequal care across individuals, is essential to promoting better health. Although the comparison between the United States and Canada addressed this issue, using longitudinal data to examine the impact of equal care adds to the significance of this

study. By looking at individuals over time, this study can draw further conclusions about the impact of extending or implementing universal health insurance in the United States.

Joint Canada/United States Survey of Health

The Health Statistics Division of Statistics Canada and the National Center for Health Statistics in the United States collaboratively developed the JCUSH. Telephone surveys were conducted in both countries in 2002 and 2003. Data were collected in each of the U.S. states and Canadian provinces (excluding the Northern territories). Eligible participants were non-institutionalized people over 18 years of age. Using Random Digit Dialing, 3,505 Canadians and 5,183 Americans were interviewed. Elderly people were over-sampled.

The overall response rate for the United States was 50.2% and 65.5% for Canada. The difference in the response rate is a consequence of the Random Digit Dialing procedure. To select the telephone numbers, phone companies' lists were used in each of the countries. The United States has greater numbers of phone companies' lists, making the validation of numbers as eligible extremely difficult. In the United States, the response rate was computed using the product of the resolution rate and the cooperation rate. The resolution rate refers to the proportion of phone numbers correctly identified. Unresolved phone numbers were numbers with answering machine, for which the person hangup before identifying her/himself, or for which no one answered. The resolution rate was 80.4%.

The cooperation rate refers to the proportion of household in which the interview was completed. The household response rate was 62.4%. The combination of these two rates resulted in an overall response rate around 50%. In Canada, this problem was not an issue because of the smaller number of phone companies' lists (Statistics Canada, United States National Center for Health Statistics, 2004). Sample characteristics by countries appear in the following Table 5.

Table 5

JCUSH Sample Characteristics.

	Canada		United States	
	n (unweighted)	% (weighted)	*n* (unweighted)	% (weighted)
Men	1610	49.1	2224	48.0
18-44	1678	52.3	2341	52.3
45-64	1072	32.1	1691	31.7
65 and older	755	15.6	1151	16.0
Married	1992	65.4	2784	63.7
Widow/divorced/separated	737	13.5	1278	17.1
Single	732	21.2	916	19.2
≥ High school degree	2670	80.3	4385	88.2
White	2890	82.1	3721	70.0

The data were weighted to ensure accurate representation of both the Canadian and U.S. populations. Each person was given a weight representing the participant's target population. The Canadian 1996 Census and the 2002 U.S. Current Population Survey were used to estimate the populations. Weights were based on age, sex and region in Canada, and age, sex, and race in the United States, and account for non-response.

The content of the JCUSH was derived from the National Health Interview Survey (United States), the Canadian Community Health Survey, and the Canadian National Population Health Survey. JCUSH covers a wide array of topics including health status, health behaviors, preventive care, health care utilization, health coverage, and sociodemographic indicators (Table 6). Several questions were country specific. The question dealing with Race, insurance coverage, and income were adjusted to fit the countries' cultural, currency, and policy differences.

Table 6

JCUSH Variable Domains

I. Health Status	III. Preventive Care
General health	PAP smear test
Restriction and limitation of activity	Mammography
Chronic condition	IV. Health care Utilization
Mental health	Contact with physician
Health Utility Index	Dental visits
II. Health Behaviors	Use of medication
Smoking	Hospital visits
Physical activity	V. Insurance coverage
Body Mass Index	VI. Sociodemographic

The JCUSH was designed to compare health indicators in the United States and Canada. The JCUSH was uniquely constructed to account for methodological problems usually encountered when comparing multiple data sets. For instance, Raley, Harris and Rindfuss (2000) examined methodological factors affecting the findings from comparative studies. They determined that time of interview, criteria used to select the participants such as age range or sampling procedures, and formulation and meaning of questions influence findings. Moreover, a study examining problems surrounding comparative studies determined that difficulties arise around the equivalence of the indicators, the unit of analysis, and the administrative formalities (Scheuch, 1993).

Health and Retirement Study

The HRS is an ongoing longitudinal study developed in 1992 by the National Institute on Aging. It was designed to follow people in the work force as they reached retirement. More specifically, HRS's objectives were to study the effect of retirement over time and examine the relationship between economic situation and health outcomes over time. Eligible respondents were United States residents aged 51-61 excluding institutionalized persons. Blacks, Hispanics, and residents of Florida were over-sampled. At least one member of the household needed to qualify for the age restriction. People were interviewed via face-to-face interviews at baseline and via telephone for every follow-up. The HRS used a multi-stage probability sampling design. The first stage selected 84 Metropolitan Statistical Areas (MSAs) and non-

MSA counties. The second stage was derived from the 1990 Census. It consisted of area segments of at least 72 housing units. Housing units were randomly selected within each area segment. Finally, household members within each household unit were screened for eligibility (Heeringa & Connor, 1995). HRS response rate in 1992 was 81.7%. Respondents were interviewed every two years since 1992. The last year of publicly available data is 2002. Data were weighted by region, race, marital status, sex, and age to compensate for the over-sampled and were adjusted to yield accurate population estimates. The weighting accounts for non-response rates. Wave and sample characteristics are presented in the following Tables 7 and 8.

Table 7

HRS Waves Response Rates and Samples.

	1992	1994	1996	1998	2000	2002
Response rate[a] (%)	81.7	89.1	86.3	84.9	84.0	84.9
Response rate[b] (%)		91.6	88.5	85.7	82.0	80.1
Sample size	12,654	11,597	11,199	10,857	10,377	10,142

Note. [a]Response rates are based on the sample from the previous year. [b]Response rates are based on the baseline sample.

Table 8

HRS Sample Characteristics.

	Baseline	
	n (unweighted)	% (weighted)
Men	5,867	49.9
< 65	9,324	73.7
Married	10,281	81.3
Widow/divorced/separated	2,009	15.9
Single	362	2.9
< High school degree	3,696	29.2
White	9,112	72.0

Similarly to the JCUSH, the HRS included a broad range of topics (Table 9). Baseline information included sociodemographic indicators, health status, health care utilization, employment, assets and income, and health insurance.

Table 9

HRS Survey Content

I. Health Status	III. Health Care Utilization
General health	Contact with physician
Limitation of activity	Dental visits
Chronic condition	Hospital visits
II. Health Behaviors	Medical expenses
Smoking	IV. Socioeconomic Factors
Physical activity	Employment
Body Mass Index	Assets and income
Alcohol use	V. Health insurance
	VI. Demographic Indicators

II.2. Measures

Joint Canada/United States Survey of Health

Dependent variables

To determine differences in health status between the two countries, this study examined a variety of health outcomes. The outcome measures were self-rated health, Health Utilities Index Mark 3, chronic conditions, and functional limitations.

First, self-rated health has been identified as a reliable measure of both subjective and objective health status. Research shows a relationship between self-rated health and mortality related to health problems (Benjamins, Hummer, Eberstein, & Nam, 2004). In addition, the association between self-rated health and mortality was stronger with increasing health problems. In other words, the predictive power of self-rated health was greater among people with more health problems. This result suggests that self-rated health not only assesses one's physical health but also accurately measures the gravity of one's health status. In the JCUSH, self-rated health was assessed by the following question: "In general, would you say your health is excellent, very good, good, fair, or poor?"

Second, the Health Utilities Index Mark 3 (HUI3) is a composite measure assessing health status. HUI3 has been identified as being a good measure of health-related quality of life (Furlong, Feeny, Torrance, & Barr, 2001). Canadian researchers developed HUI3, which has eight attributes representing dimensions of functional health: vision, hearing, speech, ambulation, dexterity, emotion, cognition, and pain and discomfort. Every attribute has five or six levels assessing the level of disability from high (e.g., deaf) to normal (normal hearing abilities). Each attribute has a score ranging from 0.00 to 1.00 (normal). The overall score for the HUI3 ranges from -0.36 "worse than dead" (when each attribute has the lowest score), to 0.00 "dead" and to 1.00 "perfect health" (Feeny et al., 2002; Horsman, Furlong, Feeny, & Torrance, 2003). HUI3 has been used successfully in cross-cultural studies (Boyle, Furlong, Feeny, Torrance, & Hatcher, 1995). Studies have determined that differences of 0.03

or more in overall HUI3 scores are viewed as quantitatively important (Grootendorst, Feeny, and Furlong 2000; Horsman et al., 2003). In addition, Drummond (2001) found that differences of 0.01 might be important, in the context of population health.

Self-rated health and HUI3 are both measures of health-related quality of life. Nonetheless, HUI3 provides a more objective description of health status. HUI3 has been shown to be a predictor of mortality over and above self-rated health (Kaplan et al, under review). Conversely, self-rated health may capture other dimensions such as mental and social health status affecting health. Therefore, including both measures is important.

Third, the number of chronic conditions also measures health status. Because chronic illness is so prevalent in the daily life of the elderly, it is an important concept to examine when assessing health status. In the JCUSH, respondents were asked if they had a long-term health condition lasting for at least six months and diagnosed by a health professional. Participants reported whether they had been diagnosed with any of the following nine conditions: asthma, arthritis, hypertension, emphysema or chronic obstructive pulmonary disease, diabetes, heart disease, coronary heart disease, angina, and/or heart attack.

Last, having functional limitation is also part of daily living for a great number of elderly. Similar to chronic disease, the level of functional disability is strongly associated with well-being. Functional limitations assessed the ability of respondents to do different activities of daily living. JCUSH participants were asked if they had difficulties in doing activities because of health problems. The activities included

walking a certain distance, walking without stopping, standing or sitting for a long period of time, bending or kneeling, reaching over their head, handling small objects, carrying loads, pushing large objects, going out, doing social activities, and/or doing leisure activities. For the proposed study, items will be aggregated to compute the overall level of functional limitation of each participant. Respondents could have a functional limitation score varying from 0 to 12.

In addition to studying health status, it is important to examine lifestyle factors, as suggested within the population health approach. Evidence suggests that engaging in risky lifestyle behaviors such as smoking or poor diet, or healthy behaviors such as exercising influences health status. Health-related behaviors examined in this study included smoking, physical activity, and Body Mass Index.

Smoking was evaluated using the frequency and quantity of smoking habits. Respondents were asked if they had smoked at least 100 cigarettes in their entire life. Those who responded "no" were categorized as never smokers. Then, participants were asked if they were currently smoking. Those who responded "yes" were considered current smokers. Former smokers were defined as those who had smoked in their life but were not currently smoking. For the purpose of this study, smoking status was dichotomized into former and never smokers versus current smokers.

Physical activity was assessed using energy expenditure, which measures the respondents' average daily energy expenditure during leisure time activity in the past three months. Energy expenditure is computed by using frequency, duration and metabolic energy cost per activity session. For the purpose of this study, physical

activity was categorized into those exercising at least 3 times a week for 15 minutes, defined as active, versus those reporting no activity or exercising less than 3 times a week for 15 minutes, defined as sedentary.

Body Mass Index allows for the evaluation of weight problems. It measures the participants' weights relative to their heights. Based on World Health Organization guidelines (World Health Organization, 1997), respondents were classified into four categories:

Underweight: $<18.5\ kg/m^2$

Normal weight: ≥ 18.5 to $<25.0\ kg/m^2$

Overweight: ≥ 25.0 to $< 30.0\ kg/m^2$

Obese: $\geq 30.0\ kg/m^2$

Dummy variables were constructed to determine the likelihood of being underweight, overweight, or obese compared to being normal weight.

Moreover, this study examined health care access, which is highly dependent on health care policies, using regular contact with a health care professional as a measure. Regular contact with a provider could be used as a proxy measure of health care system efficiency in facilitating access to care. Indeed, as seen previously, people who are covered under a system minimizing health care access inequalities are more likely to have a regular provider (Schoen et al., 2004). Respondents were asked if they had a regular medical doctor. Having a regular doctor was also used as a control variable for some of the research questions.

Independent variable

Respondents were evaluated on the type and presence of insurance coverage. These health insurance questions apply only to U.S. participants. Respondents who reported having any type of insurance coverage, including employer-sponsored health insurance, military health care, Medicare, Medicaid, or privately purchase insurance, were classified as being insured. Those reporting having none of these insurances were defined as uninsured.

Control variables

Based on Evans and collaborators' model (1994), health is influenced by many determinants. To account for the impact of these factors, the following confounders were selected: gender, marital status (married vs. unmarried), race (white vs. non-white), educational attainment (less than high school degree, high school degree and higher), income, and regular doctor.

To retain anonymity, specific racial categories were derived for each country. That is, to ensure that respondents could not be identified, some variables were transformed. For instance, because the majority of Canadians are whites, responses categories may have low frequencies, which could lead to identification of the respondents. Therefore, in Canada, race was classified in two categories: white, and other and multiple races. The other category includes Asians, Hispanics, Blacks, Arabs, and Aboriginals. In the United States, race was categorized into six groups: American Indian or Alaskan Native, Asian, Black/African American, White, other,

and multiple races. Because the Canadian race variable was only available as two-category variable (white/other), the American race variable was also recoded into the same two categories.

Income was measured using the total household income from all sources. Sources of income included wages, dividends and interest, worker's compensation, retirement pension, Old Age Security and Guaranteed Income Supplement, social assistance and welfare, child support, alimony, and other. Income was adjusted for the number of persons in the household and for country of residence. To protect anonymity, income was collapsed into 11 categories ranging from 0 to $\geq$ $80,000. Then, household income was divided in quintiles. Income in this data set has a great number of missing values (20.8%). For the purpose of this study, and following the recommendation of both C. Simile (personal communication, July 26, 2005) and J-M Berthelot (personal communication, September 9, 2005), the missing values were included as a category. In other words, a sixth category was added to the household income quintile variable as follow: lowest household income, lowest to middle income, middle income, middle to highest income, highest income, and missing. By introducing the missing as a category, the variance explained by people without an income value is accounted for. Preliminary analyses comparing the list-wise deletion method to having missing values as a category showed small differences in the estimates (Appendix B). Indeed, these results showed that, despite a loss of 20.8% of the sample when using list-wise deletion, the standard errors were similar. Based on these findings, the six-category variable was used as a control variable.

Finally, controlling for having a regular doctor is important when discussing health differences pertaining to the older population. As seen previously, having a regular doctor can be essential in dealing with health-related issues such as chronic illness and disability (Menec et al., 2005).

Health and Retirement Study

Dependent variables

The outcome variable was self-rated health assessed by: "Would you say your health is excellent, very good, good, fair, or poor?"

Independent variable

The independent variable included insurance coverage. Respondents were asked to identify the type of health coverage, if any, they had. Of interest was whether participants were insured or uninsured. The insured respondents are defined as respondents, who were currently insured with any type of insurance such as employer-sponsored plans, Medicaid, Medicare, military insurance, veterans' insurance, or privately purchased insurance. Insurance coverage was identified for each wave except in the sixth wave, 2002, because all of the near elderly had reached the age of Medicare, thus being insured by definition.

Despite the longitudinal design of the HRS, not every participant was asked his/her health insurance status from wave to wave resulting in missing information. Cases could have as little as one measurement missing to as much as five missing

(everyone had reached Medicare in wave 6). The distribution of missing information across waves is presented in Appendix C.

In order to determine the health insurance status of each participant and to enable convergence of the complex growth curves that were tested, participants in the insured group had to have 4 out of 5 data points, indicating an insured status. Models using missing data estimation methods with less missing data points did not reach convergence, and, thus, individuals were included in the insured group if they had no more than 1 missing data point at any wave. The sample size for the insurance group was then 3,443 (999 with 5 data points and 3,443 with 4 data points).

There were no participants in the near elderly group who reported being uninsured at all waves. To be in the partially uninsured group, respondents had to be uninsured any time during the five waves and have at least 3 data points available. The choice of a minimum of 3 data points is based on minimizing misclassification and maximizing power for convergence. The sample size for the partially uninsured was 895.

Control variables

Following Evans and colleagues approach (1994), the control variables, measured at baseline, included marital status (married vs. unmarried), race (white vs. non-white), education (less than high school degree, high school degree, or college), smoking habits (currently smoking vs. never or former), alcohol use (number of drinks

per day), Body Mass Index, and physical activity ($\geq$ 3 times per week vs. $\leq$ 2 times a week).

II.3. Overview of Statistical Analyses

The following section describes the statistical procedures that were used to evaluate each of the research questions. These questions utilized the data obtained from the JCUSH and the HRS.

Research Question I: Are older Canadians healthier than older Americans?

To investigate whether older Canadians (65+) have better overall health than older Americans, two regression procedures were used: ordinary least squares regression (OLS) models and logistic regression. First, OLS models were used to examine the adjusted mean[3] differences in health status between countries. There were three sets of OLS regression models used to examine this question. The first set compared Canadian and American older adults' self-rated health, chronic conditions, functional limitations, and HUI3 scores.

The second set of regression models compared Canadian and American older adults' self-rated health, HUI3 scores, and functional limitations only for respondents who reported at least one chronic condition. The last set of regression analyses

[3] Few statistical software packages provide the option to adjust for complex sampling design when using analysis of variance procedures. SUDAAN provides adjusted means within the regression procedures.

compared Canadian and American older adults' self-rated health and HUI3 scores, and chronic conditions for respondents who reported at least one functional limitation

Following other studies, self-rated health was used as a continuous variable (Zullig, Valois, & Drane, 2005; Tay, Wang, Rochtchina, & Mitchell, 2005; Barger, 2006). To determine if self-rated health followed a normal distribution, skewness and kurtosis diagnostics were computed. The results showed that self-rated health followed a normal distribution for each country (the distribution of self-rated health is presented in Appendix D). Moreover, linear regression has been shown to provide valid estimates even if the assumption of normality is violated (Lumley, Diehr, Emerson, & Chen, 2002). Dichotomizing self-rated health into poor vs. good is a common procedure but can lead to a loss of information about the individual, lower statistical power, and lower effect size (MacCallum, Zhang, Preacher, & Rucker, 2002; Altman & Royston, 2006).

Second, logistic regression models were used to examine which variables predicted having a regular doctor (vs. none), smoking habits (current vs. never or former smokers), exercising (vs. being sedentary), being underweight, being overweight, or being obese (vs. being normal weight) among older Americans to those of older Canadians. These logistic analyses were not performed among older adults with health problems. All of these OLS and logistic regression analyses were adjusted for gender, marital status, race, education, income, and regular doctor (when applicable).

Research Question II: Are Canadians healthier than Americans?

To examine the role of health care on population health, the Canadians' and Americans' health profiles were compared. For this question, Canadian and Americans of all ages were included in the analyses. OLS regression was conducted to determine whether health indicators among Canadians were significantly different from health indicators among Americans, while controlling for the potential confounding effects of gender, race, education, and income.

In addition, logistic regression was used to compare the predictors of smoking, exercising, being underweight, being overweight, being obese, and having a regular doctor, after adjusting for gender, race, education, and income.

Research Question III: Does universal health coverage contribute to better health at all ages?

To further explore whether universal health coverage leads to better health, the differences in health between Canadians and Americans were examined among different age groups. Using OLS regression models, the adjusted means of self-rated health and HUI3 scores among young (18-44) and middle-aged (45-64) Canadian adults were compared to those of American adults. All analyses included gender, race, education, and income as control variables.

Research Question IV: Does health insurance prior to Medicare coverage affect the health of Medicare beneficiaries?

To investigate the possible effects of extending Medicare to a younger age, the change in health status prior to Medicare eligibility was compared to the change in health status after Medicare enrollment using a growth curve analysis approach. Growth curve analysis allows researchers to measure change over time using longitudinal data. In the present study, the growth curve analysis was used to measure the change of self-rated health over time between 1992 and 2002 using HRS. Self-rated health distribution at baseline is presented in Appendix D.

For this question, the impact of Medicare was compared between those who were insured and those who were partially uninsured prior to Medicare eligibility age[4]. Partially uninsured were participants who reported being uninsured at any time between 1992 and 2002. The change in health among partially uninsured people was therefore compared to the change in health among insured persons, using a multi-group latent growth curve model (Bollen, 1989). In addition, this research question implied that the change in health observed prior to Medicare eligibility age would differ from the change in health following Medicare enrollment. To analyze this non-linear trend, a piecewise latent growth model was used (Li, Duncan, T., Duncan, S., & Hops, 2001). Piecewise models are ideally suited to examine this type of

[4] In the HRS, participant's age at baseline interview (1992) varied between 55 and 83; thus, respondents reached the age of 65 at different waves. To account for the age variability at baseline, specific codes were created to identify at which wave each respondent reached Medicare eligibility age (Mehta & West, 2000). A description of this coding is presented in Appendix D.

discontinuous trend over time, because separate slopes representing change over time before and after a critical point (Medicare eligibility) can be estimated. To compare growth rates between insured and partially insured groups, a multigroup version of the piecewise model was used. Further statistical details on these models are provided in Appendix E.

HRS sample reduction

For the purpose of this analysis, a number of factors reduced the sample size available in the HRS at baseline from over 12,000 participants to 3,674. First, the questions related to health insurance were only asked of the primary person interviewed. Thus, all analyses pertaining to the HRS used only individuals with insurance data. Second, for the purpose of this study, the sample was limited to those aged 55 and older. Third, individuals who died or were institutionalized between 1992 and 2002 were given a sampling weight of 0, effectively eliminating them from the analyses. The number of respondents with a weight of 0 was small (<10%), and was not expected to have a substantial influence on the results. Fourth, the sample size was further reduced because complete or near complete data on insurance coverage was needed to define full and partial coverage. The following Table 10 summarizes the sample size available based on each of these limiting factors:

Table 10

Sample Size Available for Analyses

	n	%
HRS 1992 complete sample	12,652	100.0
Household sample with insurance data	7,547	59.7
Near-elderly and elderly sample	6,972	92.1
Sample excluding weight > 0	6,592	94.4
Sample with near-complete insurance data used for the analyses	3,674	55.7

Sampling design adjustments

All analyses were conducted using sampling design weights to adjust for disproportionate sampling from the population. The complex sampling design of the JCUSH also requires an adjustment to the standard errors and significance tests. These adjustments were made using the Taylor series linearization approach (Woodruff, 1971) in SUDAAN (Release 9.0.1; Research Triangle Institute, Research Triangle Park, N.C.).

Although the HRS also requires adjustment for the sampling design, the software used for the latent growth curve analysis (Mplus 4.0, Muthén, L. & Muthén B., 2006) does not provide sampling design adjustments for some complex modeling circumstances. A comparison of growth curve models examining the change in health over time (excluding the group differences and the non-linear change estimation) with

and without the sampling design adjustment, however, revealed small differences in the fit of the models and no differences in the standard errors. Consequently, all analyses performed with the HRS made adjustments using sampling weights but did not adjust standard errors. Findings from these growth curve models with and without sampling adjustments are presented in Appendix F.

III. RESULTS

This chapter presents the findings of the four questions. The first set of analyses examined whether older Canadians were healthier than older Americans. Second, multiple regression models explored the role of health care on population health. The third set of analyses assessed the impact of universal health care on health separately for several age groups. Finally, using a latent growth curve approach, the effect of Medicare coverage on self-rated health was analyzed.

III.1. Are Older Canadians Healthier than Older Americans?

The aim of this question was to explore whether health differences between older Canadians and older Americans (65+) persist even after Americans receive health insurance via Medicare. To do so, three specific research questions were investigated: (1) do older Canadians report better health status, health habits, and health care access than older Americans? (2) do older Canadians with chronic conditions report better self-rated health and have higher HUI3 scores than older Americans? and (3) do older Canadians with functional limitations report better self-rated health and have higher HUI3 scores than older Americans? These analyses investigating all of these questions were adjusted for gender, marital status, race, education, income, and having a regular doctor (when applicable).

OLS regression models assessed whether Canadians were in better health than Americans. The adjusted means of HUI3, self-rated health, chronic conditions, and functional limitations are presented in the following Table 11.

Table 11

Adjusted Means of HUI3, Self-Rated Health, Chronic Conditions, and Functional Limitations Among Elderly 65+

	Canada (n = 755)	United States (n = 1,151)
HUI3	0.82	0.78
Self-Rated Health	2.20	2.17
Chronic Conditions	1.48	1.72
Functional limitations	2.61	3.03

Note. Means adjusted for gender, marital status, race, education, income, and having a regular doctor. Chronic conditions ranged from 0 "no chronic condition" to 9 chronic conditions and functional limitations varied from 0 to 12 functional impairments.

As seen in Table 12 and 13, once gender, marital status, race, education, income, and having a regular doctor were controlled, older Americans had significantly lower HUI3 scores and more chronic conditions than their Canadian counterparts (mean [M]= .78 vs. M = .82, $p < .01$; and M= 1.72 vs. M= 1.48, $p < .01$; respectively). The HUI3 ranged from -.36 "worse than dead" to 1.00 "perfect health".

No significant difference between older Americans and Canadians were observed for self-rated health or functional limitations.

Table 12

HUI3 (n = 1,690) and Self-Rated Health (n =1,806) Among Elderly 65+

	HUI3 b (SE)	Self-Rated Health b (SE)
United States	-0.043 (0.02)**	-0.027 (0.06)
Men	-0.014 (0.02)	-0.106 (0.08)
< 12 years of education	-0.115 (0.02)***	-0.371 (0.09)***
White	0.034 (0.02)	0.277 (0.09)**
Lower middle income	0.029 (0.03)	0.168 (0.10)
Middle income	0.092 (0.03)***	0.706 (0.12)***
Middle higher income	0.106 (0.03)***	0.710 (0.13)***
Highest income	0.113 (0.04)**	0.713 (0.17)***
Missing (income)	0.047 (0.02)	0.352 (0.09)***
Married	0.034 (0.04)	0.198 (0.18)
Widow/divorced/separated	-0.020 (0.05)	0.203 (0.17)
Has a regular doctor	0.014 (0.04)	0.383 (0.16)*
R^2	8.9 %	10.2 %

Note. Referent category included Canada, women, ≥ 12 years of education, lower income, never married, and not having a regular doctor. R^2 is the amount of variance accounted for by the overall model controlling for the confounders.

*$p < .05$. **$p < .01$. ***$p < .001$.

Table 13

Chronic Conditions (n = 1,806) and Functional Limitations (n = 1,422) Among Elderly 65+

	Chronic Conditions b (SE)	Functional limitations b (SE)
United States	0.244 (0.08)**	0.413 (0.22)
Men	0.365 (0.10)***	-0.493 (0.25)*
< 12 years of education	0.356 (0.11)**	1.364 (0.33)***
White	-0.039 (0.13)	-0.533 (0.34)
Lower middle income	0.104 (0.14)	-0.298 (0.37)
Middle income	-0.466 (0.15)**	-1.313 (0.39)***
Middle higher income	-0.389 (0.16)*	-1.163 (0.38)**
Highest income	-0.343 (0.22)	-1.865 (0.37)***
Missing (income)	-0.312 (0.12)**	-0.622 (0.34)
Married	0.117 (0.21)	0.442 (0.63)
Widow/divorced/separated	0.324 (0.21)	0.797 (0.65)
Has a regular doctor	-1.010 (0.14)***	-0.975 (0.51)
R^2	6.8%	8.9%

Note. Referent category included Canada, women, ≥ 12 years of education, lower income, never married, and not having a regular doctor. *$p < .05$. **$p < .01$. ***$p < .001$.

Findings from the logistic regression analyses (Tables 14 and 15) assessing the predictors of health habits and health care access showed that American older adults were less likely to have a regular doctor (92.8% vs. 96.6%, $p <. 001$; respectively), less likely to be physically active (43.9% vs. 52.4%, $p <. 001$; respectively), and were

more likely to be obese (20.6% vs. 14.8%, $p <$. 001; respectively) than their Canadian counterparts.

Table 14

Regular Doctor Access (n =1,806), Physical Activity (n =1,797), and Smoking Status (n =1,793).

	Regular Doctor AOR (CI 95%)	Physical Activity AOR (CI 95%)	Smoking Status AOR (CI 95%)
United States	0.41 (0.25 - 0.69)***	0.61 (0.48 - 0.77)***	0.68 (0.47 - 1.00)
Men	0.40 (0.23 - 0.70)**	1.70 (1.28 - 2.24)***	1.64 (1.04 - 2.60)
< 12 years of education	0.64 (0.37 - 1.11)	0.60 (0.43 - 0.83)**	0.94 (0.58 - 1.53)
White	2.08 (1.25 - 3.46)**	1.32 (0.92 - 1.90)	1.27 (0.70 - 2.21)
Lower middle income	1.25 (0.62 - 2.54)	0.98 (0.66 - 1.47)	0.94 (0.51 - 1.70)
Middle income	1.76 (0.61 - 7.22)	1.73 (1.09 - 2.74)*	0.73 (0.33 - 1.59)
Middle higher income	2.50 (0.87 - 7.22)	3.04 (1.87 - 4.95)***	0.83 (0.38 - 1.85)
Highest income	0.93 (0.32 - 2.70)	1.66 (0.92 - 2.98)	0.38 (0.10 - 1.47)
Missing (income)	1.60 (0.85 - 3.01)	1.06 (0.74 - 1.52)	0.53 (0.30 - 0.93)*
Married	8.56 (3.46 - 21.18)	1.70 (0.92 - 3.14)	1.09 (0.35 - 3.37)
Widow/divorced/separated	3.42 (1.39 - 8.45)	1.39 (0.75 - 2.57)	1.56 (0.52 - 4.71)
Has a regular doctor	--	1.04 (0.61 - 1.78)	2.28 (1.11 - 4.66)*

Note. Referent category included Canada, women, ≥ 12 years of education, lower income, never married, and not having a regular doctor. AOR: Adjusted Odd Ratio; CI: Confidence Interval

*$p < .05$. **$p < .01$. ***$p < .001$.

Table 15

Underweight (n =1,643), Overweight (n =1,746), and Obese (n =1,746).

	Underweight	Overweight	Obese
	AOR (CI 95%)	AOR (CI 95%)	AOR (CI 95%)
United States	0.61 (0.32 - 1.17)	1.01 (0.80 - 1.28)	1.56 (1.16 - 2.10)**
Men	0.06 (0.01 - 0.26)***	1.54 (1.17 - 2.04)**	0.90 (0.63 – 1.29)
< 12 years of education	0.31 (0.13 - 0.75)**	1.23 (0.90 - 1.67)	1.31 (0.93 – 1.83)
White	0.54 (0.19 - 1.50)	1.29 (0.90 - 1.86)	0.52 (0.36 - 0.75)***
Lower middle income	0.24 (0.07 - 0.87)*	1.62 (1.10 - 2.39)*	0.89 (0.57 – 1.39)
Middle income	0.98 (0.26 - 3.69)	1.71 (1.06 - 2.76)*	0.92 (0.52 – 1.62)
Middle higher income	0.56 (0.11 - 2.97)	1.27 (0.78 - 1.60)	0.59 (0.31 – 1.11)
Highest income	0.00 (0.00 - 0.00)	1.79 (1.00 - 3.18)*	0.35 (0.14 - 0.89)*
Missing (income)	0.62 (0.24 - 1.63)	1.12 (0.78 - 1.60)	0.84 (0.56 – 1.25)
Married	0.16 (0.04 - 0.59)**	1.73 (0.90 - 3.31)	0.74 (0.36 – 1.54)
Widow/divorced/separated	0.24 (0.07 - 0.81)*	1.52 (0.79 - 2.92)	0.87 (0.41 – 1.81)
Has a regular doctor	0.91 (0.22 - 3.79)	1.38 (0.80 - 2.39)	0.62 (0.32 – 1.20)

Note. Referent category included Canada, women, ≥ 12 years of education, lower income, never married, and not having a regular doctor. AOR: Adjusted Odd Ratio; CI: Confidence Interval

*$p < .05$. **$p < .01$. ***$p < .001$.

To further examine the late life health differences between the two countries, older Canadians with chronic conditions and older Canadians with functional limitations were compared to their Americans counterparts. The findings

from the multiple regressions revealed that older Americans with chronic conditions and those with functional limitations had lower HUI3 scores than their Canadian counterparts (M = .76 vs. M = .80, $p < .05$ and M = .73 vs. M = .77, $p = .055$; respectively). In addition, older Americans with functional limitations were significantly more likely to have chronic conditions than their Canadian counterparts (M = .1.71 vs. M = 2.01, $p < .01$; respectively). There were no significant differences between the two countries in self-rated health (Tables 16, 17).

Table 16

HUI3 (n = 1,318), Self-rated Health (n = 1,412), and Functional Limitations (n =1,093) Among Elderly with Chronic Conditions

	HUI3	Self-Rated Health	Functional Limitations
	b (SE)	b (SE)	b (SE)
United States	-0.041 (0.02)*	0.020 (0.07)	0.298 (0.26)
Men	-0.017 (0.02)	-0.133 (0.08)	-0.676 (0.29)*
< 12 years of education	-0.127 (0.03)***	-0.312 (0.10)**	1.391 (0.36)***
White	0.025 (0.03)	0.263 (0.10)**	-0.505 (0.39)
Lower middle income	0.038 (0.03)	0.167 (0.11)	-0.350 (0.42)
Middle income	0.995 (0.03)**	0.773 (0.13)***	-1.329 (0.46)**
Middle higher income	0.128 (0.03)***	0.763 (0.14)***	-1.469 (0.44)***
Highest income	0.105 (0.05)*	0.633 (0.21)**	-2.140 (0.43)***
Missing (income)	0.050 (0.03)	0.377 (0.10)***	-0.490 (0.39)
Married	0.000 (0.06)	0.088 (0.21)	1.076 (0.74)
Widow/divorced/separated	-0.055 (0.06)	0.084 (0.20)	1.248 (0.75)
Has a regular doctor	-0.060 (0.08)	0.077 (0.21)	-0.883 (0.90)
R^2	9.6%	10.3%	9.6%

Note. Referent category included Canada, women, ≥ 12 years of education, lower income, never married, and not having a regular doctor. *$p < .05$. **$p < .01$. ***$p < .001$.

Table 17

HUI3 (n =846), Self-rated Health (n =902), and Functional Limitations (n =902) Among Elderly with Functional Limitations

	HUI3 b (SE)	Self-Rated Health b (SE)	Chronic Conditions b (SE)
United States	-0.044 (0.02)[m]	0.005 (0.08)	0.298 (0.11)**
Men	-0.008 (0.03)	-0.080 (0.10)	0.496 (0.14)***
< 12 years of education	-0.107 (0.03)**	-0.222 (0.12)	0.282 (0.14)*
White	0.054 (0.04)	0.578 (0.12)***	-0.151 (0.15)
Lower middle income	0.015 (0.04)	0.031 (0.13)	0.221 (0.18)
Middle income	0.072 (0.04)	0.586 (0.16)***	-0.472 (0.19)*
Middle higher income	0.093 (0.04)*	0.421 (0.19)*	-0.241 (0.24)
Highest income	0.136 (0.05)**	0.683 (0.24)**	-0.654 (0.30)*
Missing (income)	0.034 (0.04)	0.138 (0.12)	-0.263 (0.16)
Married	0.049 (0.06)	0.184 (0.26)	0.224 (0.25)
Widow/divorced/separated	0.031 (0.06)	0.348 (0.26)	0.323 (0.26)
Has a regular doctor	-0.120 (0.07)	0.217 (0.22)	-1.055 (0.25)***
R^2	8.8%	11.6%	9.4%

Note, Referent category included Canada, women, ≥ 12 years of education, lower income, never married, and not having a regular doctor. *$p < .05$. **$p < .01$. ***$p < .001$. [m]$p = .055$.

In summary, older Canadians reported better health than their American counterparts. They also had healthier habits and were more likely to receive regular

care. The next step was to investigate the potential role of health care in explaining the health differences observed in the elderly population.

III.2. Are Canadians Healthier than Americans?

To investigate whether Canadians were healthier than Americans, two specific questions were examined. First, do Canadians of all ages report better health status, health habits, and health care access than their American counterparts? Second, do insured Americans have poorer health status, health habits, and health care access than Canadians?

Comparing Canadian and American health for all ages.

The objective of this first question was to determine whether the health profile of Canadians was different from the health profile of Americans once gender, race, education, and income were controlled. Ordinary least squares regression models were used to examine the predictors of HUI3, self-rated health, the number of chronic conditions, and the number of functional limitations. Logistic regression analyses were performed to determine U.S.-Canadian differences in the likelihood of having a regular doctor, being physically active, being underweight (< 18.5 kg/m2), being overweight (≥ 25.0 to < 30.0 kg/m2), obese (≥ 30.0 kg/m2) vs. being normal weight (≥ 18.5 to < 25.0 kg/m2), or current smoking status.

Overall, Canadians reported better health status than Americans. Indeed, Americans had significantly lower HUI3 scores than Canadians (M = .87 vs. M = .89, $p < .001$; respectively). Dummond (2001) argued out that a HUI3 score difference of .001 is important in population health, and, according to this standard, this difference would be considered important. Americans also reported having significantly more chronic conditions (45.8% with one or more conditions vs. 42.2%, $p < .001$; respectively) and more functional limitations (M = 1.23 vs. M= 1.09, $p < .05$; respectively) than their Canadian counterparts. Finally, Americans rated their health[5] poorer than Canadians (M = 2.67 vs. M = 2.72, $p = .054$; respectively). The findings from these regression analyses are presented in Tables 18 and 19.

[5] Self-rated health ranged from 0 (poor) to 4 (excellent)

Table 18

HUI3 (n = 8,132) and Self-rated Health (n =8,363) among all respondents

	HUI3 b (SE)	Self-Rated Health b (SE)
United States	-0.022 (0.01)***	-0.048 (0.03)[m]
Men	0.012 (0.01)*	0.037 (0.03)
< 12 years of education	-0.105 (0.01)***	-0.492 (0.05)***
White	-0.009 (0.01)	0.100 (0.04)**
Lower middle income	0.059 (0.01)***	0.308 (0.06)***
Middle income	0.097 (0.01)***	0.054 (0.06)***
Middle higher income	0.106 (0.01)***	0.634 (0.06)***
Highest income	0.123 (0.01)***	0.712 (0.06)***
Missing (income)	0.064 (0.01)***	0.346 (0.06)***
R^2	8.0%	9.6%

Note. Referent category included Canada, women, ≥ 12 years of education, and lower income. *$p < .05$. **$p < .01$. ***$p < .001$. [m]$p = .054$.

Table 19

Chronic Conditions (n = 8,372) and Functional Limitations (n = 7,696) among all respondents

	Chronic Conditions b (SE)	Functional Limitations b (SE)
United States	0.138 (0.03)***	0.134 (0.06)*
Men	0.013 (0.04)	-0.445 (0.07)***
< 12 years of education	0.423 (0.06)***	1.134 (0.16)***
White	0.183 (0.04)***	0.274 (0.08)**
Lower middle income	-0.121 (0.07)	-0.680 (0.15)***
Middle income	-0.324 (0.06)***	-1.126 (0.15)***
Middle higher income	-0.371 (0.06)***	-1.156 (0.14)***
Highest income	-0.042 (0.06)***	-1.352 (0.14)***
Missing (income)	-0.204 (0.06)***	-0.781 (0.15)***
R^{2}	4.0%	7.2%

Note. Referent category included Canada, women, ≥ 12 years of education, and lower income.

*$p < .05$. **$p < .01$. ***$p < .001$.

These analyses also showed that Americans were less likely to have a regular doctor than Canadians (79.6% vs. 84.9%, $p < .001$; respectively). With regard to health behaviors, Americans were proportionally less likely to be physically active (42.5% vs. 52.4%, $p < .001$; respectively) and close to 50% more

likely to be obese than Canadians (20.7% vs. 15.3%, $p < .001$; respectively). On the other hand, the percentage of Canadians who were underweight was higher than the percentage of Americans who were underweight (2.8% vs. 2.2%, $p < .05$; respectively). There were no significant differences between the two countries in the percentage of those who were smokers or the percentage of those who were overweight. Findings from the logistic regressions are presented in Tables 20 and 21.

Table 20

Regular Doctor Access (n = 8,366), Physical Activity (n = 8,348), and Smoking Status (n = 8,340) among all respondents.

	Regular Doctor AOR (CI 95%)	Physical Activity AOR (CI 95%)	Smoking Status AOR (CI 95%)
United States	0.72 (0.63 - 0.83)***	0.64 (0.58 - 0.71)***	0.95 (0.83 - 1.08)
Men	0.53 (0.45 - 0.62)***	1.44 (1.28 - 1.62)***	1.32 (1.13 - 1.54)***
< 12 years of education	0.80 (0.64 - 1.10)	0.58 (0.47 - 0.70)***	1.38 (1.08 - 1.75)**
White	1.61 (1.36 - 1.91)***	1.03 (0.89 – 1.20)	1.52 (1.25 - 1.86)***
Lower middle income	1.33 (1.04 - 1.71)*	1.47 (1.19 - 1.83)***	1.07 (0.83 - 1.39)
Middle income	1.96 (1.48 - 2.59)***	1.67 (1.34 - 2.08)***	0.72 (0.55 - 0.95)*
Middle higher income	1.60 (1.22 - 2.10)***	2.06 (1.66 - 2.56)***	0.57 (0.43 - 0.76)***
Highest income	2.33 (1.76 - 3.07)***	2.36 (1.90 - 2.93)***	0.39 (0.29 - 0.53)***
Missing (income)	1.58 (1.23 - 2.01)***	1.20 (0.98 - 1.48)	0.59 (0.45 - 0.77)***

Note. Referent category included Canada, women, ≥ 12 years of education, and lower income.

AOR: Adjusted Odd Ratio; CI: Confidence Interval. *$p < .05$. **$p < .01$. ***$p < .001$.

Table 21

Underweight, Overweight, and Obese among all respondents (n = 8,053).

	Underweight	Overweight	Obese
	AOR (CI 95%)	AOR (CI 95%)	AOR (CI 95%)
United States	0.66 (0.47 - 0.91)*	1.01 (0.91 - 1.13)	1.47 (1.28 - 1.68)***
Men	0.21 (0.11 – 0.40)***	2.03 (1.79 - 2.30)***	0.96 (0.83 – 1.11)
< 12 years of education	0.72 (0.37 - 1.40)	1.16 (0.95 - 1.42)	1.46 (1.17 - 1.81)***
White	0.51 (0.33 - 0.77)**	0.92 (0.79 - 1.08)	0.82 (0.69 - 0.98)*
Lower middle income	0.75 (0.37 - 1.51)	1.23 (0.98 - 1.54)	0.91 (0.71 – 1.17)
Middle income	0.47 (0.24 - 0.93)*	1.32 (1.04 - 1.68)*	0.75 (0.58 - 0.97)*
Middle higher income	0.45 (0.23 - 0.91)*	1.13 (0.89 - 1.43)	0.84 (0.65 – 1.09)
Highest income	0.56 (0.26 - 1.19)	1.19 (0.95 - 1.51)	0.68 (0.52 - 0.89)**
Missing (income)	0.92 (0.50 - 1.67)	1.10 (0.88 - 1.37)	0.68 (0.53 - 0.86)**

Note. Referent category included Canada, women, ≥ 12 years of education, and lower income. AOR: Adjusted Odd Ratio; CI: Confidence Interval. *$p < .05$. **$p < .01$. ***$p < .001$.

In summary, the Canadian population was in better health overall, had healthier habits except for smoking, and had greater access to care than the American population. The next step in the analyses was to learn more about the role of health care in population health by comparing insured Americans were compared to Canadians.

Comparing insured Americans to Canadians

The purpose of this question was to examine further the differences in health of Canadians and insured Americans, after adjusting for gender, race, income, and educational attainment. As with the previous question, multiple regression models were used to examine whether differences in health status between Canadians and insured Americans existed. Logistic regression analyses were conducted to assess the differences in health care access and health behaviors among Americans with health care coverage and Canadians.

The results showed that insured Americans had significantly lower HUI3 scores than Canadians (M = .87 vs. M = .89, $p < .001$; respectively), reported having more chronic conditions than Canadians (43.4% vs. 38.9%, $p < .001$; respectively) and reported having more functional limitations than Canadians (M = 1.28 vs. M = 1.09, $p < .01$; respectively). Insured Americans also had marginally lower self-rated health scores than Canadians (M = 2.67 vs. M = 2.72, $p = .055$; respectively). Tables 22 through 23 present the findings from the linear regressions.

Table 22

HUI3 (n = 8,126) and Self-rated Health (n = 8,350) Among Canadians and Insured Americans

	HUI3	Self-Rated Health
	b (SE)	b (SE)
Insured Americans	-0.025 (0.01)***	-0.051 (0.03)[m]
Uninsured Americans	-0.005 (0.01)	-0.017 (0.06)
Men	0.012 (0.01)*	0.032 (0.03)
< 12 years of education	-0.105 (0.01)***	-0.494 (0.05)***
White	-0.009 (0.01)	0.103 (0.04)**
Lower middle income	0.061 (0.01)***	0.309 (0.06)***
Middle income	0.100 (0.01)***	0.502 (0.06)***
Middle higher income	0.109 (0.01)***	0.632 (0.06)***
Highest income	0.127 (0.01)***	0.772 (0.06)***
Missing (income)	0.066 (0.01)***	0.341 (0.06)***
R^2	8.0%	9.5%

Note. Referent category included Canada, women, ≥ 12 years of education, and lower income. *$p < .05$. **$p < .01$. ***$p < .001$. [m]$p = .055$.

Table 23

Chronic Conditions (n = 8,359) and Functional Limitations (n = 7,695) Among Canadians and Insured Americans.

	Chronic Conditions b (SE)	Functional limitations b (SE)
Insured Americans	0.194 (0.03)***	0.189 (0.06)**
Uninsured Americans	-0.316 (0.04)***	-0.319 (0.13)*
Men	0.026 (0.03)	-0.432 (0.07)***
< 12 years of education	0.465 (0.06)***	1.118 (0.16)***
White	0.147 (0.04)***	0.238 (0.08)**
Lower middle income	-0.171 (0.06)**	-0.732 (0.15)***
Middle income	-0.387 (0.06)***	-1.189 (0.15)***
Middle higher income	-0.445 (0.06)***	-1.228 (0.14)***
Highest income	-0.498 (0.06)***	-1.432 (0.14)***
Missing (income)	-0.249 (0.06)***	-0.822 (0.15)***
R^2	5.8%	7.4%

Note. Referent category included Canada, women, ≥ 12 years of education, and lower income.

*$p < .05$. **$p < .01$. ***$p < .001$.

Results from the logistic regression analyses (Tables 24 and 25) showed that there was no apparent difference between Canadians and insured Americans regarding having a regular doctor (84.6% vs. 84.8%, respectively). The results also revealed that insured Americans were significantly less physically active than Canadians (43.9% vs.

52.4%, $p <$. 001; respectively). Moreover, compared to Canadians, Americans with health insurance were 50% more likely to be obese (20.7% vs. 15.3%, $p <$. 001; respectively). In contrast, Canadians were more likely to be current smokers than insured Americans (19.0% vs. 15.0%, $p <$. 05; respectively).

Table 24

Regular Doctor Access (n = 8,353), Physical Activity (n = 8,335), and Smoking Status (n = 8,327) Among Canadians and Insured Americans.

	Regular Doctor AOR (CI 95%)	Physical Activity AOR (CI 95%)	Smoking Status AOR (CI 95%)
Insured Americans	1.00 (0.86 - 1.16)	0.66 (0.59 – 0.74)***	0.84 (0.73 - 0.97)*
Uninsured Americans	0.13 (0.10 - 0.17)***	0.51 (0.40 – 0.64)***	1.98 (1.53 - 2.56)***
Men	0.52 (0.44 - 0.61)***	1.45 (1.28 – 1.63)***	1.30 (1.10 - 1.52)**
< 12 years of education	0.95 (0.74 - 1.25)	0.59 (0.48 – 0.72)***	1.30 (1.02 - 1.65)*
White	1.40 (1.17 - 1.68)***	1.03 (0.88 - 1.19)	1.66 (1.34 - 1.65)***
Lower middle income	1.09 (0.83 - 1.43)	1.45 (1.17 - 1.80)**	1.17 (0.90 – 1.51)
Middle income	1.49 (1.11 - 2.00)**	1.62 (1.30 - 2.03)***	0.81 (0.61 – 1.07)
Middle higher income	1.12 (0.84 - 1.49)	1.99 (1.60 - 2.48)***	0.66 (0.49 - 0.87)**
Highest income	1.58 (1.17 - 2.13)**	2.27 (1.82 - 2.83)***	0.45 (0.34 - 0.61)***
Missing (income)	1.30 (0.99 - 1.70)	1.17 (0.95 - 1.44)	0.64 (0.49 - 0.84)**

Note. Referent category included Canada, women, ≥ 12 years of education, and lower income. AOR: Adjusted Odd Ratio. *$p < .05$. **$p < .01$. ***$p < .001$.

Table 25

Underweight, Overweight, and Obese Among Canadians and Insured Americans (n =8,042)

	Underweight	Overweight	Obese
	AOR (CI 95%)	AOR (CI 95%)	AOR (CI 95%)
Insured Americans	0.59 (0.42 - 0.83)**	1.00 (0.90 - 1.12)	1.50 (1.31 - 1.72)***
Uninsured Americans	1.17 (0.62 - 2.21)	1.11 (0.87 - 1.41)	1.21 (0.91 - 1.61)
Men	0.21 (0.11 - 0.38)***	2.02 (1.78 - 2.29)***	0.97 (0.84 - 1.13)
< 12 years of education	0.68 (0.34 - 1.34)	1.16 (0.94 - 1.09)	1.48/ (1.19 - 1.84)***
White	0.54 (0.36 - 0.82)**	0.93 (0.79 - 1.09)	0.81 (0.68 - 0.97)*
Lower middle income	0.81 (0.39 - 1.66)	1.23 (0.98 - 1.54)	0.90 (0.70 - 1.15)
Middle income	0.52 (0.27 - 1.02)	1.33 (1.05 - 1.69)*	0.74 (0.57 - 0.96)*
Middle higher income	0.51 (0.26 - 1.03)	1.14 (0.90 - 1.44)	0.82 (0.63 - 1.07)
Highest income	0.64 (0.30 - 1.35)	1.21 (0.95 - 1.53)	0.66 (0.51 - 0.87)**
Missing (income)	0.99 (0.55 - 1.79)	1.10 (0.88 - 1.38)	0.67 (0.53 - 0.86)**

Note. Referent category included Canada, women, ≥ 12 years of education, and lower income..

AOR: Adjusted Odd Ratio. *$p < .05$. **$p < .01$. ***$p < .001$.

Surprisingly, there were no apparent differences between Canadians and uninsured Americans in HUI3 or self-rated health scores. Moreover, uninsured Americans appeared to have reported fewer chronic conditions and functional limitations than Canadians (M = .27 vs. M = .59, and, M = .77 vs. M = 1.09; respectively).

Contrary to most, if not all studies examining the health of uninsured Americans versus insured Americans, these findings suggested that uninsured Americans were not in poorer health. It is noticeable that the prevalence of Americans without health insurance reporting at least one chronic condition (25.6%) was lower than the prevalence observed in the 2003 National Health Interview Survey, in which 45% of uninsured non-elderly Americans reported at least one condition (Robert Wood Johnson Foundation, 2005). This finding may reflect an under-representation of uninsured Americans with chronic conditions in the JCUSH. Although most studies show that people without health insurance are in poorer health than those with health coverage (IOM, 2003), it is important to note that people in poor health, specifically with chronic conditions, have also been shown to be more likely to have health insurance than those without chronic conditions either through privately own insurances or through public programs (Reed & Tu, 2002). Therefore, lack of insurance affects health but health influences the likelihood of having health insurance.

In addition, the lower prevalence of chronic conditions in the uninsured population could be the result of poor access to health care. The results of the present study also indicated that less than 50% of uninsured Americans reported having a regular doctor and 40% had unmet health care needs; and consequently, they may not have been aware of their conditions or may not have been diagnosed by a health professional. Many reports and studies noted that uninsured Americans have greater difficulties in accessing care compared to their insured counterparts (IOM, 2003;

Robert Wood Johnson Foundation, 2005; Ayanian, Weissman, Schneider, Ginsburg, & Zaslavky, 2000; Collins, Schoen, Kriss, Doty, & Mahalo, 2006; Ross, Bradley, Busch, 2006). Indeed, uninsured Americans are less likely to get preventive screening tests and are more likely to have poor patient-provider communications essential in health awareness (Collins et al., 2006; Menec et al., 2005).

Another potential explanation for these surprising findings, is that people without health insurance were also more likely to be younger adults and therefore in better health. Finally, the lack of differences between uninsured and Canadians or insured Americans may be due to the high correlation between lacking insurance and income (Collins et al., 2006). Additional analyses were conducted and showed that when income was removed from the regression equation, then uninsured Americans reported significantly poorer health compared to Canadians. This finding suggests the important role of income, especially among those not eligible for Medicaid, in explaining the variability in health of uninsured person. Therefore, the complexity of the uninsured group may explain these unexpected results. Consequently, the results concerning the uninsured must be examined with caution.

In summary, the findings indicated that insured Americans had lower HUI3 and self-rated health scores and reported having more chronic conditions and functional limitations than Canadians. Furthermore, insured Americans had poorer health habits than Canadians, excluding smoking. The next question further examined whether insurance coverage impacts health across the life span.

III.3. What is the Impact of Universal Health Care on Health at all Ages?

This research question investigated whether the health differences between Americans and Canadians existed across the life span by comparing the two populations at various age groups (18-44, 45-64). For the analyses investigating this question, HUI3 and self-rated health were used as the outcome variables. The differences in health status between Canadians and Americans were examined using separate multiple linear regression models for each age group (18-44 and 45-64).

The results showed that there were no significant differences between young adult Canadians (18 - 44) and insured Americans on HUI3 or self-rated health scores. Furthermore, the findings revealed that insured middle-aged Americans (45 - 64) had lower HUI3 and self-rated health scores than middle-aged Canadians (M = .85 vs. M = .89, $p = .052$; and M = 2.57 vs. M = 2.66, $p < .001$; respectively). Findings are presented in Tables 26 and 27.

Table 26

HUI3 (n = 3,828) and Self-Rated Health (n = 3,879) Among People 18-44

	HUI3	Self-Rated health
	b (SE)	b (SE)
Uninsured Americans	-0.007 (0.01)	-0.177 (0.07)**
Insured Americans	-0.002 (0.01)	0.015 (0.03)
Men	0.013 (0.01)	0.095 (0.04)*
< 12 years of education	-0.086 (0.02)***	-0.343 (0.08)***
White	0.005 (0.01)	0.175 (0.05)***
Lower middle income	0.037 (0.02)*	0.175 (0.08)*
Middle income	0.061 (0.01)***	0.283 (0.08)***
Middle higher income	0.067 (0.01)***	0.387 (0.08)***
Highest income	0.078 (0.01)***	0.427 (0.08)***
Missing (income)	0.046 (0.02)**	0.183 (0.08)*
R^2	5.9%	7.3%

Note. Referent category included Canada, women, ≥ 12 years of education, and lower income. *$p < .05$. **$p < .01$. ***$p < .001$.

Table 27

Self-Rated Health (n =2,665) and HUI3 (n = 2,605) Among People 45-64

	Self-Rated health b (SE)	HUI3 b (SE)
Uninsured Americans	-0.031 (0.11)	-0.049 (0.03)
Insured Americans	-0.094 (0.05)[m]	-0.039 (0.01)***
Men	-0.044 (0.05)	0.004 (0.01)
< 12 years of education	-0.479 (0.10)***	-0.066 (0.03)*
White	0.165 (0.07)*	-0.013 (0.01)
Lower middle income	0.519 (0.11)***	0.110 (0.03)
Middle income	0.661 (0.11)***	0.160 (0.03)***
Middle higher income	0.907 (0.10)***	0.176 (0.02)***
Highest income	1.056 (0.10)***	0.206 (0.02)***
Missing (income)	0.704 (0.10)***	0.132 (0.03)***
R^2	13.7%	10.3%

Note. Referent category included Canada, women, ≥ 12 years of education, and lower income. *$p < .05$. **$p < .01$. ***$p < .001$. [m]$p = .052$.

In summary, among insured Americans, respondents between ages 45 and 64 had lower HUI3 scores than Canadians. It is noteworthy that younger Americans did not differ in their health status from Canadians.

Summary of the findings from the first three research questions

The findings from these first three research questions revealed that (1) older Americans were in poorer health than older Canadians, (2) the Canadian population was healthier than the American population, (3) insured Americans reported poorer health than their Canadian counterparts, and (4) middle-aged insured Americans were also in poorer health than Canadians of the same age.

Based on these findings, it appears that the health of older Americans may be poorer because of improper health care throughout their life. Since insured Americans were in poorer health than Canadians in middle adulthood (45-64), the poorer health of older Americans could be attributed to the coverage gaps that they may have faced in their younger years, rather than to the health care access inequalities of Medicare. In addition, it is unclear if the potential health benefits of Medicare are comparable to the positive effect of having universal coverage throughout the life span. Having secure coverage via Medicare should be better than fluctuating health insurance. As some proposed to extend Medicare to younger age groups, it is unknown whether extending Medicare would contribute to the better health of older adults and reduce or eliminate the differences observed between older Canadians and Americans. Thus, the next section explored what would be the effect of extending Medicare to the near-elderly persons using longitudinal data.

III.4 Does health insurance prior to Medicare coverage affect the health of Medicare beneficiaries?

To further examine the importance of health care coverage in later life, the present study investigated: (1) whether the change in self-rated health prior to and after Medicare enrollment differed; and (2) whether the change in self-rated health over time varied depending on the respondent's insurance status prior to the Medicare eligibility age, after controlling for gender, marital status, education, race, BMI, alcohol use, smoking status, and physical activity. The Health and Retirement Survey 1992 to 2002 was used for these analyses.

A multi-group piecewise latent growth model was used to examine the differences in growth trajectories between 1992 and 2002 among insured (N = 3,443) and partially uninsured (N = 895) individuals. Partially uninsured persons were defined as participants who were uninsured at least once over the course of the study. A series of models estimated whether the change in self-rated health prior to age 65 significantly differed from the change in self-rated health after age 65 and whether partially uninsured individuals significantly differed from insured individuals. The "baseline model", which allowed for different estimates of change for the periods before and after age 65 and differences between the two insurance groups, was compared to a series of subsequent models that imposed equality constraints using chi-square difference tests to determine significance (Bollen, 1989). Overall results from

the baseline model will be presented first, followed by the difference tests comparing the insured and partially insured groups.

Baseline model

Findings from the baseline model (shown in Figure 3) revealed that after controlling for the possible confounding variables, in 1992 respondents between 55 and 64 with insurance rated their health as good on average ([mean] $\alpha = 3.46$, on a scale of 1 to 5). Also, self-rated health scores differed significantly across individuals ([variance] $\psi = .66, p < .001$). In other words, in 1992, the respondents' self-rated scores in 1992 varied on average by .66 points around the mean.

Furthermore, there was a significant decrease in health over time prior to reaching Medicare eligibility age ([slope] $\beta_{pre65} = -.05, p < .001$) and after reaching that age ($\beta_{post65} = -.07, p < .001$). In other words, for every year between the age of 55 and 64, self-rated health decreased .05 points, on average, and for every year from 65 and over, self-rated health decreased .07 points, on average. In addition, among individuals with insurance, prior to Medicare and after Medicare eligibility, the decrease in self-rated health significantly varied across individuals ($\psi_{pre65} = .01, p < .001$, $\psi_{post65} = .02, p < .001$; respectively).

Similarly, among the partially uninsured group, in 1992, individuals 55 to 64 rated their health, on average, as good ($\alpha = 3.38$). The average health varied significantly across individuals ($\psi = .79$, $p < .001$). Furthermore, the results showed that prior to reaching Medicare eligibility age, partially uninsured individuals

experienced a decrease in self-rated health over time (β_{pre65} = -.07, p < .001), varying across respondents (ψ_{pre65} = .03, p < .001). In other words, as partially uninsured respondents aged from 55 to 64 years old, their self-rated scores decreased .07 points per year. After 65 years of age, however, this group did not exhibit a significant decline over time, suggesting that health stabilized after the age of 65 (β_{post65} = -.04, ns). This non-significant decline varied across individuals (ψ_{post65} = .04, p < .01). A summary of the findings for the baseline model is presented in Table 28. Findings from the control variables are available in Appendix G.

Figure 3. Change in Self-Rated Health over Time Among Insured and Partially Uninsured 55+.

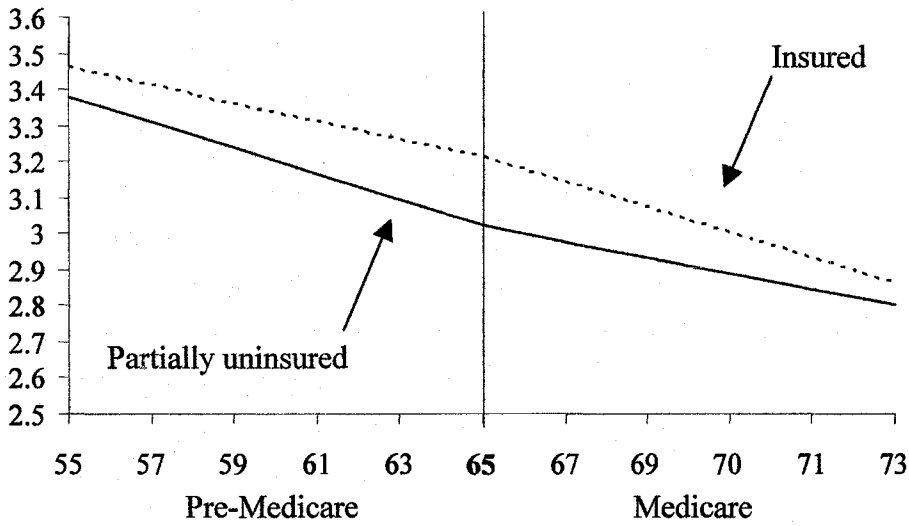


Table 28

Baseline Multi-Group Piecewise Growth Latent Model Results

	Coefficient[a]	SE	P-value
Insured Near-Elderly			
Intercept mean, α	3.46	.03	.001
Slope 1, β_{pre65}	-.05	.01	.001
Slope 2, β_{post65}	-.07	.01	.001
Intercept variance, ψ	.66	.03	.001
Slope 1 variance, ψ_{pre65}	.01	.002	.001
Slope 2 variance, ψ_{pre65}	.02	.003	.001
Partially Uninsured Near-Elderly			
Intercept mean, α	3.38	.07	.001
Slope 1, β_{pre65}	-.07	.02	.001
Slope 2, β_{post65}	-.04	.04	ns
Intercept variance, ψ	.79	.05	.001
Slope 1 variance, ψ_{pre65}	.02	.01	.001
Slope 2 variance, ψ_{pre65}	.04	.01	.01

Note. Model adjusted for gender, marital status, race, education, smoking status, alcohol use, BMI, and physical activity

[a]unstandardized coefficient

The baseline model showed that the two insurance groups had different self-rated health scores in 1992 and different trends over time. To determine if these observed differences were significant, however, it was necessary to compare models by setting various estimates to be equal in each group and comparing the fit of the models using chi-square difference tests. For example, the fit of a model[6] in which the mean for self-rated health in 1992 was set equal in the two insurance groups group was compared to the fit of the baseline model which allowed means to be different in the two groups.

Group differences in the means of self-rated health

In order to determine if the mean self-rated health (measured in 1992) differed significantly between insured and partially uninsured respondents, the baseline model was compared to a model in which the means of self-rated health were constrained to be equal in both groups (model 2). The model statistics, presented in Table 29, indicated that the mean of self-rated health in 1992 was different between the groups ($\chi^2_{difference} = 55.35, p < .001$). In other words, individuals with insurance rated their health as higher compared to people who were partially uninsured ($\alpha_{insured} = 3.46$ vs. $\alpha_{uninsured} = 3.38$).

[6] The variance of self-rated health was set to be equal across groups in the baseline model to achieve convergence.

Group differences in the pre-Medicare decline in health

Next, the change overtime in self-rated health prior to Medicare eligibility age was constrained to be equal in each group in order to assess whether the decline in health among individuals 55 to 64 years old was the same in both groups (model 3). The results showed that the change in self-rated health prior to Medicare enrollment was also different across groups ($\chi^2_{difference} = 20.10, p < .001$). The health of respondents without full coverage decreased more rapidly over time than the health of respondents with full coverage ($\beta_{pre65(insured)} = -.05$ vs. $\beta_{pre65(uninsured)} = -.07$).

Group differences in the post-Medicare decline in health

To identify whether the post-Medicare decline in self-rated health among the insured individuals was different from the post-Medicare decline in health among partially uninsured individuals, the baseline model was compared to the model constraining the estimates of the post-Medicare change over time to be equal across the two groups (model 4). Notably, the difference in the change of self-rated health between insured and partially uninsured individuals was not significant after reaching Medicare eligibility age ($\chi^2_{difference} = <1$, ns).

Difference between pre- and post-Medicare decline in health

To determine if the decline in health prior to age 65 was different from the decline in health after age 65, the changes in self-rated health in each period (prior to and after Medicare enrollment) were set to be equal in each group (model 5). Among

the insured group, the decline in health when one reaches Medicare eligibility age was significantly different from the decline in health before Medicare enrollment ($\chi^2_{difference} = 48.52$, $p < .001$). As insured individuals reached Medicare eligibility age, their self-rated health decreased more rapidly than prior to reaching that age ($\beta_{pre65} = -.05$, $\beta_{post65} = -.07$).

Among the partially uninsured group (model 6), the change in health prior to Medicare enrollment was also significantly different from the change in health after enrollment ($\chi^2_{difference} = 35.07$, $p < .001$). The health of individuals without health coverage stabilized when they reached Medicare eligibility age ($\beta_{pre65} = -.07$, $\beta_{post65} = -.04$).

Table 29

Model Fit Comparison Using Chi-Square Test.

Model	χ^2	χ^2_{diff}	*p*-value
Baseline Model[a]	32169.59		
Model 2	32117.89	-55.352	.001
Model 3	32197.05	20.10	.001
Model 4	32169.92	0.27	Ns
Model 5	32249.84	48.52	.001
Model 6	32222.54	35.07	.001

Note. χ^2_{diff} = Chi-square difference between baseline model and each following model. Degree of freedom (df) for baseline model equal 143. df for model2 through 6 equal 144.

In summary, as expected, the findings revealed that individuals in their late 50s without health coverage are in poorer health than those with health insurance, and their health decreases more rapidly over time than for insured people. When uninsured individuals became eligible for Medicare, their health stabilized over time, whereas the health of insured near-elderly continued to decline.

IV. DISCUSSION

With aging comes health degeneration, greater demands for health services and medications, and therefore, rising health expenditures. Facing the reality of an aging population with health care needs, it is projected that Medicare spending will rise from 2.6 to 9.2% of the gross domestic product in 2050 (Cutler, 2005) and that the population over 65 will nearly double by the year 2030 (Wan et al., 2005). As a result, the growth of the elderly population and the continuous rise of health care spending have generated discussions regarding the sustainability of health care systems (Reinhardt, Hussey, & Anderson, 2004; Bodenheimer, 2003; Begley, Aday, Laison, & Slater, 2002). In 2004, the Institute on Medicine studied the relationship between health care and health outcomes and recommended that health care needed to be universal. Universal health care systems such as the Canadian system have been associated with lower health care spending, diminished health inequalities, higher quality of delivery of care (Blendon et al., 2002; Anderson et al., 2001). Yet, little is known about the impact of universal coverage on health status in late life. The present study addressed this research gap by first examining the health differences between Canadian and American elderly persons; second, by investigating the impact of health care on health at several age groups; and third, by simulating the role of universal coverage on health.

IV.1. Summary of the Findings

Older Canadians vs. Older Americans

The results revealed that older Canadians (65 and over) were in better health, had fewer chronic diseases and functional limitations, and were less likely to be sedentary and obese than older Americans of the same age. These findings are consistent with other studies showing that Canadians have better health outcomes than Americans (Schoen et al, 2000; Roos, Fisher, Brazauskas, Sharp, & Shapiro, 1992). Schoen and collaborators (2000) found that a higher percentage of older Americans reported poorer self-rated health than Canadians. Roos and colleagues (1992) also showed that Canadians had lower pre-surgical comorbidity and higher survival rates to surgical interventions. The findings from the present study contradict previous research that found no differences between the two countries in the prevalence of chronic conditions (Schoen et al., 2000) and no differences in self-rated health (Sanmartin et al., 2003).

It is noteworthy that these previous studies did not adjust for potential confounders as the current study did. The current study showed that health differences between older Canadians and Americans persisted even after controlling for socioeconomic factors, race, and gender. This finding is important because various studies have found that race/ethnicity, income (Michalski & Nattinger, 1997), and gender (Rathore et al., 2000; Michalski & Nattinger, 1997) were associated with health disparities among the U.S. older population. For instance, research shows that

non-whites had greater difficulties accessing care (Dunlop, Manheim, Song, & Chang, 2002; Cooper, Yuan, Landefeld, and Rimm, 1996), had poorer surgical outcomes (Cooper et al., 1996) and treatments (Rathore et al., 2000) than whites. Therefore, the observed health differences between older Canadians and Americans are the consequences of other factors.

Health care system

It is conceivable that the health differences between the two countries are the result of the differences in health care systems. That is, U.S. Medicare may generate health disparities between Medicare beneficiaries via various coverage gaps. For example, in 2002, Medicare covered 45% of the beneficiaries' total health care services (Kaiser Family Foundation, Health Research, & Education Trust, 2005). To compensate for the coverage gap, Medicare recipients enrolled in supplemental health insurance schemes such as Medigap plans, insurances from former employers, or Medicaid. Clearly, not every elderly person is able to afford supplemental insurances, nor meet the eligibility criteria of Medicaid. Wan, Sengupta, Velkoff, and DeBarros (2005) showed that 63.1% of elderly are enrolled in supplemental insurance, 7.6% are covered under Medicaid, and 26.7% do not have supplemental insurance. Research showed that those who had Medicare only were more likely to delay their care and medication treatment than those with any supplemental insurance, suggesting difficulties in accessing care in late life because of the cost of care (Wan et al., 2005; Stuart & Grana, 1998).

Health care utilization

The present study showed that elderly Americans were less likely to have a regular doctor than their Canadian counterparts. Having a regular doctor becomes critical in older age to treat and assist in the management of increasing health problems. It is important to note that Elderly Americans are more likely to see specialists as their regular care provider than Canadians are (Mojtabai & Olfson, 2006; Schoen, et al., 2004). According to Mojtabai and Olfson, Canadians were more likely to seek mental health treatment from a family doctor or a general practitioner while Americans were more likely to see a psychologist or psychiatrist. Therefore, the prevalence of older Americans with a regular doctor in the present study may be lower because American elderly see more specialists than Canadians. The differences in the choice of care providers between the two populations may also influence the differences in health outcomes. Primary care as opposed to specialist care offers a holistic view of the patient health. In contrast, specialist care may only focus on different aspects of the patient's health condition. Several studies have shown that primary care, as opposed to specialist care, was associated with identical or better health outcomes and lower health care expenditures. For instance, Franks and Fiscella (1998) found that individuals using primary care had a 33% lower annual mortality rate than those using specialty care. In addition, several studies have shown that primary care was associated with fewer documented diagnoses (Franks & Fiscella, 1998; Rosser, 1996) and prescribing fewer medications (Ayanian et al., 1994).

Chronic care

Another potentially serious consequence to the partial coverage in the U.S. system is that older Americans with health problems (chronic conditions and functional limitations) reported lower health-related quality of life than their Canadian counterparts. Elderly with chronic conditions are in need of frequent contact with physicians, expensive medications and treatments, and possible hospital stays, to manage their diseases. Medicare expenditures among the elderly in poor health can be two to four times higher than the elderly who are in good health and these expenditures are mostly due to medication expenses. Considering that 70% of elderly Canadians and Americans rely on medications (Schoen et al., 2000), the importance of drug coverage is essential to their well-being (Mojtabai & Olfson, 2003). Elderly Americans with health problems may be in poorer health than Canadians because of the differences in prescription drug coverage between the two countries. That is, prior to Medicare part D, older Americans were less likely to have drug coverage than Canadians (Donelan et al., 2000). In Canada, nearly all elderly have generous drug coverage for most medications at low or no cost (Morgan, Barer, & Agnew, 2003). In contrast, in the United States, with the newly implemented Medicare Part D, when beneficiaries reach an annual drug cost between $2,250 and $5,100, they must pay 100% of their medication costs (known as the "doughnut hole"). Drug-benefit caps are implemented as a cost-containment strategy. Even though this technique may be efficient in preventing overuse, it may also create a barrier to care and penalize those in poorer health requiring medication treatment (Hsu et al., 2006). Because Medicare

Part D was not implemented at the time of the survey, it is unknown how this new benefit will affect the health differences between elderly Canadians and Americans; however, it could be expected that the above mentioned "doughnut hole" associated with Part D is likely to increase the differences observed between the two countries. Policy makers need to be attentive to the problem surrounding the affordability of Medicare drug coverage and the potential detrimental effects on health management of chronic diseases.

In addition, Roos and colleagues (1992) suggested that Canadians have greater access to primary and long-term care than U.S. older persons. Elderly persons with chronic conditions are more likely to be hospitalized. Post-hospitalization care in nursing home facilities or at home is an essential part of chronic care. In Canada, long-term care does not have a time limit and is free of charge or with small copayments depending on the province policy (Roos et al., 1992). In contrast, under Medicare, long-term care in nursing facilities is free of charge for the first 20 days, $119 up to 100 days, and 100% of the cost afterwards. Although the present study did not investigate the importance of long-term care, the findings suggest that chronic care in Canada may ensure better health-related quality of life than in the United States.

The role of health care in population health

To further examine the role that health care may play in the health of older adults, the present study examined the differences between the Canadian and American populations at all ages. The findings showed the Canadian population

reported better health, had a healthier life-style, and had greater access to regular care than the American population. These findings support previous research showing that the Canadian population reported better self-rated health and access to care (Lasser, Himmelstein, & Woolhandler, 2006; Kaplan et al., 2004) than the American population. For instance, Lasser and collaborators found that Canadians were less likely to have chronic conditions, be obese, and sedentary than their American counterparts. Similarly, Kaplan and colleagues showed that starting at age 30, the prevalence of Americans reporting poor self-rated health was greater than that of Canadians and Europeans of the same age. Both studies noted that universality and equal access to care may explain the differences in health status between the two populations. Nonetheless, these studies did not account for potential confounders such as socioeconomic or demographic indicators. As Evans and collaborators (1994) argued multiple factors contribute to a person's wellbeing. They noted that medical care is important in the management of disease; however, other factors, specifically socioeconomic status, may have a greater influence on wellbeing. Interestingly, the present study shows that the health differences between Canadian and American populations remained even after controlling for socioeconomic indicators measured at the individual level. This finding may reflect the potential role of the health care system in ensuring population health.

Canada vs. insured Americans

The current study also investigated the health differences between Americans with insurance and Canadians at all ages. The results showed that Americans with

health insurance reported poorer health status, more chronic conditions and functional limitations, and more unhealthy lifestyles such as lacking exercise and being obese. This finding implies that having health insurance in the United States may not guarantee better health. To my knowledge, this is the first study to examine health differences between Canadians and insured Americans controlling for socio-demographic factors.

In view of these findings and of the potential role of health care in shaping these results, the present study went further by exploring the health differences between the two countries at various age groups. The results revealed that there were no health differences between the two countries among younger age groups (18-44) but insured middle-aged American adults (45-64) reported poorer health than their Canadian counterparts. It is conceivable that the absence of differences between insured young Americans and young Canadians is the result of being young and healthy, and, therefore, having fewer medical needs. In contrast, Middle-aged individuals (45-64) are faced with increasing health-related issues and greater medical care needs, both resulting in higher out-of-pocket expenditures (National Center for Health Statistics, 2005). In contrast with middle-aged Canadians, middle-aged Americans are exposed to variability and discontinuity in health coverage. In other words, middle-aged Americans may face various periods without health insurance and have different benefit packages when they do have health coverage (Sudano & Baker, 2003). This variability in coverage may be the consequence of changes in employment or health conditions. For instance, individuals are likely to have many jobs throughout

their life. In most cases, changing jobs will result in losing coverage for variable periods of time, and could imply changes in benefits covered, premiums paid, copay, or deductibles (Kapur, 1998). In contrast, middle-aged Canadians do not face periods without health insurance regardless of their employment situation or health conditions. Because lack of coverage has been shown to have detrimental effects on health (IOM, 2003), it is conceivable that the variability in health insurance influences the health disparities between middle-aged Americans and Canadians. Clearly, health policies need to address the problem of portability in coverage from job to job to ensure stability of coverage throughout life.

Moreover, variability in out-of-pocket expenses is potentially harmful for both Americans health and their financial situations (IOM, 2001; Himmelstein, Warren, Thorne, & Woolhandler, 2005). Nevertheless, the present study controlled for income, which could potentially attenuate the impact of out-of-pocket expenses on health. However, adjusting for income may not account for the consequences out-of-pocket spending on health care utilization. For instance, there is evidence that high out-of-pocket expenditures are barriers to health care. A Commonwealth Fund report showed that 17% of insured families with high expenditures reported unmet health care needs because of deductibles and copayments (Merlis, Gloud, & Mahato, 2006; May & Cunningham, 2004). It would be interesting to know if the health differences between the two populations would persist if out-of-pocket expenditures were controlled.

In summary, this finding implies that because Americans may face a lack of stable, equal, and affordable health coverage throughout their adulthood, Americans

may age in poorer health than their Canadian counterparts, thus, entering old age with a health disadvantage that is likely to contribute to the observed differences between the elderly populations.

What would be the effect of extending Medicare to near-elderly persons?

To this point, the argument has been made that the U.S.-Canada health differences observed among insured middle-aged Americans and among older Americans may be due to the health care system differences. That is, Canadians may be in better health because of the availability of secure and stable basic health care throughout the life span. In contrast, variability in availability and affordability of health insurance, in the United States throughout one's life may be conducive to poorer health. These findings imply that the Canadian health care system might be better suited to promote healthy aging and population health than the United State's mixed system.

Nonetheless, the cross-sectional nature of the data only allows for speculation. Hence, the present study further explored the role of "universal" health care coverage in late life using longitudinal analysis. Using U.S. Medicare as a model for "universal care", the present study further explored the effect of providing "universal" health care by examining the health trajectories of near elderly persons (55 to 64) as they entered Medicare.

This analysis adds to the Canadian-U.S. comparison. First, the present study showed that older Americans were in poorer health than older Canadians. Second, this

study clearly showed that the health differences between the two countries appears earlier in life suggesting that Americans may age in poorer health than Canadians. Therefore, the role that U.S. Medicare may play in the health differences between the two older populations is unclear. Consequently, determining if U.S. Medicare reduces the health inequalities among beneficiaries is important in understanding the impact of universal health coverage on health in late life.

Thus, comparing the change in health of insured and partially uninsured individuals before and after Medicare eligibility age provides some basis for speculation about the impact of a program that would provide universal coverage to the near elderly. The results from the longitudinal analysis, which followed individuals over a 10-year span, indicated that the decline in health of uninsured near elderly stabilized after reaching Medicare eligibility. As observed with the U.S.-Canada comparison, this finding suggests that availability of universal coverage at younger ages (55 to 64), which could be achieved by extending Medicare coverage, is likely to show benefits for the health of older adults.

It is conceivable, however, that the decline in health stabilized because after reaching the age of 65, elderly persons receive both Medicare and Social Security, therefore, potentially reducing the health disparities and poverty in late life (Eichner & Vladeck, 2005). It could be argued that because of Social Security, socioeconomic disparities within the elderly population are reduced and thus the ill-effect of socioeconomic differences is also reduced. Nonetheless, the present study adjusted for income from Social Security; therefore, the impact of social disparities on the health

differences should be minimized, implying that Medicare coverage may reduce health disparities in late life by providing health care access to all.

It is also possible that the decline in the health status of uninsured near-elderly persons stabilized after Medicare just because having some health coverage is better than having none. As Lichtenberg (2002) pointed out, once Medicare is accessed, elderly persons increase their consumption of health services such as physician and hospital care, potentially contributing to the high health expenditures of Medicare. He also determined that one of the primary reasons for this growth in health care utilization was that near-elderly persons postponed the use of these services until receiving Medicare. In addition, the decline in health may stabilize because previously uninsured near-elderly persons are receiving preventive care. Evidence suggests that uninsured individuals are less likely to receive preventive care (Ayanian et al., 2000; DeVoe, Fryer, Phillips, & Green, 2003; Adams, Florence, Thrope, Becker, & Joski, 2003) than insured persons. In later life, screening for hypertension, cholesterol, diabetes, and cancer is essential in preventing disease, detecting and treating conditions, and substantially reducing morbidity or mortality (Eisenberg & Douglas, 2001). Thus, the observed decline in the health status of elderly persons who were uninsured prior to becoming Medicare beneficiaries may stabilize because they are receiving the primary and preventive care they delayed but needed.

Other factors

Nonetheless, although the present study is focused on health care, the possibility that other factors could influence the health differences between Canadians and Americans among middle-aged and elderly persons should not be overlooked. For example, the health disparities between the two countries could be the result of the differential effect of social inequality on health. Although adjusting for income at the individual level may account for some of the inequality, it is far from a perfect measure of social inequality. The United States has greater economic disparities than Canada. In addition, several studies have shown that the unequal distribution of income affects health differently in Canada and the United States (Ross et al., 2000; Gorey et al., 2003). That is, there is a relationship between social inequality and mortality in the United States but not in Canada.

Furthemore, social inequality has been associated with social capital (Kawachi, Kennedy, Lochner, & Prothrow-Stith, 1997). Social capital refers to civic participation, trust in others, and participation in social organization. Higher levels of social inequality are related to lower investment in social capital (Kawachi et al., 1997). Kawachi and colleagues examined the relationship between income inequality, social capital, and mortality. They found that lack of investments in social capital mediated the relationship between income inequality and mortality. Another study has shown a negative relationship between income inequality and social trust (Marmot, 2002; Brehm & Rahn, 1997). In return, low social trust can lead to low civic engagement (Putman, 1993). Therefore, the United States with greater income

inequality is more prone to have lower levels of social capital, trust in government, and civic engagement. Canadians on the other hand are more supportive of their government choices (Lispet, 1900). In Canada, greater social capital may contribute to higher investment in social infrastructures such as health care and ultimately better population health.

IV.2. Implications and Recommendations

The findings from the present study provide further evidence of the importance of universal health care coverage on health and have implications for policy makers who are developing health care reforms. Future health care reforms should consider coverage for all, reducing coverage gaps, controlling costs and affordability for all in order to meet health care needs.

Coverage to all

First, the findings of the current research suggest that universal care ensures better health. That is, the Canadian health care system leads to better population health than the U.S. system. In addition, Medicare also appears to reduce health inequalities among Medicare recipients. Therefore, this study suggests that providing coverage to all would benefit the health of older adults. Policy makers should center their efforts around ensuring universality of care. Various strategies aimed at redressing uninsurance such as tax credits, mandatory insurances, extending current health programs, or implementing a single-payer system (IOM, 2004) have been suggested.

The results from the present study do not provide evidence to support which strategies would be most effective in covering all Americans. It can only suggest that extending programs such as Medicare or implementing a single-payer system would improve the health of those currently without coverage.

Coverage gaps

Although providing coverage to all is needed, it would not be sufficient to ensure better health in late life. The present study showed that both elderly Americans and middle-aged Americans were in poorer health than their Canadian counterparts despite having coverage suggesting that the availability of Medicare or private insurance in the United States is not sufficient. Based on this evidence, what appears to be needed are health care policies oriented toward eliminating or reducing the coverage gaps not only in late life but also throughout the life span.

Cost control

More efforts are also needed to control the cost of health care thereby ensuring affordability to all as well as sustainability of the health care system. For example, the lack of control over Medicare cost may lead to increasing out-of-pocket expenses and reduced benefits (Hsu et al., 2006). This is especially important for elderly and near-elderly persons with chronic health conditions. The present study also showed that American elderly with chronic conditions and functional limitations reported lower health-related quality of life than their Canadian counterparts. This finding suggests

that chronic care in Canada is more efficient in ensuring health-related quality of life than in the United States. The out-of-pocket cost from prescription drugs and specialist care can be detrimental for patients with chronic conditions, implying that affordable care could be a positive step toward providing better chronic care to Americans. Therefore, keeping health care affordable is clearly important in ensuring better health in the elderly. One strategy that could help with cost control would be to emphasize primary care use as opposed to specialty care.

Moreover, the current study suggests that extending Medicare to persons 55 and older would benefit the health status of those who are uninsured. It might also reduce Medicare health expenditure. A recent study simulated the implications of covering the uninsured near-elderly persons on health spending (Hadley & Waidmann, 2006). The authors determined that if the near-elderly uninsured persons had insurance until they received Medicare, the total Medicaid and Medicare health spending for the new beneficiaries would be reduce. This result implies that receiving health coverage (through Medicare) may contribute to reducing the national health care spending. It also would improve the future of sustainability of the system.

Affordability

Ensuring affordable care is also necessary to contribute to better health in late life. As seen previously, coverage gaps, associated with Medicare or experienced earlier in life, are most certainly generating health disparities. These disparities exist because the cost of care creates access difficulties. Much attention has been focused

on the problem of affordability of care among the uninsured, but increasing health care costs also affect insured Americans. In 2003, one in seven families reported having difficulties paying for medical care (May & Cunningham, 2004). In addition, bankruptcy from health care bills has experienced a substantial growth (Himmelstein et al., 2005). As employers continue to shift the cost of health care to employees, developing strategies addressing affordability of health care becomes an increasingly salient priority for policy makers to consider.

IV.3. Limitations

There are several limitations to the present study. One limitation is that, in the U.S.-Canada comparison, the health care system was measured using country of residence. This measure may capture other differences, such as disparities in way of life, which are unrelated to the type of health care system. Thus, the findings must be interpreted with caution. In addition, in both the JCUSH and the HRS, details on health insurance plans (such as benefits provided, premiums, or copayments) were not available. As seen previously, these expenditures have been associated with negative health outcomes (Heisler et al., 2004). Nonetheless, as established in the literature, income and health coverage are highly correlated (Collins et al., 2006); hence, controlling for income should capture some of the variability accounted for in the health insurance variability.

Another limitation is that the results observed in the present study may be underestimated due to survival bias. Because on average Americans are 30% more likely to die than Canadians before reaching old age, it is possible that the American survivors are not representative of the population and may be healthier. Moreover, this study cannot account for violent crime (rape and homicide) and AIDS which are more prevalent in the United States than in Canada (Statistics Canada, 2001c). It is likely that externally-caused deaths such as homicide and AIDS in the United States contributes to the survival bias. Nonetheless, the impact of violence on health over time could not be assessed. It is conceivable that the health differences between the two countries could be influenced by the detrimental effect on health of being the victim of violence (Koss, Heise, & Russo, 1994).

Another limitation is the lack of information regarding geographic differences. Although the Canadian health care system is comprehensive, it only covers the medically necessary services. Other important services for elderly persons such as drug coverage, long-term care, dental services, and alternative care are available through provincial government; therefore, there is some variability in the coverage for these services (Naylor, 1999). For instance, Anis, Guh, and Wang (2001) showed that drug coverage vary greatly regarding price, ability-to-pay criteria, or decision concerning the inclusion or exclusion of a medication in the insurance plan. Provincial differences may influence the health of the elderly population in Canada; hence, future research is needed to account for the variability between provinces' coverage when examining healthy aging.

Another limitation is that the JCUSH is a cross-sectional study and does not allow for causal inference, as a result, one cannot determine causal relationships because the respondents were observed only once. Because of this limitation, this study can only provide speculation about the trend in health disparities in the United States and Canada. Nevertheless, this limitation was partially addressed by examining at the impact of health care on health status over time using the HRS. Also, the present study used secondary data. Thus, research questions were limited by the information available within the data, resulting in the exclusion of potentially important confounders. For example, JCUSH lacks information on alcohol use and social support, which are important determinants of well-being and could contribute to the observed health differences between the two countries.

Furthermore, data were self-reported, which could result in under or overestimation of some indicators. For example, overweight people tend to underestimate their weight, while underweight individuals appear to overestimate their weight (Hill & Roberts, 1998). In addition, participants may have provided socially desirable answers such as overestimating their physical activity level and underestimating their smoking habits.

Moreover, the surveys excluded people without telephones and may have resulted in biased population characteristics. The exclusion of these individuals may result in a higher SES sample, which can lead to over-and under-estimation of the estimates. In other words, generalizing to the population may not be accurate because the people without telephones were not included in the analysis. This could have

resulted in the exclusion of many uninsured Americans who may not have had phone service.

Another limitation is the coding pattern used to account for the lack of available data on insurance coverage for each year in the HRS. Respondents who had missing data on health coverage for some of the HRS years and who were included in the analyses may have been misclassified. That is, those belonging to the insured group may have had uninsured periods during the years with missing information. This misclassification could lead to underestimation or overestimation of the effect observed.

Finally, the JCUSH has a low response rate for the United States. Low response rates result in non-response bias; which is the assumption that the non-respondents observed the same characteristics as the respondents. If the assumption is not true then survey estimates will be inaccurate. In addition, the differential in response rates between the two countries may also bias the estimates. That is, since the United States has a lower response rate, the sample may be restricted to higher socioeconomic persons more willing to participate than lower socioeconomic groups, thus endangering the generalizability of the findings to the population. Nonetheless, comparison with the Census data (Census, 2000) shows that the sample is representative of the U.S. population.

IV.4. Strengths

Despite these limitations, the present study has a number of valuable strengths. This study is among the first to investigate the health disparities between older Canadians and Americans using comparable data. Few studies have provided information regarding health differences among elderly populations in the United States and Canada (Schoen et al., 2000; Sanmartin et al., 2003; Roos et al., 1992); however, their interests were centered around health care utilization or on specific aspects of health such as surgery outcomes. The present study showed that despite the Medicare program, health differences between the older Canadians and Americans remained.

Another important contribution is that this study assessed the health disparities between the two countries at several ages, adjusting for factors known to influence health outcomes. In contrast, most studies that have examined the health differences between Canadians and Americans did not adjust for confounders or assessed the population overall as opposed to specific groups (Blendon et al., 2002; Kaplan et al., 2004; Lasser et al., 2006). By examining different age groups, the present study provided a deeper investigation of the health disparities between the two countries, and indicated that Americans appear to be in poorer health than their Canadian counterparts from middle age to older age. Future research examining health disparities between these two countries should consider stratifying by age.

This study is also one of the first to compare the change in health prior to and

after Medicare enrollment based on pre-Medicare insurance status using longitudinal data. After determining that older Americans were in poorer health than their Canadian counterparts, this study went further by examining the impact of Medicare's "universal" health coverage on health. There is limited evidence about what happens to uninsured Americans once they receive Medicare and most of this research is focused on health care utilization as opposed to health status (Sudano & Baker, 2003). Using longitudinal data, the present study compared the health trajectories of insured and uninsured Americans once they became Medicare eligible and concluded that Medicare reduces health inequalities in late life.

IV.4. Future Research

Although this study complements the research examining the impact of health care on health, it also points to unanswered research questions. First, additional research is needed to determine how the variability in health insurances in the United States influences the observed health differences between Americans with health coverage and Canadians. That is, future research comparing different benefit packages and/or adjust for out-of-pocket expenditures in the United States could provide additional information regarding health disparities between the two countries.

Moreover, longitudinal analyses would better capture the health effect of a health care system over time. The present study lacks information on earlier life experiences dealing with health care access difficulties and previous health status or

conditions. Additional longitudinal analyses comparing the health trajectories of Canadians and Americans since birth would be essential to understanding the long-term effect of the two health care systems. Future studies could provide further information on the potentially detrimental aspect of coverage gaps. For example, does the lack of health care from coverage gaps influence health negatively more than the out-of-pocket expenditures generated from the lack of coverage or inversely?

In addition, using longitudinal designs, future studies could estimate the impact of health coverage instability on the health trajectory of those who may die in the United States before reaching old age, thus, estimating the impact of survival bias. For example, using Canada as a control for health care coverage, a study could follow Canadians and Americans with similar characteristics at various age groups over time. Assuming that such a study would control for many health determinants such as demographic, socioeconomic, lifestyle, and physical environment, this future study could reveal causal patterns between health coverage gaps or expenses and mortality.

In conclusion, the present study follows previous examinations, which argue that a universal health care system is a more efficient means of contributing to population health. Although not perfect, the Canadian system appears to ensure better population health than the U.S. system at all ages. The present study suggests that health care coverage is important but that having coverage alone is not enough; having stable and uniform coverage is what truly matters. This research offers a number of important and novel findings which could provide incentives for future research. In

addition, the findings of this research have the potential to lead to the development of health care reforms aimed at improving health care access for all and in doing so, guarantee a greater quality of life among the growing elderly population.

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Appendix A: Medicare Benefits and Rules, 2006

Services	Rules
Part A	
Hospital: semiprivate room, meals, general nursing, and hospital services and supplies. Inpatient mental health care in a psychiatric facility up to 190 days (lifetime).	1 - 60 days = $952 61 - 90 days = $238 daily 91 - 150 days = $476 daily > 150 days = all costs
Skilled Nursing Facility Care: semiprivate room, meals, skilled nursing and rehabilitative services, and other services and supplies	0 - 20 days =no cost 21 - 100 days= $119 daily > 100 = all costs
Home Health Care: part-time or intermittent skilled nursing care and home health aid services, physical therapy, occupational therapy, and speech-language pathology. Includes medical social services, durable medical equipment, medical supplies, and other services.	No cost for services 20% of durable equipment
Hospice care is for terminal illness and includes drugs, medical and support service	No cost
Blood refers to the blood during hospital stay or skilled nursing facility stay	No cost for first 3 pints then 20%
Part B	Monthly premium of $88.50, $124 deductible
Physician services except routine exams	20% co-pay
Outpatient medical and surgical services and supplies	20% co-pay
Diagnostic tests, ambulatory surgery center facility fees for approved procedures, durable equipment	20% co-pay
Outpatient mental health care	50% co-pay
Outpatient occupational and physical therapy	20% co-pay
Clinical laboratory services	No cost
Home Health Care: part-time or intermittent skilled nursing care and home health aid services, physical therapy, occupational therapy, and speech-language pathology. Includes medical social services, durable medical equipment, medical supplies, and other services.	No cost
Outpatient hospital services refers to hospital services and supplies received as part of a doctor's care	20% co-pay

Appendix A. Continued

Blood refers to the blood during hospital stay or skilled nursing facility stay	Free for first 3 pints then 20%
Preventive services including bone mass measurements, cardiovascular screening, colorectal cancer screening, diabetes screening, flu shots, glaucoma test, hepatitis B shots, pap test and pelvic exam, pneumococcal shot, prostate cancer screening, mammogram screening	20% of durable equipment
Part C	Premium and co pay are based on the plan chosen
Health Maintenance Organization Plans: Primary care doctors, specialists, hospital stay specified	Providers must be part of the Medicare plan. Referral needed for specialist
Preferred Provider Organization Plan: Primary care doctors, specialists, hospital stay	Providers are specified by the plan and accept Medicare patients. No referral needed for specialist
Special Needs Plans: not available in all areas	Specific to people with some conditions, institutionalized
Private Fee-for-Service Plans: Primary care doctors, specialists, hospital stay	Providers approved by the private company plan
Medicare Cost Plans: Not available in all areas	Follow HMO rules
Part D	Drug coverage is based on the current plan
Standard coverage	$32 monthly premium, $250 yearly deductible, 25% co-pay of $250-$2,250 yearly drug costs, 100% of the next $2,850 of drug cost, 5% of drug cost for the rest of the year after spending $3,600 out-of-pocket.
Major needs not covered by Medicare	Dental, eye, hearing, and foot care

Source: Medicare and you 2006 Handbook, Center for Medicare & Medicaid Service, 2006.

Appendix B: List-Wise Deletion Method vs. Including Missing as a Category

	List-wise deletion (n^a = 1,201)	Missing as category (n^a = 1,690)
United States	-0.038 (0.02)*	-0.042 (0.02)**
Men	-0.012 (0.02)	-0.013 (0.02)
< 12 years of education	-0.088 (0.03)**	-0.114 (0.02)***
White	0.042 (0.03)	0.033 (0.02)
Lower middle income	0.029 (0.03)	0.028 (0.03)
Middle income	0.095 (0.03)***	0.092 (0.03)**
Middle higher income	0.110 (0.03)***	0.105 (0.03)***
Highest income	0.118 (0.04)**	0.113 (0.04)***
Missing (income)	NA	0.046 (0.02)
Married	-0.029 (0.05)	0.031 (0.04)
Widow/divorced/separated	-0.087 (0.05)	-0.023 (0.05)
R^2	9.7%	8.9%

Note. Referent categories included Canada, women, ≥ 12 years of education, non-white, lower income, never married. HUI3 was used as the outcome variable.

[a]sample of older people 65 and older in the JCUSH

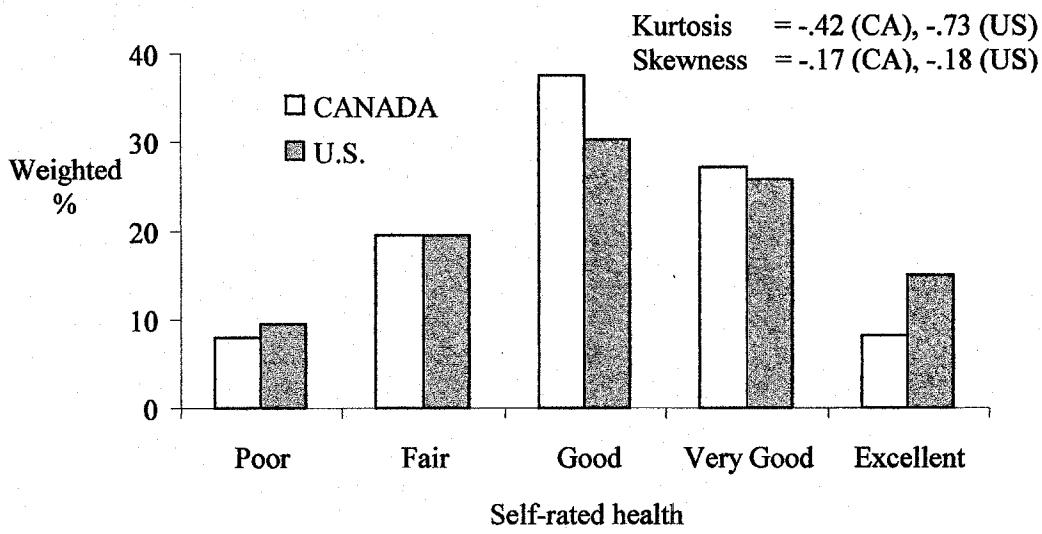
Appendix C: Distribution of Missing Information

	Sample size	Cumulative percentage
Complete data at all waves	1,347	19.5
Information missing for one wave	2,759	59.0
Information missing for two waves	1,341	78.3
Information missing for three waves	695	88.2
Information missing for four waves	608	97.0
Information missing for five waves	212	100.0

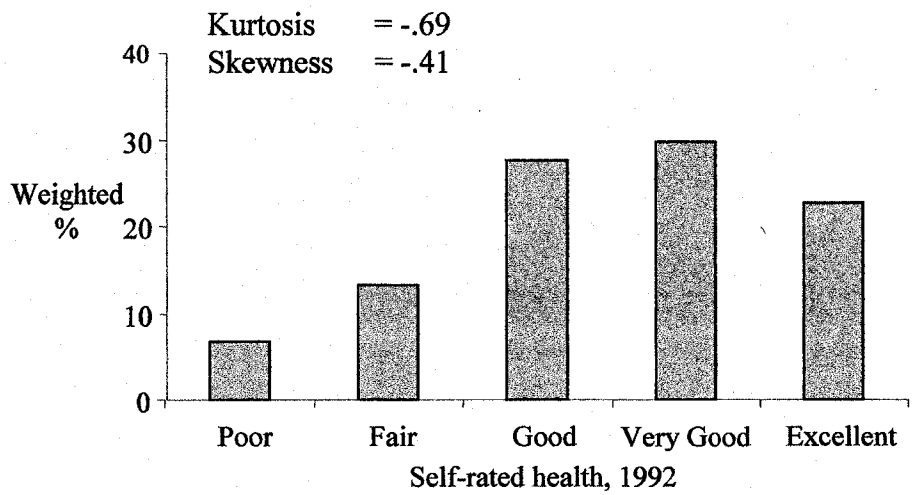
Note. Each row represents the number of cases with missing information on the health insurance variable in HRS 1992 to HRS 2000 *(n = 6,972)*

Appendix D: Distribution of self-rated health

Distribution of self-rated health in the JCUSH among persons aged 65 and older.



Distribution of self-rated health in the HRS among persons aged 65 and older.



Appendix E: Description of the Statistical Approach to the Piecewise LGM

The piecewise latent growth model examines the rate of change of a phenomenon studied. For example, a study from Chou, Yang, Pentz, and Hser (2003) examines smoking among junior high school students (stage 1) and high school students (stage 2). The authors argued that smoking among students increased with age but that the rate of increase differed depending on whether the students were in junior high school or high school. The piecewise latent growth model allows the researcher to separate growth trajectories into multiple developmental stages (Li et al., 2001). In this study, the first stage analyzes growth rate prior to Medicare enrollment and the second stage determines growth rate after Medicare enrollment, after the age of 65. In the HRS, participants' ages at baseline varied between 55 and 83; thus, respondents reached the age of 65 at different waves. To account for the age variability at baseline, individually-varying times of observation were used in the analyses (Mehta & West, 2000).

Individually-Varying Times of Observation

The optimal strategy to account for the age differences at baseline is to create specific codes that identify at which wave each respondent reached the Medicare eligibility age. These codes are presented in Table 1. Two sets of coding were created to represent the two stages of growth. The first set refers to the pre-Medicare stage. An increasing coding pattern indicates the time between the current age and reaching 65.

Once the participant has reached the age of 65, the code is then repeated. For example, a hypothetical participant who was 58 years old at baseline would reach 65 at wave 5. Consequently, this participant would have an increasing codes pattern from wave 1 to wave 5, and a repeating pattern afterward as follows: 0 for Wave 1; 1 for Wave 2; 2 for Wave 3; 3 for Wave 4; 4 for Wave 5; and a repeating 4 for Wave 6. The second stage refers to the age after Medicare eligibility. For the second stage, a participant is assigned a code of 0 until the age of 65 and increasing coding pattern after the age of 65. Participants who begin the study at a different age follow a similar coding scheme, but they differ in which wave is used for the change point in the codes. The individually varying codes address the variability among respondents in their ages, but an additional analysis approach is required to make comparisons between insured and uninsured participants.

Table 1
Coding Used to Account for Individual-Varying Time of Observation.

	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5	Wave 6
Age	55-56	57-58	59-60	62-62	63-64	65-66
Pre-Medicare	0	1	2	3	4	5
Post-Medicare	0	0	0	0	0	0
Age	57-58	59-60	61-62	63-64	65-66	67-68
Pre-Medicare	0	1	2	3	4	4
Post-Medicare	0	0	0	0	0	1
Age	59-60	61-62	63-64	65-66	67-68	69-70
Pre-Medicare	0	1	2	3	3	3
Post-Medicare	0	0	0	0	1	2
Age	61-62	63-64	65-66	67-68	69-70	71-72
Pre-Medicare	0	1	2	2	2	2
Post-Medicare	0	0	0	1	2	3
Age	63-64	65-66	67-68	69-70	71-72	73-75
Pre-Medicare	0	1	1	1	1	1
Post-Medicare	0	0	1	2	3	4
Age	65+	67+	69+	71+	73+	76+
Pre-Medicare	0	0	0	0	0	0
Post-Medicare	0	1	2	3	4	5

Multigroup Latent Piecewise Model

The focus of the research question is to examine the growth curve differences between insured and uninsured participants. A multigroup latent growth modeling (LGM) approach is needed to determine if the growth rates of near elderly with insurance prior to Medicare and after Medicare are different from the growth rates of

the partially uninsured near elderly (Duncan, T., Duncan, S., Strycker, Li, & Alpert, 1999).

To test for group differences, several models were examined. First, a baseline model, accounting for individually-varying times of observation and controlling for gender, education, marital status, race, BMI, physical activity, smoking, and alcohol consumption was used to examine the growth rate prior to and after Medicare enrollment (55 – 64). The baseline model determines the average health at baseline (intercept, α) and the change in health over time prior to (pre-Medicare slope, β_{pre65}) and after (post-Medicare slope, β_{post65}) Medicare enrollment. In order to avoid convergence problems, it was assumed that variances of health across waves were equal. This assumption is made in many regression-based approaches to growth curve models, and is, therefore, not an unreasonable assumption (Raudenbush & Bryk, 2002).

To compare growth parameters between the insured and partially insured groups, it was necessary to test models that place equality constraints on particular parameters (e.g., the pre-Medicare slopes). Each model employing equality constraints across groups was then compared to the baseline model, and a chi-square difference test of fit was used to determine if the constrained parameter differed significantly between groups (Bollen, 1989). Thus, the second model constrained the initial level of self-rated health (i.e., intercept) to be equal in the insured and the partially uninsured groups. The third model examined whether there were differences in the growth rates

between the groups prior to Medicare by constraining the pre-Medicare slope to be equal across the two insurance groups. The fourth model assessed whether the growth rates after Medicare were the same in each group by constraining post-Medicare slope to be equal across groups. The last two models determined whether the growth rates prior and after Medicare eligibility were the same within each group by constraining the pre-Medicare slope and post-Medicare slope to be equal first in the partially uninsured group and then in the insured group. A summary of the multi-group model comparisons is presented in Table 2.

Table 2

Summary of the Constraints Used in the Different Models

Constraints to be equal	Baseline	Model 2	Model 3	Model 4	Model 5	Model 6
Variances of self-rated health	X	X	X	X	X	X
Intercept		X				
Slope 1, pre65			X			
Slope 2, post65				X		
Slope 1 and 2, insured group					X	
Slope 1 and 2, Uninsured group						X

The multigroup piecewise model was analyzed using Mplus. Contrary to other software packages that might be used for growth curve analyses, such as HLM, Mplus is able to analyze group comparisons. MLR estimation (maximum likelihood with robust standard errors) was used in the analyses. MLR is designed to adjust for

nonmorality in the standard errors (Sattora & Bentler, 1994). These analyses did not use missing value estimation because the models would not converge when this estimator was used

Appendix F: Sampling Design Adjustment in HRS Using Mplus

Latent Growth Curve Model with and without design adjustments (n = 3,674)		
	Design and weight	Weight
Intercept	3.463 (0.028)	3.463 (0.028)
Slope	-0.053 (0.005)	-0.053 (0.005)
Intercept Variance	0.690 (0.024)	0.690 (0.027)
Slope Variance	0.014 (0.001)	0.014 (0.001))
Intercept, b(SE)		
Gender	0.024 (0.036)	0.024 (0.036)
Age	-0.010 (0.006)	-0.010 (0.006)
race	0.289 (0.046)	0.289 (0.046)
Marital Status	0.130 (0.046)	0.130 (0.046)
Education	0.607 (0.046)	0.607 (0.046)
Body Mass Index	-0.043 (0.004)	-0.043 (0.004)
Physical Activity	0.209 (0.035)	0.209 (0.035)
Smoking Status	-0.253 (0.044)	-0.253 (0.044)
Alcohol Use	0.095 (0.022)	0.095 (0.022)
Insurance	-0.053 (0.049)	-0.053 (0.049)
Slope, b(SE)		
Gender	0.007 (0.007)	0.007 (0.007)
Age	-0.003 (0.001)	-0.003 (0.001)
race	-0.010 (0.009)	-0.010 (0.009)
Marital Status	0.007 (0.009)	0.007 (0.009)
Education	-0.032 (0.009)	-0.032 (0.009)
Body Mass Index	0.000 (0.001)	0.000 (0.001)
Physical Activity	-0.011 (0.007)	-0.011 (0.007)
Smoking Status	-0.016 (0.009)	-0.016 (0.009)
Alcohol Use	-0.008 (0.005)	-0.008 (0.001)
Insurance	-0.023 (0.011)	-0.023 (0.011)
CFI	0.983	0.983
RMSEA	0.031	0.031
SRMS	0.014	0.009

Note. Self-rated health was used as the outcome variable

Appendix G: Change in Self-Rated Health Over Time, Covariate Results

	Intercept	Pre-65 Slope	Post-65 Slope
	Insured (n = 2,982)		
Gender	0.035 (0.04)	-0.003 (0.01)	0.035 (0.02)*
Race	-0.282 (0.05)***	-0.011 (0.01)	0.004 (0.02)
Marital Status	0.131 (0.05)*	-0.007 (0.01)	0.024 (0.03)
Education	0.657 (0.05)***	-0.039 (0.01)**	-0.032 (0.02)
Physical Activity	0.209 (0.04)***	-0.010 (0.01)	0.001 (0.02)
Smoking Status	0.282 (0.05)***	-0.021 (0.01)	-0.008 (0.02)
Alcohol Use	0.089 (0.03)***	-0.007 (0.01)	-0.004 (0.01)
Body Mass Index	-0.010 (0.006)	0.002 (0.00)	-0.001 (0.00)
	Partially Uninsured (n = 692)		
Gender	-0.003 (0.09)	-0.030 (0.02)	-0.064 (0.05)
Race	0.340 (0.10)**	-0.027 (0.03)	-0.001 (0.05)
Marital Status	0.170 (0.10)	0.011 (0.03)	0.061 (0.06)
Education	0.508 (0.09)***	-0.030 (0.03)	0.036 (0.05)
Physical Activity	0.177 (0.09)*	-0.018 (0.02)	-0.076 (0.05)
Smoking Status	-0.386 (0.09)***	-0.019 (0.02)	0.041 (0.06)
Alcohol Use	0.123 (0.05)*	-0.011 (0.01)	-0.034 (0.03)
Body Mass Index	-0.020 (0.01)*	-0.001 (0.00)	0.002 (0.01)

*$p < .05$. **$p < .01$. ***$p < .001$.