The London School of Economics and Political Science

Examining aspects of equity in Canada's health system

Sara Allin

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ProQuest LLC
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106-1346

DECLARATION

I certify that the thesis I have presented for examination for the MPhil/PhD degree of the London School of Economics and Political Science is solely my own work other than where I have clearly indicated that it is the work of others (in which case the extent of any work carried out jointly by me and any other person is clearly identified in it).

ABSTRACT

Canada's health system is based on the firmly-held belief that the receipt of care should be based on need and not ability to pay. This thesis examines three aspects of this equity goal: provincial variations in equity in the receipt of care; the role of private prescription drug insurance in explaining inequity in the use of physician services; and the equity implications of subjective unmet need. Canada's provinces are responsible for planning and funding most publicly insured health services, hence there is variation in health system characteristics across the country. In the context of such variation, the first empirical analysis examines equity in the use of health services across the provinces. The analysis reveals some evidence of inequity in the likelihood of a GP visit, and the likelihood and number of specialist and dentist visits; some variations can also be found across the provinces. The second empirical analysis investigates the role of complementary insurance for prescription drugs in explaining inequity in the use of publicly-funded physician services. Due to the complementary relationship between prescription drugs and physician services, and the unequal distribution of private insurance coverage across income groups, inequity in physician utilisation partly can be explained by the interaction with insurance. The third empirical analysis assesses the equity implications of subjective unmet need. It finds that there are different utilisation patterns among the different types of unmet need, which raises methodological and conceptual challenges. The concluding chapter positions the three empirical studies within the broader policy context, offers an in-depth discussion of their methodological and policy implications, and proposes areas for future research.

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CHAPTER 1: INTRODUCTION

1.1 Thesis objective

The set of values that underlie a health system gives rise to the objectives with which to evaluate the system. Canadians have a long-held belief that health care is a social good that should be distributed equally across the population (Canada, 1964, 1997, 2002a). Achievement of this equity goal should therefore be monitored. The specific equity objective that should be empirically assessed is not clearly defined, although in research and policy discussions, the prevailing definition is that individuals should receive health care on the basis of their need (Canada, 2002a; Evans, 1983; Mendelsohn, 2004; Wilson & Rosenberg, 2004).

The primary objective of this thesis is to employ quantitative empirical methods to examine some key aspects of equity in the receipt of health care in Canada. Studies from high-income countries consistently demonstrate that a system of financing health care that separates the payment of health care from the receipt of health care (such as through a pre-payment tax-based system) is not sufficient to ensure the attainment of this equity objective. Therefore, this thesis examines three aspects of equity that address some of the gaps in the literature to develop our understanding of some of the challenges and policy options to achieve this equity goal. This thesis also aims to place the empirical analyses into the Canadian policy context to highlight the implications of observed inequity, and to further the research agenda to address the policy and methodological issues that relate to equity. This chapter briefly introduces the Canadian health system and then outlines the background and objectives for the three empirical research questions.

1.2 The Canadian health system: an overview

The Canadian health system can be viewed from the perspective of its broad functions. Health systems have four main functions: financing (including collecting and pooling resources and purchasing services), resource generation (including investment and training), delivering services (on an individual and population level) and providing oversight or 'stewardship' (World Health Organization, 2000).

The foundation of the insurance system in Canada took place through a succession of province-led reforms following the Second World War (Evans, 1983). Saskatchewan first implemented universal hospital insurance (in 1947), followed by the federal government's formal agreement to contribute to funding provincial hospital insurance plans with the Hospital Insurance and Diagnostics Act of 1957. By 1961 all provinces had a universal hospital insurance plan. The extension to physician services again was initiated in Saskatchewan, with the introduction of the universal medial (physician) care insurance in 1962 by the then premier, Tommy Douglas. The Royal Commission on Health Services (the "Hall Commission") recommended federal support of provincial physician insurance plans (Canada, 1964), and in 1966 the federal government passed the Medical Care Act. By 1972, all provinces and territories had implemented public insurance for physician services (Marchildon, 2005).

Canada's health system can be described as predominantly publicly financed through taxation. Taxation by the provincial, territorial and federal governments accounts for about 70% of total health expenditure, the majority comes from individual income taxes, consumption taxes and corporate taxes. Most of the revenue that is raised by the federal government for health expenditure is transferred to the provinces, although some

is spent directly by the federal government on public health programmes, pharmaceutical regulation, drug product safety, as well as Aboriginal (First Nations and Inuit) health care services (constituting 3.7% of total health expenditure). Out-of-pocket payments make up almost 15% of total health expenditure. Since hospital and physician services are, almost wholly, free at the point of use, out-of-pocket payments fund the large part of vision care, over-the-counter medications, complementary and alternative medicines and therapies, and about 20% of prescription drugs. The majority of private health insurance (constituting about 13% of total health expenditure) is employment-based insurance. It is supported through substantial tax expenditure subsidies and is designed to provide coverage for health goods and services that are not covered by the public insurance system (termed Medicare), such as dental care, ambulatory prescription drugs and hospital amenities. Thus, private insurance for the publicly insured physician and hospital services is either prohibited or restrictions on physicians' ability to provide services in both the public and private sectors and that limit the fees they can charge for private services have deterred the development of a private sector and consequently private insurance (Flood & Archibald, 2001). The regulation and coverage of prescription drugs are discussed in more detail below.

Services are provided through private (a mix of for-profit and not-for-profit) and public (both arm's-length and direct) bodies (Evans, 2000; Marchildon, 2005). Hospitals are paid mostly through global budgets, physicians mainly by fee-for-service (accounting for over 80% of total remuneration), and other health care personnel such as nurses by salary within hierarchically directed health organisations (Marchildon, 2005). Physicians include general practitioners (GPs) and specialists, the former who work mostly in solo private practice, the latter in hospitals. Patients require a referral from

their GP in order for them to consult a specialist, thus they serve a gate-keeping function in the system.

Oversight of the system takes place at the three levels at which health care is organised: federal, provincial/territorial, and inter-governmental levels. The federal government, through the ministry, Health Canada, is responsible for protecting the health and security of Canadians. It sets the standards for the national Medicare system and it has responsibilities for public health, drug and food safety regulation, data collection and health research, as outlined in the Canadian constitution. The provinces and territories govern the administration of their single-payer systems for universal hospital and medical services, including paying for hospitals, negotiating and setting remuneration rates for physicians, providing public health services, and funding research. Intergovernmental not-for-profit corporations, as well as some nongovernmental not-for-profit agencies funded by the sponsoring governments, facilitate and coordinate policy and programme areas, notably the advisory committees to the Conference of Federal-Provincial-Territorial Ministers of Health (Marchildon, 2005).

With regards to pharmaceuticals, the federal government is responsible for regulating the safety, efficacy and quality of drug products both prior to determining market authorisation, and once they reach the market (Paris & Docteur, 2007). Also the federal government regulates the prices of patented medicines through the Patented Medicine Prices Review Board. The Board's objective is to ensure that the patented drug prices are not "excessive" on the basis of its "degree of innovation" and through a comparison with the prices of existing medicines in Canada and with the prices in seven comparator countries including the United States and the United Kingdom (Paris & Docteur, 2007). Price variations across provinces may result, however, from the differential levels of

wholesalers' and pharmacists' margins, and differential pricing policies by provincial governments.

Pharmaceutical price regulation takes place at the federal level, although the provinces are principally responsible for decisions related to prescription drug coverage. Therefore there are variations across the provinces in the design of the provincial programmes that subsidise the costs of the services. Provincial prescription drug insurance plans generally cover vulnerable population subgroups such as those receiving social assistance, older people, individuals with specific diseases, and families with high prescription drug expenditures (Demers, Melo, Jackevicius, Cox, Kalavrouziotis, Rinfret et al., 2008; Grootendorst, 2002). The majority of individuals who are not covered in a provincial prescription drug insurance plan are privately insured through employer-sponsored insurance. In three provinces – British Columbia, Manitoba and Saskatchewan – there are income-based, as opposed to the above group-based, public insurance plans; and in Québec there is mandatory public insurance for all resident who do not have private prescription drug insurance (Section 6.2 2 offers an in-depth discussion of these programmes). Moreover, variations across provinces can arise due to different eligibility requirements and levels of cost sharing in the public plans (Fraser Group/ Tristat Resources, 2002; Grootendorst & Veall, 2005), and differences in the formularies used by the provincial drug plans (Paris & Docteur, 2007). Differences across provinces are also seen in other services outside of the hospital and physician services, such as arrangements for funding long-term care services, dental services, and allied medical services; these differences are explored in greater detail in Section 3.2.

An important feature of the Canadian health system is its system of rationing health services with waiting lists in the context of scarce public resources. Waiting times for

elective surgery and diagnostic procedures are long in Canada; international evidence suggests that Canada fares particularly poorly in terms of waiting times relative to other OECD countries (Siciliani & Hurst, 2004). As a result of the lengthy waiting times in the province of Québec along with the prohibition of private insurance for services provided in hospital, in 2005 there was a Supreme Court challenge by a Québec resident, who had waited for 12 months for a hip replacement, and his physician, Dr Jacques Chaoulli. The Supreme Court ruled (by a four-to-three majority) that the Québec government's ban on private health insurance for hospital and physician services with long waiting times violated individuals' rights to life and security of person under the province's Charter of Human Rights and Freedoms. This decision highlights the conflict that policy makers face between the equity objective of ensuring equality in access by prohibiting a 'two-tier' system and restrictions on personal liberty.

The Canada Health Act serves as the legislative underpinning of the health system; it outlines the conditions for which the federal government assists in the funding of provincial health programmes. The federal cash transfer flows to the provinces and territories on a per capita basis. The Act states that: "the primary objective of Canadian health policy 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 House of Commons, 1984). The federal government further states that the goal of reasonable access should be applied to necessary hospital and physician services (Health and Welfare Canada, 1989). The federal ministry of health, Health Canada, distinguishes between economic and physical accessibility, the former refers to the provision of health services without financial charges (either direct or indirect), which implies that individuals' ability to pay should not determine access to care. Thus, under the Canada Health Act, all residents of a

province or territory are eligible to receive medically necessary services free at the point of use. This includes landed immigrants after an initial residency period (but not foreign visitors), serving members of the Canadian military or Royal Canadian Mounted Police, and inmates of federal penitentiaries.

Reasonable access has been interpreted to mean access in accordance with need, or medical necessity, where need is determined on the basis of the expectation of protecting, promoting or restoring health (Birch & Abelson, 1993; Evans, 1983; Evans, 1992; Giacomini, Hurley, Gold, Smith, & Abelson, 2004; Law, 1986; Manga, 1987). Whether the concern is with the actual use of services or the opportunity to use the services is less clear, although it has been argued that "reasonable access" should be interpreted as equitable utilisation. This interpretation would be consistent with the objectives of the Canada Health Act and it would facilitate empirical measurement (Birch & Abelson, 1993).

1.3 Research questions

The aims of this thesis are to measure equity in health care utilisation in Canada, to explain some of the contributors to observed inequity, to examine the equity implications of subjective unmet need, and to discuss the policy and methodological implications of these analyses. To achieve these objectives, I will address three specific research questions, and then review these empirical findings, highlight areas for future research, and examine their implications. There are many possible questions that could be raised with regards to the broader issue of equity in the Canadian health system; however, these three questions were chosen because they build on the existing literature,

they address current policy relevant issues, they go beyond conventional analyses, and they serve as catalysts for further research. (Box 1 below summarises some of the key terms that are used in this thesis).

1. What is the extent of inequity in the Canadian system? How do the level and contributors to inequity vary across the Canadian provinces? (Chapter 3)
2. In the province of Ontario, does the exclusion of prescription drugs from the universal public insurance plan, and reliance on private insurance, contribute to inequity in physician service utilisation? (Chapter 4)
3. To what extent can subjective unmet need inform our understanding of equity in the Canadian health system? (Chapter 5)

1.3.1 Research Question 1

The equity principle that I introduced above is institutionalised at the national level and appears to be valued by citizens across Canada (Canada, 2002a). However, the interpretation and importance of equity as a goal in policy making may vary across the provinces; characteristics of the provincial health systems that impact patterns of utilisation may also vary. Some commentators have argued that there is not one single Canadian system, but thirteen separate, universal, single-payer systems of hospital and physician care for the ten provinces and three territories (Marchildon, 2005). Previous studies have found some variations in patterns of utilisation across the provincial systems (Birch, Eyles, & Newbold, 1993; Dunlop, Coyte, & McIsaac, 2000; Newbold, Birch, & Eyles, 1994). To understand equity in the Canadian context, an approach that considers the separate provincial health systems is needed.

The first empirical chapter, therefore, systematically investigates equity in the different health care sectors across Canada's provinces. For this analysis, the definition of equity is informed by the interpretations of Canadian policy documents and previous empirical research: individuals with equal need for health care should have similar utilisation patterns. This analysis focuses on inequity due to income, consistent with policy statements of the importance of ensuring access or utilisation is based on need for health care, and not ability to pay. Building on a previous study that included Canada in the analysis of equity in 21 countries (van Doorslaer, Masseria, & the OECD Health Equity Research Group Members, 2004), I calculate income-related inequity for the ten provinces, across primary and secondary care, investigating separately the initial contact with the health system and the volume of services consumed. The factors contributing to inequity are also examined in order to assess not only whether the level of inequity varies across the county, but also whether the sources of inequity differ. National-level analyses confirm previous studies by showing a statistically significant, but modest, concentration of the probability of a GP visit among the rich, though the total number of GP visits and the number of visits conditional on having made one visit is concentrated among the poor. The distributions of specialist and dental visits are significantly pro-rich, and hospital admissions are more concentrated in the lower end of the income distribution. Variations across the provinces in the level of income-related inequity can be seen, and, to some extent, these differences relate to the funding of non-Medicare services such as dental care and prescription drugs.

1.3.2 Research Question 2

In the literature on equity in the use of health services in Canada, little is known about the reasons for observed inequity. There has been a removal of direct barriers to access

alongside consistent policy commitments to ensuring equity. Higher utilisation rates among individuals in higher socioeconomic groups may be driven by preferences for higher levels of health (Grossman, 1972), alternatively, these patterns may be attributed to factors that are mutable by policy (Aday & Andersen, 1981; Gulliford, Figueroa-Minoz, & Morgan, 2002).

The results of the first empirical chapter point to the role of prescription drug insurance as a mechanism through which inequity in physician care may arise. Therefore, the second empirical chapter of this thesis tackles this issue explicitly. It provides an in-depth analysis of the role of complementary insurance for prescription drugs in explaining patterns of utilisation and inequity in the receipt of physician services. This analysis explores an interesting interaction between public and privately funded services that are complementary. Almost 100% of physician costs are funded publicly compared to about half of the cost of prescription drugs. Moreover, a physician's prescription is legally required in order for patients to access prescription drugs. One previous study has shown a positive impact of holding any form of complementary insurance for prescription drugs on the likelihood of a GP visit (Stabile, 2001). Building on this study, I examine the impact of public and private insurance for prescription drugs on the use of GPs and specialists, and on income-related inequity in these services. This analysis raises important policy implications of the current mixed model of financing for certain health services.

1.3.3 Research Question 3

In the first two empirical chapters, self-assessed health is conceptually and empirically understood as approximating need for health care; hence it is used to standardise

utilisation in order to observe any remaining variations that are not explained by need. In the literature that measures equity in access to health care, most studies employ regression techniques to determine if factors other than need, such as income and socioeconomic status, are significantly associated with utilisation. These conventional methods may be complemented by the direct measurement of unmet need.

The third empirical chapter seeks to develop our understanding of the concept of unmet need by outlining the different types of unmet need that can arise and discussing these different equity implications. It empirically assesses the systematic association between subjective unmet need and actual health care utilisation by calculating the extent to which individuals with different types of subjective unmet need use fewer or more health services than expected based on the empirical norm. The analysis links unmet need to conventional methods of equity measurement in order to gain an understanding of the policy relevance of subjective unmet need and to highlight limitations with the conventional methods.

1.4 Structure and contribution of the thesis

The following chapter (Chapter 2) provides an overview of the conceptual issues underlying this area of equity research as applied to health care, first exploring the ideological bases of current equity definitions, then discussing the translation of these definitions to measurable and policy relevant metrics of equity. Chapter 2 then reviews the literature on equity in the Canadian context, and finally outlines the methodological tools that are used to address the research questions. Chapters 3, 4 and 5 constitute the original empirical analyses for this thesis that address the three research questions outlined above. Finally, Chapter 6 summarises the results of the empirical analyses,

discusses some of the key policy and methodological implications, and develops an agenda for future research.

How will this thesis contribute to the literature? In this thesis, I apply methodological techniques to a number of policy-relevant empirical questions in order to generate new evidence to inform policy development, highlight limitations and methodological challenges with this type of research, and raise new questions for further research. To address the first two research questions, I will calculate concentration indices to quantify and decompose income-related inequity in health care utilisation. First, I will investigate provincial variations in levels and contributors to inequity, and second, I will assess the equity impact of the interactions between publicly-funded physician services and private insurance for prescription drugs. The third research question addresses the equity implications of subjective unmet need and offers an exploratory analysis that, for the first time, attempts to link, both conceptually and empirically, conventional approaches to equity measurement with reported unmet need. In addition to these three empirical chapters, this thesis offers an in-depth discussion of how to take this research forward. It will provide suggestions for the design of surveys, and will raise new research questions that address the challenges in measuring equity and that guide the development of policies to achieve equity goals.

Overall, there are three ways in which this thesis is innovative. First, it builds on the empirical literature that measures equity in the receipt of health care by confirming previous findings with more in-depth analyses and discussions, and by developing new techniques to empirically assess equity. Second, it goes further than existing empirical studies of equity by linking the empirical analyses to policy debates and attempting to understand the policy context in which equity arises, and can be addressed. Third, it

critically assesses the findings from both methodological and policy perspectives in order to further the research agenda in a meaningful way.

CHAPTER 2: CONCEPTUAL OVERVIEW, LITERATURE REVIEW AND METHODOLOGY

2.1 Understanding equity: why is this topic important for policy?

One of the fundamental goals of developed countries' health systems is to achieve an equitable distribution of health care resources. In other words, health systems, such as Canada's, aim to ensure that health services are provided on the basis of need and not other factors, such as socioeconomic status (Evans, 1983). There is a vast literature on the subject of defining and understanding equity from the perspectives of political philosophy, public policy, psychology, economics and political science[1]. In the following section, I provide an overview of the dominant ideological positions on equity to set the context for investigating equity in health care. Discussions of equity are complex; the underlying philosophical views are often conflicting and there is no agreement on how to define equity more generally, let alone in the health care sector. The aim of this overview is not to provide a comprehensive analysis of the ideological debates surrounding equity; rather, it aims to trace some of the policy statements on equity and empirical definitions of equity to some of the more prominent philosophical positions.

Debates surrounding the definition of equity date back to the Aristotelian principles of justice that equals should be treated equally, or horizontal equity, and that unequals should be treated unequally in proportion to the relevant inequalities, or vertical equity

[1] Some reviews of this literature have been drawn upon for this section (Gillon, 1985; Le Grand, 1991; Olsen, 1997; Wagstaff & van Doorslaer, 2000; Williams, 1993).

(Gillon, 1985; Williams, 1993). This principle, in both its horizontal and vertical forms, underlies most current definitions of equity in the context of health care.

Among the numerous theories of justice, there are five commonly referenced in current debates about equity in health care: the libertarian theory of personal liberty, the utilitarian theory of maximum total utility, Rawls' theory of justice as fairness, and Sen's theory of equality of capabilities. Each of these is reviewed briefly below and the implications for health policy follow.

Personal liberty is the most important goal according to libertarian theories stemming from the work of John Locke's on man's natural rights to life, health, liberty and possessions. Libertarians argue that fairness (or equity) is determined by the process in which exchanges are made and not the resultant distribution, and thus they are concerned with process (deontological) as opposed to end-state (or consequentialist) ethics. Nozick's 'Entitlement Theory' presumes that the most important right is that of self-ownership (including one's talents and anything produced with those talents), suggesting that the government has no right to tax the fruits of individuals' labour in order to redistribute resources to others. Moreover, a distribution can be considered to be just if everyone is entitled to what it is they possess, whether through an original acquisition of holdings, the just transfer of holdings, or rectification of historical injustice in holdings (Nozick, 1974). Nozick has been criticized by selecting only part of the spectrum of Lockean rights, and thus his arguments against taxation to help the sick, poor and disadvantaged are not well supported (Gillon, 1985).

Utilitarian theories, in contrast, are consequentialist and emphasise the maximisation of total happiness or welfare (utility) in the population. Utility maximisation seeks to

achieve the greatest good for the greatest number. Libertarians would argue that this approach sacrifices personal rights or liberty at the expense of maximising overall welfare, while egalitarians (see more below) would criticise this theory for its lack of concern with the distribution of utility in the population (equal weight is given to the everyone's interests), and that some actions that increase total utility may involve sacrifices by others (Olsen, 1997). To the extent that inequalities in utility in a population produce disutility, however, coupled with diminishing marginal utility of commodities and money, utilitarians argue that approaches that increase equality would also increase total utility (Hare, 1982).

Rawls' theory of justice states that a just society is one where principles or rules of social justice are agreed by impartial individuals in the 'original position' (Rawls, 1971). In this original position, individuals are placed behind a 'veil of ignorance' where they would neither have knowledge of their place (social standing) in society nor their level of natural assets and abilities. The principle of justice that Rawls argues would be accepted through this process is that "all social values – liberty, opportunity, income and wealth and the bases of self-respect – are to be distributed equally unless an unequal distribution of any, or all, of these values is to everyone's advantage" (Rawls, 1971, p.62). These social values, or social primary goods, are those that are important to people, but that are created, shaped, and affected by social structures and political institutions. In other words, knowing that natural primary goods (intelligence, strength, imagination, talent and good health) will be unequally distributed in society, rational, self-interested individuals behind a 'veil of ignorance' would want social primary goods to be distributed equally. They would also support the 'difference principle', which ensures that any existing inequalities work to everyone's advantage (Stone, 2002).

Critiques of Rawlsian justice often centre on the relationship between natural and social primary goods. The argument of equal claim to social primary goods, for example, that individuals with worse health do not deserve less income or opportunity, may not go far enough, because they may need more income or opportunity in order to be compensated for their relative disadvantage. Also in relation to health care, it can be argued that health should be considered a social primary good because of the importance of health care, a social institution, in preserving and protecting health (Olsen, 1997).

Sen builds on the above theories by asking the question for ethical analysis: equality of what? (Sen, 1992). While Rawls is concerned with equalising primary goods, Sen argues for the importance of considering differences in individuals' abilities to convert those primary goods into 'functionings' (such as nourishment, good health, happiness and self-respect) that contribute to their well-being (Olsen, 1997; Sen, 1992). Therefore, the answer to his question of what space should be the focus of attention for equality is in the capabilities or freedoms to achieve, as opposed to Rawls' means to achieve (social primary goods), or utilitarians' achievements themselves (utility) (Sen, 1992). In response, Rawls argued that primary goods do account for individuals' basic capabilities, and, moreover, the primary goods are those that are required for individuals to be fully functioning members of society (Rawls, 2001).

It has been suggested that, with regards to health care, the two ideological perspectives that can be broadly referred to as libertarianism and egalitarianism dominate current ethical debates (Donabedian, 1971; Williams, 1993; Williams, 2005)[2]. These viewpoints would support two distinctive health care systems. Libertarians are concerned with preserving personal liberty and ensuring minimum health care standards

[2] From a political science or public policy perspective these two viewpoints can alternatively be termed 'social conservativism' and 'social liberalism' (Stone, 2002)

are achieved. Moreover, access to health care can be seen as a privilege and not a right: people who can afford to should be able to pay for better or more health care than their fellow citizens (Williams, 1993). Egalitarians seek to ensure that health care is financed according to ability to pay, and that health care should be allocated on the basis of need and not ability to pay, with a view of promoting equality in health (Wagstaff & van Doorslaer, 2000). The egalitarian viewpoint supports the belief that access to health care is a fundamental human right, one that can be viewed as a prerequisite for personal achievement and critical to life itself, and, thus, access should not be influenced by income or wealth (Evans, 1983; Williams, 1993). Moreover, Hurley argues that equality of access is based on the ethical notion of equal opportunity or a fair chance, and not necessarily on the consequences of such access, such as utilization or health outcomes (Hurley, 2000). (Appendix A1 summarises these two viewpoints).

While the Rawlsian perspective has been interpreted to suggest that equity is satisfied if the most disadvantaged in society have a decent minimum level of health care (Williams, 1993), if health care can be considered one of Rawls' social primary goods, an equitable society depends on the equal distribution of health care, thus in line with egalitarian goals. Although Rawls states that government-provided health care could be included in the index of primary goods since it is an extension of the primary goods of income and wealth, he argues that health care policies should be made at the legislative stage and not in the original position or constitutional convention (Rawls, 2001). Moreover it has been argued that health care ought not to be considered as a primary good because of the societal costs in maximising the benefit to the least advantaged in terms of health, and in order to avoid the potential trade-offs between health care and income (McGuire, Henderson, & Mooney, 1988). To the extent that health care can be

considered essential for individuals' capability to function, then the above egalitarian perspective could also be consistent with Sen's theory of equality.

Although no perfectly libertarian or egalitarian health care system exists, egalitarian viewpoints are in large part supported by both the policy community and society. This support is evidenced by the predominance of publicly funded health systems with strong government oversight that separate payment of health care from receipt of health care, and the numerous programmes that are in place to support the most vulnerable groups. On an international level, the view that access to health care is a right is illustrated by, among other things, the 1948 Universal Declaration of Human Rights. The debate between libertarian and egalitarian perspectives, however, is not resolved in practice: policies of redistribution exist alongside policies preserving individual autonomy and freedom of choice, as evidenced by the existence of a private sector in health care that allows those able or willing to pay to purchase additional health services. Moreover the view that health care is a right suggests that health care resources are infinite; therefore, in the context of scarce resources, a limit to access through rationing by price, or other tools such as waiting lists, is inevitable. The conflict between equity and efficiency is discussed further in Sections 2.1.3 and 6.2.

2.1.1 What objective of equity do we want to evaluate?

It is widely supported that health systems should pursue equity goals. However the operationalisation of equity in the context of health care is not straightforward. In the economics literature, Mooney identified seven possible definitions of equity that would oftentimes conflict and thus lead to different policy considerations (Mooney, 1983, 1986): (1) equality of expenditure per capita; (2) equality of inputs (taking into

consideration differing average prices across regions); (3) equality of input for equal need (with need defined for example by age/sex structure, morbidity, marital status, patient flow in and out of region, etc); (4) equality of (opportunity of) access for equal need; (5) equality of utilisation for equal need; (6) equality of marginal met need; and (7) equality of health.

The first two – equality of expenditure per capita and equality of inputs across regions - are unlikely to be equitable since they do not allow for variations in levels of need for care across the regions. While the third – equality of input for equal need – does account for need, it does not consider factors beyond the size of the health care budget that may give rise to inequity. The third and fourth are the most commonly cited definitions – equality of access for equal need (individuals should face equal costs of accessing care) and equality of utilisation for equal need (individuals in equal need should not only face equal costs but also demand the same amount of services). If everyone's information, preferences and tastes for health and health care were the same, then the goal of equality of access should yield the same outcome as equality of utilisation. The sixth suggests that if needs are prioritised/ranked in the same way across regions, then equity is achieved when each region was able to meet the same 'last' or 'marginal' need. The seventh argues that we should not be concerned with the distribution of health care according to need but with the distribution of health care in order to ensure equality in health, which raises concerns as to the role of health care in reducing inequalities, and the conflict with this equity goal and efficiency (Mooney, 1983); this is discussed further below.

In addition to the above goals – all concerned with health care delivery - equity in health care can be defined in terms of health care financing, whereby individuals'

payments for health care should be based on their ability to pay, and therefore should be proportional to their income. Individuals with higher income should pay proportionally more and individuals with lower income should pay less, regardless of their risk of illness and receipt of care. This concept is based on the vertical equity principle of unequal payment for unequals, where unequals are defined in terms of their level of income (Wagstaff & van Doorslaer, 2000), and has direct implications for access to care since financial barriers to access may arise from inequitable (or regressive) systems of health care finance.

From a policy perspective, a working definition of equity is needed that is both realistic (i.e. within the scope of health policy) and that makes intuitive sense (Le Grand, 1991; Whitehead, 1991). In an attempt to clarify the principles of equity for policy makers, Whitehead builds on the principles proposed by Mooney to develop an operational definition that encompasses three dimensions: accessibility, acceptability and quality (Whitehead, 1991). Equity in the health care context thus requires the fulfilment of all three of the following goals:

1. Equal access to available care for equal need. This implies that all people have equal entitlements (i.e. universal coverage), that there is a fair distribution of resources throughout the country (i.e. allocations on the basis of need), and that geographical and other barriers to access are removed.
2. Equal utilisation for equal need. The aim is to ensure that the use of services is not restricted by social or economic disadvantage (and to ensure the appropriate use of essential services), though accepting those differences in utilisation that may arise from individuals exercising their right to use, or not to use, services according to their preferences. This recognition of the acceptable role of preferences in affecting utilisation is consistent with the definition of equity that is linked to personal choice,

such that an outcome is equitable if it arose in a state in which all people had equal choice sets (Le Grand, 1991)[3].

3. Equal quality of care for all. This implies an absence of preferential treatments that are not based on need, that the same professional standards apply to everyone (e.g. consultation time, referral patterns), and that health care is acceptable for everyone.

The last of Mooney's goals - equal (or less unequal) health outcomes – is another important policy objective (Whitehead, 1991). However, there are two factors that complicate the adoption of the goal of equality in health for policy makers: first, the multiple and varied social and economic determinants of health that fall outside of the health system make its attainment possible only with efforts beyond the scope of health care, and second, the fact that it might require restrictions on the ways in which people may choose to live their lives (Mooney, 1983). In fact, the policy support for improving equity in access or receipt of care appears to be more evident than the commitment to reduce inequalities in health (Gulliford, 2002); although in the United Kingdom the reduction of avoidable health inequalities is a priority government objective (Department of Health, 2002, 2003) and the formula that is used to allocate resources to the regions seeks to improve both equity in access to services and also to reduce health inequalities (Bevan, 2008).

These two principles are clearly linked; policy support for an equity objective based on access or utilisation derives from its potential to achieve equality in health. Health care

[3] Critics of this choice-based equity definition question the autonomy in making choices that affect health, arguing that many choices are in fact out of individuals' control. Le Grand counters that denying individual autonomy denies the existence of free will (Le Grand, 1991). Also, critics point out a contradiction in Le Grand's theory that states that health differences owing to individual choice are not inequitable, although differential rights to health care on the basis of these choices would constitute inequity (Culyer & Wagstaff, 1993).

is instrumental in the improvement of health. Few people would like to consume health care in a normal situation; however, at the time of illness, health care becomes essential to restore health. Demand for health care is thus derived from the demand for health itself (Grossman, 1972; World Health Organization, 2000). Therefore, in ensuring an equitable distribution of health care resources, there is a broader aim of health improvement and reduction of health inequalities. It is often argued that, from the egalitarian viewpoint, ensuring equal access by allocating health care resources according to need will promote equality in health (Wagstaff & van Doorslaer, 2000); however, if access is defined in terms of cost of utilisation or maximum attainable consumption of health care, equality in access may not give rise to equal health (Culyer & Wagstaff, 1993).

Further complications arise from the argument that, although a greater consensus exists from policy and research communities on the horizontal principle of equity, this goal may not be as effective a route to reducing inequalities in health as its vertical counterpart that seeks to ensure that people with different needs are receiving appropriately differentiated treatment (Mooney, 2000). The empirical literature, to date, has almost exclusively focused on horizontal equity (with some exceptions; (Sutton, 2002)). This focus is mainly due to the value judgements that would be required for, and the difficulties associated with, measuring differences in need and assessing what is an appropriately greater or lesser amount of health care to receive.

2.1.2 How do we measure access and utilisation?

In Canada the stated objective of the health system is to ensure reasonable access to care by removing direct and indirect barriers. This has been interpreted to mean that the receipt of health care should be based on need and not ability to pay (Evans, 1983). This interpretation is consistent with the international policy community's recognition of the importance of not only ensuring that individuals have the opportunity to use services, but that they are availing themselves of these services (Whitehead, 1991). Equitable access is a commonly stated objective in policy documents; therefore, this section discusses how access can be understood and defined, and then considers the benefits and limits to the reliance on utilisation to approximate access.

Access can be defined in numerous and competing ways. Narrowly defined, access pertains to the money and time costs people incur in obtaining care: how accessible a service is can then be understood as the opportunity cost to individuals of seeking that service (Le Grand, 1982; Mooney, 1983). But if two people face the same time and money costs they are said to have the same access irrespective of their income (Le Grand, 1991). Olson and Rogers therefore develop the definition of access to mean the maximum attainable level of consumption of medical care given individuals' income, time and money costs: "people have equal access to a good if and only if they are able to consume the same quantity of that good" (Olsen & Rogers, 1991, p.93). A definition of access that incorporates further conditions is "the ability to secure a specified set of health care services, at a specified level of quality, subject to a specified maximum level of personal inconvenience and cost, whilst in possession of a specified amount of information" (Goddard & Smith, 2001, p.1151). The authors stress the importance of a

multi-dimensional approach to defining access and extending, for instance, its considerations to quality of care.

Accessing health care thus depends on an array of supply and demand-side factors. Supply-side factors affecting access to and receipt of care include the volume and distribution of human resources and capital, waiting times, referral patterns, booking systems, how individuals are treated within the system (continuity of care), and quality of care (Aday & Andersen, 1974; Gulliford, Figueroa-Munoz, Morgan, Hughes, Gibson, Beech et al., 2002; Starfield, 1993; Whitehead, 1991). On the demand-side there are predisposing, enabling and needs factors, including socio-demographics, past experiences with health care, perceived quality of care, perceived barriers, health literacy, beliefs and expectations regarding health and illness, income levels (ability to pay), scope and depth of insurance coverage, and educational attainment (Aday & Andersen, 1974; Dixon, Le Grand, Henderson, Murray, & Poteliakhoff, 2007; Goddard & Smith, 2001).

Clearly there is a multitude of factors that affect access and there are many potential indicators of access. Lacking information on access, many researchers use the term "access" as synonymous with "utilisation", implying that an individual's use of health services is proof that he/she can access these services (Evans, 1983). However, utilisation is not equivalent to access (Le Grand, 1982; Mooney, 1983); as noted above, access can be viewed as opportunities being open for people, while receipt of treatment depends both on the existence of these opportunities and whether an individual has actually made use of them (Wagstaff & van Doorslaer, 2000). Aday and Andersen suggested that a distinction ought to be made between having access – the *possibility* of using a service if required, and gaining access – actually *using* a service (Aday &

Andersen, 1974, 1981). Likewise, Donabedian asserted that "the proof of access is use of service, not simply the presence of a facility", thus he argued that utilisation represented *realised* access (Donabedian, 1972, p.111). Thus, in order to evaluate whether an individual has gained access, one must measure actual utilisation of health care, and if possible also the level of satisfaction with that contact and ultimately, health improvement.

A consensus about the most appropriate metric of access remains to be found. Many different elements or indicators of access can be measured, such as waiting times, availability of resources and access costs, while utilisation can be directly observed. Indeed empirical research has centred on the measurement of equity by observing the distribution of utilisation across income and other population groups (Evans, 1983). In this way, inequity is assumed to arise when individuals in higher socioeconomic groups are more likely to use, or are using a greater quantity of, health services after controlling for their level of need. If we rely on utilisation to measure equity, however, we must keep in mind that differences in (needs-adjusted) utilisation levels by socioeconomic status may be driven in part by individuals' informed choices or preferences (Le Grand, 1991; Oliver & Mossialos, 2004). Also an apparently equal or pro-poor distribution of needs-adjusted utilisation by socioeconomic status may not imply equity or pro-poor inequity if the services being used by those at the lower end of the socioeconomic distribution are of low quality, or are inappropriate (Thiede, Akweongo, & McIntyre, 2007). This limitation should be acknowledged and complementary analyses could be undertaken to measure the dimensions of access not captured by utilisation.

A potential complementary approach would be to measure equity in access to health care as the extent to which individuals did not receive needed health care (Aday &

Andersen, 1981). 'Unmet need' could be measured with clinical information, such as medical records or clinical assessments, or by self-report. Subjective unmet need is easily measurable and is included in national health surveys. Moreover, individuals may have better information about their health care needs, as suggested by the stronger predictive power of subjective ratings of health on future mortality and health care use than clinical assessments (see below). Therefore levels of subjective unmet need and the stated reasons for unmet need could provide further insight into the extent of inequity in the system, in particular if they are complemented by measures of equity based on health care utilisation. This form of metric will be explored in Chapter 5.

2.1.3 How can we define need for health care?

Whether one relies on utilisation (receipt of health care) or access (opportunities to receive health care) to assess equity, an operational definition of 'need' has to be determined since utilisation or access that varies in proportion to need would be unequal but not necessarily inequitable. This section begins with a conceptual discussion of need measurement, and then goes on to the practical measurement of need for empirical research.

In the economics literature, four possible definitions of need have been proposed (Culyer & Wagstaff, 1993):

1. Need for health care is defined in terms of an individual's current health status;
2. Need is measured by capacity to benefit from health care;
3. Need represents the expenditure a person ought to have; i.e. the amount of health care required to attain health; or

4. Need is indicated by the minimum amount of resources required to exhaust capacity to benefit.

The authors argue that the first definition is too narrow since it may miss the value of preventive care, and certain health conditions may not be treatable (Culyer & Wagstaff, 1993). The second does not take into account the amount of resources spent, leaving unanswered the question of how much health care a person needs. The third concept takes into consideration this issue since need is defined as the amount of health care required to attain equality of health. The fourth definition implies that when capacity to benefit is, at the margin, zero, need is zero; but when capacity to benefit is positive, need is assessed by considering the amount of expenditure required to reduce capacity to benefit to zero (Culyer & Wagstaff, 1993). By combining the level of need with the level of required resources, however, this last definition implies that an individual who requires more expensive intervention has greater need than someone with a potentially more urgent need but for a less expensive treatment (Hurley, 2000).

Although the fourth definition commands the widest approval in the economics literature (Folland, Goodman, & Stano, 2004), empirical studies measure need by level of ill-health (and risk of ill-health) partly because of data availability and relative ease of measurement. Also, the assumption that current health status reflects needs is generally considered to be a reasonable one: an individual in poor general health with a chronic condition clearly needs more health care than an individual in good health with no chronic condition. Moreover, since individuals with higher socioeconomic status have been shown generally to have more favourable prospects for health and thus greater capacity to benefit (Evans, 1994), then allocation according to needs as defined by capacity to benefit may distort the allocation of resources away from the most

vulnerable population groups. These latter groups would have worse ill health, so allocating resources according to this principle would exacerbate socioeconomic inequalities in health (Culyer, 1995). Utilitarians are not concerned with the distribution of utility in the population but instead seek its maximisation; in the context of health care, health would be maximised when resources are distributed according to capacity to benefit. The Rawls' difference principle that inequalities should be to everyone's advantage, in particular the most disadvantaged, suggests that we should be concerned with the health of the worst-off in society and therefore ensure the distribution of health care is directed towards those in worse health. An egalitarian perspective that supports equality of access for equal need would conflict with the definition of need as capacity to benefit because of the potential unintended implications for health inequality.

Measuring need as ill-health

To measure need for health care, an individual's level of ill health is most commonly captured by a subjective measure of self-assessed health (SAH). This provides an ordinal ranking of perceived health status and it is often included in general socioeconomic and health surveys, both at international (for example, the Joint Canada-US Survey of Health) and national level (for example, the Canadian Community Health Survey). The usual health question asks the respondent to rate their general health, sometimes including a time reference (individuals are asked to rate their health in their last twelve months) or an age benchmark (respondents are asked their current health compared to individuals of their own age). Five categories are usually available for the respondent, ranging from very good or excellent to poor or very poor. SAH has been used extensively in the literature, and it has been applied to measure the relationship

between health and socioeconomic status (Adams, Hurd, McFadden, Merrill, & Ribeiro, 2003), the relationship between health and lifestyles (Kenkel, 1995) and the measurement of socioeconomic inequalities in health (van Doorslaer, Wagstaff, Bleichrodt, Calonge, Gerdtham, Gerfin et al., 1997).

There are numerous potential methodological problems associated with relying on SAH as a measure of need. An obvious worry relates to the reliability of SAH as a predictor of objective health status. But this concern may be misplaced. An early study from Canada found SAH to be a stronger predictor of seven-year survival among older people than their medical records or self-reports of medical conditions (Mossey & Shapiro, 1982). This finding has been replicated in many studies and countries since then (Idler & Benyamini, 1997; Idler & Kasl, 1995). In their review, the authors argued that self-rated health represents an invaluable source of health status information, and suggested several possible interpretations for its strong predictive effect on mortality (Idler & Benyamini, 1997).

- SAH more accurately measures health because it captures all illnesses a person has and possibly as yet undiagnosed symptoms. It reflects judgements of severity of illness, and it could reflect an individual's estimate of longevity based on family history.
- SAH not only assesses current health, but it is a dynamic evaluation that represents a decline or improvement in health. Poor assessments of health may lessen an individuals' engagement with preventive or self care, or non-adherence to screening recommendations, medications or treatments.
- SAH reflects social or individual resources that can affect health or it could reflect an individual's ability to cope with illness.

Since this review, mounting evidence has shown SAH to be a valid summary measure of health, one that relates to other health-related indicators such as mortality (Bailis, Segall, & Chipperfield, 2003; Mackenbach, Simon, Looman, & Joung, 2002; McGee, Liao, Cao, & Cooper, 1999; Singh-Manoux, Martikainen, Ferrie, Zins, Marmot, & Goldberg, 2006; Sundquist & Johansson, 1997; van Doorslaer & Gerdtham, 2003) and health care use (van Doorslaer, Wagstaff, van der Burg, Christiansen, De Graeve, Duchesne et al., 2000).

Self-assessed measures of health include subjective and quasi-objective indictors (Jürges, 2007), with the latter being based on respondents' reporting on more factual items, such as specific conditions or symptoms. Examples of these quasi-objective indicators include the presence of chronic conditions (where specific chronic conditions are listed), specific types of cancer, limitations in activities of daily living (ADL) such as walking, climbing the stairs, etc, or in instrumental activities of daily living (IADL), such as eating or having a bath.

There is strong evidence that SAH is not only predictive of mortality and other objective measures of health but may be a more comprehensive measure of health status than other measures. However, bias is possible whereby different population groups may systematically under- or over-report their health status relative to other groups (Sen, 2002). Due to its subjective nature, SAH can be influenced by a variety of factors that impact perceptions of health. That is, the mapping of "true" or objective health into SAH categories may vary according to respondent characteristics. Indeed subgroups of the population appear to use systematically different cut-point levels when reporting SAH, despite having equal levels of "true" health (Hernández-Quevedo, Jones, & Rice, 2008). Moreover, the rating of health status appears to be influenced by culture and

language (Angel & Thoits, 1987; Zimmer, Natividad, Lin, & Chayovan, 2000), social context (Sen, 2002), gender and age (Groot, 2000; Lindeboom & van Doorslaer, 2004), fears and beliefs about disease (Barsky, Cleary, & Klerman, 1992), in addition to the way a question is asked such as the ordering of the question with other health-related questions, and form-based versus face-to-face elicitation (Crossley & Kennedy, 2002). Among the potential biases with SAH include state-dependence reporting bias (Kerkhofs & Lindeboom, 1995), scale of reference bias (Groot, 2000) and response category cut-point shift (Sadana, Mathers, Lopez, Murray, & Iburg, 2000).

Various approaches have been developed to correct for reporting bias in the literature. The first is to condition on a set of objective indicators of health and argue that any remaining variation in SAH reflects reporting bias. For example, Lindeboom and van Doorslaer (2004) used Canadian data and the McMaster Health Utility Index as their quasi-objective measure of health, and found some evidence of reporting bias by age and gender, but not for income. However, this approach relies on having a sufficiently comprehensive set of objective indicators to capture all the variation in true health. The second is to use health vignettes such as those currently included in the World Health Survey (Bago d'Uva, Van Doorslaer, Lindeboom, & O'Donnell, 2008) and the Survey of Health, Ageing and Retirement in Europe (Bago d'Uva, O'Donnell, & van Doorslaer, 2008). The third is the use of biological markers of disease risk. Some studies combined self-reported data with biological data, which could improve the accuracy of the results (Banks, Marmot, Oldfield, & Smith, 2006). Also Johnston et al (2007) reported that an income gradient appeared to be significant when using an objective measure of hypertension measured by a nurse rather than the self-reported measure of hypertension included in the Household Survey of England (Johnston, Propper, & Shields, 2007).

However, the availability of objective measures of health, such as biomarkers, is limited. Some examples of European surveys that include objective measures (such as walking speed, grip strength) include the Survey of Health, Ageing and Retirement in Europe, in addition to national surveys from Finland (blood tests and anthropometric tests – FINRISK), Germany (anthropometric measures – National Health Interview and Examination Survey; urine and blood samples – German Health Survey for Children and Adolescents) and the United Kingdom – English Longitudinal Study of Ageing (ELSA) and Health Survey of England (HSE).

Together with the limited availability, biomarkers may still be subject to bias due to variations in methods of collection. For example, a person's blood pressure may vary according to the time of day it is taken. This measurement error is particularly problematic if it is correlated with socio-demographic characteristics, hence biasing estimates of social inequalities. Collecting biological data also tends to reduce survey response rates, which limits the sample size and their ability to represent the whole population (Masseria, Allin, Sorenson, Papanicolas, & Mossialos, 2007).

Overall there is widespread support for equity goals in health care, though there is no single operational definition of equity that can capture the multiple supply- and demand-side factors affecting the allocation of effective, high quality health care on the basis of need. This complexity necessitates not only a comprehensive set of information on individuals, their contacts with health care and system characteristics, but also strong methodological techniques to assess these relationships empirically. After Section 2.2 reviews the empirical literature of equity in the Canadian context, Section 2.3 will address the issues of measurement methodology.

2.2 Evidence of equity in the Canadian context: what is known on this topic?

Given the value placed on equity goals in most developed countries, including Canada, equity-related empirical research has been quite extensive. There is considerable emphasis on equity in health care in official policy statements in Canada, although there is no clear stated definition of equity. Moreover, the stated goal of the health system is to provide reasonable access to medically necessary health care. These concepts remain undefined although medically necessary services are generally accepted to be what the hospitals and physicians provide (Charles, Lomas, Giacomini, Bhatia, & Vincent, 1997; Evans, 1983). Thus the definition of equity most studied to date in the Canadian context, and commonly interpreted by federal and provincial governments, is the egalitarian viewpoint that individuals in equal need be treated equally, and that receipt of care should not be based on ability to pay, with need, measured by self-reported health status (Birch & Abelson, 1993; Birch, Eyles, & Newbold, 1993; Hurley, Birch, Stoddart, & Torrance, 1997; McGrail, 2008). Thus medical necessity can be understood as an individual's level of health, or level of risk to ill-health: those with poorer health or greater risk have greater needs for services that can be expected to improve their health.

Early studies of equity compared use of health care with health care need in the United Kingdom (Collins & Klein, 1980; Le Grand, 1978). Since then a wide literature has developed. Several national and international studies have analysed equity in health care service use using the empirical technique of calculating the degree to which utilisation is related to income after standardising for differences in needs across the income distribution, for example in Australia (van Doorslaer, Clarke, Savage, & Hall, 2008), the United Kingdom (Bago d'Uva, 2005; Morris, Sutton, & Gravelle, 2005;

O'Donnell & Propper, 1991; Propper, 1998; Propper & Upward, 1992), Finland (Hakkinen & Luoma, 2002), Belgium (Van Der Heyden, Demarest, Tafforeau, & Van Oyen, 2003), Spain (Abásolo, Manning, & Jones, 2001; García-Gómez & López-Nicólas, 2007), Italy (Atella, Brindisi, Deb, & Rosati, 2004), the United States (Chen & Escarce, 2004), Europe (Bago d'Uva, Jones, & van Doorslaer, 2007; van Doorslaer, Koolman, & Jones, 2004; van Doorslaer, Wagstaff, van der Burg et al., 2000), member countries of the Organisation for Economic Co-operation and Development (van Doorslaer, Masseria, & the OECD Health Equity Research Group Members, 2004) and Asia (Lu, Leung, Kwon, Tin, van Doorslaer, & O'Donnell, 2007). These studies highlight the persistence of systematic disparities in health care utilisation across socioeconomic and income groups and across a wide range of jurisdictions with comprehensive health and welfare systems.

The study of equity in Canada's health system dates back to the introduction of Medicare, the insurance system that was founded on the principles of universality and solidarity that sought a more equitable sharing of the burden of illness (Evans, 1983). Research from that time points to significant improvements in the accessibility of health services, demonstrated by an increased rate of utilisation among lower income groups, following the introduction of universal coverage for hospital and physician care in some Canadian provinces such as Québec (Enterline, Salter, McDonald, & McDonald, 1973; McDonald, McDonald, Salter, & Enterline, 1974; Siemiatycki, Richardson, & Pless, 1980), Alberta (Greenhill & Hawthorne, 1972), Ontario (Barer, Manga, & Shillington, 1982; Manga, 1978) and Saskatchewan (Beck, 1974; Beck & Horne, 1976).

Later studies of equity in utilisation, which are discussed in detail below, found variations in utilisation were in part explained by variations in health care need.

However these studies revealed that socioeconomic factors were also important. Overall, there is evidence of inequity in health care utilisation in some sectors and provinces favouring the higher income and educational groups ("pro-rich" distribution), and the lower utilisation than needed among poorer populations despite the removal of direct cost barriers for the large part of services. Most studies separately examined GP, specialist, hospital and, sometimes, dental services. Initial contacts with health care professionals are commonly modelled separately from the volume of services consumed. This two-stage approach derives from the conceptualisation of utilisation whereby an initial contact is driven much more by the patient, whereas future contacts with the health system are determined in large part by the provider (whether for follow-up or through a system of referral) (Evans, 1984). Some studies have measured equity by directly asking individuals in general population surveys to describe barriers to care or unmet medical needs; this literature is described in detail in Section 5.4.

The sections that follow begin with a presentation of early national studies that measured socioeconomic effects on utilisation, followed by a discussion of province-level, then service-specific, studies, and then reviews the results of some recent national studies including the international study of income-related inequity in utilisation based on the *ECuity* method. It ends with a discussion of the remaining gaps in our understanding of equity in the Canadian context. In addition to the literature that investigates the role of socioeconomic status in explaining variations in treatment patterns across individuals or population subgroups, which is detailed below, there is a vast literature that seeks to explain 'small-area' treatment variations in terms of differences in medical practice (Bevan, 1995), the so-called 'practice-style factor' (Wennberg, 1984). These studies are discussed in Section 6.3.5 in reference to the consideration of supply in efforts to understand utilisation patterns.

2.2.1 Early national studies

Numerous studies have investigated the role of socioeconomic factors in influencing the use of physician and hospital services: in the absence of direct financial barriers to access, is utilisation based on need and not ability to pay? For instance, studies using data from the Canada Health Survey and the General Social Survey assessed the extent to which hospital and physician utilisation was influenced by economic factors. These studies largely followed the model of health care utilisation that separates the explanatory factors of utilisation into three categories: 1) predisposing factors such as family composition and social structure; 2) enabling factors such as income, insurance status, and education; and 3) need factors (Aday & Andersen, 1974).

Early studies found negligible income effects on health care utilisation. Using 1978-79 data from the Canada Health Survey, a series of studies have evaluated the relative importance of health needs and socioeconomic variables on hospital and physician service utilisation (Broyles, Manga, Binder, Angus, & Charette, 1983; Manga, Broyles, & Angus, 1987). The 1983 study found that with respect to any physician visit, health care need (measured by a comprehensive set of health status indicators including previous prescription drug use) appeared to be the most significant determinant of both the decision to seek care and the volume of services consumed, and income was not significant in the model of use/non-use but lower income was associated with a greater number of physician visits (Broyles, Manga, Binder et al., 1983). Although they found employed people had a greater likelihood of visiting a physician than the unemployed, the authors concluded that national health insurance had reduced, or even eliminated, financial impediments to health care and resulted in "a more equitable distribution of physician care" (Broyles, Manga, Binder et al., 1983, p.1050). However, the inclusion

of previous prescription drug use, which is conditional upon having seen a physician to receive the prescription, may have masked some of the socioeconomic effects in the model. In the 1987 study, the authors found that, controlling for need (using the same measures as above), occupational status and income were not significantly associated with the probability of a hospital utilisation, although they did find that poor and middle income groups consumed more inpatient care (spend more days in hospital) than their wealthier counterparts (Manga, Broyles, & Angus, 1987). Overall there appeared to be little evidence of inequity in physician and hospital care in the late 1970s.

A later study of physician utilisation based on the 1985 General Social Survey yielded similar findings (Birch, Eyles, & Newbold, 1993). The authors found that controlling for health status and demographics, neither income nor education was associated with the probability of a family physician visit or with the volume of services used conditional upon use. However they also found that analysing utilisation separately for each level of need (by category of self-reported health), income remained non-significant, but higher educated individuals in "excellent" health were using more physician services, which the authors suggested was due to a greater tendency to seek preventive care among the better educated. In addition, residents of Ontario and British Columbia had significantly greater likelihood of a family physician visit and were making more visits than in the Atlantic provinces. The authors concluded that while income did not appear to affect physician service utilisation, other barriers may have existed, such as education and region of residence (Birch, Eyles, & Newbold, 1993). Drawing on this same survey, a comparison of factors affecting utilisation in two provinces – Ontario and Québec – revealed some provincial differences. For instance higher income was significantly associated with the likelihood of a family physician visit in Québec but not Ontario, both in the total sample and in the subset analyses of

only those reporting "excellent" and "good" health status (Newbold, Birch, & Eyles, 1994). Comparing patterns of use in 1991 and 1985 revealed little difference in the magnitude of the effect of income on utilisation: no income gradient was seen in family physician visits in both years, and a positive income gradient in dental care utilisation was found in both years (Eyles, Birch, & Newbold, 1995). These studies again showed little inequity in family physician used, though they identified other socioeconomic and provincial effects and found dental care to be inequitable.

Later studies analysed use of GP and specialist physicians separately, controlling for underlying needs indicators, and found income effects in specialised but not in primary care[4]. An analysis of 1994 National Population Health Survey of the relationship between socioeconomic status and utilisation of GPs and specialists found evidence of inequity in specialist services (Dunlop, Coyte, & McIsaac, 2000). Specifically, Canadians with lower incomes and fewer years of schooling visited specialists at a lower rate than those with higher incomes and higher education (controlling for need: self-assessed health status and number of chronic health problems). However, with regards to primary care, the likelihood of a GP visit was found to be independent of income, and the frequency (having at least 6 visits) was greater among lower income individuals. Higher educated individuals were more likely to make use of GP and specialist services than those without post-secondary education. The authors reported significant differences between geographies: Québec residents were less likely to visit a GP but more likely to make at least one specialist visit; and urban residents were more likely than rural ones to visit a GP and specialist (for women but not men). They concluded that access to primary health care was independent of income, confirming

[4] Remember that in order for a patient to access a specialist, a referral from a GP is needed. However after the initial referral, patients are able to contact the specialist directly for follow-up consultations.

previous studies, however they also found that the likelihood of a specialist physician visit was greater for higher socioeconomic groups (Dunlop, Coyte, & McIsaac, 2000).

Other studies have analysed the determinants of utilisation using NPHS data. One examined the role of social networks in facilitating access to health care among immigrants (Deri, 2005); the other investigated the impact of income and 'supplemental' insurance coverage on utilisation (Stabile, 2001). Including only those individuals with first languages other than English or French, Deri analysed the NPHS from 1994-1999 (cross-sectional files) and found an income effect on utilisation. Among this immigrant population, higher income (and not stating income) was associated with a greater likelihood of a dentist, GP, specialist or any health care professional visit, though fewer GP visits (Deri, 2005). Stabile (2001) analysed 1994 and 1996 data of the NPHS for the working-age population and found that higher income increased the probability of a GP visit but the income effect on the conditional number of GP visits was negative and significant, and negative but not significant for the likelihood of hospital admission and number of days spent in hospital. He also found that 'supplemental insurance' for prescription drugs (including private and public insurance) increased GP utilisation, although it was not significantly associated with hospital use (Stabile, 2001).

2.2.2 Province-level studies

Some province-level studies have been conducted to examine utilisation patterns by socioeconomic status. To a large extent these confirm earlier national studies in spite of their use of administrative, as opposed to survey, data sources in some cases.

An analysis of the 1990 Ontario Health Survey of hospital utilisation patterns by gender revealed that socioeconomic factors were more important for women than for men (Iron & Goel, 1998). Younger women on low income and older women not in the work force were more likely to be admitted to hospital, after controlling for need (as measured by the number of health problems and self-assessed health). This finding of "pro-poor" distribution of hospital care supports earlier evidence at the national level. Also using the 1990 Ontario Health Survey, Katz et al showed that lower-income earners had more physician contacts than middle or higher-income earners (not adjusting for health status). This pattern was especially pronounced for those reporting fair or poor health status, but also seen to a lesser extent among those with good or excellent/very good health status (Katz, Hofer, & Manning, 1996). Further analyses of the 1990 Ontario Health Survey revealed that GP visits were equitably distributed across socioeconomic groups, whereas use of specialist services favoured the higher educated and higher income groups (McIsaac, Goel, & Naylor, 1997) as found in national studies (Dunlop, Coyte, & McIsaac, 2000).

Using Ontario data from the 1994/1995 National Population Health Survey (NPHS) linked to the Ontario Health Insurance Plan providers' database, however, Finkelstein found that income did not influence physician service use. Physician utilisation was measured by the total expenditure incurred for any physician, including out-of-hospital physicians and specialists. The author concluded that physician service use was based on need in this province (Finkelstein, 2001). However, higher education was significantly associated with the likelihood of specialist physician visit. Compared to those with no high school education, those who graduated had a higher likelihood of specialist service use (and they spent on average $21 more, though this was not

significant). The finding that income was non-significant may be due to the relatively small sample size (2170 observations) that only included the 40-79 year olds and those who approved of data linkages. The finding could also relate to the different measure of utilisation in this study (expenditure) compared to previous studies that measured self-reported visits.

An analysis of physician service utilisation in Nova Scotia using the 1990 Nova Scotia Nutrition Survey linked with 1990-1994 data from the Medical Services Insurance Physicians' Services database showed that controlling for age, sex and region, lower income and lower educated individuals used more physician services (Kephart, Thomas, & MacLean, 1998). This observed inverse relationship between socioeconomic status and service use may have been due to unobserved need that was correlated with income and education. Others analysed survey data from Nova Scotia and found that individuals on lower incomes and less education used more GP services but less specialist services than wealthier and more educated comparison groups (Veugelers & Yip, 2003).

In Québec using administrative data from the Québec Health Insurance Board from 1991, Rivest and colleagues found that income was not significantly associated with the volume of physician care, including GPs and specialists, as found in Ontario, (Finkelstein, 2001). They measured the costs incurred based on the physician fee schedule. They found regional inequalities were significant (Rivest, Bosse, Nedelca, & Simard, 1999). Here, need was measured by the extent of previous hospitalisation, therefore, restricting the analyses to those individuals who had accessed the system.

Several other studies have demonstrated that factors other than need influence health care utilisation. Numerous studies based in Winnipeg, Manitoba made use of administrative data and income divisions based on neighbourhood statistics. One investigated inequalities in hospital and physician services and demonstrated that lower income groups had higher health care needs as measured by mortality rates (Roos & Mustard, 1997). The authors found that poorer income groups used significantly more GP and hospital inpatient care, whereas surgery and specialist physician consultation rates did not vary across income groups. The authors therefore concluded that the distribution of surgical and specialist care was inequitable favouring the richer populations. In another analysis, Roos *et al* found a pro-rich inequality in physician services: residents of low-income neighbourhoods incurred comparable physician expenditures as those from wealthier neighbourhoods (though greater hospital expenditures) despite their greater health care needs as measured by population mortality and morbidity (measured by premature -before age 75- mortality rate, hip fractures and acute myocardial infarctions and diabetes prevalence) (Roos, Forget, Walld, & MacWilliam, 2004). A further analysis compared rates of physician and hospital utilisation for ambulatory care sensitive conditions by income quintile; it revealed significantly higher utilisation rates for both in the lower income neighbourhoods (Roos, Walld, Uhanova, & Bond, 2005). The above studies relied on administrative data, which, despite the advantages of being able to accurately measure expenditure, does not link individual-level health care needs and socioeconomic status with utilisation. In spite of this limitation the studies' results are not inconsistent with previous research.

2.2.3 Service-specific studies

Utilisation of more specific services, whether among the population or among individuals with specific diseases, has also been studied in relation to socioeconomic status[5]. While focussing on specific conditions may have the advantage of offering a targeted approach to investigate a specific sub-population, and restricts consideration to those who by definition have very similar needs, the findings cannot be generalised to the general population.

Alter et al linked Ontario hospital and physician administrative data from 1994-1997 with neighbourhood statistics to impute income and to assess the rates of use and waiting times for coronary angiography and revascularisation procedures (Alter, Naylor, Austin, & Tu, 1999). They found that socioeconomic status significantly influenced access: there was a significant positive association between income and rate of use of the two cardiac surgeries, and waiting times were inversely correlated with neighbourhood income quintiles (waiting times for procedures were 45% lower and use of procedures 23% higher for patients from the highest-income neighbourhoods than for patients from lowest-income neighbourhoods). Furthermore, mortality rates demonstrated a similar socioeconomic gradient in favour of higher income individuals: a between-neighbourhood difference of $10,000 was associated with a 10% difference in one-year mortality favouring the higher income neighbourhood. A survey of physicians and hospital administrators also showed that access to specialised cardiac

[5] Systematic differences in health care utilisation by other factors such as gender and age has also been seen among individuals with specific diseases such as cancer and heart disease (Jackevicius, Alter, Cox, Daly, Goodman, Filate et al., 2005; Sheppard, Behlouli, Richard, & Pilote, 2005; Townsley, Pond, Peloza, Kok, Naidoo, Dale et al., 2005).

care was influenced by factors other than clinical need such as the patient's type of employment (Alter, Bassinki, & Naylor, 1998).

Preventive services, such as screening and diagnostics, have also been investigated. The use of diagnostics has been shown to be related to income in Winnipeg, Manitoba. Administrative data for a 12-month period between 2001 and 2002 revealed that for six different diagnostic imaging categories, higher income was associated with higher uptake after controlling for morbidity level (based on three grouping using the ICD-9) and age (Demeter, Reed, Lix, MacWilliam, & Leslie, 2005). Patterns of preventive service use also demonstrated income-based differences favouring the rich in national analyses (Snider, Beauvais, Levy, Villeneuve, & Pennock, 1997) and in Ontario (Glazier, Creatore, Gozdyra, Matheson, Steele, Boyle et al., 2004; Katz & Hofer, 1994).

The findings of the studies on equity of health care use in Canada suggest that hospital services may be equitable (found in 1 out of 4 studies) or "pro-poor" (i.e. more concentrated among lower income groups; 3 out of 4 studies), general physician services may be equitable (7 out of 14 studies), "pro-poor" (4 studies) or "pro-rich" (3 studies, all measuring the likelihood of contacting a GP), and specialist services were "pro-rich" in 3 out of 5 studies. However this literature exhibits three major limitations: (1) most recent studies rely on provincial, rather than national datasets; therefore they do not permit comparisons across provinces; (2) they employ simplistic statistical models that do not control adequately (if at all) for need variables, and individual characteristics; (3) they provide little evidence for the underlying contributors to inequity; and (4) there is little or no discussion of the policy context in which inequity arose and could, therefore, be reduced.

2.2.4 Recent national studies

The above studies were followed by an international study of income-related inequity that addressed some of the limitations of previous research (van Doorslaer, Masseria, & Koolman, 2006; van Doorslaer, Masseria, & the OECD Health Equity Research Group Members, 2004). More specifically, this study controlled for systematic variations in health care need by income in order to better evaluate the extent to which equal utilisation for equal need is achieved, and compared levels of inequity across countries (this methodology is discussed in detail in Section 2.3.2).

Van Doorslaer and colleagues calculated inequity among the 15 years and older population based on the 2001 Canadian Community Health Survey (the sample included 107,613 individuals) (van Doorslaer, Masseria, & Koolman, 2006; van Doorslaer, Masseria, & the OECD Health Equity Research Group Members, 2004). Income-related inequity in total doctor visits, after standardising for need, was non-significant; therefore, doctor visits appeared to be distributed according to need. However, when they examined the probability of any use, the rich were significantly more likely to visit any doctor than the poor. Also the rich were slightly, but significantly, more likely to visit a GP, after standardising for need. However conditional upon having visited the GP, the poor were making more visits than their richer counterparts. For specialist visits, after standardising for need, the rich were significantly more likely to visit a specialist and were also doing so more frequently than the poor. Similar to specialist visits, the probability and frequency of dental care appeared considerably "pro-rich", in other words the distribution of dental utilisation was heavily concentrated among the upper end of the income distribution. On the contrary, hospital care appeared to be concentrated among the poor, both for the probability of admission, and total number of

nights spent in hospital. These results are mostly consistent with the literature; however, this methodological approach (the *ECuity* method) not only measured the existence of inequity, but quantified its extent and identified some of the contributors. Inequity appeared to have been driven by the effect of income itself, education and province effects (van Doorslaer, Masseria, & the OECD Health Equity Research Group Members, 2004).

Since this study, there have been additional analyses conducted with the following objectives:

- to measure the effect of income on health care utilisation after controlling for a greater number of needs indicators (Asada & Kephart, 2007),
- to estimate the between-province and within-province contributions to estimates of income-related inequity in both health and health care use using the *ECuity* methods (Jiménez-Rubio, Smith, & van Doorslaer, 2008),
- to examine any changes in the effect of income on health care utilisation between the years 1978 and 2003 (Curtis & MacMinn, 2007),
- to measure distance-related inequity in the use of hospital services in Ontario (Hurley, Grignon, Wang, & McGrath, 2008), and
- to undertake more in-depth analyses of inequity in the dental sector drawing on a supplementary module to the Canadian Community Household Survey (Grignon, Hurley, Wang, & Allin, 2008).

With regards the first, using the same dataset as van Doorslaer et al 2004, the authors confirm their findings that higher income increased the probability of a GP and specialist visit. However, they found that income had no effect on the likelihood of an

inpatient stay, unlike the previous finding of a pro-poor inequity, which the authors attribute to a more complete needs-adjustment (Asada & Kephart, 2007).

With regards the second study, the authors also used the same dataset as the van Doorslaer et al 2004 study to examine differences in inequity across provinces. They confirm previous findings at national level but add to the existing knowledge; they found that inequity in health care use in Canada was driven more by between-province effects (i.e. people in wealthier provinces using more services than those in poorer provinces) than within-province effects (i.e. wealthier individuals within provinces using more services than poorer individuals controlling for need) (Jiménez-Rubio, Smith, & van Doorslaer, 2008).

The third study compiled four national surveys of six cross-sections covering a 25-year period and revealed relative stability in the independent positive income effect on specialist care utilisation (both the likelihood of a visit and the conditional number of visits). They found a slight increase in the income and education effects on the probability of a visit to a medical doctor over time (Curtis & MacMinn, 2007). The fourth and fifth studies investigated hospital and dental care; these are discussed in greater detail in Sections 3.6.2 and 6.3.5.

2.2.4 Gaps in the literature

Some recent additions to the literature have built upon the evidence of inequity in health care use in Canada and have addressed some of the limitations of previous studies. However there remain significant gaps that this thesis seeks to address.

1. Most studies relied on provincial, rather than national datasets, and those that used national datasets did not examine levels of inequity separately for each province. This is a significant omission given that the health systems are provincially-administrated and governed by provincial policies. This will be addressed explicitly in Chapter 3.
2. The majority of previous studies have been concerned with testing for inequity (e.g. finding a non-zero effect of income or socioeconomic status on health care utilisation) as opposed to quantifying the level of inequity. Using the method developed by the *ECuity* project it is possible to estimate the level of inequity; this approach is applied to the Canadian context in Chapters 3 and 4.
3. Although recent studies consistently demonstrated a pro-rich inequity in the likelihood of a GP visit, and pro-rich inequity in the likelihood and number of specialist visits, no study has measured the role of private and public prescription drug insurance in explaining inequity in physician service use. This is addressed in Chapter 4.
4. Some studies have sought to examine the equity implications of perceived access problems, although none have explicitly investigated the relationship between subjective 'unmet need' and actual health care utilisation. Chapter 5 therefore addresses this issue.
5. Few studies have examined the policy implications of any inequity that is observed, leaving many questions about the policy relevance of the findings unanswered; this is the subject of Chapter 6.

2.3 Methodology: how does this thesis address the research questions?

Methods of measuring equity in access to health care originated with comparisons of health care use with health care need (Collins & Klein, 1980; Le Grand, 1978), and since then have taken broadly two directions. The first is to measure the independent effect of some measure of socioeconomic status on the likelihood of contact with health services or the volume of health services used or expenditures incurred with regression models (the regression method). The second is to quantify inequity by comparing the cumulative distribution of utilisation with the cumulative distribution of needs-adjusted utilisation (the *ECuity* method). These two are the most common but are not the only metrics of equity. Some other approaches are listed in Appendix 2B and include approaches that draw on correlations and regressions, and those that are based on distributional measures.

2.3.1 Regression method

Measuring equity empirically on the basis of regression analyses is the most common approach in the literature, as shown in the previous section. These studies draw heavily on the behavioural model of health service use developed by Ronald Andersen and Lu Ann Aday over the past four decades. Initially, the behavioural model in the 1960s suggested health care service use (HC) was a function of an individual's predisposition to use services (social structure, health beliefs), factors which enable or impede use on an individual level (income and education) and community level (availability of services), and their need for care (Andersen, 1995). The factors affecting utilisation can be separated into needs and non-need variables, denoted by vectors X and Z respectively.

$$HC = f(X, Z)$$

Inequity thus is assumed to arise when factors other than needs significantly affect the receipt of health care. Regression models of utilisation address the question: holding need and demographic factors affecting utilisation constant, are individuals with socioeconomic advantage (e.g. in terms of income, education, employment status, availability of private insurance, etc.) more likely to access health care, and are they making more contacts, than their less advantaged counterparts? Making use of a comprehensive model of utilisation with multiple explanatory variables allows for policy-relevant interpretations, whereby one can identify the factors that affect utilisation and then, to the extent they are mutable, develop policies accordingly. This approach therefore is appealing to both researchers and policy-makers. However, while the findings may signal the existence of inequity, they do not quantify its extent.

Regressions can either assume linearity or non-linearity of the chosen dependent variable of utilisation. Health care utilisation is conceptually understood as a two-stage process, where the likelihood of a contact is usually considered separately from the number of contacts made thereafter. Moreover utilisation variables are often count variables (unless measured in expenditure) and highly skewed (many zeros and ones and a long right-hand tail). Appendix 2C offers a visual depiction of the distributions of physician and dentist visits by Canadian provinces; these distributions are characterised by a high proportion of zero and one values, with few that are greater than one. Therefore these formally call for non-linear models, a binomial probit or logistic model for the initial contact (yes or no), and then a model based on the poisson distribution for the measure of the number of visits (a count variable) (Deb & Trivedi, 2006; Newhouse

& the Insurance Experiment Group, 1993). Probit models are based on a normal distribution and logit a logistic distribution; the results of these two models are usually equivalent unless the outcome is very rare and in this case a logit provides more accurate estimates of effects (Dougherty, 2002). The number of visits is also typically highly skewed, therefore empiricists have developed models accounting for both the count nature of the variables and its skewness (such as the negative binomial model) (Jones, Rice, Bago d'Uva, & Balia, 2007). The effects of different model specifications should be tested, therefore, to determine whether the results are sensitive to the choice of model and their underlying assumptions. As an alternative to the conventional two-part model of health care utilisation, some argue that instead of considering the use/non-use separately from extent of use, the infrequent or low users should be compared to the frequent or high users based on a "latent class framework" (Deb & Trivedi, 2002); however this approach is uncommon.

2.3.2 The ECuity method: concentration index

The second approach also makes use of a regression model, but tests for the existence of inequity by creating a relative index that allows comparisons across jurisdictions, time or sectors (O'Donnell, van Doorslaer, Wagstaff, & Liondelow, 2008). This now widely recognised approach was developed by the European Community Health Services Research Programmes on Equity, known as the *ECuity* project. This project aims to measure and compare inequality in health and inequity in health care finance and delivery across countries. They define inequality in utilisation as any differences in actual, unadjusted utilisation across the income distribution, whereas horizontal inequity

is defined as any differences in utilisation by income that remain after controlling statistically for differences in need for health care across the income distribution.

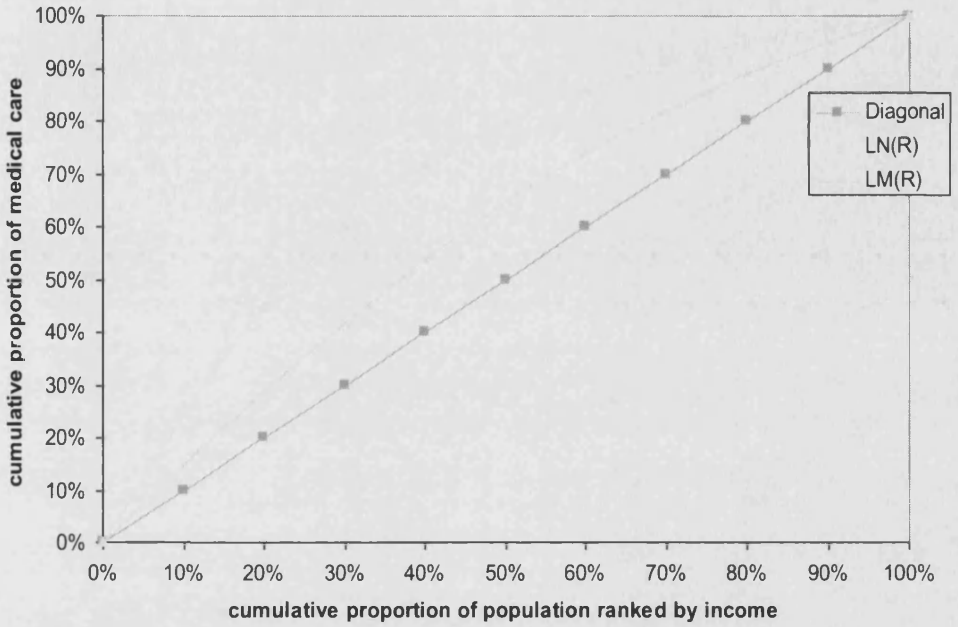
This method derives from the literature on income inequality based on the Lorenz curve and the Gini index of inequality. The concentration curve, similar to the Lorenz curve that describes the distribution of income in a population, describes the relationship between the cumulative proportion of the population ranked by income (on the x-axis) and the cumulative proportion of health care utilisation (on the y-axis). Like the Gini index that provides a measure of income inequality, the concentration index is a measure of income-related inequality in access to health care and it is estimated as twice the area between the concentration curve and the line of equality (the diagonal) (O'Donnell, van Doorslaer, Wagstaff, & Lindelow, 2008).[6]

Figure 2.1 shows the concentration curves for medical care (*LM*) and for need (*LN*), ranking individuals by a socioeconomic variable, such as income, from the lowest (poorest) to the highest (richest) individual. If both the cumulative proportion of health care utilisation and the cumulative proportion of needs-adjusted utilisation are equally distributed across income, the two curves would coincide with the diagonal (line of equality). To quantify the level of horizontal inequity in the receipt of health care the level of needs-adjusted utilisation (*LN*) is compared with the amount of health care received (*LM*) by ranking each individual according to their income level. When the

[6] The concentration index approach has mainly been used for measuring horizontal inequity. Few studies have used the vertical equity principle of proportional unequal access for unequals in measuring access to health care. In contrast, the vertical equity principle has mainly been used for measuring income-related equity in health care finance ((O'Donnell, van Doorslaer, Wagstaff et al., 2008; Wagstaff & van Doorslaer, 2000). The Kakwani index measures the extent to which each source of finance separately (e.g. taxes, social insurance, private insurance and out of pocket payments) or the overall financing system (weighted average of each source of finance index) departs from proportionality.

health care and needs-adjusted utilisation curves coincide, the horizontal inequity index equals zero and no inequity is detected (in other words, the utilisation of health services is proportional to needs). As shown in Figure 2.1, when the needs-adjusted utilisation concentration curve (*LN*) lies above the health care utilisation concentration curve (*LM*), there is horizontal inequity favouring the rich. This is described as "pro-rich inequity" in the literature. In this case, actual health care utilisation is more concentrated in the lower end of the income distribution; however, after accounting for higher levels of need among lower income groups, the level of utilisation is actually not concentrated enough among those with lower income, and income-related inequity is found. It is also possible for the level of needs-adjusted utilisation to be concentrated among the lower income groups; in the literature this is referred to as "pro-poor" inequity. Such "pro-poor" inequity could be understood as an *over*-utilisation among the poorer groups (which could arise for reasons such as inappropriate or poor quality care that is being received by poorer groups or a need for more services to achieve health gain than higher income groups), or alternatively it could be understood as an appropriately higher utilisation due to the inability to accurately measure the greater health needs among these groups with the data available. The level of inequity can then be calculated as twice the area between the two curves (*LN and LM)* (Wagstaff & van Doorslaer, 2000).

Figure 2.1 Concentration curves for utilisation (*LM*) and need (*LN*) compared to the line of equality (diagonal).



When levels of inequity are relatively small in magnitude then graphical depictions as in Figure 2.1 are not very informative and are difficult to interpret[7]. Therefore in this thesis I calculate the level of inequity directly using the methods that are explained below.

Beginning with a health care demand model, as in the above regression approach, it is possible to calculate the index of horizontal equity in five basic steps (O'Donnell, van Doorslaer, Wagstaff et al., 2008). First, calculate the concentration index of actual, unadjusted utilisation (CI, unadjusted):

$$(1) \qquad CI_{unadj} = \frac{2\sigma_R^2}{y_m} y,$$

[7] In Canada where levels of inequity are relatively modest, the concentration curves are not very informative. However inequity in the some areas, in particular for dental care, is more substantial, and for illustrative purposes a concentration curve for the use of dental check-ups in the province of Ontario is depicted in Appendix 3F.

where σ_R^2 is the variance of the income rank (R) in the population (weighted to represent the reciprocals of selection probabilities normalized to the sample size), y is the utilisation variable of interest, and y_m is the weighted mean of utilisation.

Second, estimate a model of health care utilisation.

(2) $$y = \alpha + X'\beta + Z'\delta + \varepsilon,$$

where α, β, and δ are regression coefficients, X and Z are the vectors of need and non-need variables, respectively, and the error term is represented by ε.

As the need for health care tends to be associated with income, one must adjust for differences in the distribution of need by income in order to determine the inequality in use that remains (and can then be interpreted as inequity). Using the indirect standardisation approach, it is possible to generate the predicted value of health care for each individual that depends only on need. The predicted value indicates the amount of health care that each individual would have received if she/he had been treated on average by the system the same as others with the same need characteristics. Therefore the third step predicts needs-adjusted utilisation for each individual by setting the value of all non-need variables at their sample mean during prediction:

(3) $$\hat{y} = \hat{\alpha} + X'\hat{\beta} + Z^m\delta,$$

where all variables are defined as above, and Z^m refers to the sample means of the non-need variables.

Fourth, calculate the concentration index of needs-adjusted utilisation (CI, adjusted):

(4) $$CI_{adj} = \frac{2\sigma_R^2}{y_m}\hat{y}.$$

Finally, calculate horizontal inequity as the difference between the concentration indices of unadjusted and needs-adjusted utilisation:

(5) $HI = CI_{unadj} - CI_{adj}$.

To test for statistical significance, confidence intervals and standard errors for the concentration indices (CI_{unadj}, CI_{adj} and HI) are generated by running a "convenient regression" (Kakwani, Wagstaff, & van Doorslaer, 1997) on relative income rank (R),

(6) $CI = \alpha + \beta R + \varepsilon$,

where β and its standard error would be the point estimate and standard error of the concentration index (CI_{unadj}, CI_{adj} and HI).

The above methods rely on linear models of utilisation (OLS) which may or may not be the most efficient model due to the skewed and count nature of most utilisation variables (Jones, Rice, Bago d'Uva et al., 2007). Therefore a 'linear transformation' has been proposed in order to calculate the index of inequity using an underlying utilisation model that is non-linear (O'Donnell, van Doorslaer, Wagstaff et al., 2008). To model the probability of health care utilisation, a nonlinear functional form that constrains the estimated probability to lie in the (0,1) can be taken, such as the probit model, based on the cumulative standard normal distribution, or the logit model, based on the cumulative standard logistic distribution. (In the economics literature, analyses tend to rely on the probit model except for in cases with very rare probabilities.) For the number of visits, a skewed count variable could be modelled with a negative binomial specification that extends the Poisson approach (O'Donnell, van Doorslaer, Wagstaff et al., 2008)[8]. Based on non-linear utilisation models, instead of calculating HI by subtracting the needs-

[8] If, instead of physician visits, expenditure on physician services is the dependent variable, then one possible approach to addressing its lognormal distribution would be to take the natural logarithm of expenditure and then use a linear specification (O'Donnell, van Doorslaer, Wagstaff et al., 2008).

standardised inequality index (CI_{adj}) from the unadjusted inequality index (CI_{unadj}), as outlined in equation 5 above, *HI* is estimated by first calculating needs-standardised utilisation,

$$(7) \qquad y_s = y - \hat{y} + \hat{y}_m,$$

where y_s is the needs-standardised utilisation variable, y is the utilisation variable, $\hat{y}$ is needs-predicted probability from equation 3 and $\hat{y}_m$ is the weighted mean of needs-predicted utilisation. Then *HI* is calculated directly based on the relationship between the variance of income rank and the needs-standardised probability of utilisation,

$$(8) \qquad HI = \frac{2\sigma_R^2}{y_s^m} y_s,$$

where y_s^m is the weighted mean of needs-standardised utilisation generated in (7). The calculation of *HI* using either (5) or (8) would yield equivalent estimates if the underlying utilisation models were linear, and even if they were non-linear, these estimates would be similar (O'Donnell, van Doorslaer, Wagstaff et al., 2008).

Standardising for need is crucial to the measurement of inequity. Nearly all empirical studies of horizontal inequity in health care utilisation have measured need using a combination of demographic indicators such as age and sex and health status indicators such as self-assessed health status, the presence of chronic conditions, and activity limitations (O'Donnell et al. 2008). Although there is some concern that current health status may not be the most appropriate measure of need for past health care use, given that the health services consumed may have improved health (in other words endogeneity that derives from a causal impact of health service use on current health

status), there is evidence that this effect is minimal (Bago d'Uva, Jones, & van Doorslaer, 2007; Windmeijer & Santos Silva, 1997).

An advantage of the concentration index approach is that it enables the decomposition of the contribution of need (i.e. ill-health) and non-need (i.e. socioeconomic) variables to overall inequality in health care (O'Donnell, van Doorslaer, Wagstaff et al., 2008; Wagstaff, van Doorslaer, & Watanabe, 2003). The contribution of each determinant to total inequality in health care utilisation can be decomposed into three components: two deterministic components, equal to the weighted sum of the concentration indices of need and non-need regressors, where the weight is the health elasticity (evaluated at the sample mean in the case of non-linear models); and a residual component that reflects the inequality in health that cannot be explained by systematic variation across income groups.

Therefore, for a linear additive regression model of health care utilisation (y) on a set of need and non-need variables, such as in equation (2), the unadjusted concentration index (CI_{unadj}) alternatively can be calculated as the sum of the individual contributions of the need (CI_n) and non-need explanatory variables (CI_z),

$$(9) \qquad CI_{unadj} = \sum(\beta_x x_m / y_m)CI_n + \sum(\delta_z z_m / y_m)CI_z + GC_\varepsilon / y_m ,$$

where y_m is the mean of the utilisation variable y, x_m and z_m are the mean of the need (X) and non-need (Z) variables, CI_n and CI_z are, respectively, the concentration indices for the need and non-need variables, and GC_ε is the generalised concentration index of the error term (ε). This error component measures the difference between the unadjusted inequality (CI_{unadj}) calculated directly from equation (1). Therefore, if there are determinants of utilisation that are correlated with income but not included in the utilisation models, then the sum of the contributions of each of the variables in the

model will not equal the actual, unobserved concentration index as found through equation (1).

The contribution of each non-need, z, variable, is calculated in terms of its concentration index (CI_z) (based on the covariance between each variable, z, included in the regression (2) and the rank (r) in the income distribution), its prevalence (the sample mean), and the mean of needs-adjusted utilisation:

$$(10) \quad Contribution_z = \frac{2\mathrm{cov}(z,r)}{\hat{y}_m} z_m,$$

where z_m is the mean of the non-need variable and $\hat{y}_m$ is the mean of needs-adjusted utilisation.

Based on the decomposition in (9), the contributors to inequality can be divided into inequalities in each of the need (X) and non-need (Z) variables (O'Donnell, van Doorslaer, Wagstaff et al., 2008; Wagstaff, van Doorslaer, & Watanabe, 2003). Income-related inequity may be due to a direct effect of income, or to an indirect effect of other factors. Because income may be correlated with other socio-demographic characteristics, such as education, place of residence, employment and immigration status, a finding of income-related inequity can represent a direct effect of income or the combined effect of other characteristics in their relationship with both income and utilisation.

The role of income itself in explaining inequity therefore depends on how unequal the income distribution is (measured by the concentration index of income) and how strong its marginal effect is (holding all other variables constant) on utilisation. The contribution of income and the index of income-related inequity may differ since the marginal contribution is based on all else being constant though the inequity index is

based on holding only needs variables constant (i.e. needs-standardised utilisation). It is likely that the marginal income contribution will be smaller than the index of inequity (*HI*) because other variables also contribute.

If, for instance, higher income individuals also have higher educational attainment, and if higher education is associated with increased utilisation, this will result in a positive contribution of education to the income-based concentration of health care use. A higher contribution depends on a higher absolute value of the relationship between education and health care use and a greater concentration of education on income. A contribution can be either positive or negative. A negative contribution would arise if the effect of education on health care use and the income-based concentration index for education are of opposite signs. A variable that is included in the demand model may not contribute to inequity for three reasons: it may be strongly associated with health care utilisation but not correlated with income, it may be strongly correlated with income but with no significant effect on utilisation, or it may be both correlated with income and health care utilisation but have very low prevalence in the population. Though this approach offers a powerful tool to disentangle the contributors to inequity, it is inevitably limited to the consideration of factors that can be quantitatively measured at an individual level.

There are some limitations with this approach to measuring equity. For instance, when the demand for health care is not modelled using linear estimation techniques, the decomposition method is not easily applicable (O'Donnell, van Doorslaer, Wagstaff et al., 2008). However, analyses have consistently shown little difference in the results from linear and non-linear approaches (O'Donnell, van Doorslaer, Wagstaff et al., 2008; van Doorslaer, Masseria, & the OECD Health Equity Research Group Members, 2004).

In addition, jurisdictions with different mean levels of health care use may yield the same inequity index; the index does not impose any judgement about an appropriate level of utilisation in a population. Also a value of zero for the horizontal inequity index can be obtained if the two curves (utilisation and need) cross the diagonal (e.g. a pro-poor part in the distribution may compensate a pro-rich in another, or vice versa). The concentration index has also been criticised for being difficult to interpret since it is not expressed in natural units (Mackenbach & Kunst, 1997). In response to this critique, the concept of income redistribution from the literature on income inequality was applied to the concentration index to come up with an intuitive interpretation (Koolman & van Doorslaer, 2004). A concentration index of 0.10 implies that a lump-sum redistribution of 10% of the total amount of utilisation would be required from the richest half to the poorest half of the population in order to equalise the distribution of services. Also, when the degree of inequality doubles, an index also doubles, for example from 0.10 to 0.20. If you suppose that the distribution of need is concentrated among the lower income groups, and the concentration index of needs is -0.05; then a 10% redistribution of utilisation will not be sufficient to achieve equity. The horizontal inequity index is interpreted in the same way, such that the HI index of 0.15 implies a 15% redistribution of utilisation is required to reduce inequity to zero. Overall, the concentration and horizontal inequity indices provide useful tools for measuring and understanding inequity in health care.

Box 1. Defining key terms for analyses of equity

Utilisation probability	The likelihood of reporting use of health care services in the past year. The variable would equal 1 if the individual reported any use in the past year, and a 0 if he or she reported no use.
GP probability	The utilisation probability for the use of GP services. The variable would equal 1 if the individual reported 1 or more visits to the GP in the past year, and a 0 if he or she reported having no visits to the GP.
Conditional visits	The number of visits that an individual has made to a health care provider (GP, specialist, dentist) in the past year conditional upon having made at least one visit. It is a count variable that includes all non-zero observations; the lowest value is 1.
Concentration index	An index that ranges from -1 to 1 that measures the extent that health care utilisation is concentrated in the income distribution.
Horizontal inequity	Any variation in utilisation by income (or socioeconomic status) that remains after statistically adjusting for differences in need by income.
Horizontal inequity index	The concentration index of horizontal inequity measures the concentration of health care utilisation after adjusting for need across the income distribution.
Pro-rich inequity	Health care utilisation is concentrated in the upper end of the income distribution (after adjusting for need); the horizontal inequity index would be positive.
Pro-poor inequity	Health care utilisation is concentrated in the lower end of the income distribution (after adjusting for need); the horizontal inequity index would be negative.

2.3.3 Data: the CCHS

This section describes the data that is used to address the three research questions of this thesis.

1. What is the extent of inequity in the Canadian system? How do the level and contributors to inequity vary across the provinces? (Chapter 3)
2. Does the exclusion of prescription drugs from the universal public insurance plan, and reliance on private insurance, contribute to inequity in physician service utilisation? (Chapter 4)
3. To what extent can subjective unmet need inform our understanding of equity? (Chapter 5)

To address these questions, recent nationally- and provincially-representative data are required that cover the set of individual-level variables of interest: health status, demographics, health care utilisation, income and other socioeconomic indicators, and complementary insurance. On the basis of these criteria, this thesis draws on the Canadian Community Health Survey (CCHS), a nationally representative survey conducted by Statistics Canada. It is a cross-sectional, community-based population health survey based on a multi-stage clustered design with individual occupants of private occupied dwellings as the final sampling unit.

The level of information collected and the unit of observation is the individual: one individual per household is randomly selected using various selection probabilities based on age and household composition. All members of the household are listed and a person aged 12 years or over is automatically selected on the basis of weighted probabilities by age: the selection weight multiplicative factor is 5 for 12-19 year-olds,

2 for 20-29 year-olds, 2 for 30-44 year-olds, 1 for 45-64 year-olds, and 1 for the 65+ age group. For a household with five or more members, however, each individual is given an equal probability of selection (to avoid extreme sampling weights). This was changed from the 2003 (CCHS 2.1) sampling method, which assigned a weight of 5.8 to the child (under age 20) in a single-child household for a household with one adult (20 and over), 4.8 if two adults, 3.8 if three adults, 4.8 if four adults, and equivalent if five or more; if there are two children within the household the weight for selecting a child would be 2.9 if one adult, 2.4 if two adults and equivalent thereafter (Statistics Canada, 2005).

The survey began collection in September 2000, and there have been data releases in 2001, 2003, and 2005. The survey has a two-year collection cycle and covers the whole country. Since 2007, data collection takes place on an annual basis. Persons living on Indian Reserves or Crown lands, residents of institutions, full-time members of the Canadian Armed Forces and residents of certain remote regions are excluded from this survey. Applying sampling weights to the data, its coverage is around 98% in the provinces, while in the Territories it is about 90% and 71% in Nunavut, primarily due to the fact that some remote regions are excluded.

The following subjects are included in the survey:

- Disability
- Diseases and health conditions
- Factors influencing health
- Health status
- Health services performance and utilisation
- Injuries
- Mental health and well-being
- Prevention and detection of disease

To complete the full interview takes approximately 45 minutes and it is administered using computer-assisted interviewing. The advantages of computer-assisted interviewing include the following: the question text is customised to the respondent, including reference periods and pronouns (based on interviewee age and sex, interview date, and answers to preceding questions); it automatically checks for inconsistencies and out-of-range responses, therefore giving the respondent and interviewer chance for corrections; and it automatically skips inapplicable questions.

The CCHS includes both a mandatory core component that is completed by respondents in all provinces and optional components completed at the discretion of individual provinces. Response rates are very high. In 2003 (wave 2.1), the overall Canadian response rate was 81%, and in 2005 (wave 3.1) it was 79%.

Table 2.1 Survey response rates for CCHS 2.1 and 3.1

Province	CCHS 2.1 (2003)	CCHS 3.1 (2005)
British Columbia	81.2	77.3
Alberta	82.7	81.5
Saskatchewan	84.3	84.1
Manitoba	85.3	83.3
Ontario	78.5	77.2
Québec	78.0	76.4
Nova Scotia	84.1	83.8
New Brunswick	86.3	83.6
Prince Edward Island	83.4	83.4
Newfoundland and Labrador	87.0	85.7
CANADA	80.7	79.0

In cases where the respondent was, for reasons of physical or mental health, incapable of completing an interview, another knowledgeable member of the household supplied information about the selected respondent. Proxy respondents represented less than 2%

of the total sample and were not included in the analyses of this thesis if there were any missing data for the variables of interest.

The CCHS is available in two forms: a publicly available microdata file (or public use microdata file, PUMF) and a master data file available at Statistics Canada licensed research data centres. The PUMF differs in a number of important aspects from the master data files held by Statistics Canada because of efforts to protect the anonymity of individual survey respondents. For instance, variables that are deemed to be 'sensitive' are grouped, capped or completely removed from the files. Also, some health regions are collapsed with other regions due to their small population sizes.

The relevant differences for this thesis between the PUMF and master data files include utilisation and income. The PUMF truncates the right-hand tail of the health care utilisation distributions for the purpose of ensuring anonymity. While for the master data file there is no upper limit, in the PUMF the annual maximum for GP visits and hospital nights is 31, and for specialists and dentists the maximum is 12 visits.

Another 'sensitive' variable that is aggregated in the PUMF is reported income level. The CCHS is primarily a health survey and therefore the questions on socioeconomic status are not comprehensive; estimates of income are based on a single question. Since income is one of the primary variables of interest for this thesis, it is important to acknowledge the variations between the CCHS datasets. In both data files, income is measured based on the individual's response to this question: "What is your best estimate of the total income, before taxes and deductions, of all household members from all sources in the past 12 months?" In the master data file, income is measured as a continuous variable. It is therefore possible to apply the OECD equivalence scale to

generate individual income that is adjusted for household size and composition. This scale assigns a weight of 1.0 to the first adult household member, 0.5 to the second adult household member and 0.3 to children.

This same survey question is used to generate grouped variables for the PUMF. The categorical income variables available in the PUMF differ from 2003 (CCHS 2.1) and 2005 (CCHS 3.1). In 2003, total household income is provided in quintiles that are adjusted for the number of people living in the household to represent individual income, according to the following classification:

1) <$10,000 if one to four people; <$15,000 if five or more people;
2) $10,000 to $14,999 if one or two; $10,000 to $19,999 if three or four; $15,000 to $29,999 if five or more;
3) $15,000 to $29,999 if one or two; $20,000 to $39,999 if three or four; $30,000 to $59,999 if five or more;
4) $30,000 to $59,999 if one or two; $40,000 to $79,999 if three or four; $60,000 to $79,999 if five or more;
5) >$60,000 if one or two; >$80,000 if three+.

The publicly available data set for the 2005 data release does not adjust household income for household composition. Instead, it includes total household income in six categories: 1) no income, 2) less than $15,000, 3) $15,000-$29,999, 4) $30,000-$49,999, 5) $50,000-$79,999, and 6) $80,000 or more. The 2005 PUMF is used in Chapter 5, and in the analyses I include information on the number of people in the household as a form of indirect equivalisation method.

The CCHS does not include information on the availability of health care resources, or supply characteristics that may be affecting patterns of health care utilisation. At the level of the health region in which an individual resides, data are available on the numbers of GPs and specialists per capita from annual reports published by the Canadian Institute for Health Information. These data were included in preliminary analyses to test whether they significantly affect utilisation. In all cases, these, albeit crude, measures of supply did not significantly affect health service use and therefore were not included in the final empirical analyses. Instead, regional variables were included in order to capture differences in service availability, consistent with previous studies (Broyles, Manga, Binder et al., 1983; Dunlop, Coyte, & McIsaac, 2000). Section 6.3.5 addresses the issues related to supply characteristics, geographical barriers and inequity in more detail. Details of the independent and dependent variables for the empirical analyses are provided in the individual chapters that follow, and the limitations stemming from this data source are discussed in Chapter 6.

Alternative health surveys

There are other health-related surveys in Canada that I chose not to use because although they may have some advantages, they do not cover all topics of interest for this thesis. These include the National Population Health Survey, the Survey of Household Spending, and supplemental surveys to the Canadian Community Health Survey.

The National Population Health Survey is a national survey that includes information on some but not all of the variables of interest for this thesis. The main advantage with this survey is that it includes a longitudinal component, which as discussed in greater detail in Chapter 6, would strengthen analyses of health care utilisation by being able to

control for unobserved individual heterogeneity. This would be of particular importance in the analysis of unmet need (Chapter 5). However, the sample is much smaller, making province-level analyses more difficult. This presents a particular problem when modelling relatively rare events such as hospital admissions (which accounts for less than 10% of the sample). Also information on complementary insurance (for prescription drugs, dental care, hospital amenities) has not been available since the 2002 survey, and in the previous years that do include this information it does not differentiate between private and public insurance.

The Survey of Household Spending is a useful source of information on some health-related spending patterns of Canadians. It includes a comprehensive set of questions on socioeconomic variables such as detailed sources and level of income, and home ownership. Moreover it queries respondents about their health-related spending patterns, including information on money spent on public and private insurance premiums, prescription drugs, over-the-counter medicines, eye care, dental care, and any physician or hospital costs (excluding payments which have been or will be reimbursed). Although the survey contains data of considerable depth and detail, by necessity it excludes many of the variables of interest to this thesis, namely health status and health care utilisation. Two other surveys, the Labour Force Survey and the Survey of Labour and Income Dynamics, also have much more detailed questions on the components of working-aged individuals' income and spending such as housing rent and specific characteristics of employment such as wages, components of salary (commission, tips, etc) and benefits received.

Several supplemental modules of the CCHS have been conducted on a small selection of respondents covering topics such as perceptions of access to health care, lifestyles

and nutrition, and screening for diseases. In addition, a small sample of previous CCHS respondents was surveyed by telephone about their experiences with primary care (Canadian Survey of Experiences with Primary Health Care) in 2007. In some cases I have drawn on these supplements in this thesis when performing additional tests.

CHAPTER 3: DOES EQUITY IN HEALTH CARE USE VARY ACROSS CANADIAN PROVINCES?[9]

3.1 Introduction

The stated objective of Canadian health policy is to protect, promote and restore the physical and mental well-being of its residents and to facilitate access to health services. Equity in health care is a concept of vital importance to Canadians (Canada, 2002a) and 'reasonable' access to health care is legislated in the Canada Health Act of 1984: "insured persons must have reasonable and uniform access to insured health services, free of financial or other barriers. No one may be discriminated against on the basis of such factors as income, age, and health status".

While reasonable access to care is a major objective of the Canadian health system, this equity goal is also echoed at the provincial level. The actual enactment of policy takes place in the provincial ministries of health: provinces are responsible for planning and funding most public health care services (hospital and physician care) dating back to the 1867 Constitution that granted them exclusive powers of "establishment, maintenance and management of hospitals". Provincial policy documents and public consultations consistently state the importance of improving access to care and of achieving equity in the health system. Often these commitments to improving equity in health care exist alongside objectives of improving efficiency and ensuring sustainability; therefore provinces face a trade-off between these potentially conflicting objectives. There are likely to be differences across provinces in the weight that policy makers place on these

[9] This chapter extends the following published peer-reviewed article: Allin, S (2008) Does Equity in Healthcare Use Vary Across Canadian Provinces? *Healthcare Policy*, 3 (4): 83-99.

health policy objectives, and over time the priorities are likely to change with changes in political party representation. Appendix 3A lists some of the recent provincial policy statements that relate to equity.

The provinces share a common set of historical, economic and institutional constraints, although there is a relatively high degree of variability in provincial health policy (Imbeau, Landry, Milner, Pétry, Crête, Forest et al., 2000). Differences in provincial policy priorities that affect the level and sources of health care financing, the types of provider payment mechanisms, the generosity of the public benefits packages, the supply of health services, and the level of further decentralisation to regional and local level may, thus, lead to different degrees of inequity in health services use across the provinces.

As detailed in the previous chapter, studies of equity revealed that the introduction of universal coverage better aligned the distribution of health services according to need, although inequity persists. Research in this area approximates access to health care with utilisation (Evans, 1983), although the two concepts may bring along different sets of conditions (Donabedian, 1972; Oliver & Mossialos, 2004); the differences between access and utilisation are discussed in detail in Section 2.1. The goal of equal access for equal need presumes that individuals are given equal opportunities to access services; however, inequity in utilisation may not solely reflect inappropriate or unfair differences in service use, since utilisation is affected by personal characteristics such as individual preferences, expectations and beliefs. Therefore, observed inequity in utilisation may not necessarily be unfair. However, utilisation of services can be seen as proof of access such that an individual has availed himself of the opportunity to access the services. Examining equity in health care utilisation appears to be consistent with

interpretations by federal and provincial governments (Birch & Abelson, 1993; Birch, Eyles, & Newbold, 1993; Evans, 1983).

An extensive literature reveals inequity in health care use in some sectors and provinces in Canada, as discussed in Chapter 2. There is relatively strong evidence that shows that individuals with socioeconomic advantage, in terms of having higher income and more years of education, make more visits to a specialist, but not to a GP. The less advantaged appear to make more use of hospital services but not necessarily surgical services when these were measured separately (Dunlop, Coyte, & McIsaac, 2000; Manga, Broyles, & Angus, 1987; McIsaac, Goel, & Naylor, 1997; Roos, Forget, Walld et al., 2004; Roos & Mustard, 1997; Veugelers & Yip, 2003). However, some studies found that income did not influence physician visits, as measured by expenditure (Finkelstein, 2001) and it did not affect hospital admissions (Asada & Kephart, 2007). Finally, few studies investigated equity in specific procedures, demonstrating higher rates of diagnostic service utilisation and cardiac surgeries for higher income individuals (Alter, Naylor, Austin et al., 1999; Demeter, Reed, Lix et al., 2005).

Some evidence of province-level effects in utilisation has also been shown. A greater likelihood and number of visits to a family physician were seen in Ontario and British Columbia than the Atlantic provinces (Birch & Abelson, 1993). Also, a lower likelihood of a GP visit, but higher likelihood of at least one specialist visit, was found among Québec residents than the rest of the country (Dunlop, Coyte, & McIsaac, 2000), Finally, residents of Ontario and Québec appeared to represent distinct populations in terms of the incidence of family physician utilisation (Newbold, Birch, & Eyles, 1994).

A recent international study applied the *ECuity* methods to study income-related equity in 21 high-income countries including Canada (see Section 2.3). They found that standardising for need differences, higher income groups in Canada had an increased probability of a GP, specialist and dentist visit (in other words there was a 'pro-rich' distribution of use), with the reverse seen in inpatient care (a 'pro-poor' distribution). Furthermore, the intensity of specialist and dentist use (measured as the number of visits) was concentrated among the rich, while intensity of GP visits was concentrated among the poor (van Doorslaer, Masseria, & the OECD Health Equity Research Group Members, 2004). The importance of this study is that it applied a methodological approach that not only measured the existence of, but also quantified the extent of inequity. These features enable the comparison of equity across both service areas and jurisdictions. However, what remains missing in the literature is a systematic examination of equity in the different health care sectors across the Canadian provinces, given that all the provinces aim to achieve equity, and yet differ to some extent in their system characteristics.

3.2 Policy context in Canada as it relates to equity

Patterns of health care utilisation are affected by, among other things, the manner in which the system plans, administers, and funds health care. Canada introduced a system of universal health care coverage over a period of 25 years (1947 to 1972) following a succession of province-led reforms that aimed to distribute health services according to need and not ability to pay (Evans, 1983; Marchildon, 2005; Mhatre & Deber, 1992). In Canada, there are effectively 13 single-payer, universal insurance systems of hospital and primary physician care (referred to as Medicare). All services

that are delivered in hospital and by physicians (with a few exceptions) are defined as "insured services" and are, hence, governed by the federal Canada Health Act.

The separate universal systems of hospital and physician care, governed by provincial legislation, are influenced by the federal government through its fiscal transfer policy: provinces must conform to the five principles of the Canada Health Act – universality, public administration, comprehensiveness, portability, and accessibility – in order to receive federal cash transfers (Marchildon, 2005). The federal government also distributes federal tax revenue from the wealthier to the poorer provinces with the aim of ensuring that "provincial governments have sufficient revenues to provide reasonably comparable levels of public services at reasonably comparable levels of taxation" (Subsection 36(2) of the Constitution Act, 1982).

Administration of public health services in Canada is highly decentralised reflecting the provincial responsibility for the administration and delivery of most public health care services. Two factors further contribute to the decentralised nature of health care in Canada: the historic arm's-length relationship between government on the one hand and the hospital sector and physicians on the other, and recent regionalisation reforms in which sub-provincial organisations are now responsible for the allocation of resources for hospital and community health services (Marchildon, 2005). These features place a tension on the pursuit of equity objectives in health policy both within provinces and at the national level.

Over the past decade, the Canadian provinces have experienced sweeping administrative reforms to public health services in the direction of regionalisation (Table 3.1 shows the size of the provincial populations, and the number and size of the

regional health authorities). Broadly speaking, this reform was associated with a devolution of managerial and partial budgetary authority from the provincial to the regional (i.e. sub-provincial) level in the form of regional health authorities (Casebeer, Reay, Golden-Biddle, Pablo, Wiebe, & Hinings, 2006). The aims of regionalisation included both efficiency and equity dimensions: to contain costs by rationalising delivery; to better coordinate and integrate health care between hospital services and other provincial public services; to shift public resources from "downstream" illness care to "upstream" illness prevention and health promotion; to improve responsiveness to local needs and increase public participation; and to improve accountability from providers to patients and to government (Lewis & Kouri, 2005). Thus there is cross-provincial agreement to deliver health care in an effective and equitable manner (some recent policy statements and public consultations are listed in Appendix 3A); but at the same time, regionalisation has devolved some administrative and managerial power to the "regional" level. This policy context allows not only provincial discretion over the implementation of national policies, which may lead to different utilisation patterns, but differences may also exist within provinces.

Table 3.1 Population size and process of regionalisation in Canadian provinces

Province	Total population in thousands	Established/ changed (year)	Current number of RHAs	Population size of RHAs in thousands (2005)
Prince Edward Island (P.E.I.)	139	1993-1994/2005	0	-
Newfoundland and Labrador (N.L.)	510	1994/2003-2004	6/4/2	295-41
New Brunswick (N.B.)	749	1992/2002	8	180-29
Nova Scotia (N.S.)	934	1996/2001	9	398-33
Saskatchewan (Sask.)	985	1992/2001-2002	13	272-2
Manitoba (Man.)	1178	1997-1998/2002	11	622-1
Alberta (Alta.)	3376	1994/2003	9	1043-66
British Columbia (B.C.)	4310	1997/2001	5/16	1314-286
Québec (Que.)	7652	1989-1992/2003	18	1783-10
Ontario (Ont.)	12,687	2005	14	1357-234

Note: Provinces are sorted in ascending order by total population. RHAs are regional health authorities.
Sources: Marchildon, 2005; Statistics Canada, 2006.

In compliance with the Canada Health Act, the large majority of physician and hospital services are free at the point of delivery. Private health insurance that attempts to provide a private alternative, or faster access, to "medically necessary" hospital and physician services is prohibited or discouraged by a complex set of provincial laws and regulations (Flood & Archibald, 2001). In Québec this prohibition of private insurance was challenged at the Supreme Court level in 2005 (the case of Chaoulli v. Quebec). The Court ruled that the ban on private insurance violated the provinces' Charter of Human Rights and Freedoms because in the face of a long wait for publicly-financed elective surgery, patients should have the option of insuring themselves privately for these same services.

Physician and hospital services are co-funded by the federal and provincial governments, and hence are guided by national policy. Coverage of services outside of physician and hospital care is left entirely to the discretion of the provinces, although there is some consistency in the extent to which provinces subsidise these costs. To

better ensure equitable access, services falling outside of Medicare are subsidised to various degrees by the provinces and territories. For example, prescription drug costs are generally covered by the different provincial insurance plans for vulnerable population subgroups such as those receiving social assistance, older people, individuals with specific diseases, and families with high prescription drug expenditures, with varying levels of cost sharing (Demers, Melo, Jackevicius et al., 2008; Grootendorst, 2002). The majority of individuals who are not covered in a provincial prescription drug insurance plan are privately insured through employer-sponsored insurance, although those without adequate coverage may face additional cost barriers to accessing medicines. Moreover the proportion of the population without such additional coverage varies across the provinces.

Also the majority of dental care falls outside of the public system with the exception of those services provided in hospital (hospital services represent about 5% of total dental expenditure). There is very little provincial subsidy for ambulatory dental costs; the main mechanisms to fund dental care in 2005 were individuals' out-of-pocket payments (45%) and private insurance (55%) (Canadian Institute for Health Information, 2007b). In fact the level of public subsidy for dental costs declined in those provinces with more generous programmes through the 1990s with the aim of containing costs in the face of economic slowdown. The few public provincial programmes for dental care for children or seniors were removed in British Columbia, Saskatchewan and Manitoba and reduced in Newfoundland and Alberta (Leake, 2006). In the absence of province-wide dental programmes, most provinces appear to be concerned with the distribution of dental care as evidenced by the variety of community-level services to serve vulnerable populations. As in the case of prescription drug coverage, in dental care policy the

provinces face a trade-off between the objectives of (public) cost containment and equity.

Very little public subsidy exists for vision care, over-the-counter medication as well as complementary, alternative medicines and therapies, for which the majority of financing is through out-of-pocket payments (Marchildon, 2005). Therefore the costs of non-Medicare services may represent a deterrent to seeking care for those who are poor, but not protected by social assistance or government insurance plans, in particular the 'working poor'. There has been a gradual increase in the relative importance of these non-Medicare services over the past thirty years (Marchildon, 2005), representing a concurrent shift of the burden of funding health care onto the individual (Tuohy, Flood, & Stabile, 2004). Further shifting of costs onto the individual has occurred through the gradual reduction of the basket of services provided in the public system, for example for physiotherapy services in the provinces of Alberta and Ontario (Stabile & Ward, 2005).

In sum, the ten provinces (and three territories) vary to some extent in the financing, administration, delivery modes and range of public health care services in spite of their broad similarities in values, historical and macroeconomic context, and national constraints on social policies. While the federal equalisation payments redistribute federal taxes from the wealthier to poorer provinces and territories to ensure that they all have largely comparable resources for public services, there is still variation in spending per capita, the public/private mix of funding and supply of personnel (Table 3.2 summarises some of these variations). The standardisation of the way in which 'insured' services are funded has not led to a consequent standardisation of the

organisation of planning, management, delivery and distribution of these services (Newbold, Birch, & Eyles, 1994).

Table 3.2 Characteristics of the provincial health systems, 2004

Province	Per capita spend on health care (in CAD$)	Public spend as a % of total spending	Avg. life expectancy at birth	GPs per 100,000 people	Specialists per 100,000 people
Que.	3900	69.8	79.3	108	106
P.E.I.	4100	70.0	78.6	95	57
B.C.	4300	69.9	80.4	108	88
N.B.	4300	69.4	79.0	100	67
Sask.	4400	75.1	79.0	87	66
N.L.	4400	76.3	77.9	99	93
N.S.	4500	68.9	78.8	115	98
Ont.	4600	67.2	79.7	86	92
Man.	4800	73.2	78.4	92	85
Alta.	4800	72.9	79.5	100	86
Canada	4400	69.6	79.0	97	92

Note: Provinces are sorted in ascending order by per capita expenditure (which is rounded to the nearest hundred).
Source: Canadian Institute for Health Information, 2006a.

3.3 Methods

This chapter addresses the first research question of this thesis: what is the extent of inequity in the Canadian system, and how does this vary across the provinces? First, this section describes the data and variables used for the analysis, and then it reviews the statistical methods.

3.3.1 Data

This chapter addresses the above research question drawing on a nationally representative survey, the 2003 Canadian Community Health Survey (CCHS); it is

described in detail in Section 2.3.3. The CCHS is representative of approximately 98% of the Canadian population aged 12 or older and the 2003 cycle has a total sample of 134,072 respondents.

This analysis is based on the Public Use Microdata from 2003 (cycle 2.1). Individuals under age 15 (7410 observations) are not included in the analysis in order to focus on the young adult and adult populations, and to be consistent with previous studies. Territories are not included due to under-sampling of these regions (2360 observations). Also excluded are cases where the income data is missing (19,681 observations) and a further 111 observations for missing observations of the dependent and independent variables. There are some differences between those cases that are missing income data and the rest of the sample in terms of health status and socioeconomic status, though not as much with health care use (see Appendix 3B for more details on missing data). For instance those missing income are disproportionately represented by the youngest age group (ages 15-19), individuals who are female, in poorer health, and with lower education. The extent of missing income observations is relatively consistent across the provinces. Income is missing for 16.1% of the national sample, although it is lower in some provinces (Ontario: 14%, British Columbia: 15%, and Québec: 16%) and higher in the others (Manitoba: 17%; Newfoundland: 17.8%, Alberta: 18%, Saskatchewan: 18.1%, New Brunswick: 18.5%, Nova Scotia: 19%, Prince Edward Island: 20%).

Health care use is measured by the following questions.

- [Not counting when you were an overnight patient], in the past 12 months, how many times have you seen, or talked on the telephone, about your physical, emotional or mental health with:
    - a family doctor or general practitioner? *[GP]*

- an eye specialist or any other medical doctor (such as a surgeon, allergist, orthopedist, gynaecologist or psychiatrist)? *[specialist]*
- a dentist or orthodontist? *[dentist]*

- In the past 12 months, have you been a patient overnight in a hospital, nursing home or convalescent home? *[inpatient]*

Specialists include any physician that is not a GP, and they may be based in hospitals or in ambulatory clinics. For the probability models the dependent variables were transformed into a dichotomous variable that equalled 0 if the individual had no visits in the past year, and 1 if he or she reported 1 or more visits. For the models of the conditional number of contacts, only individuals who report any use are included. There may be issues with regards to recall capacity for this 12-month period; this is discussed in greater detail in Section 6.3.1.

Indicators of health care need include demographic and health status variables (with the exception of dental care, see below). Interactions of age and sex are captured with dummy variables for the following age groups: 15-34; 35-44; 45-64; 65-74; 75 and above, separately for men and women; men aged 15-34 is the reference category. Self-assessed health is measured in five categories (excellent – reference category, very good, good, fair and poor), and limitations in activities due to health are reported as affecting the respondent "sometimes" or "often" (with no limitations as the reference category). The interaction between age and sex is particularly important given that women up to age 45 can be considered to be of child-bearing age and therefore potentially to be in need of regular physician consultations and then hospital services for

childbirth[10]. For dental care, age and self-assessed oral health in five categories (as above) approximate need.

Total household income is measured in five categories and adjusted for the number of people living in the household, but not household composition, to represent individual income (see Table 3.3). The first income category, IC1 is the reference category. Using this categorisation, almost all Canadians fall into the third, fourth and fifth income groups.[11]

Table 3.3 National sample distribution by household income category

Income category (IC)	Description	Percentage
IC1	<$10,000 if one to four people; <$15,000 if five+ people;	2.8%
IC2	$10,000 to 14 999 if one or two; $10,000 to 19,999 if three or four; $15,000 to 29,999 if five+	6.0%
IC3	$15,000 to 29 999 if one or two; $20,000 to 39,999 if three or four; $30,000 to 59,999 if five+	19.5%
IC4	$30,000 to 59 999 if one or two; $40,000 to 79,999 if three or four; $60,000 to 79,999 if five+	34.6%
IC5	$60,000 if one or two; $80,000 if three+	37.2%

Note: Due to rounding the sum of the percentages is greater than 100%.

[10] Further indicators of need were not included in order to replicate previous analyses and limit the extent of missing observations (the latter is especially problematic in provinces with small sample sizes). Sensitivity analyses including chronic conditions as additional needs variables do not substantively affect the results. This analysis therefore does not include this additional information (see Appendix 3D for more information).

[11] The use of gross as opposed to net household income as the ranking variable may not accurately represent household purchasing power. Moreover, after taking into account benefits and income taxes, the population ranking of income may change. However, for the purpose of this thesis, it is important to have a ranking of individuals on a variable that represents socioeconomic status, such as gross income, and not a measure of purchasing power. Gross income represents not only purchasing power but social class and a household's relative position in the social gradient. Further discussion of the methodological challenges associated with different measures of income is found in Section 6.3.2.

Factors other than need and income have been shown to influence utilisation patterns (the literature is reviewed in Section 2.2); therefore, in order to gain an understanding of what contributes to any observed inequity by income, other socioeconomic variables are included in the utilisation models. Highest level of education is included and grouped into the following categories: less than secondary education (used as the reference category), secondary, and post-secondary education. The effect of education could be to increase health care utilisation because of higher degrees of health literacy (e.g. knowing when it is appropriate to seek care when ill), better knowledge about how to navigate the health system, better communication skills with health professionals, and being more demanding, for example for referrals or for more services (Dixon, Le Grand, Henderson et al., 2007; Roos & Mustard, 1997). However the education effect may also be negative, since higher educated individuals also tend to be in better health (Mustard, Derksen, Berthelot, Wolfson, & Roos, 1997; Raphael, 2004) and more efficient in producing health (Grossman, 1972); therefore, it may be capturing unobserved health. Also included is whether the individual resides in the capital city of the province (or province dummies for the national-level analysis) in order to capture some supply effects under the assumption that capital cities have both a greater density of professionals and hospitals and shorter travel times to access these facilities. I also consider whether the respondent is employed, a student, retired, unemployed, or self-employed (reference category), which may capture some of the time costs of seeking health care that would be greater for the employed than non-employed. As is the case with education, employment status could capture unobserved needs to the extent that the employed and students are in better health than those who are retired or unemployed.

Complementary insurance coverage is included as an explanatory variable. Insurance that covers all or part of the cost of prescription drugs is included in the physician models; hospital charges for a private or semi-private room in the model of hospital inpatient care; and dental care in the dentist model. While for dental care and hospital amenities insurance mostly refers to private insurance (most often employment-based), complementary insurance for prescription drugs could be either private (again, mostly employment-based) or public (for certain eligible groups)[12].

3.3.2 Statistical analysis

This empirical chapter calculates income-related inequity in four areas of health care use across the Canadian provinces: GP, specialist, inpatient, and dental care services. It does so by examining the probability of any use, the total number of visits (or nights in the case of hospital care) and the conditional number of visits (nights). Sampling weights included in the public dataset are used for all analyses.

Equity is calculated by comparing the distribution of health care use by income with the distribution of health care need (health status) based on the concept of the concentration curve (Wagstaff & van Doorslaer, 2000); as explained in detail in Section 2.3.2.

First, the concentration index (CI) for unadjusted utilisation (CI_{unadj}) is calculated as the product of utilisation, y, and the variance of the income rank,

[12] In the CCHS 2.1 from 2003, which this analysis draws on, there is no information on the source of the complementary insurance. However, in 2005 this data is available for Ontario, and less than 8% of those with insurance coverage for dental costs or hospital amenities report this coverage through a government programme.

(1) $$CI_{unadj} = \frac{2\sigma_R^2}{y_m} y.$$

Second, a linear model of the determinants of utilisation is estimated using both need- and non-need variables;

(2) $$y = \alpha + X'\beta + Z'\delta + \varepsilon,$$

where y is the utilisation variable, α, β and δ are regression coefficients, X is a vector of need-related indicators, and Z is a vector of non-need variables. Separate OLS regressions are run for the probability of a visit (or hospital admission) and for the total and conditional number of visits (nights) on the set of need and non-need indicators. Third, needs-adjusted utilisation is predicted for each individual in the sample by setting the value of all non-need variables at their sample mean during prediction. Fourth, the concentration index for the distribution of needs-adjusted utilisation (CI_{adj}) is calculated as in (1), but replacing actual with needs-adjusted utilisation. Finally, the horizontal inequity index (HI) derives from the difference between the estimates of income-related inequality in actual health care use and income-related inequality in needs-expected use

(3) $$HI = CI_{unadj} - CI_{adj}.$$

The distinction between inequality and inequity is an important one. Unequal utilisation patterns by income are not necessarily unfair because of the underlying unequal distribution of need, whereas inequity captures any unequal health care use by income that remains after need standardisation.

The 'convenient regression' (4) on relative income rank (R) is used to calculate the estimates and standard errors of the concentration indices (Kakwani, Wagstaff, & van Doorslaer, 1997)

(4) $CI = \alpha + \beta R + \varepsilon$,

where β and its standard error would be the point estimate and standard error of the concentration index (CI_{adj}, CI_{unadj}, HI).

By construction, a zero index of horizontal inequity (HI) implies that after controlling for differences in need across income groups, all individuals have equal probability of using health services or are using the same amount, regardless of income. After adjusting for need, when service use is more concentrated among the better-off, the horizontal inequity index is positive. Likewise, if service use is more concentrated among the lower income groups after adjusting for needs, then HI would be negative. The index ranges from -1 to 1: a positive index implies that individuals on higher income are more like to visit a physician than one would expect on the basis of their reported need and vice versa.

By calculating horizontal inequity indices separately for each province, there is an underlying assumption that differences in the mean utilisation levels across provinces or in the differences in utilisation between people in different levels of need are acceptable. Thus, I assume that provincial norms of utilisation should be used for calculating inequity as opposed to national norms, in light of (often immeasurable) socio-cultural heterogeneity across provinces.

For binary outcomes such as the probability of visiting a physician, a linear probability model such as OLS may not be the most efficient functional form; likewise, for skewed count variables such as the number of physician visits, OLS may not be suitable (Jones, Rice, Bago d'Uva et al., 2007). Therefore, I checked the robustness of the study's conclusions against probit models for the probability variables and negative binomial

regressions for the total and conditional utilisation variables using the nonlinear approach to calculating inequity outlined in Section 2.3.2. The results do not appear to be sensitive to these changes in specifications, with the exception of hospital care, and I chose to use the simpler OLS to facilitate the calculation and interpretation of inequity and decomposition of contributing factors (Appendix 3F compares the estimates found under linear versus non-linear assumptions). This finding of insensitivity to the underlying functional form of the empirical model is consistent with the literature (O'Donnell, van Doorslaer, Wagstaff et al., 2008; van Doorslaer, Masseria, & the OECD Health Equity Research Group Members, 2004).

In addition, I use the decomposition method to measure whether socioeconomic factors related to income, such as education, residence, employment status and complementary insurance coverage, contribute to the overall level of income-related inequity (Wagstaff, van Doorslaer, & Watanabe, 2003); this decomposition method is detailed in Section 2.3.2. Different utilisation patterns across income groups can theoretically be due to underlying related socioeconomic characteristics such as education and insurance status; therefore, the decomposition analysis allows us to discover what other factors may be driving inequity. The contribution of each variable to inequity is a product of its impact on demand, as measured by its marginal effect on utilisation, its prevalence, and its correlation with the income distribution. For example, a positive contribution of education to inequity in specialist care indicates that higher education is associated both with higher income and increased used of specialist services.[13]

[13] The above analyses were also conducted using CCHS 3.1 (from the year 2005) to detect any changes in the results over the two-year period. The two surveys however are not directly comparable. The year 2003 was initially chosen for this analysis because of the availability of information on complementary insurance for dental care, hospital charges and prescription drug insurance; whereas information on insurance was only available for the province of Ontario in the 2005 survey. Another reason why the

3.4 Results

This section presents the results of the analyses that directly address the research question and that are relevant to policy. Additional results are available in appendices (Appendix 3).

3.4.1 Descriptive statistics

This section includes the descriptive statistics by province in utilisation and complementary insurance coverage. Appendix 3C shows the mean levels of the need and non-need variables by province. With the exception of income, there is relatively little variation in these variables across the provinces. Alberta and Ontario clearly have the highest proportion of high-income individuals.

There is some degree of variation in reported utilisation of health services across the country (Table 3.4).[14] The mean likelihood of visiting a GP at least once in the past year is lowest in Québec (70%) and highest in Prince Edward Island and Nova Scotia

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results are not comparable is due to differences in the income variable: in 2005 income is not adjusted for household size, while in 2003 it is. Also, information on self-reported oral health for the analyses of equity in dental care is only available in British Columbia and Ontario in the 2005 survey. Appendix 3H shows the national-level analysis over these two years for comparative purposes and reveals only modest changes to the estimates of inequity.

[14] According to OECD data, utilisation rates in Canada are relatively high compared to other countries. For example, number of doctor consultations per capita in 2005 was 6 consultations in Canada compared to 5 in the United Kingdom and 4 in the United States. The estimate for Canada is higher than that in Table 3.4 for Canada; this could be due to the exclusion of children from the survey. For acute inpatient days the per capita utilisation was 0.9 in Canada and the United Kingdom, compared to 0.7 in the United States. This is not directly comparable to Table 3.4 because the definition of inpatient care in the survey includes nursing and convalescent homes.

(84-85%). About half of the population reported a specialist visit in the past year, the proportion ranges from 49% in British Columbia to 57% in Québec. The probability of hospitalisation ranges from less than 8% in Ontario and British Columbia to about 11% in Prince Edward Island and New Brunswick. Finally, the likelihood of a dentist visit in the past year ranges from 46% in Newfoundland to 70% in Ontario.

Utilisation rates do not appear to be related systematically to levels of supply as measured by per capita number of providers (as shown in Table 3.2). For example New Brunswick, Saskatchewan and in particular Prince Edward Island have the lowest supply of specialists, and possibly an 'under-supply' when compared to the national average, though only in New Brunswick is the average probability of a visit to a specialist lower than the national average. Also Québec has a high density of GPs though low rates of use. Given these supply indicators are very crude and do not account for important factors such as whether GPs have open or closed patient lists (Glazier, 2007), the volume of services they provide (Watson, Katz, Reid, Bogdanovic, Roos, & Heppner, 2004), and the significant within-province differences (Canadian Institute for Health Information, 2006a), it is not surprising that at this aggregated level a correlation is not observed.

Table 3.4 Descriptive statistics for health care utilisation: percentage with one visit (mean number of visits), and percentage without a regular doctor

Province	n	GP	Specialist	Inpatient	Dentist	No regular doctor (%)
P.E.I.	1530	84.14	53.82	10.94	63.31	8.05
		(3.10)	(1.39)	(0.80)	(1.26)	
N.L.	3067	83.04	51.13	9.84	46.38	13.36
		(4.15)	(1.15)	(0.76)	(0.91)	
N.S.	3821	84.53	52.78	9.28	60.92	5.52
		(3.92)	(1.32)	(0.61)	(1.29)	
N.B.	3827	80.24	51.77	11.33	52.3	7.55
		(3.36)	(1.16)	(0.84)	(1.07)	
Sask.	5716	80.63	54.59	9.62	54.73	14.45
		(3.66)	(1.19)	(0.57)	(1.02)	
Man.	5827	77.00	51.16	8.77	60.24	16.47
		(3.00)	(1.22)	(0.53)	(1.22)	
Alta.	10,377	80.33	52.17	8.22	62.57	16.41
		(3.35)	(1.16)	(0.42)	(1.21)	
B.C.	12,367	82.24	49.26	7.78	67.43	10.92
		(3.74)	(1.20)	(0.41)	(1.41)	
Que.	21,552	69.69	56.67	8.88	56.22	26.10
		(2.25)	(1.30)	(0.54)	(1.05)	
Ont.	34,419	79.76	55.4	7.52	69.61	8.41
		(3.26)	(1.34)	(0.44)	(1.48)	
CANADA	104,510	77.85	54.18	8.26	63.69	14.26
		(3.12)	(1.28)	(0.49)	(1.29)	

Notes: Provinces are sorted in ascending order by smallest to largest survey sample sizes. Whether or not an individual reports having a "regular doctor" (which is not defined in the survey but most probably would be interpreted as a regular family doctor who would be a GP) is not included in the utilisation models because it is likely to be endogenous to the decision to visit a doctor.

Also shown in Table 3.4 is the reported prevalence of not having a regular family doctor. Arguably this indicator represents a disadvantage to individuals in terms of potentially having less opportunity to receive continuous primary care and referrals to secondary care when needed. This prevalence ranges from a low of 5.5% in Nova Scotia to a high of 26% in Québec.[15]

[15] It is possible that the high prevalence of specialist utilisation in Québec relates to cultural differences in the delivery of health care. Previous studies have found that controlling for measurable characteristics such as morbidity, residents of Québec have a high use of specialists compared to other provinces (Dunlop, Coyte, & McIsaac, 2000). Possibly the very high use of specialist services in France (OECD, 2008; Sandier, Paris, & Polton, 2004) is a cultural characteristic shared with the French Canadians.

Some variation can also be seen in the self-reported insurance coverage for complementary services – prescription drugs, hospital amenities and dental care (Table 3.5). Prescription drug coverage ranges from a low of 67% in Prince Edward Island to a high of 90% in Québec (where there is universal coverage, see Section 6.2.2). For dental care, 46% of individuals in Québec and 49% in Newfoundland report having insurance coverage, compared to 69% in Ontario and 71% in Alberta (these two provinces are also those with the highest proportion of high-income earners). Finally, coverage for hospital charges for private or semi-private rooms ranges from 54% in British Columbia to 70% in Alberta, compared to the national average of 63%.

Table 3.5 Percentage reporting insurance coverage for prescription drugs, dental care and hospital amenities

	Insurance for prescription drugs	Insurance for dental care	Insurance for hospital amenities
P.E.I.	67.02	54.19	58.27
N.L.	69.15	49.66	56.79
B.C.	72.92	62.97	53.61
Man.	72.96	65.68	66.42
N.B.	73.27	60.11	61.38
Sask.	73.32	65.71	66.25
N.S.	77.53	59.93	65.37
Ont.	77.97	68.84	65.45
Alta.	80.26	71.14	70.07
Que.	89.80	46.45	61.27
CANADA	79.77	61.92	63.23

Note: Provinces are sorted in ascending order by the prevalence of prescription drug insurance coverage. Insurance coverage in all three areas includes any public or private (employer/group-based or individual) plans.

3.4.2 Equity in Canada – national level

National level analyses confirm that there are differential utilisation patterns across the provinces (the regression results are shown in Appendix 3E). At a national level,

income effects on utilisation are significant and positive only the models of GP probability, and total and probability of a specialist and dentist visits. Canada-wide analyses of horizontal equity support the observed income effects and reveal significant pro-rich inequity in the probability of a GP, specialist and dentist visit, and also the total number specialist and dentist visits[16]. Negative HI indices are found in inpatient hospital care, for the total number of nights, the probability of an admission, and the conditional number of nights spent in hospital. As stated earlier, the estimates of inequity remain relatively unchanged when using data from the 2005 survey; both results are reported in Appendix 3H for comparative purposes.

3.4.3 Analysis of equity across provinces

The aim of this chapter is to compare estimates of income-related inequity across the Canadian provinces. The analyses of income-related inequity reveal some differences across the provinces in the extent of horizontal inequity, but some national patterns can be seen (Figures 3.1-3.4). The 'convenient' regression was used to calculate the indices and their standard errors (equation (4) in Section 3.3); the proceeding figures use circles to depict that the estimates of inequity are statistically significantly different from zero at the $p<0.05$ level.

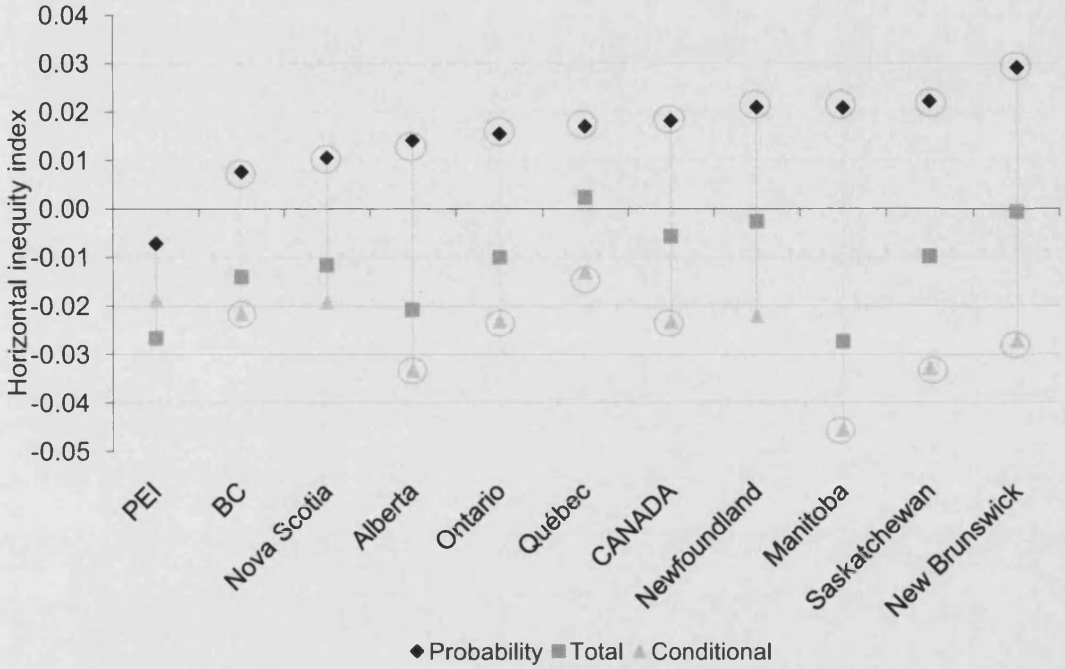
There appears to be consistent though modest "pro-rich" inequity in the probability of a GP visit. For the total and conditional number of GP visits however, there is a greater

[16] Sensitivity analyses of income-related equity in specialist use that distinguished eye doctors from other specialists reveal little difference in estimates of equity for these two specialist groups. Analyses at Canada level revealed that the level of pro-rich inequity in the likelihood of a visit to an eye doctor was 0.05, compared to 0.06 for other specialists, and it was 0.05 for the two groupings of specialists combined.

concentration of utilisation among the lower income groups even after standardising for need, which can be referred to as "pro-poor" inequity (Figure 3.1). Therefore, although the probability of visiting a GP in the past year is concentrated among the rich, once the initial contact has been made, the extent of GP service use is greater among the poorer groups. The exceptions are Québec, where the index of inequity in total utilisation is very slightly positive, and Prince Edward Island which has a pro-poor, although non-significant, inequity in the probability of a visit to a GP. Considering the number of visits made that were made among those with at least one visit (conditional visits), the estimates of inequity become significant in most provinces. It is possible that including additional indicators of need would reduce the level of pro-poor inequity that is found, and in some cases this appears to be the case (Appendix 3D shows the equity estimates that also adjusts for six chronic conditions). However, in those provinces where the pro-poor inequity was significantly different than zero, the addition of chronic conditions into the models did not make these estimates non-significant, with the exception of Québec.

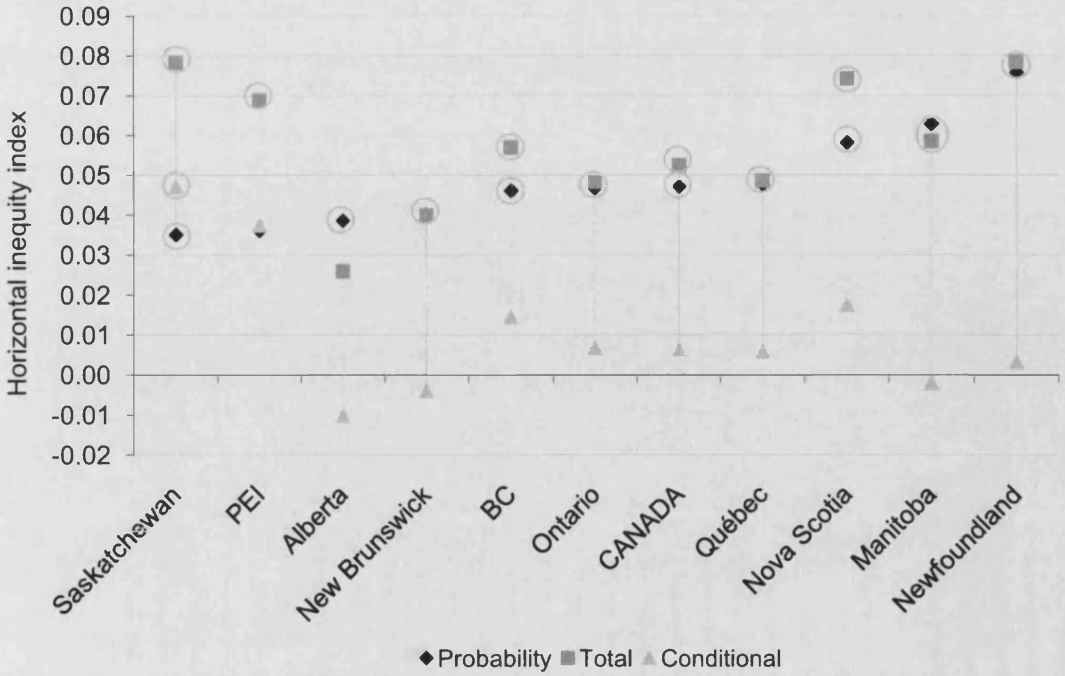
For specialist visits, the estimates of inequity are consistently higher than seen with GPs, for both the probability of a visit and also the total number of visits in all provinces (Figure 3.2). For the probability of a visit, the lowest index of inequity for specialists is greater than the highest for GPs (see Figure 3.1). When only those who had at least one specialist visit are included, i.e. conditional number of visits, the observed inequity disappears in most cases, with the exception of Saskatchewan where it remains significantly pro-rich.

Figure 3.1 Equity in the probability of a GP visit, and total and conditional number of GP visits



Notes: Provinces are ranked in ascending order of inequity in the probability of a GP visit. Encircled indices denote significance at $p<0.05$, meaning the estimates of inequity are statistically significantly different from zero (the 95% confidence intervals do not cross zero).

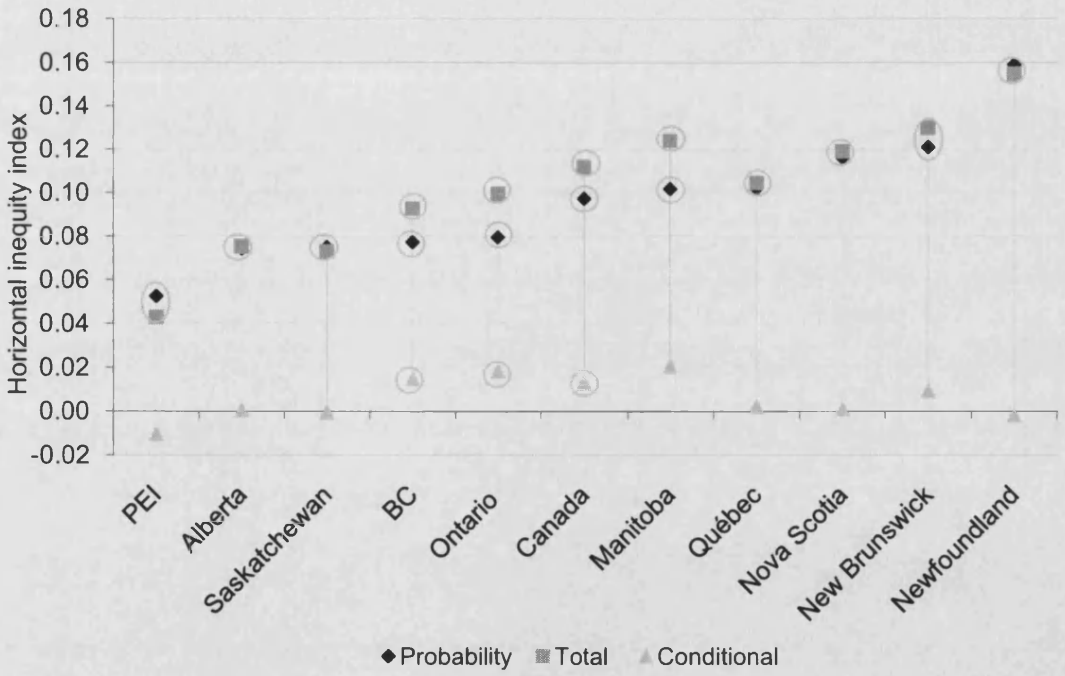
Figure 3.2 Equity in the probability of a specialist visit and the total and conditional number of visits



Notes: Provinces are ranked in ascending order of inequity in the probability of a specialist visit. Encircled indices denote significance at $p<0.05$.

Dental care is the most inequitable, both for the probability of at least one visit and the total number of visits (Figure 3.3). However, there is notable variation across the provinces, with the lowest level of inequity in Prince Edward Island and the highest in Newfoundland. As seen with specialist visits, the conditional number of dentist visits remains pro-rich in most cases, but becomes non-significant in all provinces but British Columbia and Ontario (these have larger sample sizes than in Manitoba where the point estimate is slightly higher).

Figure 3.3 Equity in the probability of a dentist visit and the total and conditional number of visits

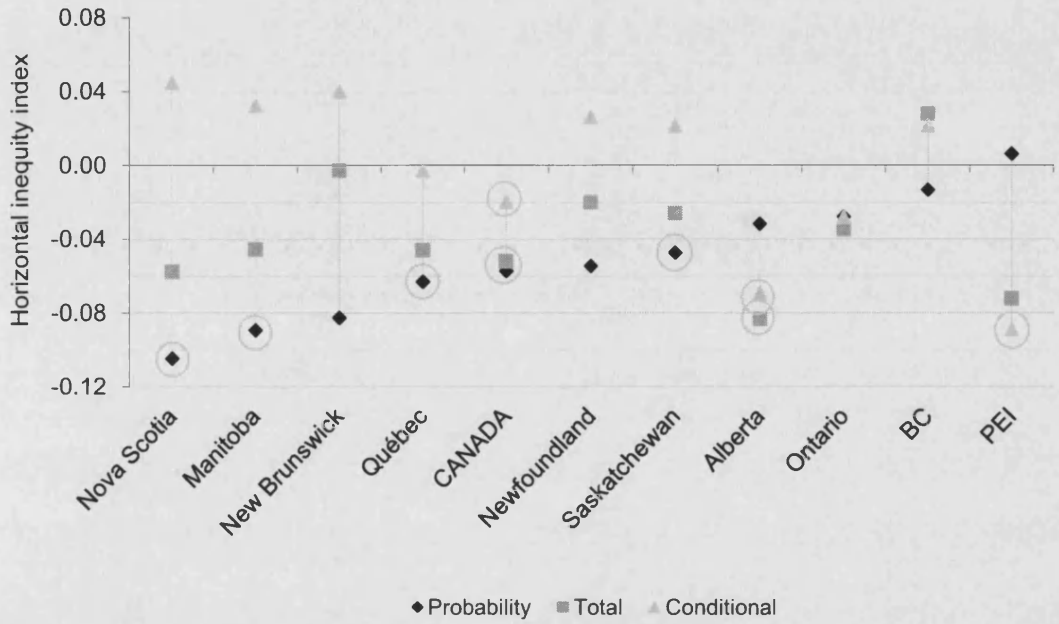


Notes: Provinces are ranked in ascending order of inequity in the probability of a dentist visit. Encircled indices denote significance at $p<0.05$.

In the case of inpatient care, there appears to be considerable variation in the estimates of inequity across the provinces, although there is little evidence of significant inequity. For the total number of nights spent in hospital the index of inequity is pro-poor but non-significant in most provinces (Figure 3.4). The probability of spending a night in

hospital is significantly pro-poor in five provinces (the highest in Newfoundland), and non-significantly pro-poor in the remaining. There is a wide range of estimates of inequity in the conditional number of inpatient nights. Comparison of inequity in admissions however is made difficult because of the small sample sizes in some provinces coupled with low admission rates. It is possible that the effect of lower income on utilisation is driven by unobserved need (Asada & Kephart, 2007). The inclusion of further indicators of need, measured by reported chronic conditions, however, does not reduce the level of pro-poor inequity that is found in most provinces (a comparison of the estimates of inequity with additional needs adjustment is shown in Appendix 3D). Some reduction from the addition of these variables can be found in Saskatchewan for the total inpatient nights and the probability of admission (with a reduction of one-third to one half, respectively), and in Newfoundland there is about a one-third reduction in the estimate of inequity for the total inpatient nights. Estimates of inequity are sensitive to the choice of the needs indicators and to the assumption of linearity in the utilisation model (see the note below). Therefore, these findings should be interpreted cautiously.

Figure 3.4 Equity in the probability of hospital admission, total and conditional number of nights spent in hospital



Notes: Provinces are ranked in ascending order of inequity in the probability of an inpatient stay. Encircled indices denote significance at $p<0.05$. As shown in Appendix 3F, the pro-poor but non-significant inequity in total hospital nights disappears in Ontario, Québec and Prince Edward Island when using non-linear estimations, and in Saskatchewan, Newfoundland, New Brunswick and Nova Scotia the negative index becomes positive (but non-significant). Little change can be seen with the conditional number of hospital nights. For the probability of admission, the level of inequity becomes less pro-poor in Alberta, Saskatchewan, Ontario, Québec and Prince Edward Island, but more pro-poor in Manitoba and New Brunswick under non-linear specifications. This sensitivity to the assumption of linearity of the utilisation variable signals a need for caution in interpreting the results and for further research using more disaggregated information of hospital utilisation.

The results of the decomposition analyses provide some indication of the drivers of inequity across the country (the contributing factors are presented in Tables 3.6-3.9). The tables can be interpreted in the following way, using the example of the probability of a GP visit in Saskatchewan (Table 3.6, third column). Here, the unadjusted concentration index (CI_{unadj}) of the probability of a GP visit is very slightly positive (0.005), which implies that, across the income distribution, there is nearly a proportional probability of visiting a GP, although it is slightly concentrated among the rich. Once needs are standardised for, the level of inequity (HI) is 0.022, which implies a pro-rich distribution. The contribution of the need factors to inequality are negative (-0.017),

meaning individuals with poorer self-assessed health and activity limitations and who are older are more concentrated among the lower income groups and are also more likely to have visited a GP. The most important needs-adjustor (the variable with the most negative contribution) appears to be older women. The sum of the contributions of non-need indicators represents *HI*, which in this case is equivalent to the estimate of *HI* that is calculated as the difference between CI_{unadj} and CI_{adj}, (equation 3 above). The main contributing factor is income (its contribution is 0.015), explaining 68% of *HI*: higher income earners are more likely to visit a GP, holding all else constant. The other non-need contributors are education (0.004), which explains 18% of *HI*, prescription drug insurance (0.004), which explains a further 18% of HI, and residence in the capital city health region (0.001), which explains 4%. Activity status has a negative contribution to inequity, meaning the net effect of the dummies for employment, student, retired and unemployed is to reduce inequity. Finally the error term is almost zero, which implies that there are only some effects on the probability of visiting a GP that are related to income and that are not accounted for in the utilisation model.

Overall, Tables 3.6-3.9 show negative signs for the contributions of needs variables, which mean that poor self-assessed health, activity limitations and older age are inversely correlated with income groups and are positively associated with utilisation. For the non-need indicators, there is a less consistent pattern. If the contributions of education and activity status were consistently negative, this would indicate that they captured some effect of unobserved needs. In some cases, these contributions are negative, and in some cases they are positive. In cases where there is pro-rich inequity, such as in specialist and dental care, it appears that income itself is not the only contributor to the inequitable patterns of health care use by income groups, but these

other socioeconomic factors also contribute to inequity because they are correlated with income and utilisation. If the error component is not zero then there are some systematic determinants of utilisation that are not captured by the independent variables, but that are correlated with income.

For GP care, total use is concentrated among the poor in all provinces except Québec (Table 3.6). The contributions of prescription drug insurance coverage, education and activity status are not much higher in Québec than in the other provinces, while the negative role of income is less important. In other words, individuals on lower income still make more use of services than the higher income groups, but to a less extent in Québec than the other provinces. There is consistent modest "pro-rich" inequity in the probability of a GP visit across all provinces except Prince Edward Island, and in most cases income itself is the main contributing factor; it explains about two-thirds of the pro-rich inequity in most provinces, but over 80% in New Brunswick. Education contributes positively to inequity in the probability of a visit, and explains around one quarter of inequity; therefore, the observed inequity by income is partly explained by the fact that higher educated people have higher income and are also more likely to visit a GP. This does not imply that a reduction in levels of education would reduce estimates of inequity, but rather that the differential treatment of higher educated individuals than those with less education is one of the mechanisms through which income-related inequity arises. Education has a similar positive contribution to the level of equity in the total and conditional number of visits in some provinces (Saskatchewan, Manitoba, Québec, and Newfoundland), but it contributes negatively in the remaining provinces. There is more of a consistent negative impact of activity status on equity, which, upon closer inspection, appears to be driven by the dummy variables indicating that a person is retired or unemployed; individuals who are either retired or unemployed

are more likely to have lower income and also to use more health services. Among the other variables, urban residence exerts very little effect on inequity, while complementary insurance for prescription drugs makes a positive contribution of a similar magnitude to education. The positive effect of insurance means that private insurance dominates the overall effect on inequity, because it is the privately insured who are more likely to represent higher income groups (in most provinces public insurance covers older people and social assistance recipients). The role of insurance is explored in greater detail in Chapter 4.

Table 3.6 Decomposition of inequality in the total number of visits to a GP, the probability of a GP visit, and the conditional number of visits

	B.C.	Alta.	Sask.	Man.	Ont.	Que.	N.L.	N.B.	P.E.I.	N.S.
Total number of GP visits										
CI_{unadj}	-0.081	-0.083	-0.081	-0.084	-0.072	-0.063	-0.067	-0.078	-0.092	-0.090
(95% interval)	(-.098, -.06)	(-.11, -.06)	(-.11, -.05)	(-.11, -.06)	(-.08, -.06)	(-.08, -.05)	(-.10, -.033)	(-.10, -.05)	(-.13, -.05)	(-.12, -.06)
HI	-0.014	-0.021	-0.010	-0.027	-0.010	0.002	-0.003	-0.001	-0.027	-0.012
(95% interval)	(-.029, .001)	(-.04,.002)	(-.03, .014)	(-.05,-.004)	(-.02,.0005)	(-.013,.02)	(-.035, .03)	(-.023, .022)	(-.06,.009)	(-.04,.014)
Need	-0.068	-0.066	-0.073	-0.059	-0.064	-0.068	-0.065	-0.077	-0.067	-0.079
SAH	-0.045	-0.028	-0.036	-0.028	-0.031	-0.033	-0.036	-0.048	-0.039	-0.039
health limitations	-0.014	-0.026	-0.024	-0.015	-0.021	-0.022	-0.018	-0.019	-0.022	-0.028
age-male	-0.001	-0.003	-0.003	-0.003	-0.002	-0.003	-0.003	-0.003	-0.001	0.001
age-female	-0.008	-0.009	-0.010	-0.013	-0.010	-0.009	-0.008	-0.006	-0.005	-0.013
Non-need	-0.014	-0.018	-0.011	-0.027	-0.007	0.003	-0.002	-0.004	-0.026	-0.013
Income	-0.023	-0.015	-0.023	-0.037	-0.003	-0.008	-0.017	-0.005	-0.024	-0.013
Education	-0.002	-0.004	0.011	0.006	0.001	0.006	0.004	-0.002	-0.002	-0.005
Activity status	0.002	-0.006	-0.005	0.000	-0.009	0.001	0.005	-0.001	-0.006	0.002
Capital city	0.000	0.000	0.000	-0.003	-0.001	0.000	0.002	-0.001	-0.001	-0.006
Drug insurance	0.009	0.006	0.006	0.007	0.004	0.005	0.004	0.005	0.008	0.009
Error	0.001	0.001	0.003	0.003	0.000	0.001	0.000	0.003	0.000	0.002
Probability of GP visit										
CI_{unadj}	-0.002	0.003	0.005	0.006	0.003	-0.003	0.003	0.009	-0.017	-0.003
(95% interval)	(-.008, .005)	(-.006,.01)	(-.004,.015)	(-.006, .02)	(-.002,.008)	(-.01,.004)	(-.008,.013)	(-.001, .02)	(-.03, -.01)	(-.01, .01)
HI	0.008	0.014	0.022	0.021	0.015	0.017	0.021	0.029	-0.007	0.011
(95% interval)	(.001, .014)	(.006, .02)	(.013,.031)	(.01, .032)	(.011, .02)	(.009, .02)	(.011, .031)	(.019, .039)	(-.019,.004)	(.001, .02)
Need	-0.009	-0.012	-0.017	-0.015	-0.012	-0.021	-0.018	-0.020	-0.010	-0.014
SAH	-0.005	-0.002	-0.004	-0.005	-0.003	-0.007	-0.006	-0.010	-0.003	-0.004
health limitations	-0.002	-0.003	-0.004	-0.003	-0.003	-0.004	-0.003	-0.003	-0.003	-0.003
age-male	0.002	0.002	-0.001	0.000	0.000	-0.001	-0.001	-0.002	-0.001	0.003
age-female	-0.004	-0.008	-0.007	-0.007	-0.006	-0.009	-0.008	-0.005	-0.003	-0.009

	B.C.	Alta.	Sask.	Man.	Ont.	Que.	N.L.	N.B.	P.E.I.	N.S.
Non-need	0.008	0.014	0.022	0.020	0.015	0.017	0.022	0.028	-0.007	0.010
Income	0.005	0.010	0.015	0.013	0.013	0.011	0.015	0.024	-0.013	0.001
Education	0.001	0.002	0.004	0.006	0.001	0.004	0.001	0.004	0.003	0.004
Activity status	-0.003	-0.001	-0.002	-0.002	-0.003	0.000	0.003	-0.002	-0.004	0.000
Capital city	0.000	0.001	0.001	0.000	-0.001	0.000	0.001	0.000	0.000	0.001
Drug insurance	0.005	0.002	0.004	0.003	0.004	0.002	0.003	0.002	0.006	0.005
Error	-0.0002	0.0004	0.0003	0.0011	0.0003	0.0008	-0.0015	0.0011	0.0003	0.0010
Conditional number of GP visits										
CI_{unadj}	-0.080	-0.086	-0.086	-0.089	-0.075	-0.060	-0.070	-0.087	-0.076	-0.087
(95% interval)	(-.095, -.06)	(-.11, -.06)	(-.11, -.06)	(-.11, -.07)	(-.086, -.07)	(-.07, -.05)	(-.10, -.038)	(-.11, -.06)	(-.11, -.04)	(-.11, -.06)
HI	-0.022	-0.033	-0.033	-0.045	-0.023	-0.013	-0.022	-0.027	-0.019	-0.019
(95% interval)	(-.036,-.008)	(-.05, -.01)	(-.05, -.01)	(-.067,-.02)	(-.03,-.013)	(-.03,-.00)	(-.05, .008)	(-.048,-.006)	(-.05,.016)	(-.04,.004)
Need	-0.059	-0.055	-0.055	-0.045	-0.054	-0.048	-0.048	-0.060	-0.057	-0.068
SAH	-0.040	-0.027	-0.032	-0.023	-0.029	-0.027	-0.031	-0.039	-0.035	-0.034
health limitations	-0.012	-0.023	-0.020	-0.012	-0.018	-0.019	-0.016	-0.018	-0.020	-0.027
age-male	-0.002	-0.004	-0.001	-0.003	-0.001	-0.003	-0.002	-0.002	0.001	-0.003
age-female	-0.005	-0.002	-0.002	-0.007	-0.005	0.000	0.001	-0.001	-0.003	-0.004
Non-need	-0.022	-0.031	-0.034	-0.046	-0.021	-0.012	-0.023	-0.028	-0.018	-0.020
Income	-0.029	-0.025	-0.038	-0.051	-0.015	-0.017	-0.032	-0.026	-0.011	-0.016
Education	-0.003	-0.005	0.007	0.001	-0.001	0.003	0.004	-0.006	-0.006	-0.007
Activity status	0.005	-0.005	-0.004	0.001	-0.006	0.000	0.003	0.001	-0.003	-0.005
Region	0.000	0.000	-0.001	-0.003	0.000	0.000	0.002	-0.001	-0.002	0.002
Drug insurance	0.004	0.004	0.003	0.006	0.000	0.003	0.001	0.004	0.003	0.005
Error	0.002	0.000	0.003	0.002	-0.001	0.000	0.001	0.002	0.000	0.001

Note: 95% interval is the confidence interval for concentration indices and indices of horizontal inequity.

Specialist care appears to be the most inequitable in Saskatchewan, Newfoundland and Nova Scotia (Table 3.7). In Saskatchewan, income is the most important driver of inequity; it contributes over 80% of inequity in the total number of visits, 70% of inequity in the probability of a visit, and 85% in the conditional number of visits. In Newfoundland, income itself explains less than half of the pro-rich inequity. Here, the contribution of urban (capital city) residence is pro-rich, and explains 25% of the inequity in total visits, 17% in the probability of a visit, and 33% in the conditional number of visits. Positive contributions by residence are also seen in Manitoba and Saskatchewan, although of the magnitude of about 10%. Complementary insurance contributes a further 25% in the total number of specialist visits in Newfoundland. In Nova Scotia, the relatively high level of inequity appears to be driven by income, education and drug coverage. There is a consistent positive effect of education on inequity; in Manitoba and New Brunswick, education explains a greater proportion of the inequity in the total number of specialist visits than income.

Appendix 3G provides the detailed decomposition for the total number of specialist visits in Newfoundland, where inequity is the most pro-rich. It also compares the decomposition results using linear (as in this analysis) versus nonlinear models. It appears that the estimate of inequity is slightly higher when it is calculated as the sum of the non-need contributions based on the linear model ($HI = 0.085$) than when it is calculated as the sum of the contributions based on the nonlinear model ($HI = 0.077$). Each variable's contribution to inequity, calculated based on the mean of each variable, its concentration index (CI), and its marginal effect on utilisation, is similar across the linear and nonlinear models. It seems the contribution of income to inequity is almost wholly driven by the highest income category. Likewise, the positive contribution of education is mainly through the highest educational category (post-secondary

education). Therefore, it is the highest income earners and the most educated who use more specialist services, holding all else constant. The different categories of activity status contribute differently to inequity. There is a negative contribution from the employed (because the employed have higher income alongside a negative marginal effect on utilisation), and a positive contribution from the unemployed (because the unemployed have lower income and have a negative marginal effect on specialist utilisation). The contributions of being a student and being retired are low because of their low prevalence combined with weak marginal effects on utilisation.

Table 3.7 Decomposition of inequality in the total number of visits to a specialist, the probability of a visit, and the conditional number of specialist visits

	B.C.	Alta.	Sask.	Man.	Ont.	Que.	N.L.	N.B.	P.E.I.	N.S.
Total number of specialist visits										
CI_{unadj}	-0.012	-0.024	0.014	0.001	-0.013	-0.006	0.022	-0.036	-0.001	-0.026
(95% interval)	(-.037, .013)	(-.05,.004)	(-.02, .048)	(-.035, .036)	(-.03,.001)	(-.025,.01)	(-.019, .06)	(-.067,-.006)	(-.04, .04)	(-.06, .01)
HI	0.057	0.026	0.078	0.059	0.048	0.049	0.079	0.040	0.069	0.074
(95% interval)	(.033, .081)	(-.001,.05)	(.045, .11)	(.025, .09)	(.035,-.06)	(.03, .066)	(.04, .12)	(.011, .069)	(.03, .11)	(.04, .11)
Need	-0.071	-0.053	-0.072	-0.060	-0.064	-0.060	-0.056	-0.076	-0.071	-0.101
SAH	-0.037	-0.015	-0.022	-0.020	-0.025	-0.033	-0.029	-0.042	-0.031	-0.046
health limitations	-0.015	-0.027	-0.026	-0.018	-0.022	-0.017	-0.028	-0.021	-0.020	-0.028
age-male	-0.006	0.002	-0.010	-0.008	-0.004	-0.004	-0.002	-0.005	-0.003	-0.004
age-female	-0.012	-0.013	-0.014	-0.013	-0.013	-0.006	0.002	-0.008	-0.017	-0.023
Non-need	0.054	0.028	0.089	0.061	0.052	0.052	0.079	0.039	0.071	0.074
Income	0.042	0.017	0.065	0.020	0.046	0.034	0.019	0.010	0.043	0.040
Education	0.010	0.008	0.011	0.029	0.013	0.018	0.023	0.026	0.020	0.025
Activity status	-0.008	-0.011	0.003	0.000	-0.014	-0.006	-0.002	-0.004	-0.005	-0.004
Capital city	0.000	0.002	0.003	0.005	-0.001	-0.001	0.021	0.002	0.001	0.000
Drug insurance	0.011	0.012	0.006	0.007	0.007	0.007	0.017	0.005	0.012	0.014
Error	0.004	0.000	-0.003	-0.001	-0.001	0.001	0.000	0.000	-0.001	0.001
Probability of specialist visit										
CI_{unadj}	0.013	0.014	0.007	0.030	0.017	0.018	0.045	0.002	0.003	0.016
(95% interval)	(-.001, .027)	(-.002,.03)	(-.011, .02)	(.008, .051)	(.01, .026)	(.008, .03)	(.023, .068)	(-.017, .022)	(-.02,.028)	(-.007,.04)
HI	0.046	0.039	0.035	0.063	0.047	0.048	0.076	0.040	0.036	0.058
(95% interval)	(.032, .06)	(.02, .054)	(.018,.052)	(.043, .083)	(.04, .055)	(.04, .057)	(.055, .097)	(-.043, .033)	(.012, .06)	(.036, .08)
Need	-0.033	-0.025	-0.029	-0.034	-0.030	-0.030	-0.031	-0.037	-0.033	-0.043
SAH	-0.011	-0.002	-0.003	-0.008	-0.005	-0.010	-0.013	-0.013	-0.012	-0.011
health limitations	-0.006	-0.008	-0.009	-0.006	-0.007	-0.005	-0.008	-0.009	-0.006	-0.011

	B.C.	Alta.	Sask.	Man.	Ont.	Que.	N.L.	N.B.	P.E.I.	N.S.
age-male	-0.005	-0.001	-0.003	-0.006	-0.003	-0.002	0.000	-0.003	0.002	0.000
age-female	-0.011	-0.014	-0.013	-0.013	-0.014	-0.013	-0.010	-0.012	-0.017	-0.022
Non-need	0.044	0.037	0.037	0.063	0.047	0.048	0.077	0.039	0.038	0.057
Income	0.034	0.021	0.025	0.045	0.041	0.037	0.037	0.021	0.027	0.036
Education	0.004	0.003	0.004	0.014	0.005	0.009	0.014	0.009	0.011	0.007
Activity status	-0.002	-0.001	0.004	-0.001	-0.005	-0.003	0.005	-0.002	-0.006	0.004
Capital city	0.000	0.001	0.000	0.001	0.000	0.000	0.013	0.001	0.000	0.000
Drug insurance	0.008	0.013	0.004	0.003	0.006	0.004	0.009	0.009	0.006	0.010
Error	0.002	0.001	-0.002	0.000	0.000	0.000	-0.002	0.001	-0.002	0.002
Conditional number of specialist visits										
CI_{unadj}	-0.025	-0.038	0.008	-0.029	-0.031	-0.024	-0.023	-0.038	-0.004	-0.041
(95% interval)	(-.05, -.005)	(-.06, -.01)	(-.02, .036)	(-.06, -.00)	(-.04, -.02)	(-.04, -.01)	(-.06, .011)	(-.06, -.015)	(-.04, .03)	(-.07, -.01)
HI	0.014	-0.010	0.047	-0.002	0.007	0.006	0.003	-0.004	0.037	0.017
(95% interval)	(-.005, .034)	(-.03,.012)	(.019,.075)	(-.03, .026)	(-.005,.02)	(-.009,.02)	(-.03, .036)	(-.027, .019)	(.007, .07)	(-.01, .04)
Need	-0.041	-0.030	-0.046	-0.027	-0.039	-0.033	-0.027	-0.035	-0.042	-0.119
SAH	-0.028	-0.014	-0.019	-0.011	-0.022	-0.024	-0.019	-0.029	-0.019	-0.071
health limitations	-0.010	-0.020	-0.017	-0.015	-0.017	-0.014	-0.019	-0.011	-0.014	-0.040
age-male	-0.002	0.002	-0.008	-0.002	-0.001	-0.002	-0.003	-0.001	-0.007	-0.009
age-female	-0.001	0.002	-0.002	0.000	0.001	0.008	0.014	0.006	-0.002	0.001
Non-need	0.014	-0.008	0.055	0.000	0.009	0.008	0.002	-0.003	0.037	0.037
Income	0.012	-0.002	0.040	-0.026	0.009	0.001	-0.016	-0.015	0.018	0.006
Education	0.005	0.005	0.007	0.016	0.009	0.009	0.012	0.016	0.011	0.039
Activity status	-0.007	-0.013	0.001	0.002	-0.011	-0.004	-0.011	-0.004	0.003	-0.019
Region	0.000	0.001	0.005	0.004	0.000	0.000	0.010	0.001	0.002	0.003
Drug insurance	0.003	0.000	0.003	0.004	0.002	0.003	0.007	-0.002	0.003	0.008
Error	0.002	-0.001	-0.001	-0.002	-0.001	0.001	0.001	0.000	0.000	0.041

Note: Appendix 3F compares the decomposition of inequity in the probability of a specialist visit in Newfoundland, where the level of inequity is highest.

Estimates of inequity in hospital care are either near zero (equitable) or negative (pro-poor) in all provinces (Figure 3.4). When the inequity indices are positive, they are not significantly different from zero. There is a large error component in the estimates of inequity for most provinces, which means that the variables included in the models do not sufficiently explain hospital utilisation, and these omitted variables are associated with income (Table 3.8). In general, the needs variables contribute negatively to inequity, which means that they make the index of inequity more pro-poor. Income either contributes negatively or positively; and the contribution of insurance for hospital amenities is usually positive.

The main contributors to inequity in dental care are income and dental insurance coverage in all provinces (Table 3.9). Income contributes more to the pro-rich inequity than insurance in all provinces except Newfoundland. In Newfoundland, inequity is highest than in the other provinces, and income and insurance contribute about equally to inequity in the total number of dentist visits (both income and insurance contribute about 42% to inequity). Living in the capital city of the province is associated with greater use of dental services, but, because region is only weakly associated with income, its overall effect on income-related inequity is small in all provinces except Newfoundland, where it contributes about 10%.

Table 3.8 Decomposition of inequality in the total number of nights spent in hospital, the probability of admission, and the conditional number of inpatient nights

	B.C.	Alta.	Sask.	Man.	Ont.	Que.	N.L.	N.B.	P.E.I.	N.S.
Total number of nights										
CI_{unadj}	-0.173	-0.242	-0.197	-0.194	-0.204	-0.235	-0.176	-0.211	-0.215	-0.211
(95% interval)	(-.24, -.11)	(-.32, -.16)	(-.27,. -12)	(-.29, .10)	(-.25, -.15)	(-.29, -.18)	(-.30, -.05)	(-.288, -.14)	(-.35, .08)	(-.29, -.12)
HI	0.028	-0.083	-0.026	-0.046	-0.035	-0.046	-0.020	-0.003	-0.072	-0.058
(95% interval)	(-.03, .08)	(-.16,-006)	(-.10, .048)	(-.13, .04)	(-.08,.014)	(-.10, .01)	(-.14, .10)	(-.075, .07)	(-.19, .05)	(-.14, .03)
Need	-0.227	-0.169	-0.174	-0.146	-0.185	-0.203	-0.154	-0.205	-0.143	-0.156
SAH	-0.101	-0.074	-0.076	-0.051	-0.066	-0.083	-0.095	-0.090	-0.104	-0.064
health limitations	-0.040	-0.038	-0.045	-0.035	-0.052	-0.051	-0.043	-0.047	-0.022	-0.074
age-male	-0.017	-0.022	-0.009	-0.034	-0.018	-0.027	-0.012	-0.029	-0.017	0.004
age-female	-0.069	-0.035	-0.045	-0.025	-0.050	-0.043	-0.005	-0.039	-0.001	-0.022
Non-need	0.057	-0.089	-0.030	-0.056	-0.017	-0.033	-0.024	-0.015	-0.067	-0.062
Income	0.024	-0.096	-0.058	-0.043	-0.011	-0.053	0.002	-0.017	-0.031	-0.045
Education	0.008	0.000	0.013	0.014	-0.002	0.000	-0.006	-0.008	-0.012	0.008
Activity status	0.001	-0.025	-0.007	-0.025	-0.015	0.016	0.012	-0.001	-0.032	-0.022
Capital city	0.001	-0.004	-0.007	-0.009	0.002	0.000	-0.014	-0.003	0.002	-0.013
Insurance	0.024	0.036	0.027	0.007	0.010	0.004	-0.018	0.013	0.005	0.010
Error	-0.004	0.016	0.007	0.008	-0.002	0.002	0.001	0.009	-0.005	0.007
Probability of admission										
CI_{unadj}	-0.122	-0.124	-0.143	-0.160	-0.121	-0.156	-0.154	-0.176	-0.069	-0.189
(95% interval)	(-.17, -.08)	(-.18, -.07)	(-.20, -.09)	(-.22, .10)	(-.15, -.09)	(-.19, .12)	(-.219, -.09)	(-.231, .12)	(-.15, .011)	(-.26, -.12)
H	-0.013	-0.032	-0.047	-0.089	-0.028	-0.063	-0.055	-0.083	0.006	-0.105
(95% interval)	(-.055, .03)	(-.09,.026)	(-.10, .006)	(-.15, .03)	(-.06,.005)	(-.10, -.03)	(-.116, .007)	(-.136, .029)	(-.07, .08)	(-.17, -.04)
Need	-0.115	-0.090	-0.094	-0.072	-0.071	-0.098	-0.103	-0.093	-0.077	-0.178
SAH	-0.045	-0.027	-0.040	-0.024	-0.036	-0.051	-0.068	-0.041	-0.052	0.000
health limitations	-0.020	-0.024	-0.020	-0.020	-0.005	-0.026	-0.020	-0.031	-0.008	-0.110
age-male	-0.009	-0.018	-0.007	-0.014	-0.010	-0.016	-0.009	-0.010	-0.001	-0.068
age-female	-0.041	-0.021	-0.027	-0.014	-0.020	-0.006	-0.006	-0.010	-0.017	0.000

	B.C.	Alta.	Sask.	Man.	Ont.	Que.	N.L.	N.B.	P.E.I.	N.S.
Non-need	-0.003	-0.047	-0.055	-0.088	-0.023	-0.062	-0.060	-0.090	0.013	-0.110
Income	-0.010	-0.050	-0.058	-0.082	-0.017	-0.058	-0.034	-0.074	-0.009	-0.068
Education	-0.005	-0.004	0.015	0.010	0.001	-0.001	-0.015	0.009	0.018	-0.003
Activity status	0.000	-0.010	-0.025	-0.023	-0.013	-0.002	0.019	-0.007	-0.010	-0.039
Capital city	0.000	-0.002	-0.003	-0.007	0.001	0.000	-0.003	-0.004	-0.001	-0.013
Insurance	0.013	0.020	0.015	0.014	0.005	-0.001	-0.027	-0.014	0.016	0.014
Error	-0.005	0.013	0.006	0.000	-0.003	0.005	0.008	0.007	-0.005	0.005
Conditional number of nights										
CI_{unadj}	-0.054	-0.117	-0.055	-0.033	-0.088	-0.080	-0.022	-0.038	-0.148	-0.027
(95% interval)	(-.11, -.002)	(-.18, -.06)	(-.12, .006)	(-.107, .40)	(-.13, -.05)	(-.12, -.04)	(-.13, .08)	(-.09, .018)	(-.24,-.06)	(-.09, .04)
HI	0.021	-0.069	0.022	0.032	-0.028	-0.003	0.026	0.040	-0.089	0.045
(95% interval)	(-.022, .06)	(-.12, -.02)	(-.03, .07)	(-.03, .09)	(-.06,.007)	(-.04,.035)	(-.077, .13)	(-.007, .086)	(-.15,-.02)	(-.02, -.11)
Need	-0.484	-0.046	-0.076	-0.417	-0.067	-0.083	-0.047	-0.080	-0.055	-0.073
SAH	-0.173	-0.036	-0.023	-0.099	-0.019	-0.021	-0.033	-0.047	-0.023	-0.028
health limitations	-0.113	-0.012	-0.018	-0.149	-0.020	-0.023	-0.040	-0.012	-0.019	-0.026
age-male	-0.030	0.010	-0.007	-0.060	0.001	-0.006	0.020	0.000	-0.010	0.001
age-female	-0.168	-0.009	-0.028	-0.108	-0.029	-0.033	0.006	-0.021	-0.003	-0.021
Non-need	0.196	-0.075	0.019	0.173	-0.017	0.006	0.031	0.039	-0.094	0.044
Income	0.103	-0.065	0.004	0.159	-0.005	-0.017	0.058	0.029	-0.056	0.004
Education	0.042	0.007	0.003	0.008	-0.004	0.007	0.005	-0.012	-0.035	0.029
Activity status	-0.006	-0.031	0.009	0.033	-0.014	0.010	-0.020	-0.005	-0.027	0.014
Region	0.007	-0.003	-0.005	-0.023	0.000	0.000	-0.007	0.000	0.003	-0.001
Insurance	0.050	0.017	0.008	-0.004	0.005	0.006	-0.004	0.027	0.021	-0.001
Error	0.234	0.004	0.002	0.211	-0.004	-0.003	-0.007	0.003	0.001	0.002

Note: 95% interval is the confidence interval for the concentration indices and indices of horizontal inequity.

Table 3.9 Decomposition of inequality in the total number of visits to the dentist, the probability of visiting a dentist, and the conditional number of dentist visits

	B.C.	Alta.	Sask.	Man.	Ont.	Que.	N.L.	N.B.	P.E.I.	N.S.
Total number of visits										
CI_{unadj}	0.099	0.087	0.080	0.123	0.094	0.112	0.176	0.147	0.064	0.124
(95% interval)	(.08, .11)	(.067, .11)	(.05, .106)	(.094, .15)	(.08, .10)	(.09, .13)	(.14, .22)	(.102, .19)	(.03, .098)	(.095, .15)
HI	0.093	0.075	0.073	0.124	0.100	0.105	0.155	0.130	0.043	0.119
(95% interval)	(.08, .11)	(.055, .095)	(.05, .099)	(.096, .15)	(.09, .11)	(.086, .12)	(.11, .195)	(.084, .18)	(.009, .08)	(.089, .15)
Need	0.004	0.009	0.007	0.001	-0.004	0.007	0.021	0.014	0.014	0.006
Age	0.005	0.007	0.008	0.001	0.000	0.006	0.009	0.006	0.006	0.003
SAH oral	-0.001	0.002	-0.002	-0.001	-0.004	0.001	0.012	0.008	0.009	0.004
Non-need	0.092	0.072	0.072	0.119	0.099	0.105	0.152	0.128	0.042	0.117
Income	0.053	0.049	0.049	0.105	0.075	0.066	0.067	0.084	0.022	0.058
Male	-0.004	-0.006	-0.006	-0.007	-0.004	-0.003	-0.007	-0.008	-0.009	-0.004
Education	0.002	0.002	-0.003	-0.006	0.001	0.014	0.002	0.020	0.007	0.017
Activity status	0.000	-0.004	0.001	0.004	-0.001	0.004	0.011	-0.010	-0.002	0.006
Capital city	0.000	0.004	-0.001	0.004	-0.002	-0.001	0.014	0.002	0.002	0.000
Insurance	0.042	0.027	0.031	0.019	0.031	0.026	0.065	0.040	0.021	0.040
Error	0.002	0.006	0.001	0.003	-0.002	0.000	0.004	0.005	0.007	0.001
Probability of dentist visit										
CI_{unadj}	0.092	0.089	0.093	0.114	0.089	0.117	0.181	0.142	0.079	0.127
(95% interval)	(.085, .099)	(.08, .097)	(.08, .105)	(.104, 12)	(.085, .09)	(.11, .12)	(.165, .198)	(.129, .156)	(.064, .094)	(.12, .14)
HI	0.077	0.074	0.075	0.102	0.080	0.102	0.159	0.121	0.053	0.116
(95% interval)	(.068, .087)	(.06, .087)	(.06, .092)	(.086, .12)	(.07, .085)	(.09, .11)	(.137, .181)	(.103, .139)	(.033, .072)	(.10, .13)
Need	0.014	0.013	0.017	0.011	0.009	0.015	0.021	0.018	0.022	0.012
Age	0.004	0.005	0.008	0.005	0.001	0.006	0.010	0.005	0.007	0.001
SAH oral	0.010	0.009	0.009	0.007	0.008	0.008	0.011	0.013	0.015	0.011
Non-need	0.077	0.071	0.073	0.100	0.079	0.101	0.157	0.120	0.052	0.115
Income	0.043	0.046	0.046	0.075	0.058	0.064	0.082	0.074	0.034	0.066
Male	-0.002	-0.003	-0.005	0.007	-0.002	-0.002	-0.006	-0.004	-0.005	-0.003

	B.C.	Alta.	Sask.	Man.	Ont.	Que.	N.L.	N.B.	P.E.I.	N.S.
Education	0.005	0.006	0.007	-0.004	0.005	0.020	0.012	0.020	0.013	0.017
Activity status	-0.001	-0.004	0.001	0.005	-0.003	0.002	0.006	-0.002	-0.006	0.003
Capital city	0.000	0.003	0.001	0.002	0.000	0.000	0.013	0.001	0.001	0.001
Insurance	0.031	0.022	0.024	0.015	0.022	0.017	0.051	0.031	0.015	0.032
Error	0.019	0.005	0.003	0.002	0.000	0.001	0.004	0.004	0.005	0.000
Conditional number of visits										
CI_{unadj}	0.006	-0.002	-0.013	0.009	0.005	-0.005	-0.005	0.004	-0.015	-0.003
(95% interval)	(-.006, .02)	(-.017, .01)	(-.03, .007)	(-.014, .03)	(-.003, .01)	(-.02, .01)	(-.045,.036)	(-.036, .044)	(-.04, .01)	(-.03, .02)
HI	0.015	0.0005	-0.001	0.020	0.018	0.002	-0.002	0.009	-0.011	0.001
(95% interval)	(.003, .027)	(-.01, .015)	(-.021, .02)	(-.002, .04)	(.01, .026)	(-.01, .018)	(-.04, -.038)	(-.03, .05)	(-.04, .02)	(-.024, .03)
Need	-0.009	-0.003	-0.012	-0.010	-0.011	-0.007	-0.003	-0.004	-0.006	-0.004
Age	0.000	0.002	0.000	-0.003	-0.001	0.001	-0.004	-0.001	-0.001	0.002
SAH oral	-0.010	-0.005	-0.012	-0.006	-0.010	-0.008	0.001	-0.003	-0.005	-0.006
Non-need	0.014	-0.002	0.000	0.019	0.018	0.004	-0.002	0.008	-0.012	0.001
Income	0.010	0.003	0.004	0.027	0.016	0.003	-0.012	0.007	-0.012	-0.006
Male	-0.002	-0.003	0.000	-0.003	-0.002	-0.001	-0.001	-0.003	-0.004	-0.001
Education	-0.002	-0.004	-0.009	-0.007	-0.003	-0.005	-0.004	0.000	-0.003	0.000
Activity status	0.000	-0.001	0.001	-0.001	0.002	0.002	0.002	-0.006	0.002	0.002
Capital city	0.000	-0.001	-0.002	0.001	-0.001	0.000	0.001	0.001	0.001	0.001
Insurance	0.008	0.004	0.005	0.003	0.007	0.006	0.012	0.009	0.003	0.005
Error	0.001	0.001	-0.002	-0.001	-0.002	-0.001	0.000	0.000	0.002	0.001

Note: 95% interval is the confidence interval for the concentration indices and indices of horizontal inequity.

3.5 Discussion

In Canada, the provinces share common national constraints on social policies; they also broadly share a common historical and macroeconomic context. Furthermore, the training of health professionals is harmonised across the country and federal equalisation payments redistribute federal taxes from the wealthier to the poorer provinces with the aim that they all have largely comparable resources for public services. The provinces also aim to achieve equity goals in health care, but face tradeoffs with other policy goals, namely public cost containment. In spite of some commonalities, some variation still exists in spending per capita, in the public/private mix of funding, and in supply and quality of care that may impact upon equity in health care use. It has been argued that aggregate (i.e. national) analyses of health care utilisation may risk overlooking significant variations across jurisdictions (Newbold, Birch, & Eyles, 1994). In this analysis, there appear to be similar patterns of inequity across the provinces, although with some variations in extent and in the underlying contributors.

3.5.1 Inequity in physician utilisation

At a national level the results demonstrate that there is inequity in the probability of using physician services; provincial analyses also reveal inequity in the probability of a specialist visit in all provinces, and inequity in the probability of a GP visit in all provinces except Prince Edward Island. Higher income individuals are more likely to visit a GP and specialist after adjusting for differences in need across income groups. The total number of GP visits has a distribution that is more concentrated among lower

income groups, however for total specialist visits the distribution remains pro-rich. Moreover, conditional upon one visit, in all provinces, inequity in GP visits becomes pro-poor (significantly in most provinces), and even nears zero for specialist care. Therefore, there may be some barriers to accessing a GP for an initial visit for lower income groups, which can be considered to be more patient-driven, but the intensity of primary care use, which is more provider-driven, is more concentrated among the lower income groups.

It is possible that inequitable access to a GP to some extent drives the inequity in specialist care. Since these results show that individuals with higher income are more likely to visit their GP, conditional on their needs, then reducing this inequity at the initial point of contact in the system may have the effect of reducing inequity in specialist care. Policy makers should not only be concerned about the implication of inequity at the stage of initial contact with a GP on the delivery of appropriate and needed primary care services but also on the accessibility of more specialised services for which GP referrals are needed.

Similarly, in the case of specialist care the well documented disparity in specialist care favouring higher income and better educated individuals (see, for example, (Dunlop, Coyte, & McIsaac, 2000; van Doorslaer, Masseria, & the OECD Health Equity Research Group Members, 2004) appears to be more important in securing the initial appointment, which is available only through GP referral, than in accessing further needed specialist care. Patients may be able to exert pressure on their doctors to receive a referral to a specialist. Indeed, at least one study of referral patterns in Ontario did show a higher specialist referral rate in the highest-income neighbourhood after adjusting for differences in disease prevalence (Chan & Austin, 2003). The finding of

non-significant inequity in conditional specialist visits is consistent with a national-level study of the income effects on utilisation using earlier data from the CCHS (Asada & Kephart, 2007). However, the persistent inequity in the use of physician services, in particular at specialist level, goes against the equity objectives of the provincial health systems. Moreover, this finding signals the need for further policy action to better align the distribution of physician service utilisation with health care need, and for policy makers to place more weight on achieving equity relative to other competing health policy objectives.

3.5.2 Inequity in dentist utilisation

Inequity in dentist use exists in all of the provinces. It is not surprising that the level of inequity is highest in dental care (very high in most provinces, i.e. *HI* is 0.10 or larger). This sector is left entirely outside of the public system and federal oversight, and complementary insurance coverage is held almost exclusively by the wealthy and younger age groups (Bhatti, Rana, & Grootendorst, 2007). The high costs of dental care can act as a barrier to the use of needed services by those with no, or inadequate, dental insurance coverage. The positive contribution of holding dental insurance on inequity in dental care is consistent with previous studies that have identified a positive effect of insurance on visits to the dentist (Kosteniuk & d'Arcy, 2006; Millar & Locker, 1999). Relatively simple procedures such as fillings and extractions can cost up to $200 and $150, respectively; more complicated procedures such as dental crowns and root canals can be much more expensive (Grignon, Hurley, Wang et al., 2008). Since the survey question that is used in this analysis includes both dentist and orthodontist visits, and orthodontics are generally very expensive and include many cosmetic procedures such

as teeth straightening, it is possible that the estimate of inequity is driven in part by the inclusion of these more expensive, and arguably less essential, services.

This finding of consistent pro-rich inequity implies that more public funding could be directed towards subsidising dental care costs or dental insurance costs to improve access for lower income groups, in particular in provinces with the highest level of inequity. Indeed the Liberal Party pledged to "support dental services for low-income Ontario families" as part of their platform during the 2007 Ontario provincial election (The Ontario Liberal Party, 2007, p.18); though to date this has not yet been implemented (Section 6.2.1 offers further discussion of dental care policy in Canada).

In addition to having the highest level of inequity, dental care also displays notable variability in the extent of inequity across the provinces. The highest level of inequity is found in Newfoundland, where both mean utilisation and dental insurance coverage are lowest, and the least inequity in Prince Edward Island, where utilisation rates are high. However, more information is needed on the types of dental services used and how these contribute to inequity. This information would enable use to distinguish between cosmetic services, for which public subsidies should not necessarily be given, and preventive and restorative services that actually improve health (suggestions for future research in equity in dental care can be found in Section 6.2.1).

Some information on the type of dental services received is available in an optional component to the CCHS. Respondents in two provinces, British Columbia and Ontario, completed this more detailed set of questions related to dental care services allowing some testing of the level of inequity in check-ups compared to overall utilisation. These provinces completed the optional module in the CCHS that included the following

question: "Do you usually visit a dentist for a check up: (a) more than once a year; (b) about once a year; (c) less than once a year; or (d) only for emergency care?" We undertook exploratory analyses to compare inequity in frequent preventive care (a positive response to (a)), and some preventive care (a positive responses to either (a), (b) or (c)) (Grignon, Hurley, Wang et al., 2008). Appendix 3I shows the results of the decomposition of inequity for these two dependent variables in Ontario and British Columbia, in addition to a graphical depiction of inequity using the concentration curve. A much higher level of inequity was found for frequent check-ups (about 50% higher) than with total utilisation and regular check-ups. Since there is limited evidence supporting more frequent check-ups than once per year, it is likely that even this measure of 'preventive care' includes some degree of cosmetic, or less essential, services.

To what extent that dentists may induce patient demand in Canada is not known, although it is likely to play some role in explaining utilisation patterns. Some studies have shown a positive effect of the supply of dentists on utilisation (Birch, 1988; Nguyen, Häkkinen, & Rosenqvist, 2005).

3.5.3 Inequity in hospital utilisation

The evidence of inequity in inpatient service use is limited, although wide variations in the estimates of inequity are seen across the country. Overall, it appears on the basis of these analyses that there is a non-significant trend in the direction of pro-poor inequity. Therefore poorer groups are more likely to be admitted to hospital and also stay longer than higher income groups. The equitable, or pro-poor, distribution of hospital care differs from the other service areas. Perhaps this is because the hospital services within

the regional health authorities are better integrated and therefore more able to meet the needs of disadvantaged groups. Alternatively, perhaps a lack of effective primary care leads to a greater reliance on emergency hospitalisations for lower income groups, as has been shown in Ontario (Glazier, Tepper, Agha, & Moineddin, 2006). Also, it is possible that when faced with difficulties getting a referral to see a specialist, lower income individuals access specialist care in an emergency hospital setting. Better data that disaggregates the type of hospitalisation that occurred would be useful to disentangle some of these possible effects.

The analysis of inequity in hospital care presents some specific methodological challenges, such as a heavily skewed distribution, a small numbers of users, and the reliance on a single question to capture a multitude of possible services and levels of service complexity. Therefore, these results should be interpreted with caution. Because the survey question includes all types of hospitalisation, including nursing homes, it is very difficult to understand the underlying contributors to the seemingly pro-poor inequity as these are likely to be different for acute, emergency, elective and long-term care admissions (see Section 6.3.2 for further discussion of these limitations). As illustrated in Appendix 3F, it is the analysis of equity in hospital care that is the most sensitive to the choice of linear versus nonlinear specifications. Using nonlinear models brings the estimates of inequity in hospital care closer to zero in most cases; therefore, the observation that hospital utilisation is heavily concentrated among lower income individuals (after adjusting for need) is sensitive to the underlying choice of estimation. Clearly in the hospital sector more refined data and estimation techniques are needed to address the question of how inequitable are the use of these services.

3.5.4 Provincial variations

There is no one province with the lowest level of income-related inequity in all four service areas. Prince Edward Island, a very small island province of less than 140,000 inhabitants appears to have the lowest inequity in primary and dental care. This finding may relate to fewer geographic barriers to access or it could relate to more homogeneous preferences for health services in this population. Relatively high levels of inequity can be found in Newfoundland. Geographical barriers may partly explain the high level of inequity in specialist and dental care in Newfoundland, where residing in the capital city contributes to pro-rich inequity. In other words, individuals living in the capital city are more likely to have higher income and also more likely to make use of specialist and dental services in Newfoundland.

The differential impact of complementary insurance across the country appears to play some role in explaining the observed variations. In Newfoundland, where the highest level of inequity in dental care is seen, there is also the strongest effect of insurance on utilisation and the largest contribution to inequity. In Newfoundland, having insurance is associated with an increase in the likelihood of visiting a dentist by 28%, compared to 18.5% in Canada as a whole (the marginal effects of holding insurance on the likelihood of visiting a dentist are reported in Appendix 3J).

For GP and specialist care, complementary coverage for prescription drugs appears to contribute more to pro-rich inequity in the Atlantic provinces, where levels of reported coverage are among the lowest (see Table 3.2). Moreover, the decomposition of GP inequity reveals that prescription drug coverage, which includes both private and public coverage, is the main *positive* contributing factor to inequity (as displayed in Table 3.7).

Some steps have recently been taken to extend eligibility for public drug insurance in the province of Newfoundland to a further 85,000 inhabitants (over 15% of the population) with the passage of the new *Pharmaceuticals Services Act* in 2006; this may reduce inequity in physician care in this province.

Patterns of inequity may also relate to differences in utilisation rates. The descriptive statistics show that Prince Edward Island has a high-use population compared to the other provinces, in particular for the probability of a GP visit (see Table 3.4). Moreover, the provinces with the lowest levels of inequity in GP services are also those with the highest utilisation rates – Prince Edward Island, Nova Scotia and British Columbia. The same relationship also exists to some extent with dental care, as noted above.

In this analysis, I decided not to include as an independent variable whether or not an individual has a regular family doctor, because this is arguably endogenous to the decision to visit a physician. An individual who needs to visit a physician is also more likely to ensure that he or she has a regular physician. Having a regular family doctor is an important point of contact into the health system, both for primary care and specialist care. One study found that those without a regular family doctor were twice as likely to report difficulties in accessing routine care than those with a regular doctor, an effect that was not seen in immediate care (Sanmartin & Ross, 2006). The 'protective effect' of having a family doctor has been shown in previous studies to reduce the use of emergency care services (Dunlop, Coyte, & McIsaac, 2000). By observing the variations in reporting having a regular physician across the country, it seems that while a higher proportion of the population than the national average reports not having a regular doctor in Manitoba, Alberta and Québec, these provinces do not exhibit higher-

than-average levels of inequity, with the exception of the likelihood of visiting a specialist in Manitoba. The province of Québec appears to be something of an outlier, with lower rates of GP utilisation alongside the lowest proportion of respondents reporting a regular doctor. And yet the results point to relatively low inequity the probability of visiting a GP and in the total number of GP visits. Perhaps there are cultural differences in health care seeking behaviours relative to other provinces.

Overall conclusions

These analyses reveal some variation across the provinces in the rates of health care use and in the levels of income-related inequity alongside some national trends. These trends include evidence of inequity favouring higher income groups - for the probability of visiting a GP, specialist and dentist, and for the total number of specialist and dentist visits. There is evidence of pro-rich inequity, to a less extent, in the number of specialist and dental visits conditional on one visit. There is limited evidence of inequity in the use of hospital services and in the total number of visits to the GP. These findings cannot be attributed to financial barriers to access to physician and hospital services; those imposed by geography, by an inability to secure a regular physician, by a lack of insurance for the costs of dental services, and by difficulties in getting a referral to specialist care may be important. Direct financial barriers may, however, exist in the case of specialist care, since not all services are fully funded by provincial public insurance systems, e.g. some dermatology and ophthalmology services. Moreover, inequity is clearly highest in dental care where there is very little public funding, therefore substantial costs are likely to deter lower income groups from seeking care.

These national trends suggest that federal oversight and public funding of hospital and physician sectors helps to achieve the goal of reasonable and uniform access to care, in particular to GP services, as indicated by low levels of inequity and relatively little variation across the country. This low level of variation has been achieved in spite of a declining federal role in funding provincial health insurance programmes, as measured by the funding from federal transfers as a proportion of total spending (Marchildon, 2005). Further research is needed on the provincial policies that affect utilisation, such as the coverage of services outside the public insurance programmes, to better understand the observed variations in the level and drivers of inequity.

Methodological limitations

These findings should be interpreted in light of the analyses' methodological limitations. Self-reported health care use may be biased because of problems in recall. If different population groups report utilisation in a systematically different way (e.g. older people may have worse recall), then some bias may be introduced. Some researchers believe that self-reported data on physician visits may be unreliable (Roberts, Bergstralh, Schmidt, & Jacobsen, 1996); and that recall for hospital visits is generally better than that for physician contacts (Barer, Manga, & Shillington, 1982). These limitations are also discussed in Section 6.3.1.

There is considerable debate surrounding the approximation of need with self-reported health status (Goddard & Smith, 2001). First, although measuring need for health care with ill-health is the most convenient and commonly used approach, it may not accurately measure an individual's need for care. In the case of dental care it can be argued that self-assessed oral health may be an endogenous outcome of dental care,

especially preventive care, as opposed to an endogenous prompter of dental care utilisation (Nguyen & Häkkinen, 2004). Second, biases in the reporting of health may systematically exist across population groups (Adamson, Ben-Shlomo, Chaturvedi, & Donovan, 2003; Lindeboom & van Doorslaer, 2004; O'Donnell & Propper, 1991). However, numerous studies support the validity of self-reported health status, demonstrating significant relationships with other measures of health status (Idler & Benyamini, 1997; Kaplan & Camacho, 1983; Mossey & Shapiro, 1982; Sutton, Carr-Hill, Gravelle, & Rice, 1999). I will discuss these issues further in Section 6.3.4.

It is important to note that because of missing data on income, the findings cannot be generalised to the under-20 population. Finally, it is important to underscore that this line of research, based on a macro-level study of inequity in health care in Canada rather than a micro level investigation of a specific disease or service category, does not address the issue of appropriateness or quality of care.

CHAPTER 4: INEQUITY IN PUBLICLY FUNDED PHYSICIAN CARE: WHAT IS THE ROLE OF PRIVATE PRESCRIPTION DRUG INSURANCE?[17]

4.1 Introduction

Private health insurance is commonly thought to contribute to inequity in the health system, both in its finance and access (Mossialos & Thomson, 2004; OECD, 2004). Private insurance for services covered within a public insurance system that allows the holder to bypass public queues has been identified as a source of income-related inequity in the use of physician services in Australia and Ireland (van Doorslaer, Clarke, Savage, & Hall, 2007; van Doorslaer, Masseria, & the OECD Health Equity Research Group Members, 2004). Indeed its contribution to inequity has been identified as one of the arguments against *supplementary* private insurance in the persistent debates over public and private financing in many countries (Mossialos & Thomson, 2004).

Such equity effects, however, should not be limited to this type of supplementary insurance. Complementary private insurance – insurance for services and costs *not* insured by a public plan – may also give rise to inequity in the use of publicly financed services. If the services or costs not insured by the public system but covered by complementary insurance are complements to the use of publicly financed services,

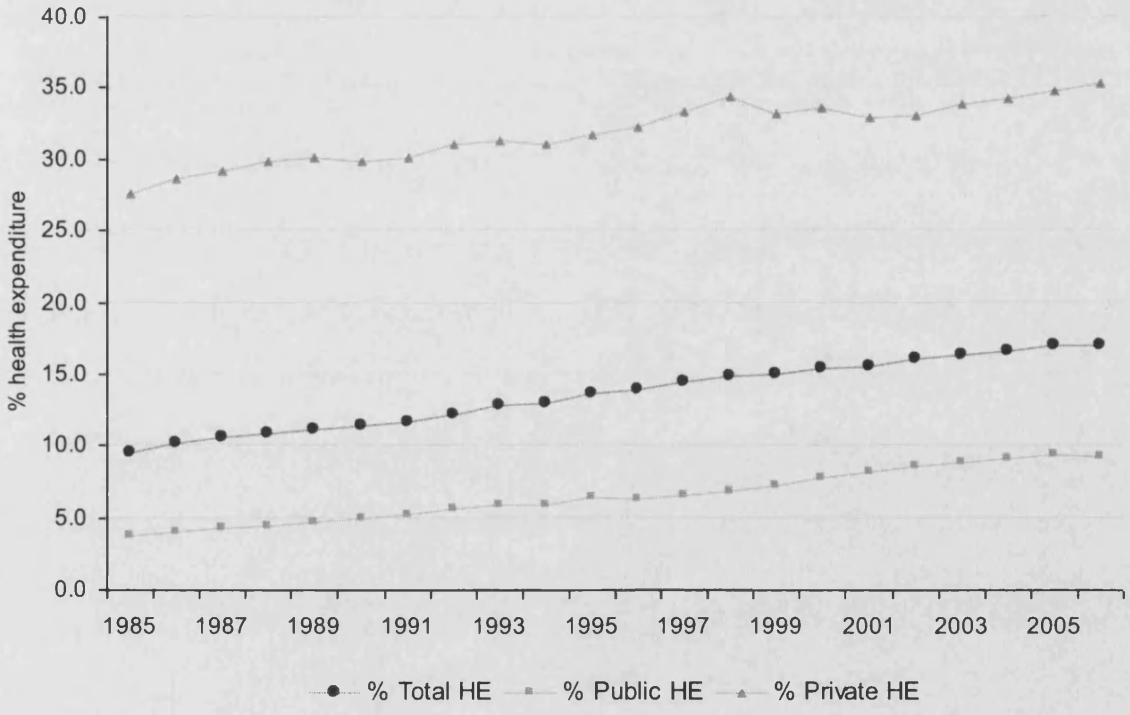
[17] This chapter is based on the published peer-reviewed article: Allin, S and Hurley J (2008). Inequity in publicly funded physician care: what is the role of private prescription drug insurance? *Health Economics*. My co-author, Jeremiah Hurley, played a supervisory role in this project during the period Sept – Dec 2007, contributed to the refinement and revision of the paper (a draft had been written in July 2007), and suggested the subgroup analysis for people with and without chronic conditions. The origination of the research question, drafting of the chapter, review of the literature, statistical analysis and writing was my own work.

such insurance can create inequity in the use of a publicly insured service. This effect is best documented for private insurance that covers the cost-sharing provisions of public insurance plans. In both the United States and France, for example, whose public insurance systems require substantial patient cost-sharing, private complementary insurance that covers the cost-sharing provisions increases use of the publicly insured services (Atherly, 2001; Buchmueller, Couffinhal, Grignon, & Perronnin, 2004). Because such insurance is held disproportionately by middle and high-income individuals, researchers have argued that it contributes to inequity in the use of physician services in France and the US (Chen & Escarce, 2004; van Doorslaer, Masseria, & the OECD Health Equity Research Group Members, 2004).

Much less studied is the extent to which private insurance for services that fall outside the public system contributes to inequity in the use of publicly insured services. Prescription drugs and physician visits, for instance, are complements: legally, in most developed countries one can only obtain a prescription drug by first visiting a physician to obtain the prescription. Obtaining a prescription is often a primary purpose of a physician visit. But most countries provide less generous public coverage for drugs than they do for physician visits; in Canada, the level of public coverage is the lowest, next to the Untied States, compared to other high-income countries (OECD, 2008; Robinson, 2002). Greater reliance on private finance for drugs can induce an income gradient in the use of physicians. Stabile (2001) estimated that in Canada those with 'supplemental' insurance that covers prescription drugs were significantly more likely to make a publicly financed physician visit than those without such insurance (Stabile, 2001). The impact of such spill-over effects is of growing importance for drugs, which are becoming the primary treatment for many medical conditions. Indeed the role of pharmaceuticals in the health system has increased markedly in the past 20 years; as a

proportion of total health spending, pharmaceuticals constituted 9.5% in 1985 and 17% in 2006 (see Figure 4.1). Pharmaceutical price regulation takes place at the federal level in Canada (as discussed in Chapter 1), with the objective of ensuring patented drug prices are not excessive; further regulations are in place at the provincial level. In Ontario, the setting for this chapter's analysis, there are also price-volume agreements with manufacturers in addition to generic price caps at 50% of the original product price (Paris & Docteur, 2007). Also the Ontario public plan has frozen the negotiated prices on its drug formulary since 1994 to avoid price inflation (Morgan, Barer, & Agnew, 2003).

Figure 4.1 Spending on pharmaceuticals as a proportion of total health expenditure (HE), public health expenditure and private health expenditure, 1985-2006



Source: Canadian Institute for Health Information, 2007b.

Drugs, however, are but one example of a more general challenge for the achievement of equity goals in health care. To the extent that privately financed health care services

are complements to use of publicly financed services, policies to achieve equitable access to and use of publicly financed services must look beyond the public system.

This chapter examines the impact that private financing of prescription drugs in Canada has on equity in the use of publicly financed physician services. Canada offers a unique setting for investigating this question. Public insurance provides universal, first-dollar coverage for medically necessary physician services. Private insurance for these same publicly insured physician services is either prohibited (in 4 of 10 provinces) or restrictions on physicians' ability to provide services in both the public and private sectors and that limit the fees they can charge for private services have deterred the development of a private sector and consequently private insurance (Flood & Archibald, 2001). Over 98% of physician expenditures are publicly financed (Canadian Institute for Health Information, 2007b). In contrast, in 2005 private sources financed 53% of prescription drug costs (of which 34% was through out-of-pocket expenditures and 66% through private insurance) (Canadian Institute for Health Information, 2007b). Public drug insurance is mostly limited to defined populations, primarily those aged 65 or over and those receiving social assistance. Because private insurance for drugs is not confounded by private insurance for physician services and effectively all physician visits are publicly financed, this chapter therefore aims to identify the impact of private insurance on income-related equity in the use of publicly financed physician services.

It is possible to address these empirical questions with the CCHS, a representative survey of the community-dwelling population, includes information on whether an individual has drug insurance. Among those with drug insurance, the 2005 survey further documents whether the source of the insurance is a public programme, employer-provided private insurance or individual-purchased private insurance.

As shown in Chapter 3, the utilisation of specialist services in most provinces in Canada appears to be inequitable favouring the wealthier individuals, while use of GP services tends to be mildly, but significantly, concentrated among the rich for the probability of a visit (pro-rich), and mildly pro-poor for the number of visits conditional on one visit. These findings are consistent with previous studies (Asada & Kephart, 2007; Curtis & MacMinn, 2007; Jiménez-Rubio, Smith, & van Doorslaer, 2008; van Doorslaer, Masseria, & Koolman, 2006). While inequitable use of specialist care is evidenced in most countries, pro-rich inequity in the probability of a GP visit is unusual internationally; inequity was found in only three of 16 OECD countries included in the analysis - Canada, Portugal and Finland (van Doorslaer, Masseria, & the OECD Health Equity Research Group Members, 2004). The positive income gradient for the likelihood of a visit, the aspect of utilisation most controlled by the individual, may be partly explained by the interaction with the largely privately funded complementary prescription drugs.

4.2 Drug consumption, drug financing, and use of physician services

Are prescription drugs and physician services complements? Ostensibly, they are: many countries require a physician visit to obtain a prescription before an individual can obtain a prescription drug. In Canada, 60% of office-based physician consultations result in a prescription (IMS Health, 2007). Moreover, individuals appear to be sensitive to the cost of medicines associated with physicians since a Canadian study found that one stated reason for not visiting a physician when ill was the cost of prescriptions (Williamson & Fast, 1998).

But complementarity is not the only possibility. Drugs can also substitute for physician services. A number of mental health conditions that previously required regular therapy visits with a psychiatrist are now treated primarily with prescription drugs. Similarly, prescription drugs play a large role in controlling many chronic conditions (e.g., hypertension, diabetes, heart disease) that, if not controlled properly, require physician and hospital care. Such dynamics presumably underlie the conclusions of Shang and Goldman (2007) and Anis *et al.* (2005) that drugs are a substitute for physician care (Anis, Guh, Lacaille, Marra, Rashidi, Li et al., 2005; Shang & Goldman, 2007). A growing literature also documents that prescription drugs may clinically substitute for inpatient hospital care, where a reduction of the cost of prescription drugs is associated with a decrease in inpatient utilisation (Choudhry, Avorn, Antman, Schneeweiss, & Shrank, 2007; Shang & Goldman, 2007), and similarly that increased patient cost-sharing for prescription drugs appears to increase hospital admission rates (Chandra, Gruber, & McKnight, 2007) and the use of nursing homes (Soumerai, Ross-Degnan, Avorn, McLaughlin, & Choodnovskiy, 1991).

Estimates of the impact of drug insurance on physician visits will include these counter-acting complementary and substitutive relationships, potentially masking the impact of insurance. In the analysis it is therefore possible to identify situations in which one of them is expected to dominate. For instance, a lack of drug insurance is most likely to inhibit an initial GP visit, that aspect of utilisation over which patients exert the greatest control. In some cases physician visits can substitute for drugs, a phenomenon that can be expected to be associated with a positive relationship between lack of drug insurance and the conditional utilisation of physician services. It is also expected that drug insurance will exert a stronger influence on GP visits than on specialist visits, because GPs serve as gatekeepers to specialist care. Overall, therefore, it is hypothesised that

drug insurance should have the largest impact on the likelihood of a GP visit. This is consistent with Stabile (2001), which found that those with drug insurance were significantly more likely to visit a physician, but did not have a higher number of visits conditional on some use, controlling for past utilisation and potential selection into insurance.

The impact of insurance on use is also expected to be largest among otherwise healthy people who suffer occasional acute problems (e.g., respiratory infection). Individuals with chronic conditions are both more likely to visit their physician regularly and more likely to exhibit the substitutive relationship, muting any overall estimated effect. To test these hypotheses, in this analysis, models are estimated separately for GP visits and specialist visits; separately for the likelihood of a visits and the conditional number of visits among users; and for the overall sample and separately for those with and without a chronic condition.

Even if drug insurance influences the use of physician visits, its impact on income-related equity of physician use also depends on whether insurance status and income are correlated in the population. Prescription drug costs in Canada may be covered in four ways:

1. Provincial public drug insurance generally covers those on social assistance, those aged 65 or over, those with catastrophic expenditures (e.g., over 4% of income) and those who suffer from a small number of designated diseases.
2. Group-based or employer-sponsored private insurance, which covers much of the employed population and benefits from a tax subsidy.
3. Individual private insurance (a very small segment).
4. No coverage.

The details of the four options vary somewhat across the Canadian provinces; for example British Columbia, Manitoba and Saskatchewan have income-, and not age-based prescription drug insurance programmes, and private insurance premiums are not tax-exempt in the province of Québec.

Approximately two-thirds of Canadians hold private drug insurance (Canada Life and Health Insurance Association, 2007), which finances 20% of total prescription drug expenditures (CIHI 2007). A clear income gradient in private insurance coverage for drugs has been previously noted (Naylor, 1999). Estimates of the proportion uninsured range from 10% of the population, based on a combination of survey and administrative data (Applied Management in association with Fraser Group and Tristat Resources, 2000b), to 23% of the population, based on survey data (Dewa, Hoch, & Steele, 2005; Kapur & Basu, 2005). The "uninsured" in most provinces are eligible for high-deductible catastrophic public insurance, although most people are not aware of this coverage and would therefore report themselves as uninsured (Applied Management in association with Fraser Group and Tristat Resources, 2000b; Kapur & Basu, 2005). These institutional arrangements imply that public drug insurance is negatively correlated with income while private insurance coverage is positively correlated with income since most get it through employment in a full-time job (Dewa, Hoch, & Steele, 2005).

4.3 Methods

This chapter addresses the following research question: to what extent does the exclusion of prescription drugs from the universal public insurance plan and reliance on

private insurance contribute to inequity in physician service utilisation, given that these two services are complementary?

To address this question, income-related inequity in physician visits is estimated using the well-established *ECuity* methods based on concentration curves for utilisation, which compare the cumulative distribution of health care use to the cumulative distribution of the population rank-ordered by income (Kakwani, Wagstaff, & van Doorslaer, 1997; O'Donnell, van Doorslaer, Wagstaff et al., 2008; Wagstaff & van Doorslaer, 2000; Wagstaff, van Doorslaer, & Paci, 1991). This method is explained in detail in Section 2.3.2, and involves five basic steps:

1. calculate the concentration index (CI) for unadjusted physician utilisation (CI_{unadj});
2. estimate a model of the determinants of physician utilisation using both need-related and non-need related variables;
3. predict needs-adjusted utilisation for each individual in the sample by setting the value of all non-need variables at their sample mean during prediction;
4. calculate the concentration index for the distribution of needs-adjusted utilisation (CI_{adj});
5. calculate horizontal inequity (*HI*) as the difference between the unadjusted CI and the needs-adjusted CI: $HI = CI_{unadj} - CI_{adj}$.[18]

A zero *HI* index implies that, after controlling for differences in need across income groups, all individuals have equal utilisation, regardless of income. A positive *HI* implies 'pro-rich' inequity in which, after adjusting for need, higher-income individuals

[18] Note: this is different from the calculation of *HI* using non-linear estimates; instead, *HI* is calculated directly as the concentration index for *needs-standardised* utilisation (see Section 2.3.2 for more information).

are more likely to visit the physician, or have more visits, than lower-income individuals. A negative *HI* implies 'pro-poor' inequity in which, after controlling for need, lower-income individuals are more likely to visit the physician, or have more visits, than are higher-income individuals. To assess the contribution of drug insurance to income-related inequity in the physician utilisation, I decompose the unadjusted concentration index (CI_{unadj}) using the methods described in Section 2.3.2 (Wagstaff, van Doorslaer, & Watanabe, 2003).

Multivariate regression models of physician visits for step (2) above are central to these methods. Models for GP visits and for specialist visits are estimated separately. For each the standard two-part model is employed in which part 1 analyses the decision to make at least one visit (i.e., use vs. no use) and part 2 analyses the number of visits conditional on being a user. The dichotomous dependent variable for part 1 and the count nature of the dependent variable for part 2 formally call for non-linear models (Deb & Trivedi, 2006). Because estimates derived from linear models often provide a good approximation to those of non-linear models and aspects of the equity analysis (especially the decomposition) are easier to implement and interpret with linear models, I compared the results when I employ non-linear models and linear models. As in the previous chapter, the pattern of coefficient estimates did not differ importantly across the two approaches and the resulting *HI* estimates were nearly identical, so the following analysis is based on the linear models. Results for the non-linear models are presented in Appendix 4A for comparison.

The variable of particular interest in this analysis – drug insurance – may be endogenous. The usual concern is adverse selection whereby those with above-average (unobserved) risk purchase drug insurance. Three factors mitigate concern about

endogeneity in this setting. First, the largest group of individuals who hold public drug insurance are automatically eligible because of age. There is no element of voluntary choice and therefore chance of selection. Second, there is very little choice in the private insurance market. Over 90% of those with private insurance obtain the insurance through group plans, most often through employment; insurance premiums for individual insurance are risk-rated and include pre-existing condition clauses, thereby either explicitly excluding many individuals in poor health or pricing them out of the market (Hurley and Guindon, 2008). Tying private insurance to employment may create counter-acting selection effects: selection into employment would create favourable selection into the insurance pool that would bias the estimates downward; but, conditional on working, health-related selection into jobs that offer better extended health care benefits would create adverse selection. Some evidence of favourable selection can be found both in Stabile (2001) whose instrumental variable-estimates of the impact of insurance of a GP visit are larger than his uncorrected OLS estimates (0.026 vs 0.020) and in a study of four European countries, where adopting a simultaneous equation approach actually increased the effect of insurance on specialist utilisation (Jones, Koolman, & van Doorslaer, 2007). Stabile (2001) used as an instrument cross-provincial variation in marginal tax rates (which are correlated with insurance status because employer-provided insurance is not included in taxable income). Such an instrumental variable approach is not possible in this single-province study. Nor is it possible to implement the strategy employed by Jones et al (2007) because there is not any information on whether an individual's employer offers private insurance as a fringe benefit. Given that both of these studies find evidence of favourable selection, to the extent that selection bias is present in the estimates, it likely biases them downward.

Third, the problem of endogeneity is substantially reduced when, as in this case (see below), models include good measures of health status so that any unobserved component in the residual is small (Buchmueller, Grumbach, Kronick, & Kahn, 2005). In other words, any bias arising from the possible selection of sicker individuals (adverse selection) or healthier individuals (favourable selection) into insurance is minimised by adjusting for a comprehensive set of health indicators.

Another concern lies with the potential for employers that offer insurance to also provide higher salaries, thereby possibly confounding the effects of insurance and income on utilisation. The effect of such collinearity would be to bias the estimated coefficients, which could either lead to an under- or over-estimation of the insurance effect, the former if the insurance effect is inflating the estimate of the income coefficient, and the latter if some of the effect of income is picked up by the variable of insurance. Because those with group-based insurance cover a large proportion of the population with a wide range of income levels, I assume that the estimates are unbiased and that if there is any bias, it does not affect substantively the study's findings.

To test the robustness of the estimates to various types of unobserved heterogeneity that might be associated with both holding insurance and physician use, the above models are estimated by a) excluding individuals aged 65 or over, which constitutes the majority of the population eligible for public drug coverage; and b) excluding income. The findings are robust to these changes in sample and specification (Appendix 4B).

Self-reported measures of insurance status may also introduce bias. Individuals who visit a physician and receive a prescription are more likely to know their true insurance status; non-users are more likely to misreport that they have no insurance. A review of

studies measuring the uninsured in the US found under-reporting of coverage by the public programme for low income earners – Medicaid – which the authors speculate may be due to stigma associated with public assistance programmes, or because the respondent is not currently receiving health services (Lewis, Ellwood, & Czajka, 1998). One would expect under-reporting of insurance coverage to be greater among people who are healthy and less likely to visit a physician. One would also expect it to be greater among people with public insurance who are automatically eligible compared to those with private insurance for which insurance is an explicit component of the employment contract. Self-reported insurance status in the National Population Health Survey in Canada from 1996/7 also identified just half of the population aged 65 or over who were eligible for public insurance reported they had insurance, and reporting was more likely among seniors who had taken prescription drugs in the past two days (Grootendorst, Newman, & Levine, 2003). It is not possible to measure the extent to which this bias may affect this chapter's results. However, because an individual's decisions regarding care are influenced by their perceived coverage (even if this perception is incorrect), it can be argued that such misreporting is not an important problem for this analysis.

4.4 Data and variable specification

To address the research question, this chapter draws on the Ontario component of the 2005 Canadian Community Health Survey (CCHS) master data file. Ontario was the only province with data that distinguished private and public prescription drug coverage, an optional component of the survey. The CCHS, conducted by Statistics Canada, is a cross-sectional, community-based population health survey based on a multi-stage clustered design with individual occupants of private occupied dwellings as

the final sampling unit. The survey response rate for Ontario was 77.2%. The Ontario sample totals 41,766 and this analysis includes 33,161 individuals after dropping children under 15 and observations with missing data (see below for more information).

4.4.1 Dependent variables

As in the previous chapter, physician utilisation is measured separately for GPs and specialists, and separately for the likelihood of a visit (no visits versus one or more visits) and the number of visits conditional on at least one visit. The survey asks the respondent how many times, in the past 12 months, he or she has seen or talked on the telephone about his or her physical, emotional or mental health with a family doctor or general practitioner (GP). It also asks the same question in reference to an eye specialist, in addition to any other medical doctor such as surgeon, allergist, orthopaedist, gynaecologist or psychiatrist (this question is used to define specialist utilisation).

4.4.2 Independent variables

Income

Income is measured as the respondent's best estimate of gross annual household income aggregated from all sources. Unlike in the previous chapter that draws on the Public Use Micro Data, for this analysis I use the full microdata file where income is available as a continuous variable. Therefore, I calculate individual income by adjusting the estimate of household income for household size and composition using the modified

OECD scale. The modified OECD equivalence scale assigns a weight of 1.0 to the first adult household member, 0.5 to the second adult household member and 0.3 to children.

About 14% of the sample did not report income and were dropped from the analysis. A further 15% reported their income categorically rather than on a continuous scale. For those 15% with income category but not their "best estimate", continuous income is predicted using a linear regression of the natural logarithm of income on income category (in eleven categories), age, sex, employment status, level of food security, education, and whether they were born in Canada (Table 4.1).

Table 4.1 Auxiliary linear regression to impute income for subset of observations with categorical income information (dependent variable: ln(income))

	Coef.	***Std. Err.***
Socio-demographic and economic variables		
Age	**0.002**	*0.001*
Age^2	**0.000**	*0.000*
Male	**0.012**	*0.004*
Employed	**0.028**	*0.005*
Student	**-0.030**	*0.007*
Household size (ranges from 1-14)	**-0.159**	*0.002*
Resides in Toronto	**0.023**	*0.007*
Born in Canada	**0.029**	*0.005*
Marital status: married	**-0.064**	*0.005*
Marital status: common-law	**-0.070**	*0.007*
Marital status: single	**-0.043**	*0.006*
Education: secondary	-0.003	*0.006*
Education: some postsecondary	0.000	*0.008*
Education: postsecondary degree/diploma	**0.032**	*0.004*
Income category		
$5000-10,000 (<$5000 is the reference category)	**0.344**	*0.032*
$10,000-15,000	**0.621**	*0.031*
$15,000-20,000	**0.825**	*0.030*
$20,000-30,000	**1.056**	*0.030*
$30,000-40,000	**1.298**	*0.030*
$40,000-50,000	**1.483**	*0.030*
$50,000-60,000	**1.642**	*0.031*
$60,000-80,000	**1.834**	*0.031*
$80,000-100,000	**2.034**	*0.031*
$100,000+	**2.445**	*0.031*
Constant	**9.251**	*0.034*
Sample size	28,267	
R^2	0.889	
F(24, 28242)	5955.75	

Note: bold is significant at p<0.05

An alternative approach to imputing income for individuals who only reported their income in categorical form is to assign an income estimate as the mid-point of the reported income category. In this way, individuals who report their categorical income as less than $5000, their income estimate is entered as $2500, and for those in the range of $5000 and $10,000, it would be $7500, and so on. As a sensitivity analysis, the below analyses were run using this alternative income estimation and results are reported in Appendix 4C, demonstrating the robustness of the main results to the choice of income imputation method.

Indicators of health care need

Need-related variables included in the models of physician utilisation include age, age-squared, sex, an interaction between female and usual child-bearing age (18-45), self-assessed health based on five categories (excellent, very good, good, fair and poor), and whether the individual reports no, moderate or severe activity limitations due to health. Also included is a dummy variable that equals one if the individual reports any chronic conditions. The assumption is that individuals who are older, in worse general health, with greater health-related limitations in activities and with a chronic illness need more physician-delivered health services. There is a concern that indicators of need will be endogenous to the outcome variable of utilisation; it is possible that poorer health leads to more service use but also that utilisation leads to improved health. It appears that the bias associated with this bidirectional association is minimal in studies that control for past health status (Bago d'Uva, Jones, & van Doorslaer, 2007); however, to the extent that indicators of need are endogenous, the effects of need on utilisation may be underestimated.

Indicators unrelated to health care need

Non-need related variables in the models include highest level of education attained (less than secondary, secondary, some post-secondary, or post-secondary), residence in an urban area, employment status (employed, student, retired or not working) whether the individual was born in Canada, and, the variable of particular interest, drug insurance status. Drug insurance status is defined through a set of dummy variables representing the following coverage categories: no drug insurance; public drug insurance; private employer- or group-based drug insurance; and private, individual drug insurance.

4.5 Study results

4.5.1 Descriptive statistics by insurance status

Table 4.2 presents descriptive statistics on the total sample and for the sample sub-groups defined by insurance status. Utilisation of physician services varies by insurance coverage: those with no drug insurance are the least likely to have a GP and specialist visit, and make fewer visits than the insured, while individuals with public insurance are the highest users. Higher rates of health care use among the publicly insured is not surprising since it covers seniors, lower income groups, and individuals with high drug consumption relative to their income (Appendix 4D provides more information on the public drug programme in Ontario).

The uninsured, publicly insured and privately insured also differ in their needs and non-needs profiles. In terms of health status, compared to the uninsured, the publicly insured have worse self-assessed health, more moderate limitations in activities, and greater likelihood of reporting a chronic condition than the uninsured, while the privately insured have better self-assessed health, fewer limitations in activities but are more likely to report a chronic condition. Levels of education are different across the three population groups: compared to the uninsured, the publicly insured are less educated and the privately insured are more educated. Both insured groups are more likely to reside in an urban area, are more likely to have been born in Canada, and are less likely to be a student than the uninsured. Because the large majority of private insurance is employment-based, and those aged 65 or over are eligible for public insurance, the privately insured have higher rates of employed, and the publicly insured lower, than the uninsured. Mean income differences are also significant, with a spread of about $20,000 between the publicly insured and the privately insured. The distribution of income by prescription drug insurance category is depicted in Figure 4.2. It shows a clear income gradient for both government-sponsored insurance, which disproportionately covers the lower income groups, and employer-sponsored insurance, which disproportionately covers high-income groups.

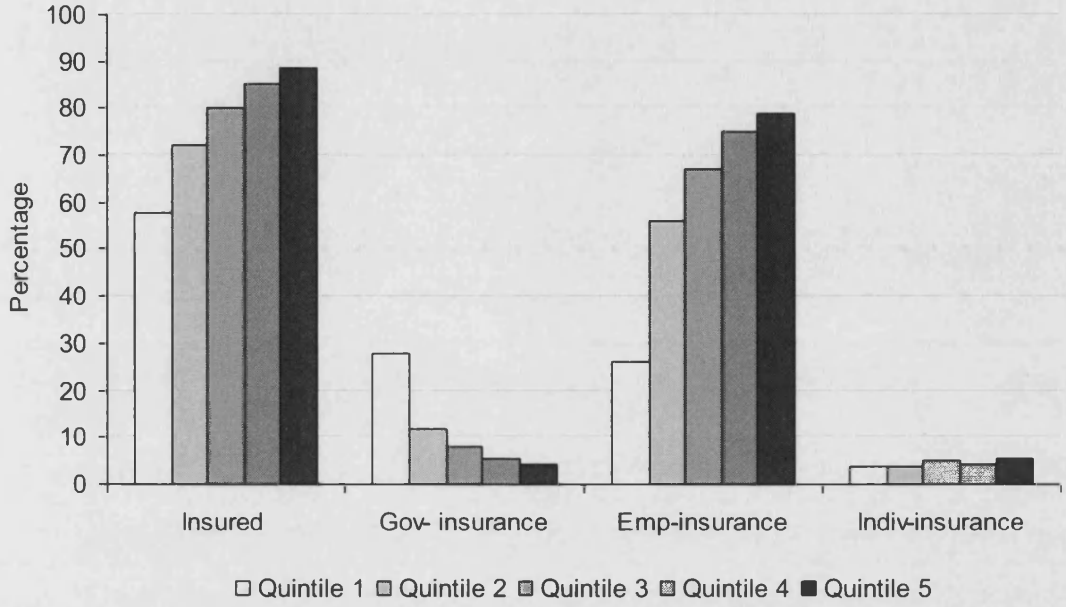
Table 4.2 shows the majority (60%) of the Ontario population is covered by employer-based prescription drug insurance, with an additional 11% covered through the government plan and 5% with individually purchased insurance. This leaves over 23% of the population with no drug coverage. This estimate is relatively high compared to other studies; thus some people who may be eligible for public coverage are not aware of their eligibility, while others may be unaware of their employer-based coverage, as discussed above.

Table 4.2 Descriptive statistics for the total sample and sub-samples defined by drug insurance status

	Total sample (N=33161)	No drug insurance (N=7606)	Public drug insurance (N=5176)	Private drug insurance (N=20379)
Variable	**mean (sd)**	**mean (sd)**	**mean (sd)**	**mean (sd)**
Utilisation				
Total number of GP visits	3.28 (5.17)	2.91 (4.66)	5.16* (8.02)	3.10* (4.64)
Probability of a GP visit	0.80 (0.4)	0.75 (0.43)	0.87* (0.34)	0.81* (0.39)
Conditional number of GP visits	4.09 (5.47)	3.90 (5.02)	5.96* (8.35)	3.82 (4.87)
Total number of specialist visits	1.57 (4.5)	1.22 (3.21)	2.25* (4.59)	1.58* (4.83)
Probability of a specialist visit	0.56 (0.5)	0.48 (0.50)	0.69* (0.46)	0.57* (0.50)
Conditional no. specialist visits	2.81 (5.72)	2.56 (4.27)	3.25* (5.21)	2.80* (6.16)
Needs variables				
Excellent SAH	0.22 (0.41)	0.22 (0.41)	0.14* (0.34)	0.24* (0.42)
Very good SAH	0.39 (0.49)	0.39 (0.49)	0.29* (0.45)	0.42* (0.49)
Good SAH	0.28 (0.45)	0.28 (0.45)	0.31* (0.46)	0.27* (0.44)
Fair SAH	0.08 (0.27)	0.08 (0.27)	0.17* (0.37)	0.07* (0.25)
Poor SAH	0.03 (0.17)	0.03 (0.17)	0.11* (0.31)	0.02* (0.13)
Moderate limitations in daily activities	0.14 (0.34)	0.12 (0.33)	0.17* (0.38)	0.14* (0.34)
Severe limitations	0.10 (0.30)	0.09 (0.28)	0.25* (0.43)	0.08* (0.26)
No limitations	0.77 (0.42)	0.79 (0.41)	0.58* (0.49)	0.79 (0.41)
At least one chronic condition	0.72 (0.45)	0.67 (0.47)	0.87* (0.34)	0.71* (0.46)
Female	0.50 (0.50)	0.50 (0.50)	0.51* (0.36)	0.49 (0.50)
Age	43.83 (17.19)	42.24 (17.67)	58.52* (20.1)	41.91* (15.2)
Female age 18-45	0.28 (0.45)	0.29 (0.46)	0.15* (0.36)	0.30 (0.46)
Non-need variables				
Income	$41,781 (29,032)	$32,863 (26,815)	$28,636.85* (24,829.13)	$47,069.55* (28,973.61)
Less than secondary education	0.17 (0.38)	0.21 (0.41)	0.36* (0.48)	0.13* (0.34)
Secondary education	0.17 (0.37)	0.19 (0.39)	0.17* (0.37)	0.16* (0.37)
Some post-secondary education	0.08 (0.28)	0.08 (0.27)	0.08 (0.26)	0.09 (0.28)
Post-secondary education	0.57 (0.49)	0.52 (0.50)	0.465* (0.49)	0.62* (0.49)
Urban residence	0.86 (0.35)	0.84 (0.37)	0.863* (0.34)	0.87* (0.34)
Employed	0.69 (0.46)	0.65 (0.48)	0.249* (0.43)	0.78* (0.42)
Student	0.14 (0.35)	0.14 (0.34)	0.11* (0.31)	0.02* (0.36)
Born in Canada	0.69 (0.46)	0.61 (0.49)	0.67* (0.47)	0.72* (0.45)
Insurance for prescription drugs				
Public insurance	0.11 (0.31)			
Private Ins- Group	0.62 (0.49)			0.93 (0.25)
Private Ins - Individual	0.05 (0.21)			0.07 (0.25)

Note: SAH is self-assessed health; sd is standard deviation; * represents significant difference with uninsured ($p<0.05$)

Figure 4.2 Income quintile (Q1 is lowest) distribution by prescription drug insurance category



4.5.2 Determinants of physician service use

As expected, the most important determinants of physician service utilisation are indicators of health care need, namely self-assessed health (Table 4.3). For both GPs and specialists, and for each of the likelihood of a visit and the conditional number of visits, a gradient is observed in use by self-assessed health status, activity limitation, and chronic disease status. Women are more likely to make a physician visit, but the conditional number of visits does not differ between men and women. Age is positively associated with the likelihood of a GP visit but not the conditional number of visits; it is positively associated with both the probability and conditional specialist visits.

Table 4.3 OLS analysis of the probability of a physician visit and the conditional number of visits, GPs and specialists

	GP				Specialist			
	Probability		Conditional no. visits		Probability		Conditional no. visits	
	Coef	SE	Coef	SE	Coef	SE	Coef	SE
Needs variables								
Very good SAH	**0.042**	0.009	**0.433**	0.080	**0.031**	0.011	-0.019	0.118
Good SAH	**0.044**	0.010	**1.156**	0.098	**0.047**	0.012	**0.256**	0.118
Fair SAH	**0.076**	0.013	**2.591**	0.220	**0.077**	0.017	**1.075**	0.226
Poor SAH	**0.110**	0.013	**5.370**	0.464	**0.133**	0.023	**3.937**	0.822
Moderate limitations	**0.034**	0.009	**0.923**	0.137	**0.097**	0.012	**0.611**	0.135
Severe limitations	**0.063**	0.008	**2.367**	0.201	**0.119**	0.013	**1.823**	0.225
Chronic condition	**0.102**	0.009	**1.115**	0.075	**0.079**	0.010	**0.593**	0.108
Female	**0.059**	0.008	0.189	0.119	**0.091**	0.011	0.071	0.138
Age	0.000	0.001	0.001	0.015	-0.002	0.001	0.027	0.020
Age^2	**0.000**	0.000	0.000	0.000	**0.000**	0.000	**0.000**	0.000
Female 18-45	**0.064**	0.011	**0.862**	0.160	**0.032**	0.014	**0.787**	0.208
Non-need variables								
Income (ln)	**0.029**	0.007	**-0.420**	0.080	**0.047**	0.008	**0.351**	0.148
Secondary education	0.014	0.011	-0.024	0.150	0.020	0.014	**0.363**	0.139
Some post-secondary education	0.008	0.015	0.102	0.175	**0.083**	0.018	**0.432**	0.152
Post-secondary education	**0.037**	0.010	0.071	0.133	**0.082**	0.012	**0.679**	0.118
Urban	**0.018**	0.008	0.152	0.103	-0.001	0.010	0.209	0.112
Employed	0.005	0.009	**-0.479**	0.135	**-0.034**	0.011	**-0.376**	0.152
Student	**0.033**	0.012	**-0.699**	0.145	**0.081**	0.015	-0.122	0.338
Born in Canada	**-0.020**	0.008	-0.035	0.096	0.006	0.010	**0.277**	0.114
Insurance for prescription drugs								
Public insurance	**0.048**	0.011	**0.943**	0.191	**0.074**	0.015	0.212	0.170
Private Ins- Group	**0.052**	0.009	**0.267**	0.107	**0.074**	0.011	0.120	0.119
Private Ins - Individual	**0.044**	0.017	0.560	0.302	**0.061**	0.022	0.063	0.215
Constant	**0.199**	0.075	**6.292**	0.857	**-0.283**	0.091	**-3.316**	1.569
R^2	0.063		0.131		0.0915		0.054	
F	**51.97**		**79.34**		**82.21**		**14.46**	
N	33161		26671		33161		19283	

Notes: Bold is significant at $p<0.05$; SAH is self-assessed health; SE is standard error.

Non-need factors are also associated with physician visit rates. Consistent with the findings from Chapter 3, higher-income earners are more likely to have at least one GP visit and also to a specialist. Conditional on visiting a physician, however, lower-income earners make a greater number of GP visits than higher-income earners but the reverse association is seen for the number of specialist visits. A person's level of

education exhibits only a weak relationship with GP visits but is positively associated with both the probability of a visit and the number of visits to a specialist. Living in urban areas, where physicians are in greater supply, is associated with an increased likelihood of GP visit. The employed use fewer services than the retired and unemployed, and students are more likely than the unemployed and retired to report a GP or specialist visit but have fewer visits conditional on positive use, keeping all else constant. Finally, individuals born in Canada are less likely to visit a GP and, conditional on seeing a specialist, have more visits than immigrants.

Individuals with prescription drug insurance make more physician visits than do those without drug insurance. Irrespective of the source of drug insurance, those with insurance are more likely than the uninsured to visit a GP and to visit a specialist, with similar effect sizes across the insurance groups. Those with public insurance and private group insurance also have a greater conditional number of GP visits (with a larger estimated effect for public insurance), while drug insurance is not associated with the conditional number of specialist visits. Overall, relative to those with no drug insurance, the insured make more use of physician services after controlling for need and the relationship is most consistent for the probability of seeking care. These results are consistent in both linear and non-linear models (see Appendix 4A).

The findings are consistent with Stabile (2001) who found a significant marginal effect of prescription drug insurance on the likelihood of visiting a GP. He argued that such an insurance effect could either be due to moral hazard, over-consumption of the insured in the absence of price signals, or adverse selection, whereby individuals who purchased coverage did so because they knew they would require more services. Because he controlled for adverse section, Stabile attributed the observed insurance effect to moral hazard. However, with the data available, empirically it is not possible

to disentangle the insurance effect into that which is attributed to moral hazard, or over-consumption beyond the clinically appropriate level among the insured, as opposed to under-consumption among the uninsured. From an equity perspective it is important to consider the possibility that a large part of the effect is due to under-consumption among those without prescription drug insurance.

Table 4.4 presents a summary of the analyses stratified by chronic condition. As hypothesised, the impact of drug insurance on the likelihood of a GP is larger for those who do not have a chronic condition than it is for those with a chronic condition[19]. Furthermore, there is no relationship between insurance and the likelihood of a specialist visit among those with no chronic condition. The impact of insurance on the likelihood of a visit among the healthier individuals (with no chronic condition) remains significant, but the effect on the conditional number of visits is no longer significant. This provides some support for the hypothesised complementary relationship between prescription drugs and physician services. For those with a chronic condition, the results also indicate that the complementary relationship dominates any substitutive relationship: those with insurance are more likely to visit both a GP and a specialist and to have more GP visits.

[19] The level of reported insurance coverage among those with chronic conditions is only modestly greater than those with no condition (78% compared to 74%), in spite of the existence of some public insurance programmes in Ontario to protect individuals with chronic conditions.

Table 4.4 Impact of drug insurance on physician visits: analysis stratified by presence of chronic conditions

	Total Sample		No Chronic Conditions		Chronic Conditions	
	Coef	SE	Coef	SE	Coef	SE
GP: Probability						
Public insurance	**0.048**	0.011	**0.085**	0.038	**0.036**	0.011
Private Ins- Group	**0.052**	0.009	**0.071**	0.018	**0.042**	0.009
Private Ins - Individual	**0.044**	0.017	0.063	0.044	**0.032**	0.018
GP: Conditional visits						
Public insurance	**0.943**	0.191	0.457	0.304	**1.006**	0.220
Private Ins- Group	**0.267**	0.107	0.132	0.111	**0.318**	0.142
Private Ins - Individual	0.560	0.302	0.221	0.256	0.642	0.376
Specialist: Probability						
Public insurance	**0.074**	0.015	0.069	0.044	**0.079**	0.016
Private Ins- Group	**0.074**	0.011	**0.060**	0.020	**0.081**	0.012
Private Ins - Individual	**0.061**	0.022	0.066	0.053	**0.059**	0.023
Specialist: Conditional visits						
Public insurance	0.212	0.170	0.203	0.230	0.242	0.193
Private Ins- Group	0.120	0.119	0.111	0.129	0.147	0.153
Private Ins - Individual	0.063	0.215	-0.256	0.183	0.132	0.265

Notes: These models also control for all other covariates listed in Table 1. Bold is significant at $p<0.05$.

4.5.3 Income-related inequity in physician utilisation

The analyses of income-related inequity reveal small, but statistically significant, "pro-rich" inequity in the probability of a GP visit, and greater "pro-rich" inequity in the probability and conditional number of specialist visits as also shown in the previous chapter (Chapter 3). In contrast, there is "pro-poor" distribution of the conditional number of GP visits (see Figure 4.3). These results are consistent with non-linear models, as shown in Table 4.5[20].

[20] In the previous chapter the results of income-related inequity analyses for the province of Ontario were conducted using a previous year of the survey (CCHS 2.1, 2003) and relied on the public used microdata file (PUMF); therefore, some differences can be seen. While the estimates of inequity in the probability of GP and specialist visits remain unchanged, the estimates of inequity in the conditional number of both GP and specialist visits is reduced here compared to the previous chapter. For GP visits inequity was -0.023 in the previous analysis compared to -.05 here, and for specialist visits it was 0.007 in the previous analysis and 0.04 here. The direction of inequity (pro-poor for GP and pro-rich for specialists) are the same however the difference that is seen only for the conditional number of visits may in part be explained by the measurement of physician utilisation: in the PUMF the number of visits for both types of

Table 4.5 Comparison of *HI* with linear and non-linear models

		Non-linear	Linear
GP	Probability	0.017	0.017
	Conditional number of visits	-0.044	-0.051
Specialist	Probability	0.041	0.041
	Conditional number of visits	0.049	0.045

Note: all *HI* indices are significant at $p<0.05$.

Figure 4.3 Horizontal inequity in GP and specialist probability and conditional number of visits (and 95% confidence intervals)

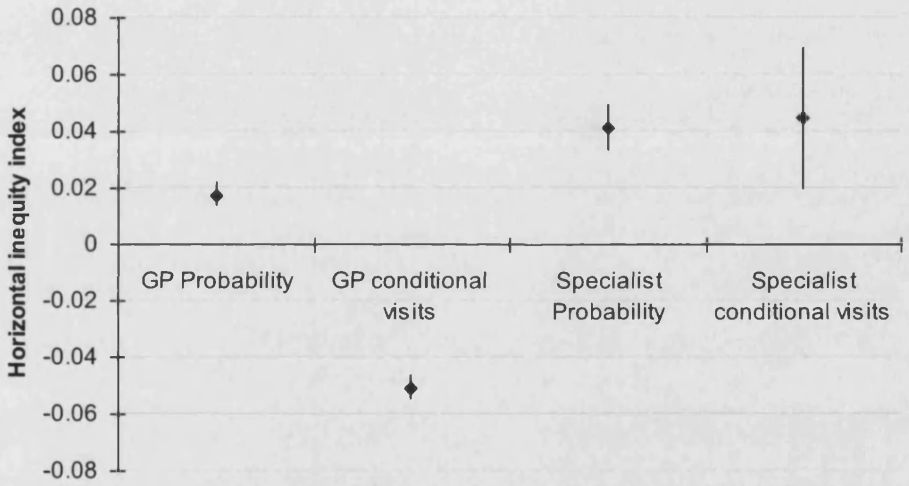
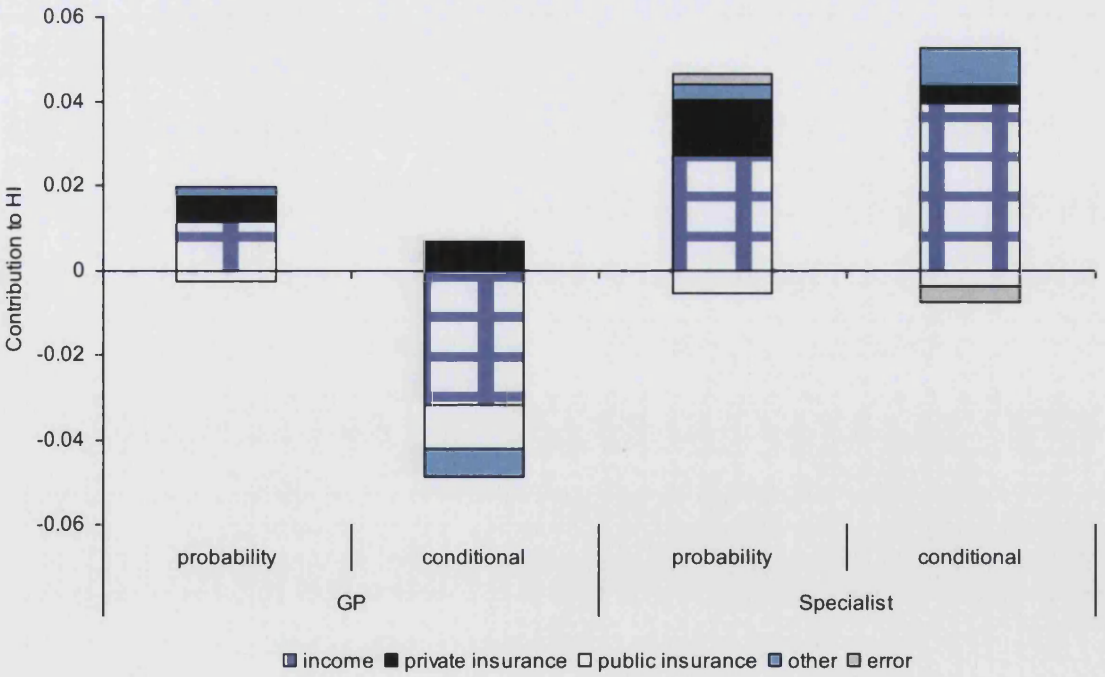


Figure 4.4 presents the results of the decomposition analysis, depicting the contribution to income-related inequity of the non-need factors: income, education, private (combining employer-based and individual) and public prescription drug insurance coverage, other factors (combining employment status, education, urban residence and being born in Canada), and an error component. Income makes a positive contribution

physicians is capped at 31 visits whereas the master data has a much longer right-hand tailed distribution for both. This implies that lower income individuals are disproportionately representing the extreme right of the GP distribution whereas higher income earners represent higher users of specialist care.

to inequity in all areas except for the conditional number of GP visits, because higher income is associated with an increased likelihood of visiting a GP and specialist, and a greater number of specialist visits, yet it is associated with a reduction in the number of GP visits. The most important contributors to inequity in both GP and specialist care are income and private insurance. Private prescription drug insurance contributes to the observed income-related inequality in physician visits because higher income earners are both more likely to have private prescription drug insurance and to visit a GP or specialist. In contrast, government-sponsored public insurance covering mostly low income and over-65 populations has a "pro-poor" effect because of the negative concentration index and a positive marginal effect on utilisation.

Figure 4.4 Components of horizontal equity in the probability and conditional number of GP and specialist visits



Notes: The sum of all the components provides an estimate of horizontal inequity (*HI*); "Other" includes employment, education, urban residence, and born in Canada; the error component measures the difference between inequality in actual utilisation (CI_{unadj}) and the sum of all need and non-need components.

If prescription drug insurance coverage is provided to the entire population, then both the association between income and insurance status and the net contribution of public and private prescription drug insurance to inequity in physician visits would be eliminated. Using the estimates from the decomposition, such full coverage is predicted to reduce the observed index of inequity in the probability of a GP visit by 24% (*HI* falls from 0.017 to 0.013) and inequity in the probability of a specialist visit by 21% (*HI* falls from 0.038 to 0.03) though with little effect on the estimate of inequity in the conditional number of GP and specialist visits.

4.6 Discussion

This chapter's estimates of income-related inequity in physician service use in Ontario are consistent with the findings from Chapter 3 showing a mild pro-rich inequity in the probability of a GP visit, pro-poor inequity in the conditional number of GP visits, and larger pro-rich inequity with respect to both the probability of and conditional number of visits to specialists. These findings are also consistent with previous studies (Asada & Kephart, 2007; Jiménez-Rubio, Smith, & van Doorslaer, 2008; van Doorslaer, Masseria, & Koolman, 2006).

Of particular policy interest is the causes of this inequity. Some may be rooted in demand-side behaviour beyond the design of the health care system. For example, even if the system of free public insurance for physician visits has equalised access to physicians, Grossman's model of the demand for health and health care predicts that higher income individuals will both demand higher levels of health and, conditional on a given health status, demand more health care (Grossman, 1972). Of greater policy

concern to policy makers is the extent to which the inequity is rooted in system design. This research demonstrates that the income-related inequity that we observe in Canada derives in part from its heavy reliance on private finance for prescription drugs, which are complementary to publicly financed physician visits. Higher income individuals are both more likely to hold private drug insurance and, in the absence of such insurance, can more easily afford out-of-pocket costs. Hence, they are less deterred from physician visits because of the expected costs of drugs that are often prescribed by physicians during a visit.

Drug insurance has a significant impact on the likelihood of a physician visit, the aspect of utilisation over which patients have the most discretion; the effect on the conditional number of visits is reduced. Also, the effect of insurance on the likelihood of a GP visit appears to be stronger for individuals without any chronic conditions than for those with at least one condition. This finding suggests that these otherwise healthy individuals are more likely to be deterred from visiting a GP by the expected cost of prescription drugs than individuals with chronic conditions who likely have regular physician contacts, more experience with their health problems, and are more likely to substitute drugs for physician care. With an estimated 30% of physician visits exclusively for acute conditions, even though not all acute conditions require medication a lack of prescription drug insurance coverage is a non-trivial policy concern (Katz, Hofer, & Manning, 1996). It was also expected that there would be a weaker influence of drug insurance on specialist than GP physician utilisation because specialist visits require a referral and are less under the control of patients; however, insurance remained important for the likelihood of a specialist visit.

The low rates of self-reported prescription drug insurance coverage among the over-65 population are surprising. Individuals turning 65 should receive, via mail, notification of their upcoming eligibility to the public benefit programme. From the first day of the month following an individual's 65th birthday, he or she is automatically enrolled in the Ontario Drug Benefit Programme, and needs only to tell the pharmacist (and present the Health Card) when filling a prescription. Therefore it is possible those who are underreporting have not filled a prescription. However, using the previous wave of the same survey (CCHS 2.1 from 2003), among individuals aged 65 and older from Ontario who responded to the subsection of the survey on medication use (N=1105), almost all had taken at least one medication in the past month (94%) and visited a physician in the last year (89%). This reference period of one month differs from that for physician visits, the question does not distinguish medications that are prescribed and over-the-counter (in some cases they could be both, such as pain relievers, allergy medicine, cold remedies, etc.), and the survey asked whether or not the medicine was used and not the number of medicines taken; therefore, more refined survey questions that are better integrated with questions of health care utilisation could address some of the questions that arise from this analysis. With Ontario data used in this study, it appears that 80% of seniors (who are eligible for public coverage) reported having insurance for prescription drugs. An earlier study based on the Ontario Health Survey showed that turning 65 in Ontario, hence becoming eligible for full prescription drug coverage in 1990 when there was no patient cost sharing, was associated with an increase in the number of medicines consumed primarily among those with lower levels of health (Grootendorst, O'Brien, & Anderson, 1997). Updating this analysis after almost 20 years could assess the impact of turning 65 in Ontario and other provinces with comprehensive coverage for this age group on their use of medicines and other health

services, in particular among vulnerable groups such as those who previously had no insurance and who have low income.

To conclude, these analysis point to the role of private insurance for prescription drugs in explaining part of the inequity that we observe in the use of physician services by income, because private insurance is concentrated among the higher income groups, and has a positive effect on physician utilisation. Since public insurance covers the lower income groups and older people, and has a similarly positive effect on utilisation, its contribution to the estimate of inequity is negative. From a policy perspective, since there is evidence that insurance for prescription drugs increases the use of physician services, if this effect is explained by the removal of financial barriers to access (due to the cost of these complementary services) and not the moral hazard effect of insurance, then inequity in physician services by income may be reduced if coverage were extended to the uninsured populations.

Both the Honourable Roy Romanow (Canada, 2002a) and Senator Kirby (Canada, 2002b) advocated a movement towards a more universal and integrated approach to prescription drug coverage (these proposals are discussed in Section 6.2.2 and Appendix 6A). Such a policy change would not only improve equity in access to prescription drugs (Evans, 2005), it would reduce the income gradient in both insurance and utilisation of publicly financed physician services (Section 6.2.2 offers more in-depth policy discussions). In light of the vital role prescription drugs play in the prevention and treatment of illness, Romanow in his final report reiterated the statement from the National Forum on Health from 1997 that "a strong case can be made that prescription drugs are just as medically necessary as hospital or physician services" (Canada, 2002a, p.190); this study supports this argument not only because of the value of medicines

themselves but in light of the evidence that they are also complementary with physician services. To the extent that services not included in the public insurance plan are complements to the use of publicly insured sources, as exemplified by prescription drugs and physician visits, efforts to improve equity in access to and use of public services must account for interactions with privately funded services.

Another possible area where the equity implications of the interaction between public and private services could be investigated is long-term care. The public/private mix in long-term care is evident in both the delivery and financing, moreover there are significant variations in these arrangements across the provinces (Greb, Chambers, Gafni, Goeree, & Labelle, 1994; Stabile, Laporte, & Coyte, 2006). The trend in the past decade of shifting care out of hospital has seen an increase in the extent of care provided in the home. Although public funding of home care has increased significantly over this period (which has led to greater use of home care services and a reduction in the reliance on informal care; (Stabile, Laporte, & Coyte, 2006)), there is substantial variation across the country in the level of public subsidy for these services and a continued reliance on private contributions (Coyte & McKeever, 2001; Stabile, Laporte, & Coyte, 2006). Future research could empirically assess the equity implications of the mixed funding and delivery features along with the extent of provincial variations in equity of access to long-term care services.

CHAPTER 5: SUBJECTIVE UNMET NEED AND UTILISATION OF HEALTH CARE SERVICES IN CANADA: IMPLICATIONS FOR EQUITY[21]

5.1 Introduction

As we have seen, most health systems in high-income countries endorse equity goals in health care. One widely used approach to measure inequity in the receipt of health care is to determine whether factors other than need for health care, such as socioeconomic status, affect health care utilisation, or as I will refer to it within this chapter, the "conventional method". Inequity arises when individuals in higher socioeconomic groups are more likely to use, or are using a greater quantity of, health services after controlling for their level of ill-health (approximating need). This conventional method may be biased for at least three reasons. First, differences in (needs-adjusted) utilisation patterns by socioeconomic status may not necessarily imply inequity because these differences may be explained in part by individuals' informed choices or preferences (Le Grand, 1991; Oliver & Mossialos, 2004). Second, utilisation is usually measured as visit rates or in some cases expenditure levels, so that an apparently equal or pro-poor distribution of needs-adjusted utilisation by socioeconomic status may not be equitable if the services being used are inappropriate (Thiede, Akweongo, & McIntyre, 2007).

[21] This chapter extends the following manuscript: Allin, S., Grignon, M., and Le Grand, J. Subjective unmet need and utilisation of health care services in Canada: what are the equity implications? Unpublished manuscript. Michel Grignon contributed to the paper through discussions of the methodology in addition to reviewing previous versions. Julian Le Grand played a supervisory role, contributed to the conceptualisation of unmet need and discussions of equity. The origination of the research question, drafting of the chapter, review of the literature, statistical analysis and writing constitutes my own work.

Third, standard approaches to needs-adjustment rely on measures of ill-health (or risk of ill-health) to approximate need. Such indicators may overestimate need if some conditions have no effective treatments available or if an individual's capacity to benefit is low (Culyer & Wagstaff, 1993) or if the indicators are too crude they may underestimate need. Therefore, the direct measurement of "unmet need", or any need for health care that remains because health care was not received or was inadequate, may complement conventional methods to measuring equity and shed some light on the possible biases therein.

Two possible approaches to measuring unmet need in a population include "clinical" and "subjective" methods. The former relies on a clinical assessment of whether an individual received less than the amount of resources required to restore his or her health (Carr & Wolfe, 1976). The latter relies on individuals' subjective assessments. This approach is preferred because it is more technically feasible with numerous existing surveys including questions pertaining to unmet need; and arguably individuals are better able to estimate their health status as well as their health care needs (Idler & Benyamini, 1997). The RAND study, for instance, considered subjective assessments of health as opposed to clinical assessments to predict health care expenditures (Newhouse & the Insurance Experiment Group, 1993). Subjective assessments of unmet need may also include information on the reasons for unmet need, which can then be useful for focusing policy actions.

This chapter therefore examines the relationship between subjective unmet need (SUN) for health care and residual utilisation from conventional utilisation models. It will assess to what extent SUN can inform our understanding of equity in the receipt of health care and can provide insight into possible biases with the conventional method of

measuring equity. This chapter has two objectives. The first is to draw existing work together to establish meaningful definitions of unmet need, with a focus on how SUN differs from the conventional method to measuring equity. The second is to empirically assess the relationship between different types of SUN and health care utilisation in the Canadian context by measuring any systematic association between reporting SUN and the error term (the "residual") from a conventional model of health care utilisation. The second aim addresses the questions: do individuals with SUN have systematically higher or lower unexplained utilisation than those who do not report SUN, and does this association differ across the different types of SUN?

The next section proposes a conceptual framework of unmet need, followed by a review of the existing evidence and a discussion of the relationship between unmet need, utilisation and equity. The data and methods are reviewed in the following sections, and the results are presented and discussed in the final sections.

5.2 Conceptualising unmet need

Need for health care is an elusive concept that is difficult to define and measure, as shown in Chapter 2. Although, the definition of need commanding the widest approval is that it measures the care that is required to bring about the maximum possible health improvement (Culyer & Wagstaff, 1993; Folland, Goodman, & Stano, 2004; Stevens & Gillam, 1998). Unmet need therefore arises when an individual does not receive an available and effective treatment that could have improved her health. It has been referred to as a measure of "the differences, if any, between those services judged necessary to deal appropriately with defined health problems and those services actually being received...an unmet need is the absence of any, or of sufficient, or of appropriate

care and services" (Carr & Wolfe, 1976, p.418). The potential for unmet need to arise is described in the categories below.

Category 1. *Unperceived unmet need.* An individual does not perceive that she actually needs health care; for example, she has hypertension without symptoms, or denies having a mental health problem. Unperceived unmet need may also arise from non-adherence to treatment, e.g. a patient does not perceive the need to complete the full course of a prescription. Since this type of unmet need is not perceived, clinical investigations would be required to detect it. This type of unmet need would be missing from the conventional method since it relies on self-reported ill-health to measure need. The following analyses do not include 'unperceived' unmet need, although from a public policy perspective, we would be concerned with individuals who are either unaware of potentially serious health conditions or do not feel the need for (and so do not adhere to) prescribed treatments.

Category 2. *Subjective, chosen unmet need.* An individual perceives himself as in need of some form of health intervention but chooses not to demand the health services available. For example, individuals may prefer to self-treat, to seek complementary or alternative medicine, or may decide not to seek any care. The possibility that under- or non-use is a function of individual choices and preferences is not accounted for by the conventional method.

Category 3. *Subjective, not-chosen unmet need.* An individual perceives herself as in need of some form of health intervention, but does not receive health services because of access barriers beyond her control. These perceived access barriers may or may not be important from a policy perspective, for example, it is of less concern if individuals who are wealthy choose to live

in a remote area and then find it difficult or time consuming to access health care. Other examples are more policy relevant: some who live in remote areas may not be able to afford to travel to a health care facility when needed; others without any access to a regular source of primary care may not be able to access preventive or emergency services. In equity analyses following the conventional method, this type of unmet need may be captured by individuals using fewer services than would be predicted on the basis of their need. The stated reasons for this non-chosen unmet need may therefore inform our understanding of the drivers of inequitable utilisation.

Category 4. *Subjective, clinician-validated unmet need.* An individual perceives a need for health care, but does not receive the treatment that a clinician would judge as adequate[22]. For example, a patient is referred to a specialist, but the waiting time for an appointment is considered by both the patient and the referring doctor to be too long and thus posing a health risk. Analyses of equity based on the conventional method would not capture this type of unmet need because there is no information about the adequacy of the care that an individual received, simply whether an individual used a service or not (and how much). Conventional methods of measuring equity by income may underestimate the level of inequity if lower socioeconomic groups are more likely to receive inadequate care.

Category 5. *Subjective unmet expectations.* An individual perceives himself as in need of some form of health intervention who accesses health care, but in his

[22] The complexity of medical care is well known, and of course different clinicians may have different views of treatment plans. For example, some illnesses have multiple treatment options, such as minor angina, for which different providers may prescribe preventive options such as physical activity or dietary changes, others medications, and even others surgical treatment.

own perception did not receive the most suitable treatment; the care received did not meet his expectations. As above, this information is not available in conventional methods, nor is it available in clinical assessments of unmet need, since individuals' assessments of the adequacy of treatment can only be elicited directly. The equity implications of this type of unmet need, however, are unclear; information on the validity of these unmet expectations would be needed to make equity judgments.

5.3 Existing research on subjective unmet need

To date research on SUN has focused on measuring its prevalence and investigating its individual- and system-level predictors. Most studies have presumed that SUN represents access barriers (as in Category 3 above)[23]. Indeed many survey questions are phrased in order to measure that SUN which arises through access barriers (mostly costs). Most studies do not disaggregate analyses of unmet need into the different categories, although, as this chapter will go on to argue, a disaggregated approach is needed in order to generate policy-relevant findings.

Most existing studies of unmet need have been carried out in the US. They have measured unmet need with survey questions referring to the past 12-month period[24].

[23] A wide literature also investigates the level of unmet need for personal assistance for disabilities (Allen & Mor, 1997; Desai, Lentzner, & Weeks, 2001; Quail, Addona, Wolfson, Podoba, Levesque, & Dupuis, 2007).

[24] Common questions include: "Was there any time that someone in the family needed medical/dental/prescription/eye glasses care but could not get it?" "Were you unable to get medical care due to costs?" "Was there any time that you thought you should get medical care, but did not?" "Was there any time when you needed medical care, but did not get it because you couldn't afford it?" and "Did you have a problem getting any health care such as medical, mental or dental care that you needed?"

Especially when the wording of the question relates directly to costs, one would expect a strong relationship between SUN and having lower income and/or being uninsured or underinsured. And indeed, this is borne out in a number of US studies which identify two of the strongest correlates of unmet need as being uninsured and low income, both among children and adolescents (Ford, Bearman, & Moody, 1999; Newacheck, Hughes, Hung, Wong, & Stoddard, 2000; Newacheck, Hung, Park, Brindis, & Irwin, 2003) and adults (Cunningham & Kemper, 1998; Diamant, Hays, Morales, Ford, Calmes, Asch et al., 2004; Hendryx, Ahern, Lovrich, & McCurdy, 2002; Himmelstein & Woolhandler, 1995; Litaker & Love, 2005; Pagán & Pauly, 2006; Shi & Stevens, 2004; Strunk & Cunningham, 2002).

Two US studies provide some support for the validity of self-reports of unmet needs in general population surveys. One study investigated the medical symptoms and medical consequences of not receiving needed care and found that the majority (70%) of individuals who reported unmet need had "very serious" or "somewhat serious" symptoms, and half continued to have "pain or disability" (Donelan, Blendon, Hill, Hoffman, Rowland, Frankel et al., 1996). Another study that compared unmet need among different insurance categories (those enrolled in a health maintenance organisation, HMO, or not) found no significant difference in utilisation rates or the likelihood of reporting unmet need by insurance category, but consistent with the authors' expectations, HMO members were less likely to report unmet need due to financial barriers to access, but more likely to report unmet need due to organisational arrangements of the HMO, such as wait times, denial, or lack of available professionals (Reschovsky, Kemper, & Tu, 2000).

Few studies have explicitly addressed the question of how unmet need relates to patterns of health care utilisation. A study drawing on two years of the National Survey of America's Families investigated the association between self-reported unmet need and service use at a hospital emergency department. People with unmet needs were found to be significantly higher users of emergency care: individuals reporting unmet need had increased odds of occasional (one or two) emergency department visits (adjusted odds ratio of 1.67) and even higher odds of frequent (three or more) visits (2.38) compared to not reporting an unmet need (and adjusting for health status, socioeconomic and insurance status) (Zuckerman & Shen, 2004). That individuals with an unmet need are higher users of emergency care may reflect the poorer health status (beyond the variables included in the model) of those reporting unmet need, or it could reflect inadequate primary care. The relationship between SUN and utilisation of health services other than emergency care, however, was not examined, though a positive association between SUN and the number of physician visits (also controlling for health status, socioeconomic and insurance status) has been shown elsewhere (Mollborn, Stepanikova, & Cook, 2005).

In countries with universal health care coverage such as in Europe and Canada, research on unmet need has been less developed than in the US, perhaps because of the relative lack of direct cost-based barriers to physician and hospital care. Prevalence estimates of unmet need experienced in the past year in Europe based on the recent Survey of Income and Living Conditions range from 1% in Denmark to 13% in Sweden (Koolman, 2007)[25]. Other Swedish studies of the 20-65 age group identified higher rates of unmet need in relation to physician visits in the past three months, with 24% of

[25] In France, 4% of adults reported unmet need due to financial reasons for general health care services over the past 12 months – in 1998, but 12% for dental care (Bocognano, Dumesnil, Frèrot, Le Fur, & Sermet, 1999).

those surveyed having refrained from a visit when needed (Westin, Ahs, Persson, & Westerling, 2004), and higher estimates among the unemployed population of the same age (42%) (Ahs & Westerling, 2006). The latter clearly reflects the relationship between being unemployed and in poorer health. Similarly, an earlier Swedish study found a high proportion (22%) of individuals who reported to have forgone primary health care due to the cost (Elofsson, Undén, & Krakau, 1998)[26]. Among the over-50 population included in the Survey of Health, Ageing and Retirement in Europe, the proportion who reported care foregone due to costs, unavailability or care that is not easily accessible ranged from 2.5% in the Netherlands to 9.3% in Greece, with a higher likelihood of care foregone among individuals with lower income in all countries studied (Mielck, Kiess, van den Knesebeck, Stirbu, & Kunst, 2007).

In Canada, the ongoing National Population Health Survey and the Canadian Community Health Survey (CCHS) include questions about unmet need. Research has shown a growth in reported SUN from 4% to 12% during the period 1994 to 2001 (Sanmartin, Houle, Tremblay, & Berthelot, 2002). The most substantial increase was seen between 1998 to 2001, when unmet need doubled from 6-12%; the largest increase was due to reasons related to waiting times, personal choice, and "other" reasons (Sanmartin, Houle, Tremblay et al., 2002). Studies from Canada have identified that the population groups with a greater likelihood of reporting any unmet health care need were women, people in worse health, non-elderly, higher educated, and non-immigrants (Chen & Hou, 2002; Kasman & Badley, 2004; Law, Wilson, Eyles, Elliott, Jerreta, Moffat et al., 2005; Wu, Penning, & Schimmele, 2005). Reported unmet need was also

[26] Descriptive analyses revealed little relationship between foregone care and the number of physician visits made in the past year, though a slightly higher proportion of people forgoing a physician visit was found among those with no previous physician contact (Elofsson, Undén, & Krakau, 1998).

significantly associated with previous GP, specialist and physiotherapist visits, after adjusting for health status and demographics (Kasman & Badley, 2004).

Chen and Hou (2002) investigated the factors associated with SUN separately for the following three groups defined on the basis of the stated reason for unmet need: availability, including lengthy waits and insufficient supply; accessibility, including cost, language or transportation barriers; and acceptability, including attitudes, preferences and choices. Individuals with all three types of unmet need were, not surprisingly, found to be in poorer health than the general population (Chen & Hou, 2002). They also found an association between reporting an unmet need due to "availability" and "acceptability" and previous GP or specialist utilisation; an association with utilisation was not found with SUN due to "accessibility". A similar approach was also taken with regards to mental health services (Nelson & Park, 2006), where a positive association was found between reported unmet mental health needs and previous mental health care utilisation across all groups.

5.4 Unmet need, utilisation and equity

Overall, the literature on unmet need suggests that the relationship between SUN and utilisation is not straightforward. It depends upon how SUN is defined, upon the framing of the questions, and upon the possible reasons for unmet need that are included. Previous health care utilisation among individuals who report any unmet need, which was shown in some studies, is expected given that they are in poorer health (having some need for health care in the first place). One would expect, and studies that focus on cost-related unmet need suggest, that after adequately controlling for ill-health, there will be a negative association between service use and 'not-chosen' SUN due to

barriers (Category 3). One would also expect that individuals who have chosen not to seek needed care (Category 2) would exhibit a negative association with service utilisation. When SUN is related to perceptions that care was inadequate or did not meet their expectations (Categories 4 or 5), the association with utilisation could be positive, because of the implied contact with the health system, or negative, for example if the perception of inadequate care left the individual unsatisfied and less likely to seek care (Kravitz, 2001). For any type of SUN, a positive marginal effect on utilisation could arise because of unobserved needs in the underlying utilisation models.

As discussed in Chapter 2, research on equity in health care use in Canada has predominantly focused on measuring the extent to which health care utilisation varies by socioeconomic status, namely income, after adjusting for variations in need (health status). I made use of this conventional method in Chapters 3 and 4 and found that, consistent with previous research, there is significant but modest 'pro-rich' inequity (a distribution of health care use that favours higher income groups) in the probability of visiting a GP, and a pro-poor or equitable distribution of the total and conditional number of GP visits. This research has also identified pro-rich inequity in specialist care, both for the likelihood of a visit and for the conditional number of visits, but pro-poor inequity in inpatient care, consistent with previous studies (Jiménez-Rubio, Smith, & van Doorslaer, 2008; van Doorslaer, Masseria, & the OECD Health Equity Research Group Members, 2004). As mentioned at the outset, these analyses may be biased for a number of reasons.

Information on SUN may complement conventional methods and may provide some insight into the extent and type of the bias with these methods. An association between the different types of SUN and "residual" (or unexplained) utilisation, as calculated as

the error term from a conventional utilisation model, would suggest that either there is some bias with this method, that there is bias with reported unmet need, or that there is a combination of these two possibilities. Systematic positive residual utilisation across all SUN categories would imply that reported unmet need captures additional dimensions of health care need that are unaccounted for in conventional utilisation models. Negative "residual" utilisation for individuals with SUN, whereby they report unmet need and also use fewer services, would suggest that the stated reasons for unmet need could be used to inform the drivers of inequity in utilisation. An upward bias in inequity (i.e. more pro-rich inequity) with the conventional method could arise from utilisation patterns being driven by differing preferences and choices. For example, individuals with lower income or socioeconomic status may choose not to seek 'needed' care to a greater extent than individuals with higher income (Category 2). A downward bias (more pro-poor inequity) is possible if utilisation patterns mask important information on the adequacy of care received, for example, individuals with lower income who are high users may disproportionately receive less optimal care (Category 4) (Health Disparities Task Group of the F/P/T Advisory Committee on Population Health and Health Security, 2004). I propose to explore the link between SUN and conventional methods by examining the relationship between SUN and residual utilisation.

5.5 Methods

This chapter addresses the third research question of this thesis. To what extent can subjective unmet need inform our understanding of equity in the Canadian health system?

To investigate empirically the association between SUN and conventional methods of measuring equity, I employ a three-step approach. First, I model utilisation on a comprehensive set of needs-related and socioeconomic factors, in addition to the different types of unmet need. Second, I obtain the predicted values from the utilisation models. Third, I analyse the relationship between unmet need and the "residual" between actual and predicted utilisation.

For the first step, I model health care utilisation separately for GP visits, specialist visits, and hospital nights. For each utilisation variable, the probability of a visit or night spent in hospital is estimated with a probit, and the number of visits/nights conditional on having had at least one visit is estimated using OLS on the full set of explanatory variables

(1) $y = \alpha + X'\beta + Z'\delta + \varepsilon$,

where y is the utilisation variable, α , β , δ , and τ are the regression coefficients, X is a vector of health and demographic variables to approximate need, and Z is a vector of socioeconomic variables that have been shown to be associated with health care utilisation, but do not reflect clinical need, and province dummies (these variables are described in Table 5.2).

For the second step, needs-predicted utilisation ($\hat{y}$) is calculated for each individual,

(2) $\hat{y} = \alpha + \hat{X}'\beta + \hat{Z}'\delta$.

The "residual" (ε^*) is then calculated as the difference between actual and predicted utilisation for each individual,

(3) $\varepsilon^* = y - \hat{y}$.

This "residual" is taken to define unexplained "under" and "over" utilisation. This is then used as the dependent variable in the second-stage equation (4). This equation attempts to explain over or under utilisation based on the different types of SUN (U), which were not originally included in the utilisation models (equation 1) and socioeconomic (Z) variables, which were included in the original models.

(4) $e^* = \alpha + U'\beta + Z'\delta + \varepsilon$.

To explore the possibility that any observed systematic association between the different categories of SUN and residual utilisation is driven by personal preferences, I recalculate residual utilisation including indicators of preference,

(5) $y = \alpha + X'\beta + Z'\delta + P'\tau + \varepsilon$,

where y is the utilisation variable, α , β , δ , and τ are the regression coefficients, X and Z are the same vectors of needs and socioeconomic variables, respectively, and P is the vector of preference variables (including general levels of satisfaction with life and the likelihood of reporting unmet need for home care services). Then the residuals are recalculated as in equations 2 and 3 above, and subsequently they are used as dependent variables as in equations 4 and 5.

The residual between actual and predicted utilisation is taken to indicate under- or over-utilisation compared to the empirical norm. A systematic negative association with residual utilisation would imply that individuals with SUN are using less than an expected amount of health services. On the contrary, if the marginal effect of SUN on residual utilisation is positive, this suggests that, for individuals with the same measurable characteristics, those with SUN use more health care. Because individuals may be in a better position to estimate their level of health care need than estimates

based solely on reported health status, a positive association with residual utilisation for individuals with SUN could reflect unobserved needs in the conventional method.

5.6 Description of the data and variables

In this chapter, the analyses draw on the Public Use Microdata File of the 2005 CCHS. The Northern Territories, Yukon and Nunavut were excluded due to under-sampling in these regions, and only the adult population aged 18 and over was included[27]. The total sample for the ten provinces was 132,947 (ages 12 and above), and the sample for this study included 116,263 individuals aged 18 and over.

Measures of unmet need

SUN is measured by the following question: "During the past 12 months, was there ever a time when you felt you needed health care but you didn't receive it?" Respondents were provided with the following possible reasons for not getting care (choosing all that applied):

- not available in the area
- not available at the time required (e.g. doctor on holidays, inconvenient hours)
- waiting time too long
- felt would be inadequate
- cost
- too busy
- didn't get around to it/didn't bother
- didn't know where to go
- transportation problems
- language problems
- personal or family responsibilities

[27] Due to the subjective nature of the variable of interest – unmet need – I decided to exclude the under-18 population; this is consistent with the literature in this area that mostly separately investigates unmet need among adolescents and adults.

- dislikes doctors/afraid
- decided not to seek care
- doctor didn't think it was necessary
- unable to leave the house because of a health problem
- other.

I created separate categories of unmet need based on the stated reasons for unmet need. I then mapped the stated reasons for unmet need to the categorisation outlined at the outset (see Table 5.1, below). Some difficulty surrounds that SUN which is related to 'waiting times'; they do not clearly fit into one of the proposed categories. They could be considered access barriers (Category 3) (as suggested by (Gulliford, Figueroa-Munoz, Morgan et al., 2002)), such that waiting lists prevent the individual from using the needed service. Though they could also be conceptualised as 'inadequate' (Category 4) or 'unmet expectations' (Category 5) depending on the extent to which the waiting time would be judged to be clinically inadequate (Category 4), or perceived to be so by the individual but not necessarily by a clinician (Category 5). Because of the uncertainty surrounding this group, I considered it separately as 'wait-related' unmet need. Also the final group could not be categorised because they simply responded to the question with "other" reasons. Since respondents could choose multiple reasons for unmet need, the four groups add up to more than the total of 12%, about 10% of those reporting unmet need fall into more than one category, and the proportions of individuals in the four groups add up to more than 1.

Table 5.1 Categorisation of subjective unmet need using CCHS

Category of unmet need	Stated reasons for unmet need	Proportion of the sample (standard deviation about the mean)
Category 2 (Personal choice)	• felt would be inadequate • too busy • didn't get around to it • dislikes doctors • decided not to seek care • doctor didn't think it was necessary	2.65% (0.16)
Category 3 (Barriers)	• unavailable in the area • cost • didn't know where to go • transportation problems • language problems • personal/family responsibilities • unable to leave the house because of a health problem	2.4% (0.15)
Category 4 (Clinician validated)	-	-
Category 5 (Unmet expectations)	-	-
Wait-related	• not available at the time required • waiting time too long	5.36% (0.23)
"Other"	• "Other"	2.7% (0.16)

5.6.1 Dependent variables

Utilisation of GP, specialist and inpatient hospital services in the past 12 months are estimated separately, first as the probability of a visit/night and then as the number conditional on one visit/night. These variables are defined as in the previous chapters.

5.6.2 Independent variables

A comprehensive set of health and demographic variables is included in the analyses with the aim to minimise any bias associated with unobserved needs. These include:

- Age and sex dummy variables, with age measured in the following groups: 18-34, 35-44, 45-54, 55-64, and 65 years and over;
- Self-assessed health (excellent, very good, good, fair and poor);
- Fair or poor self-assessed mental health (compared to good, very good or excellent mental health);
- Worse general health status than the previous year (compared to improvement or no change);
- Any chronic condition;
- No, moderate or severe activity limitations due to health;
- Obesity, defined as having a body mass index of 30 or above; and
- Two dummy variables to capture missing information on chronic conditions and weight/height (to calculate body mass index).

Socioeconomic variables that have been demonstrated to influence health care utilisation are included in the models[28]. These include:

- The highest level of education attained: less than secondary, secondary, and post-secondary education;
- Whether the individual was born in Canada;
- Marital status (married, widowed, and not married);
- Current cigarette smoker, and past cigarette smoker;
- Heavy drinking (5 or more drinks at least once a week); and
- Two dummy variables that capture missing information on education and immigrant status.

[28] Supply variables were originally included in the models– the number of GPs and specialists per capita in the health region of residence – however these were shown to be non-significant, and also introduced problems with multi-collinearity as evidenced by a variance inflation factor greater than 10. Therefore these variables were not included in the final estimations.

Province dummies are also included in the models to capture some of the supply differences across the country.

Income is measured as gross annual household income aggregated from all sources. In this dataset, income is only available in five income categories: <$15,000, $15,000-$29,999, $30,000-$49,999, $50,000-$79,999, $80,000 or more. I also include a dummy variable to indicate that the estimate of income is missing, because of a relatively high item non-response rate of about 15%[29]. The non-respondents are disproportionately elderly, lower educated and in poorer health. Since the estimates of household income are not adjusted for household composition, five dummy variables of household size (1, 2, 3, 4 or 5 or more persons) are included in the regression models. The independent variables are described in Table 5.2.

5.7 Results

5.7.1 Descriptive statistics

Table 5.2 reports the means of the utilisation, demographic, health status and socioeconomic variables that are described above. Health status appears to be worse among individuals with SUN than those without. Self-assessed health (SAH) is reported as poor in 3% of the total population, 2% for those with no SUN, compared to 6% among those with SUN due to waiting, 10% among those with SUN due to barriers (Category 3), 5% among the personal choice-based SUN (Category 2), and 8% among

[29] The proportion of the sample missing income information is slightly lower that this in the 2003 CCHS (wave 2.1) used in Chapter 3. The approach of including a dummy for those with missing income has also been taken elsewhere (Deri, 2005).

those with SUN for "other" reasons. Health limitations, chronic conditions, and general health that is worse than in the past year follow similar trends.

Socioeconomic characteristics also differ across these groups. People with SUN due to waiting appear to have higher income and education than the total population and those with SUN for barriers or other reasons. The proportion of individuals with SUN due to waiting that is in the highest income category ($80,000 or more) is 31%, compared to 29% in the total population, and only 18% for those in Category 3 (barrier-related unmet need). Education follows a similar trend, with prevalence of post-secondary education at 56% of the total population, 66% for those with SUN due to waiting, 58% for SUN due to barriers (Category 3), 57% for choice-related SUN (Category 2), and 62% for SUN for other reasons.

Rates of health care use vary across the different population groups. Individuals with SUN due to wait, barriers, and 'other' reasons have higher rates of GP and specialist visits than both the total population and those with choice-related SUN (Category 2). For inpatient care, all categories of unmet need have higher utilisation than the total population, although those in Category 2 (choice-related SUN) are using less than the other categories.

Table 5.2 Mean utilisation, demographic and socioeconomic variables by total sample, unmet need subgroups

	Total	No SUN	SUN: choice	SUN: wait	SUN: barriers	SUN: "other"
N	116,113	102,357	3148	6347	2960	3094
Utilisation						
GP total visits (mean)	3.08	2.91	3.61	4.56	4.80	4.60
GP visit probability	0.78	0.78	0.76	0.86	0.81	0.80
GP visits (conditional)	3.93	3.73	4.73	5.33	5.93	5.77
Specialist total visits (mean)	1.30	1.22	1.41	2.14	1.81	2.05
Specialist visit probability	0.55	0.54	0.53	0.68	0.58	0.62
Specialist visits (conditional)	2.37	2.27	2.68	3.17	3.11	3.28
Inpatient probability	0.08	0.07	0.09	0.12	0.12	0.15
Inpatient total nights (mean)	0.48	0.44	0.68	0.75	0.89	1.07
Inpatient nights (conditional)	6.07	5.95	7.19	6.18	7.48	7.11
Demographics						
Male 35-44	0.11	0.11	0.11	0.11	0.10	0.10
Male 45-54	0.10	0.10	0.08	0.09	0.08	0.09
Male 55-64	0.07	0.08	0.04	0.06	0.05	0.06
Male 65+	0.07	0.07	0.02	0.05	0.03	0.04
Female 18-34	0.15	0.14	0.23	0.17	0.20	0.19
Female 35-44	0.10	0.10	0.10	0.14	0.15	0.13
Female 45-54	0.10	0.10	0.10	0.13	0.13	0.13
Female 55-64	0.07	0.07	0.05	0.07	0.07	0.08
Female 65+	0.09	0.09	0.04	0.06	0.05	0.06
Health status						
Very good SAH	0.38	0.38	0.35	0.33	0.30	0.30
Good SAH	0.29	0.28	0.33	0.33	0.34	0.33
Fair SAH	0.09	0.08	0.13	0.15	0.15	0.16
Poor SAH	0.03	0.02	0.05	0.06	0.10	0.08
Moderate limitations	0.13	0.12	0.24	0.22	0.23	0.24
Severe limitations	0.10	0.09	0.17	0.24	0.29	0.26
Chronic condition	0.71	0.69	0.78	0.85	0.86	0.86
Chronic (missing)	0.00	0.00	0.00	0.00	0.00	0.00
SAH worse than past year	0.11	0.10	0.19	0.22	0.24	0.23
Poor mental SAH	0.05	0.04	0.13	0.10	0.16	0.15
Obese	0.15	0.15	0.16	0.16	0.18	0.18
BMI (missing)	0.03	0.03	0.03	0.03	0.03	0.04
Socioeconomic variables						
Married	0.65	0.65	0.55	0.67	0.57	0.63
Widow	0.12	0.12	0.10	0.12	0.16	0.13
Smokes	0.21	0.20	0.30	0.26	0.32	0.26
Past smoker	0.41	0.42	0.36	0.40	0.36	0.44
Drinks	0.07	0.07	0.12	0.07	0.07	0.07
Secondary education	0.25	0.25	0.29	0.21	0.26	0.24
Post-secondary educ.	0.56	0.55	0.57	0.66	0.58	0.62
Education (missing)	0.03	0.03	0.02	0.02	0.02	0.03
Born in Canada	0.75	0.75	0.82	0.75	0.75	0.78
Born in Canada (miss)	0.07	0.07	0.06	0.07	0.08	0.06
Income $15,000-$29,999	0.11	0.11	0.10	0.11	0.16	0.11
Income $30,000-$49,999	0.17	0.17	0.17	0.17	0.18	0.18
Income $50,000-$79,999	0.23	0.23	0.23	0.24	0.22	0.22
Income $80,000+	0.29	0.29	0.30	0.31	0.18	0.28
Income (missing)	0.15	0.15	0.15	0.12	0.14	0.13

Table 5.3 describes the unadjusted association between SUN (as a proportion of each cell) in the different categories and utilisation of GP, specialist and inpatient services. The proportion of the population reporting any type of unmet need increases with increasing frequency of GP, specialist and inpatient contacts. Compared to the total sample estimate of 12% who report any SUN, the prevalence of unmet need is 17% among those who had four or more GP visits, 19% of those with three or more specialist visits, and 18% of those with at least one inpatient stay. The association between Category 2 (personal choice) and utilisation is relatively proportional, although there is a slightly positive association between SUN from Category 3 (barriers) and utilisation, and a clear positive relationship for wait-related and 'other' reasons for SUN.

Table 5.3 Prevalence of unmet need, and SUN subgroups by level of health care utilisation

	SUN (Total)	SUN- Choice (Category 2)	SUN- Barriers (Category 3)	SUN- Wait related	SUN- "Other"
Total	11.84	2.81	2.40	5.36	2.70
GP visits					
0	9.89	3.40	2.12	3.57	2.55
1	8.32	2.22	1.70	3.77	1.57
2	10.54	2.64	1.82	4.88	2.21
3	11.80	2.72	2.29	5.47	2.55
4+ visits	16.90	2.96	3.58	8.23	4.06
Specialist visits					
0	10.05	2.96	2.21	3.84	2.25
1	10.34	2.53	2.01	4.57	2.30
2	14.28	2.57	2.54	7.46	3.07
3+ visits	18.86	3.10	3.76	10.29	4.73
Hospital inpatient					
0	11.34	2.80	2.30	5.11	2.49
1+ nights	17.65	2.91	3.63	8.26	5.18

5.7.2 Analysis of residual utilisation

From the utilisation models it is possible to calculate "residual" utilisation as the difference between actual and predicted utilisation for all individuals; Appendix 5A

presents the results of the full utilisation models that are used to calculate residuals. Table 5.4 shows the estimates of the effects of each of the four categories of SUN on "residual" utilisation, after controlling for socioeconomic and provincial variables (the full results of the models are shown in Appendix 5B).

The first row of Table 5.4 reports the effects of the different categories of SUN on the residual probability of a GP visit (i.e. the difference between the actual probability of a GP visit and the predicted probability). Reported wait-related SUN is associated with a 4.4% increase in residual utilisation, compared to not having reported wait-related SUN. Reported unmet need due to perceived barriers to access is associated with a 2.4% reduction in residual utilisation. Choice-related unmet need is also associated with a reduction in the residual probability of a GP visit, by about 6%. Finally "other" SUN is associated with a reduction in the residual probability of a GP visit by 4%.

In general, individuals with wait-related SUN have systematically higher unexplained use than individuals with the same measured characteristics but who do not report this type of SUN. On the contrary, for SUN due to personal choice, there is a negative association with residual utilisation. Reported SUN due to barriers significantly reduces the residual probability of a GP visit, though the opposite is seen for the conditional number of GP visits and the likelihood of an inpatient admission. For "other" SUN, there is a negative trend in the residual likelihood of a GP visit, and a significant positive association with residual utilisation of the other services.

Table 5.4 Estimates of the effects of SUN on residual utilisation

SUN category	Marginal effect (ME) on the residuals (standard error)	
GP: Probability		
Wait	**0.044**	(0.007)
Barriers	**-0.024**	(0.012)
Choice	**-0.059**	(0.012)
Other	**-0.038**	(0.012)
GP: Conditional number of visits		
Wait	**0.602**	(0.104)
Barriers	**0.391**	(0.194)
Choice	**-0.254**	(0.122)
Other	**0.559**	(0.154)
Specialist: probability		
Wait	**0.081**	(0.009)
Barriers	-0.022	(0.014)
Choice	**-0.039**	(0.013)
Other	0.012	(0.014)
Specialist: conditional number of visits		
Wait	**0.392**	(0.071)
Barriers	-0.021	(0.110)
Choice	-0.090	(0.104)
Other	**0.310**	(0.114)
Inpatient: probability		
Wait	**0.013**	(0.006)
Barriers	-0.003	(0.008)
Choice	**-0.017**	(0.006)
Other	**0.035**	(0.009)
Inpatient: conditional number of nights		
Wait	-0.361	(0.372)
Barriers	0.054	(0.626)
Choice	-0.007	(0.731)
Other	0.193	(0.489)

Note: Regression coefficients are adjusted for socioeconomic variables and province dummies. Bold indicates statistically significant effects at the $p<0.05$ level. Full results are in Appendix 5B.

It is possible that the significant association between SUN and the residuals from the utilisation models could be explained by personal preferences and psychological traits, such as higher levels of dissatisfaction and complaints in general. It is also possible that the association could be explained by unobserved health care needs. In an attempt to disentangle these two possibilities, I incorporate two "preference"-related variables into the calculations of the residuals. Reporting unmet need is significantly associated with both subjective unmet home care needs and satisfaction with life in general (Appendix

5C)[30]. Those reporting unmet home care needs have between twice to three times the odds of SUN; lower levels of satisfaction also increase the odds of SUN.

Table 5.5 Association between SUN and residuals of models of total and conditional number of specialist visits including a) only need and socioeconomic variables, b) need, socioeconomic and preference variables

	Model a		**Model b**		
Total number of specialist visits					*% difference*
	ME	Standard error	ME	Standard error	
SUN- Wait	**0.473**	(0.027)	**0.461**	(0.027)	*-2.6%*
SUN- Barrier	-0.065	(0.040)	**-0.108**	(0.040)	*-64.9%*
SUN- Choice	**-0.160**	(0.037)	**-0.173**	(0.037)	*-8.3%*
SUN- Other	**0.231**	(0.038)	**0.204**	(0.038)	*-11.6%*
Conditional number of specialist visits					
	ME	Standard error	ME	Standard error	
SUN- Wait	**0.392**	(0.071)	**0.380**	(0.071)	*-2.9%*
SUN- Barrier	-0.021	(0.110)	-0.064	(0.110)	*-200%*
SUN- Choice	-0.090	(0.104)	-0.111	(0.104)	*-22.9%*
SUN- Other	**0.310**	(0.114)	**0.289**	(0.114)	*-6.7%*

Notes: Bold is significant at 5% level. Full results are reported in Appendix 5D.

To determine whether these personal characteristics attenuate the relationship between SUN and residual utilisation, the indicators of satisfaction and unmet home care needs are entered into the utilisation models, and new residuals are calculated. Table 5.5 reports the marginal effects of SUN on residual utilisation. Using the example of the total number of specialist visits, there appears to be some change, though quite modest, in the association between SUN and the residual utilisation. As expected, the inclusion

[30] Greater unmet home care needs could be an indicator of personal characteristics associated with an increased tendency towards complaints and dissatisfaction, it could reflect unobserved health care needs, or it could be a combination of both. I believe that this variable captures characteristics unrelated to health care need because this question is asked separately to that for health care, and the majority (60%) of those who report unmet home care needs indicate these services were required for "meals", 25% for "shopping" and 22% for housework, compared to less than 10% for "health services". Other measures of satisfaction such as those specifically directed towards the health care system (e.g. rating the availability and quality of health care in the province and community) were available in optional modules that only half of the sample contributed, therefore these were not used here. Also, more detailed, questions about satisfaction were included in an optional module that was completed by only 10% of the sample.

of identifying factors related to personal preferences, including a predisposition towards dissatisfaction and non-health care related unmet needs, leads to a reduction in the strength of the effect of SUN due to waiting and SUN due to "other" reasons on residual utilisation. However, the effects of these two categories of SUN on the residual remain positive and, in most cases, significant.

5.8 Discussion

Directly measuring unmet need for health care may inform our understanding of equity in the use of health services. This chapter links the different reasons for unmet need and conventional models of utilisation. One might assume that unmet need arises when an individual is using fewer health services than an expected amount (hence her needs are not being met). However, this assumption depends on unbiased models of health care utilisation that accurately measure both individuals' experience with health care and their need for care. It also depends on the validity of reported unmet need, meaning it is not simply measuring individual preferences and psychological traits such as a tendency towards dissatisfaction in health service provision alongside a preference for frequent health care consumption. In this chapter, I find that for some types of SUN (wait-related and "other" SUN), after controlling for socioeconomic differences, there is a tendency towards over-utilisation of physician services; these types of SUN are significantly associated with positive 'residual' utilisation. On the contrary, for the other types of SUN (Categories 2 and 3), there is the expected under-utilisation.

It is possible that SUN captures unobserved needs, whereby individuals have more information about their health care needs than can be gleaned from self-reported health

status and demographics. These unobserved needs may explain part of the 'over-utilisation' that was found for some types of SUN, which implies that there may be a bias in the conventional method of assessing equity. However I do not find that there is systematic 'over-utilisation' across all categories of SUN; therefore, it is likely that factors other than unobserved needs explain this finding.

I propose four explanations for the positive residual utilisation among the two subgroups of people reporting unmet need. First, as already stated, individuals who report wait-related and "other" SUN may have a greater degree of unobserved needs than those reporting other types of unmet need. Second, these subgroups may have unobserved individual characteristics, such as psychological traits that lead to declaration biases in surveys, preferences for more health care, and a predisposition towards dissatisfaction with care. Third, since utilisation is measured in terms of volume and does not capture information on the quality of care an individual received, individuals may have used many services, and yet they still report their needs as not having been met because the care they received was inadequate. This third explanation was also proposed by the authors of a Canadian study that found higher rates of utilisation among those who reported any unmet need (Kasman & Badley, 2004); the authors also suggested that reported unmet need could relate to the fact that there is a lack of effective treatments for some conditions. Fourth, and perhaps the most likely, there could be a combination of these three explanations.

In an attempt to control for individuals' preferences that may explain the observed 'over-utilisation' (the second explanation above), I included some indicators of 'preference' in the utilisation models: reported unmet home care needs and dissatisfaction with life in general. After including these variables there was a modest

reduction in the positive effect of SUN on residual utilisation. This suggests that possibly there are some individual (unmeasured) characteristics that reflect an individual's predisposition toward dissatisfaction with care alongside a tendency to use more services. This has also been suggested elsewhere (Kasman & Badley, 2004). Further research using longitudinal data could address the hypothesis that unobserved individual characteristics explain the 'over-utilisation'. Moreover, additional survey questions would be needed to distinguish between unmeasured characteristics related to need as opposed to preferences.

Given that there appears to be a systematic association between some types of SUN and 'residual' utilisation and that it is possible that SUN captures unobserved needs (the first explanation above), it can be argued that SUN should be included in the utilisation models in the calculation of equity. I performed an additional test to examine whether the inclusion of SUN as a needs variable in utilisation models affected the estimates of income-related inequity in the use of specialist services (see Section 2.3.2 for a detailed description of the methods to calculate inequity). I found a positive concentration index (*CI*) for SUN due to wait, which means that there is a positive correlation between this type of SUN and income; and the other types of SUN have negative correlations with income (negative *CIs*). The contribution of SUN to inequity, which is calculated on the basis of each variable's *CI*, its marginal effect on utilisation and its prevalence, is very close to zero. Finally, the inclusion of SUN into the utilisation model does not change the estimate of income-related inequity in needs-adjusted utilisation (see Table 5.6).

Table 5.6 Contribution of unmet need to income-related inequity in the total number of specialist visits

	Mean	Concentration index	Marginal Effect	Contribution to HI
SUN-wait	0.055	0.015	0.457	0.0003
SUN-barriers	0.024	-0.206	-0.094	0.0004
SUN- choice	0.028	-0.008	-0.204	0.0000
SUN-other	0.027	-0.041	0.257	-0.0002
Income-related inequity index				0.060

As an alternative to including SUN in the utilisation models, the different reasons for SUN could complement studies of equity measured in the conventional way. It appears that individuals with SUN due to barriers (Category 3) make fewer physician visits than expected, and they disproportionately represent lower income groups (there is a negative *CI*, Table 5.5). For these reasons, the specific barriers that individuals report may help to explain inequity in health care use.

Individuals who report unmet need, but who have in fact chosen not to seek health services (Category 2), are also using fewer services than expected. This is unlikely to violate equity goals if it is considered to be acceptable for utilisation patterns to vary according to different preferences and individual choices. Conventional methods of measuring inequity may overestimate inequity if individuals who choose not to seek needed health care are disproportionately drawn from the lower socioeconomic groups; although this does not appear to be the case.

The greatest proportion of SUN relates to waiting times, a complaint that has been shown previously (Wilson & Rosenberg, 2004), and "other" reasons; these types of SUN also have a positive association with residual utilisation. This finding suggests that it is unlikely that individuals with "other" SUN face barriers to the receipt of care (Category 3), but, instead, they are more likely to have experienced 'inadequate' care

(Category 4) or unmet expectations (Category 5). It is difficult to interpret the wait-related SUN, because, without further information on the length of time individuals were waiting, and for what services, it is difficult to assess the validity of their complaints. However, the categories of SUN are not mutually exclusive; along the care pathway, an individual may access primary care and then experience difficulties accessing higher levels of care, whether because waiting times are perceived to be too long, or for other reasons. The conceptualisation of unmet need, therefore, could be further developed to take into consideration the dynamic nature of perceived needs and access to health care. The equity implications of these two categories of SUN are also unclear. It is possible that these complaints (i.e. reporting unmet need) are legitimate, which means that they reflect unobserved needs or inadequate care that was received. If this is the case, then this type of SUN can be considered inequitable, whereby individuals in equal need are not being treated equally. However, if there are reasons why we might discount these preferences, because they do not reflect underlying needs or inadequacies in care, then there is less evidence of inequity.

Overall, this study has two main contributions to the literature. First, there appear to be at least four distinct groups of individuals who report unmet needs; these groups should be considered separately, as they each have different equity implications. Second, there is a systematic association between SUN and "residual" utilisation from conventional utilisation models that is mostly negative for SUN arising from individuals' choices (Category 2) and barriers (Category 3) and mostly positive for SUN due to waiting and 'other' reasons. These significant associations with residual utilisation imply that the conventional models of utilisation may be biased for two reasons: a) the measures of health status, even when comprehensive, do not adequately measure need for health care, and b) crude measures of utilisation that only measure the number of visits to a

provider do not capture the quality and effectiveness of the services received. They also imply that unmet need, when measured subjectively, is not easily interpreted.

Further research is needed to increase our understanding of unmet need and its equity implications. Longitudinal data would allow us to control for the unobserved individual characteristics that may explain the association with residual utilisation. Information on the quality of care an individual received, in addition to the intensity of the care (measured not only in number of contacts, but amount of services or tests received per contact), would help address the question of whether unmet need relates more to quality as opposed to quantity. It would also be interesting to make use of clinical data sources to measure the prevalence of Category 1, i.e. with unperceived unmet needs, which may be important from a public policy perspective; tackling unperceived unmet need may yield health improvements. Further analyses could combine administrative data of health care utilisation, clinical information, such as diagnoses, and survey data. This research could begin to distinguish between the different categories of unmet need, could clarify some of the uncertainty surrounding the 'other' and waiting-time related unmet need groups, and could improve our understanding of the equity implications of unmet need. Section 6.2.3 in the proceeding chapter provides a discussion of the policy challenges associated with waiting times and unmet need, and suggests some additional avenues for future research.

CHAPTER 6: DISCUSSION OF FINDINGS, POLICY AND METHODOLOGICAL IMPLICATIONS, AND FUTURE RESEARCH

This thesis has examined three aspects of equity in the Canadian health system. The findings of these three analyses build upon the empirical literature of equity in the use of health services in Canada. The findings also have policy implications and they raise some methodological questions; these implications highlight areas for future empirical investigation. This chapter begins with a broad summary of the results from the three empirical chapters (Section 6.1), then it will discuss the key policy implications (Section 6.2), and finally, it will review the main methodological strengths and limitations (Section 6.3). Suggestions for future research are integrated into the in-depth discussions of policy and methodological implications, because future research in this area should not only be relevant to current policy debates, but it should also go some way towards addressing the existing methodological challenges.

6.1 Summary of the empirical results

Equity goals in health care are espoused by most countries' governments, including Canada's. In Canada, the concern for equity appears at both the federal and provincial level. Motivated by the egalitarian belief that health care is a right, not a privilege, policy makers have been concerned with the distribution of health care in the population. They have also been motivated by the belief that if utilisation patterns are equitable, there will be a reduction in health inequalities across social and other population groups. Translating this policy goal into a measurable objective is not straightforward, because there is no consensus on how to define some of the key

concepts, such as equity, health care need, and access. Neither has a consensus been reached about the most appropriate, or accurate, way to measure equity in health care. Equitable access is often stated as a policy goal in national and provincial policy documents and in public consultations, although the measurable endpoint or proof of access is the actual receipt of health care. There appears to be some agreement among policy makers and researchers that equity should be assessed according to the extent that individuals receive health care on the basis of their level of need and not on their ability to pay.

In this thesis, inequity is identified when patterns of utilisation differ across individuals with the same level of health care need across income groups. For these analyses, I used two releases of a representative national health survey from Canada with information on socioeconomic status, health status and utilisation to examine three aspects of equity in the Canadian health system. Each of the three empirical studies is discussed in turn below.

6.1.1 Provincial variations in equity

An examination of equity in Canada must recognise that the provinces hold a large share of responsibility over the planning, management and funding of their individual systems; hence provincial system characteristics, health care reforms, and policy developments vary across the provinces. The provincial systems are guided by the federal Canada Health Act which enables the federal transfer payments to support provincial programmes. This Act serves as one of the main instruments of federal oversight in the system. Given that each provincial health system endorses equity

objectives, the first empirical analysis in this thesis investigated the extent to which variations could be found across the provinces in the level of, and reasons for, income-related inequity in the use of GP, specialist, inpatient and dental services. Physician and hospital services are almost wholly publicly funded, whereas dental care is mostly privately funded; hence, income-related inequity was expected to be much higher in this sector. A recent international study showed this to be the case in Canada and most other countries (van Doorslaer, Masseria, & the OECD Health Equity Research Group Members, 2004). Therefore, I calculated inequity separately for each province and separately for each health care sector, and then I statistically decomposed the observed inequity into its measurable contributing factors.

For the different health care services, I considered two stages of health care use. The first stage was the initial contact with the provider, which can be viewed as mostly patient-led; and the second stage referred to the number of subsequent contacts, which can be viewed as largely provider-led (Evans, 1983). (Total utilisation was also measured, which captures the combined effect of the above two stages). In Canada, a referral from a GP is needed in order for a patient to access specialist care, and a specialist consultation precedes non-emergency inpatient admissions. However these higher level, or more specialised, services were also considered separately for the initial contact and for further contacts. Patients play less of a role in deciding whether to seek specialised care, because GPs serve a gatekeeping function, although patients can exert pressure on their GPs for referrals.

I first conducted a national-level analysis of recent survey data which confirmed some of the findings of previous studies. I found that there was a statistically significant, but modest, 'pro-rich' inequity in the probability of a GP visit, and 'pro-poor' inequity in

the total number of GP visits and in the number of visits conditional on being a user. Specialist care was found to be more concentrated among the rich, although for the number of specialist visits made among those who had at least one visit, the level of pro-rich inequity was reduced. Hospital care was found to be more concentrated in the lower end of the income distribution. In contrast, inequity in dental care was significantly pro-rich; utilisation of dental services was much more concentrated in the upper end of the income distribution (although the level of inequity was reduced for the number of visits conditional on having one visit to a dentist).

Variations in the level of income-related inequity across the provinces were seen, although there was no clear pattern across all of the health care sectors. Such a clear pattern across the sectors would not necessarily be expected, since the potential factors that give rise to inequity would be different in each of the sectors. The clearest distinction is between dental care and the other sectors, since the former is mostly privately financed and the latter is publicly financed. As a result of these differences in financing, an individual's ability to pay (measured by income) was expected to have a much stronger effect on the decision to visit a dentist. In the more sparsely populated provinces, I also expected to find a stronger effect of living in the capital city[31] on utilisation, and I did find this effect was stronger in New Brunswick and Newfoundland than in the other provinces.

The level of variation across the provinces was the lowest in the extent of inequity in the use of GP services. At the stage of the initial contact with a GP, all provinces except one – Prince Edward Island – had an index of inequity that was close to, but

[31] This is a proxy for supply of health care, given the capital cities have a disproportionate supply of providers (per capita), especially in the case of highly specialised care.

significantly greater than, zero, which signals pro-rich inequity. This implies that, in all provinces, conditional on their need, individuals with higher income are slightly more likely to visit a GP than those with lower income. In contrast to the likelihood of a visit to a GP, the conditional number of GP visits had a distribution that was more concentrated among the lower income groups (the index of inequity was negative or close to zero). The total number of GP visits represents a combination of both of these stages of utilisation, the initial pro-rich inequity in the likelihood of a visit, and the subsequent pro-poor distribution. As a result, inequity in the total number of visits to a GP in most provinces was slightly negative or near zero.

The distinction between inequity in the initial contact with a GP and the subsequent contacts is important. It is possible that there is a greater acceptance by GPs of new patients who are among higher socioeconomic groups in the context of oversubscribed GPs, many of whom with closed patient lists (Glazier, 2007). The difference in inequity in these two stages of utilisation could also relate to different patterns of utilisation of preventive and curative care, whereby individuals with relative socioeconomic advantage may be more likely to schedule annual physical check-ups and engage in other preventive services. Evidence from both Canada and England suggests that there is a socioeconomic gradient in preventive service use (Dixon, Le Grand, Henderson et al., 2007; Glazier, Creatore, Gozdyra et al., 2004; Snider, Beauvais, Levy et al., 1997). Overall, it appears that, although individuals with higher income are more likely to visit a GP, there is no evidence of pro-rich inequity in accessing further GP services. This is an important achievement in the provincial health systems since GPs serve as the initial point of contact in the system for the majority of people. Moreover, GPs ensure continuity of care as the patient moves through the system. The finding that

complementary insurance is one of the contributors to pro-rich inequity is important and one that I return to later.

I found that there was some variation across the Canadian provinces in the level of inequity in specialist care. In all provinces, specialist visits were more concentrated among higher income groups (with the exception of the index of inequity for the conditional number of specialist visits in Alberta, Manitoba, and New Brunswick which was negative, but not significant). This pro-rich inequity mostly could be explained by the direct effect of income, although higher education, residing in the capital city (capturing supply), and complementary insurance for prescription drugs also played a role. The highest level of inequity in specialist care was in Newfoundland (the inequity index was 0.08 for the probability and total number of visits, though much lower, 0.03, for the conditional number of visits). In this province, living in the capital city had the largest contribution to inequity, which implies that characteristics that are related to supply and geographical barriers explain some part of this relatively high level of inequity.

On the whole, individuals with higher income, higher education, holding prescription drug insurance and in some cases living in the capital city appear to have better access to specialist care, as indicated by their high rates of utilisation after controlling for needs. However, once the initial contact has been made, the level of inequity is reduced considerably, implying there may be difficulty gaining initial access to specialists which takes place through GP referrals. Indeed, one survey of GPs and specialists found that 'patients' wishes' was the most frequently cited non-medical factor accounting for a referral (Langley, MacLellan, Sutherland, & Till, 1992); the more vocal and demanding patients may have a greater likelihood of getting referred to specialists. In addition,

using physician claims data for Ontario in 1996, another study identified that referral rates were higher in lower income neighbourhoods; however, after controlling for disease prevalence which is also higher in low-income communities, the wealthiest neighbourhoods had a modest but significantly higher referral rate (Chan & Austin, 2003). (Similar evidence was found in the United States; (Kikano, Schiaffino, & Zyzanski, 1996). Also, although the large part of specialist care is entirely publicly funded, some services do require payment, which may limit the accessibility of these services for those less able to pay[32]. The delisting of some services in the past decade from the provincial insurance programmes would also have had the effect of introducing financial barriers to their use (Charles, Lomas, Giacomini et al., 1997; Fuller, Fuller, & Cohen, 2003; Stabile & Ward, 2005). If surveys included information on the type of specialist patients consulted, then inequity in specialist care could be disaggregated by medical speciality.

The explanations for inequity in specialist care are not straightforward, and clearly are not simply a function of ability to pay. It has been suggested that for specialist services with long waits, such as diagnostics, individuals with socioeconomic advantage may be able to game the system "through purchase of diagnostic tests that could allow them to jump the queue" (Canada, 2002a, p.8). Likewise, Kirby argued that better-off and more powerful individuals are better able to access services due to the fact that "they understand how the system works and have appropriate contacts in hospital service delivery and administration" (Canada, 2002b, p.xvi). Overall, people from higher socioeconomic groups appear to have an advantage over lower socioeconomic groups in availing themselves of needed services across the country.

[32] For example some diagnostic services may not be covered, e.g. bone mineral density tests in the province of Ontario are only reimbursed once every three years and annually for high-risk patients, and most cosmetic services including those delivered by dermatologists.

As expected due to its predominantly private funding, dental care exhibited significant inequity across all provinces. As seen with specialist care, in Newfoundland, the level of inequity in dental care was higher than in the rest of the country (inequity index is 0.16), although high levels of inequity were also seen in two other Atlantic provinces: Nova Scotia and New Brunswick. In all of the provinces, inequity appeared to mostly be driven by the direct income effect, but also by dental care insurance. With regards to the latter, individuals with dental insurance are both more likely to be higher income and are more likely to visit a dentist and visit more frequently. In Newfoundland, both income and insurance contributed to the high level of inequity, as did living in the capital city, where dentists are in greater supply. In this province, less than half the population is covered by dental insurance, much lower than the national average of 62% (though not as low as in Québec where it is 46% and inequity is not quite as high), and the marginal effect of holding such insurance on the likelihood of a dentist visit was higher in Newfoundland than in the other provinces.

There were quite different patterns of inpatient hospital utilisation than those found in the other health care sectors. Also, wide variations in the levels of inequity in inpatient hospital care were found across the provinces. In some provinces, there was a significant pro-poor distribution in both the probability of admission and the total number of nights spent in hospital, although in most provinces, there was a non-significant trend in this direction. The estimates of inequity in hospital inpatient service utilisation were more sensitive to the assumption of linearity than the estimates of inequity in the other sectors. Moreover, due to methodological limitations with measuring inequity in inpatient care, these results should be interpreted with caution (see Section 6.3.3 for further discussion of these limitations). However, this aggregate

level examination of the utilisation patterns showed little evidence of inequity in the direction of the rich.

Overall, the trends that I observed in this analysis suggest that the value of equity is embraced across the country, and health systems have been broadly organised and managed in ways that are consistent with this shared value. However, there remain a few challenges with respect to the use of specialist and dental services, in addition to the initial contact with a GP.

6.1.2 Prescription drug insurance as a contributor to inequity

The causes of inequity in a publicly-funded system that consistently supports equity goals relate to a complex array of individual and system-level factors. It is likely that individuals with personal connections to health care professionals, high levels of health literacy, and confidence in expressing their demands for treatment will be able to secure better and even timelier services than those without these advantages. However, policy makers are interested in the factors contributing to inequity that can be attributed to system characteristics and that are mutable to policy, as opposed to individual characteristics or preferences.

Physician services are almost completely publicly funded; however, this thesis found some evidence of an inequitable distribution of utilisation favouring higher income groups. Moreover, in the previous study of provincial variations, complementary insurance appeared to be one of the contributors to inequity. Data did not permit the separation of type of insurance into public (government programme), private employer-

based plan, and individually purchased plans; though the relative role of these three plans in explaining inequity likely differ. It was possible to investigate this relationship in greater depth in one province of Canada, Ontario, by examining the effect of the different types of insurance an individual had on the use of physician services and the level of inequity therein.

Prescription drugs outside hospital represent a unique component of health care in Canada because of the mixed model of financing for this sector that draws on out-of-pocket payments and private insurance, although with some variations across the provinces (more discussion can be found in Section 6.2.2). The federal government assists in the financing of physician and hospital services in the provinces under the legal framework of the Canada Health Act. However, for services outside physician and hospital sectors, notably ambulatory prescription drugs and long-term care services, each province can decide the level of public subsidy at their own discretion. Considerable harmonisation of the provincial plans for these services can be seen. In the case of prescription drugs, all provinces provide public insurance for low-income individuals receiving social assistance, and most provinces also provide public insurance for the population aged 65 and over (either the whole older population or just those with lower income). Private health insurance covers about two-thirds of the population, and this funds about one-third of the total cost of prescription drugs.

Chapter 4 therefore explored the equity impact of prescription drug insurance on publicly-funded physician service utilisation. Due to the complementary nature of prescription drugs and physician services, whereby prescription drugs can only be obtained through physicians, individuals who face the full cost of prescription drugs may be deterred from visiting a physician. It is likely that awareness of the cost of

prescription drugs would have the strongest impact on the initial decision to contact a physician, as shown previously (Stabile, 2001). It is also likely that the impact would be greater for an acute condition. Thus, the stage of utilisation at which the greatest effect of insurance coverage on utilisation would be expected was for the likelihood of a GP visit, and this effect likely would be stronger among individuals without any chronic condition. It was also expected that, due to the institutional arrangements for the financing of prescription drugs, private insurance would be held disproportionately by individuals with higher income, and public insurance by those with low income. Therefore, it was expected that the former would be an important contributor to pro-rich inequity in physician (especially GP) care, and the latter would contribute negatively, thereby reducing inequity.

The results provide some support for these hypotheses, as I found a positive and significant effect of holding any type of prescription drug insurance on the likelihood of visiting a GP, and the effect was stronger for those with no chronic conditions than for individuals with one or more conditions. However, I also found a positive and significant effect of prescription drug insurance on the conditional number of GP visits and the likelihood of a specialist visit, and I demonstrated that insurance also contributed to inequity in these areas, though to a less extent. Indeed, the contribution of private insurance to inequity in the probability of a GP visit was almost 40%. For the conditional number of GP visits, private insurance also had a positive contribution to inequity (i.e. made it less pro-poor) by 15%, for specialist care it contributed about one-third to the inequity in the probability of a visit, and it increased the level of inequity in the conditional number of visits by about 8%. This empirical analysis showed that individuals appeared to be affected by the cost of complementary goods, and this effect was seen not only at the point of initial contact with the system but also in subsequent

contacts. Private insurance had the expected positive contribution to inequity, while public insurance reduced this inequity. Policies to improve equity in the receipt of health services, therefore, need to look beyond the public system to explore possible interactions with privately funded services.

6.1.3 Subjective unmet need

The first two empirical chapters investigated equity in the Canadian health system using methods of regression and concentration indices, whereby differences in needs-adjusted utilisation across socioeconomic groups signalled inequity. The three main limitations associated with this conventional method of measuring equity are: that it does not account for potentially acceptable variations in utilisation such as those driven by individuals' informed choices; that it relies on reported ill-health to measure need for health care, which may or may not be accurate; and that it does not capture the qualitative aspects beyond the number of contacts. Therefore, an alternative, or complementary, metric of equity could derive from the measurement of unmet need. In the literature, unmet need that is measured subjectively through surveys is typically interpreted as representing barriers to accessing care; thus, unmet need could be seen to violate equity goals. Little effort has been made to understand the link between unmet need and conventional methods of analysing equity in utilisation. This thesis's third empirical analysis advanced the empirical research in the following ways: a) by developing a conceptualisation for different types of unmet need, b) by exploring the relationship between these different types of unmet need and unexplained utilisation, and c) by discussing the implications for analyses of equity.

The conceptual framework distinguishes different types of unmet need, each with different potential equity implications. These include unmet need which is chosen (an individual may decide not to seek needed care) or not chosen (an individual may face insurmountable barriers to access), and unmet need that is related to inadequacies with the care that was received (an individual received care that was of poor quality, was ineffective in improving health, or was perceived to be unsatisfactory). The equity implications of these types of unmet need differ, as do their hypothesised associations with utilisation. When unmet need arises from individuals making a choice not to seek needed care, it may not be considered inequitable. However, when individuals face barriers to accessing needed care, this can be considered as in violation of the equal goal. Moreover, to the extent that this type of unmet need is disproportionately affecting lower socioeconomic groups, it may also contribute to income-related or socioeconomic inequity in health care use. The other types of unmet need have implications for equity that are less clear. When needed care that was received was ineffective or of poor quality, then the resulting unmet need could be considered inequitable. However, the perception that the health services that were received were unsatisfactory may or may not be inequitable; this depends on whether that perception was based on actual clinical inadequacies or whether it could be attributed to personal preferences and tendencies towards complaint.

By modelling health care utilisation with the conventional method, I examined the association between different types of unmet need with "residual", or unexplained, utilisation (measured as the difference between actual and predicted utilisation). Negative residual utilisation would imply that individuals who report an unmet need use fewer health services than the amount that would be predicted on the basis of their measurable characteristics; such under-use would be expected for individuals who faced

barriers to accessing care. A positive association with residual utilisation could arise from unobserved need characteristics in the utilisation model, such that individuals reporting unmet need actually need more health care services than is captured by the available health and demographic variables. Alternatively, a positive association may reflect unmeasured personal preferences for more care alongside personal tendencies to be dissatisfied with care that was received (in this way, subjective unmet need could be seen as a measure of dissatisfaction; (Kasman & Badley, 2004). Finally, a greater degree of unexplained utilisation among people who reported unmet need could reflect inadequacy in the measurement of utilisation that does not capture the quality of the care that was received.

The results of this empirical analysis revealed different associations with residual utilisation across the different types of unmet need. For two types of unmet need, that which was chosen, and that which arose from barriers to access, there was a negative association with residual utilisation, as hypothesised; these types of unmet need were associated with a reduction in the 'unexplained' part of utilisation. However, the other types of unmet need, owing to "other" reasons or waiting too long, were associated with increased residual utilisation. I provided some empirical support for the theory that personal preferences explained some of this 'overuse', although the associations between SUN and unexplained utilisation suggest that there may be limitations in the underlying utilisation models.

Overall, the analysis suggests that the equity implications of unmet need depend on the type of unmet need reported. The majority of individuals who reported unmet need could be grouped into the wait-related unmet need and unmet need due to "other" (unspecified) reasons; a minority reported unmet need due to barriers and personal

choices. The equity implications of these different types of unmet need vary. For individuals who chose not to seek needed care, although they appear to be have less-than-expected level of utilisation, it can be argued that equity goals are not being compromised. In contrast, when unmet need arose due to barriers to access, there was also lower unexplained utilisation, yet there is a strong case for this type of unmet need to constitute inequity. However, the equity implications of the other two groups, which have a positive association with residual utilisation, are less clear. Provided these complaints can be viewed as legitimate and representing some degree of unmeasured need, then this type of unmet need is inequitable. However, if there are reasons why these complaints would not be viewed as legitimate (for instance if they are not supported by clinical assessment of need), there is less evidence of a violation of equity goals.

6.2 Implications for policy

The empirical analyses conducted in this thesis demonstrated that the magnitude of income-related inequity in health service utilisation in Canada was not great; however, there were some specific areas that deserved some attention. This section will describe some of the key policy themes that emerge from the findings of this thesis, and it will outline some of the areas that are needed for future research.

First, it is important to ask what level of inequity would be considered significant from a policy perspective. In a recent editorial the authors asked two questions: "How much inequality of access and/or outcome is acceptable? Indeed, how much is addressable by public policy?" (Deber & Lewis, 2007, p.118) The same questions could be posed of

these analyses of equity in health care utilisation: how close to a zero index of inequity should we strive for, and to what extent can policies effectively reduce any existing inequity? The first is a normative question that can be addressed on the basis of the political processes that lead to the setting of policy objectives in light of the trade-offs associated with potentially conflicting objectives. One such trade-off is between equity and efficiency objectives. There are some reasons why inefficiencies may result from the pursuit of equity goals. One example relates to the allocation of specialist services in an equitable way, such that individuals would face the same distance and time costs of access. In a country the size and low population density of Canada, this goal would be extremely inefficient and, on any reasonable calculation of social welfare, would almost certainly outweigh any equity gains. Alternatively, some have argued that depending on how equity and efficiency are defined, these goals do not necessarily have to conflict. By taking a weighted utilitarian perspective based on weighted quality-adjusted life years, for example, then social welfare could be maximised taking account of both equity and efficiency objectives. Moreover, Culyer has repeatedly argued that there is no conflict between equity and efficiency objectives if equity is defined on the basis of the consequentialist approach with the end goals being the maximisation of health and minimisation of health inequality and efficiency is defined as the maximising of health with available health care resources (Culyer, 1988; Culyer, 2006; Culyer, 2007). However, the second question that asks what policies can do to reduce inequity is an empirical question that this thesis goes some way to address.

The first empirical analysis identified that dental insurance enabled dental service use, whereby insurance increased both the likelihood of a visit to a dentist and the number of visits made in a year. Moreover, insurance was found to be one of the main contributors to the pro-rich inequity in dental care, and it explained some of the

provincial variations. This section will begin with an exploration of the policy context of dental care financing, and will identify some research areas that are needed to inform policy (Section 6.2.1).

The first two empirical analyses investigated, first, provincial variations in equity and, second, the role of prescription drug insurance in explaining inequity. These analyses underscore the pressing issue facing policy makers in Canada that is to decide how to fund prescription drugs in a way that is consistent with the broader equity objectives in the system. Therefore, Section 6.2.2 will discuss the current state of prescription drug coverage across the provinces to identify some policy options to improve equity and reduce provincial variations. Moreover, it will suggest areas for future research that would help to inform these policy decisions.

The third empirical analysis raised important questions about the current approaches that are used to measure equity in the system. It highlighted the need to look beyond crude measures of need and utilisation to capture the quality of individuals' health care contacts, including the length of time patients had to wait for care. The important policy challenge to reduce waiting times is currently a high priority in Canadian provinces. Section 6.2.3 will explore the association between perceived waiting times and dissatisfaction, and will identify some of the gaps in our knowledge on unmet need and waiting times that could be addressed with additional research.

6.2.1 Dental care- what is the role for public funding?

6.2.1.1 Policy context

In Chapter 3 of this thesis I found that the greatest level of income-related inequity in Canada was in the use of dentist services; the index of inequity was at least twice that of specialist service use in almost all of the provinces. Dental insurance, which is nearly always private (employer or group-based), not only significantly and substantially increased the likelihood of a visit to a dentist and the number of visits, but also contributed to pro-rich inequity almost as much as income itself. In other words, individuals with insurance and higher income used more dental services, after adjusting for demographic and other socioeconomic variables; these findings are consistent with previous studies (Bhatti, Rana, & Grootendorst, 2007; van Doorslaer, Masseria, & the OECD Health Equity Research Group Members, 2004).

Inequity in dental care is not surprising given that dental health services have been left to the market in Canada. Dental care services are provided by self-regulated private practitioners, they are paid for almost wholly privately through private insurance or direct payments out of pocket, and dental fees are not regulated. With regards to financing, in 2007, 95.5% of dental costs were paid for privately; out-of-pocket payments made up 45% of private dental expenditures and private insurance made up the remainder (Canadian Institute for Health Information, 2007b). The organisational features of the dental sector stand in sharp contrast to those health services provided in hospital and by ambulatory physicians.

To the extent that dental care contributes to health improvement, and the equity goals that are clearly supported for other health improving services can be extended to dental

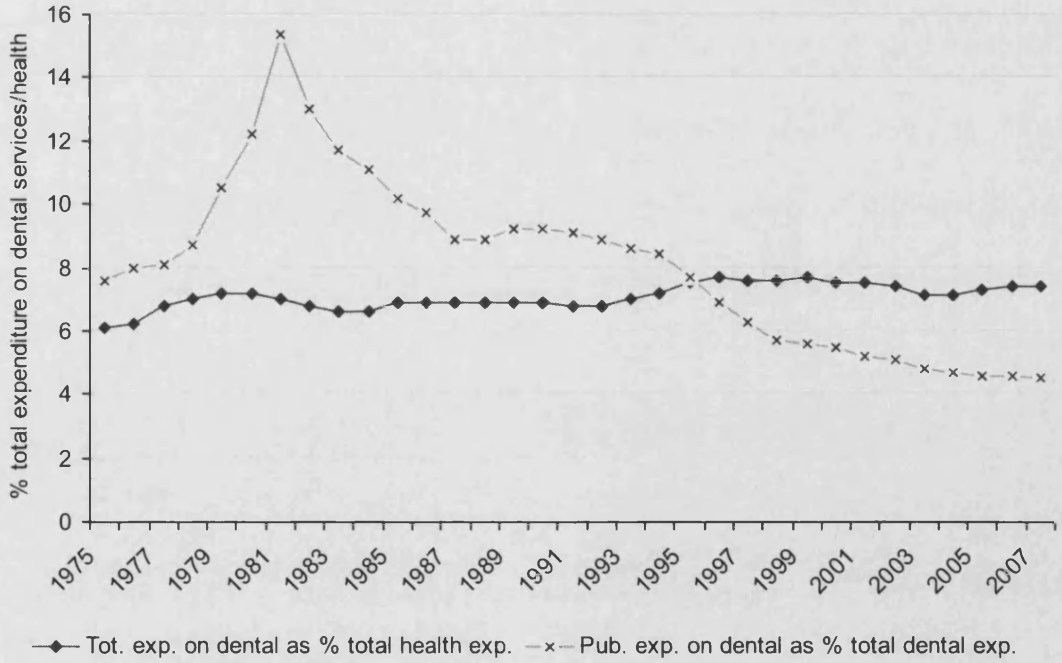
services, a case can be made for ensuring individuals in need of dental care do not confront financial barriers to their access. There is evidence that, although oral health problems are not life threatening, they can have a significant impact on health and well-being (Petersen, 2003), and that dental care can improve oral health (Guay, 2006; Sintonen & Linnosmaa, 2000). Furthermore, studies have consistently demonstrated that there exist inequalities in oral health: lower income groups, new immigrants and those without dental insurance consistently report poorer oral health status than those with higher income, dental insurance, and non-immigrants (Brodeur, Payette, & Bedos, 1998; Leake & Main, 1996; Locker & Matear, 2001). These findings imply that there is some reason to be concerned with dental utilisation patterns among these population groups.

Dental costs may prevent individuals with low income from using services. Studies have documented the effects of dental costs on utilisation, in particular among those with lower income. In the United States, the Rand study demonstrated that individuals were sensitive to the price of dental services; there was a strong negative effect of co-insurance on dental expenditures (Manning, Bailit, Benjamin, & Newhouse, 1985). Since then, studies from high-income countries have also shown a strong income effect on dental service utilisation, for example, in Sweden (Wamala, Merlo, & Boström, 2006), Greece (Zavras, Economou, & Kvriopoulos, 2004), the United Kingdom (McGrath, Bedi, & Dhawan, 1999), Finland (Nguyen & Häkkinen, 2004), the United States (Manski & Goldfarb, 1996), and Canada (Bedos, Brodeur, Benigeri, & Olivier, 2004; Kosteniuk & d'Arcy, 2006; Millar & Locker, 1999).

The concentration of dental service use among the rich, coupled with the significant effect of insurance on dentist utilisation, to some extent reflects recent trends in

financing dental care in Canada. The level of the public contribution to finance dental care has declined since its peak in 1982, yet total dental costs have risen as a proportion of total spending on health (Figure 6.1). The peak in public funding corresponds to the introduction of programmes to subsidise dental costs for school children in the 1970s and 1980s in most provinces (the first such programme was in Saskatchewan, followed by British Columbia, Manitoba, Québec, Nova Scotia, and Prince Edward Island), and for seniors (in Alberta and the Northwest Territories) (Leake, 2006; Marchildon, 2005). The subsequent decline in the public role reflected the dismantling or reduction of such programmes; cost containment was prioritised in a time when provinces were faced with struggling economies and reduced federal funding.

Figure 6.1 Trends in dental expenditure in Canada, 1975-2007: total expenditure on dental care as a proportion of total health expenditure, and public expenditure on dental care as a proportion of total dental expenditure



Source: OECD, 2008.

Currently, much of the public funding for dental care comes in the form of tax exemptions for employment-based dental insurance premiums [33]. This regressive

system of tax exemptions for private insurance contributions rewards the most affluent. Therefore, substantial subsidies for dental care are directed to the higher income earners (which has the effect of enabling utilisation for these groups), although there is little support for those on lower income. This public support for dental services for the higher income groups is inequitable; arguably, it is also inefficient, because the subsidy does not account for the effectiveness or cost-effectiveness, of the services that are being subsidised.

In addition to this public subsidy through the tax system, the remainder of public funding is directed to a patchwork of programmes subsidising dental costs for children and low-income families. These programmes are fragmented, for example, in one health region in Alberta, there are 17 different options for public subsidy for children, social assistance recipients, veterans and Aboriginals[34].

Would a national publicly funded dental programme reduce the level of inequity in dental care? A proposal such as this is not new. For example the 1964 Royal Commission on Health Services recommended the incremental implementation of children's and maternal dental programmes in addition to funding dental care for social assistance recipients (Canada, 1964). Also, Evans and Williamson advocated for a

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[33] Estimates of the public expenditure on services covered by private insurance (mostly dental costs and prescription drugs) in the form of foregone taxes were roughly £3 billion in 1994 (Smythe, 2001), which is equivalent to about 4% of total health spending that year.

[34] For example the Alberta Child Health Benefit covers routine dental services for children under the age of 18 in low-income families, Calgary Health Region Community Dental Clinics offer reduced dental fees for children and adults with limited income and no insurance based on income and family size, and Alberta Adult Health Benefit covers basic services for pregnant women, disabled people with eligibility based on income. More information can be found here: http://www.calgaryhealthregion.ca/programs/dental/pdf/how_to_get_dental_tx_guide2007Oct.pdf (Accessed June 2008)

public school-based children's dental programme on the basis that this programme would not only have the greatest potential for increasing utilisation rates among the non-users and hence improving oral health, but it would also enable the increase in the use of dental auxiliaries to improve efficiency in delivery (Evans & Williamson, 1978). They contrasted this proposal to a universal plan that they argued would have little impact on utilisation, it would perpetuate the existing inefficiencies, and it would increase the public subsidy for the relatively higher income groups who consume the largest proportion of dental care. Some evidence suggests that the targeted use of public funding, such as in the case of Nova Scotia's children's programme, can achieve a more equitable distribution of dental service utilisation (Ismail & Sohn, 2001). Municipal programmes that are in place in other provinces, such as in Ontario in the city of Toronto, have not been systematically evaluated, although apparently they have been unsuccessful in meeting the needs of the uninsured population (Toronto Public Health, 2008). Therefore, some proposals have been put forward to develop a province-wide policy on access to dental care in order to standardise the services covered under the current government-funded programmes, and to include dental services in the list of primary health care services that are provided by community health centres and by other agencies that deliver services to the working poor and other marginalised groups (Toronto Public Health, 2008). To provide some evidence to support these and other policy recommendations, additional research could empirically assess the potential impacts of the different policy options, it could identify the causes of inequity, and it could improve the measurement of needed dental care.

6.2.1.2 Future research on equity in dental care

Inequity is higher in dental care utilisation than the other three health care sectors; this relates to the heavy reliance on private funding for dental services. It also relates to the nature of the services themselves, since many could be characterised as cosmetic or not clinically essential. However the data that are currently available do not enable us to distinguish between essential and non-essential dental services.

There is evidence that dental care improves health (Guay, 2006; Sintonen & Linnosmaa, 2000); therefore, there are reasons to be concerned with the distribution of dental services in the population. However, not all dental services are health-improving. Since the widespread fluoridation of the water supply in urban areas and the use of fluoride toothpaste, oral diseases have declined significantly over recent decades in high-income countries (Nandanovsky & Sheiham, 1995). This decline has led to a corresponding decline in the need for dentists; to some extent, dentists have responded by redefining dentistry towards more cosmetic care. Since these cosmetic services are not clinically essential, policy makers are not concerned with the extent to which utilisation is determined by ability to pay. (Similar arguments have been made for health services that are not needed or effective in improving health; e.g. (Culyer, 1993)). Further research is needed to determine the level of inequity in needed services versus cosmetic services; research is also needed to measure the contribution of non-essential services to the current estimates of inequity in overall utilisation.

The design of the relevant questions in the available surveys currently does not permit such analyses. The question in the CCHS that was asked of all respondents, and that was analysed in this thesis (in Chapter 3), referred to the number of visits that were

made to a dentist or orthodontist in the past 12 months. Visits to a dentist and to an orthodontist should be separated; arguably, orthodontic services more often are directed towards cosmetic, and less clinically essential, services (e.g. expensive braces to correct imperfections in the alignment and appearance of the teeth). It is possible that the orthodontic services increased the estimate of inequity. Supplementary survey modules on dental care and oral health were available in the CCHS from 2003 (wave 2.1) only for two provinces (British Columbia and Ontario). These supplementary questions to some extent allowed the separation of preventive services and emergency services, but they did not include information on the use of cosmetic services, such as tooth whitening. Also, there is no information on how much money was spent on dental care. If the Survey of Household Spending, which includes information on the amount of money a household spent on dental services, could be linked to the CCHS, it would be possible to measure the average intensity of the visits.

Since dental services are not publicly funded (with the exception of emergency dental care delivered in hospitals), it is not possible, as it is with hospital and physician services, to link survey with administrative claims data. Collaboration with insurance companies to access claims data would be one possible route to addressing some of these questions.

A final concern with the policy relevance of the current research on dental care is that the ability to measure individuals' need for dental care is limited with the existing surveys. Some services are preventive, and, therefore, would be needed by the entire dentate population. For other services, self-assessed poor oral health may not necessarily indicate need for dental care. For example, an individual with fewer teeth may have less need for dental care, but would report his oral health as poor. In this

thesis I relied on self-assessed oral health that was measured in five categories (as for self-assessed health) to approximate need for dental care. However, this indicator does not always appear to be a prompter of dental service use: poor self-assessed oral health is negatively associated with the probability of visiting a dentist, and it is positively associated with the conditional number of dentist visits. There has been very little investigation of the validity of this indicator, as has been done extensively with its health counterpart. The supplementary oral health component of the CCHS completed by respondents in Ontario and British Columbia included a greater number of potential needs indicators, such as mouth pain, bleeding, and ability to chew. However, even the inclusion of a wider range of needs indicators did not affect the estimates of inequity (Grignon, Hurley, Wang et al., 2008). Therefore, it may be more useful to disentangle the preventive or emergency dental care from the measures of dental utilisation as opposed to developing better indicators of need. This approach will enable us to identify the population groups who receive fewer needed services than other, likely more socioeconomically advantaged, groups. Public subsidy of needed dental care could then be directed towards these groups.

6.2.2 Prescription drug coverage in Canada

6.2.2.1 Policy context

The findings from this thesis have implications for the policy debates about funding prescription drugs in Canada. First, the analyses demonstrated that there was a significant independent effect of holding either public or private prescription drug insurance on individuals' decisions to visit a physician, in particular for those visits that were likely to have arisen from an acute condition. Second, I found that inequity in the likelihood of visiting a GP partly could be explained by private insurance; individuals

with higher income were more likely to have private prescription drug insurance and were also more likely to have visited a GP. Third, some of the variations in income-related inequity in physician use across provinces appeared to be related to differences in the contribution of prescription drug insurance. This evidence raises the question: would better integration of prescription drugs into the public insurance system help policy makers to achieve equity goals?

The funding of prescription drugs is unique; unlike the funding of hospital and physician services, there is a significant private role in funding prescription drugs, which comes in the form of private insurance and out-of-pocket payments. The reimbursement of the costs of prescriptions drugs outside hospital is not mandated by any federal legislation, such as the Canada Health Act; this Act refers to physician and hospital costs, and the provinces are, therefore, left to establish and fund their own public programmes. The lack of a comprehensive national pharmaceutical strategy can be attributed to long-held fears of rapid cost increases. There is relative consistency in the breadth and depth of public plans for prescription drugs across the provinces, although, there are some differences in the eligibility criteria and the cost sharing arrangements. Moreover, there is a lack of portability of public prescription drug plans across the country. Individuals who are covered by a provincial prescription drug plan likely would lose their benefits if they moved to another province, and they would face a three month wait period before they would become eligible for public coverage in the new province (Applied Management in association with Fraser Group and Tristat Resources, 2000a).

This policy context gives rise to at least three potential sources of inequity. One is the possibility that individuals are uninsured. The uninsured face the full cost of

prescriptions (up to a certain limit, since in most provinces there is some form of catastrophic coverage), which could deter both the use of and adherence to prescription medicines, and also the decision to visit a physician. The second source of inequity is the possibility that individuals are under-insured, such that the cost sharing arrangements of their public or private insurance plans act as financial barriers to these same services. The third source of inequity is the potential for individuals to face different cost barriers depending on which province they reside in, because of different eligibility requirements for public plans and different levels of cost sharing.

With regards to the problem of un- and under-insurance, there have been some studies that have estimated the proportion of Canadians who are not well insured against the cost of prescription drugs. One such study suggested that 2% of the Canadian population had no protection against severe drug expenses (as defined by expenses that exceeded $5000 per year), and 10% were only partially protected (Fraser Group/ Tristat Resources, 2002; Paris & Docteur, 2007). Another study estimated that 10% of the population were without insurance for prescription drugs and a further 10% had inadequate coverage (Applied Management in association with Fraser Group and Tristat Resources, 2000b). The lack of financial protection was found to be disproportionately in the Atlantic provinces. Even though the majority of Canadians have some form of insurance for prescription drugs, the average Canadian family is estimated to spend over $1200 per year on prescription drugs (Canada, 2002a). This estimated out-of-pocket expenditure likely is closer to zero for the young and healthy population groups, but it would be considerably higher for those with chronic diseases that are not included in a provincial disease-based public insurance plan. Also, a study of pharmaceutical expenditures showed that in the second half of the 1980s, at a time when public insurance programmes were more generous than at present, per capita out of pocket

drug expenses of higher income households were actually lower than those of lower income households, both in absolute terms and as a proportion of income (Lexchin, 1996).

Inadequate insurance for prescription drugs disproportionately harms the more vulnerable population groups who are less able to pay for the costs of medicines in the case of being uninsured, and less able to cover the co-payments in the case of being under-insured. The public health system in Canada that provides universal first-dollar coverage of the population to a comprehensive basket of physician and hospital protects the majority of the population from the costs of falling ill. However, there are some groups that may disproportionately face barriers to accessing health care, such as the homeless, Aboriginal peoples, and the 'working poor'. The working poor refer to those who have incomes that are too high to qualify for full public subsidisation of prescription drugs (through qualification for social assistance) but are not employed in sectors that offer drug insurance benefits. There appears to have been a growth in 'non-standard' employment and 'vulnerable workers' in Canada in recent years, which may have increased the number of uninsured. Vulnerable workers are characterised by low pay (less than 10$/hour in 2005 prices), and poor access to rights, benefits and supports (Saunders, 2008). They are unlikely to be covered by any extended insurance plans (covering prescription drugs outside hospital, rehabilitative services outside hospital, vision care, and dental care). Non-standard employment, i.e. not being a full-time employee with a single employer of indefinite duration, has increased to almost 40% of total employment; and some of these may include vulnerable workers (Saunders, 2008). These are the populations who likely would benefit from an extension of public prescription drug insurance programmes; the potential benefits would include an improvement in adherence, a removal of indirect barriers to physician care, and a

reduction of the financial burdens of ill health. Moreover, extended public coverage would reduce the perverse incentives that some individuals currently face, whereby they may choose not to seek employment in order to maintain their drug coverage (the 'benefits trap'). The challenges facing the more vulnerable workers likely would increase in periods of economic recession and high levels of unemployment.

The third source of inequity is the potential for individuals to be treated differently across provinces. The mix of public and private funding for prescription drugs and the arrangements for public insurance plans differ across the country. The lowest reliance on private funding is in Alberta (41% of total prescription drug expenditure was private in 2005) and the highest is in the Atlantic provinces: 56.5% in New Brunswick, 54% in Newfoundland and PEI, 51% in Nova Scotia (Canadian Institute for Health Information, 2008). These differences in spending correspond to variations in the systems of public coverage for prescription drugs, including different levels and types of cost sharing; the Atlantic provinces provide the least generous public coverage in the country (Anis, Guh, & Wang, 2001; Coombes, Morgan, Barer, & Palgliccia, 2004; Demers, Melo, Jackevicius et al., 2008; Grégoire, MacNeil, & Skilton, 2001; Grootendorst, 2002; Grootendorst, Palfrey, Willison, & Hurley, 2003; Millar, 1999). One study that examined the variations across provinces in the level of out-of-pocket payments required for individuals in different health and demographic scenarios led the authors to conclude that "prescription drug reimbursement in Canada is manifestly unequal" (Demers, Melo, Jackevicius et al., 2008, p.409). In sum, not only do individuals in similar income and age groups face different levels and options for coverage across the country, but also there is considerable heterogeneity in coverage within provinces.

These equity implications are compounded by the increasing importance prescription drugs are playing in the health system. Pharmaceuticals currently represent the second largest category of health spending in Canada, the first is hospital spending (Canadian Institute for Health Information, 2008). Drugs constituted 9.5% of total health care expenditure in 1985 compared to 16.8% in 2007. The rising cost of prescription drugs has been attributed to increased utilisation (accounting for over half of the rise in spending) in addition to changes in therapeutic choice, and less attributed to increases in drug prices (Morgan, 2004), similar to analyses from the province of British Columbia (Morgan, 2002; Morgan, Agnew, & Barer, 2004). Also the majority of prescription drug expenditure is concentrated among five therapeutic classes (Morgan, 2004). At the margin, however, it is important to consider the implications of high-cost hospital-administered cancer drugs for both cost concerns and also equity (Richards, 2008).

The variability across provinces and fragmentation of funding within provinces has prompted calls for a national approach to "pharmacare" to establish uniform standards of coverage across the country (see Appendix 6A for more information). A programme to fund prescription drugs that was parallel to Medicare would arguably improve equity in access to medicines in addition to distribute the burden of costs more equitably (Evans, 2005). The policy options are not straightforward; though some lessons can be learned from the experiences in provinces that have introduced 'universal' prescription drug programmes, further research is needed to assess the potential benefits and challenges to equity goals that would be associated with the different options.

6.2.2.2 Future policy-relevant research on prescription drugs and equity

The challenge of reforming the system for financing prescription drugs is one of the mostly widely discussed policy issues in Canada at present. In recent years, several proposals have been put forward to provide better protection for Canadians from the financial burden of prescription drug costs, and to harmonise the funding arrangements across the provinces (see Appendix 6A). Studies have documented a significant effect of insurance status on prescription drug expenditure and utilisation (Gemmill, Thomson, & Mossialos, 2008; Lexchin & Grootendorst, 2004a; Stabile, 2002). This thesis supports previous research by demonstrating an enabling effect of prescription drug insurance coverage on the decision to see a physician (Stabile, 2001), an effect that appears to be stronger among those with lower income (Stabile, 2002), and with no chronic conditions.

As outlined above, this policy context gives rise to at least three sources of inequity: the possibility of being uninsured, the possibility of being underinsured, and the provincial variations in financial burden. There are some questions that remain unanswered that can be empirically tested in order to inform the policy debate surrounding the funding of prescription drugs and equity in the health care system. What population groups are uninsured or under-insured? What would the equity impact be of extending current insurance plans to additional population groups or of reducing cost sharing for those with insurance?

Studies have been conducted to identify the population groups who are at greater risk of being uninsured. However, further evaluation of the existing provincial plans that aim to be universal in Québec, British Columbia and Manitoba could provide some insight

into the possible methods to increase coverage. These experiences of implementing universal prescription drug insurance have been evaluated, however further research is needed to assess the equity impacts of these reforms. Québec was the first province to implement a prescription drug programme that covers the entire population with the aim "to ensure that all persons in Québec have reasonable and fair access to the medication required by their state of health" (Éditeur officiel du Québec, 1996). It has been described as a public-private social insurance scheme (Marchildon, 2006). The law states: that all residents are legally obligated to have some form of drug insurance coverage, either through the public insurance agency or a private insurer; that all insurance plans must cover the drugs listed in the provincial formulary; that no insured can pay more than $881 per year for drug costs; and co-insurance cannot exceed 29% of drug costs (Pomey, Forest, Palley, & Martin, 2007). With the exception of low-income seniors, social assistance recipients and children, all publicly insured share the cost of medicines through income-rated premiums, deductibles and co-payments. As in Québec, all residents of Manitoba are eligible for the public drug benefit programme (although take-up is not legally mandated) with an income-based deductible (except for social assistance recipients who have full coverage). Most recently, British Columbia shifted from an age-based to an income-based prescription drug insurance programme, called "Fair PharmaCare". This reform aimed to reduce programme spending, to improve fairness by allocating subsidies on the basis of ability to pay, as opposed to age, and to improve equity in finance and access (Morgan & Coombes, 2006).

In Québec, even ten years after the programme had been introduced, "many Quebecers are still unaware that they have to sign up for public prescription drug insurance coverage" (Pomey, Forest, Palley et al., 2007, p.486). Also, registration in the British Columbia income-based public plan has not reached 100% of the population, with early

figures showing that, by the end of 2004, 78% of households had registered, and enrolment was much higher for seniors (95% of senior households) than for non-seniors (73%) (Hanley, Morgan, Hurley, & van Doorslaer, 2008). Further research is needed in at least three areas: a) to determine which population groups continue to remain uninsured in these provinces, b) to assess the effectiveness of initiatives to increase enrolment; and c) to measure the impact of an increase in registration with the public programmes on equity in access to medicines and other health services.

If residents in these provinces completed the optional insurance module of the CCHS, or if insurance questions were again included in the NPHS, as in past years, some of these questions could be empirically tested. Also, more in-depth analysis of existing data sources could also provide an indication of which population groups who are eligible for public insurance are not aware of this eligibility. A study based on the 1996 NPHS found that where deductibles or premiums were in place in public plans for seniors, there was a greater misreporting of insurance coverage (Grootendorst, Newman, & Levine, 2003). In the context of less generous pubic drug insurance, therefore, some individuals may behave as though they were uninsured. In Ontario, not all seniors, who are automatically eligible, reported having insurance for prescription drugs in the national surveys. Further research is needed to investigate who these individuals are. One possibility would be to use linked survey data and administrative data from the public insurance programme to investigate the medicine consumption patterns among those who are aware of their coverage (and hence report themselves as covered) versus those who are not. Not only is it important to identify who these individuals are, but also to evaluate different approaches of informing the population (e.g. media campaigns, mailings). Moreover, studies could investigate whether informing individuals of their eligibility would increase their use of medicines and

whether it would also increase the likelihood of visiting a physician when they experience illness.

With regards to the question of the equity impact of increasing or decreasing coverage, there is some existing evidence on the impact of such changes on some population groups. In particular, the literature that has estimated the effects of costs on the demand for medicines has been extensive (Alan, Crossley, Grootendorst, & Veall, 2002; Gemmill, Thomson, & Mossialos, 2008; Lexchin & Grootendorst, 2004b). However, further research could be undertaken to examine the equity impacts of the different policy options for provincial or national prescription drug plans. For example, what are the equity impacts of restricting coverage for previously comprehensively covered populations? The process of universalising prescription drug plans in some provinces did not remove financial barriers, and co-payments and deductibles have undermined the equity gains. Provinces that introduced universal insurance programmes faced the usual trade-off between the policy objectives of equity and cost containment; therefore, instead of providing first-dollar coverage for the population, there was a sharing of costs between individuals (with premiums, deductibles, etc) and the provinces. For some groups, there was actually a move away from first-dollar coverage.

Literature reviews have demonstrated that, in general, individuals are sensitive to the price of medicines; few studies have also shown some negative effects on health as a result of reduced consumption of medicine (Gemmill, Thomson, & Mossialos, 2008; Lexchin & Grootendorst, 2004b). In the Canadian context the effect of increased cost sharing among social assistance recipients and seniors in Québec, who had previously contributed very little (a maximum annual ceiling of $0 rose to $81 for the former and $100 to $240 for the latter), was to lower expenditure on medicines (Contoyannis,

Hurley, Grootendorst, Jeon, & Tamblyn, 2005), to lower consumption of prescription drugs by the poorer and sicker populations, and to increase rates of emergency hospital service use and adverse events (Tamblyn, Laprise, Hanley, Abrahamowicz, Scott, Mayo et al., 2001). However, another study of this same policy change found that there was no impact of this increased cost sharing on mortality or readmissions for complications among a specific population group that was over 64 years and who had experienced a heart attack (Pilote, Beck, Richard, & Eisenberg, 2002). Studies of the impact on equity in use of medicines and other services, however, have not been conducted.

Also, in Manitoba individuals appeared to remain sensitive to the cost of drugs after the introduction of an income-based prescription drug insurance programme. After the change in policy from a fixed annual deductible plus 40% co-insurance to income-based deductible and no further cost sharing, analyses showed that children in all income groups but the lowest income quartile significantly decreased their use of inhaled corticosteroids for the treatment of asthma, but those with full coverage (i.e. receiving social assistance or part of a treaty First Nations prescription programme) had no change (Kozyrskj, Mustard, Cheang, & Simons, 2001). Also, rates of treatment remained lower for children from lower-income families than for children from wealthier families (Kozyrskj, Mustard, & Simons, 2001); and an individual's perceived adequacy of income was found to be an important predictor of filling at least one prescription among older people living in urban (but not rural) areas (Carrie, Grymonpre, & Blandford, 2006). However, the extent to which individuals who perceive the costs of drugs to be too high are also not visiting a physician when needed has not been studied.

The design of a cost sharing policy will have an impact on consumption patterns. One study of seniors in Nova Scotia, who were all beneficiaries of the public prescription drug programme, found that the effect of an increase in costs (a shift from a $3 co-payment to a 20% coinsurance) diminished as they became closer to reaching their annual out-of-pocket spending limit (Kephart, Skedgel, Sketris, Grootendorst, & Hoar, 2007). Also, they found that the increased cost to the patient had a greater effect on the quantity of medications consumed, and not on the likelihood of consumption.

In light of the evidence that even modest cost sharing could prevent some individuals from accessing needed care, policy makers recently sought to remove cost barriers for a greater number of more vulnerable populations in Québec. In this province, in 2007, they extended the 1999 law that had exempted all of those who are "unfit to work" from user charges to protect a greater number of low-income individuals who were insured by the public programme (an estimated 13% of the total population)[35]. Research is needed to assess the impact of this expansion on use of medicines and other services.

One study found that in British Columbia the change in prescription drug insurance policy had apparently little measurable impact on access to medicines (Caetano, Raymond, Morgan, & Yan, 2006), unlike the effect of increasing cost sharing for certain population groups in Québec on the use of medicines. The authors measured access as the proportion of the population that was dispensed medication before and after the policy change, and they focussed on commonly prescribed medicines that would be used over long period and indicated for sub-clinical risk factors (Caetano,

[35] The purpose of this bill is to provide free access to medication for all recipients under a last resort financial assistance program, all persons 60 years of age or over and less than 65 years of age who hold a claim booklet, and all persons 65 years of age or over receiving 94% or more of the maximum amount of the guaranteed income supplement.

Raymond, Morgan et al., 2006). They did not find statistically significant changes in access after the policy change; there was no difference in the rates of treatment initiation across the different age and income groups in 2002 and 2003. However, this study only tackled one dimension of access; further analyses of equity in the use of medicines (including adherence) are needed to empirically assess the effect of the pharmaceutical insurance reforms on access to medicines across different age, income, and other population groups.

Studies of the impact of the reform in British Columbia on equity in financing showed that, although overall regressivity decreased[36] (Hanley, Morgan, Hurley et al., 2008), average private payments for drugs as a proportion of income rose for all households, across all age and income groups, and even for low-income seniors and non-seniors (Hanley, Morgan, & Yan, 2006). These findings would suggest that there may be a possible effect of the policy change on medication and physician use among those who are sensitive to price.

The evidence above highlights the importance of protecting individuals who are most sensitive to the price of medicines, even if that price is relatively low. These individuals may not visit their family physician when they fall ill because of the expected costs of these medicines. These costs may stem from a lack of insurance, or they may result from explicit cost sharing arrangements in the form of deductibles, co-payments or co-insurance. Moreover, if patients do visit their physician they may be less likely to fill a prescription or follow the full treatment course because of the costs (Brand, Smith, &

[36] Payments are regressive if they represent a greater proportion of income for lower-income earners than for those with higher income. The authors measured regressivity based on the Kakwani Index and found that this index changed from -0.118 to -0.087 (less regressive), due to the fact that out-of-pocket payments became more closely linked to ability to pay (Hanley, Morgan, Hurley et al., 2008).

Brand, 1977). Along with a comprehensive insurance plan that does not require administrative hurdles to registration, information campaigns are needed to ensure individuals are aware of the benefits they are entitled to, in addition to waiving co-payments for the most vulnerable groups as is the case in Ontario[37]. Even when co-payments are relatively small, there may be negative impacts on equity, for example, with regards to reduced adherence to treatment (Poirier, LeLorier, Page, & Lacour, 1998).

In addition to the above suggestions, such as extending the prescription drug insurance questions of existing surveys to all the provinces, including additional survey questions would help address some of the research questions identified in this section. For example, surveys could include questions about the previous GP visits they report having made, whether they received a prescription, how many, and for what conditions (specific illnesses, acute versus chronic). Furthermore, additions to the existing questions of unmet need could disaggregate by the specific health care contact that was needed, and then ask the reason for not visiting a physician when needed. Among the possible answers could be the cost of medication. These suggestions would go some way towards improving our understanding of the mechanisms behind inequity in the public system.

[37] In Ontario, individuals aged 65 or over who are not on low income (with a household income greater than $16,000 if single and $24,000 if a couple) have an annual deductible of $100 and co-payment *up to* $6.11 per prescription. If low income, they *may have to pay* $2 per prescription and no deductible (to get this status they have to fill out a form at the pharmacy).

6.2.3 Waiting times: a source of unmet need and dissatisfaction

6.2.3.1 Policy context

Lengthy waiting presents an important policy challenge. International evidence suggests that Canada has relatively long waiting times compared to other OECD countries (Siciliani & Hurst, 2004), although, recently, some efforts have been made across the provinces to reduce waiting times. For example, following the First Ministers' Health Accord of 2004, waiting time reduction was prioritised, and benchmarks were established, in five clinical areas: cancer, cardiac care, diagnostic imaging, joint replacement, and sight restoration. This Accord was accompanied by substantial federal funding that was earmarked for waiting time reduction in the specific areas of hip/knee replacement, cataract removal, radiation therapy, MRI and CT scanning, and coronary bypass surgery. Some progress has been made in these areas, although more needs to be done to ensure that the methods of collecting and reporting waiting times data are more consistent across provinces (Canadian Institute for Health Information, 2006b). The most visible outcome of lengthy waits was the recent Supreme Court challenge by a Québec resident, who had waited for 12 months for a hip replacement, and his physician, Dr Jacques Chaoulli. The Supreme Court ruled (by a four-to-three majority) that the Québec government's ban on private health insurance for hospital and physician services violated the Québec Charter of Human Rights and Freedoms. The legal and policy implications of this Supreme Court decision have been extensively debated (Flood, Roach, & Sossin, 2005).

Patients can be required to wait for care at several possible stages in the care pathway. One conceptualisation of waiting times suggests the following stages (Thind, Thorpe, Burt, M, Reid, Harris et al., 2007). A patient who develops symptoms and decides to

see a family physician will have to wait for an appointment (wait #1). After a consultation with a family physician, a patient may be referred for specialist care, and, thus, will have to wait for the appointment with a specialist (wait #2). Following the consultation with a specialist, the patient may need to undergo surgery or other specialised procedures (wait#3). Also, for emergency care, individuals must wait to be treated in the emergency room of a hospital.

Waiting to access health care interventions can be detrimental for several possible reasons. In some cases, waiting too long can increase the risks of adverse clinical events and it can reduce an individual's capacity to benefit from future interventions. Waiting can also increase a patient's stress, and can prolong pain and disability. Prior research has documented that there are numerous adverse effects that patients can experience while waiting for care, including pain and limited mobility (Hajat, Fitzpatrick, Morris, Reeves, Rigge, & Williams, 2002; Mahon, Bourne, Rorabeck, Feeny, Stitt, & Webster-Bogaert, 2002; Williams, Llewelleyn-Thomas, Arshinoff, Young, & Naylor, 1997), and stress (Bengston, Herlitz, Karlsson, & Hjalmarson, 1994).

From an equity perspective, it is important to assess whether there are differential waiting times across socioeconomic groups. It is possible that individuals with the same clinical diagnoses and level of severity, but in different socioeconomic groups, may have different waiting times. The evidence of inequity in waiting times, however, is limited. Measuring and analysing waiting time data is fraught with difficulties, not least because of the variability in the estimates of waiting times in Canada. This variability stems from a lack of a standard definition of when waiting starts, such as at the first GP visit, at the time the treatment decision was made, at the time the facility was booked, or at the time of the last consultation before surgery (Sanmartin, Shortt,

Barer, Sheps, Lewis, & McDonald, 2000). Most research on waiting times has relied on subjective reports using survey data, although some disease-based analyses (for example, studies of patients who suffered from stroke) using administrative data have found some evidence of longer waits for patients residing in lower income neighbourhoods (Kapral, Wang, Mamdani, & Tu, 2002).

One study that made use of the health care access survey supplement to the CCHS found that there were some variations in reported waiting times across provinces, although they found that there was no relationship between income and reported waiting time for specialist visits (Sanmartin, Pierre, & Tremblay, 2006)[38]. A study on the delivery side found that waiting times to see a family physician appeared to vary across physicians (Thind, Thorpe, Burt et al., 2007). Waiting times were reported to be longer for physicians who were female, involved in teaching, working part-time, and serving a population in a small town or rural and isolated communities. Some preliminary results of a study of patients who were recently diagnosed with congestive heart failure pointed to some variations in waiting times, and the frequency of specialist consultations, across socioeconomic groups: referrals to cardiologists were greater, and waiting times were shorter, for the higher socioeconomic groups (Feldman, 2008).

One potential source of inequity in waiting times is the system of workers compensation. If an employee is injured at work, the associated health care costs may be borne by the parallel insurance system, and the waiting times may be lower, than if someone is injured outside of work and hence the costs are covered by the provincial system. The workers compensation board is a system of social insurance that has

[38] The finding that waiting times do not differ across socioeconomic groups has also been found outside Canada, for example in Norway (Arnesen, Erikssen, & Stavem, 2002), and for elective surgery in the United Kingdom in 2006 (Cooper, McGuire, Jones, Hart, & Le Grand, 2008).

financed health care for employed individuals who have work related injuries or illness since the early 1900s (Hurley, Pasic, Lavis, Culyer, Mustard, & Gnam, 2008). The boards finance health care to restore an employed person's health so that he or she can return to work. They also pay for disability benefits and vocational rehabilitation to help the employee find alternative employment, if needed. The boards provide some services directly, such as rehabilitation, in their own facilities; however, for physician and acute hospital care, the boards usually contract with providers in the public insurance system (Hurley, Pasic, Lavis et al., 2008). Lower waiting times for patients in this parallel system may result from the stronger incentives that are faced by the workers compensation boards to provide expedited care for their workers (Hurley, Pasic, Lavis et al., 2008). Further research is needed to evaluate the impact of this parallel system of funding on the achievement of equity goals.

Lengthy waiting times may not compromise clinical outcomes; however, they may reduce public confidence in the system and may lead to increased feelings of dissatisfaction (Lewis & Sanmartin, 2001). Waiting times have been identified as a key factor in determining patient satisfaction with care (Levesque, Bogoch, Cooney, Johnston, & Wright, 2000; Thompson & Yarnold, 1995). The Ontario Minister of Health recently recognised that access and waiting times were important sources of public dissatisfaction: "Reducing ER wait times and connecting patients to family health care will improve patient satisfaction and enhance confidence in Ontario's health care system" (Government of Ontario, 2008).

In Chapter 5 of this thesis, I found that the most prevalent type of subjective unmet need was related to waiting (either waiting times that were too long, or care was not available when needed). This reason for unmet need appears to have increased over the past

decade (Chen & Escarce, 2004; Wilson & Rosenberg, 2004). As I discussed in Chapter 5, it is not possible to separate this type of unmet need into that which would also be deemed unmet need by a clinician (i.e. the waiting time was longer than the clinical standards) and that which reflects an individual's dissatisfaction or unmet expectations. People who report wait-related unmet need are also using more than an 'expected' amount of health services; below, I suggest some areas for future research than can help us to understand the equity implication of this type of unmet need. The difficulty arises in the attempt to distinguish between unmet "needs" versus "wants" (Ministry of Health and Long-Term Care, 2006). I would argue that subjective unmet need that relates to waiting can be considered inequitable if a) the unmet need is not only perceived by the individual but also is clinically validated, and b) any observed 'over-utilisation' can be considered to be legitimate (i.e. if such overuse reflects unobserved needs in the utilisation models as opposed to personal preferences).

There are some reasons why we might presume unmet needs and 'overuse' are driven partly by individuals' preferences. In the empirical analyses of Chapter 5, there was a reduction in the extent of overuse after adjustment for some personal characteristics, such as the tendency for reporting unmet need that was unrelated to health care and general dissatisfaction with life. In addition, there appeared to be a positive correlation between reported wait-related unmet need and income; previous studies also showed these people were more educated. However, there may be some reasons to view subjective unmet need as clinically valid, because the underlying utilisation models cannot perfectly capture individuals' needs for health care and they lack information on the quality of health care that was received. Further research is needed to explore these possibilities.

Some support for the link between reporting lengthy waiting times and personal characteristics, such as higher education and dissatisfaction, can be found in the literature. Among patients (in Saskatchewan) who had undergone a hip or knee replacement within the past 12 months, the maximum length of time that they thought would be acceptable increased if they believed that they had been treated fairly, and increased as the actual time they had spent waiting for their surgery increased (Conner-Spady, Johnston, Sanmartin, McGurran, & Noseworthy, 2007). An analysis of the health care access survey supplement to the 2003 CCHS found that between 17% and 29% of patients who had waited for a specialist appointment considered their waiting time to be unacceptable, and less educated individuals were significantly less likely to report their waiting times to be unacceptable (Sanmartin, Berthelot, & McIntosh, 2007). Similarly, individuals with post-secondary education were more likely than those with less than post-secondary education to report that they faced difficulties in accessing routine care provided by a GP and intermediate care (care for minor non-life-threatening problems by a GP, walk-in clinic or emergency room) (Sanmartin & Ross, 2006). The authors proposed that differential expectations were likely to have played a role in explaining the education effect. Dissatisfaction with health care has also been shown to be lower among those with lower education (Sitzia & Wood, 1997).

It is likely that that subjective unmet need partly captures dissatisfaction and personal preferences, and partly reflects legitimate unobserved needs. To the extent that individuals reporting wait-related unmet needs are dissatisfied with the care they received, are better educated, and have higher expectations, policy makers need to ensure a clinically appropriate standard of waiting times to which patients can compare their experiences, and possibly also can adjust their expectations. These efforts may have the effect of increasing satisfaction, reducing 'unmet need' and increasing public

support for the system. More research is needed to better understand the different sources of unmet need and their equity implications.

6.2.3.2 Future research on unmet need and waiting times

In order to analyse the extent of inequity in waiting times (for example, by examining variations across population groups), we need to disentangle the mechanisms behind subjective unmet need due to waiting. Data are needed that combine administrative and survey data. One starting point for research would be to compare self-reported waiting times, and perceptions that waiting times are unacceptable, with actual waiting time data and clinical benchmarks.

Subjective reports of waiting times are currently available. One of the supplements to the CCHS incorporated some questions on perceived waiting times and perceived difficulties in accessing health care; however, this was only contributed by a subset of the population. Among these questions included: "How long did you have to wait between when you and your doctor decided that you should see a specialist and when you actually visited the specialist?" For those who had not yet seen the specialist, the question begins with: "How long have you been waiting?" Similar questions were asked with reference to non-emergency surgery and diagnostic scans. To assess the validity of patients' complaints, we need to have better information, such as from administrative data, about the patients' health care contacts.

Administrative data would enable researchers to measure utilisation more accurately than the crude indicators of utilisation that are available in surveys. Analyses that have relied on existing utilisation measures have neglected the unmeasured features of the

health care contact such as quality or appropriateness. Administrative data would also permit the measurement of the quantity of use for physician and hospital services with the dollar value of the services that were used. Besides dollar values, administrative records provide information on the specialty of the provider and the procedure that was delivered.

Linked administrative and survey data could extend the analyses to increase our understanding of the meaning of reported unmet need and its equity implications. By applying the methods that I used in Chapter 5 to linked administrative and survey (CCHS) data, it would be possible to examine whether positive residual utilisation (or more-than-expected utilisation) remains when more accurate measures of utilisation are available. This approach would empirically test the hypothesis that the increase in residual utilisation among those reporting wait-related (and "other") unmet need could be driven by inadequate utilisation measures in the underlying models. Moreover, since administrative data includes information on individuals' diagnosed health conditions and the services they received, we can investigate the extent to which higher 'unexplained' utilisation arose from the greater use of clinically necessary services (which would support the hypothesis of "unmeasured need") as opposed to the use of non-essential services (which would lend support to the "preference" hypothesis). Empirical support for the "unmeasured need" hypothesis would then suggest that subjective unmet need conveys some unmeasured information on health that is not directly observable through standard measures, such as general health status and reported chronic conditions.

Longitudinal analyses of linked administrative and survey (NPHS) data could also provide insight into the mechanisms that underlie reported unmet need. The analyses

that were conducted in this thesis suggest that there is a possibility that subjective unmet need captures unobserved characteristics of individuals; these unobserved characteristics may be related to need or to preferences. Longitudinal data would allow us statistically to control for unobserved individual heterogeneity. These data would also enable us to examine the dynamics between changes in individuals' health states on health care utilisation and the reporting of different types of unmet need. Further discussion of data issues and some suggestions for future research can be found in Section 6.3.

6.3 Methodological strengths and limitations

Chapters 3 and 4 of this thesis applied the now well-established econometric methods based on the concept of the concentration curve to the investigation of inequity and its contributors in the Canadian health system. Calculating a concentration index to measure inequity allows for, not only the identification of inequity, but a quantification of its extent, which permits comparisons across health care sectors and jurisdictions (Wagstaff, Paci, & van Doorslaer, 1989; Wagstaff, van Doorslaer, & Paci, 1991). The concentration index is a relative measure of inequality. This index measures the socioeconomic dimension of inequalities and it includes information on the whole socioeconomic distribution (i.e., the income distribution). This empirical approach also allows for a quantification of the contributors to inequity based on the variables included in the utilisation models, as I used in Chapters 3 and 4. Chapter 5 of this thesis explored the complementary role that subjective unmet need could play in understanding the reasons for inequity in the receipt of health services. It also revealed some of the limitations associated with the conventional methods to analyse inequity.

In addition to the limitations that were discussed in the separate empirical chapters, there are some general limitations with the methods that were used in this thesis that should be acknowledged. Many of these limitations relate to the use of survey data, such as the exclusion of some populations and potential recall bias (Section 6.3.1), the difficulties that are associated with the measurement of income (Section 6.3.2), the limitations with analyses of inequity in the hospital sector (Section 6.3.3), the challenges with the measurement of health care needs (Section 6.3.4), and the challenges associated with measuring the effect of supply and geographical barriers to access on utilisation (Section 6.3.5). I will discuss these limitations and I will also highlight some of the possible directions for future research that would build on the strengths of this research and would address some of the limitations. In this thesis, I chose to focus on measuring equity in the receipt of health care, as opposed to the more consequentialist view of equality of health outcomes; therefore, the final section explores some potential avenues for future research that would link these two equity goals (Section 6.3.6).

6.3.1 Limitations with survey data: excluded populations and recall bias

The analyses in this thesis were based on nationally representative survey data to examine three key aspects of equity in the Canadian context. I restricted the analyses to the ten provinces; therefore, the results of the empirical analyses cannot be generalised to the three Canadian "territories". Not only were the surveys that I relied on less representative of these regions, but also the challenges that policy makers in the

territories must face in achieving equity objectives are, arguably, different from the provinces.

Most surveys, by design, exclude certain population groups. Unless they are specifically targeted, these groups include homeless people, individuals living in institutions such as nursing homes and other long-term care facilities, those without a telephone, and Aboriginal people who live on reserves. These excluded populations represent a relatively small proportion of the Canadian population, however studies suggest that they would be more likely than the general population to experience barriers accessing health care (Hwang & Bugeja, 2000; Newbold, 1997; Shah, Gunraj, & Hux, 2003; Stark, 1992; Wright & Tompkins, 2005). The institutionalised population is comprised of older people in long-term care facilities, individuals in psychiatric institutions, and prisoners; these groups constitute a higher risk, typically lower socioeconomic profile population. Income-related inequity in the use of health services, as estimated in this thesis, may have been underestimated as a result of these exclusions. Also, the exclusion of institutionalised populations may have lead to sample selection bias toward healthier individuals with lower levels of health care utilisation. Again, this possible bias would have the effect of producing more conservative estimates of inequity.

Self-reported utilisation may be biased because of difficulties associated with recall. Surveys ask individuals to recall their experiences and contacts with health care during a period of time; in this study, the time period was the past 12 months. The accuracy of these self reports may be limited because of problems with recall. Some researchers argue that the self-reporting of physician visits may be unreliable (Jobe, White, Kelley, Mingay, Sanchez, & Loftus, 1990; Roberts, Bergstralh, Schmidt et al., 1996). It has

been suggested that recall accuracy for hospital visits is generally better than for physician contacts (Barer, Manga, & Shillington, 1982). Also, the RAND study showed that outpatient dental out-of-pocket expenditures were estimated more accurately with a 12-month recall than were physician expenditures (Marquis, Marquis, & Newhouse, 1976). However, using a one-year recall period is a common limitation of survey data. Problems with recall may be elevated for older age groups. One study found that reporting error in self-reported physician visits was relatively minor, although older people were more likely to underreport utilisation (Cleary, 1984). Another study that examined the recall of utilisation among people in their 60s found very little error in self-reported contact with a physician (i.e. the likelihood of a visit); they found a greater discrepancy between self-reported and archival data in the number of visits, in particular among the higher users (Glandon, Counte, & Tancredi, 1992).

What are the data requirements for future research on equity? Research on equity in the health care sector relies on the availability of comprehensive and reliable data. Ideally, there would be available survey and administrative sources that are linked at the individual level. Population health surveys should include information on the following indicators:

- health status, including general self-assessed health, specific questions on conditions, symptoms, and activities of daily living, and other quasi-objective measures such as diagnoses, weight, and height;
- objective health indicators through clinical examinations (these could be used to test the validity of self-reported indicators of health (Thomas & Frankenberg, 2000)

- 'vignettes' of health states to test for reporting bias (Section 6.3.4 discusses the methodological challenges that are associated with the measurement of need for health care);
- socioeconomic status, including all income sources, assets (e.g. home ownership and financial assets), educational attainment, employment status;
- details of individuals' health care contact (see below); and
- residence (post code), which would allow the researcher to calculate an individual's distance to the nearest health care facilities, and to include local-level supply characteristics.

Survey questions on utilisation could be improved in the following ways:

- by disaggregating the type of service, such as by asking the individual which type of specialist he consulted, whether the service was private or public, and where the contact took place;
- by capturing dimensions of an individual's subjective experience with health care, including indicators of accessibility, acceptability, waiting times, satisfaction, perceived quality, direct costs and non-use of health care, i.e. unmet need; and
- by including details of insurance status and benefits entitlements.

Survey data have the potential to provide comprehensive information on all these levels; however, administrative data may provide more accurate information on utilisation. Administrative data include information on the intensity of use, measured not just by number of visits, but by total expenditure; they also differentiate the types of services used (e.g. diagnostic tests received, day surgeries, referrals). Administrative data of utilisation also address the problems of recall bias (Palin & Zumbo, 2003), and cover

the entire population using health care, including those groups typically excluded or underrepresented in surveys.

However, administrative data have some important limitations. Information on an individual's need for health care (health status) is often based on physicians' diagnoses, and, therefore, it depends on the individual having had prior contact with the system. One assumption that underlies this approach is that individuals who did not contact the system did not have any need for health care. This is an important assumption that could easily be violated. Also administrative data provide a less comprehensive source of socioeconomic information than that which can be collected through surveys; typically socioeconomic status is inferred on the basis of geographical measures of income or deprivation (Section 6.3.2 discusses the challenges associated with the measurement of income with survey data). A recent study shows area-based income information has poor validity as measured by comparison to actual tax-validated income (Hanley & Morgan, 2008). The authors underscore that results of analyses such as those undertaken in this thesis are, indeed, sensitive to the choice of income variable. Moreover there is a possibility of ecological fallacy, where associations (e.g. between income and health care use) found at the aggregate level may not represent the associations at an individual level. Also measures of the experiences with health care, such as perceptions of quality and barriers to access, are only available through surveys. There is little or no information from administrative data sources on health care utilisation (or expenditure) outside of the public system, such as dental care, home care, and the large part of ambulatory prescription drugs.

Linked administrative and survey data, as used by Finkelstein (2001) to measure physician utilisation, benefits from the improved accuracy and detail of utilisation

information from administrative data with the comprehensiveness of socioeconomic and health indicators and subjective experiences from survey data. Administrative data would also permit some evaluation of clinical appropriateness (comparing diagnoses with treatments that were received. This would enable us to better understand the potential differences in the quality of care received by different population groups, even when the volume of care consumed is apparently equitable.

Data that are available on a longitudinal basis would permit an investigation of the trends and dynamics of inequalities over time. A long-term perspective provides useful information on links between outcomes and earlier experiences and behaviours, and on the dynamics between individual and family characteristics, the take-up of insurance, accumulation of assets, health status and health care consumption. With regards to the measurement of inequalities in health, it has been shown that using longitudinal data captures the mobility of individuals in their ranking according to their socioeconomic level (Hernández-Quevedo, Jones, López-Nicolás, & Rice, 2006; Jones & López-Nicolás, 2004). Longitudinal data also allows us to consider the possible endogeneity of needs variables in the health care utilisation models (Sutton, Carr-Hill, Gravelle et al., 1999). The distinction between an initial state of health and the final state of health after receiving health care is most often ignored (due to limitations of survey data to cross-sections) (Culyer, 1993). If the relationship between morbidity and utilisation is bi-directional, then the endogenous and exogenous effects could be corrected, to some extent, by including past health status. The bias of reciprocal causality that stems from the causal impact of health care contacts on current health status, however, appears to be minimal (Bago d'Uva, Jones, & van Doorslaer, 2007; Windmeijer & Santos Silva, 1997). I would argue that the way forward in this area of research is with combined

survey and administrative data, preferably on a longitudinal basis in order to test for some of these possible biases.

6.3.2 Limitations with measuring income, potential solutions

Measuring income is fundamental to the methods employed in this thesis to quantify and explain income-related inequity in the use of health services. Measures of income are needed that are reliable and comparable across individuals. However, as I noted in the empirical chapters, there are high rates of item non-response for income information in surveys: the CCHS has about 15-20% missing data on income. It is possible that there is income-related response bias, such that individuals with different levels of income have different likelihoods of responding. I would hypothesise that individuals on the lowest and highest ends of the income distribution would be less likely to report their income than individuals with levels of income that are near the population average. A study that compared the estimates of income yielded from survey, census and tax data in Canada showed that in the lower end of the distribution, the census (with a higher response rate) more closely resembled the tax data estimates of income than did the survey data (Frenette, Green, & Picot, 2004). Therefore, the results of the empirical analyses in this thesis may not be generalised to the lowest income groups. This limitation is most relevant in Chapter 3, because I excluded observations with missing income information for these analyses. Since I used the full microdata for Chapter 4, I was able to impute income in cases where this was missing. In Chapter 5, the analyses did not require the ranking of the sample by income, and, therefore, I was able to include a dummy variable to indicate that the estimate of income was missing.

When studies measure the effects of income on patterns of health care service use, there is an underlying assumption that variations in income reflect differing living standards. Therefore, in this thesis, I attempted to adjust household income by the composition of the household. As income is held constant and the number of household members increases, ability to pay does not decline proportionately; two people can live with about the same standard of living as one (Aronson, Johnson, & Lambert, 1994). One way to account for these differences in living standards is to apply the modified OECD scale, which counts the first individual as 1, each subsequent person aged 14 and over as 0.5 and each child under age 14 as 0.3. I made use of this approach in Chapter 4 that drew on the full microdata file.

In the Public Use Microdata file that is available to researchers outside of the designated Research Data Centres, which were used in Chapters 3 and 5, the data are recoded to preserve confidentiality and anonymity. For this reason, in the 2003 data release (Chapter 3), income data were grouped into five categories, depending on the size of the household. This equivalisation method presumes, for example that a household of between one to four individuals earning less than $10,000 is equivalent to a larger household with over four members earning less than $15,000, and that a household of one or two people earning more than $60,000 is equivalent to a household with three or more members earning more than $80,000. There are two limitations with this approach: first, the five categories reduce the level of variability in the information of income distribution; and second, the crude method of equivalisation may not accurately reflect living standards. In the 2005 public data release, (Chapter 5), income data were not equivalised, but were simply provided in five household income categories.

Since the income variable is integral to the measurement of inequity, it is important to test the sensitivity of the estimates of income-related inequity to the different income variables. Table 6.1 shows the estimates of inequity for three measures of income. The first is a continuous income measure that assigns the mid-point of the reported categorical income for individuals with missing continuous income; the second is a continuous income measure that predicts income based on a regression model on individual characteristics and reported income category (as in Chapter 4, Table 4.1); the third is a categorical income variable that is adjusted for household size following Statistics Canada methods (as above). There appears to be very little variation in estimates of inequity across the different income measures, although there are some exceptions. Analyses based on categorical income may overestimate the level of pro-poor inequity in hospital inpatient care by about 20%, and may underestimate the level of pro-rich inequity in the conditional number of specialist visits by about 50%.

Table 6.1 Comparison of estimates of income-related inequity in GP, specialist, hospital, and dentist utilisation in Canada in 2005 using three income measures

		Income ranking variable		
		Continuous: assigned based on mid-point of income category	Continuous: predicted based on categorical income and individual characteristics	Categorical: 5 groups adjusted by household size
GP	Total	-0.020	-0.020	-0.021
	Probability	0.018	0.018	0.018
	Conditional	-0.035	-0.036	-0.036
Specialist	Total	0.076	0.076	0.055
	Probability	0.046	0.047	0.041
	Conditional	0.034	0.033	0.017
Hospital inpatient	Total nights	-0.041	-0.044	-0.055
	Probability	-0.035	-0.038	-0.047
Dentist	Total	0.113	0.115	0.110
	Probability	0.106	0.107	0.101
	Conditional	0.007	0.008	0.008

Further difficulties may arise due to the nature of the income question. The survey asks an individual to report their gross income before taxes and deductions. Therefore, it is

possible that an individual, who earns a certain amount of income (*I*) before taxes (*T*), would earn less (*I-T*) after these deductions; therefore, their ranking in the income distribution may change. To the extent that the ranking would not change after accounting for taxes and deductions, the results of this thesis would remain unchanged.

To what extent might there be differences in purchasing power and living standards across the country? It is common in international studies that measure inequalities in health and health care use by income for income estimates to not only be net of taxes and deductions, but also adjusted for differences in purchasing power across the countries. This is a relatively straightforward exercise, since national consumer price indices are available in order to adjust income; however, for sub-national analyses such as in Chapter 3 of this thesis, it is possible that purchasing power does differ, although these differences are more difficult to take into account. It is, therefore, worth acknowledging that the failure to adjust income for purchasing power in sub-regions, for example, in urban versus rural areas, may bias the income estimates. It is unlikely that this bias would have a significant impact on the empirical findings of this thesis; however, future research could explicitly measure this potential bias.

6.3.3 Limitations of analyses of equity in hospital care, potential solutions

An important limitation with the analyses of equity in the use of hospital inpatient services that were conducted in this thesis relates to the aggregate nature of the utilisation variable. The survey question refers to the number of nights that an individual spent as an inpatient in a hospital, nursing or convalescent home. This variable captures a wide variety of services, including acute, chronic, rehabilitative, and

long-term care services. The relevance of the evidence of inequity for policy makers in such a broad sector is limited.

Existing health surveys do not provide information on whether an individual received surgical day care, a type of intervention that represents a rapidly growing area of health care services. In the ten-year period from 1995-2005, there was an increase of 30% in the number of day surgery visits in Canada (Canadian Institute for Health Information, 2007a), and in 2002-2004 almost 100% of cataract removals were performed as day cases, and over 70% of hernia repairs (Castoro, Bertinato, Drace, & McKee, 2007). From an equity perspective, one recent study from British Columbia demonstrated that the highest level of income-related inequity in service use was in day surgeries: inequity in the probability of undergoing day surgery was more than twice the level of inequity in the probability of a visit to a specialist (the index of horizontal inequity was 0.025 for day surgery compared to 0.011 for specialists) (McGrail, 2008). An earlier study from Winnipeg, Manitoba, also revealed higher rates of surgical procedures, but not acute hospital admissions, among higher income neighbourhoods (Roos & Mustard, 1997). To better understand the nature of inequity in the hospital sector, we need to have information on the type of inpatient services an individual received. Since the survey question on hospital utilisation that was used in this thesis depended on a patient having stayed over night, it excluded day surgeries. Since the available evidence suggests that day surgeries may be more concentrated among the higher income groups, it is possible that the findings of inequity in the use of specialist services could be driven, in part, by inequity in day surgeries.

The available survey data do not include information on the reason for the hospital admission. Analyses of hospitalisation rates for ambulatory sensitive conditions (also

known as preventable hospitalisation) have shown a clear income gradient, with higher rates for the lowest neighbourhood income quintile than the highest income quintile (Roos, Walld, Uhanova et al., 2005; Sanchez, Vellanky, Herring, Liang, & Jia, 2008). This higher rate of avoidable hospitalisations did not appear to be related to lower rates of physician visits for these same conditions, since lower income groups had more physician contacts (Roos, Walld, Uhanova et al., 2005). Higher rates of hospitalisation and physician utilisation would be expected among the lower income groups, since they tend to be in poorer health. These studies suggest that some of the observed 'pro-poor' inequity in hospitalisation may be avoidable, which would reflect sub-optimal ambulatory care. Sub-optimal care could result from difficulties in accessing specialist care, which is consistent with the evidence of pro-rich inequity in the use of specialist services. It could also result from barriers to accessing primary care services from a GP, which is consistent with the evidence of slight pro-rich inequity in the probability of accessing a GP, and the evidence that indicates a lower uptake of preventive services among the lower socioeconomic groups. Therefore, future research is needed to explicitly investigate the association between inequity in physician care and inequity in hospitalisation: do deficiencies in primary and specialist care contribute to the higher concentration of hospital service use among the poorer population groups?

Analysed on an aggregate level, this thesis shows a trend towards higher utilisation of inpatient care among the lower income groups, which is consistent with previous studies (Glazier, Badley, Gilbert, & Rothman, 2000; Manga, Broyles, & Angus, 1987; Mustard & Frohlich, 1995; Newbold, Eyles, & Birch, 1995; Roos & Mustard, 1997). This finding could reflect sub-optimal care at lower levels of the system. Alternatively, it is possible that the estimates of inequity in hospital use were measured with error due to limitations in the measurement of need, income or utilisation data.

Lower income may capture the effects of unobserved need, which would lead to a downward bias in the estimates of inequity. The possibility that unobserved need could bias estimates of inequity is discussed in Chapter 5. In a recent study in Ontario, the finding that having a regular doctor was associated with an increase in the likelihood of a hospital admission of about 20% led the authors to suggest the possibility that unobserved needs were correlated with having a regular physician (Hurley, Grignon, Wang et al., 2008).

There is some evidence to suggest that the estimates of inequity are sensitive to the measure of income that is used for the ranking variable (as shown in Table 6.1). Also, a recent study showed that the pro-poor inequity in the likelihood of a hospital admission and in the number of hospital admissions was driven, in part, by the use of the categorical income measure in the public use file as opposed to the more accurate, continuous measure of income (Hurley, Grignon, Wang et al., 2008). However this continuous income estimate still suffers from the limitations associated with being based on a single question; therefore, it may miss some income sources that are more difficult to recall or subject to reporting bias. The sensitivity of the estimates of inequity in hospital care to the assumption of linearity in the underlying utilisation model also raises some concern as to the appropriateness of these methods for aggregate analyses of equity in this sector.

Based on the above observations, there are some additional survey questions that could help address the gaps in our current understanding of inequity in hospital care. Survey questions could differentiate:

- emergency and elective hospitalisations,
- day and overnight hospital stays,

- diagnostic testing, surgeries, and re-admissions,
- hospitalisation for childbirth (and whether childbirth was natural or by caesarean),
- separate hospital admissions an individual has had in the past year as opposed to the total number of nights spent in hospital,
- public versus private hospital, and
- acute care and long-term care.

Research on equity in hospital care would benefit from the above information. In addition, administrative records linked to survey data would enable the researcher to analyse detailed information on the reasons for hospitalisation, the types of services that were received, and the outcomes of these treatments (such as re-admissions). Taking the research agenda in this direction would provide more support for the development of policies to achieve equity-related goals.

6.3.4 Challenges with measuring need, potential solutions

The measurement of need is critical to analyses of equity; an equitable allocation of health care is one that varies in accordance with need. Need for health care varies across the population; ill-health and disease tends to be concentrated among the lower socioeconomic groups (Humphries & van Doorslaer, 2000). This thesis made use of a combination of general (e.g. self-assessed health) and specific (e.g. limitations in activities, chronic conditions) self-reported indicators of health to approximate need for health care. Self-reported health indicators are the most commonly used measures of health care needs, as they are available in most health surveys; moreover, it can be assumed that, *ceteris paribus*, individuals with poorer health need for more health care. These self-reported measures of (ill-) health may be subject to bias; however, numerous studies have shown that they are strong predictors of objective health status and mortality (see Section 2.1.3).

The debates about potential bias in self-reported health and their suitability as indicators of health care need have not been resolved. Recently, some studies have noted a differential association between self-rated general health and mortality across socioeconomic groups, with a weakening association with socioeconomic advantage (Jürges, 2005; Singh-Manoux, Dugravot, Shipley, Ferrie, Martikainen, Goldberg et al., 2007), while others found the reverse (Dowd & Zajacova, 2007; Huisman, van Lenthe, & Mackenbach, 2007). Another study assessed the validity of quasi-objective health measures – self-reported chronic conditions- through a comparison with medical records (Baker, Stabile, & Deri, 2004). The authors found a considerable degree of reporting error, which partly was related to the severity of the reported condition (there was less error among the more severe conditions) and partly to employment status (not working was associated with greater reporting error in the form of 'false positives').

A literature review of studies of equity in the United Kingdom noted that the majority of studies paid little attention to the complex concept of need (Goddard & Smith, 2001). Studies tended to rely on one of the following assumptions:

- levels of need are equal across the groups being studied (for example, in disease-specific studies);
- need is measured using self-assessed health (SAH), assuming there are no systematic variations between groups in reporting;
- need is measured with biomedical measures, assuming collection methods are standardised and that unmeasured factors are not related to need;
- levels of need are inferred through characteristics of the area people live (e.g. levels of deprivation);
- need is approximated with socioeconomic measures; or

- need is inferred from the results of other studies.

In the majority of studies, in fact, there is widespread acceptance of the second assumption (need is measured using SAH). However, most studies control for factors that may affect the reporting of health status, such as age and sex. They also incorporate measures of an individual's risk of ill-health in addition to considering a broader set of health status variables than solely general SAH.

How can we better measure health care need? In light of the potential problems with self-reported indicators of health, the use of diagnostic categories to measure needs has been advocated as an alternative approach to measuring need. For example, the Adjusted Clinical Group (ACG) system is a validated case-mix grouper for health services developed at Johns Hopkins University (Reid, MacWilliam, Verhulst, Roos, & Atkinson, 2001). This system classifies individuals into different categories on the basis of all diagnoses they have received in the past year in ambulatory or hospital settings with the aim to reflect expected health care utilisation. Therefore, individuals in the same ACG would have the same expected health care needs. However, such information is only available with administrative data, and is contingent upon prior contact with the health system.

Combining subjective, quasi-objective and objective measures of health may provide the most accurate measure of need. Many surveys collect quasi-objective indicators of ill-health, based on respondents' reporting on more factual items such as specific conditions or activity limitations (e.g. presence of chronic conditions, symptoms, and specific limitations in activities of daily living). These indicators have proven to be useful for building a general index of ill-health that corrects reporting bias across countries (Jürges, 2007). The inclusion of health state vignettes (e.g. in the World

Health Survey) have also enabled researchers to reduce the bias with subjective measures. The availability of objective measures of health, such as biomarkers, is restricted to few national, cross-sectional surveys; furthermore, they face methodological challenges with regards to the standardisation of data collection methods.

6.3.5 Capturing effects of supply and geographical barriers

The use of health services represents a function of supply-side and demand-side factors (Aday & Andersen, 1974; Evans & Stoddart, 1990). A vast literature drawing mainly on administrative data from the United States but also from Canada and the United Kingdom supports a causal association between supply and utilisation. At an aggregate level the relationship between supply characteristics, such a bed availability and number of providers, and utilisation patterns can be found; however, studies of variations in specific conditions and procedures show that these variations can be attributed to variations in medical practice beyond the conventional supply indicators (Bevan, 1995). Studies have shown that local workforce conditions and level of supply affect the use of physician services (Welch, Miller, Welch, Fisher, & Wennberg, 1993), more beds available increase the likelihood of chronically ill patients being treated in hospital (Fisher, Wennberg, Stukel, & Sharp, 1994; Fisher, Wennberg, Stukel, Skinner, Sharp, Freeman et al., 2000; Wennberg & Gittelsohn, 1973; Wennberg, Freeman, & Culp, 1987), practice variations are affected by the availability of resources (Pritchard, Fisher, Teno, Sharp, Reding, Knaus et al., 1998), and condition-specific analyses reveal large practice variations in some conditions and relatively small variations in others (the latter having greater professional consensus on treatment) (Wennberg, 1984). Studies from Canada (Manitoba and Ontario) have also identified the importance of practice

variations that cannot be explained by supply, for example in the case of hysterectomy rates (Roos, 1984), middle-ear surgery (Coyte, Croxford, Asche, To, Feldman, & Friedberg, 2001) and knee replacement (Coyte, Hawker, & Wright, 1996). Although an early study from Canada found that supply accounted for a large part of provincial differences in surgical procedures (Vayda, Morison, & Anderson, 1976). Significant variations in surgical procedures across regions in England and Wales were mostly explained by supply and not morbidity characteristics (McPherson, Wennberg, Hovind, & Clifford, 1982). Moreover evidence from the United States found that higher spending was not associated with improved quality of care or health outcomes (Fisher, Wennberg, Stukel, Gottlieb, Lucas, & Pinder, 2003a, 2003b).

These findings suggest that practice-level variations and supply characteristics are important to consider in understanding inequity in health care utilisation. They raise at least two important policy issues. First, are 'small-area' variations stemming from supply and practice characteristics unrelated to individual characteristics of the patients more important from both a cost and equity perspective than individual-level variations in utilisation (e.g. practice differences that vary by income class of the patient)? Second, if inequalities in treatment patterns that are explained by supply and practice characteristics do not lead to differential quality of care or health outcomes, then at an individual level, higher use among higher income individuals (inequity as found in this thesis) may not lead to better outcomes. This second issue is addressed in Section 6.3.6.

In this thesis, I included information on individuals' residence in order to capture some of the differences in the availability of health care providers. However, these relatively crude indicators of supply may not be sufficient to measure the effect of geographical variations and practice variations on patterns of utilisation.

Research on geographical barriers to access and variations in the supply of health care professionals across the country has been extensive. The geographic dispersion of the population creates challenges to ensuring access according to need in sparsely populated countries such as Canada, but also in the United Kingdom (Haynes, 2003). The Romanow Commission reported that "people in rural and remote communities have poorer health status than Canadians who live in larger centres. Access to health care also is a problem, not only because of distances, but because these communities struggle to attract and keep nurses, doctors and other health care providers" (Canada, 2002a, p.159). Therefore, policies have been implemented to reduce barriers to access in countries where significant numbers of the population living in rural and remote areas. These policies include offering financial incentives to physicians to work in underserved areas, locating training facilities in more remote areas, and employing tele-medicine technologies to establish links between the remote areas and specialised medical centres (Healy & McKee, 2004; Simoens & Hurst, 2006). The Canadian provinces mostly have relied on financial incentives to address the problems of physician undersupply; there has been less consistent emphasis on policy approaches that are centred on education and training (Barer & Evans, 2001).

Studies that have investigated the relationship between distance to the nearest hospital and the use of hospital services have not been conclusive. Some studies support the 'distance decay' theory (Haynes, 2003), where a negative gradient was found between distance and use: the greater the distance, the lower the rates of utilisation (Lin, Allan, & Penning, 2002). However, the reverse association has also been found. An analysis of individual-level data in Manitoba found that residents of the smallest communities were more likely to report an inpatient admission (Manga, Broyles, & Angus, 1987).

Another study in Manitoba found higher utilisation rates in the more remote regions (Martens, The Need to Know Team, Fransoo, & Burchill, 2006). This same study also found that there were lower rates of preventive services, such as immunisations and cervical cancer screening, in the more remote regions. A study of age- and sex-adjusted rates of utilisation among older people in British Columbia found that the residents of rural and small town areas spent more days in hospital, but had fewer GP and specialist visits than those living in urban areas (Allan & Cloutier-Fisher, 2006).

A recent study that investigated distance-related inequity in hospital utilisation in Ontario based on concentration indices found some evidence of inequity (Hurley, Grignon, Wang et al., 2008). The authors measured distance as the linear distance from an individual's place of residence to the nearest hospital. They found a pro-distance bias when they only considered large hospitals with 200 or more beds. When all hospitals were considered, the authors did not find any evidence of distance-related inequity. However, they found that the characteristics of the hospital had an impact on utilisation. The likelihood of a hospital admission decreased with hospital size and occupancy rate; individuals whose nearest hospital had a 60% occupancy rate were more likely to be hospitalised than those whose nearest hospital had a 90% occupancy rate (Hurley, Grignon, Wang et al., 2008).

It is clear that the relationship between supply and utilisation is complex. Future research that applies the concentration index approach to measure inequity by distance could be employed in other parts of the country. Better measures of supply could be incorporated into equity research (Hurley & Grignon, 2006), since crude indicators often fail to show any significant effect on utilisation patterns. Also, the inclusion of measures of distance to hospitals had little effect on the estimates of income-related

inequity in hospital admissions (Hurley, Grignon, Wang et al., 2008). Likewise, a study from England showed that the contribution of supply variables on income-related inequality in probability of use of GP and outpatient visits, day cases, and inpatient stays was near zero, even though there was a positive effect of these measures of supply on utilisation (Morris, Sutton, & Gravelle, 2003). Crude indicators of supply may not be sufficient to capture the supply-side influences on utilisation; however, it is not clear what effect this omission has, if any, on estimates of inequity.

6.3.6 Equity in health or health care?

Policy makers seek to achieve an equitable distribution of health services with a view to reducing inequalities in health. "If all things are equal, better access is associated with reduced disparities...Health care financing in Canada, and Medicare in particular, is organized to ensure that all [socioeconomic] groups have access to services and hence reduce health disparities" (Health Disparities Task Group of the F/P/T Advisory Committee on Population Health and Health Security, 2004, p.6-7). Policy makers are, therefore, concerned with the distribution of health services under the assumption that these services would improve health. Culyer has consistently argued that there is no reason for "advocating equality in the provision of ineffective medicine" (Culyer, 1988, p.43); and that "equity is a factor in determining resource allocation decisions only in respect to health care that is needed" (Culyer, 2007, p.23). This argument is consistent with the consequentialist view of equity in health care; the moral concern for equity in health care lies in its consequences, which is improved health and improved capability to function (Sen, 1992).

There is strong policy and public support for the goal of ensuring equity in the receipt of health care. The research conducted in this thesis, in addition to the majority of studies that have investigated equity in health care, measured the receipt of health care, not its consequences. However, since a strong moral argument for our concern for equity in health care is the consequentialist one that views health care as instrumental in improving health, empirical research is needed to investigate the causal relationship between the equity in the receipt of health care and equality in health. Pursuing this area of research would not only improve our understanding of the processes by which health inequalities arise, and could therefore be reduced, but it would also increase public and policy support for prioritising equity goals in health policy.

There is a growing evidence base that has identified inequitable treatment patterns in most countries. The question of whether inequitable utilisation leads to unequal health outcomes has received little attention, partly because it is very difficult to answer with the type of datasets typically available to researchers. Research in this area has relied on disease-specific approaches, which, although they cannot be generalised to the population level, they have the potential to inform specific policy decisions. For example, some studies have examined the level of inequity in the treatment and outcomes of particular conditions, such as acute myocardial infarction and stroke (Alter, Chong, Austin, Mustard, Iron, Williams et al., 2006; Alter, Naylor, Austin et al., 1999; Kapral, Wang, Mamdani et al., 2002; Pilote, Joseph, Belisle, & Penrod, 2003; Saposnik, Jeerakathil, Selchen, Baibergenova, Hachinski, & Kapral, 2008). Research at the population level, perhaps drawing on longitudinal linked administrative and survey data, is needed to measure the link between access and outcomes.

The policies that are required to reduce inequalities in health extend far beyond the health care system; they depend on integrated, multi-sectoral approaches (Mackenbach & Bakker, 2002). However, equity in access to health care plays a critical role in the inequalities reduction agenda (Dahlgren & Whitehead, 2006). Careful monitoring of equity in health care on the basis of robust empirical analyses is vital to measure the impact of health care policies and broader reform initiatives on the achievement of the health systems' objectives. Continued research is needed to understand not only the causes of inequitable patterns of health care utilisation, but also to identify which policy measures are effective in ensuring individuals in need of health care receive high quality care. Further attention could also be directed towards empirically assessing the extent to which equitable utilisation reduces health inequalities. This thesis goes some way to addressing these questions by examining three policy relevant aspects of equity in the Canadian context. Further research is needed to support the development of policies that help meet the health system's equity objectives.

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CHAPTER 2: 2A-2C

Appendix 2A. Summary of beliefs associated with "Viewpoints A and B" in the debates about equity in health care

	Libertarian (Viewpoint A)	Egalitarian (Viewpoint B)
Basics	Freedom of choice is a good in itself Individuals are the best judges of their own welfare Social welfare is no more than the sum of individuals' welfare	All members of society have equal rights to basic goods It is for society to determine what these basic goods are Social welfare depends on how these goods are distributed within the society
Achievement	Personal achievement must be rewarded and "nothing unearned should be given".	Committed to linking reward with effort but economic failure does not equate to moral failure. Lack of achievement must not be punished.
Misfortune	Private charity is the proper way to show social concern, but under strict conditions so as not to undermine people's motivations to assume personal responsibility.	Charity is the least desirable avenue to showing social concern because it can demean the recipient and corrupt the donors. Collective mechanisms are needed if people are to be dealt with equitably and to create and ensure self-sufficiency.
Freedom	Freedom is a supreme good in itself and should not be sacrificed lightly. Government involvement is viewed as encroaching on personal freedom.	Freedom is about real opportunities to make alternative choices, and these may need to be curtailed for some in order that they can be enlarged for others. Government is seen as the major instrument to assure liberties for most people.
Equality	Equality is defined as equality before the law, with freedom dominating equality if ever they conflict	Equality of opportunity for achievement is the key concept. In its absence, compensation of the deprived becomes a moral obligation.
Implications for health care	Health care is not special, thus should be considered a good like any other. Oppose government involvement; compulsory insurance impinges on personal freedom. Out of concern for the disadvantaged, charity is preferred.	Health care is a right and should be removed from the reward system. Support centralised health planning and compulsory insurance.

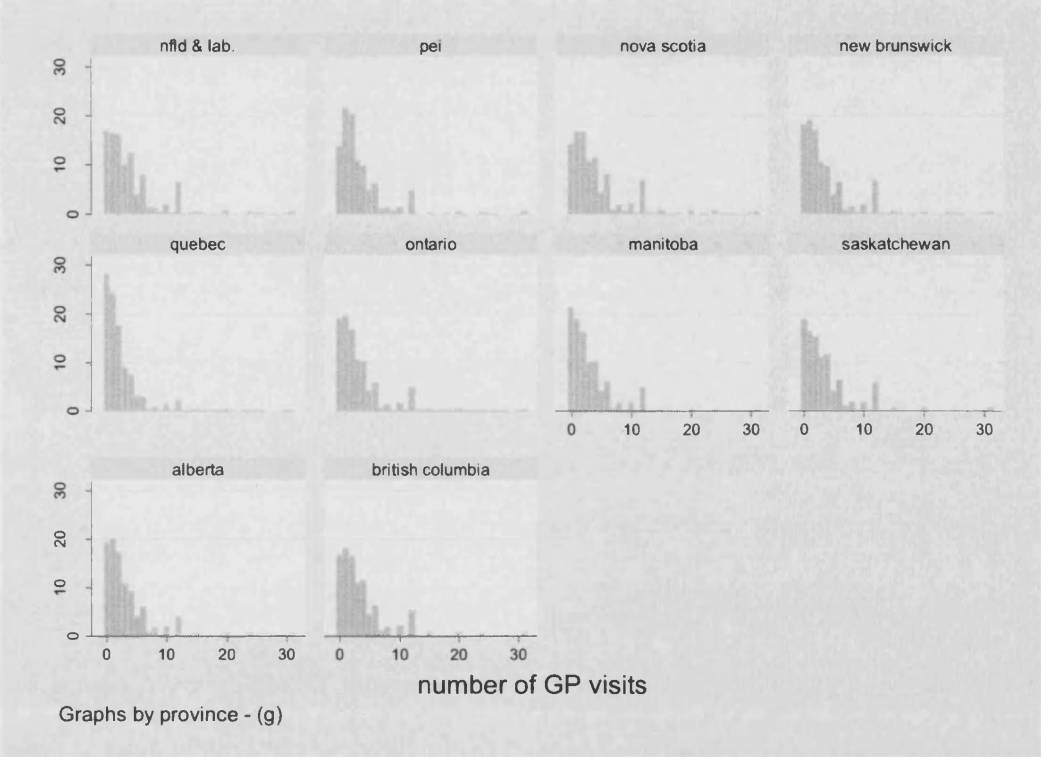
Sources: Donabedian, 1971; Williams, 1993; Williams, 2005.

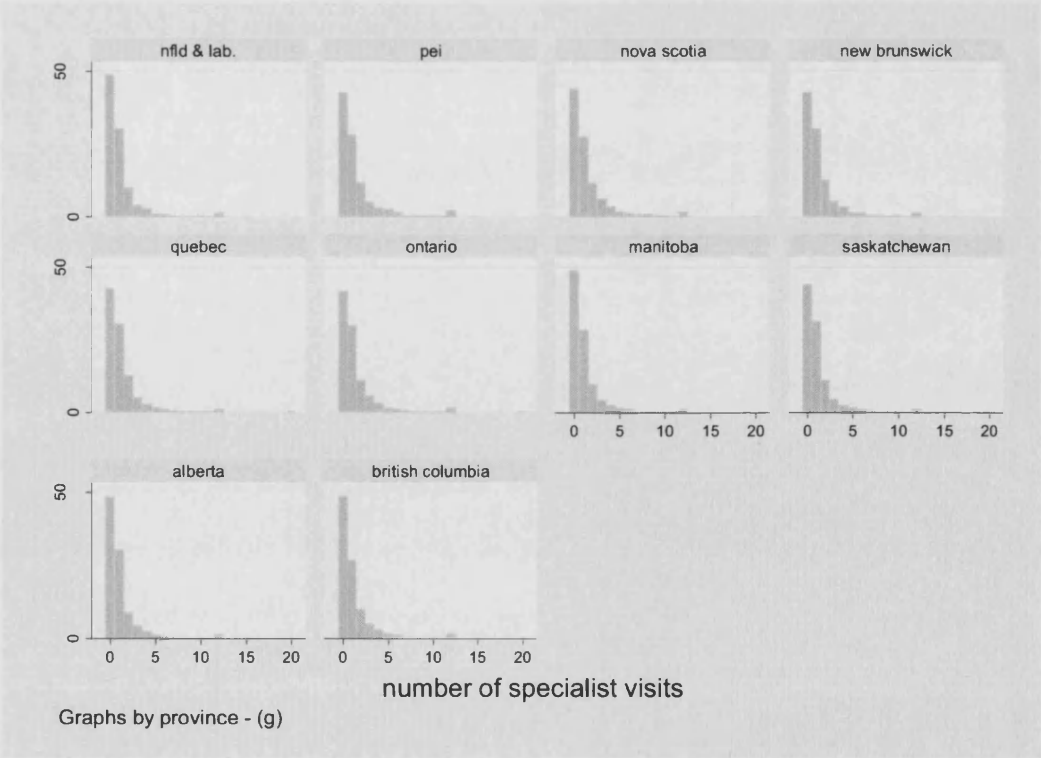
Appendix 2B. Examples of summary measures of socioeconomic inequalities in access to health care

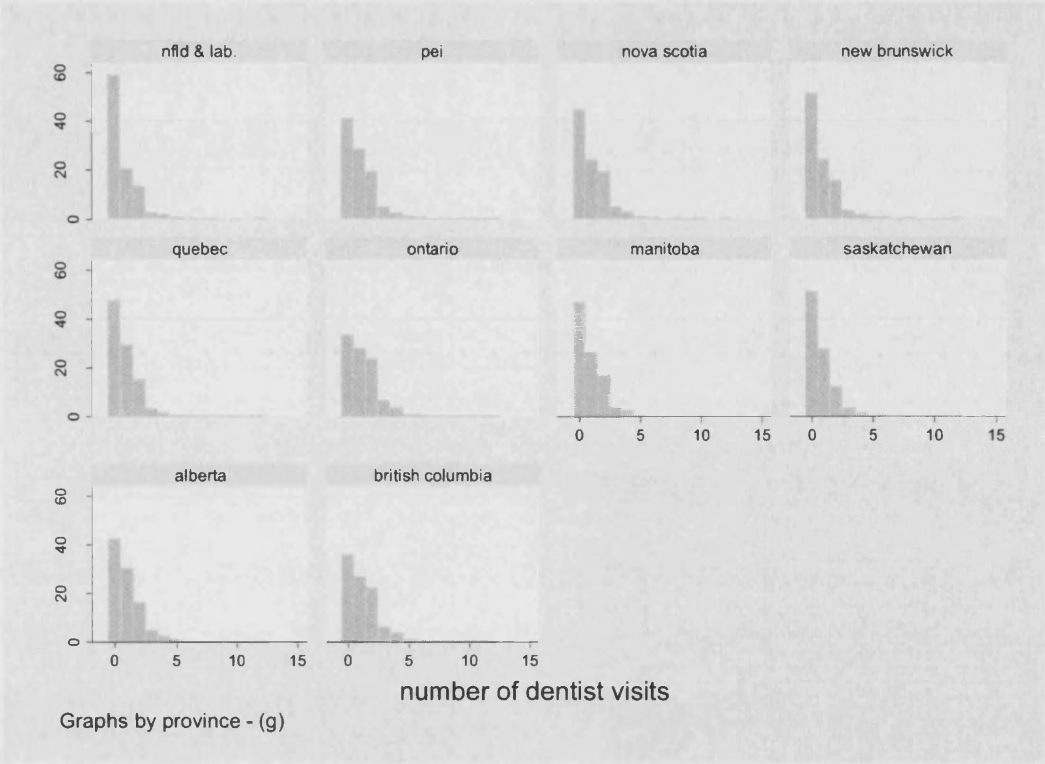
Index	Interpretation
Correlation and regression	
Product-moment correlation	Correlation between health care utilisation rate and socioeconomic status (SES)
Regression on SES	Increase in utilisation rate per one unit increase in SES (or Utilisation rate difference between group with lower and higher-than-average morbidity rates)
Regression on cumulative percentiles (Relative Index of Inequality; Slope Index of Inequality)	Utilisation rate ratio (Rll) or differences (SII) between the least and most advantaged person
Distributional coefficients	
Pseudo-Gini coefficient	0 = no utilisation differences between groups; 1 = all utilisation is in the hands of one person
Concentration index	0 = no utilisation differences associated with SES; -1/+1 = all utilisation is in the hands of the least/most advantaged person
Horizontal inequity index	0 = no utilisation differences associated with SES after need standardisation; -1/+1 = all need standardised utilisation is in the hands of the least/most advantaged person
Generalised concentration index	Based on the concentration index, but includes also the mean distribution of health care

Source: Mackenbach & Kunst, 1997.

Appendix 2C. Histograms of physician (GP and specialist) and dentist visits by province







Source: Canadian Community Health Survey 2.1 (2003), used in Chapter 3.

Appendix 3A Policy statements related to equity and access to health care across Canada's provinces

Province	*Institution, year*	*Equity-related statements*
British Columbia	Ministry of Health, 1997[39]	Equitable access to needed and appropriate health services is a key contributor to our health, and must be preserved.
	Ministry of Health, 2008[40]	Our government is working to strengthen health care to meet the needs of patients, and ensure that every British Columbian can access the care they need, when they need it... Access to high quality health services also has an impact on health status.
	Ministry of Health, 2008, *Conversation on Health*[41]	British Columbian said they believed in a strong and sustainable public health care system that delivers services to all British Columbians regardless of where they live, their incomes or their backgrounds and cultures. Managing access to the system in an equitable way that achieves optimal health outcomes.
Alberta	Ministry of Health, 1999 (Public consultation)[42]	The health system should reflect basic values and principles, including: All Albertans should have equal access to health care when they need it.
	Alberta Health and Wellness (Ministry of Health), 2003[43]	Albertans can be assured of access to high quality, essential health services no matter where they live.
	Minister of Health and Wellness, 2008	Alberta has a good public health system that needs to be made more accessible.
Saskatchewan	Ministry of Health, 2001[44]	Our top priority is improving the quality of services and access to care, while ensuring our health system is sustainable into the future.
Manitoba	Manitoba Health (Ministry of Health), 2007[45]	One of the government's policy objectives is to provide quality health care in a cost effective, sustainable and equitable manner.

[39] Health Goals for British Columbia: http://www.healthservices.gov.bc.ca/library/publications/year/1997/healthgoals.pdf
[40] Budget: 2008/09 – 2010/11 Service Plan http://www.bcbudget.gov.bc.ca/2008/sp/pdf/ministry/hlth.pdf
[41] http://www.bcconversationonhealth.ca/EN/envisioning_a_strong_and_sustainable_system_of_care/
42 Health Summit '99 Report – Think About Health: http://www.health.alberta.ca/key/summit99_health-report.html#Executive
[43] Alberta Health First: Building a Better Public Health System. Reform Highlights 2003 http://www.health.alberta.ca/key/highlights.pdf
[44] The A*ction Plan for Saskatchewan Health Care* http://www.health.gov.sk.ca/adx/aspx/adxGetMedia.aspx?DocID=966,94,88,Documents&MediaID=1013&Filename=actionplan-2001.pdf
[45] Manitoba Health and Healthy Living Annual Report 2006-2007: http://www.gov.mb.ca/health/ann/200607/annrpt0607.pdf

Province	*Institution, year*	*Equity-related statements*
Ontario	Health Services Restructuring Commission, 1999[46] (advisor to Ministry of Health from 1996-2000)	An issue that is important for moving health system reform forward is equity: to ensure equity of access for all communities and regions across the province as well as specific populations experiencing barriers to service.
	Toronto Central Local Health Integration Network, 2008[47]	Aims to: Ensure all receive the high-quality and responsive care they need, regardless of their social position and conditions. Reduce language, navigation and other barriers to equitable access and high-quality healthcare for all.
Québec	Ministry of Health, 2006[48]	Our health and social-services system symbolizes the values of social justice, compassion and solidarity that unite Québecers. It is founded on the principles of universality, equity and the public nature of services.
	Ministry of Health, 2007[49]	Universality, equity and public administration are at the centre of the fundamental principles which have guided the evolution of the health and social services system since its beginnings. Thus, health services and social services are accessible to all without discrimination.
Nova Scotia	Department of Health 2003[50]	Accessible primary care requires equity of access for those who have historically faced barriers, including but not limited to barriers related to illness, disability, poverty, culture, race, ethnicity, language, geography, and gender.
	Department of Health, 2007[51]	The Department will support increasing the number of interdisciplinary teams of primary health care providers so Nova Scotians have equitable access to high quality, comprehensive care.

[46] http://www.health.gov.on.ca/hsrc/phase2/NEXTSTEPSFINAL.doc
[47] Health Equity Discussion Paper 2008: http://www.torontocentrallhin.on.ca/uploadedFiles/Home_Page/Report_and_Publications/Health%20Equity%20Discussion%20Paper%20v1.0.pdf
[48] *Guaranteeing Access: Meeting the challenges of equity, efficiency and quality* http://publications.msss.gouv.qc.ca/acrobat/f/documentation/2005/05-721-01A.pdf
[49] The Québec Health and Social Services System in Brief: http://publications.msss.gouv.qc.ca/acrobat/f/documentation/2007/07-731-01A.pdf
[50] Primary Health Care Renewal: Action for Healthier Nova Scotians: http://www.gov.ns.ca/health/reports/pubs/Primary_Health_Care_Renewal_Report_May_2003.pdf
[51] Department of Health Annual Accountability Report for the fiscal year 2006-2007: http://www.gov.ns.ca/health/reports/pubs/DOH_Accountability_2006_07.pdf

Province	*Institution, year*	*Equity-related statements*
New Brunswick	Department of Health, 2005[52]	One of the provincial health priorities is: Better Access to Care and Services – safe care and efficient use of health care providers
Newfoundland	Ministry of Health and Community Services, 2005[53]	Every person has a fair opportunity to attain his/her full health potential. Policies and services are developed to reduce the differences in health status that are associated with factors such as socioeconomic status, gender, age, ability, and culture. Ensure communities have reasonable access to a core set of primary health care services; Improve the quality and accessibility of secondary and tertiary care in the province.
Prince Edward Island	Department of Health and Social Services, 2001 [54]	We are concerned about the ability of our health system to continue to support equity, access, and the core values of Medicare.

[52] The New Brunswick Health Care Report Card 2005: http://www.gnb.ca/0051/pub/pdf/3780e-final-compressed.pdf

[53] A Strategic Health Plan for Newfoundland and Labrador: http://www.health.gov.nl.ca/health/strategichealthplan/pdf/HealthyTogetherdocument.pdf

[54] A Strategic Plan for the Prince Edward Island Health and Social Services System, 2001-2005: http://www.gov.pe.ca/photos/original/hss_stratplan.pdf

Appendix 3B. Comparison of national samples with and without missing income information

	Full sample		Sample missing income	
	Mean	*Std. Err.*	Mean	*Std. Err.*
Age				
15-34	0.324	*0.002*	0.444	*0.007*
35-44	0.226	*0.002*	0.121	*0.005*
45-64	0.321	*0.002*	0.265	*0.006*
65-74	0.082	*0.001*	0.118	*0.004*
75+	0.047	*0.001*	0.053	*0.002*
male	0.501	*0.003*	0.422	*0.007*
Self-assessed health				
excellent	0.229	*0.002*	0.209	*0.006*
very good	0.366	*0.002*	0.339	*0.006*
good	0.296	*0.002*	0.322	*0.006*
fair	0.085	*0.001*	0.100	*0.004*
poor	0.024	*0.001*	0.030	*0.002*
health limitations				
sometimes	0.150	*0.002*	0.138	*0.004*
often	0.098	*0.001*	0.088	*0.003*
never	0.752	*0.002*	0.774	*0.005*
Education				
Less than secondary	0.206	*0.002*	0.344	*0.006*
Secondary	0.269	*0.002*	0.307	*0.006*
Post-secondary	0.526	*0.003*	0.349	*0.006*
Employment				
employed	0.629	*0.002*	0.528	*0.007*
retired or unemployed	0.245	*0.002*	0.299	*0.006*
student	0.055	*0.001*	0.100	*0.004*
Utilisation				
Hospital inpatient	0.082	*0.001*	0.076	*0.003*
GP visit probability	0.778	*0.002*	0.782	*0.006*
Specialist visit probability	0.541	*0.003*	0.533	*0.007*
Dentist visit probability	0.639	*0.002*	0.612	*0.006*
GP visits	3.131	*0.013*	3.195	*0.032*
Specialist visits	1.313	*0.007*	1.398	*0.020*
Hospital nights	0.496	*0.008*	0.578	*0.022*
Dentist visits	1.285	*0.005*	1.232	*0.013*

Note: All differences in mean values between national sample and sub-sample missing income are significant at $p<0.05$ except the probability of visiting a GP, and the number of GP visits, probability of visiting a specialist, and probability of hospital admission.

Appendix 3C. Province-level descriptive statistics (mean) for need and non-need variables

	B.C.	Alta.	Sask.	Man.	Ont.	Que.	N.L.	P.E.I	N.S.	N.B.
Income categories										
Income C2	0.07	0.04	0.06	0.05	0.05	0.08	0.10	0.09	0.08	0.09
Income C3	0.19	0.16	0.21	0.21	0.17	0.23	0.29	0.26	0.26	0.26
Income C4	0.35	0.34	0.37	0.38	0.33	0.36	0.35	0.42	0.37	0.37
Income C5	0.36	0.44	0.33	0.33	0.43	0.30	0.23	0.21	0.27	0.24
Self-assessed health (SAH)										
Very good SAH	0.37	0.41	0.40	0.40	0.36	0.34	0.45	0.45	0.39	0.32
Good SAH	0.28	0.26	0.28	0.27	0.30	0.32	0.22	0.24	0.28	0.34
Fair SAH	0.08	0.06	0.09	0.08	0.09	0.08	0.08	0.06	0.11	0.13
Poor SAH	0.03	0.02	0.02	0.02	0.02	0.02	0.04	0.03	0.03	0.04
Activity limitations										
Some limitations	0.16	0.16	0.14	0.15	0.15	0.14	0.12	0.14	0.17	0.15
Often limitations	0.11	0.09	0.09	0.09	0.10	0.09	0.11	0.09	0.14	0.12
Age and sex										
male 35-44	0.12	0.12	0.11	0.11	0.12	0.11	0.11	0.10	0.11	0.11
male 45-64	0.17	0.17	0.16	0.16	0.16	0.17	0.19	0.17	0.17	0.18
male 65-74	0.04	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
male 75+	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.03	0.02	0.02
female 15-34	0.15	0.18	0.16	0.16	0.16	0.16	0.15	0.14	0.15	0.15
female 35-44	0.11	0.11	0.10	0.11	0.12	0.10	0.10	0.13	0.11	0.12
female 45-64	0.17	0.14	0.15	0.15	0.16	0.17	0.18	0.16	0.17	0.17
female 65-74	0.04	0.03	0.05	0.04	0.04	0.05	0.04	0.04	0.04	0.04
female 75+	0.03	0.02	0.04	0.04	0.03	0.03	0.02	0.03	0.03	0.03
Education										
Secondary education	0.31	0.30	0.29	0.31	0.28	0.22	0.23	0.23	0.22	0.28
Post-secondary education	0.54	0.53	0.48	0.46	0.54	0.54	0.48	0.52	0.54	0.44
Region										
Capital city health region	0.14	0.38	0.26	0.61	0.21	0.26	0.37	0.51	0.43	0.27
Employment										
Retired	0.07	0.05	0.08	0.08	0.07	0.06	0.07	0.09	0.08	0.07
Unemployed	0.16	0.12	0.14	0.13	0.15	0.20	0.23	0.13	0.18	0.18
Student	0.06	0.05	0.04	0.06	0.05	0.06	0.04	0.03	0.03	0.02
Employed	0.56	0.62	0.57	0.61	0.60	0.57	0.57	0.61	0.57	0.59

Appendix 3D. Comparison of *HI* estimates with extended needs variables

	B.C.	Alta.	Sask.	Man.	Ont.	Que.	N.L.	N.B.	P.E.I.	N.S.
Total number of GP visits										
HI	*-0.014*	*-0.021*	-0.010	**-0.027**	*-0.010*	0.002	-0.003	-0.001	-0.027	-0.012
HI - ext	-0.009	-0.016	0.000	-0.016	-0.004	0.007	0.011	0.011	-0.018	0.001
Conditional GP visits										
HI	**-0.022**	**-0.033**	**-0.033**	**-0.045**	**-0.023**	**-0.013**	-0.022	**-0.027**	-0.019	-0.019
HI - ext	**-0.017**	**-0.029**	**-0.023**	**-0.035**	**-0.017**	-0.008	-0.014	**-0.023**	-0.006	-0.009
Probability GP visit										
HI	**0.008**	**0.014**	**0.022**	**0.021**	**0.015**	**0.017**	**0.021**	**0.029**	-0.007	**0.011**
HI - ext	**0.008**	**0.015**	**0.024**	**0.025**	**0.017**	**0.017**	**0.027**	**0.028**	-0.013	**0.014**
Specialist visits: total visits										
HI	**0.057**	0.026	**0.078**	**0.059**	**0.047**	**0.049**	**0.079**	**0.040**	**0.069**	**0.074**
HI - ext	**0.057**	**0.030**	**0.086**	**0.054**	**0.052**	**0.055**	**0.089**	**0.039**	**0.073**	**0.072**
Conditional specialist										
HI	0.014	-0.010	**0.047**	-0.002	0.007	0.006	0.003	-0.004	0.037	0.017
HI - ext	0.015	-0.009	**0.052**	-0.007	0.009	0.010	0.013	-0.001	**0.040**	0.011
Probability specialist										
HI	**0.046**	**0.039**	**0.035**	**0.063**	**0.047**	**0.048**	**0.076**	**0.040**	**0.036**	**0.058**
HI - ext	**0.046**	**0.041**	**0.035**	**0.063**	**0.049**	**0.050**	**0.080**	**0.039**	**0.042**	**0.062**
Hospital inpatient (total)										
HI	0.028	**-0.083**	-0.026	-0.046	-0.035	-0.046	-0.020	-0.003	-0.072	-0.058
HI - ext	0.035	**-0.083**	-0.017	-0.048	-0.025	-0.038	0.012	-0.010	-0.075	*-0.072*
conditional inpatient										
HI	0.021	**-0.069**	0.022	0.032	-0.028	-0.003	0.026	**0.040**	**-0.089**	0.045
HI - ext	0.020	**-0.076**	0.011	0.036	-0.023	0.003	0.054	0.037	**-0.081**	0.039
probability inpatient										
HI	-0.013	-0.032	**-0.047**	**-0.089**	-0.028	**-0.063**	*-0.055*	-0.083	0.006	**-0.105**
HI - ext	-0.013	-0.036	-0.042	**-0.090**	-0.027	**-0.060**	-0.030	**-0.082**	0.001	**-0.110**

Appendix 3E. Full OLS utilisation models for Canada-level analysis using CCHS 2.1– GP, Specialist and Hospital Inpatient

	GP			Specialist			Hospital inpatient		
	Total	Prob	Cond	Total	Prob	Cond	Total	Prob	Cond
Needs									
Very Good SAH	**0.411**	**0.058**	**0.358**	**0.114**	**0.031**	**0.118**	0.025	0.002	**0.603**
Good SAH	**1.141**	**0.084**	**1.186**	**0.308**	**0.054**	**0.385**	**0.122**	**0.024**	**0.711**
Fair SAH	**2.504**	**0.112**	**2.536**	**0.819**	**0.114**	**0.905**	**0.711**	**0.069**	**2.454**
Poor SAH	**5.065**	**0.111**	**5.228**	**1.772**	**0.150**	**1.927**	**2.339**	**0.175**	**3.864**
Limited some	**1.198**	**0.070**	**1.136**	**0.481**	**0.077**	**0.538**	**0.195**	**0.029**	**0.775**
Limited often	**2.850**	**0.097**	**2.778**	**1.150**	**0.159**	**1.112**	**1.172**	**0.103**	**3.066**
male 35-44	-0.068	**0.042**	**-0.255**	**-0.105**	-0.007	**-0.193**	**-0.109**	**-0.026**	0.672
male 45-64	0.092	**0.092**	**-0.208**	**0.114**	**0.114**	**-0.202**	0.025	-0.007	**1.186**
male 65-74	**0.480**	**0.182**	-0.101	**0.410**	**0.235**	-0.128	**0.496**	**0.032**	**2.819**
male 75+	**0.754**	**0.205**	0.104	**0.385**	**0.279**	**-0.311**	**0.783**	**0.048**	**3.232**
female 35-44	**1.545**	**0.173**	**1.290**	**0.699**	**0.169**	**0.665**	**0.256**	**0.086**	-0.139
female 35-44	**0.938**	**0.166**	**0.542**	**0.500**	**0.152**	**0.354**	0.069	**0.019**	0.367
female 45-64	**0.726**	**0.179**	**0.215**	**0.452**	**0.201**	0.063	**-0.093**	**-0.010**	0.045
female 65-74	**0.720**	**0.218**	-0.002	**0.511**	**0.293**	**-0.183**	**0.245**	-0.003	**2.747**
female 75+	**0.818**	**0.215**	0.054	**0.356**	**0.285**	**-0.355**	**0.868**	**0.036**	**3.978**
Non-need variables									
Income									
IC 2	0.174	0.000	0.232	*-0.138*	0.006	**-0.301**	0.112	-0.007	0.781
IC 3	0.140	0.016	0.112	0.002	0.023	-0.139	0.046	-0.017	0.559
IC 4	0.041	**0.027**	-0.083	0.095	**0.066**	-0.132	-0.021	-0.023	0.199
IC 5	-0.054	**0.050**	*-0.287*	**0.208**	**0.114**	-0.105	-0.013	-0.028	0.472
Education									
Secondary	-0.027	0.001	-0.061	**0.186**	**0.025**	**0.210**	-0.044	-0.005	-0.149
Post-secondary	0.042	**0.025**	-0.074	**0.365**	**0.071**	**0.353**	-0.001	-0.003	0.286
Insurance for drugs	**0.406**	**0.060**	**0.240**	**0.222**	**0.077**	**0.109**	**0.065**	*0.006*	0.363
Student	**0.317**	-0.004	**0.402**	0.006	**-0.071**	**0.284**	**0.156**	**0.032**	**0.758**
Employed	**-0.252**	-0.005	**-0.293**	**-0.256**	**-0.037**	**-0.308**	**-0.186**	**-0.022**	**-1.095**
Province									
N.L.	**0.907**	**0.048**	**0.874**	*-0.102*	-0.012	-0.137	**0.298**	**0.021**	**1.796**
P.E.I.	-0.067	**0.061**	**-0.367**	**0.162**	0.016	**0.218**	**0.372**	**0.035**	**1.752**
N.S.	**0.409**	**0.044**	**0.272**	-0.073	*-0.025*	-0.033	0.069	0.008	0.134
N.B.	**-0.206**	0.005	**-0.288**	**-0.201**	**-0.024**	**-0.266**	**0.312**	**0.027**	**1.163**
Ont.	**-1.031**	**-0.101**	**-0.934**	-0.013	**0.016**	**-0.095**	**0.137**	**0.015**	0.440
Man.	**-0.183**	*-0.017*	*-0.176*	-0.051	**-0.026**	-0.004	*0.097*	**0.012**	0.319
Sask.	**0.451**	**0.017**	**0.485**	**-0.087**	0.007	**-0.161**	**0.136**	**0.020**	0.366
Alta.	**0.239**	**0.017**	**0.230**	**-0.130**	**-0.018**	**-0.159**	**0.072**	**0.013**	0.032
B.C.	**0.517**	**0.031**	**0.475**	**-0.119**	**-0.054**	0.012	-0.021	0.005	**-0.640**
N	*101445*	*101445*	*80610*	*101445*	*101445*	*56384*	*101445*	*101445*	*9552*
R^2	*0.182*	*0.076*	*0.170*	*0.1035*	*0.0802*	*0.091*	*0.075*	*0.0624*	*0.182*
F	***203.02***	***93.56***	***147.32***	***109.25***	***129.15***	***49.16***	***42.57***	***63.16***	***30.59***

Notes: Bold is significant at $p<0.05$, italics is significant at $p<0.10$; SAH is self-assessed health; IC is income category.

Appendix 3E Continued. Full Utilisation models for Canada-level analysis using CCHS 2.1 (2003) – Dentist visits

	Dentist		
	Total	Probability	Conditional
Needs			
age 35-44	**0.124**	**0.042**	**0.064**
age45-64	**0.106**	**0.032**	**0.063**
age 65-74	**0.122**	**0.019**	**0.121**
age 75+	0.024	-0.006	0.046
Very Good SAOH	-0.023	**-0.033**	**0.050**
Good SAOH	**-0.072**	**-0.105**	**0.189**
Fair SAOH	0.038	**-0.145**	**0.568**
Poor SAOH	**0.208**	**-0.180**	**1.188**
Non-need variables			
Income			
IC 2	-0.087	0.002	**-0.244**
IC 3	0.090	**0.057**	-0.092
IC 4	**0.286**	**0.145**	-0.055
IC 5	**0.471**	**0.217**	0.001
male	**-0.212**	**-0.059**	**-0.141**
Secondary education	**0.056**	**0.072**	**-0.152**
Post-secondary education	**0.153**	**0.124**	**-0.157**
Dental insurance	**0.489**	**0.177**	**0.226**
employed	0.019	0.007	0.012
student	**-0.402**	**-0.105**	**-0.263**
Province			
N.L.	*-0.092*	**-0.080**	0.095
P.E.I.	**0.195**	**0.069**	0.114
N.S.	**0.199**	**0.032**	**0.228**
N.B.	0.015	**-0.037**	**0.163**
Ont.	**0.266**	**0.075**	**0.179**
Man.	*0.081*	0.005	**0.117**
Sask.	**-0.114**	**-0.041**	-0.070
Alta.	-0.004	-0.002	0.005
B.C.	**0.253**	**0.074**	**0.164**
N	*101445*	*101445*	*58308*
R^2	*0.0711*	*0.1528*	*0.0316*
F	***133.83***	***327.89***	***21.03***

Notes: Bold is significant at $p<0.05$, italics is significant at $p<0.10$; SAOH is self-assessed oral health; IC is income category.

Appendix 3F. Comparison of indices of inequity with linear versus non-linear utilisation models

	B.C.	Alta.	Sask.	Man.	Ont.	Que.	N.L.	N.B.	P.E.I.	N.S.
*Total number of **GP visits***										
Linear	*-0.014*	*-0.021*	-0.010	**-0.027**	*-0.010*	0.002	-0.003	-0.001	-0.027	-0.012
Non-linear	-0.011	-0.017	-0.003	-0.019	-0.006	0.005	0.008	0.003	-0.027	-0.010
Conditional GP										
Linear	**-0.022**	**-0.033**	**-0.033**	**-0.045**	**-0.023**	**-0.013**	-0.022	**-0.027**	-0.019	-0.019
Non-linear	**-0.019**	**-0.031**	**-0.028**	**-0.042**	**-0.021**	*-0.012*	-0.018	**-0.028**	-0.021	-0.018
Probability GP										
Linear	**0.008**	**0.014**	**0.022**	**0.021**	**0.015**	**0.017**	**0.021**	**0.029**	-0.007	**0.011**
Non-linear	**0.008**	**0.014**	**0.022**	**0.020**	**0.016**	**0.017**	**0.019**	**0.027**	-0.010	**0.011**
Specialist visits										
Total specialist visits										
Linear	**0.057**	*0.026*	**0.078**	**0.059**	**0.048**	**0.049**	**0.079**	**0.040**	**0.069**	**0.074**
Non-linear	**0.065**	**0.028**	**0.094**	**0.061**	**0.054**	**0.057**	**0.077**	**0.042**	**0.080**	**0.078**
Conditional specialist										
Linear	0.014	-0.010	**0.047**	-0.002	0.007	0.006	0.003	-0.004	0.037	0.017
Non-linear	*0.017*	-0.009	**0.055**	-0.004	0.009	0.009	0.002	-0.003	**0.039**	0.019
Probability specialist										
Linear	**0.046**	**0.039**	**0.035**	**0.063**	**0.047**	**0.048**	**0.076**	**0.040**	**0.047**	**0.058**
Non-linear	**0.046**	**0.039**	**0.035**	**0.063**	**0.047**	**0.047**	**0.077**	**0.041**	**0.037**	**0.059**

Note: Bold is significant at $p<0.05$, italics significant at $p<0.10$

Appendix 3F Continued

	B.C.	Alta.	Sask.	Man.	Ont.	Que.	N.L.	N.B.	P.E.I.	N.S.
*Total **inpatient days***										
Linear	0.028	**-0.083**	-0.026	-0.046	-0.035	-0.046	-0.020	-0.003	-0.072	-0.058
Non-linear	**0.064**	**-0.094**	0.042	-0.053	0.006	0.000	0.049	0.034	0.001	**0.199**
Conditional inpatient										
Linear	0.021	**-0.069**	0.022	0.032	-0.028	-0.003	0.026	**0.040**	**-0.089**	0.045
Non-linear	0.016	**-0.082**	0.037	0.049	*-0.034*	*-0.035*	0.049	**0.054**	-0.091	*0.067*
Probability inpatient										
Linear	0.006	**-0.057**	**-0.083**	-0.055	**-0.063**	**-0.089**	-0.047	-0.013	0.008	**-0.105**
Non-linear	-0.003	-0.026	-0.046	**-0.093**	-0.021	-0.021	-0.042	**-0.086**	0.012	**-0.104**
Dentists										
Total dentists										
Linear	**0.093**	**0.075**	**0.073**	**0.124**	**0.100**	**0.105**	**0.155**	**0.130**	**0.043**	**0.119**
Non-linear	**0.093**	**0.076**	**0.070**	**0.122**	**0.099**	**0.102**	**0.151**	**0.129**	**0.042**	**0.119**
Conditional dentists										
Linear	**0.015**	0.000	-0.001	0.020	**0.018**	0.002	-0.002	0.009	-0.011	0.001
Non-linear	**0.015**	0.001	0.000	*0.021*	**0.018**	0.002	-0.002	0.009	-0.011	0.001
Probability dentist										
Linear	**0.077**	**0.074**	**0.075**	**0.102**	**0.080**	**0.102**	**0.159**	**0.121**	**0.053**	**0.116**
Non-linear	**0.077**	**0.073**	**0.073**	**0.101**	**0.079**	**0.101**	**0.150**	**0.118**	**0.050**	**0.115**

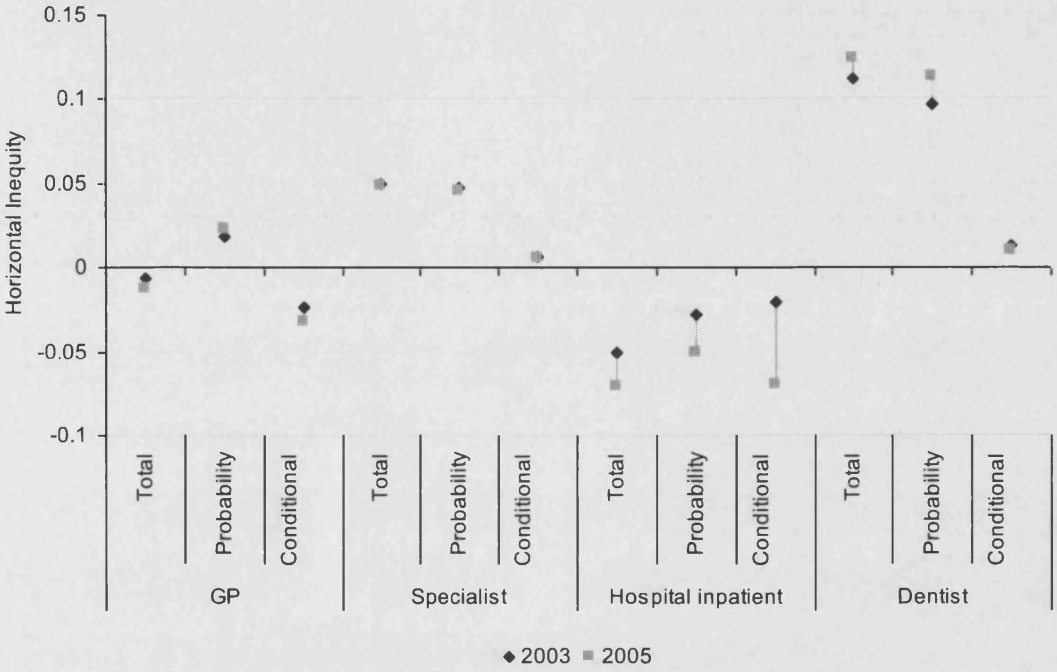
Note: Bold is significant at $p<0.05$, italics significant at $p<0.10$

Appendix 3G. Decomposition of inequity in specialist visit probability using linear versus non-linear models, Newfoundland

Non-linear	Mean	CI	ME	Contribution	Sum
HI					0.085
Income C2	0.099	-0.732	0.009	-0.001	
Income C3	0.286	-0.347	-0.011	0.002	
Income C4	0.347	0.174	0.015	0.002	
Income C5	0.230	0.628	0.132	0.037	0.040
Very good SAH	0.453	0.022	0.096	0.002	
Good SAH	0.222	-0.060	0.109	-0.003	
Fair SAH	0.075	-0.188	0.209	-0.006	
Poor SAH	0.036	-0.403	0.236	-0.007	-0.013
Some limitations	0.123	-0.051	0.116	-0.001	
Often limitations	0.106	-0.197	0.181	-0.007	-0.009
male 35-44	0.113	0.167	0.035	0.001	
male 45-64	0.188	0.071	0.130	0.003	
male 65-74	0.043	-0.135	0.279	-0.003	
male 75+	0.019	-0.318	0.131	-0.002	0.000
female 15-34	0.152	-0.032	0.155	-0.001	
female 35-44	0.104	0.045	0.174	0.002	
female 45-64	0.178	-0.027	0.265	-0.003	
female 65-74	0.038	-0.281	0.226	-0.005	
female 75+	0.024	-0.426	0.143	-0.003	-0.010
Secondary education	0.228	-0.009	0.040	0.000	
Post-sec. education	0.477	0.192	0.083	0.015	0.015
St John's region	0.374	0.153	0.128	0.014	0.014
Insurance drugs	0.690	0.097	0.073	0.010	0.010
Retired	0.066	-0.257	-0.012	0.000	
Unemployed	0.226	-0.282	-0.067	0.008	
Student	0.043	0.115	0.055	0.001	
Employed	0.566	0.128	-0.023	-0.003	0.006
Error					-0.007

Linear	Mean	CI	ME	Contribution	Sum
HI					0.077
Income C2	0.099	-0.732	0.010	-0.001	
Income C3	0.286	-0.347	-0.011	0.002	
Income C4	0.347	0.174	0.012	0.001	
Income C5	0.230	0.628	0.121	0.034	0.037
Very good SAH	0.453	0.022	0.087	0.002	
Good SAH	0.222	-0.060	0.099	-0.003	
Fair SAH	0.075	-0.188	0.203	-0.006	
Poor SAH	0.036	-0.403	0.228	-0.006	-0.013
Some limitations	0.123	-0.051	0.109	-0.001	
Often limitations	0.106	-0.197	0.164	-0.007	-0.008
male 35-44	0.113	0.167	0.033	0.001	
male 45-64	0.188	0.071	0.121	0.003	
male 65-74	0.043	-0.135	0.281	-0.003	
male 75+	0.019	-0.318	0.116	-0.001	0.000
female 15-34	0.152	-0.032	0.146	-0.001	
female 35-44	0.104	0.045	0.165	0.002	
female 45-64	0.178	-0.027	0.253	-0.002	
female 65-74	0.038	-0.281	0.221	-0.005	
female 75+	0.024	-0.426	0.129	-0.003	-0.010
Secondary education	0.228	-0.009	0.034	0.000	
Post-sec. education	0.477	0.192	0.076	0.014	0.014
St John's region	0.374	0.153	0.118	0.013	0.013
Insurance drugs	0.690	0.097	0.068	0.009	0.009
Retired	0.066	-0.257	-0.001	0.000	
Unemployed	0.226	-0.282	-0.057	0.007	
Student	0.043	0.115	0.049	0.000	
Employed	0.566	0.128	-0.018	-0.003	0.005
Error					0.002

Appendix 3H. Comparison of income-related inequity in Canada in 2003 (CCHS 2.1) and 2005 (CCHS 3.1)



Note: All indices significant at $p<0.05$ level except that for total GP visits and conditional specialist visits.

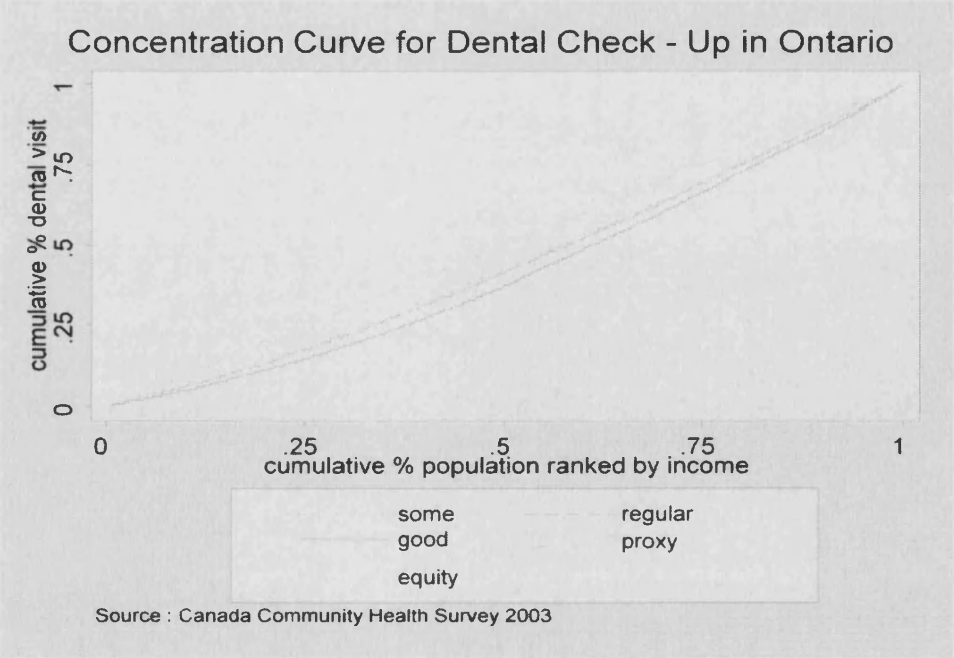
Appendix 3I. Inequity in Preventive Dental Utilisation

Table 1. Indices of inequity in preventive dental utilisation and its contributing factors in Ontario and British Columbia

	Ontario		British Columbia	
Variable	Some check-ups	Frequent check-ups (>1 per year)	Some check-ups	Frequent check-ups (>1 per year)
CI_{unadj}	0.0980	0.1719	0.0981	0.1578
HI	0.1017	0.1664	0.0917	0.1547
Non-need variables				
Income	0.0600	0.1108	0.0443	0.0659
Sex	-0.0031	-0.0037	-0.0028	-0.0047
Education	0.0079	0.0061	0.0075	0.0078
Work status	0.0029	0.0053	0.0001	0.0034
Dental Insurance	0.0154	0.0331	0.0255	0.0547
Capital city	0.0004	0.0012	0.0002	0.0009
Other	0.0047	0.0031	0.0101	0.0055
Need				
Age	0.0036	-0.0055	0.0065	0.0030
Error	0.0060	0.0215	0.0003	0.0182

Note: CI_{unadj} is unadjusted inequality in utilisation by income, and *HI* is the adjusted horizontal inequity index. All indices are significant at $p<0.05$. "other" variables include marital status, race, whether or not the individual is an immigrant, and a smoker.

Figure 1. Concentration curves for dental check-ups in Ontario under different specifications



(1) "some": respondents who report any frequency of check-up visits (less than once, once or more than once a year); (2) "regular": respondents who report a check-up visit at least once a year; (3) "good": respondents who report more than one check-up visit per year; (4) "proxy": respondents with at least one visit in past twelve months with no extraction (proxy for prevention).

Appendix 3J. Effect of dental insurance on the likelihood of a dentist visit (marginal effects from probit model, controlling for all other variables)

	Percentage of population with dental insurance	Marginal effect of dental insurance on the likelihood of a dentist visit (standard error)
Newfoundland	49.66	0.281 *(0.030)*
PEI	54.19	0.151 *(0.039)*
Nova Scotia	59.93	0.232 *(0.026)*
New Brunswick	60.11	0.214 *(0.026)*
Québec	46.45	0.145 *(0.013)*
Ontario	68.84	0.202 *(0.010)*
Manitoba	65.68	0.130 *(0.028)*
Saskatchewan	65.71	0.196 *(0.024)*
Alberta	71.14	0.214 *(0.019)*
BC	62.97	0.220 *(0.015)*
CANADA	61.92	0.185 *(0.006)*

Note: All coefficients are significant at $p<0.05$.

Appendix 4A. Non-linear estimations of GP and specialist utilisation

	GP				Specialist			
	Probability		Conditional		Probability		Conditional	
	ME	SE	Coef	SE	ME	SE	Coef	SE
Needs								
Very good SAH	**0.038**	*0.008*	**0.156**	*0.025*	**0.032**	*0.011*	-0.011	*0.048*
Good SAH	**0.041**	*0.009*	**0.345**	*0.027*	**0.049**	*0.013*	0.087	*0.045*
Fair SAH	**0.071**	*0.011*	**0.576**	*0.039*	**0.084**	*0.018*	**0.317**	*0.065*
Poor SAH	**0.114**	*0.011*	**0.856**	*0.053*	**0.152**	*0.026*	**0.800**	*0.104*
Moderate limitations	**0.037**	*0.009*	**0.214**	*0.028*	**0.104**	*0.012*	**0.245**	*0.045*
Severe limitations	**0.075**	*0.009*	**0.421**	*0.032*	**0.130**	*0.015*	**0.502**	*0.048*
Chronic condition	**0.094**	*0.009*	**0.362**	*0.023*	**0.080**	*0.011*	**0.265**	*0.048*
Female	**0.063**	*0.010*	**0.057**	*0.025*	**0.099**	*0.012*	0.042	*0.047*
Age	**-0.002**	*0.001*	-0.004	*0.003*	**-0.004**	*0.002*	0.007	*0.007*
Age^2	**0.000**	*0.000*	0.000	*0.000*	**0.000**	*0.000*	0.000	*0.000*
Female 18-45	**0.051**	*0.011*	**0.234**	*0.034*	0.030	*0.015*	**0.263**	*0.054*
Non-need variables								
Income (ln)	**0.029**	*0.007*	**-0.095**	*0.019*	**0.051**	*0.009*	**0.093**	*0.045*
Secondary education	0.016	*0.011*	0.005	*0.030*	0.027	*0.015*	**0.144**	*0.046*
Some post-secondary education	0.010	*0.014*	0.022	*0.039*	**0.091**	*0.018*	**0.161**	*0.052*
Post-secondary education	**0.041**	*0.010*	0.028	*0.026*	**0.095**	*0.013*	**0.255**	*0.038*
Urban	**0.019**	*0.008*	0.032	*0.024*	0.001	*0.011*	**0.072**	*0.036*
Employed	0.007	*0.009*	-0.104	*0.027*	**-0.035**	*0.012*	**-0.116**	*0.041*
Student	**0.028**	*0.011*	-0.163	*0.035*	**0.081**	*0.016*	-0.009	*0.129*
Canada born	**-0.021**	*0.008*	-0.022	*0.022*	0.006	*0.011*	**0.084**	*0.038*
Insurance for prescription drugs								
Public insurance	**0.043**	*0.011*	**0.179**	*0.034*	**0.078**	*0.016*	**0.093**	*0.048*
Private Ins-Group	**0.049**	*0.008*	**0.068**	*0.026*	**0.079**	*0.011*	0.037	*0.038*
Private Ins - Individual	**0.037**	*0.015*	0.132	*0.068*	**0.063**	*0.023*	0.022	*0.074*
Constant	**-1.217**	*0.276*	**1.753**	*0.212*	**-2.039**	*0.251*	**-0.874**	*0.41*
Alpha			0.394	*0.012*			0.546	*0.028*

Notes: Probit estimations are used for probability models (ME= marginal effects); negative binomial regression estimations are used for the models of conditional number of visits. For negative binomial models, *alpha* is the estimate for over-dispersion. Bold is significant at $p<0.05$.

Appendix 4B. Effects of drug insurance coverage on the two-part GP and specialist models under different specifications (OLS models adjusting for all other variables)

		GP		Specialist	
		probability	**conditional visits**	**probability**	**conditional visits**
	Drug insurance coverage				
Full specification					
N=33161	Public	**0.048**	**0.943**	**0.074**	0.212
	Private-Group	**0.052**	**0.267**	**0.074**	0.12
	Private-Individual	**0.044**	*0.56*	**0.061**	0.063
Under 65 population					
N=26354	Public	**0.038**	**1.219**	**0.082**	0.322
	Private-Group	**0.055**	**0.295**	**0.079**	0.12
	Private-Individual	**0.044**	*0.645*	**0.056**	0.02
Excluding income					
N=33161	Public	**0.047**	**0.965**	**0.072**	0.196
	Private-Group	**0.061**	0.136	**0.089**	**0.225**
	Private-Individual	**0.051**	0.454	**0.074**	0.139

Note: Bold is significant at 5% level, italics is significant at 10% level.

Appendix 4C. Effects of drug insurance coverage on the two-part GP and specialist models and estimates of inequity with alternative income variable (OLS models, adjusting for all other variables)

	GP		Specialist	
	probability	conditional visits	probability	conditional visits
Standard imputation				
Public	**0.048**	**0.943**	**0.074**	0.212
Private-Group	**0.052**	**0.267**	**0.074**	0.12
Private-Individual	**0.044**	*0.56*	**0.061**	0.063
Estimates of inequity	**0.017**	**-0.051**	**0.041**	**0.045**
Alternative imputation				
Public	**0.048**	**0.016**	**0.074**	0.214
Private-Group	**0.054**	**0.016**	**0.078**	0.132
Private-Individual	**0.046**	*0.541*	**0.064**	0.071
Estimates of inequity	**0.016**	**-0.051**	**0.041**	**0.047**

Note: Bold is significant at 5% level, italics is significant at 10% level.

Appendix 4D. Details of the public drug programme in Ontario

The public drug programme in the province of Ontario, termed the Ontario Drug Benefit Programme, covers different population groups each with different cost sharing arrangements. It is funded by the Ministry of Health and Long-Term Care and the Ministry of Community and Social Services. Each year the plan covers about 2.8 million Ontario residents at a cost of about $3.8 billion (Ontario Public Drug Programs, 2007). The benefits are listed on the Ontario Drug Benefit Formulary/Comparative Drug Index and include over 3,400 prescription drug products, about 450 limited-use drug products, and some nutritional and diabetic testing agents. For drugs that are not included in the Formulary, the Ministry of Health's Individual Clinical Review considers their inclusion on a case-by-case basis. It does not cover drugs purchased outside Ontario, prescribed by a pharmacist not licensed in Ontario, and the following products: syringes and other diabetic supplies such as lancets and glucometers, eyeglasses, dentures, hearing aids, or compression stockings.

The following population groups are covered:

- All Ontario residents 65 years of age and older (no registration is required, cost sharing is income-based)
- Ontario residents on social assistance (Ontario Disability Support Programme and/or Ontario Works)
- Residents of homes for special care and long-term care homes
- Ontario residents receiving professional home care services
- Ontario residents with high prescription drug costs relative to their income (covered by the Trillium Drug Programme)

- Individuals with certain chronic conditions (covered by the Special Drugs Plan) with no deductibles or co-payments. This programme covers specific drugs for the treatment of cystic fibrosis and thalassaemia, specific drugs used to treat people who are HIV positive, Erythropoietin (EPO) for people with end stage renal disease, Cyclosporine for people who have had a solid organ or bone marrow transplant, human growth hormone for children with growth failure, Clozapine for treatment of schizophrenia, and Alglucerase for people with Gaucher's Disease

Cost sharing arrangements for over-65 population

Individuals are classified into either high-income or low-income. High-income seniors are defined as: singly seniors with an annual income of $16,018 or more and seniors in couples with a combined annual income of $24,175 or more. This category must pay an annual deductible of $100.00, and co-payment of up to $6.11 toward the dispensing fee each time they fill a prescription (dispensing fees vary across pharmacies). Low income seniors are defined as singles with an annual income below $16,018 and seniors in couples with combined annual income less than $24,175 *may* have a co-payment of up to $2.00. Upon turning 65 all seniors are automatically enrolled in the high-income category. All other categories of eligible groups of the public drug programme have no deductible, and may have to pay up to $2.00 co-payment.

The Trillium Drug Program offers coverage for Ontario residents who have a valid Ontario Health Card, have high prescription drug costs in relation to their net household income, do not have private insurance coverage (or their coverage is not 100%), and do not fall into any of the categories above eligible for public coverage. Eligible

individuals must apply for registration (at a local pharmacy, by phone, or online). The cost sharing arrangements are as follows. There is an annual deductible (the year runs from August 1 to July 31) that is calculated on the basis of the household income and size, and paid quarterly. Co-payments up to $2.00 are then required for every drug product purchased. For households with annual net income below $100,000, the Ontario Drug Plan calculates the deductible for all possible income and household size categories. A single person with a net annual income of $40,000 would face an annual deductible of $1411. For households with annual net income above $100,000 the deductible is calculated on the basis of the following formula: total household net income minus $20,000, multiplied by 0.045 (subtract $100 if the number of people in the household is two, $150 if three, and $200 if four or more). For example, a family of three with two working parents and one child with a total annual net income of $120,000 would pay an annual deductible of: $4350.

Appendix 5A. Full utilisation models (to calculate residuals)

(1) GP visit

	Probability (probit)		Total Number (OLS)		Conditional Number (OLS)	
	Coef.	*Std. Err.*	Coef.	*Std. Err.*	Coef.	*Std. Err.*
Needs variables						
male 35-44	0.034	*0.026*	-0.014	*0.063*	-0.061	*0.083*
male 45-54	0.150	*0.030*	-0.124	*0.070*	-0.323	*0.089*
male 55-64	0.302	*0.033*	0.126	*0.073*	-0.183	*0.090*
male 65+	0.572	*0.033*	0.579	*0.081*	0.115	*0.096*
female 18-34	0.513	*0.024*	1.556	*0.059*	1.386	*0.071*
female 35-44	0.389	*0.027*	0.712	*0.070*	0.446	*0.086*
female 45-54	0.469	*0.031*	0.585	*0.076*	0.211	*0.090*
female 55-64	0.528	*0.031*	0.458	*0.071*	0.000	*0.086*
female 65+	0.644	*0.031*	0.539	*0.076*	-0.030	*0.091*
Very good SAH	0.093	*0.018*	0.262	*0.036*	0.270	*0.044*
Good SAH	0.132	*0.020*	0.736	*0.044*	0.840	*0.053*
Fair SAH	0.208	*0.031*	1.780	*0.092*	1.936	*0.103*
Poor SAH	0.343	*0.054*	4.303	*0.204*	4.454	*0.212*
moderate limitations	0.180	*0.022*	0.800	*0.057*	0.764	*0.063*
severe limitations	0.344	*0.028*	2.002	*0.086*	1.908	*0.091*
chronic condition	0.371	*0.016*	1.016	*0.032*	0.942	*0.040*
chronic (missing)	-0.201	*0.135*	0.211	*0.458*	0.759	*0.687*
Worse SAH past year	0.177	*0.025*	0.854	*0.073*	0.795	*0.080*
poor mental SAH	0.081	*0.037*	0.781	*0.121*	0.811	*0.131*
Obese	0.052	*0.019*	0.389	*0.050*	0.402	*0.058*
BMI missing	-0.064	*0.040*	0.446	*0.113*	0.615	*0.133*
Socioeconomics and provincial variables						
married	0.088	*0.020*	0.326	*0.051*	0.291	*0.063*
widow	0.046	*0.024*	0.460	*0.068*	0.469	*0.081*
Current smoker	-0.120	*0.018*	-0.046	*0.049*	0.097	*0.059*
Past smoker	0.012	*0.016*	-0.013	*0.037*	-0.025	*0.044*
drinks	-0.024	*0.026*	-0.178	*0.058*	-0.173	*0.072*
Secondary/some post - secondary education	0.094	*0.022*	0.006	*0.058*	-0.083	*0.069*
Post-secondary education	0.145	*0.020*	0.017	*0.053*	-0.144	*0.063*
Educ (missing)	0.017	*0.053*	0.165	*0.152*	0.202	*0.186*
2 person household	-0.026	*0.021*	-0.021	*0.057*	0.005	*0.069*
3 person household	-0.013	*0.024*	0.099	*0.063*	0.154	*0.077*
4 person household	0.037	*0.027*	0.063	*0.072*	0.050	*0.087*
5+ person household	-0.028	*0.032*	0.037	*0.081*	0.096	*0.097*
Born in Canada	-0.042	*0.021*	-0.039	*0.049*	-0.009	*0.057*
Born in Canada (missing)	-0.074	*0.040*	-0.010	*0.107*	0.076	*0.128*
Income $15,000-$29,999	0.054	*0.031*	-0.243	*0.093*	-0.399	*0.111*
Income $30,000-$49,999	0.125	*0.030*	-0.273	*0.092*	-0.518	*0.111*
Income $50,000-$79,999	0.164	*0.031*	-0.351	*0.091*	-0.663	*0.109*
Income $80,000+	0.233	*0.032*	-0.460	*0.091*	-0.856	*0.110*
Income (missing)	0.091	*0.033*	-0.427	*0.096*	-0.640	*0.114*
N.L.	0.165	*0.036*	0.566	*0.096*	0.467	*0.109*
P.E.I.	0.183	*0.054*	-0.068	*0.132*	-0.293	*0.148*
N.S.	0.173	*0.035*	0.367	*0.085*	0.219	*0.095*
N.B.	0.006	*0.031*	-0.423	*0.073*	-0.568	*0.086*
Que.	-0.284	*0.018*	-1.022	*0.041*	-1.029	*0.049*

	Probability		Total		Conditional	
	Coef.	*Std. Err.*	Coef.	*Std. Err.*	Coef.	*Std. Err.*
Man.	0.029	*0.032*	-0.102	*0.078*	-0.173	*0.091*
Sask.	0.108	*0.030*	0.240	*0.071*	0.160	*0.081*
Alta.	0.015	*0.024*	0.030	*0.063*	0.019	*0.075*
B.C.	0.118	*0.022*	0.553	*0.060*	0.530	*0.068*
Constant	-0.141	*0.043*	1.020	*0.114*	2.290	*0.139*
N		116113		116113		92364
Wald chi^2(probit)/F (OLS)		4389.06		223.22		159.44
Prob > chi^2(probit)/Prob>0 (OLS		0		0		0
Pseudo R^2 (probit)/ R^2 (OLS)		0.0843		0.1949		0.1844

Appendix 5A Cont'd:
(2) Specialist visits

	Probability (probit)		Total (OLS)		Conditional (OLS)	
	Coef.	*Std. Err.*	Coef.	*Std. Err.*	Coef.	*Std. Err.*
Needs variables						
male 35-44	-0.008	*0.025*	-0.041	*0.034*	-0.064	*0.068*
male 45-54	0.242	*0.028*	0.060	*0.038*	-0.205	*0.067*
male 55-64	0.373	*0.029*	0.205	*0.044*	-0.128	*0.072*
male 65+	0.766	*0.028*	0.604	*0.043*	0.026	*0.066*
female 18-34	0.440	*0.022*	0.696	*0.033*	0.694	*0.056*
female 35-44	0.378	*0.025*	0.411	*0.036*	0.257	*0.062*
female 45-54	0.490	*0.028*	0.391	*0.042*	0.040	*0.068*
female 55-64	0.563	*0.027*	0.434	*0.045*	0.005	*0.070*
female 65+	0.813	*0.028*	0.505	*0.040*	-0.149	*0.062*
Very good SAH	0.033	*0.016*	0.040	*0.021*	0.030	*0.034*
Good SAH	0.088	*0.018*	0.179	*0.025*	0.198	*0.040*
Fair SAH	0.208	*0.026*	0.622	*0.051*	0.707	*0.070*
Poor SAH	0.313	*0.043*	1.449	*0.108*	1.614	*0.128*
moderate limitations	0.237	*0.018*	0.501	*0.032*	0.496	*0.044*
severe limitations	0.348	*0.022*	1.033	*0.047*	1.070	*0.059*
chronic condition	0.249	*0.015*	0.356	*0.018*	0.379	*0.031*
chronic (missing)	0.040	*0.130*	0.112	*0.157*	0.235	*0.302*
Worse SAH past year	0.118	*0.020*	0.200	*0.039*	0.149	*0.052*
poor mental SAH	-0.011	*0.029*	0.369	*0.071*	0.628	*0.101*
Obese	-0.033	*0.016*	0.011	*0.027*	0.066	*0.041*
BMI missing	-0.035	*0.034*	0.229	*0.064*	0.464	*0.094*
Socioeconomic and provincial variables						
married	-0.017	*0.018*	0.102	*0.029*	0.204	*0.049*
widow	-0.044	*0.022*	0.057	*0.038*	0.168	*0.058*
Current smoker	-0.160	*0.017*	-0.150	*0.026*	-0.035	*0.042*
Past smoker	0.012	*0.014*	0.061	*0.022*	0.083	*0.033*
drinks	-0.040	*0.024*	-0.099	*0.032*	-0.145	*0.058*
Secondary/some post - secondary education	0.201	*0.019*	0.307	*0.028*	0.252	*0.045*
Post-secondary education	0.292	*0.018*	0.422	*0.026*	0.336	*0.040*
educ (missing)	0.028	*0.047*	0.093	*0.061*	0.114	*0.096*
2 person household	-0.003	*0.019*	-0.113	*0.032*	-0.188	*0.051*
3 person household	-0.035	*0.022*	-0.125	*0.036*	-0.163	*0.058*
4 person household	-0.037	*0.025*	-0.168	*0.041*	-0.236	*0.066*
5+ person household	-0.033	*0.029*	-0.196	*0.045*	-0.298	*0.072*
Born in Canada	0.070	*0.018*	0.091	*0.028*	0.065	*0.042*
Born in Canada (missing)	0.040	*0.035*	0.045	*0.048*	0.010	*0.076*
Income $15,000-$29,999	-0.007	*0.028*	-0.037	*0.046*	-0.084	*0.071*
Income $30,000-$49,999	0.069	*0.028*	0.060	*0.046*	-0.011	*0.070*
Income $50,000-$79,999	0.134	*0.029*	0.152	*0.047*	0.062	*0.072*
Income $80,000+	0.239	*0.030*	0.215	*0.048*	0.029	*0.074*
Income (missing)	0.105	*0.030*	0.032	*0.047*	-0.107	*0.072*
N.L.	-0.119	*0.031*	-0.238	*0.044*	-0.280	*0.075*
P.E.I.	0.036	*0.042*	0.040	*0.070*	-0.010	*0.107*
N.S.	-0.039	*0.030*	-0.035	*0.048*	0.005	*0.071*
N.B.	-0.050	*0.028*	-0.224	*0.041*	-0.319	*0.063*
Que.	0.064	*0.016*	0.009	*0.025*	-0.078	*0.038*
Man.	-0.086	*0.028*	-0.116	*0.041*	-0.092	*0.066*
Sask.	-0.029	*0.025*	-0.194	*0.037*	-0.314	*0.058*
Alta.	-0.076	*0.022*	-0.224	*0.032*	-0.290	*0.051*
B.C.	-0.102	*0.019*	-0.161	*0.028*	-0.127	*0.044*

	Probability		Total		Conditional	
	Coef	*SE*	Coef	*SE*	Coef	*SE*
Constant	-0.871	*0.040*	-0.034	*0.062*	1.249	*0.100*
N		116113		116113		65184
Wald chi^2(probit)/F (OLS)		4719.01		115.63		54.53
Prob > chi^2(probit)/Prob>0 (OLS		0		0		0
Pseudo R^2 (probit)/ R^2 (OLS)		0.0685		0.1103		0.10

Appendix 5A Cont'd
(3) Inpatient admissions

	Probability		**Total Number**		**Conditional**	
	Coef.	*Std. Err.*	Coef.	*Std. Err.*	Coef.	*Std. Err.*
Needs variables						
male 35-44	-0.239	*0.043*	-0.077	*0.031*	0.693	*0.575*
male 45-54	-0.183	*0.043*	-0.051	*0.042*	1.515	*0.678*
male 55-64	-0.021	*0.041*	0.053	*0.047*	1.362	*0.552*
male 65+	0.260	*0.038*	0.559	*0.060*	2.843	*0.539*
female 18-34	0.508	*0.034*	0.221	*0.028*	0.064	*0.392*
female 35-44	0.075	*0.038*	-0.013	*0.031*	0.020	*0.453*
female 45-54	-0.101	*0.048*	-0.102	*0.036*	0.196	*0.517*
female 55-64	-0.077	*0.043*	-0.047	*0.041*	1.067	*0.559*
female 65+	0.133	*0.038*	0.300	*0.054*	2.340	*0.550*
Very good SAH	-0.010	*0.027*	0.016	*0.012*	0.654	*0.186*
Good SAH	0.110	*0.027*	0.109	*0.019*	1.183	*0.218*
Fair SAH	0.361	*0.034*	0.714	*0.063*	2.797	*0.378*
Poor SAH	0.693	*0.045*	2.313	*0.179*	4.286	*0.539*
moderate limitations	0.210	*0.023*	0.205	*0.030*	0.652	*0.251*
severe limitations	0.409	*0.025*	0.854	*0.065*	2.414	*0.319*
chronic condition	0.151	*0.024*	0.054	*0.015*	0.505	*0.197*
chronic (missing)	-0.040	*0.211*	-0.004	*0.113*	0.467	*1.957*
Worse SAH past year	0.243	*0.023*	0.402	*0.053*	0.575	*0.269*
poor mental SAH	-0.052	*0.034*	-0.089	*0.080*	0.367	*0.446*
Obese	0.041	*0.021*	-0.030	*0.031*	-0.298	*0.248*
BMI missing	-0.027	*0.041*	0.010	*0.060*	0.162	*0.450*
Socioeconomic and provincial variables						
married	0.282	*0.026*	0.097	*0.028*	-1.054	*0.306*
widow	0.233	*0.031*	0.157	*0.046*	-0.347	*0.404*
Current smoker	0.045	*0.024*	-0.028	*0.028*	-0.336	*0.274*
Past smoker	0.087	*0.020*	0.052	*0.021*	-0.175	*0.214*
drinks	0.062	*0.047*	-0.021	*0.036*	-0.612	*0.439*
Secondary/some post - secondary education	-0.035	*0.025*	0.000	*0.036*	0.522	*0.296*
Post-secondary education	-0.021	*0.022*	0.009	*0.034*	0.404	*0.266*
Educ (missing)	0.105	*0.063*	0.081	*0.081*	0.135	*0.651*
2 person household	-0.125	*0.028*	-0.145	*0.041*	-0.528	*0.372*
3 person household	0.032	*0.031*	-0.051	*0.042*	-0.209	*0.408*
4 person household	-0.034	*0.036*	-0.072	*0.046*	-0.244	*0.481*
5+ person household	-0.007	*0.042*	-0.099	*0.046*	-0.853	*0.483*
Born in Canada	0.103	*0.025*	0.116	*0.027*	0.396	*0.290*
Born in Canada (missing)	0.044	*0.051*	0.046	*0.053*	0.025	*0.526*
Income $15,000-$29,999	-0.075	*0.031*	-0.170	*0.070*	-0.603	*0.428*
Income $30,000-$49,999	-0.101	*0.032*	-0.248	*0.067*	-1.231	*0.431*
Income $50,000-$79,999	-0.142	*0.033*	-0.231	*0.067*	-0.759	*0.445*
Income $80,000+	-0.163	*0.035*	-0.255	*0.067*	-1.205	*0.460*
Income (missing)	-0.152	*0.034*	-0.205	*0.070*	-0.396	*0.480*
N.L.	0.014	*0.042*	0.029	*0.052*	-0.164	*0.471*
P.E.I.	0.181	*0.057*	0.410	*0.144*	1.846	*0.997*
N.S.	0.026	*0.037*	0.049	*0.048*	-0.019	*0.409*
N.B.	0.066	*0.035*	0.153	*0.055*	0.329	*0.463*
Que.	0.118	*0.022*	0.081	*0.027*	-0.348	*0.262*
Man.	0.075	*0.039*	0.040	*0.046*	-0.321	*0.444*
Sask.	0.174	*0.035*	0.088	*0.047*	-0.716	*0.388*
Alta.	0.115	*0.030*	0.046	*0.034*	-0.456	*0.311*
B.C.	-0.008	*0.026*	-0.049	*0.029*	-0.694	*0.315*

	Probability		Total Number		Conditional	
Constant	-2.073	*0.058*	0.128	*0.074*	3.864	*0.645*
N		116113		116113		11185
Wald chi^2(probit)/F (OLS)		3177.1		41.66		28.25
Prob > chi^2(probit)/Prob>0 (OLS		0		0		0
Pseudo R^2 (probit)/ R^2 (OLS)		0.0988		0.0691		0.1477

Appendix 5B. Full OLS models of residual GP, specialist and inpatient utilisation

	Residual GP utilisation			Residual specialist utilisation			Residual inpatient utilisation	
	Prob	Cond	Total	Prob	Cond	Total	Prob	Cond
SUN-wait	**0.044**	**0.602**	**0.666**	**0.081**	**0.392**	**0.473**	**0.013**	-0.361
SUN-barrier	**-0.024**	**0.391**	0.219	-0.022	-0.021	-0.065	-0.003	0.054
SUN-choice	**-0.059**	**-0.254**	**-0.479**	**-0.039**	-0.090	**-0.160**	**-0.017**	-0.007
SUN-other	**-0.038**	**0.559**	**0.293**	0.012	**0.310**	**0.231**	**0.035**	0.193
married	-0.002	-0.003	-0.010	-0.001	-0.002	-0.005	0.002	0.000
widow	-0.002	-0.002	-0.009	0.000	0.000	-0.004	0.000	0.003
Current smoker	0.001	-0.028	-0.015	-0.001	-0.014	-0.010	-0.001	0.007
Past smoker	0.000	-0.007	-0.005	-0.001	-0.003	-0.004	0.000	-0.003
drinks	0.002	0.007	0.009	0.001	0.002	0.004	-0.001	0.002
Secondary/some post -secondary education	0.001	-0.014	-0.009	-0.001	-0.007	-0.006	-0.001	-0.001
Post-secondary education	0.001	-0.029	-0.021	-0.002	-0.016	-0.014	0.000	0.014
Education. (missing)	0.001	-0.004	-0.003	0.000	-0.006	-0.002	-0.001	-0.024
2 person household	0.001	0.000	0.003	0.000	0.001	0.002	-0.001	0.003
3 person household	0.001	-0.004	0.001	0.001	-0.003	0.001	0.001	0.001
4 person household	0.001	-0.003	-0.001	0.001	-0.002	-0.001	0.000	0.005
5+ person household	0.002	0.001	0.005	0.001	0.000	0.003	0.001	0.008
Born in Canada	0.000	0.003	0.006	0.000	0.002	0.003	0.000	-0.001
Born in Canada (missing)	0.000	-0.010	-0.003	0.000	0.001	-0.002	0.001	0.028
Income $15,000-$29,999	-0.001	0.019	0.009	0.000	0.007	0.003	0.001	0.004
Income $30,000-$49,999	-0.002	0.024	0.014	-0.001	0.007	0.004	0.001	0.009
Income $50,000-$79,999	-0.003	0.029	0.014	-0.001	0.008	0.004	0.001	0.007
Income $80,000+	-0.002	0.032	0.015	-0.001	0.008	0.003	0.000	0.004
Income (missing)	-0.001	0.032	0.016	0.000	0.010	0.006	0.001	0.001
N.L.	-0.004	0.000	0.000	0.000	-0.008	-0.003	0.001	0.010
P.E.I.	-0.004	-0.014	-0.019	-0.002	-0.011	-0.013	0.000	0.010
N.S.	-0.003	0.001	-0.002	0.000	0.001	-0.002	0.001	0.008
N.B.	-0.003	0.005	0.002	0.000	0.000	-0.001	0.001	0.000
Que.	-0.001	-0.008	-0.010	-0.001	-0.006	-0.009	0.000	0.007
Man.	0.000	-0.009	-0.002	0.000	-0.005	-0.005	0.000	0.003
Sask.	0.000	0.010	0.013	0.001	0.001	0.005	0.000	-0.005
Alta.	-0.001	0.010	0.009	0.001	0.005	0.005	0.000	-0.001
B.C.	0.000	-0.001	0.003	0.001	0.000	0.003	0.001	0.003
N	116113	92364	116113	116113	65184	116113	116113	11185
R^2	*0.0014*	*0.0023*	*0.0022*	*0.0016*	*0.0023*	*0.0031*	*0.0007*	*0.0002*
F	***2.22***	***2.02***	***2.49***	***2.79***	*1.22*	***11.17***	*0.78*	*0.04*

Appendix 5C: Association between 'preferences' and SUN - Adjusted odds ratios of reported unmet home care needs and satisfaction with life in general and SUN

	Any unmet need			SUN-wait		SUN-barrier		SUN-choice		SUN-Other	
	Mean	OR	*95% CI*	OR	*95% CI*	OR	*95% CI*	OR	*95% CI*	OR	*95% CI*
Unmet home care needs											
yes	0.017	3.22	*(2.78-3.72)*	1.99	*(1.65-2.39)*	3.05	*(2.46-3.78)*	2.15	*(1.68-2.75)*	2.43	*(1.99-2.98)*
Satisfaction with life in general											
very satisfied	0.379										
satisfied	0.518	1.26	*(1.18-1.35)*	1.18	*(1.08-1.29)*	1.35	*(1.17-1.56)*	1.49	*(1.30-1.71)*	1.16	*(1.00-1.35)*
neither satisfied nor dissatisfied	0.052	2.00	*(1.77-2.25)*	1.41	*(1.19-1.66)*	2.53	*(2.02-3.16)*	2.51	*(2.03-3.10)*	1.60	*(1.25-2.03)*
dissatisfied	0.026	2.11	*(1.80-2.46)*	1.42	*(1.15-1.75)*	3.11	*(2.37-4.08)*	2.31	*(1.76-3.03)*	1.74	*(1.34-2.27)*
very dissatisfied	0.005	2.66	*(2.01-3.52)*	1.41	*(0.94-2.10)*	2.62	*(1.75-3.91)*	2.63	*(1.56-4.43)*	2.11	*(1.42-3.12)*
(missing)	0.020	1.03	*(0.80-1.32)*	0.86	*(0.64-1.16)*	1.29	*(0.71-2.36)*	1.05	*(0.66-1.68)*	1.50	*(0.98-2.31)*
Pseudo R2		0.101		0.064		0.094		0.067		0.072	

Notes: Odds rations (ORs) adjusted for all needs variables; 95% CI is the 95% confidence interval surrounding the point estimate.

Appendix 5D. OLS models of residual GP and specialist utilisation after incorporating "preference" indicators in the utilisation models to generate residuals

	Residual GP utilisation		Residual specialist utilisation	
	Conditional	Total	Conditional	Total
SUN-wait	**0.573**	**0.638**	**0.380**	**-0.173**
SUN-barrier	0.287	0.136	-0.064	**0.461**
SUN-choice	**-0.295**	**-0.505**	-0.111	**-0.108**
SUN-other	**0.491**	*0.237*	**0.289**	**0.204**
married	-0.004	-0.011	-0.002	-0.005
widow	-0.003	-0.009	0.000	-0.004
Current smoker	-0.024	-0.012	-0.012	-0.009
Past smoker	-0.006	-0.005	-0.003	-0.003
drinks	0.007	0.009	0.002	0.004
Secondary/some post -secondary education	-0.012	-0.007	-0.006	-0.005
Post-secondary education	-0.025	-0.019	-0.014	-0.013
Education (missing)	-0.004	-0.003	-0.006	-0.002
2 person household	0.001	0.003	0.001	0.002
3 person household	-0.002	0.002	-0.002	0.001
4 person household	-0.002	0.001	-0.002	0.000
5+ person household	0.003	0.006	0.001	0.004
Born in Canada	0.004	0.006	0.002	0.004
Born in Canada (missing)	-0.008	-0.002	0.002	-0.002
Income $15,000-$29,999	0.015	0.006	0.006	0.001
Income $30,000-$49,999	0.019	0.010	0.005	0.002
Income $50,000-$79,999	0.023	0.010	0.007	0.001
Income $80,000+	0.025	0.010	0.005	0.000
Income (missing)	0.026	0.012	0.008	0.003
N.L.	-0.001	-0.001	-0.009	-0.004
P.E.I.	-0.014	-0.019	-0.011	-0.014
N.S.	0.000	-0.003	0.001	-0.003
N.B.	0.003	0.000	-0.001	-0.002
Que.	-0.009	-0.010	-0.007	-0.009
Man.	-0.008	-0.002	-0.005	-0.005
Sask.	0.009	0.012	0.000	0.005
Alta.	0.008	0.007	0.004	0.004
B.C.	-0.001	0.004	0.000	0.003
N	92364	116113	65184	116113
R^2	*0.002*	*0.002*	*0.2927*	*0.0029*
F	***1.72***	***2.27***	***1.12***	***10.46***

CHAPTER 6

Appendix 6A. Proposals for national prescription drug plans

Recent policy proposals to address the gaps in coverage for medicines and variations in coverage across provinces include the 2002 Commission on the Future of Health Care in Canada (known as the "Romanow Commission"; (Canada, 2002a)) and the 2002 Final Report on the State of the Health Care System in Canada (the "Kirby Report"; (Canada, 2002b)). Following these recommendations, in 2003 the First Ministers' Accord on Health Care Renewal stated their support for developing a strategy for prescription drugs "to ensure that Canadians, wherever they live, have reasonable access to catastrophic drug coverage" (Health Canada 2003), and then restated again in 2004 in the ten-year plan to strengthen health care that cited catastrophic drug coverage as a priority.

Romanow advocated for a gradual integration of prescription drugs into the health system. Initially he proposed the allocation of additional federal funds to support all provinces in their provision of catastrophic coverage (with a threshold of $1500) for high drug costs as a means of reducing disparities in coverage across the country. Additional funds could be used to expand existing programmes in order to reduce cost sharing or extend coverage to people not currently included.

The Kirby Report similarly proposed that the federal government should pay 90% of prescription drug expenditures in excess of $5000 per person (combining out-of-pocket expenses and provincial contributions). This federal cost sharing would be conditional on provinces ensuring an annual out-of-pocket maximum per family of 3% of family income. This federal contribution would apply to both provincial programmes and private drug insurance plans, where for the latter the plans would have to ensure that no

insured would have to pay more than 3% of family income or $1500, whichever is less. Unfortunately following these proposals would leave unchanged many of the current impediments to accessing medicines and physicians; though it is acknowledged as a first step towards better integration of prescription drugs into the health system (Romanow, 2002). This plan would benefit the small percentage of working-age individuals who are inadequately covered at present but face very large drug costs (Grootendorst & Veall, 2005). However of all cost sharing arrangements, deductibles have the strongest potential equity implications since an individual is essentially uninsured until they reach a certain threshold. Moreover with deductibles the public subsidy of all medicines is zero across all types of medicines (generics and brand-name, essential and non-essential alike) giving patients no information or incentives with regards to their treatment choices (Morgan & Willison, 2004).

In 2004 the First Ministers established a Ministerial Taskforce to develop and implement a *National Pharmaceuticals Strategy* to address three key themes: access, safety effectiveness and appropriate use, and system sustainability. They further laid out nine elements in their 10-Year Plan to Strengthen Health Care, and these include the development of catastrophic pharmaceutical coverage that all Canadians are eligible for, is integrated with other public plans, and comparable across the country. Work so far has been conducted to identify a catastrophic drug coverage threshold, and calculate the relevant costs (private and public) associated with the plans. For example, the threshold could either be set as a variable (progressive) percentage of family income or as a fixed percentage (4.3%) and could either maintain private payers or not[55]. The 2006 progress

[55] The estimated cost of a variable percentage threshold, mixed public-private payer model would be $7.8 billion annually, and $10.3 billion without private payers. The estimated cost of a fixed percentage threshold plan with private payers would be $6.6 billion and $9.4 billion with public payers. (Current public spending is $6.6 billion). All plans reduce the reliance on out-of-pocket payments and increase the public role.

report noted that provincial governments are proceeding to evaluate the cost implications of this programme, and there remains widespread support for its implementation (F/P/T Ministerial Task Force on the National Pharmaceuticals Strategy, 2006).

These recent proposals and subsequent policy action contrast the more comprehensive and public national plan recommended by the National Forum on Health in 1997 including the absorption of the existing private plans by a public system and no deductibles.

> Because pharmaceuticals are medically necessary and public financing is the only reasonable way to promote universal access and to control costs, we believe Canada should take the necessary steps to include drugs as part of its publicly funded health care system (Canada, 1997).

Arguably such a system would be associated with the greatest equity gains. The greatest impediment to the implementation of a national drug plan has been cost (Marchildon, 2006). The expected costs of a federal 'pharmacare' programme are indeed substantial, in the range of 8 billion dollars, if the federal government simply replaced the current provincial plans, 12 billion dollars, to provide universal insurance with cost sharing at the level of the most generous provincial public plan, to 19 billion dollars, to provide universal first-dollar coverage (Marchildon, 2006). However the strong evidence base for the efficiency gains associated with single purchasers (such as the ability to more effectively manage costs) could extend to a pharmaceutical plan. The potential for a national plan to reduce provincial inequalities and extend coverage to uninsured populations is important. But also important is the potential for improved efficiency and cost saving through the formation of a national drug formulary, the

possibility of bulk buying of medicines, and the monitoring and managing of prescribing and utilisation.