

**THE IMPACT OF AREA-BASED CULTURAL CHARACTERISTICS  
ON PARTICIPATION WITH  
THE FAIR PHARMACARE PROGRAM IN BC**

by

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## ABSTRACT

**Background:** Little Canadian research exists which examines equitable access to public pharmaceutical insurance. In order to better understand issues related to access to publicly funded, universal prescription drug insurance in Canada, my thesis examines participation with (and therefore access to) the Fair PharmaCare program in BC. Specifically, my thesis: 1) describes methodologies that can be used to create area-level cultural variables for use with BC administrative data; and 2) studies the impact of household and area-level factors, particularly area-level cultural factors, on non-senior households' registration for Fair PharmaCare in 2003. I hypothesized that the process of registration may act as a barrier to participation with Fair PharmaCare, particularly for households belonging to various culturally defined communities.

**Methods:** Dissemination area (DA) level census data were obtained from Statistics Canada to create dichotomous, ecological variables which capture the collective ethnic composition, English language capacity and immigration status of residents within each DA. In turn, these variables were employed in multivariate, logistic regression analyses, which also included household-level measures of demographics, enabling resources and health status as well as area-level measures of income and health care resources. The outcome of interest was registration for Fair PharmaCare.

**Findings:** Controlling for area-level income and health care resources, household-level demographics, enabling resources and health status, as well as area-level cultural factors, influenced households' likelihood of registration for Fair PharmaCare. Households belonging to DAs with a high concentration of individuals reporting a Chinese or Punjabi ethnic background, or DAs that were ethnically homogeneous, regardless of the ethnic background, were more likely to register. In contrast households belonging to DAs consisting of a high concentration of recent immigrants or individuals belonging to ethnic minority groups that are underrepresented in BC were less likely to register.

**Conclusions:** Considering the policy context surrounding the implementation of Fair PharmaCare, the findings from my thesis suggest that specific subpopulations within BC may face difficulties with the registration process, thereby reducing their participation in the program. Government interventions however, appear to have improved registration amongst other subpopulations. Consideration should be given to interventions that may reduce inequities in participation amongst other subgroups.

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## LIST OF ABBREVIATIONS

ACG	Adjusted Clinical Group
ADG	Aggregated Diagnostic Group
BC	British Columbia
BCLHD	British Columbia Linked Health Database
CCHS	Canadian Community Health Survey
CDN	Canadian
CHA	Canada Health Act
DA	Dissemination Area
EA	Enumeration Area
H-index	Herfindahl Index
ICD	International Classification of Diseases
MEPS	Medical Expenditure Panel Survey
NPHS	National Population Health Survey
RCMP	Royal Canadian Mounted Police
SCHIP	State Children's Health Insurance Program
USA	United States of America



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# 1 INTRODUCTION

## 1.1 Pharmaceutical expenditure in Canada

Prescription drug expenditure represents one of the fastest growing categories of health expenditure in Canada [1]. Between 1985 and 2005, expenditure for prescription drugs grew at an average annual rate of 10.6% [2]. Translated into dollars, Canadian spending increased from \$2.6 billion CDN to \$19.4 billion over this period. Forecasts indicate that drug spending has continued to rise, with expenditure on prescribed drugs in 2006 and 2007 estimated to be \$20.9 billion and \$22.5 billion respectively. Moreover, as of 1997, annual total drug expenditure has surpassed annual spending on physician services in Canada. Thus, within the healthcare envelope, pharmaceutical spending is second only to hospitals.

The spiralling costs of prescription drugs raise concerns regarding the affordability of healthcare for Canadians. Unlike physician and hospital services, outpatient prescription drugs are absent within the Canada Health Act (CHA). Thus, the cost of prescription medications are not covered by a nationally regulated public insurance scheme [3]. Consequently, many Canadians purchase private drug insurance, pay out of pocket, or leave prescriptions unfilled. Past research suggests that even small financial payments toward pharmaceuticals can reduce patients' use of both essential and non-essential medicines [4-7]. This is of concern because essential medicines include life-sustaining medicines as well as medicines known to prevent the deterioration of health. The cost of pharmaceuticals therefore acts as a barrier in accessing prescription medicines, which in turn may lead to poor health outcomes.

To offset costs and potentially reduce barriers in access, provincial governments have independently developed public drug insurance plans. Indeed, since the 1970s, provincial plans have been available for those with the greatest needs and the least ability to pay (e.g. social assistance recipients and seniors) [8]. To address the needs of specific populations (Aboriginal populations, veterans, members of the military and RCMP, prisoners in federal correctional facilities and refugees), federal drug subsidy programs have also emerged [9]. However, despite efforts by governments, a substantial proportion of prescription drugs continue to be paid for

through the private sector. Of the \$22.5 billion spent on prescription drugs in 2007, \$10.8 billion was paid for by the public sector; the remaining \$11.7 billion was paid by the private sector [2]. Within the private sector, insurers spent \$7.8 billion while households spent \$3.9 billion out-of-pocket.

Out-of-pocket spending for prescription drugs represents 14.5% of total drug spending in Canada [2]. Reports indicate that 10-20% of Canadians still lack drug insurance or are underinsured [8]. This suggests that up to one-fifth of the Canadian population may face considerable financial barriers in access to prescription medications or potentially significant financial burdens for the drugs they use. This disparity threatens the long held principle of equity, equal access by all Canadians, in access to healthcare. Given the magnitude of out-of-pocket costs for prescription drugs, considerable concern exists regarding the affordability of essential prescription medicines for uninsured populations [9].

## **1.2 The Fair PharmaCare program**

In an attempt to improve equity in access to medicines, the government of British Columbia (BC) introduced the Fair PharmaCare program on May 1, 2003. Fair PharmaCare is the largest public drug plan offered by the BC government [10, 11]. Its goal is to assist families, who experience high prescription drug costs relative to their income, with the cost of their medicines (Appendix A1). All residents are eligible to enrol for Fair PharmaCare and are encouraged to do so. However, residents who are eligible to receive prescription drug coverage through another provincial or federal program<sup>1</sup> ( $\approx 8.6\%$ ) are expected to use the alternative program, as public programs offered to select subpopulations are often more generous. In order to be eligible for benefits under Fair PharmaCare, residents must register with their family for the program and consent to have their household income verified with the Canada Revenue Agency annually. This

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<sup>1</sup> For example, the BC government offers specific prescription drug programs to residents of licensed long-term care facilities, recipients of social assistance, individuals diagnosed with Cystic Fibrosis, children eligible for the Children At Home program, individuals diagnosed with a mental illness and receiving financial assistance, and palliative care patients. Federal programs include programs for RCMP and military families, refugees, Aboriginal populations, and inmates within correctional facilities, amongst others.

registration process is only required once; however families may refuse the automatic verification of their household income and be requested to provide permission on an annual basis.

The requirement of registration is a distinguishing feature of the Fair PharmaCare program. Typically, publicly funded prescription drug insurance programs in Canada are offered to seniors (aged 65 and up) or individuals with specific disease conditions [2]. In both situations, registration is not required by the general public. Seniors are often automatically enrolled in age-based prescription drug insurance programs, while individuals with a specific disease are often directed to disease specific drug insurance programs through a health care practitioner. As such, I hypothesized that the process of registration may act as a barrier to access for publicly funded drug insurance programs due to the public's lack of familiarity with programs directed at the general public (i.e. Fair PharmaCare). This hypothesis is based, in part, on evidence from the United States of America (USA) which suggests that the process of registration for public health insurance acts as a barrier to access for certain subpopulations [12].

In order to gain a better understanding of the policy context surrounding Fair PharmaCare, I conducted interviews with policymakers involved with the development and implementation of the program in 2003<sup>2</sup>. These interviews helped to shape my understanding of the government's objectives and concerns leading up to the program's introduction. Moreover, they helped me identify potential mediating factors, which may have influenced registration. In particular, through our discussions, I learned that policymakers were concerned that the process of registration may act as a barrier to accessing the program. As a result, concerted efforts were made to promote the program and facilitate registration. Specifically, promotional activities and assistance with registration were targeted at seniors, low income families, and the Chinese and Punjabi communities.

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<sup>2</sup> Interviews were conducted between August and November, 2007.

### **1.3 British Columbia's demographics**

Promotional ads and translation services were targeted to the Chinese and Punjabi communities because they represent the largest visible minority groups in BC. Based on the 2006 census, BC has the highest proportion of visible minorities of any province or territory in Canada [13]. More than one million residents now identify as a visible minority: thus visible minorities represent almost a quarter (24.8%) of the BC population. The largest visible minority group is the Chinese ethnic group, representing 40.4% of BC's visible minority population and 10% of BC's total population. The second largest visible minority group is the South Asian visible minority group (comprising of East Indian, Punjabi, Pakistani and other ethnic minority groups). South Asians represent approximately 26% of BC's visible minority population and 6.4% of BC's total population.

The burgeoning Asian population within BC is a relatively new phenomenon. Historically, source countries for immigrants settling in BC included the United Kingdom, Scotland, Germany and other countries within the British Isles and Europe [13]. This was reflected in the latest census, as the most common ethnic ancestries reported by British Columbians were British Isles, Canadian and other European. To further highlight the changing ethnic portrait of BC, the vast majority of residents reporting a European or British ancestry are Canadian-born. In contrast, almost 75% of Chinese and over 60% of South Asian residents are foreign-born.

### **1.4 Thesis overview**

Little Canadian research exists which examines equitable access to public pharmaceutical insurance. In order to better understand issues related to access to publicly funded, universal<sup>3</sup> prescription drug insurance programs in Canada, my thesis examines participation with the Fair PharmaCare program in BC. More specifically, my thesis is a policy-relevant health services research project that studies the impact of household and area-level characteristics, including neighbourhood-level cultural characteristics, on household registration for Fair PharmaCare.

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<sup>3</sup> The term universal is used to describe programs offered to all residents within a specified jurisdiction (e.g. a program not constrained by age or disease criteria).

The organization of my thesis is as follows:

- In chapter two, I review literature to obtain an appreciation for issues related to access: access to health care, access to medicines and access to publicly funded health insurance programs. Additionally, to gain insight into the methodological approaches used to study the impact of culture, I review Canadian health research studies that have attempted to quantify the influence of various aspects of culture.
- Following the literature review, which lays the foundation for my thesis, in chapter three I outline my specific study purpose, research questions and hypotheses.
- In chapters four and five, I address the two main research question of my thesis, respectively. As such, each chapter contains a short background, methods, results and discussion section pertaining to the specific question it aims to address.
- Finally, in chapter six, I conclude my thesis by discussing the overall policy implications of my research and suggesting avenues for future research.

## **2 LITERATURE REVIEW**

### **2.1 Background**

Canada's public, universal health care system (Medicare) was built on the premise that all Canadians should have equal access to care [14]. Care, as defined by the CHA, refers to all medically necessary physician and hospital services. Access to health care refers to individuals' freedom or ability to use health care services when in need. Equity, in the context of the Canadian health care system, is defined by need: equity is achieved if Canadians' access to health care is based solely on their health care needs and not influence by other characteristics, such as socioeconomic status, sex, age, etcetera [15]. In order to improve equity in access to care, Medicare is financed through general taxes to ensure that all Canadians may access health care, regardless of their ability to pay for services. Indeed, Medicare has successfully reduced the financial barriers associated with accessing physician and hospital services in Canada.

Nevertheless, despite the existence of Medicare in Canada, barriers to access to care persist. First, care as defined by the CHA, excludes outpatient medicines as well as a broad spectrum of health services available (i.e. home care, dental care, physiotherapy, etc) [3]. Thus, financial barriers in access to health care still exist. Other barriers to health care, including physician and hospital services, are waiting times, distance to services, and social and cultural factors [16]. Traditionally, the issues of waiting times and distance receive substantial attention, particularly through the media. However, social and cultural factors are also important and should not be overlooked.

Social and cultural factors, such as gender, language, education and wealth, influence individuals' ability to access care [16]. For example, language barriers have been found to impact satisfaction, the use of preventative services, compliance with care, and the quality of care received. In general, social and cultural factors are thought to affect communication, understanding of care needs and options, as well as acceptance of diagnoses and treatments.

In accordance with the aim to improve equity in access to care, Fair PharmaCare offers prescription drug insurance to all residents in BC. Research has yet to be conducted to determine the extent to which equity in access to Fair PharmaCare is achieved and what, if any, barriers exist to accessing the program. I hypothesized that cultural factors impact participation with (and thus access to) Fair PharmaCare. Therefore, in this thesis, the influence of culture on participation with Fair PharmaCare is explored. To inform this study, I review literature related to: 1) access to care; 2) access to medicines; 3) access to publicly funded insurance programs; and 4) the measurement of culture in Canadian health research.

## **2.2 Access**

As a consequence of the structure of the Canadian health care system, issues of access vary depending on the type of service considered. To gain an appreciation of the diversity of research focused on issues of access, research that examines access to health care, access to medicines and access to publicly funded insurance programs are considered separately.

My search strategy involved the Web of Science and Ovid Medline databases. To identify research related to access to health care, I began my search with the following search terms: access, health, health care, Canada, and barriers. Once relevant articles were identified, I used links provided by the databases to locate related articles, articles that have cited the relevant articles of interest and citations referenced within the articles of interest. I later expanded my search with the following search terms: household, area-level factors, neighbourhood determinants, and community. Due to the paucity of literature within Canada related household and area-level factors and their impact on access to health care, I removed the geographic restriction (e.g. Canada). I then continued my literature search using citations as described above. Although no formal restriction was placed on the time of publication, I focused on literature published after 1973<sup>4</sup>.

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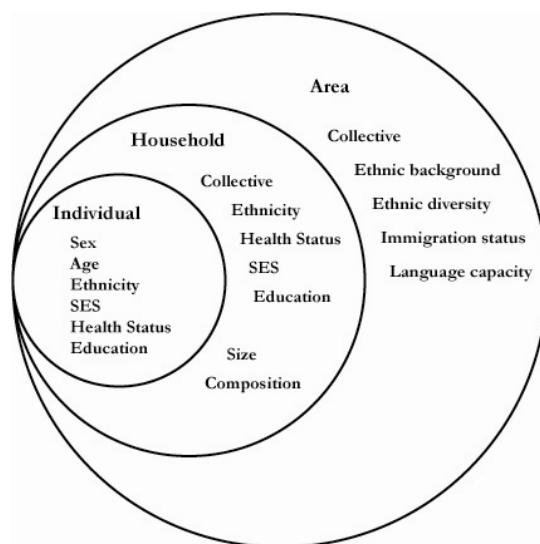
<sup>4</sup> I chose to focus on articles published after 1973 because the Andersen and Newman Behavioral Model of Utilization was published in 1973.



Similarly, using the approach described above, I searched for literature that explored issues related to access to medicines and access to publicly-funded insurance. Initially, the search terms that I employed to identify access to medicines literature included: Canada, access, medicines, pharmaceuticals, prescription drugs, utilization, barriers, and pharmaceutical insurance. I later removed the geographic restriction, again due to the limited amount of research conducted specifically in Canada. With respect to literature related to access to publicly funded insurance, I used the following search terms: Canada, public, insurance, access, cost, health care, pharmaceuticals, and registration. Given the lack of literature identified, I again removed the geographic restriction. This allowed me to identify some relevant articles, which in turn lead to a more fulsome review following citations.

## 2.21 Access to health care

Access to health care is often inferred through measuring the utilization of health care services: utilization of health care is an outcome of access to care. In addition, perceived access to health care is also measures through surveys. Hence, using measures of actual utilization as a proxy for access and measures of perceived access, a variety of factors have been shown to influence individuals' and families' access to health care, including individual, household and area-level factors (Figure 1).



**Figure 1: Factors shown to affect health care utilization**

### **2.21.1 Individual-level factors**

Following the introduction of the “Behavioural Model of Utilization” proposed by Andersen and Newman (1973) [17], numerous studies have sought to determine what factors predict individuals’ use of health care [18, 19]. A strong body of empirical evidence exists that identifies individual-level factors which predict the use of hospital care, physicians services and long term care, amongst other health care services. In order to understand how individual-level factors impact access to care in Canada, Canadian literature is reviewed.

Past research suggests that the use of hospital services is influenced by a variety of individual-level factors. Firstly, health status is a strong predictor of individuals’ use of hospital services [20]. Given that the Canadian health care system aims to provide health services to individuals based on need rather than ability to pay, researchers have also examined the use of hospital services according to health status and socioeconomic status [21]. Individuals with lower socioeconomic status and poorer health status have been found to be more likely to receive acute hospital care and general practitioner services [20-23]. These findings are consistent with the aim to provide services based on need as opposed to ability to pay, as health status has been found to decrease with decreasing socioeconomic status [21]. In contrast, use of specialist services has been found to decrease or have little variation by socioeconomic status [21-23]. Therefore, unlike acute health care services, barriers to accessing specialist care exist for individuals of lower socioeconomic status, as these individuals are expected to need more services.

In addition to health status and socioeconomic status, other factors have also been shown to impact access to care. Wilson et al (2004) used data from the National Population Health Survey (NPHS 1994) to identify characteristics of individuals who had experienced difficulties accessing care [24]. Within the NPHS, respondents were asked to indicate whether they had not received health care when needed. Women were more likely to report issues with accessing care than men. In addition, as individuals’ age increased, respondents were more likely to report difficulties accessing care. Unemployed individuals were also more likely to report being unable to access care. These findings suggest that age, sex and employment status impact access to health services in Canada.

Finally, Quan et al (2006) examined variations in health care utilization amongst ethnic populations [25]. Using the Canadian Community Health Survey (cycle 1.1), this study explored the use of general practitioners, specialists, hospitals and three cancer screening tests by members of various ethnic populations. Overall, ethnic minorities were found to use general practitioner services more, specialist services equally, and hospitals and cancer screening less when compared with the majority ('white') population. The authors hypothesize that differences in health care use by ethnic minority groups may be explained by differences in health status. Additional research is needed to clarify study findings.

Overall, a variety of individual-level factors have been shown to influence health care use by Canadians. Despite the availability of a publicly funded health care system, socioeconomic status appears to impact access to some health services. In addition, individual characteristics such as gender, age, ethnicity, employment status, and health status also influence health care utilization. Thus, consideration must be given to identify means of improving access to care in Canada.

### **2.21.2 Household-level factors**

In addition to individual-level factors, researchers have examined the influence of household-level factors on health care utilization. Early work by Schor et al (1987) examined the extent to which members of families have similar or interrelated health behaviours [26]. Findings indicate that family members tend to use health care services at similar rates and that family characteristics (e.g. family size, parents' education and parents' health care behaviours) impact the health behaviours of individual family members. Recent work by Cardol et al (2005) confirmed that family characteristics continue to significantly influence individual health care utilization [27].

Family health behaviours (or household behaviours) are health behaviours which affect family (or household) members; as opposed to the individual alone. Numerous studies have explored the influence of family characteristics on family health behaviours [28-32]. Most common within the literature are studies which focus on the impact of family characteristics on children's access to medical care [28, 30, 31]. Children's access to medical care is considered a family health behaviour, as children's access and use of health care is dependent on their family.

Chen and Escarce (2006) examined the effects of family composition on American children's visits to physicians' offices and emergency rooms as well as use of prescription medicines [28]. Various aspects of family composition were considered, including the number of parents, the number of other children and the number and type of other adults within a family. Similar to other studies that have examined children's access to medical care, this study was based on the assumption that children are dependent on their parents or other adults in order to access and use health care. Moreover, it was conjectured that the collective attributes of family members influence parents' health behaviours, which in turn influences their children. Results from multivariate regression models indicate family composition significantly impacts the use of office visits and prescription medicines by children, even after adjusting for potential confounders (e.g. demographic and socioeconomic variables, parental education and experience with child rearing, and measures of children's health status). The likelihood of children visiting a medical office or receiving prescription drugs decreased as the number of children in the family increased. Similarly, children's likelihood of using prescription drugs also decreased when their family included other adults, in addition to their parents. Therefore, findings indicate both family composition and family size impact the use of physician's offices and prescription medicines.

Heck and Parker (2002) have shown that amongst families with low maternal education, children from single-mother families have better access to care than children from two-parent families [30]. This finding is partially explained by the greater availability of public health insurance for single mothers in the USA. Indeed, inconsistent study findings related to single-mother families and children's access to care suggest that the socioeconomic status of single-mother families must be considered over family composition alone [31]. In contrast, Leininger and Ziol-Guest (2007) have shown that children residing in single-father families have poorer access to care than children of any other family composition [31]. Moreover, the effects of living in a single-father family do not vary by socioeconomic status. Thus, family characteristics such as family composition, socioeconomic status, and education are contributing factors to health care utilization.

Although many studies have evaluated the impact of family characteristics on children's access to and use of health services, few studies have examined the relationship between family

characteristics and broader family-level outcomes; for example health behaviours which impact all family members. An example of a study which has assessed such a relationship is the work conducted by Saver et al (2003) [32]. This study evaluated the influence of family-level factors on racial/ethnic disparities in the purchase of non-group health insurance<sup>5</sup> in the USA. In the USA, obtaining health insurance is often a prerequisite for accessing health care. Framed using the Behavioural Model of Utilization, a host of predisposing, enabling and need factors was considered. Study findings suggest that family members are less likely to purchase non-group health insurance if their family: belongs to specific ethnic groups (e.g. Latino or African American); has lower educational attainment; consists of younger individuals; is headed by unmarried persons; includes smokers; and/or has at least one member covered through public insurance (other than Medicare). In addition, study findings suggest that families with both adults and children as well as families with poorer mental and health statuses are more likely to purchase non-group insurance. Hence, a host of family-level factors contribute to the decision to purchase non-group health insurance in the USA.

On the whole, previous research indicates family characteristics, such as family composition, socioeconomic status, education, and ethnic composition are important predictors for household-level health behaviours [26-32]. Further research is needed to clarify how family characteristics influence broader family-level health behaviours, particularly within Canada. Although Saver et al (2003) examined the influence of multiple family characteristics on the decision to purchase non-group health insurance, the implications of purchasing health insurance in the USA are substantially different than the implications of purchasing health insurance in Canada [32]. In addition, the relative importance of family characteristics such as socioeconomic status, education and ethnic composition must be clarified, as they are likely affected by one another.

### **2.21.3 Area-level factors**

Despite efforts to measure individual and household attributes, no study has been able to fully account for variations in health services utilization. Consequently, researchers are

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<sup>5</sup> Non-group health insurance refers to health insurance that is purchased by individuals (or families) independently from a group (for example their place of employment).

increasingly recognizing the need to consider other factors which may contribute to health services utilization or health behaviours. In particular, it is conjectured that area-level factors impact health behaviours and access to care [33]. To evaluate this hypothesis, researchers are increasingly examining the impact of area-level variables on health outcomes and behaviours [34, 35]. Studies to date have focused on area-level social and economic characteristics.

Andersen et al (2002) examined the impact of area-level variables over and above individual-level variables on low-income individuals' access to health services [36]. Four categories of area-level variables were considered: 1) demand (measured by percent below poverty, percent uninsured and percent on Medicaid); 2) support (per capita income, income inequality and unemployment rate); 3) structure (public hospital bed/population ratio and community health centers/population ratio); and 4) market dynamics (HMO penetration and HMO competition). After controlling for differences in individuals' predisposing characteristics, need and individual enabling resources, area-level variables were shown to significantly impact individuals' access to care. Specifically, support, structure and market dynamics variables influenced access to care. Individuals who lived in communities with a higher per capita income, lower unemployment, lower income inequality, a higher ratio of community health centers per population and/or lower HMO competition had greater access to care. The findings suggest that a multitude of area-level characteristics can influence individuals' access to health services.

Haas et al (2004) also examined variations in access to care; however a specific focus was placed on the relationship between a community's ethnic composition and access to care by community residents of specific ethnic origin [37]. The main variable of interest, community ethnic composition, was defined by the prevalence of Black and the prevalence of Latinos by county. Individual-level and household-level variables were controlled for and included: age, sex, educational attainment, marital status, insurance status, household income, family size, and self-reported health status. Additional area-level variables considered included: managed care market penetration, percentage of adults who had graduated from high school, median per capita income, number of primary care providers per 1000 people and the population per square mile. Study results reveal ethnic minorities achieve better access to care, (measured using two questions related to perceived access to care) when they live in highly concentrated ethnic minority

communities. In contrast, 'white' people who lived in highly concentrated ethnic communities were found to report greater barriers in access to care compared to 'white' people living in non-highly concentrated ethnic communities. Thus, an interaction between community ethnic composition and individuals' ethnic identity appears to influence individuals' access to care in the USA.

Canadian researchers have also begun to examine the importance of a variety of neighbourhood characteristics on health behaviours. Yip et al (2002) investigated the importance of individual and neighbourhood socioeconomic characteristics on health care utilization [23]. Both individual level (income and education) and neighbourhood (income and percentage of single mother families) level variables were found to be significantly associated with health care use. Individuals who resided in lower income neighbourhoods were more likely to use physician services. These findings are consistent previous research, which has shown that lower income individuals have poorer health [21]. Note that these findings do not necessarily contradict the findings of Andersen et al (2002) (discussed above) [23, 36]. Yip et al (2002) examined access patterns of individuals at varying incomes while Andersen et al (2002) focused solely on low-income individuals. The upshot of these studies is that area-level socioeconomic characteristics can influence access to care; however consideration must be given to individual and system-level characteristics in order to understand the means by which area-level socioeconomic characteristics influence access.

Limited Canadian research has examined the relationship between health behaviours and area-level ethnic composition. However, Johnston et al (2004) used area-level measures of culture to predict Pap smear screening in Nova Scotia [38]. In this study, communities (defined as census Canada enumeration areas) were characterized according to the ethnic composition of residents as well as the median economic position of residents. Using the area-level variables and accounting for women's age, multivariate logistic regression analyses were used to predict whether women had received a recent Pap smear. Study findings indicated older women living in low income, Aboriginal, mixed Black, and rural communities were less likely to have had a recent Pap smear. These findings are consistent with American research, which suggest that low income women and

women belonging to Aboriginal and Black heritages are less likely to participate in preventative screening.

Along a related thread, Glazier et al (2004) investigated the use of hospital inpatient services by neighbourhood concentration of recent immigrants in Toronto [39]. Given the varying results found by previous Canadian studies regarding the health care utilization of recent immigrants, this study sought to explore whether contextual immigration effects impact community health behaviours. As such, this analysis focused solely on area-level characteristics. Recent immigrants were defined as individuals who had immigrated to Canada between 1991 & 1996 and were identified using the 1996 Canadian census. Regression results found higher rates of hospital admission for both females and males as the proportion of recent immigrants increased. Descriptive findings were also presented: neighbourhoods with the highest proportion of recent immigrants had lower incomes, higher proportions of visible minorities, higher proportions of people not speaking English at home and the largest proportion of immigrants from all periods of immigration. This study illustrates the potential impact of area-level cultural variables on access to care in Canada. Overall, American and Canadian literature suggest that area-level cultural characteristics, particularly ethnic composition, language use and immigration status, affect health behaviours.

Although studies have found area-level variables to improve the explanatory power of predictive models [33, 36, 37, 40-42], the mechanisms by which area-level factors influence health behaviours and outcomes is not well understood [33]. Several hypotheses that have emerged to explain how area-level factors influence health include: neighbourhood information networks, social capital and health care resources [33]. Neighbourhood information networks are believed to influence health behaviours because family and friends represent a common source of advice for individuals. The concept of social capital is drawn from the seminal sociological work of Bourdieu (1986): social capital theory purports the collective resources of groups can be drawn upon by individuals within those groups for personal benefit [40, 43]. Such resources consist of two components: the cognitive component describes the collective perceptions of a community, including interpersonal trust, community values and expectations; while the structural component



describes physical links that connect community members, such as neighbourhood associations. Finally, health care resources refer to the availability of health care providers and institutions.

Within health services research literature, many studies have explored ideas consistent with neighbourhood information networks to explain study findings. In an attempt to explain why ethnic minorities experience better access to care in areas with a high concentration of ethnic minorities, Haas et al (2004) assumed that living in an area where individuals share a common language and culture facilitates the dissemination of information [37]. Furthermore, they speculated that ethnic minority communities protect ethnic minorities from discrimination, which may act as a barrier to access to care. Kirby and Kaneda (2006) tested the assumption that individuals, regardless of their ethnicity, have better access to care if they live in an area where the predominant language spoken is the same as their language of choice [41]. Indeed, they found individuals report increased access to care when the language spoken in their community was consistent with their own language of choice.

In addition, health services researchers are increasingly citing social capital theory to support their study findings [32, 33, 40, 41, 43-47]. Qualitative researchers have investigated the extent to which individuals perceive local resources and networks to have an influence on their health [46]. Individuals interviewed unknowingly identified aspects of their community, consistent with social capital theory, which impacted their health and health behaviours. Social capital represents the intangible relationships and resources which exist within communities.

As researchers continue to grapple with understanding issues related to access to care, evidence to date suggests that a myriad of inter-related and yet unique factors contribute to individuals use of health care services. In addition to individual characteristics, household and area-level characteristics appear to play a role in access to care. The task ahead is, not only to identify the remaining factors which influence access, but to explain how factors contribute to barriers to care. Only then can researchers begin to identify solutions to improve access to care.

## 2.22 Access to medicines

Given the increasing utilization of medicines for the treatment of acute and chronic conditions, prescription drugs have become an integral aspect of health care delivery [48]. However, in Canada, as in many other jurisdictions, access to prescription medicines is often based on both an individual's ability to pay and the availability of extended health care benefits provided through employers. Consequently, research that examines access to medicines has focused largely on the impact of overall costs and financing mechanisms (e.g. availability, types and levels of insurance coverage). Little research examines the influence of other potentially influential factors, such as socioeconomic status, age, sex, health status, and ethnicity.

Adams et al (2001) conducted a literature review to investigate the effect of the lack of outpatient prescription drug benefits under Medicare in the USA [48]. Twenty-three studies were reviewed and compared with respect to their study populations, design, policy context and findings. Particular attention was paid to indicators of drug consumption, characteristics of drug coverage, effects of drug coverage on medication use, and associations between drug coverage and health outcomes. Evidence from all studies reviewed suggests that drug coverage increases consumption of medicines. However, studies also found that a lack of coverage or expensive cost-sharing arrangements result in decreases in the use of essential as well as less essential medicines. In turn, some studies found that a lack of outpatient prescription drug benefit results in a corresponding increase in health care use. The review concludes that inappropriate use of medicines (e.g. decreases in use due to cost barriers) results in increased overall health care costs.

Similarly, Lexchin and Grootendorst (2004) conducted a systematic review of international literature to determine the effects of prescription drugs cost sharing on vulnerable populations [6]. The focus on vulnerable populations, defined as the poor and chronically ill, was based on the belief that individuals who spend a greater proportion of their income on prescription drugs are more sensitive to increases in costs related to their drugs, including increases in cost sharing. After reviewing 25 studies and comparing multiple study aspects, including study populations, geographic location, policy contexts, study design, and results, amongst other elements, similar conclusions were drawn as Adams et al (2001) [6, 48]. Cost sharing was consistently found to be

associated with decreases in the use of essential and non-essential medicines and decreases in prescription drug use were associated with increases in health care utilization (e.g. emergency room use) [6]. Notably, several studies reviewed here compared differences between insured and non-insured populations in Canada and the USA. Unanimously, studies reviewed found higher use of prescription drugs amongst insured vulnerable populations when compared to similarly vulnerable uninsured populations.

Finally, most recently in January 2008, the Cochrane Collaboration released their latest systematic review, entitled: “Pharmaceutical policies: effects of cap and co-payment on rational drug use”[49]. The overall objective of this review was to determine the effects of cap and co-payment (cost-sharing) policies on drug use, healthcare utilization, health outcomes and costs (expenditures). Across all studies reviewed, the introduction of direct co-payments was found to reduce drug use. Reductions in drug use were observed for both essential (e.g. life-sustaining drugs or drugs required to treat chronic conditions) and non-essential medicines. This suggests that patients may lack the ability or knowledge to prioritize their health needs. With respect to expenditures, cap and co-payment policies were found to shift the cost of medicines from insurers to patients. Few studies were able to measure effects on health care utilization or health outcomes.

To date, research which has examined access to medicines has focused on the implications of costs and financing on the use of prescription drugs. Evidence suggests that individuals who face economic barriers in access to prescription drugs are more likely to decrease appropriate use of essential and non-essential medicines, which results in increases in health care utilization [5, 6, 48, 50]. Although it has been shown that cost sharing can act as a financial barrier, it has also been shown that insured populations fare better than uninsured populations [6]. That is, when comparing insured and uninsured individuals with similar needs, individuals with prescription drug insurance are more likely to use prescription medicines. Although little research has examined the relationships between costs, prescription drug use and health outcomes, it is conjectured that individuals who forgo essential medicines as a result of financial barriers, experience poorer health outcomes. Thus, research is needed to provide clarity on issues regarding access to medicines and health outcomes.

## **2.23 Access to publicly funded health insurance programs**

Little research exists within Canada regarding access to publicly funded health insurance programs. This is largely because the Canadian health care system is financed publicly: all Canadians receive publicly funded health insurance through Medicare. In contrast, publicly funded health insurance is not available to all Americans. The American health care system is driven largely by the private markets. In order to access health care in the USA, residents must purchase private health insurance or pay out of pocket. However, publicly funded health insurance is available for low income children, seniors and individuals to varying extents (depending on individuals' state of residence).

In the USA, there are three main publicly funded health insurance programs. Medicare is the national health insurance program for seniors [51]. It also covers individuals who are entitled to social security disability payments for two or more years and people with end-stage renal disease. The State Children's Health Insurance Program (SCHIP) was enacted in 1997 and provides health insurance to low income children [52]. Finally, Medicaid provides health insurance to the poorest populations [53]. Eligibility for Medicaid and SCHIP vary by state and employ strict rules for admission. In order to access these programs, eligible individuals or families must apply for program consideration: that is they must register.

Despite the availability of publicly funded health insurance, millions of Americans lack health insurance. In 2006, 43.3 million persons (under the age of 65) were uninsured [54]. These individuals represent 16.8% of the population. Moreover, statistics suggest that ethnic minorities are highly overrepresented amongst the uninsured: they account for half of all uninsured Americans [55]. Levels of uninsurance within ethnic minority groups are consistently higher than the level of uninsurance within the majority 'white' population. At any given point in time, 18% of Asian and Pacific Islanders, 20% of African Americans and 32% of Hispanics are without health insurance, compared to the national average of 16% and the average for the majority 'white' population, 15%.

### **2.23.1 State Children's Health Insurance Plan (SCHIP)**

Children represent a particularly vulnerable subgroup of the population. SCHIP was created to improve levels of health insurance coverage for children in low income families, particularly those children belonging to low income families ineligible for Medicaid [56, 57]. However, in 2006, 9.3% of children under the age of 18 still lacked health insurance (approximately 6.8 million children)[58]. The persistence of uninsured populations concerns both researchers and policymakers who have questioned why disparities in access to health insurance continue.

In order to assess the impact of SCHIP on children's insurance status, Holahan et al (2003) used census data to analyze how trends in children's health coverage changed between 1994 and 2000 [59]. Although the study found that uninsurance levels among low income children fell during the period under investigation, 12% of American children (approximately 9 million children) remained uninsured. After analyzing trends and policies with more detail, the authors concluded that children are not uninsured due to restrictive program eligibility criteria; rather they found that a lack of participation in public programs is responsible for high rates of uninsurance. In support of this finding, Stuber and Bradley (2005) estimate approximately 20% of children potentially eligible for publicly funded health insurance programs in USA are not enrolled [60]. Studies have also found that uninsured eligible children are concentrated in specific subpopulations, including Hispanics and immigrants [52, 61].

Studies have sought to explore why all eligible children are not enrolled in SCHIP in various jurisdictions [52, 59-62]. Kincheloe et al (2007) investigated factors that affect registration for California's Medicaid program (Medi-Cal) and SCHIP (Healthy Families Program) [12]. In California it is estimated that one million children under the age of 19 currently lack medical insurance. Approximately two-thirds of these children are believed to be eligible for either Medi-Cal or SCHIP. Study findings reveal that parents often fail to register their children because of their lack of awareness or confusion about program eligibility and the arduous process of registration [12, 63].

Owing to the notably low participation for SCHIP amongst ethnic minority groups, Flores et al (2005) conducted focus groups with parents of uninsured Latino children to identify major obstacles for SCHIP registration [61]. Multiple reasons were noted including: a lack of knowledge about application processes and eligibility; language barriers; immigration issues; misinformation; and system problems (e.g. discrimination and lost applications), amongst others. These obstacles were consistent within the literature [52, 59-62].

Overall, American research suggests that individual and area-level social and cultural factors impact children's access to SCHIP. Additional research is needed to clarify how individual and area-level social and cultural factors impact access to other publicly funded health insurance programs, including those in Canada.

### **2.23.2 Factors that improve access to SCHIP**

In light of differential rates of registration for SCHIP, as well as identified obstacles for registration, attempts have been made to identify initiatives which facilitate registration [56, 64]. In the study mentioned earlier, Kincheloe et al (2007) compared the likelihood of registration amongst children living in communities where outreach programs were provided to that of children living in communities where no outreach programs were available. The availability of outreach programs (government initiatives to improve registration) was shown to successfully boost participation within communities [12, 65]. Findings also suggest that these initiatives may help to overcome language barriers to registration.

Dick et al (2003) conducted retrospective telephone interviews to understand differences between children registered for SCHIP and children who had registered for its precursor program, Child Health Plus [64]. This study was motivated by notable changes in the characteristics (e.g. ethnicity, income level) of children who registered for SCHIP from Child Health Plus in New York State. Study findings reveal that government efforts to facilitate enrolment were largely responsible for increased registration amongst traditionally underrepresented groups (e.g. ethnic minorities). Specifically, community-based outreach programs, television, and print media were cited as common sources of information for new registrants.

On the whole, preliminary research suggests that governments can improve registration to publicly funded health insurance programs through targeted interventions. Promotion of programs helps to improve eligibility awareness, while outreach programs that assist with the registration process facilitate participation. Additional research is needed to inform policymakers of the characteristics of programs that successfully facilitate registration processes amongst vulnerable populations.

### **2.3 Measuring culture in Canadian health research**

In this thesis, culture is conceived of as a combination of attributes: ethnicity, language and immigration status. These characteristics may operate at the individual, household and area-levels. To inform this study, Canadian health research is reviewed to better understand how concepts of culture are operationalized. Specifically, the breath of research questions examined is explored and potential data sources and methodologies relevant to the measurement of culture are identified.

Analogous to my review of literature related to access, I searched for literature using the Web of Science and Ovid Medline databases. The search terms that I employed included: ethnicity, culture, language, immigration, health, health services research, health care, measurement, and Canada. Given that the focus of this review was to determine how concepts of culture are operationalized in Canadian health research, I sought to identify any study (published after 1970) that examined ethnicity, language and/or immigration status as a determinant of health care utilization, access or satisfaction. Thus, using the relevant articles identified using the above search terms, I followed links provided by the databases to identify related articles, cited articles, as well as articles which had cited the source article of interest.

#### **2.31 Measuring ethnicity**

The concept of ethnicity is exceptionally complex. According to John Last, an ethnic group is “a social group characterized by a distinctive social and cultural tradition, maintained within the group from generation to generation, a common history and origin; and a sense of identification with the group”[66]. Central to this definition is the notion that an ethnic group is socially

constructed. Given the imprecision surrounding what constitutes an ethnic group, no clear consensus exists regarding how to determine an individual's ethnicity [67, 68]. Consequently, a variety of methods continue to be employed across medical and social disciplines.

Several Canadian health services research studies have examined ethnicity as a key independent variable of interest. Study purposes range from: 1) examining differences in health care utilization amongst various ethnic groups [38, 69-83]; 2) studying the relationship between health care utilization and health outcomes across ethnic groups [84-86]; 3) comparing rates of health care utilization with health knowledge within specific ethnic groups [87, 88]; 4) investigating levels of satisfaction within ethnic groups [89, 90]; and 5) analyzing differences in health status by ethnic ancestry [91]. The vast majority of studies has examined ethnicity at the individual-level; only one study has considered the concept of ethnicity at an area-level [38].

Data sources employed to obtain ethnic information can be divided into three main categories: administrative datasets (n=7) [71, 72, 80, 83-86], national or regional surveys (3) [38, 70, 78, 91] and study specific surveys (13) [69, 73-75, 77, 79, 81, 82, 87-90, 92]. Administrative data sources have included hospital records (for chart review) [72, 84], the Canadian Organ Replacement Register [80, 85], the BC Cancer Agency [86], the BC Transplant Society Database [83], and a national immigration database linked to the BC linked health database (BCLHD) [71]. National/regional surveys which have been employed include the Canadian Census [38], the Quebec Health Survey [70], the Aging in Manitoba Study Survey [91], and the Canadian Community Health Survey (CCHS) [78]. For the majority of studies, ethnic data and health data were obtained through the same data source; in only three studies were ethnic data linked to health data from an alternative data source [38, 70, 71].

At the individual-level ethnicity is operationalized through a variety of approaches. Studies that collect their own ethnic data through study specific surveys largely assign ethnicity through self-report. Amongst the studies reviewed, most focused on a single ethnic group (South Asian (n=1) [69], Ethiopian (1) [73], or Chinese (8) [74, 75, 81, 82, 87, 89, 90, 92]); three examined multiple ethnic groups simultaneously [77, 79, 88]. In contrast, studies that used administrative or secondary survey data were more likely to compare experiences across ethnic groups [70, 78, 80,



85, 86, 91]. Because secondary data were used, most studies explicitly defined the ethnic categories employed [70-72, 78, 80, 84-86, 91] and discussed the appropriateness of ethnic categories [70, 72, 80, 84-86]; slightly fewer also consider the limitations of their source of ethnic data [72, 80, 84, 85].

To my knowledge, the study conducted by Johnston et al (2004) is the only Canadian health services research study that has operationalized ethnicity at an area-level. In this study, census data were used to characterize the ethnic composition of census enumeration areas (EA) [38]. Specifically, EAs were characterized as Aboriginal, mixed Black, or French (Acadian) communities. Although the designation of EA ethnic composition was based on the proportion of individuals within each EA characterized as Aboriginal, Black or French, an operational definition of each ethnic category was not provided.

Ethnicity is often used as an independent variable of interest in Canadian health services research. This review of the literature suggests that the concept of ethnicity is largely operationalized at the individual level. Moreover, a comparison of data sources indicates that health services researchers must either collect their own ethnic data through a study specific survey, or identify data sources which include both health and ethnic data. Very few studies linked separate data sources to obtain both ethnic data and health data [38, 70, 71].

### **2.32 Measuring language**

Language is an important component of culture. It is the means by which cultural norms and beliefs are communicated and disseminated over time. With respect to health research, language is viewed as a critical element, which influences individuals' abilities to access care [93]. A growing body of American research has shown that language is associated with a variety of health services outcomes, including hospital length of stay and the likelihood of receiving a follow-up by a practitioner, amongst others [93-96]. Yet few Canadian studies examine language ability as an independent predictor of health care utilization or outcomes. In Canada, the importance of language receives the most recognition within research that examines health literacy [97].

Nonetheless, two Canadian studies have examined the impact of language on health care utilization and outcomes [94, 98]. Goldman et al (2006) compared the length of stay in a hospital emergency department for children whose parents' primary language was or was not English. In this study, children whose parents declared their primary language to be Cantonese, Mandarin, Spanish or Tamil during registration were more likely to have a longer length of stay than children whose parents reported English as their primary language. Similarly, John-Baptiste et al (2004) examined the impact of English language proficiency on length of stay and in-hospital mortality amongst inpatients across three hospitals. Patients with limited English language proficiency were found to experience significantly longer lengths of stay. However, mortality was not found to be influenced by English language proficiency. Language ability was assigned according to administrative records; language data were validated through a sample of interviews.

The use of language as an independent variable of interest in Canadian health services research is limited. However, American studies suggest that language ability can significantly facilitate, hinder or moderate the use of health care services [93-96]. Canadian studies which have examined the impact of English language proficiency on experiences with hospital care have employed administrative records to obtain language data [94, 98]. Additional Canadian research is needed to further theories and methods related to language and access to care.

### **2.33 Measuring immigration status**

Given that almost 19% of the Canadian population identify as an immigrant, a large body of Canadian health research has focused on immigrant populations [99]. In particular, researchers have examined whether differences exist between immigrant and Canadian-born populations with respect to health care utilization and health outcomes [39, 100-103]. Amongst these studies, a variety of data sources were used: the National Population Health Survey [101], the Canadian Community Health Survey [101, 103], the Canadian immigration databases linked with administrative health data [104], census data [39] and interview data [102]. In all but one study, immigration status was assessed at an individual-level; one study assesses immigration status at an area-level [39].

Studies that have examined immigration status at the individual-level have inconsistent findings, as different studies have found lower, similar and higher rates of health care utilization amongst immigrants relative to their Canadian-born counterparts [39]. To explain variations in study findings, researchers note that immigrants are not a homogeneous group [100]. Immigrants differ with respect to their country of origin, circumstances of migration and time of migration.

To account for potential cohort effects, studies have operationalized immigration status as a categorical variable, with an element of time [39, 101, 103]. Specifically, immigrants are categorized according to their length of stay within the country, often by five year intervals. As a result, variations in health services utilization and health status have been observed by length of stay. In general, recent immigrants use health services less and have better health status than longer-term (established) immigrants and the Canadian-born [100].

In addition, Glazier et al (2004) examined area-level immigration status in an attempt to further explain discrepancies between previous studies [39]. As mentioned earlier, Glazier and colleagues defined neighbourhoods according to the proportion of residents who identified as a recent immigrant. Findings indicate that individuals residing in neighbourhoods with higher proportions of recent immigrants experience higher rates of hospital admissions. This suggests that the health care utilization patterns of recent immigrants should not be generalized as more or less than that of established immigrants and the Canadian-born; rather consideration should first be given to the type(s) of services accessed.

A variety of theories have been proposed to explain differences in health care utilization and health status amongst immigrants, most notably the 'healthy immigrant effect' [100]. Immigrants are hypothesized to be healthier than the Canadian-born population due to self selection (e.g. only healthy individuals choose to migrate) and the medical screening of immigrants by Canadian authorities. However, given that research has also shown that patterns of health care utilization and health status of immigrants converges with that of the Canadian-born population over time, researchers caution that immigrants are in fact a vulnerable population. The stress associated with resettlement is believed to contribute to immigrants' underutilization of some health services and

deterioration in health. In addition, changes in environmental, social, physical and cultural exposures are also thought to negatively impact immigrants' health.

Overall, research within Canada that examines immigrant populations is increasing. Analyses are most commonly performed at the individual-level with data obtained through surveys or administrative datasets. Due to inconsistencies between earlier studies' results, the immigrant population is recognized as being heterogeneous [100]. Hence, more recent research attempts to account for differences within the immigrant population, particularly length of stay within Canada. Nevertheless, as the immigrant populations in Canada continue to evolve, additional research is needed to better understand immigrant experiences and outcomes.

## **2.4 Summary**

The following points summarize key messages from the literature.

Access:

- Despite the existence of Medicare, barriers persist in Canada with respect to access to insured health services.
- Access to health care in Canada is influenced by a host of individual-level factors, including health status, socioeconomic status, age, sex, employment status and ethnicity.
- Additional factors also contribute to access to health care, including household-level factors (e.g. household size and composition, ethnicity, socioeconomic status and education) and area-level factors (e.g. community socioeconomic status, ethnic composition, and immigrant composition).
- Literature examining access to medicines has largely focused on the existence and impact of financial barriers to access to prescription drugs; little attention has been given to demographic, social or cultural factors on access to medicines.

- Financial barriers reduce the use of essential as well as non-essential medicines, suggesting that the costs associated with prescription drugs negatively impacts health outcomes and overall health care costs.
- American research focused on access to publicly funded health insurance, particularly SCHIP, reveals that social and cultural factors have a strong influence on the use of public programs.
- Evidence also exists to suggest that governments may alleviate social and cultural barriers through targeted interventions.

#### The Measurement of Culture

- Canadian researchers commonly use ethnicity or immigration status as an independent variable of interest to evaluate differences in health care utilization and health status. Language is less often employed in research studies.
- Researchers obtain information on ethnicity and immigration status through national/regional surveys and some administrative datasets. Ethnic data are also often obtained through study specific surveys.

Further research is needed to address the following knowledge gaps:

- What is the relative importance of individual, household and area-level factors on access to care, medicines and publicly funded health insurance programs?
- To what extent do demographic, social and cultural factors act as barriers to access to medicines?
- Do barriers to access to publicly funded insurance programs exist in Canada? If so, what are they? Do social and cultural factors similarly hinder access to publicly funded health insurance programs in Canada?

### **3 RESEARCH QUESTIONS**

#### **3.1 Study purpose**

As governments within Canada are increasingly looking to reform their pharmacare policies, the experience of BC, with respect to the development and implementation of Fair PharmaCare, is of particular interest. The overall purpose of this study is to determine whether equity in access to the Fair PharmaCare program was achieved in 2003. By examining participation with Fair PharmaCare, this study highlights what factors may act as barriers to publicly funded health insurance programs in Canada.

In this thesis, the concept of access is measured through registration for Fair PharmaCare in 2003<sup>6</sup>: registration is the first condition necessary to be eligible for prescription drug benefits under this program. Considering various household and area-level characteristics, households' likelihood of registration for Fair PharmaCare is assessed. In particular, given the experience of various ethnic populations in the USA with registration, as well as the actions of the BC government, specific attention is given to culturally defined populations in BC. This focus will inform policymakers, as it will elucidate which, if any, subpopulations faced difficulties with the registration process. I define equity in access as an equal likelihood of registration for Fair PharmaCare.

#### **3.2 Specific research questions and hypotheses**

The following questions are addressed in this thesis:

1. Given the lack of cultural data within administrative health datasets and restrictions on data access in BC, how can researchers measure the effect of culture when BC administrative data are used?

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<sup>6</sup> Registration in 2003 is identified using Fair PharmaCare registration files and is defined as any household that registered for Fair PharmaCare between May 1 2003 and December 31, 2003.

2. Controlling for households and area-level factors, which are conjectured to influence registration, do area-level cultural factors significantly affect the likelihood of registration for Fair PharmaCare?

The first question addresses an issue of data limitations. Administrative health data in BC lack information pertaining to individuals' cultural characteristics (e.g. ethnicity, language, immigration status, etc.). Thus, researchers who are interested in examining issues related to culture must often rely on survey data or the census. This poses a considerable challenge for researchers who use administrative data to conduct population-wide analyses. At the present time, BC researchers are not permitted to link individual-level survey or census data with provincial administrative data. Therefore, this thesis addresses a key challenge for researchers: how can we define reasonable concepts of culture using data at a level that may be linked to administrative data? In BC, one solution is to employ definitions of ethnicity, language and immigration that characterize a neighborhood of individuals, rather than individuals themselves. In chapter four of this thesis, I use census data to develop ecological variables which can be used in conjunction with provincial administrative data that lacks robust cultural data.

The second question examines whether equity in access to Fair PharmaCare was achieved in 2003 by determining which, if any, household and area-level factors, particularly neighbourhood-level cultural factors, affected registration for Fair PharmaCare. This empirical analysis (chapter five) is conducted at the household-level because registration for Fair PharmaCare is required at the household-level. The focus on neighbourhood-level cultural factors is based on evidence from the USA, which has shown that individual cultural characteristics influence registration for SCHIP.

I hypothesize that equity in access to Fair PharmaCare was not achieved in 2003. I conjecture that, consistent with previous literature, household and area-level factors will influence registration for the program. Moreover, controlling for significant household and area-level factors, I believe that neighbourhood-level cultural factors will also impact the likelihood of registration. Specifically, I predict that the following relationships will be observed:

- Household size will be negatively associated with registration: as household size increases, the likelihood of registration will decrease.
- Family composition will impact the likelihood of registration. Specifically, belonging to a single parent family or belonging to a family with at least one child will be positively associated with registration.
- Household-private insurance status will be positively associated with registration. Interviews suggest that many private insurers required that their clients register for Fair PharmaCare.
- Health status will be negatively associated with registration: as health status decreases, the likelihood of registration will increase.
- Neighbourhood-level ethnicity will impact the likelihood of registration. In particular, belonging to an ‘other’ ethnic minority neighbourhood will be negatively associated with registration. It is also hypothesized that belonging to a North American, British Isles, other European, Chinese, or South Asian neighbourhood will not predict registration: these neighbourhoods are predicted to have similar registration rates to ‘average’, non-ethnically concentrated neighbourhoods in BC.
- Neighbourhood-level English language proficiency will be positively associated with registration: as neighbourhoods’ English language proficiency increases, the likelihood of registration will increase.
- Neighbourhood-level immigration status will be negatively associated with registration: as neighbourhoods’ concentration of recent immigrants increases, the likelihood of registration will decrease.

### **3.3 Study contribution**

My thesis contributes to the literature through its content and methodologies. To my knowledge, this is the first study to assess what factors affect registration for publicly funded pharmaceutical insurance in Canada. In order to address this issue, my thesis employs emerging methodologies from social sciences disciplines which have yet to be explored by health services researchers in Canada. Specifically, I describe culture as an area-level characteristic and explore



its conceptualization for use in health services research. In addition, I combine household-level administrative data with area-level census data to examine how household and area-level characteristics impact health care seeking behaviours.

## **4 DEVELOPMENT OF AREA-LEVEL CULTURAL VARIABLES**

### **4.1 Area-level cultural variables**

In this chapter, I aim to address the following question: how can researchers measure effects of culture in health services research studies when BC administrative health data are used? In order to achieve this objective, I describe the development of ecological cultural variables for use in a specific research project, namely an analysis of what factors affect registration for Fair PharmaCare (discussed in Chapter 5). I believe that the methods used here are applicable across health services research studies. Therefore, the strategies employed and the variables created for this study serve as an example for future studies.

To characterize an area's cultural composition, here we propose to develop dichotomous variables based on the proportion of individuals within an area who report a given characteristic, for a series of characteristics. For example, with respect to immigration status, we can determine the proportion of individuals within an area who identify as an immigrant. By calculating this value for multiple areas covering all of BC, we can then plot the distribution of proportions along a curve, to then determine a threshold that identifies areas with a relatively high proportion of immigrants. Subsequently, an area can be categorized as having a high proportion or an average (or low) proportion of immigrants. As this process is repeated for additional characteristics, such as ethnic background and language, the combination of attributes assigned to each area will reveal the area's cultural composition. This approach overcomes the constraints of data while providing cultural context to an analysis. The logistics behind the development and utility of area-level cultural profiles are described below.

### **4.2 Methods**

#### **4.2.1 Data source**

After considering all possible data sources, I decided that the Canadian census would be the best source of data to create area-level cultural variables. Statistics Canada conducts a census of

Canadians every five years to provide a “statistical portrait” of Canada and its population [105]. Census questionnaires are distributed to all Canadian households; 80% of households receive a short form which collects data on individuals’ age, sex, marital status and language, while 20% of households receive a long form which collects additional data on income, housing, ethnic background, education, and employment, etc.

Within the long form of the 2001 Census, individuals were asked fifteen questions under the category “socio-cultural information” [106]. In particular, individuals were asked to provide information pertaining to their country of birth, citizenship, immigration status, English and/or French language capacity, knowledge and use of other languages, ethnic ancestry, and religion. Given the breadth of information obtained and the proportion of the population covered, I believe that, in comparison to other national surveys, the census is best suited for developing variables for a population-wide analysis.

Census data are not made available at the individual level; rather data are provided to researchers at various levels of geography [107]. The smallest level of aggregated data for which all census profiles are made is the dissemination area (DA) level. This level of geography was chosen for the development of our area-based measures: BC is divided into 7,463 DAs. Each DA is defined by population size, consisting of approximately 400-700 people. The geographic area of DAs varies widely depending on whether they are located in a rural or urban area.

#### **4.22 Data permissions**

Permissions were obtained from the BC Ministry of Health on March 12, 2007 to create area-level cultural variables from census data, which could then be linked with administrative health data. Specifically, permissions were granted to link DA level census data with individual-level data from the BC Linked Health Database (BCLHD), Fair PharmaCare registration files and BC PharmaNet. Within the agreement, details regarding the use of the DA level census data were provided. In particular, the agreement states that DA level data would be used to create a series of dichotomous, socio-cultural variables that capture the socio-cultural characteristics of residents within each DA. In order to appease the concerns of data stewards regarding privacy, the

agreement also stipulates that no fewer than ten DAs would contain a unique combination of values for the series of variables. This stipulation was established by the data stewards of PharmaNet and the BC ministry of health to ensure that no DA could be identified through its socio-cultural characteristics; thereby ensuring no residents could be identified.

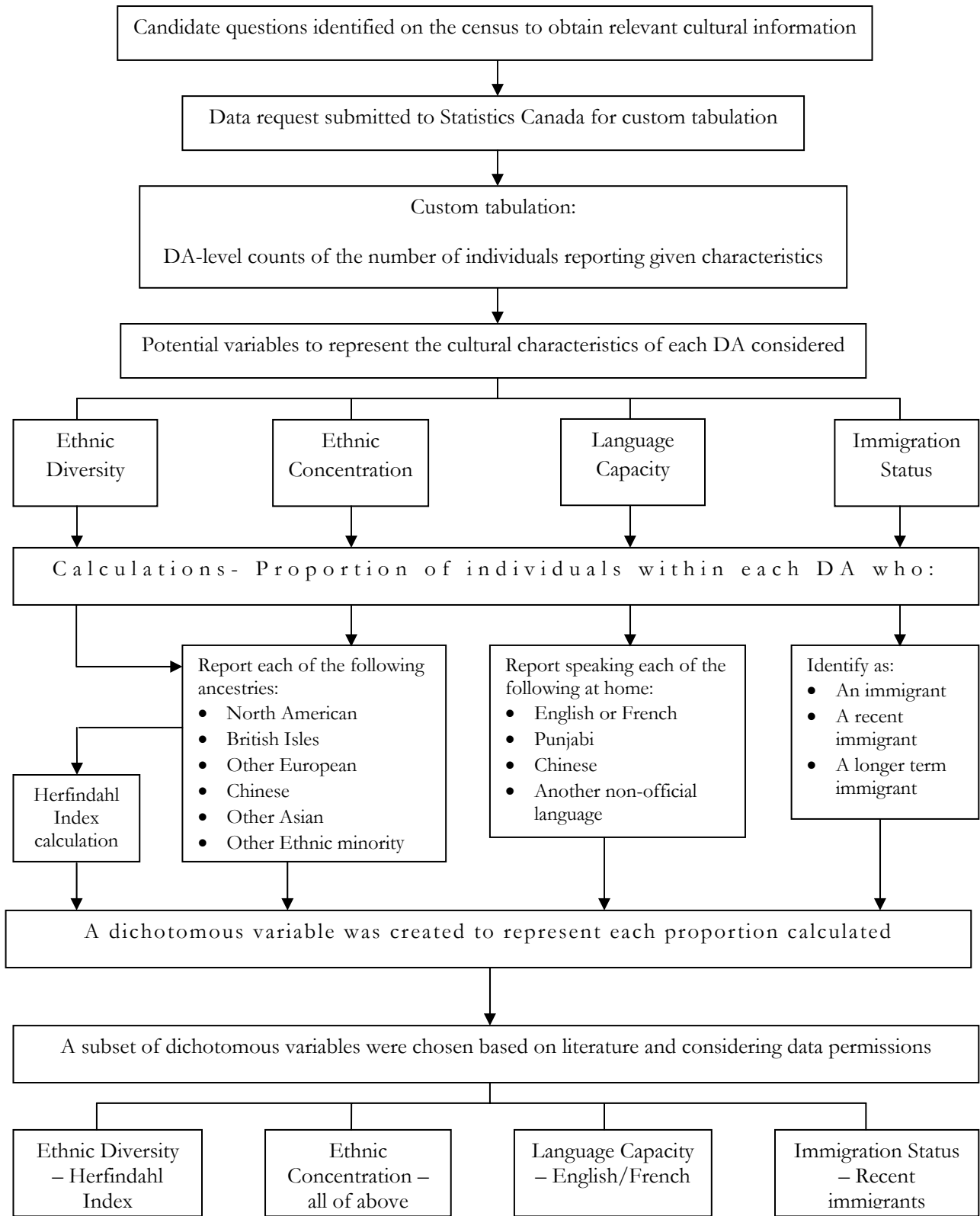
Ethics approvals for this study were obtained from the University of British Columbia's Research Ethics Board on August 30, 2007 (UBC BREB # H07-01701).

#### **4.23 Statistics Canada custom tabulation**

I obtained DA level census data through a Statistics Canada custom tabulation. One of many data products offered by Statistics Canada, the custom tabulation allows researchers to obtain data that is not readily available to the public and is tailored to their specific needs. To obtain the custom tabulation, I worked with a census consultant to define the parameters of the tabulation, including the content, level of geography, format and output medium.

The content of a custom tabulation refers to the desired information that can be derived from responses to census questions. Hence, the first step involved identifying which census and which questions would provide information that was of interest to this study (Figure 2). The 2001 census was chosen as the appropriate census from which to obtain information, as the 2001 census provides the closest approximation of the cultural composition of DAs in 2003. The area-level cultural variables developed here are desired for an analysis of Fair PharmaCare registration involving 2003 administrative data. With respect to the content of the 2001 census, only a small subset of questions could be chosen to comply with the conditions of our data permissions. Four constructs were chosen as most relevant for the purposes of characterizing an area's cultural composition: immigrant composition, language capacity, ethnic concentration and ethnic diversity. Accordingly, the following census questions were identified to obtain relevant information (see Appendix A2 for responses) [106]:

- Is this person now or has this person ever been a landed immigrant?
- In what year did this person first become a landed immigrant?
- What language does this person speak most often at home?
- To which ethnic or cultural group(s) did this person's ancestors belong?



**Figure 2: Flow chart - process for creating cultural variables**

The second step involved identifying the desired information that would populate the custom tabulation. Counts of the population by selected cultural characteristics by DA were requested to allow for proportion calculations (see Appendix A3). First and foremost, counts of the total population per DA were requested. With respect to immigration, population counts by DA were obtained for the total number of immigrants, the number of immigrants that had arrived between 1996 and 2001, and the number of immigrants that had arrived prior to 1991. Language information requested included counts of the population by DA who reported speaking English, French, Punjabi, Chinese, and/or another non-official language most often at home. Finally, counts of the population who reported any of the following ethnic ancestries were acquired by DA: Aboriginal ethnic origins; African ethnic origins; Arab ethnic origins; British Isles ethnic origins; Caribbean, Latin, Central and South American ethnic origins; North American ethnic origins; Chinese ethnic origins; East and Southeast Asian ethnic origins; French ethnic origins; Other European ethnic origins; South Asian ethnic origins; West Asian ethnic origins; and Oceania ethnic origins.

The custom tabulation was provided in the Beyond 20/20<sup>7</sup> format; however data were immediately exported into an excel spreadsheet, and later into SAS software. Within excel, the format of the table was as follows: each row contained information for one DA and each column contained information regarding one cultural characteristic (Table 1). Thus, each cell within the table contained the count of individuals reporting each characteristic by DA. In total, the custom tabulation contained information for 6571 DAs in BC. Each DA was labelled with an anonymized eight digit code. Information was suppressed by Statistics Canada for 12% of DAs (n=892) due to small sample sizes for particular response categories.

**Table 1: Example of custom tabulation format**

DA	Total Population	Total North American	Total British Isles	Total Chinese	Etc.
12345678	500	300	150	10	...
12345670	690	235	400	0	...

<sup>7</sup> Beyond 20/20 is the name of the preferred statistical software of Statistic Canada.

## **4.24 Defining constructs with census data**

As mentioned, the four constructs considered most relevant for the purposes of characterizing an area's cultural composition included: immigrant composition, language capacity, ethnic concentration and ethnic diversity. In order to operationalize each construct, I considered the variety of measures that could be created using the data within the custom tabulation. Subsequently, I created an array of conceptually relevant measures that could potentially be used to define and quantify each construct.

Here I describe the array of conceptually relevant measures considered prior to their conversion into dichotomous variables. Recall that our data permissions state that no fewer than ten DAs can be characterized by a unique set of characteristics and that characteristics must be described using dichotomous variables. Thus, it is necessary to recognize that 1) only a subset of the measures considered could be included in current analyses of Fair PharmaCare and 2) I could not know which measures would be chosen because measures had yet to be converted into dichotomous variables. To ensure that the variables considered measure separate constructs, prior to dichotomizing variables, I examined whether any variables were correlated. To do this, I used the spearman correlation coefficient. Following my assessment of the correlation of variables, in section 4.25, I describe how measures were converted into dichotomous variables. Finally, in section 4.26, I identify which measures were chosen to represent each of the four constructs.

### **4.24.1 Immigrant composition**

The immigrant composition of an area can be defined and measured using three distinct approaches. First, for each DA, I calculated the total proportion of the population who identified as an immigrant. In addition, given that the literature has shown that length of stay within a host country modifies immigrant health status profiles as well as reported challenges with access to care, I considered length of stay for potential measures [39, 100, 101, 104]. Specifically, for each DA, I determined the proportion of the population who identified as a recent immigrant as well as the proportion of the population who identified as an established immigrant. Recent immigrants were defined as immigrants who had arrived within the last 5 years (e.g. 1996-2001), while

established immigrants were defined as immigrants who had resided in Canada for at least 10 years (e.g. arrived prior to 1991).

#### **4.24.2 Language capacity**

The language capacity of individuals within a DA may be defined differently depending on the language(s) of interest. Five potential variables were created to represent the language capacity of residents within each DA: proportion who reported speaking English and/or French at home; proportion who reported speaking Punjabi at home; proportion who reported speaking Chinese at home; proportion who reported speaking another non-official language (i.e. not Punjabi or Chinese) at home; and proportion who reported speaking any non-official language at home. I created separate measures to differentiate between non-official language(s) spoken at home because the Chinese and Punjabi ethnic groups were targeted by the BC government for registration for Fair PharmaCare. Specifically, translation services were provided at the point of registration for both Chinese and Punjabi groups.

#### **4.24.3 Ethnic concentration**

The construct “ethnic concentration” defines the ethnic composition of a DA. Specifically, it is used to determine whether the residents of a DA identify predominantly with a particular ethnic group. Therefore, several measures are needed to differentiate between the various ethnic groups with which residents may identify. To measure ethnic concentration, I calculated the proportion of residents identifying with each of six ethnic categories (Table 2).

The selection of the six ethnic categories employed occurred in three stages (Table 2). The first stage involved identifying the standard ethnic categories employed by Statistics Canada. Unlike the American census, which asks individuals to classify themselves into one of six racial categories (American Indian or Alaska Native; Asian; Black or African American; Native Hawaiian or Other Pacific Islander; White; and Other Race) and one of two ethnicities (Hispanic or Latino and Not Hispanic or Latino) [108], the Canadian census does not ask individuals to identify with a racial or ethnic category. Instead, the Canadian census asks individuals to identify



their ethnic ancestry from a long, open-ended list of potential ethnic backgrounds [106]. Consequently, in the 2001 census, respondents identified with approximately 206 ethnic groups [109]. Moreover, since 1981, Canadians have been allowed to report more than one ethnic origin. The frequency with which this occurs has increased every year since. Therefore, to improve the comparability of studies which use census data, Statistics Canada has identified 25 ethnic categories and subgroups in which ethnic groups can be categorized.

Using Statistics Canada's ethnic categories as our baseline, the second stage involved further aggregating ethnic groups into thirteen ethnic categories for the custom tabulation. These categories were chosen because they represent geographically and culturally distinct groups. Despite preferences to use all thirteen ethnic categories, it was necessary to further aggregate ethnic groups to comply with our data permissions: DAs could not be identifiable through unique combinations of variables. Consequently, the third stage involved developing numerous combinations of ethnic categories to determine the minimum level of aggregation possible while complying with data permissions.

The final six ethnic categories chosen represent a compromise between identifying the ethnic diversity of the population and representing the major ethnic groups within BC. For example, the Chinese ethnic group was selected as its own ethnic category because Chinese was the second most frequently reported single ethnic category in BC in the 2001 Census (approximately 18%, second to Canadian) [110]. In contrast, the Arab, African, Aboriginal, Oceania, Latin, Central, and South American ethnic categories were the least cited single ethnic groups (less than 5% combined). Thus, together they represent the minority ethnic groups in BC.

**Table 2: Aggregating ethnic categories**

<b>Statistics Canada Ethnic Categories and Subcategories</b>	<b>Custom Tabulation Categories</b>	<b>Final Aggregated Categories</b>
North American origins	North American origins	North American origins
British Isles origins	British Isles origins	British Isles origins
French origins	French origins	
European origins		
Western European origins		
Northern European origins		
Scandinavian origins		
Eastern European origins	Other European origins	Other European origins
Baltic origins		
Czech and Slovak origins		
Southern European origins		
Balkan origins		
Other European origins		
West Asian origins	West Asian origins	
South Asian origins	South Asian origins	Other Asian origins
East and Southeast Asian origins	East and Southeast Asian origins	
Indo-Chinese origins	Chinese	Chinese origins
Oceania origins		
Pacific Islands origins	Oceania origins	
Aboriginal origins	Aboriginal origins	
Caribbean origins		
Latin, Central and South American origins	Caribbean, Latin, Central and South American origins	Other ethnic minority origins
African origins	African origins	
Arab origins		
Maghrebi origins	Arab origins	

#### **4.24.4 Ethnic diversity**

Finally, the construct “ethnic diversity” represents the heterogeneity of ethnic groups within a DA. The measure that I chose to quantify ethnic diversity is the Herfindahl index (H-index). This measure is derived from the economics literature, which has examined the relationship between ethnic diversity and economic performance as well as relationship(s) between cultural diversity (e.g. linguistic diversity, ethnic diversity, religious diversity, etc.) and behaviours [111-114]. To calculate the H-index, I first determined the proportion of residents in each DA who

reported each of the 13 ethnic backgrounds listed in the custom tabulation (Figure 3) [115]. I then calculated the square of each proportion. The H-index value for each DA is equal to the sum of the squared proportions for all ethnic categories. This value is interpreted as the probability that two randomly selected people from the same DA will belong to the same ethnic group. Therefore, as the H-index approaches a value of one, a DA is considered to be ethnically homogeneous.

$$H = \sum_{i=1}^g (n_i / N)^2$$

Where,  
 $n_i$  = number of people in each ethnic group  
 $N$  = total number of people across all groups  
 Maximum value = 1

**Figure 3: Herfindahl index calculation**

#### **4.25 Creation of dichotomous cultural variables**

Following the calculation of proportions and the H-index, as mentioned earlier, I determined whether any variables were correlated using the Spearman correlation coefficient. No variables were found to be strongly correlated; the strongest correlation observed was between the measures of the proportion of residents identifying as Chinese and the proportion of residents identifying with another Asian ethnicity ( $\rho = 0.7$ ). As a result, I decided to convert all measures into dichotomous variables.

Using excel, I sorted the distribution of values for each variable from lowest to highest and plotted them along a continuum. In order to create dichotomous variables from the continuous variables, a threshold was needed for each variable to divide values into one of two categories.

Four methods were considered to assign variable thresholds [116]:

1. Deciles – Under this method, an equal number of DAs would be placed into ten groups. Depending on the variable of interest, the 90<sup>th</sup> percentile or the 10<sup>th</sup> percentile, that is the decile containing DAs with either the highest or lowest proportions of a particular characteristic, respectively, would be chosen as the threshold.

2. Standard deviation method – This method involves determining the mean proportion (or H-index value) for each variable as well as the standard deviation of the distribution. The threshold to create the dichotomous variable would be one or more standard deviations above or below the mean.
3. Natural breaks – This method requires researchers to visually inspect each graph to identify the natural break in the curve. In turn, this break would define the threshold for the corresponding variable.
4. Jenks' optimization method – Under this method, the assignment of the threshold is based on the Fisher algorithm, which is computed using statistical software. This computation involves a series of mathematical iterations to maximize variation between categories and minimize variation within categories.

Based on the continuous nature of the curves, I decided that the natural breaks method was inappropriate; natural breaks were not clearly discernable. I also decided that the standard deviation method was unsuitable, as preliminary calculations generated variable thresholds that were not interpretable from a policy perspective. As a result, I used the deciles and Jenks' optimization methods to create two sets of dichotomous variables for comparison.

Ultimately, I decided that the Jenks' optimization method was the best method to assign thresholds to define dichotomous variables. For each variable, the distribution of proportions (or H-index values in the case of the ethnic diversity variable) was imported into the Environmental Systems Research Institute (ESRI) ArcMap 9.2 software. This software computes the algorithm employed by the Jenks' optimization method; it is typically used by geographers, who use the Jenks' methodology to determine categories within variables. To obtain Jenks' defined thresholds, we<sup>8</sup> first requested that the software divide each distribution into two categories, thereby creating dichotomous variables. This resulted in thresholds that were equal to or close to the mean value of each variable. Therefore, to obtain thresholds that would define categories representing extremes (e.g. categories that clustered DAs with the highest or lowest proportions for a given characteristic), we requested that the software divide each distribution into five categories.

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<sup>8</sup> I received assistance from Dawn Mooney, geographer at the Centre for Health Services and Policy Research, to use the ESRI ArcMap software.

Subsequently, depending on the variable of interest, the threshold separating the first and second category or the threshold separating the fourth and fifth category was chosen. The remaining categories were then re-aggregated to create a dichotomous variable.

Once the threshold for each variable was defined, the continuous variables were redefined as dichotomous variables. Subsequently, DAs were correspondingly assigned one of two values for each variable. The combination of values for all variables represents the cultural profile of each DA.

#### **4.26 Cultural variables selection**

To ensure that no fewer than ten DAs had a unique cultural profile, only a subset of the variables developed could be selected for the purposes of linking cultural variables to administrative data. I selected the final subset of variables considering:

1. The primary research question of interest: what area-level cultural factors influence registration for Fair PharmaCare?
2. The potential policy relevance of study findings related to each variable: would discovering a negative impact on registration lend itself to an intervention?
3. Hypotheses based on previous literature: what variables are anticipated to have an impact on registration?

I omitted variables that were conceptually relevant but tended to distinguish DAs.

### **4.3 Results**

#### **4.31 Final list of area-level cultural variables**

In total, I chose nine variables to represent the cultural profile of each DA (Table 3). Of these, seven variables describe the ethnic makeup of each DA. Specifically, six variables are used to differentiate whether residents within each DA identify predominantly with a particular ethnic group and one variable describes the ethnic diversity of each DA. Once linked to individual-level administrative data, the six ethnic background variables will be used to compare the likelihood of registration for individuals residing in areas with a relatively high proportion of residents reporting

a given ethnic background to those residing in non-ethnically concentrated areas. Similarly, the ethnic diversity variable will be used to compare the likelihood of registration for individuals residing in areas with a relatively homogeneous ethnic composition to those residing in more ethnically heterogeneous areas.

**Table 3: Final selection of area-level cultural variables**

<b>Variable</b>	<b>Jenks' Defined Threshold</b>	<b>Interpretation</b>
<b>Ethnic background</b>		
North American origins	> 0.45	For each ethnic background, the threshold identifies the minimum proportion of residents reporting a given ethnic background necessary for a DA to be characterized as predominantly (ethnic background).
British Isles origins	> 0.63	
Other European origins	> 0.66	
Chinese origins	> 0.54	
Other Asian origins	> 0.57	
Other ethnic minority origins	> 0.94	
<b>Ethnic diversity</b>	> 0.43	The threshold defines the minimum H-index value necessary for communities to be considered relatively homogeneous in ethnic composition.
<b>English language capacity</b>	< 0.49	The threshold indicates the maximum proportion of residents reporting English as a language spoken at home for a DA to be distinguished as having a relatively low English language capacity..
<b>Concentration of recent immigrants</b>	> 0.31	The threshold defines the minimum proportion of residents identifying as a recent immigrant necessary for communities to be characterized as having a relatively high concentration of recent immigrants.

One language variable was chosen to measure the English and French language capacity of residents within each DA. The English and French language capacity variable is defined by the proportion of individuals within a DA who report speaking English and/or French at home. This operational definition was chosen because, despite the wording of the census question, “what language does this person speak most often at home,” respondents were allowed to provide more than one response. Therefore, I conjecture that individuals who are fluent in English and/or French reported speaking English and/or French at home, in addition to any other language that they may speak at home. When linked with administrative data, the language capacity variable will compare individuals who reside in areas with residents who report relatively lower English and/or French language capacity to individuals who reside in areas with residents who report relatively higher English and/or French language capacity. In light of the fact that only 0.2% of British Columbians reported speaking French at home in the 2001 census, the English and French language capacity variable will be referred to as the English language capacity variable [110].

The final variable chosen measures the concentration of recent immigrants within each DA. This variable will be used to compare the likelihood of registration for Fair PharmaCare amongst individuals who reside in areas with a relatively high concentration of recent immigrants to those who reside in areas with relatively fewer recent immigrants. This variable was chosen because recent immigrants have been shown to experience greater difficulties accessing some health care services than more established immigrants [39, 100, 101, 104].

#### **4.32 DA cultural profiles**

In order to comply with data permissions, no fewer than ten DAs could be characterized by a unique cultural profile. Despite creating aggregated, dichotomous variables, 20 DAs had unique cultural profiles; therefore their cultural information was suppressed. Hence, in total, cultural profiles were created for 6551 DAs, which could then be linked to administrative health data.

The following table summarizes the distribution of cultural profiles across DAs in BC (Table 4). The most common cultural profile amongst DAs was an ethnically homogeneous DA, with no reference to a particular ethnic group. The three most frequent cultural profiles, defined by an

ethnic concentration, were the British Isles, other European and North American ethnic categories. In addition, many DAs had cultural profiles that were characterized by combinations of these categories. Fewer communities were defined solely by an ethnic minority category (e.g. Chinese, other Asian and other ethnic minority). More often, communities defined by an ethnic minority category were also characterized by lower English language capacity, a concentration of recent immigrants and/or as ethnically homogeneous. Communities that were not characterized by any of the cultural characteristics represent the 'average' BC DA. These are communities that were neither ethnically concentrated nor ethnically homogeneous and whose residents did not report low English language proficiency or identify largely as recent immigrants (n=2548).



**Table 4: Distribution of DA cultural profiles**

<b>DA Characteristics</b>	<b>Number of Communities</b>
<b>Single Ethnic Concentration</b>	
North American	258
British Isles	893
Other European	510
Chinese	52
Other Asian	23
Other Ethnic Minority	159
<b>Multiple Ethnic Concentrations</b>	
North American & British Isles	55
North American & Other European	19
North American, British Isles & Other European	11
British Isles & Other European	108
<b>Ethnic Composition</b>	
Homogeneous	1,510
<b>Multiple Cultural Characteristics</b>	
Other Asian & homogeneous	34
Other Asian & low English/French language capacity	45
Chinese & homogeneous	21
Chinese & low English/French language capacity	114
High concentration of recent immigrants & homogeneous	34
Low English/French language capacity & homogeneous	75
Low English/French language capacity, high concentration of recent immigrants & homogeneous	19
Other Asian, low English/French language capacity & homogeneous	18
Chinese, low English/French language capacity & homogenous	34
Chinese, low English/French language capacity & high concentration of recent immigrants	11
<b>Non-identifiable through Cultural Characteristics</b>	2548
<b>Total Number of Communities</b>	<b>6551</b>

## **4.4 Discussion**

In this chapter, I aimed to address a methodological question: how can researchers measure effects of culture in health services research studies when BC administrative health data are used? The solution that I have proposed is to create ecological variables, which can then be linked with administrative health data. To demonstrate the process of developing ecological variables to measure aspects of culture, I described methods used to create a series of dichotomous variables that in turn represent the cultural profiles of DAs. These variables will be used in an analysis of what factors affect registration for Fair PharmaCare.

Given that the importance of area-level factors on access to care has been shown by previous research, here I discuss methodological issues related to the creation and interpretation of ecological cultural variables. Firstly, I consider the limitations of the methods employed to create the host of cultural variables for the analysis of Fair PharmaCare registration. Though specific to this study, the limitations of the methods employed highlight issues that researchers must consider when developing ecological variables. Secondly, I consider issues related to the interpretation of ecological variables in general.

### **4.41 Limitations**

The development of ecological cultural variables for use in an analysis of Fair PharmaCare registration was constrained by strict data permissions. In order to obtain permissions from the BC Ministry of Health to link area-level cultural variables with individual-level administrative health data, we proposed to create dichotomous variables to capture area-level aspects of culture. The use of dichotomous variables made characteristics less distinguishable; thus was preferred for the purposes of protecting privacy. However, despite agreeing to use dichotomous variables, the data stewards from PharmaNet and the BC Ministry of Health remained concerned about the privacy of residents within DAs. Therefore, to further protect the privacy of residents within DAs, we also had to agree that no fewer than ten DAs would have a unique cultural profile to ensure that analysts would be blind to the identification of DAs. The consequence of this stipulation was that only of subset of potentially relevant variables could be employed.

I believe that the largest compromise made was the decision to include only one language variable within the host of variables used to describe the cultural profiles of DAs. The language variable chosen captured the English language capacity of residents within each DA. DAs were categorized as having low English language capacity versus average or high English language capacity. I would have preferred to characterize DAs using three language variables: the proportion of residents who reported speaking Chinese at home, the proportion of residents who reported speaking Punjabi at home and the proportion of residents who reported speaking another non-official language at home. Keeping in mind that the cultural profiles described in this chapter will be used in an analysis of Fair PharmaCare registration, the three abovementioned language variables are more conceptually relevant for the forthcoming study. The use of the non-official language variables would help to decipher the impact of government initiatives to promote and facilitate registration amongst Chinese and Punjabi communities. These variables were ultimately omitted however, as their inclusion made many DAs identifiable. Of relevance for future studies is the need for researchers to carefully consider the context with which their study is situated.

Another compromise made was the aggregation of ethnic categories. Again, due to the limitations of our data permissions, the ethnic information obtained through the custom tabulation had to be further aggregated, resulting in a loss of information. Though disappointing, the six ethnic categories employed are consistent with (if not more specific than) ethnic categories employed in previous Canadian health services research studies. To address the limitations of data, I believe that researchers must recognize that heterogeneity exists within ethnic categories, disclose the inherent assumptions made and report definitions for ethnic categories employed.

#### **4.42 Assigning thresholds for dichotomous variables**

Turning now to the methods employed to create dichotomous variables, it is necessary to consider the decision to use the Jenks optimization method to define variable thresholds. As discussed, I made the decision to define dichotomous variables using the Jenks optimization method instead of the deciles approach. Arguably, either method could have been employed to define variable thresholds. However, after employing both methods and comparing potential thresholds, I believe that the Jenks methodology yielded fewer limitations.

The Jenks methodology is data driven: Jenks uses a statistical algorithm to maximize the variability between groups and minimize variability within groups. In other words, Jenks is a statistical method to identify natural breaks in a distribution. By using this method, we can say that we are comparing DAs at the extremes of a distribution to all other DAs within the distribution. In contrast, the deciles methodology is straightforward and easily understood. This method compares the top or bottom 10% of a distribution with the remaining 90% of the distribution. Thus, both methods are relative measures that can be considered ‘arbitrary’ depending on your perspective. In both cases, the resulting variable compares DAs that have relatively higher concentrations of given characteristics to those with relatively lower concentrations.

Despite the attractiveness of the deciles approach, which would yield variables that were both easily interpreted and reproduced, I decided to use the Jenks approach. The deciding factors were the uniqueness of resulting cultural profiles and the potential policy relevance of assigned thresholds. A greater loss of information would have resulted using the deciles approach, as this method produced a greater number of DAs with unique cultural profiles (68 versus 20). In addition, a couple of the thresholds identified by the deciles method, namely those for the “other ethnic minority” ethnic group (threshold = 0.18) and the “recent immigrant” group (0.14), did not meet my preconceived notion of what would constitute a ‘highly concentrated’ DA. In contrast, the lowest threshold identified by the Jenks method is a proportion of 0.31 for the recent immigrant variable. With respect ethnic concentrations, all categories are defined by a proportion greater than or equal to 0.45. As a result, I believe that the Jenks method produces dichotomous variables that better differentiate between highly concentrated areas and less concentrated areas. Thus, any findings related to variables defined by Jenks lend themselves better to policy implications.

#### **4.43 The interpretation of ecological variables**

Previous studies that have examined the impact of area-level variables on access to care interpret the effect of area-level factors as the effect of community or neighbourhood characteristics on a particular outcome [23, 36-39]. The designation of any area-level factor,

regardless of the actual geography of an area, as a community or neighbourhood has raised concerns within the research community [35, 45, 117, 118]. Many researchers are beginning to question the comparability of studies and the meaning of the terms community and neighbourhood. Are neighbourhoods and communities the same? How do you define the boundaries of a community or a neighbourhood?

Area boundaries that are used to define a neighbourhood or community in health research are often assigned based on the source of data available to create area-level variables (e.g. census definitions) [35, 45, 117, 118]. As such, little theoretical thought is put into the social mechanisms that define communities and potentially influence their effect(s) on health outcomes or behaviours. In addition, given that neighbourhoods and communities are often socially defined, little consideration is given to the fact that neighbourhood or community boundaries are likely to differ by individual [119].

As a consequence of these concerns, I have refrained from labelling the ecological variables described in this chapter as community-level or neighbourhood-level factors. For the purposes of creating area-level variables, I maintain that assigning socially constructed descriptors is unnecessary. However, I do believe that when area-level variables are used in an analysis, they should be described using terminology with inherent social meanings. Without such designations, the interpretation of the effect(s) of area-level factors becomes meaningless.

The limitations of area-level factors should not preclude their use in empirical analyses. I argue that researchers are unlikely to come to a consensus on what constitutes a community or a neighbourhood. The concern that researchers have regarding their current use, namely that they are socially constructed, is the same reason that a consensus is not likely to be reached. Therefore, instead of refraining from using area-level factors in analyses until theoretical approaches are better defined, I suggest that (in the meantime) researchers should declare their assumptions and discuss the limitations of their approach.

In this chapter, I have defined area-level variables using the census dissemination area as my level of geography. As mentioned, a DA consists of 400 to 700 individuals. In some instances, a

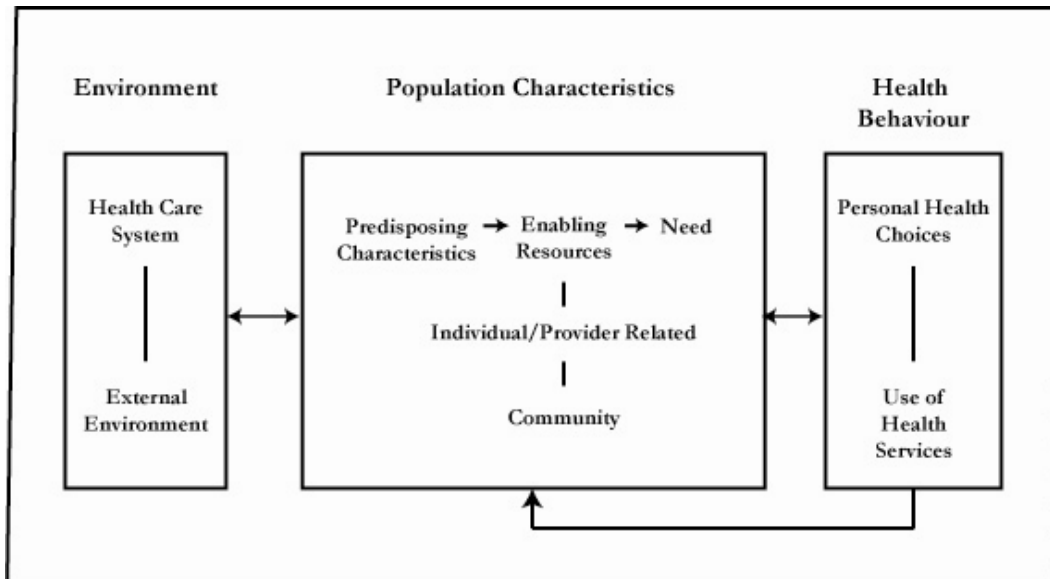
DA may represent an entire rural community, while in other cases, a DA may represent an urban city block. In my mind, neighbourhoods and communities are distinguishable concepts. I consider a community to be an area that is defined by social ties and a geographic location. The physical size of a community may differ, depending on the number of individuals that form the community's social network and the strength of their social ties. In contrast, I consider the immediate surroundings of an individual's residence to be the neighbourhood to which that individual belongs. Consequently, for the purposes of interpreting the area-level cultural variables described in this chapter, I characterize a DA as a neighbourhood.

Using a DA to define a neighbourhood is not without limitations. It is possible that individuals who reside immediately next to one another may not be considered to be within the same neighbourhood due to the boundaries of DA geographies. However, this is unavoidable without creating person-specific neighbourhoods and allowing individuals to be associated with more than one neighbourhood. Clearly this is logistically unrealistic. Thus, I consider the DA level of geography to be an appropriate proxy of a neighbourhood. Specifically, the DA was chosen in an attempt to capture the characteristics of individuals who reside in close proximity to one another.

## 5 EMPIRICAL ANALYSIS

### 5.1 Conceptual framework

In this chapter, I aim to address the following question: controlling for household and area-level factors that are conjectured to influence registration, do neighbourhood-level cultural factors significantly affect the likelihood of registration for Fair PharmaCare? My conceptual framework for this analysis is based on the behavioural model of utilization proposed by Philips et al (1998) (Figure 4) [19]. This model is an adapted version of the “Behavioural Model of Utilization” developed by Andersen et al [17, 120]. As such, it draws upon the original model and identifies three dimensions of population characteristics that act as predictors of health behaviour; namely: predisposing characteristics, enabling resources and need. Where the model differs, thereby making it more suitable for this study is the focus on and inclusion of “contextual” variables and the expansion beyond health services utilization as the outcome of interest.



**Figure 4: Behavioural model of health services utilization proposed by Philips et al (1998)**  
[19]

Contextual variables measure the context in which utilization occurs and include environmental and provider related factors [19]. Environmental variables include health care delivery system characteristics, the external environment (e.g. the economic climate) and community-level enabling variables. Provider related factors refer to provider characteristics (e.g. physician gender, physician prescribing practices, etc) as well as patient factors that are influenced by providers (e.g. use of preventative screening).

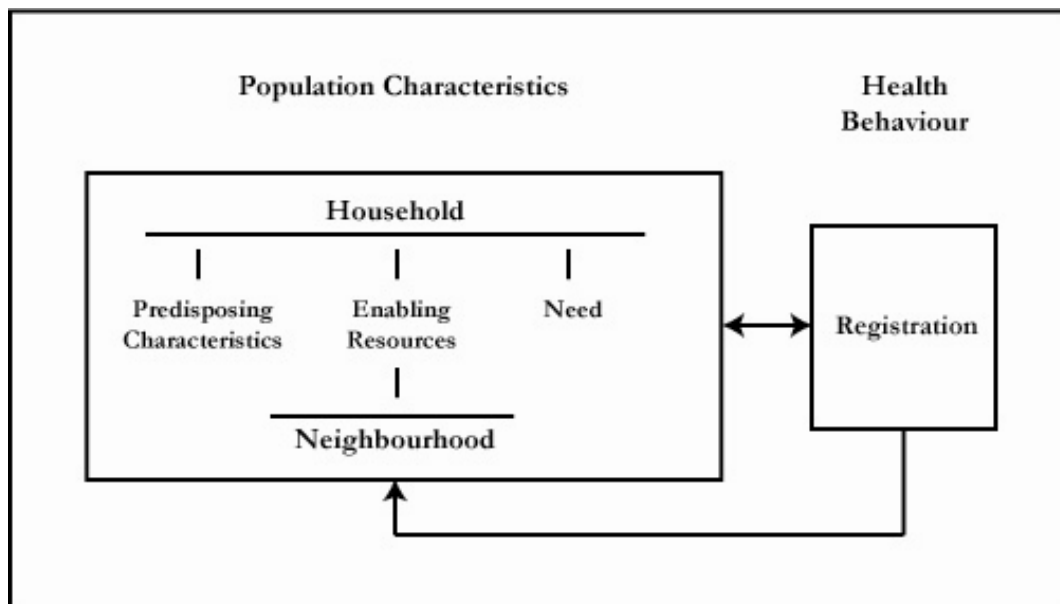
Of particular interest for the purposes of this study are community-level enabling resources. In the framework proposed by Phillips et al, community-level enabling resources refer to “attributes of the community where individuals live that enables individuals to obtain services” [19]. Such resources include human and structural resources, such as the availability of physicians or hospitals in a community. As well, social capital refers to the more intangible resources that also act as community-level enabling resources. In my thesis, I am choosing to refer to community-level enabling resources as neighbourhood-level enabling resources. As I discussed in chapter 4, I believe that a DA represents a neighbourhood, not a community. I hypothesize that the collective cultural characteristics of a DA contributes to a neighbourhood’s social capital and thus are neighbourhood-level enabling resources.

In addition to the inclusion of contextual variables, the model proposed by Phillips et al expands beyond health services utilization as the outcome of interest [19]. Instead, health behaviours are identified as the ultimate outcome of interest, with health services utilization and personal health choices included as subsets of health behaviours. I contend that this focus more appropriately represents the outcome of interest for this study, namely registration for Fair PharmaCare. Typically, health services utilization refers to the use of services that are offered by a health care provider (e.g. physician, nurse, etc). Health behaviours, on the other hand, more broadly refer to actions that impact health.

Although the conceptual framework proposed by Phillips et al is a useful model, I propose several modifications to reflect the specific research question addressed (Figure 5). The most prominent alteration is the focus on household characteristics. Registration for Fair PharmaCare does not occur at an individual-level; rather families or household members are required to register



together. Consequently, I conjecture that the collective characteristics, resources and needs of household members influence registration for the program. Although I recognize that health care delivery system characteristics, the external environment and provider related factors likely influence registration, data limitations prevent the examination of such factors. Therefore, I propose a simplified conceptual model which examines how household-level predisposing characteristics, enabling resources and need, in conjunction with neighbourhood-level enabling resources, influences registration for Fair PharmaCare.



**Figure 5: Conceptual model adapted from Phillips et al (1998)**

## 5.2 Methods

### 5.2.1 Data

I used administrative data and survey data for this analysis. Specifically, I obtained anonymized data lacking all potentially identifying information from: the British Columbia Linked Health Database (BCLHD) (2003), BC PharmaNet (2003), Fair PharmaCare registration records (2003), and the Canadian Census (2001). The BCLHD contains all fee-for-service billings for physician and hospital services obtained through the Medical Services Plan (MSP): the public

health insurance program in BC. BC PharmaNet records information regarding every prescription filled outside of acute care hospitals in the province. And Fair PharmaCare registration records contain household-level information for all households registered for the program. CHSPR researchers are using the BCLHD, BC PharmaNet, and Fair PharmaCare registration records to investigate the impact of Fair PharmaCare on drug costs, access to necessary medicines and financial equity.

On the basis of my conceptual framework, I collaborated with a CHSPR programmer<sup>9</sup> to create my dataset and develop household-level explanatory variables (e.g. predisposing and need variables). The outcome of interest, registration, was defined as a yes/no binary variable and was derived from Fair PharmaCare registration records. Households were identified using MSP family IDs within the BCLHD. In order to obtain coverage for publicly funded health services in BC, residents must enroll with MSP and pay monthly MSP premiums. MSP premiums and coverage are based on family size and income; thus families have a financial incentive to enroll for MSP as a single economic unit. Hence, MSP identification within the BCLHD is family-based: family members, enrolled as a single economic unit, are assigned the same MSP family ID.

To account for predisposing characteristics, we aggregated individual-level data using MSP family IDs to obtain measures household size and household composition (Table 5). Household composition variables identify families that had at least one female adult, had at least one child or were headed by a single parent. The measure of household size was operationalized as a categorical variable, consistent with categorizations employed by Statistics Canada.

Again, using the MSP family ID as our household definition, we created household health status measures by aggregating individual-level health status indicators (Table 5). These included prescription drug use from the previous year (2002), a count of total aggregated diagnostic groups (ADGs) and an indicator for a household with at least one family member with high co-morbidities. Previous prescription drug use is defined as the aggregate total costs of prescriptions filled by individuals in each household. I consider previous prescription drug use to be a health

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<sup>9</sup> Lixiang Yan

status measure because I believe that use of prescription medicines is directly related to disease burden. ADGs are a component of the John Hopkins' Adjusted Clinical Group (ACG) Case-Mix System, developed to assist health care providers and health care planners (e.g. public agencies) to describe or predict the populations' past or future health care utilization and costs [121]. The ACG Case-Mix System is composed of a nested series of diagnostic indicators, beginning with International Classification of Diseases (ICD) codes. ICD diagnostic codes are used by clinicians to describe patients' health conditions and treatment needs (for billing purposes). Within the ACG Case-Mix System, these codes are aggregated with respect to the severity of the condition they represent, to create 32 ADGs. Using ICD-9 and ICD-10 codes, CHSPR researchers have determined the corresponding ADGs which describe the health care burden for every individual in BC. By aggregating individual-level ADGs to a household count of ADGs, we were able to account for the health care needs of each household. In addition, an indicator was created to identify families with at least one family member with a high number of co-morbidities (e.g. four or more conditions) [122]. This provided further insight into the disease burden experienced by each household.

Three of the potentially important variables addressing enabling resources, which I included in this analysis, were previously created by CHSPR researchers: 1) a measure of private insurance status; 2) area-level income; and 3) indicators for Local Health Areas (LHA) (Table 5). In BC, to obtain physician and hospital services through MSP, residents must pay a monthly MSP premium. Premiums may be paid out-of-pocket by individuals, through an employment sponsored health benefit package, or by another third party, for example government sponsored health benefit programs for members of the military. Information regarding the source of MSP premium payments is recorded within the BCLHD. We assumed that individuals whose MSP premiums are paid by an employment sponsored health benefit package also receive prescription drug benefits. Therefore, households were assumed to have private pharmaceutical insurance when at least one household member was identified as a recipient of employment sponsored MSP premiums.

Area-level income was assigned to households to provide a measure of neighbourhood socioeconomic status. In order to create this measure, CHSPR researchers<sup>10</sup> used tax filer data from 2002 to determine the average disposable income per person by postal code [123]. Next, postal codes were ranked by average income and then divided into 1000 income bands; the corresponding income band was then assigned to households by postal code.

Finally, 89 dummy variables were created by CHSPR researchers to represent each LHA, defined by BCStats [124]. Mapping postal codes to LHAs, households were assigned to their corresponding LHA dummy variable. These indicators were used to control for the availability of health care resources within the area in which households are located. The creation of the remaining area-level enabling resource variables, namely the DA cultural characteristics, was described in Chapter 4.

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<sup>10</sup> Kimberlyn McGrail

**Table 5: Operational definitions of explanatory variables included in analysis**

<b>Explanatory Variables</b>	<b>Data Source</b>	<b>Operational Definition</b>
<b>Predisposing Characteristics</b>		
Household Size	BCLHD	Categorical variable: defined by the number of individuals assigned the same MSP family ID.
One person		
Two people		
Three or four people		
Five or more people		
Household Composition	BCLHD	Dichotomous variables:
Family with at least one adult female		Defined as true if a given MSP family ID has at least one female >18 years of age.
Family with at least one child		Defined as true if a given MSP family ID has at least one person <19 years of age.
Single parent family		Defined as true if a given MSP family ID has only one person >18 years of age and at least one person < 19 years of age.
<b>Enabling Resources</b>		
<b>Household</b>		
Private Insurance*	BCLHD	Dichotomous variable: households are assumed to have private insurance if at least one person with a given MSP family ID has their MSP premiums paid by an employer. All other household are assumed to lack private insurance.
<b>Area</b>		
Income*	Statistics Canada – T1 family file	Categorical variable: tax filer data from 2002 were used to determine the average disposable income per person by postal code; postal codes were ranked by average income and then divided into 1000 income bands; the corresponding income band was then assigned to households by postal code.

<b>Explanatory Variables</b>	<b>Data Source</b>	<b>Operational Definition</b>
Local Health Area (LHA)*	BCLHD	Categorical variable: using postal codes, households are assigned to one of 89 LHAs in BC.
Area-level cultural variables		
Ethnic concentration	Canadian Census (2001)	Dichotomous variables – see table 3
Ethnic diversity		
English language capacity		
Concentration of recent immigrants		
<b>Need</b>		
Prescription drug use from previous year	BC PharmaNet	Categorical variable: defined by the aggregate total costs of prescriptions filled by individual members in each household.
Catastrophic (>\$1000)		
High (\$500-\$1000)		
Medium (\$150-500)		
Low (<\$150)		
None (\$0)		
Sum of Aggregated Diagnosis Groups (ADGs)		Numeric variable: defined as a count of the total number of ADGs recorded for all individuals within a household.
Co-morbidity indicator		Dichotomous variable: defined as true if at least one member in a household had four or more ADGs in 2003

\* variables previously created by CHSPR researchers

## 5.22 Analytic Plan

For my analyses, I chose to focus on a cohort of non-seniors households (Table 6). I decided to exclude households with seniors because I believe that the process of registration amongst seniors systematically differed from non-seniors. Prior to the implementation of the Fair PharmaCare program in 2003, all seniors in BC received prescription drug coverage through the Seniors Plan. In order to minimize confusion regarding the policy change, all seniors received notices directly in the mail informing them of the changes to their pharmacare coverage. Therefore, seniors were systematically informed about registration for Fair PharmaCare. In contrast, most non-seniors did not directly receive instructions regarding registration. I examined registration records and discovered that registration rates differed substantially between cohorts. Almost all seniors (approximately 94%) registered in 2003 while only 55% of non-seniors registered. Given my interest in the process of registration as a potential barrier to access, from herein, I consider only the non-seniors cohort.

**Table 6: Non-seniors cohort definition**

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### **Non-seniors Cohort Definition**

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1. Families without a senior member (e.g. all members are <65 years of age)
  2. Families without any member receiving social assistance at any point in 2003
  3. Families without prescription drug coverage through another public program (e.g. other than through social assistance)
- 

The non-seniors cohort excludes families with members greater than 64 year of age in 2003, families that received social assistance and families that were likely to be eligible for prescription drug coverage through another publicly funded program (Table 7). Families who receive social assistance are excluded because they receive 100% prescription drug coverage through the Ministry of Employment and Income Assistance [125]. Families believed to be eligible for another publicly funded prescription drug program were defined as families who received MSP premiums assistance through a third party source (e.g. a military source).

**Table 7: Description of households excluded from analyses**

<b>Cohort Definition</b>	<b>Total Number of Households</b>
All BC households	1,934,604
All Non-seniors BC households	1,517,601
Non-seniors BC households, excluding social assistance recipients	1,445,187
Non-seniors BC households, excluding social assistance recipients and households likely to receive prescription drug insurance through another publicly funded program	1,371,519
Final non-seniors cohort with no missing data	1,343,545

Using the non-seniors cohort, multivariate, logistic regression analyses were conducted in SAS to determine what factors affected the likelihood of registration for the Fair PharmaCare program within its inaugural year. A conceptually-based approach was used to select variables for inclusion in analyses. Using the adapted framework described above, the first model studied included: household demographic factors, household enabling factors, area-level enabling factors, including area-level cultural factors, and household need factors. Models that included only household-level variables and only area-level variables were also studied. These models were compared to the first model, with both household and area-level variables, to determine which model could best explain differences in the likelihood of registration. I also examined models with and without each variables (e.g. each of the area-level cultural variables, each of the household-level health status measures and each of the household-level predisposing factors) to better understand how each variable affected the point estimates of the remaining variables within the model.

To compare models and select a final model for reporting, I used the log likelihood ratio test and the AIC. The log likelihood ratio test involves a comparison of  $-2\log$  likelihood values, which are calculated by SAS when a model is run, and the chi-squared distribution [126]. The null hypothesis of this test is that the models being compared are not significantly different; the



alternative hypothesis is that the models are significantly different. To calculate the log likelihood ratio test, the  $-2\log$  likelihood value obtained from the model with the larger number of parameters is subtracted from the  $-2\log$  likelihood value obtained from the model with the smaller number of parameters. The difference is compared to a critical chi-squared value, whose degrees of freedom are equal to the difference in the number of parameters between models. If the difference is larger than the critical chi-squared value, the null hypothesis is rejected. I used the AIC value, which is also computed by SAS, to determine which model is better. A lower AIC value indicates a better model.

### 5.3 Results

Using the AIC and the log likelihood ratio test, I determined that the model including all variables was significantly better than the model including only household-level variables (Table 8) and the model including only area-level variables (data not shown). The model with all variables was significantly different than the other models, as indicated by the log likelihood ratio test, and had the lowest AIC.

**Table 8: Log likelihood ratio calculation**

Model	AIC	$-2\log$ likelihood	Log likelihood ratio test
Household-level variables only	1,701,594.9	1,701,386.9	$1,701,386.9 - 1,700,813.3 = 573.6$
Household and Area-level variables	1,701,039.1	1,700,813.3	$\chi^2_{(df=9)} = 27.88$ ( $p=0.001$ ) $573.6 > 27.88$

My initial review of individual coefficients suggested that further analyses were warranted, as the directionality of certain variables was counter-intuitive. Specifically, English language proficiency was shown to be inversely associated with registration. When this variable was removed from the model, notable changes were observed in the point estimates for other area-

based cultural variables. In particular, the point estimates for the variables identifying Chinese and other Asian DAs increased significantly, while the point estimate for the variable identifying DAs with a high concentration of recent immigrants decreased. Given the unstable effect of the English language proficiency variable, it was removed from the model. The coefficients of the remaining variables were found to be robust to changes in the model. Consequently, the final model used to examine what factors affected registration for Fair PharmaCare amongst non-seniors, reported herein, includes all explanatory variables (listed in Table 5), except the English language proficiency variable.

### 5.31 Descriptive Statistics

The final cohort of non-senior households consisted of 1,343,545 families. The majority of these households (53.8%) consisted of single individuals (Table 9). Families with two members, three or four members, and five or more members represented 20.9%, 21.4%, and 3.9% of households, respectively. With respect to household composition, 68.5% of families had at least one female adult member and 26.8% of families had at least one child. Single parent families represented only 5.3% of all households.

**Table 9: Descriptive statistics – non-seniors households, predisposing factors**

<b>Explanatory Variables</b>		<b>Frequency</b>
Household size	One person	723,058
	Two persons	280,972
	Three to four persons	287,025
	Five or more persons	52,490
Household composition	Family with at least one adult female	919,782
	Family with at least one child	359,695
	Single parent family	71,334
<b>Total Households</b>		<b>1,343,545</b>

Variables measuring the enabling resources available to households included both household-level and area-level factors. Households assumed to have private insurance represented 45% of all non-seniors households. Area-based incomes were assigned to each household to account for the socio-economic status of the neighbourhood. These incomes ranged from \$4,200-\$310,900 Canadian, with a median value of \$31,300.

Non-senior households' prescription drugs costs from 2002 were categorized as catastrophic (>\$1000), high (\$500-\$1000), medium (\$150-500), low (<\$150) and zero dollars (Table 10). The majority of non-seniors households reported spending less than \$500 in 2002: households classified as incurring medium, low and no prescription drug costs were 22.0%, 32.2% and 26.9%, respectively. In contrast, less than 20% of families incurred high (9.7%) or catastrophic (9.3%) prescription drug costs. The median sum of ADGs per household was 3; fewer than 14% of household had a sum of ADGs greater than 10. Finally, almost half (45.5%) of households had at least one family member with co-morbidities (e.g. more than 3 ADGs).

**Table 10: Descriptive statistics – non-seniors households, household need factors**

<b>Explanatory Variables</b>		<b>% Households</b>
Prescription use from previous year	Catastrophic (>\$1000)	9.3
	High (\$500-\$1000)	9.7
	Medium (\$150-500)	22.0
	Low (<\$150)	32.2
	None (\$0)	26.9
Morbidity Flag	At least one person in the household has more than 3 ADGs	45 .5
<b>Total Households</b>		<b>n = 1,343,545</b>

With respect to neighbourhood-level cultural characteristics, 68.5% of households belonged to neighbourhoods that were not considered ethnically concentrated. The remaining 31.5% of households were distributed between neighbourhoods characterized as North American (3.6%), British (13.8%), European (7.7%), Chinese (4.1), Asian (non-Chinese, 2.1%), and other Ethnic minority (0.2%) (Table 11). Despite being defined independently from ethnic concentration variables, the distribution of households by ethnic diversity mirrored that of the ethnic concentration distribution: 68.5% of households belonged to ethnically heterogeneous neighbourhoods. Finally, only 1.2% of household belonged to communities characterized by a high concentration of recent immigrants.

**Table 11: Descriptive statistics – non-seniors households, neighbourhood-level enabling factors**

<b>Explanatory Variables</b>		<b>% Households</b>
<b>Enabling Resources</b>		
Neighbourhoods with a high concentration of residents reporting the following ethnic ancestries:	North American	3.6
	British Isles	13.8
	Other European	7.7
	Other Asian	2.1
	Chinese	4.1
	Other ethnic minority	0.2
	Non-ethnically concentrated	68.5
Neighbourhood Ethnic Composition	Heterogeneous	68.5
	Homogeneous	31.5
Neighbourhood Recent Immigrant Status	High concentration	1.2
	Low or average concentration	98.8
<b>Total Households</b>		<b>n = 1,343,545</b>

### 5.32 Regression Results

Multivariate regression analyses, controlling for area-level factors of LHA and area income, indicate household and neighbourhood-level factors contributed to the likelihood of registration for Fair PharmaCare in 2003. Amongst predisposing factors, household size was inversely associated with the likelihood of registering: the odds of registration decreased as family size increased (Table 12). Household composition was also found to significantly influence the likelihood of registration. The odds of registration were 80% greater for households with at least one female adult than for households lacking a female adult. Registration was also 68% more likely for households identified as a single parent family versus any other family type. The presence of children, however, was found to be inversely related with registration (odds ratio, OR=0.67): households with at least one child were less likely to register for Fair PharmaCare than households lacking any children.

**Table 12: Predisposing factors – adjusted odds ratio estimates, non-seniors households**

<b>Adjusted Odds Ratio Estimates<sup>11</sup></b>			
	<b>Point Estimate</b>	<b>95% Wald Confidence Limits</b>	
<b>Household size</b>			
One person	Ref		
Two persons	0.662	0.654	0.670
Three to four persons	0.643	0.629	0.657
Five or more persons	0.508	0.493	0.523
<b>Household composition</b>			
Family without a female adult	Ref		
Family with at least one adult female	1.801	1.784	1.818
Family without children	Ref		
Family with at least one child	0.667	0.654	0.681
Non-single parent family	Ref		
Single parent family	1.675	1.639	1.711

<sup>11</sup> The model is adjusted for household private insurance status, household health status (measured using household previous prescription drug use, total number of ADGs and an indicator for a household member with high comorbidities), LHA, neighbourhood-level income, and DA cultural characteristics (measured using variables for ethnic concentration, ethnic diversity, and concentration of recent immigrants).

Household private health insurance status significantly contributed to the likelihood of registration for Fair PharmaCare (Table 13). Households identified as likely to have private health insurance were 21% more likely to have registered than other households.

**Table 13: Household enabling factors – adjusted odds ratio estimates, non-seniors households**

<b>Adjusted Odds Ratio Estimates<sup>12</sup></b>			
	<b>Point Estimate</b>	<b>95% Wald Confidence Limits</b>	
<b>Private insurance</b>			
Assumed not to have private insurance	Ref		
Assumed to have private insurance	1.210	1.201	1.219

Household need, measured through various health status measures, also significantly influenced households’ likelihood of registration (Table 14). Use of prescription medicines in the previous year (2002) was strongly associated with registration for Fair PharmaCare: as prescription drug costs incurred in 2002 increased, households’ likelihood of registration increased. In addition, the likelihood of registration increased by 5% for each additional ADG assigned to a household, based on household members’ health care needs in 2003. Finally, households with at least one family member with co-morbidities were also 5% more likely to register.

<sup>12</sup> The model is adjusted for household size, household composition (measured using indicators for the presence of an adult female, any child, and one adult and at least one child), household health status (measured using household previous prescription drug use, total number of ADGs and an indicator for a household member with high comorbidities), LHA, neighbourhood-level income, and DA cultural characteristics (measured using variables for ethnic concentration, ethnic diversity, and concentration of recent immigrants).

**Table 14: Household need factors – adjusted odds ratio estimates, non-seniors households**

<b>Adjusted Odds Ratio Estimates<sup>13</sup></b>			
	<b>Point Estimate</b>	<b>95% Wald Confidence Limits</b>	
<b>Prescription use from previous year</b>			
None (\$0)	Ref		
Low (<\$150)	1.324	1.312	1.337
Medium (\$150-500)	1.540	1.523	1.558
High (\$500-\$1000)	1.949	1.920	1.979
Catastrophic (>\$1000)	3.695	3.630	3.761
Sum Aggregated diagnosis groups (ADG)	1.057	1.055	1.058
Flag for Co-morbid family member	1.051	1.039	1.062

Households belonging to neighbourhoods identified as ethnically concentrated had varying odds of registration (Table 15). For instance, households belonging to neighbourhoods identified as North American, British, or other European had similar odds of registration as households belonging to non-ethnically concentrated neighbourhoods. In contrast, households belonging to Chinese (OR=1.23) or other Asian (OR=1.17) neighbourhoods were more likely to register, while households belonging to neighbourhoods with a high concentration of other ethnic minorities (OR=0.83) were less likely to register. Households belonging to an ethnically homogeneous neighbourhood, irrespective of the ethnic group, were 6% more likely to have registered than households belonging to an ethnically heterogeneous neighbourhood. Finally, households

<sup>13</sup> The model is adjusted for household size, household composition (measured using indicators for the presence of an adult female, any child, and one adult and at least one child), household private insurance status, LHA, neighbourhood-level income, and DA cultural characteristics (measured using variables for ethnic concentration, ethnic diversity, and concentration of recent immigrants).



belonging to a neighbourhood identified as having a high concentration of recent immigrants were 5% less likely to have registered compared to households belonging to neighbourhoods with average or low concentrations of recent immigrants.

**Table 15: Neighbourhood-level enabling factors – adjusted odds ratio estimates, non-seniors households**

<b>Adjusted Odds Ratio Estimates<sup>14</sup></b>			
	<b>Point Estimate</b>	<b>95% Wald Confidence Limits</b>	
<b>Ethnic Concentration</b>			
Non-ethnically concentrated DA	Ref		
North American	1.009	0.989	1.029
British Isles	1.005	0.993	1.017
Other European	1.000	0.985	1.014
Other Asian	1.167	1.135	1.199
Chinese	1.228	1.202	1.256
Other	0.827	0.768	0.890
<b>Ethnic Composition</b>			
Heterogeneous	Ref		
Homogeneous	1.061	1.049	1.072
<b>Concentration of Recent Immigrants</b>			
Average	Ref		
High	0.953	0.921	0.985

<sup>14</sup> The model is adjusted for household size, household composition (measured using indicators for the presence of an adult female, any child, and one adult and at least one child), household private insurance status, household health status (measured using household previous prescription drug use, total number of ADGs and an indicator for a household member with high comorbidities), LHA, and neighbourhood-level income.

## 5.4 Discussion

Our findings suggest that area-level cultural characteristics, in addition to household characteristics, influenced registration for Fair PharmaCare amongst non-seniors families in BC. While findings are consistent with American research that has examined issues related to access, this study breaks new ground in Canada. Specifically, few Canadian studies have either examined health behaviours at the household level or investigated the impact of neighbourhood-level cultural characteristics on health behaviours. In addition, to my knowledge, no Canadian study has examined the issue of access to voluntary, publicly funded prescription drug insurance programs. As such, this study provides novel insight into the mechanisms by which access to publicly funded prescription drug programs are achieved in Canada.

Prior to discussing the relevance and meaning of study findings, I would like to discuss the appropriateness of the analytic approach employed. For this study, I used multivariate logistic regression models to assess the impact of household and area-level factors on registration for Fair PharmaCare. Although I acknowledge that multilevel statistical analyses are commonly employed and often recommended for identifying the impact of area-level characteristics on health behaviours, multilevel statistical methods are not universally accepted as the most appropriate analytic approach for such studies [119]. Indeed, recent studies have employed non-multilevel statistical approaches to assess the relative importance of area-level characteristics on health behaviours [36, 38]. In this thesis, multilevel statistical methods were not employed because data permissions prohibit the identification of DAs or the inclusion of any DA identifier. I conjecture that the use of a multilevel model for this analysis would not result in different point estimates [38]. Instead, by accounting for area-level clustering, a multi-level model may have generated wider confidence intervals. However, given that this population-based analysis included over 1.4 million households, I am reasonably confident that the study's findings would be robust to changes in the analytic approach.

#### **5.41 The impact of household factors**

Given the requirement that individuals must register for Fair PharmaCare along with their family members, our analysis was conducted at the household-level. The assumption here is that the collective characteristics, resources and needs of a household influence the likelihood of registration. Study findings suggest that indeed, family size and composition, insurance status and health status influenced the likelihood of registration for Fair PharmaCare.

Prior to discussing study findings, I would like to acknowledge that, as a consequence of our household definition, the descriptive statistics of family size and composition reported in this thesis deviate from Statistics Canada estimates [127]. I have defined a household using a definition consistent with an MSP economic unit, as reported within the BCLHD (2003). Statistics Canada households are identified as private dwellings through the census (2006). This distinction is important, as it allows readers to more accurately interpret study findings. I believe that the household definition employed in this analysis is appropriate because I believe that families who enrol for MSP as a single economic unit are likely to register for Fair PharmaCare as a family as well.

Considering study findings, consistent with past research, the likelihood of registration decreased as family size increased. Chen and Escarce (2006) examined the impact of family structure on children's use of ambulatory care and prescription medicines in the USA [28]. Similar to our findings, their study found children's use of ambulatory care and prescription medicines decreased as family size increased. Chen and Escarce (2006) cite theories from social scientists to explain their findings. In particular, they discuss the notion of finite parental resources: as family size increases, parental resources are increasingly divided and strained. It has been suggested that the additive needs of each additional family member on the head(s) of a household results in decreased use of health services for all family members. With respect to registration for Fair PharmaCare, it is plausible that larger families were less likely to register for the program due to time restraints on the household head(s). However, further research is needed to understand whether members of larger families are less aware of public programs, are misinformed regarding potential benefits or are too busy to engage in the registration process.

In accordance with our findings related to family size, families with at least one child were 33% less likely to have registered for Fair PharmaCare than families lacking children. This finding contradicts my hypothesis that families with children would be more likely to register. Originally I hypothesized that families with children would be more inclined to register because previous research indicated single parent families were more likely to enrol in public health insurance in the USA [30]. This reasoning, however, was flawed. Enrolment for public health insurance in the USA differed between single parent families and two parent families, suggesting that the resources of the parent(s) (or lack thereof) was the mediating factor influencing enrolment – not the presence of children [30]. Indeed our findings support this notion, as single parent families were 68% more likely to register for Fair PharmaCare than any other family type. I hypothesize that families with children have more demands on their time than families lacking children. Thus, it is possible that families engaged in more activities, as a result of having children, had fewer opportunities to become informed of Fair PharmaCare and/or had less time to complete the registration process. In contrast, I hypothesize that single parent families face greater financial burdens, and thus had greater incentives to register for the program. Additional research is needed to compare health behaviours between families with varying family compositions, including single and two-parent families as well as families without children. To date, studies have focused largely on families with children and differing parental structures [27, 30, 31] .

Families with at least one adult female were 80% more likely to register than families lacking an adult female. Although Canadian studies have shown that women perceive greater barriers to access to care [24, 128], studies have also shown that, adjusting for sex-specific health care utilization and age-specific mortality, sex does not significantly impact use of health care services [129]. While it would appear that our findings are inconsistent with past findings, unlike previous studies, our study focused on a health behaviour that impacts households rather than individuals. International research which has explored the relationship between family structure and health behaviours indicate maternal health behaviours are correlated with children's health behaviours [27]. Moreover, this correlation is stronger than the correlation observed between paternal health behaviours and children's health behaviours. If the assumption that children are reliant on their parents to access care holds true, these findings would suggest that females bear the responsibility of accessing health care for their families. I hypothesize that the presence of an

adult female in a household increases the likelihood of registration for Fair PharmaCare as a consequence of the social role of women in our society. Women continue to assume a large share of domestic responsibilities within households; perhaps matters related to health represent one such responsibility.

In addition to predisposing household characteristics, the availability of private health insurance influenced registration for Fair PharmaCare. Consistent with initial hypotheses, households that were identified as likely to have private prescription drug insurance were 21% more likely to have registered than households with an unknown private insurance status. My original hypothesis was based on my discussions with senior decision-makers involved with the development and implementation of Fair PharmaCare in 2003. These discussions revealed that households with private prescription drug insurance had an added incentive to register for the program: companies that provide private prescription drug insurance threatened to withhold supplementary drug coverage unless households registered for Fair PharmaCare. As such, households that were covered through a supplementary, private prescription drug insurance program were systematically made aware of the public program and were compelled to register. Therefore, it is logical that households with private insurance would be more likely to register for Fair PharmaCare.

Despite our findings related to private insurance, it is important to recognize the limitations of our analysis. We did not have a precise measure to identify which households received prescription drug coverage through a private insurance program. Instead, we were able to identify which households received payment assistance from an employer for their MSP premiums. It was assumed that most households that receive employment related health benefits have some form of prescription drug coverage. In my capacity as a research assistant at CHSPR, I conducted an informal survey of all unions in BC (n=50) to investigate the plausibility of this assumption. In total, 28 unions responded, representing approximately 106 000 British Columbians. All but two unions confirmed that their members received prescription drug coverage as a component of their employment sponsored health benefits. One union provided prescription drug coverage to members through their union membership. Based on this survey, I conjecture that the indicator for

employer paid MSP premiums is a reasonable proxy for the presence of private prescription drug insurance.

Previous Canadian research has shown that individual health status is a strong predictor of physician and hospital services utilization [20-23]. Our study has shown that household health status is a strong predictor of registration for Fair PharmaCare. While three measures of health status were employed, the strongest predictor was prescription drug costs in the previous year. High previous prescription drugs costs both imply poor health status and a need for prescription drugs; thus a financial incentive to enrol in the program. Our results indicate that previous prescription drug costs have a dose response relationship with registration for public prescription drug insurance. Households that had experienced catastrophic drug costs in the previous year (>\$1000) were almost four times (400%) more likely to have registered than households that had no drug costs (\$0) in the previous year. Households with high (\$500-1000), medium (\$150-500) and low (<\$150) previous drug costs were 95%, 54% and 32% more likely to have registered than households with no previous drug costs, respectively. With respect to our conceptual framework, this result clearly demonstrates the link between collective household needs and resources and health behaviours.

To obtain a more direct measure of household health status, our study included a count of ADGs per household as well as an indicator for a family member with high co-morbidities. Each additional ADG was associated with a 5% greater likelihood of registration. Although this finding may seem small in magnitude, it is important to note that these results were found after controlling for previous prescription drug costs, as well as other factors. Similarly, the indicator for at least one family member with high co-morbidities was also associated with a 5% greater likelihood of registration. Thus, controlling for the total number of ADGs, amongst other factors, households with a relatively ill family member were more likely to have registered. Thus, household health status is a significant predictor of registration for Fair PharmaCare.

To our knowledge, no study has previously aggregated individuals' ADGs to measure health status at the household level. Few studies have conducted analyses at the household-level and even fewer have attempted to measure household need [28, 29, 32]. Amongst studies that have

accounted for health status, survey data were used. The study conducted by Chen et al (2006) used various measures of self-reported health to adjust for need in their analysis on the effect of family structure on ambulatory visits and use of prescription medicines by children [28]. The measures for children's need were derived from responses to the Medical Expenditure Panel Survey (MEPS) and included: self-reported (or parent-reported) general health, self-reported mental health, as well as indicators for specific conditions (e.g. having frequent cough and colds, asthma, diabetes, etc). In contrast, Galbraith et al (2005) used MEPS data to construct proxies for household health status [29]. In their analyses on the financial burden of health care expenditure for families with children, household need was assigned using indicators for the worst reported health status of any family member and whether any family member reported any limitation of activity. Finally, Saver et al (2003) also created proxies for need for their analyses on the role of area-level and family-level factors on ethnic disparities in the purchase of non-group health insurance [32]. Households were assigned values for need based on the response of any adult household member to the physical and mental health status questions from the Community Tracking Study Household Survey. Thus, although all studies employed survey data to measure household need, large discrepancies exist with respect to how need variables were conceptualized and operationalized.

While research examining the validity of our household health status measures is still needed, I believe that our approach is superior to previous measures of household health status used to date. By using administrative data, we were able to capture measures of health status through diagnostic codes for every individual within each household in BC. This is preferable to using survey data, which captures information for a sample of the population versus the entire population. The use of administrative data allows us to avoid using the health status of a single individual in a household as a proxy for household health status. Instead, the health care needs of all household members are considered and contribute to the measure of household health status. Although I recognize that administrative data can only provide health status information for people who access health services, this limitation is arguably less significant than using a proxy of health status, particularly given the presence of a universal public health care system.

## 5.42 The impact of neighbourhood-level cultural factors

After accounting for household factors, area-income and the availability of health services, neighbourhood-level cultural characteristics significantly influenced the likelihood of registration for Fair PharmaCare. In order to understand the importance of area-level cultural characteristics, I consider Carpiano's interpretation of social capital theories [43]. According to Carpiano, Bourdieu's theory of social capital refers to the resources (both potential and actual) possessed by networks within a community and individual residents' abilities to draw upon those resources to attain a variety of goals [43]. In contrast, Putnam's theory of social capital is framed in terms of social cohesion: the degree to which trust, values and neighbourhood ties are shared amongst residents. Carpiano argues that Putnam's social capital (referred herein as social cohesion) and Bourdieu's social capital are distinct attributes of communities and that social cohesion is a prerequisite to attain social capital. In addition, Carpiano articulates the various forms of social capital that may be present within a community: 1) social support; 2) social leverage; 3) informal social control; and 4) community organization participation. In relation to health behaviours, social support operates directly and indirectly as emotional and physical support to facilitate health behaviours; social leverage provides the information that is attained through social networks to facilitate health behaviours; informal social control is the mechanism by which social disorder is prevented, thereby facilitating the safe participation in health behaviours; and community organization participation is the formal organization of residents' collective activities, which in turn brings residents together and allows them to act collectively to facilitate health behaviours. I use these theories to interpret this study's findings alone and in comparison to previous findings.

In this study, households belonging to a neighbourhood characterized as ethnically homogenous were 6% more likely to have registered for Fair PharmaCare than households belonging to ethnically heterogeneous neighbourhoods. Therefore, regardless of the particular ethnic background associated with a neighbourhood, households belonging to neighbourhoods with less ethnic diversity had a higher likelihood of registration. Similarly, American research has found that individuals report better access to care when the predominant ethnic group in their county of residence corresponds with their own ethnic background, compared to a different ethnic background [37]. I conjecture that neighbourhoods that are ethnically homogeneous are more



socially cohesive: residents with a similar culture are more likely to share values and experiences. Furthermore, neighbourhoods with greater social cohesion are likely to have higher social capital. In particular, it is plausible that individuals within such neighbourhoods experienced greater social leverage through information networks and thus were able to obtain information regarding Fair PharmaCare more readily. Participation in community organizations may also be greater in homogeneous ethnic communities, which in turn may have created opportunities to promote Fair PharmaCare or facilitate registration.

Despite our findings related to ethnic diversity, households belonging to neighbourhoods identified as having a high prevalence of individuals reporting a given ethnic background had different likelihoods of registration, depending on the ethnic background associated with their neighbourhood. Specifically, households belonging to neighbourhoods characterized as largely North American, British, or other European had similar odds of registration as households belonging to non-ethnically concentrated neighbourhoods. Households belonging to neighbourhoods identified as having a high concentration of Chinese or other Asians were 23% and 17% more likely to have registered than households belonging to non-ethnically concentrated neighbourhoods. In contrast, households belonging to neighbourhoods with a high concentration of other ethnic minority groups were 17% less likely to have registered. To understand why some ethnic groups were seemingly advantaged, while others were disadvantaged, it is necessary to consider other factors that may have influenced registration.

As mentioned in section 1.2, to obtain policy context, I conducted interviews with senior policymakers involved with the development and implementation of Fair PharmaCare in 2003. During these interviews, policymakers confirmed that, leading up to the introduction of the program, there was considerable concern regarding the process of registration within government. To facilitate the process, three modes of registration were developed: 1) mail-in registration forms; 2) online forms; and 3) a toll free hotline, with staff available to register households.

However, in recognition of the large and changing immigrant populations within BC, policymakers remained concerned about the process of registration. In particular, policymakers focused concern on the Chinese and Punjabi ethnic groups, the two largest visible minority groups

in BC. To ensure that information regarding Fair PharmaCare reached Chinese and Punjabi residents, educational materials (e.g. print media) were translated into Chinese and Punjabi and were distributed within ethnic communities. Moreover, to facilitate registration, mail-in and online registration forms were translated and staff were hired to accept calls in Mandarin, Cantonese and Punjabi.

Taking the information obtained through policymaker interviews into account, the findings from this study indicate government efforts to facilitate registration were highly successful. As suggested previously by research on SCHIP, government initiatives to facilitate registration processes can alleviate inequities in access to programs [12, 64, 65]. However, it must be noted that government initiatives are not without limitations. With respect to registration for Fair PharmaCare, only two ethnic groups were targeted for facilitated registration. Households belonging to neighbourhoods with a high prevalence of individuals identifying with other ethnic minority groups had a significantly lower likelihood of registration. Thus, government initiatives are limited by the scope of interventions.

The lower likelihood of registration amongst households belonging to other ethnic minority groups may be explained by theories of social capital. Neighbourhoods defined as having a high prevalence of other ethnic minorities may be comprised of individuals identifying with a variety of ethnic minority groups (e.g. African, Latin, Aboriginal, etc). Consequently, these neighbourhoods may have less social cohesion as a result of having greater diversity in cultural experiences. Furthermore, these neighbourhoods may also have less social capital: information networks may be smaller, reducing social leverage and participation in community organizations may be lower, reducing opportunities to promote common interests, including registration. Additional research is needed to more definitively understand why households belonging to neighbourhoods comprised of other ethnic minority groups are seemingly disadvantaged.

Finally, households belonging to neighbourhoods with a high prevalence of recent immigrants were 5% less likely to register than households belonging to neighbourhoods with fewer recent immigrants. Recall that neighbourhoods identified as having a high proportion of recent immigrants were also characterized as being ethnically homogeneous or predominantly

Chinese (section 4.32, Table 4). Therefore, the advantage of belonging to an ethnically homogenous or predominantly Chinese neighbourhood is negated when the neighbourhood also consists of a large proportion of recent immigrants. The consequence of belonging to a neighbourhood with many recent immigrants may be explained by low social cohesion and low social capital. Recent immigrants were defined as individuals who had arrived in Canada within the last five years. Hence, it is plausible that recent immigrants have not had sufficient opportunities to build wide social networks, which decreases their trust in their neighbours, resulting in low social cohesion. This may also decrease individuals' ability to access information network, thereby reducing the neighbourhoods' social capital: social capital is built upon individuals' abilities to access collective resources. Alternatively, recent immigrants may build social networks with each other; thus their collective lack of experience with the Canadian health care system may limit the information shared within their social network.

### **5.43 Summary**

This study explored what factors affected the likelihood of registration for Fair PharmaCare in 2003. Findings, consistent with previous literature, indicate household and area-level factors influence registration. Specifically, household size, composition, private insurance status and health needs affected the odds of registration. Neighbourhood-level cultural characteristics, including ethnic concentration, ethnic diversity and prevalence of recent immigrants also significantly influenced registration. The policy implications of these findings are considered in the following chapter.

## 6 CONCLUSIONS

### 6.1 Summary

In my thesis, I have addressed two research questions. The first question focuses on a methodological challenge faced by Canadian researchers who use BC administrative health data and want to study the impact of culture on a given health behaviour or outcome. How can researchers measure the effect of culture when BC administrative data are used? The second question examines what factors affect the likelihood of registration for Fair PharmaCare. Specifically, my thesis investigates whether, controlling for household and area-level factors, neighbourhood-level cultural characteristics influence the likelihood of registration for Fair PharmaCare.

To summarize, my thesis is divided into six chapters. The first chapter provides motivation for why access to publicly funded prescription drug insurance is an important issue. I first described the escalation in expenditure on prescription medicines in Canada over the past twenty years. In turn, I introduced BC's Fair PharmaCare program and highlighted the registration process as a potential barrier to access to (or participation in) the program. Moreover, I described interviews with policymakers, to further provide policy context to the discussion of registration. BC demographics were also considered, to emphasize the concerns noted by policymakers. Drawing on the background information provided, I then summarized the general purpose of my thesis, as well as the outline for information to come.

In order to lay a strong foundation for the research questions addressed in my thesis, I provided a review of the literature in chapter two. First, I examined issues related to access: access to health care, access to medicines and access to publicly funded health insurance programs. I focused on issues related to access because participation in, and therefore access to, Fair PharmaCare is contingent on registration for the program. Thus, in order to understand issues related to registration, I believe that one must more broadly consider issues related to access. Next, I examined issues related to the measurement of culture in Canadian health research. This

review helped to underline the methodological challenges faced by Canadian researchers interested in studying the impact of culture.

Following my review of the literature, I defined the purpose of my thesis, as well as my specific research questions:

1. Given the lack of cultural data within administrative health datasets and restrictions on data access in BC, how can researchers measure the effect of culture when BC administrative data are used?
2. Controlling for households and area-level factors, which are conjectured to influence registration, do area-level cultural factors significantly affect the likelihood of registration for Fair PharmaCare?

My first research question was motivated by my desire to examine the impact of culture on registration for Fair PharmaCare. In my quest to address this question, I quickly learned that the current research environment in BC is constrained by concerns regarding privacy. In particular, I learned that researchers cannot link individual-level survey data containing cultural information with administrative health data. To overcome this issue, my thesis draws upon evidence from previous research, which indicates that area-level cultural factors also contribute significantly to health behaviours. Hence, in chapter four, I have described how to create ecological cultural variables, which can be linked with administrative health data.

Beyond simply creating ecological cultural variables, I have attempted to highlight issues surrounding the measurement of culture for research purposes. Culture represents the shared beliefs, social practices and material traits that characterize a group defined by time and space [130]. As a construct, culture requires careful consideration, as its nature is somewhat intangible; thereby making its measurement challenging. In this thesis, I have defined a DA's cultural profile through the collective characteristics of its residents and have operationalized culture as the culmination of ethnic ancestry, language capacity and immigration status. I believe that the host of variables that I have developed to represent the cultural profiles of neighbourhoods represents, to the best of my abilities, the cultural characteristics of individuals' neighbourhoods.

Employing the host of area-level cultural variables developed, in chapter five I sought to determine whether area-level cultural characteristics influenced registration for Fair PharmaCare, controlling for other potentially influential factors. This research question was motivated by my interest in examining access to publicly funded prescription drug insurance in Canada, as well as evidence from the USA, which suggests that ethnic minorities have difficulties accessing publicly funded health insurance programs. Given the increasing importance of prescription medicines on the treatment of chronic and acute health conditions, I believe that research which explores access to prescription drug insurance is warranted at this time. Moreover, given the cultural demographics of BC, I believe that a focus on culturally defined communities is also defensible.

The findings from my analyses indicate a variety of household and neighbourhood-level factors influenced registration for Fair PharmaCare. In particular, family size and composition, household health status, household private insurance status and neighbourhood-level cultural characteristics had differing effects on households' likelihood of registration. Consideration must now be given to why household and neighbourhood characteristics impacted registration.

## **6.2 Policy implications**

With respect to study findings related to household-level characteristics, policymakers may want to consider why the likelihood of registration for Fair PharmaCare decreased as household size increased, as well as the potential implications of this finding. In addition, why were households with at least one child also less likely to register? What does this mean with respect to access to the program? I hypothesize that larger families, including families with children, face greater demands on their time than smaller families, without children. I also conjecture that larger families, particularly those with children, experience greater financial burdens. Together, these hypotheses imply that the process of registration makes publicly funded programs, such as Fair PharmaCare, less accessible to larger families who would likely benefit from program participation. Perhaps greater emphasis must be given to targeting families with children, to ensure that families are aware of the public programs available and are aware of the potential benefits associated with participation.

Based on this study's findings related to neighbourhood-level ethnic concentration, the efficacy of government interventions aimed at educating specific subgroups of public about Fair PharmaCare, as well as interventions aimed at facilitating participation, appears to be high. Registration amongst households belonging to the Chinese and other Asian ethnic neighbourhoods was shown to be 23% and 17% higher than that of households belonging to non-ethnically concentrated neighbourhoods, respectively. Therefore, although Fair PharmaCare was promoted widely through English media, this finding suggests that the promotional activities targeted at the Chinese and Punjabi ethnic communities were more successful at eliciting participation. While it is unclear why this is the case, this finding suggests that governments may play a role in alleviating potential barriers to access faced by ethnic minorities for public programs.

The lower likelihood of registration observed for households belonging to neighbourhoods with a high proportion of underrepresented ethnic minorities in BC and neighbourhoods with a high proportion of recent immigrants indicates that individuals belonging to these groups may form vulnerable populations for participation in publicly funded programs. Ethnic minorities that belong to smaller ethnic communities may have less social support than individuals belonging to larger ethnic communities, such as the Chinese ethnic community. Given that members of smaller ethnic minority groups are more dispersed geographically within BC, I hypothesize that these groups have smaller information networks and have fewer community organizations. Similarly, I hypothesize that recent immigrants have less social support as a consequence of having fewer social ties within their neighbourhoods. Alternatively, recent immigrants may be less informed regarding Canada's health care system. Consequently, recent immigrants who reside in neighbourhoods with a high concentration of recent immigrants and form social networks with their neighbours may be misinformed because their social network similarly lacks information about the Canadian health care system. The upshot of these hypotheses is that ethnic minorities and recent immigrants may be vulnerable because they are theoretically more isolated.

To alleviate potential barriers to publicly funded prescription drug programs faced by members of underrepresented ethnic minority groups and recent immigrants, policymakers must consider how best to reach members of these groups. Unlike the Chinese and Punjabi ethnic groups, which are more visible within the province, smaller ethnic minority groups and recent

immigrants may be more difficult to reach. Therefore, policymakers must carefully consider how to best identify vulnerable populations and promote public programs.

Overall, the findings from this study suggest that government policies to promote and facilitate registration for a public program can be effective. However, findings also suggest that if government policies are narrow in scope, the effectiveness of subsequent interventions are likely to be limited. As governments in Canada continue to develop new public programs, policymakers interested in ensuring their uptake must consider the composition of their population and the potential barriers that may prohibit participation amongst particular subgroups within their population. Once potential barriers have been identified, policymakers can alleviate those barriers through public policy, which directs government interventions.

### **6.3 Future research**

The results from this thesis raise many new research questions. If analyses were conducted with individual or household-level measures of culture in addition to area-level measure of culture, would area-level cultural factors continue to have an impact on registration to Fair PharmaCare? Do area-level cultural factors impact access to or use of other public programs or health services? Does access to publicly funded prescription drug insurance improve health outcomes?

While many additional questions may be asked, the most imminent question in my mind is, will improved measures of area-level culture provide greater insight into the impact of culture on registration for Fair PharmaCare? While completing this thesis, we received approvals from the BC Ministry of Health to remove the condition in our data approvals, which states that no fewer than ten DAs may be identified by a unique cultural profile. Consequently, following the completion of my thesis, I will re-examine registration for Fair PharmaCare using more precise measures of area-level culture. I hope that this study will be the first of many that will be conducted as a consequence of my thesis work.



## REFERENCES

1. Ministerial Task Force on the National Pharmaceuticals Strategy: **National Pharmaceuticals Strategy Progress Report**. Ottawa: Health Canada; 2006:1-48.
2. CIHI: **Drug Expenditure in Canada, 1985-2007**. Ottawa: Canadian Institute for Health Information; 2008.
3. Romanow RJ: **Building on Values: The Future of Health Care in Canada - Final Report**. Saskatoon; 2002:189-210.
4. Adams AS, Soumerai SB, Ross-Degnan D: **The Case for a Medicare Drug Coverage Benefit: A Critical Review of the Empirical Evidence**. *Annual Review of Public Health* 2001, **22**:49-61.
5. Kozyrskyj AL, Mustard CA, Cheang MS, Simons FE: **Income-based drug benefit policy: impact on receipt of inhaled corticosteroid prescriptions by Manitoba children with asthma**. *CMAJ* 2001, **165**(7):897.
6. Lexchin J, Grootendorst P: **Effects of prescription drug user fees on drug and health services use and on health status in vulnerable populations: A systematic review of the evidence**. *International Journal of Health Services* 2004, **34**(1):101-122.
7. Tamblyn R, Laprise R, Hanley JA, Abrahamowicz M, Scott S, Mayo N, Hurley J, Grad R, Latimer E, Perreault RM, P. *et al*: **Adverse events associated with prescription drug cost-sharing among poor and elderly persons**. *JAMA* 2001, **285**(4):421.
8. Morgan SG, Barer ML, Agnew JD: **Whither seniors' pharmacare: Lessons from (and for) Canada**. *Health Affairs* 2003, **22**(3):49-59.
9. Canadian Institute for Health Information: **Drug Expenditure in Canada, 1985-2006**. Ottawa: CIHI; 2007.
10. **Fair PharmaCare Information**  
[<http://www.health.gov.bc.ca/pharme/plani/planiindex.html>]
11. Pharmaceutical Services Division: **Pharmaceutical Services Division Annual Performance Report 2006**. Victoria: Province of British Columbia; 2007:1-66.
12. Kincheloe J, Frates J, Brown ER: **Children's Health Insurance: Determinants of Children's Participation in California's Medicaid and SCHIP Programs**. *Health Services Research* 2007, **42**(2):847-866.
13. Statistics Canada: **Canada's Ethnocultural Mosaic, 2006 Census**. Ottawa: Statistics Canada; 2008:1-36.

14. **Canada Health Act** [<http://laws.justice.gc.ca/en/ShowFullDoc/cs/C-6//en>]
15. Romanow RJ: **Building on Values: The Future of Health Care in Canada - Final Report**. Saskatoon; 2002:14.
16. Romanow RJ: **Improving Access, Ensuring Quality**. In *Building on Values: The Future of Health Care in Canada - Final Report*. Saskatoon; 2002:137-157.
17. Andersen R, Newman JF: **Societal and Individual Determinants of Medical Care Utilization in the United States**. 1973, **51**(1):95-124.
18. Davidson PL, Andersen RM, Wyn R, Brown ER: **A framework for evaluating safety-net and other community-level factors on access for low-income populations**. *Inquiry-the Journal of Health Care Organization Provision and Financing* 2004, **41**(1):21-38.
19. Phillips KA, Morrison KR, Andersen R, Aday LA: **Understanding the context of healthcare utilization: Assessing environmental and provider-related variables in the behavioral model of utilization**. *Health Services Research* 1998, **33**(3):571-596.
20. Newbold KB, Eyles J, Birch S: **Equity in health care - Methodological contributions to the analysis of hospital utilization within Canada**. *Social Science & Medicine* 1995, **40**(9):1181-1192.
21. Roos NP, Mustard CA: **Variation in health and health care use by socioeconomic status in Winnipeg, Canada: Does the system work well? Yes and no**. *Milbank Quarterly* 1997, **75**(1):89-&.
22. Dunlop S, Coyte PC, McIsaac W: **Socio-economic status and the utilisation of physicians' services: results from the Canadian National Population Health Survey**. *Social Science & Medicine* 2000, **51**(1):123-133.
23. Yip AM, Kephart G, Veugelers PJ: **Individual and neighbourhood determinants of health care utilization. Implications for health policy and resource allocation**. *Canadian journal of public health* 2002, **93**(4):303.
24. Wilson K, Rosenberg MW: **Accessibility and the Canadian health care system: squaring perceptions and realities**. *Health Policy* 2004, **67**(2):137-148.
25. Quan H, Fong A, De Coster C, Wang JL, Musto R, Noseworthy TW, Ghali WA: **Variation in health services utilization among ethnic populations**. *Canadian Medical Association Journal* 2006, **174**(6):787-791.
26. Schor E, Starfield B, Stidley C, Hankin J: **Family Health - Utilization and Effects of Family Membership**. *Medical Care* 1987, **25**(7):616-626.

27. Cardol M, Groenewegen PP, de Bakker DH, Spreeuwenberg P, van Dijk L, van den Bosch W: **Shared help seeking behaviour within families: a retrospective cohort study.** *British Medical Journal* 2005, **330**(7496):882-884B.
28. Chen AY, Escarce JJ: **Effects of family structure on children's use of ambulatory visits and prescription medications.** *Health Services Research* 2006, **41**(5):1895-1914.
29. Galbraith AA, Wong ST, Kim SE, Newacheck PW: **Out-of-pocket financial burden for low-income families with children: socioeconomic disparities and effects of insurance.** *Health Services Research* 2005, **40**(6 Pt 1):1722-1736.
30. Heck KE, Parker JD: **Family structure, socioeconomic status, and access to health care for children.** *Health Services Research* 2002, **37**(1):173-186.
31. Leininger L, Ziol-Guest KM: **Reexamining the effects of family structure on children's access to care: The single-father family.** *Health services research* 2007, **43**(1):117-133.
32. Saver BG, Doescher MP, Symons JM, Wright GE, Andrilla CH: **Racial and ethnic disparities in the purchase of nongroup health insurance: The roles of community and family-level factors.** *Health Services Research* 2003, **38**(1):211-231.
33. Prentice JC: **Neighborhood effects on primary care access in Los Angeles.** *Social Science & Medicine* 2006, **62**(5):1291-1303.
34. Ellen IG, Mijanovich T, Dillman KN: **Neighborhood effects on health: Exploring the links and assessing the evidence.** *Journal of Urban Affairs* 2001, **23**(3-4):391-408.
35. Riva M, Gauvin L, Barnett TA: **Toward the next generation of research into small area effects on health: a synthesis of multilevel investigations published since July 1998.** *Journal of Epidemiology and Community Health* 2007, **61**(10).
36. Andersen RM, Yu HJ, Wyn R, Davidson PL, Brown ER, Teleki S: **Access to medical care for low-income persons: How do communities make a difference?** *Medical Care Research and Review* 2002, **59**(4):384-411.
37. Haas JS, Phillips KA, Sonneborn D, McCulloch CE, Baker LC, Kaplan CP, Perez-Stable EJ, Liang SY: **Variation in access to health care for different racial/ethnic groups by the racial/ethnic composition of an individual's county of residence.** *Medical Care* 2004, **42**(7):707-714.
38. Johnston GM, Boyd CJ, MacIsaac MA: **Community-based Cultural Predictors of Pap Smear Screening in Nova Scotia.** *Canadian Journal of Public Health* 2004, **95**(2):95-98.
39. Glazier RH, Creatore MI, Cortinois AA, Agha MM, Moineddin R: **Neighbourhood Recent Immigration and Hospitalization in Toronto, Canada.** *Canadian Journal of Public Health* 2004, **95**(3):I30-I34.

40. Carpiano RM: **Neighborhood social capital and adult health: An empirical test of a Bourdieu-based model.** *Health & Place* 2007, **13**(3):639-655.
41. Kirby JB, Kaneda T: **Access to health care: Does neighborhood residential instability matter?** *Journal of Health and Social Behavior* 2006, **47**(2):142-155.
42. Padgett DK, Patrick C, Burns BJ, Schlesinger HJ: **Ethnicity and the use of outpatient mental-health services in a national insured population.** *American Journal of Public Health* 1994, **84**(2):222-226.
43. Carpiano RM: **Toward a neighborhood resource-based theory of social capital for health: Can Bourdieu and sociology help?** *Social Science & Medicine* 2006, **62**(1):165-175.
44. Brown ER, Davidson PL, Yu HJ, Wyn R, Andersen RM, Becerra L, Razack N: **Effects of community factors on access to ambulatory care for lower-income adults in large urban communities.** *Inquiry-the Journal of Health Care Organization Provision and Financing* 2004, **41**(1):39-56.
45. Kawachi I, Subramanian SV: **Neighbourhood influences on health.** *Journal of Epidemiology and Community Health* 2007, **61**(1):3-4.
46. Altschuler A, Somkin CP, Adler NE: **Local services and amenities, neighborhood social capital, and health.** *Social Science & Medicine* 2004, **59**(6):1219-1229.
47. Hendryx MS, Ahern MM, Lovrich NP, McCurdy AH: **Access to health care and community social capital.** *Health Services Research* 2002, **37**(1):87-103.
48. Adams AS, Soumerai SB, Ross-Degnan D: **The Care for a Medicare Drug Coverage Benefit: A Critical Review of the Empirical Evidence.** *Annual Review of Public Health* 2001, **22**:49-61.
49. Austvoll-Dahlgren A, Aaserud M, Vist G, Ramsay C, Oxman A, Sturm H, Kusters J, Vernby A: **Pharmaceutical policies: effect of cap and co-payment on rational drug use (Review).** *Cochrane Database of Systematic Reviews* 2008(1).
50. Tamblyn R, Laprise R, Hanley JA, Abrahamowicz M, Scott S, Mayo N, Hurley J, Grad R, Latimer E, Perreault R *et al*: **Adverse events associated with prescription drug cost-sharing among poor and elderly persons.** *JAMA* 2001, **285**(4):421.
51. **Medicare** [<http://www.cdc.gov/nchs/datawh/nchsdefs/medicare.htm>]
52. Howell EM, Hughes D: **A tale of two counties: Expanding health insurance coverage for children in California.** *Milbank Quarterly* 2006, **84**(3):521-554.
53. **Medicaid** [<http://www.cdc.gov/nchs/datawh/nchsdefs/medicaid.htm>]
54. **Health Insurance Coverage** [<http://www.cdc.gov/nchs/fastats/hinsure.htm>]

55. Kennedy EM: **The role of the federal government in eliminating health disparities - Strong federal action is crucial to marshaling the resources and political will to end minority health disparities.** *Health Affairs* 2005, **24**(2):452-458.
56. Kronebusch K, Elbel B: **Enrolling children in public insurance: SCHIP, Medicaid, and state implementation.** *Journal of Health Politics Policy and Law* 2004, **29**(3):451-489.
57. Bansak C, Raphael S: **The effects of state policy design features on take-up and crowd-out rates for the State Children's Health Insurance Program.** *Journal of Policy Analysis and Management* 2007, **26**(1):149-175.
58. Cohen RA, Martinez ME: **Health Insurance Coverage: Early Release of Estimates from the National Health Interview Survey, 2006.** Center for Disease Control; 2007:1-19.
59. Holahan J, Dubay L, Kenney GM: **Which children are still uninsured and why.** *Future of Children* 2003, **13**(1):55-79.
60. Stuber J, Bradley E: **Barriers to medicaid enrollment: Who is at risk?** *American Journal of Public Health* 2005, **95**(2):292-298.
61. Flores G, Abreu M, Brown V, Tomany-Korman SC: **How Medicaid and the state children's health insurance program can do a better job of insuring uninsured children: The perspectives of parents of uninsured Latino children.** *Ambulatory Pediatrics* 2005, **5**(6):332-340.
62. Shone LP, Dick AW, Brach C, Kimminau KS, LaClair BJ, Shenkman EA, Col JF, Schaffer VA, Mulvihill F, Szilagyi PG *et al*: **The role of race and ethnicity in the State Children's Health Insurance Program (SCHIP) in four states: Are there baseline disparities, and what do they mean for SCHIP?** *Pediatrics* 2003, **112**(6):E521-E532.
63. Brown ER, Ponce N, Rice T, Lavarreda S: **The State of Health Insurance in California: Findings from the 2001 California Health Interview Survey.** Los Angeles: UCLA Centre for Health Policy Research; 2002.
64. Dick AW, Klein JD, Shone LP, Zwanziger J, Yu H, Szilagyi PG: **The evolution of the State Children's Health Insurance Program (SCHIP) in New York: Changing program features and enrollee characteristics.** *Pediatrics* 2003, **112**(6):E542-E550.
65. Kinney G, Haley J, Tebay A: **Familiarity with Medicaid and SCHIP Programs Grows and Interest in Enrolling Children is High.** Washington DC: The Urban Institute; 2003.
66. Last J: *A Dictionary of Epidemiology: Fourth Edition.* New York: Oxford University Press; 2001.

67. Lin SS, Kelsey JL: **Use of Race and Ethnicity in Epidemiologic Research: Concepts, Methodological Issues, and Suggestions for Research.** *Epidemiologic Reviews* 2000, **22**(2):187-202.
68. Bhopal R: **Glossary of terms relating to ethnicity and race: for reflection and debate.** *J Epidemiol Community Health* 2004, **58**(6):441-445.
69. Ahmad F, Stewart DE: **Predictors of clinical breast examination among South Asian immigrant women.** *Journal of Immigrant Health* 2004, **6**(3):119-126.
70. Blais R, Maiga A: **Do ethnic groups use health services like the majority of the population? A study from Quebec, Canada.** *Social science & medicine* 1999, **48**(9):1237-1245.
71. Chen AW, Kazanjian A: **Rate of mental health service utilization by Chinese immigrants in British Columbia.** *Canadian Journal of Public Health/Revue Canadienne de Sante Publique* 2005, **96**(1):49-51.
72. Eric Jarvis G, Kirmayer LJ, Jarvis GK, Whitley R: **The role of Afro-Canadian status in police or ambulance referral to emergency psychiatric services.** *Psychiatric Services* 2005, **56**(6):705-710.
73. Fenta H, Hyman I, Noh S: **Mental health service utilization by Ethiopian immigrants and refugees in Toronto.** *Journal of Nervous & Mental Disease* 2006, **194**(12):925-934.
74. Golomb MR, Hune S, MacGregor DL, deVeber GA: **Alternative therapy use by Chinese-Canadian children with stroke and cerebrovascular disease.** *Journal of child neurology* 2003, **18**(10):714-717.
75. Hislop TG, Inrig KM, Bajdik CD, Deschamps M, Tu SP, Taylor VM: **Health care services and Pap testing behavior for Chinese women in British Columbia.** *Journal of Immigrant Health* 2003, **5**(4):143-152.
76. Lai D, Chappell N: **Use of Traditional Chinese Medicine by older Chinese immigrants in Canada.** *Family practice* 2007, **24**(1):56-64.
77. Mailis-Gagnon A, Yegneswaran B, Nicholson K, Lakha SF, Papagapiou M, Steiman AJ, Ng D, Cohodarevic T, Umana M, Zurowski M: **Ethnocultural and sex characteristics of patients attending a tertiary care pain clinic in Toronto, Ontario.** *Pain Research & Management* 2007, **12**(2):100-106.
78. Quan H, Fong A, De Coster C, Wang J, Musto R, Noseworthy TW, Ghali WA: **Variation in health services utilization among ethnic populations.** *CMAJ Canadian Medical Association Journal* 2006, **174**(6):787-791.
79. Reime B, Tu AW, Tzianetas R, Ratner PA: **Factors associated with reluctance to use an emergency department in a multi-ethnic community: results of a telephone survey.**

- Canadian Journal of Public Health/Revue Canadienne de Sante Publique* 2007, **98**(3):222-227.
80. Tonelli M, Hemmelgarn B, Gill JS, Chou S, Culleton B, Klarenbach S, Manns B, Wiebe N, Gourishankar S, Alberta Kidney Disease N: **Patient and allograft survival of Indo Asian and East Asian dialysis patients treated in Canada.** *Kidney international* 2007, **72**(4):499-504.
  81. Tu SP, Jackson SL, Yasui Y, Deschamps M, Hislop TG, Taylor VM: **Cancer preventive screening: a cross-border comparison of United States and Canadian Chinese women.** *Preventive medicine* 2005, **41**(1):36-46.
  82. Wang L: **Immigration, ethnicity, and accessibility to culturally diverse family physicians.** *Health & place* 2007, **13**(3):656-671.
  83. Yoshida EM, Partovi N, Ross PL, Landsberg DN, Shapiro RJ, Chung SW: **Racial differences between solid organ transplant donors and recipients in British Columbia: a five-year retrospective analysis.** *Transplantation* 1999, **67**(10):1324-1329.
  84. Banerjee AT, Gupta M, Singh N: **Patient characteristics, compliance, and exercise outcomes of South Asians enrolled in cardiac rehabilitation.** *Journal of Cardiopulmonary Rehabilitation & Prevention* 2007, **27**(4):212-218.
  85. Hemmelgarn BR, Chou S, Wiebe N, Culleton BF, Manns BJ, Klarenbach S, Khan NA, Gourishankar S, Yeates KE, Gill JS *et al*: **Differences in use of peritoneal dialysis and survival among East Asian, Indo Asian, and white ESRD patients in Canada.** *American Journal of Kidney Diseases* 2006, **48**(6):964-971.
  86. Man A, Pickles T, Chi KN, British Columbia Cancer Agency Prostate Cohort Outcomes I: **Asian race and impact on outcomes after radical radiotherapy for localized prostate cancer.** *Journal of Urology* 2003, **170**(3):901-904.
  87. Hislop TG, Teh C, Low A, Li L, Tu SP, Yasui Y, Taylor VM: **Hepatitis B knowledge, testing and vaccination levels in Chinese immigrants to British Columbia, Canada.** *Canadian Journal of Public Health/Revue Canadienne de Sante Publique* 2007, **98**(2):125-129.
  88. Loiselle CG, Semenic SE, Cote B, Lapointe M, Gendron R: **Impressions of breastfeeding information and support among first-time mothers within a multiethnic community.** *Canadian Journal of Nursing Research* 2001, **33**(3):31-46.
  89. Liu R, So L, Quan H: **Chinese and white Canadian satisfaction and compliance with physicians.** *BMC Family Practice* 2007, **8**:11.
  90. Ng J, Popova S, Yau M, Sulman J: **Do culturally sensitive services for Chinese in-patients make a difference?** *Social work in health care* 2007, **44**(3):129-143.

91. Menec VH, Shooshtari S, Lambert P: **Ethnic differences in self-rated health among older adults: a cross-sectional and longitudinal analysis.** *Journal of Aging & Health* 2007, **19**(1):62-86.
92. Lai D, Chappell N: **Use of Traditional Chinese Medicine by older Chinese immigrants in Canada.** *Family practice* 2006, **24**(1):56-64.
93. Jacobs E, Chen AH, Karliner LS, Agger-Gupta N, Mutha S: **The need for more research on language barriers in health care: A proposed research agenda.** *Milbank Quarterly* 2006, **84**(1):111-133.
94. Goldman RD, Amin P, Macpherson A: **Language and length of stay in the pediatric emergency department.** *Pediatric Emergency Care* 2006, **22**(9):640-643.
95. Fernandez LE, Morales A: **Language and use of cancer screening services among border and non-border Hispanic Texas women.** *Ethnicity health* 2007, **12**(3):245-263.
96. Yu SM, Huang ZJ, Schwalberg RH, Nyman RM: **Parental English proficiency and children's health services access.** *American Journal of Public Health* 2006, **96**(8):1449-1455.
97. Rootman I, Ronson B: **Literacy and health research in Canada - Where have we been and where should we go?** *Can J Public Health-Rev Can Sante Publ* 2005, **96**:S62-S77.
98. John-Baptiste A, Naglie G, Tomlinson G, Alibhai SMH, Etchells E, Cheung A, Kapral M, Gold WL, Abrams H, Bacchus M *et al*: **The effect of English language proficiency on length of stay and in-hospital mortality.** *Journal of General Internal Medicine* 2004, **19**(3):221-228.
99. **Immigrant population by place of birth, province and territory (2006 census)**  
[<http://www40.statcan.ca/101/cst01/demo34a.htm>]
100. Beiser M: **The Health of Immigrants and Refugees in Canada.** *Canadian Journal of Public Health* 2005, **96**:S30.
101. McDonald JT, Kennedy S: **Insights into the 'healthy immigrant effect': health status and health service use of immigrants to Canada.** *Social Science & Medicine* 2004, **59**(8):1613-1627.
102. Steele LS, Lemieux-Charles L, Clark JP, Glazier RH: **The impact of policy changes on the health of recent immigrants and refugees in the inner city: A qualitative study of service providers' perspectives.** *Canadian Journal of Public Health* 2002, **93**(2):118.
103. Wu Z, Penning MJ, Schimmele CM: **Immigrant status and unmet health care needs.** *Canadian Journal of Public Health-Revue Canadienne De Sante Publique* 2005, **96**(5):369-373.



104. DesMeules M, Gold J, Kazanjian A, Manuel D: **New Approaches to Immigrant Health Assessment.** *Canadian Journal of Public Health* 2004, **95**(3):122.
105. **Census of Canada** [<http://www12.statcan.ca/english/census/index.cfm>]
106. **2001 Census** [[http://www.statcan.ca/english/sdds/instrument/3901\\_Q2\\_V2\\_E.pdf](http://www.statcan.ca/english/sdds/instrument/3901_Q2_V2_E.pdf)]
107. **Using Census Data For Health Research** [<http://www.chspr.ubc.ca/resources/census/>]
108. Oppenheimer GM: **Paradigm lost: Race, ethnicity, and the search for a new population taxonomy.** *American Journal of Public Health* 2001, **91**(7):1049-1055.
109. **2001 Census Ethnic Origin User Guide** [[http://www12.statcan.ca/english/census01/Products/Reference/tech\\_rep/ethnic.cfm](http://www12.statcan.ca/english/census01/Products/Reference/tech_rep/ethnic.cfm)]
110. BC Stats: **2001 Census Profile British Columbia.** Edited by BC Stats: Government of British Columbia; 2003.
111. Gertler P, Levine DI, Moretti E: **Is Social Capital the Capital of the Poor? The Role of Family and Community in Helping Insure Living Standards against Health Shocks.** *CESifo Economic Studies* 2006, **52**(3):455-499.
112. Okediji TO: **The Dynamics of Ethnic Fragmentation: A Proposal for an Expanded Measurement Index.** *The American Journal of Economics and Sociology* 2005, **64**(2):637-662.
113. Campos NF, Kuzeyev VS: **On the Dynamics of Ethnic Fractionalization.** *American Journal of Political Science* 2007, **51**(3):620-639.
114. Montalo JG, Reynal-Querol M: **Ethnic diversity and economic development.** *Journal of Development Economics* 2005, **76**:293-323.
115. Haughton DMA, Mukerjee S: **The Economic Measurement and Determinants of Diversity.** *Social Indicators Research* 1995, **36**:201-225.
116. Smith RM: **Comparing Traditional Methods for Selecting Class Intervals on Choropleth Maps.** *Professional Geographer* 1986, **38**(1):62-67.
117. Frohlich KL, Dunn JR, McLaren L, Shiell A, Potvin L, Hawe P, Dassa C, Thurston WE: **Understanding place and health: A heuristic for using administrative data.** *Health & Place* 2007, **13**(2):299-309.
118. Law M, Wilson K, Eyles J, Elliott S, Jerrett M, Moffat T, Luginaah I: **Meeting health need, accessing health care: the role of neighbourhood.** *Health & Place* 2005, **11**(4):367-377.

119. Subramanian SV: **The relevance of multilevel statistical methods for identifying causal neighborhood effects - Commentary.** *Social Science & Medicine* 2004, **58**(10):1961-1967.
120. Andersen RM: **Revisiting the Behavioral Model and Access to Medical Care: Does It Matter?** *Journal of Health and Social Behavior* 1995, **36**:1-10.
121. **ACG Software Documentation/Users Manual, Version 5.** Edited by Weiner J, Abrams C. Baltimore: John Hopkins Bloomberg School of Public Health; 2001:13-39.
122. Kozyrskyj A, Lix L, Dahl M, Soodeen R-A: **High-Cost Users of Pharmaceuticals: Who Are They?** Winnipeg: Manitoba Centre for Health Policy; 2005:19-23.
123. McGrail KM: **Income-related inequities: Cross-sectional analyses of the use of medicare services in British Columbia in 1992 and 2002.** *Open Medicine* forthcoming.
124. **Local Health Areas of British Columbia**  
[<http://www.bcstats.gov.bc.ca/data/pop/maps/lhamap.asp>]
125. **PharmaCare Plan Descriptions** [<http://www.health.gov.bc.ca/pharme/plans/index.html>]
126. Cody RP, Smith JK: **Logistic Regression.** In *Applied Statistics and the SAS Programming Language. Volume 5.* Upper Saddle River, New Jersey: Elsevier Science Publishing Co.; 2006:300-309.
127. **Census families in private households by family structure and presence of children, by province and territory(2006 Census)**  
[<http://www40.statcan.ca/l01/cst01/famil54c.htm>]
128. Kasman NM, Badley EM: **Beyond access: Who reports that health care is not being received when needed in a publicly-funded health care system?** *Canadian Journal of Public Health-Revue Canadienne De Sante Publique* 2004, **95**(4):304-308.
129. Mustard CA, Kaufert P, Kozyrskyj A, Mayer T: **Sex differences in the use of health care services.** *New England Journal of Medicine* 1998, **338**(23):1678-1683.
130. **culture** [<http://www.merriam-webster.com/dictionary/culture>]
131. Pharmaceutical Services Division: **Fair PharmaCare Policy Manual Version 13.** Victoria: BC Ministry of Health 2005:1-23.

## **APPENDICES**

## A1: The Fair PharmaCare program

Following registration for Fair PharmaCare, receipt of benefits is based on household income and household spending on prescription drugs [10, 11]. Families may fall under one of two categories: enhanced assistance or regular assistance (all other families). The enhanced assistance program was created as a “grandfather program” to assist seniors who, prior to 2003, had their prescription drug costs fully covered by the BC government. Enhanced assistance is offered to families with members who were born before 1940.

**Table 16: Fair PharmaCare reimbursement scheme [10]**

	<b>Family Income</b>	<b>Family Deductible</b>	<b>Co-Payment</b>	<b>Family Maximum</b>
<b>Enhanced Assistance</b>	Less than \$33 000	0	25%	1.25% of net household income
	\$33 000 - \$50 000	2% of net household income	25%	2% of net household income
	Over \$50 000	3% of net household income	25%	3% of net household income
<b>All other families</b>	Less than \$15 000	0	30%	2% of net household income
	\$15 000 - \$30 000	2% of net household income	30%	3% of net household income
	Over \$30 000	3% of net household income	30%	4% of net household income

Benefits are offered through a three tiered system which includes deductibles, co-payments and family maximums [10]. Based on a family’s income, households must first pay a deductible of 0-3% of their net household income. A deductible is an amount that is paid in full by families before they are eligible to receive benefits. Once a family has reached their deductible, any further spending on eligible prescription medicines is subject to cost sharing. Families may pay 25-30% of prescription drug costs; the remainder is covered under Fair PharmaCare. Family maximums

are also set as a percentage of net household income (1.25-4%). Once household out-of-pocket costs reach the family maximum, Fair PharmaCare will cover 100% of additional prescription drug costs. This feature of the program is designed to protect families from catastrophic drug costs. Note that only eligible prescription drugs, drugs listed on the provincial drug formulary, are included under the Fair PharmaCare program.

Given that the cost-sharing arrangements under Fair PharmaCare are based on household income and household spending, it is necessary to define household income and a Fair PharmaCare family. Families' net household income are calculated by combining the incomes of all adults within a family. An individual's net income is defined according to line 236 on the Canada Customs and Revenue Agency (CCRA) Notice of Assessment form, minus a deduction for the Universal Child Care Benefit. The net income identified on line 236 is equal to an individual's total income, minus their RRSP and RRP contributions, along with various other eligible deductions. A Fair PharmaCare family includes the registrant and any spouse or dependent children within the registrant's family [131]. Dependent children include children under the age of 19 or up to 25 years of age if the dependent is a full-time student. Individuals may only register under one Fair PharmaCare family.

## A2: Select socio-cultural questions asked in the 2001 Canadian census<sup>15</sup>

**Table 17: Questions identified as providing relevant information and instructions for response**

Question	Instructions for Response
Is this person now, or has this person ever been a landed immigrant?	<p>Mark <b>No</b> for persons who are:</p> <ul style="list-style-type: none"> <li>• Canadian citizens by birth</li> <li>• foreign students, foreign workers, Minister’s permit holders, or refugee claimants.</li> </ul> <p>Mark <b>Yes</b> for persons who are:</p> <ul style="list-style-type: none"> <li>• Canadian citizens by naturalization</li> <li>• permanent residents under the Immigration</li> </ul>
In what year did this person become a landed immigrant?	For persons who immigrated to Canada more than once, report the year landed immigrant status was <b>first</b> obtained.
What language does this person speak most often at home?	<p>Report the language spoken <b>most often</b> at home. Report more than one language only if all languages are spoken equally often.</p> <p>For a person who lives alone:</p> <ul style="list-style-type: none"> <li>• report the language in which you feel most comfortable.</li> </ul> <p>For a child who has not yet learned to speak:</p> <ul style="list-style-type: none"> <li>• report the language spoken most often to this child at home. If two languages are spoken, report the language spoken most often. If both languages are used equally often, report both languages.</li> </ul>
To which ethnicity or cultural group(s) did this person’s ancestor’s belong?	<p>This question refers to the ethnic or cultural origins of a person’s ancestors. An ancestor is someone from whom a person is descended and is usually more distant than a grandparent. Other than Aboriginal persons, most people can trace their origins to their ancestors who first came to this continent. Ancestry should not be confused with citizenship or nationality.</p> <p>For all persons, report the specific ethnic or cultural group or groups to which their ancestors belonged, not the language they spoke. For example, report “Haitian” rather than “French”, or “Austrian” rather than “German”.</p> <p>For persons of East Indian or South Asian origins, report a specific group. Do <b>not</b> report “Indian”. For example, report “East Indian from India”, “East Indian from Guyana”, or indicate the specific group, such as “Punjabi” or “Tamil”.</p> <p>For persons with Aboriginal ancestors, report a specific group. For example, report “Cree”, “Micmac”, “Ojibway”, “North American Indian”, “Métis”. Do <b>not</b> report “Indian”.</p>

<sup>15</sup> Information obtained from 2001 Census [http://www.statcan.ca/english/sdds/instrument/3901\_Q2\_V2\_E.pdf]

### A3: Custom tabulation specifications

**Table 18: Custom tabulation specifications**

Variable	Notes
Total – Population	
Immigrants – Total	Total also includes those who immigrated between 1991 and 1996
Recent immigrants	Immigrants who arrived between 1996 and 2001
Immigrated prior to 1991	
Reported knowledge of English and/or French	
Reported English as language spoken most often at home	Includes those who reported English as language spoken most often at home, whether or not they reported any other language spoken most often at home
Reported French as language spoken most often at home	Includes those who reported French as language spoken most often at home, whether or not they reported any other language <i>excluding English</i> as language spoken most often at home
Reported Punjabi as language spoken most often at home	Includes those who reported Punjabi as language spoken most often at home, whether or not they reported any other language <i>excluding English or French</i> as language spoken most often at home
Reported Chinese as language spoken most often at home	Includes those who reported Cantonese, and/or Mandarin and/or Hakka and/or Chinese n.o.s. as their language(s) spoken at home, whether or not they reported any other language <i>excluding English or French</i> as language spoken most often at home.
Reported non-official language (other than Chinese or Punjabi) as language spoken most often at home	Includes those who reported one or more non-official languages as their language(s) spoken most often at home, <i>excluding those who reported English, French, Punjabi or Chinese.</i>
Aboriginal Ethnic origins	Includes those who reported North American Indian and/or Métis and/or Inuit origins, whether or not they also reported any other ethnic origin(s).
African Ethnic origins	Includes those who reported one or more African Ethnic origins, as defined in Appendix C of the 2001 Census Dictionary (attached),

Variable	Notes
	whether or not they reported any other ethnic origin(s).
Arab Ethnic origins	Includes those who reported one or more Arab origins, as defined in Appendix C of the 2001 Census Dictionary, whether or not they reported any other ethnic origin(s).
British Isles Ethnic origins	Includes those who reported English and/or Scottish and/or Irish and/or British n.i.e. and/or Welsh origins, whether or not they reported any other ethnic origin(s)any other ethnic origin(s).
Caribbean, Latin, Central and South American ethnic origins	Includes those who reported one or more Caribbean Origins and/or Latin/Central/South American origins, as defined in Appendix C of the 2001 Census dictionary, whether or not they reported any other ethnic origin(s).
North American ethnic origins	Includes those who reported Canadian and/or Québécois and/or Provincial and or American (USA) Ethnic origins, whether or not they reported any other ethnic origin(s).
Chinese ethnic origins	Includes those who reported Chinese ethnic origin, whether or not they reported any other ethnic origin(s).
East and Southeast Asian ethnic origins	Includes those who reported one or more East and Southeast Asian Origins, as defined in Appendix C of the 2001 Census Dictionary, <b>excluding Chinese</b> , whether or not they reported any other ethnic origin(s).
French ethnic origins	Includes those who reported French and/or Acadian ethnic origins, whether or not they reported any other ethnic origin(s).
Other European ethnic origins	Includes those who reported German and/or Dutch and/or Italian and/or Ukrainian and/or Polish and/or Russian and/or Portuguese and/or Norwegian and/or Danish and/or Jewish and/or Swedish and/or Croatian and/or Greek and/or Finnish and/or Spanish and/or Austrian and/or Romanian and/or Czech and/or Swiss and/or Serbian and/or Yugoslav n.i.e. and/or Slovak and/or Icelandic and/or Belgian origins, whether or not they reported other ethnic origin(s).
South Asian ethnic origins	Includes those who reported one or more South Asian ethnic origins, as defined in Appendix C of the 2001 Census Dictionary, whether or not they reported any other ethnic origin(s).
West Asian ethnic	Includes those who reported one or more West Asian ethnic origins, as defined in Appendix C of the 2001 Census Dictionary, whether



<b>Variable</b>	<b>Notes</b>
origins	or not they reported any other ethnic origin(s).
Oceania ethnic origins	Includes those who reported one or more Oceania Origins, as defined in Appendix C of the 2001 Census Dictionary, whether or not they reported any other ethnic origin(s).

# A4: Behavioral Research Ethics Board certificate of approval



The University of British Columbia  
 Office of Research Services  
**Behavioural Research Ethics Board**  
 Suite 102, 6190 Agronomy Road, Vancouver, B.C. V6T 1Z3

## CERTIFICATE OF APPROVAL - MINIMAL RISK

<b>PRINCIPAL INVESTIGATOR:</b> Steven G. Morgan	<b>INSTITUTION / DEPARTMENT:</b> UBC/Medicine, Faculty of/Health Care & Epidemiology/Population Health & Health Services Research	<b>UBC BREB NUMBER:</b> H07-01701
<b>INSTITUTION(S) WHERE RESEARCH WILL BE CARRIED OUT:</b>		
<b>Institution</b> UBC Other locations where the research will be conducted: N/A		<b>Site</b> Vancouver (excludes UBC Hospital)
<b>CO-INVESTIGATOR(S):</b> Charlyn Black Sabrina Wong Vivian W.S. Leong		
<b>SPONSORING AGENCIES:</b> Canadian Institutes of Health Research (CIHR) Michael Smith Foundation for Health Research		
<b>PROJECT TITLE:</b> Pharmacare for All? The Impact of Culture on Registration for BC's Fair PharmaCare		

**CERTIFICATE EXPIRY DATE:** August 30, 2008

<b>DOCUMENTS INCLUDED IN THIS APPROVAL:</b>	<b>DATE APPROVED:</b> August 30, 2007	
<b>Document Name</b>	<b>Version</b>	<b>Date</b>
<b>Protocol:</b> Successful Grant Application: Equity in PharmaCare	N/A	September 12, 2006

The application for ethical review and the document(s) listed above have been reviewed and the procedures were found to be acceptable on ethical grounds for research involving human subjects.

**Approval is issued on behalf of the Behavioural Research Ethics Board  
 and signed electronically by one of the following:**

\_\_\_\_\_

Dr. Peter Suedfeld, Chair  
 Dr. Jim Rupert, Associate Chair  
 Dr. M. Judith Lynam, Associate Chair  
 Dr. Laurie Ford, Associate Chair