

Cost Barriers to Dental Care in Canada

by

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Abstract

Objective: To determine who avoids the dentist and declines recommended dental treatment due to cost. **Methods:** A secondary data analysis was undertaken. Weights were utilized to ensure data were nationally representative. Univariate and bivariate descriptive statistics were calculated and logistic regressions were used to observe the characteristics that were predictive of reporting cost barriers to care. **Results:** Over 17 per cent of the Canadian population reported avoiding a dental professional due to cost, and 16.5 per cent reported declining recommended dental treatment due to cost. These individuals had a higher prevalence of needing treatment, had more untreated decay, missing teeth, and reported having poor oral health and oral pain often. Having no insurance, lower income, and reporting “poor to fair” oral health were the greatest predictors of reporting cost barriers to care. **Conclusions:** Individuals who report cost barriers experience more disease and treatment needs than those who do not.

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Chapter 1: Introduction

1.1 Canada's Dental Care System: Financing and Delivery

Canada's health care system is predominantly publicly financed and privately delivered. Known to Canadians as "Medicare", the system provides access to universal, comprehensive coverage for hospital and physician services as stated in the *Canada Health Act* (Deber, 2002). There is an important distinction to be made between the financing and delivery of health care. While financing refers to how services are paid for, delivery consists of how services are organized and provided (Deber, 2002). While both the public and private sectors are involved in the financing and delivery of health care in Canada, contrary to physician and hospital care, dental care in Canada is not a publicly covered benefit. Dental care is almost entirely delivered by a private for-profit system, financed dominantly through private insurance and/or out-of-pocket expenditures, each representing about half of all private dental expenditures (Marchildon, 2005).

At present, publicly funded dental care in Canada encompasses only 6 per cent of total dental care expenditures, down from 7.7 per cent in 1995, decreasing progressively from a peak of roughly 20 per cent in the early 1980s (Leake, 1984; Canadian Institute for Health Information, 2005). This trend downwards is contrasted by total dental expenditures that have continually increased from \$1.3 billion in 1980, to \$5.5 billion in 1995 (Canadian Institute for Health Information, 2005; Quiñonez, Grootendorst, Sherret, Azarpazhooh, & Locker, 2006), now reaching an estimated \$13 billion annually (Canadian Institute for Health Information, 2011). Importantly, public dental care programs in Canada are limited to those that meet strict income eligibility criteria, or those on social or disability assistance. Even among the eligible, coverage is typically for basic services and is largely limited to children and adolescents. In most cases, only emergency treatments are provided to adults (Quiñonez, Grootendorst, Sherret, Azarpazhooh, & Locker, 2006). In short, the existing dental care system arguably fails to meet the needs of lower income populations and those who experience financial and other types of barriers to accessing dental care (Locker, Maggirias, & Quiñonez, 2011).

1.2 Access to Dental Care

The issue of “access to care” is undoubtedly a significant health care policy concern. The term “access to care” is one of the most frequently used terms used in discussions of the health care system (Penchansky & Thomas, 1981) and often embodies a number of meanings and interpretations. It is important to define access carefully, however. In 1981, Penchansky and Thomas ventured to define access in the context of the health care system and presented a general concept of access that describes a series of specific dimensions outlining the fit between the characteristics and expectations of patients and health care providers (Penchansky & Thomas, 1981). These dimensions were developed into the “five As” of access to care: affordability, availability, accessibility, accommodation, and acceptability. Affordability, as conceived by Penchansky and Thomas (Penchansky & Thomas, 1981), is determined by the patient’s ability and willingness to pay for services. Availability measures the extent to which the provider meets the needs of the patients, particularly in regards to essential resources, such as personnel and technology. Accessibility is determined by how easily the patient can physically reach the provider’s location. Accommodation measures the extent to which the provider can meet the constraints and preferences of the patient (i.e. hours of operation, communications, number of appointments, etc.). Lastly, acceptability is the degree to which the patient is comfortable with the immutable attributes of the provider (e.g. age, sex, ethnicity, type of facility, location of facility), or vice versa (Penchansky & Thomas, 1981). Understanding each of the five As and how they differ is key, especially since access is commonly viewed as a concept that primarily relates to an individual’s ability or willingness to enter into the health care system, and in many policy discussions, access is equated with health insurance coverage (McLaughlin & Wyszewianski, 2002).

While there is substantial interplay between the different dimensions of access, the element of affordability, specifically the ability of the patient to pay for dental services, constitutes the focus of this study. A common proxy used to measure access is the concept of utilization. Utilization may be measured by many indicators, including self-reported numbers of dental visits in the past year, or visits for emergency rather than for preventive reasons. While utilization is not formally a measure of access, much of the dental literature uses utilization to discuss the issue.

1.3 The Influence of Income and Insurance on the Utilization of, and Access to, Dental Care

As a result of the current financing model for dental care, Canadians are largely responsible for financing their own dental care, and consequently, enabling resources for obtaining care, such as income and insurance, strongly determine the use of dental services. This system of private financing, hence, raises questions about the equity of distribution of dental services for Canadians. In particular, to what extent do individuals' financial resources, including income and dental insurance coverage, affect their ability to use, or access, dental services?

Overall, the majority of Canadians have reasonable access to dental care. According to the 2007-09 Canadian Health Measures Survey (CHMS), over 70 per cent (74.5 per cent, CI: 71.4–77.4) of Canadians reported having a dental visit within the last 12 months and about the same number (74.3 per cent, CI: 70.6–77.7) reported regular visits to a dentist at least once a year (Health Canada, 2010). Yet not surprisingly, low-income and uninsured Canadians experience challenges, with only 59.3 per cent (CI: 55.0–63.5) of the uninsured and 60.0 per cent (CI: 55.3–64.6) of low-income Canadians reporting visiting a dentist in the last year (Health Canada, 2010).

The literature demonstrates that income and insurance are the two most important determinants of utilizing dental care, even after controlling for different socio-demographic factors. In this regard, the probability of receiving dental care increases markedly with dental insurance and household income (Millar & Locker, 1999; Bhatti, Rana, & Grootendorst, 2007; Locker, Maggias, & Quiñonez, 2011; Bedos, Brodeur, Benigeri, & Olivier, 2004). To illustrate, Millar and Locker (Millar & Locker, 1999) found that with all other factors being equal, the highest-income Canadians are almost three times as likely to visit a dentist compared to the lowest income Canadians. In 2010, Grignon *et al.* (Grignon, Hurley, Wang, & Allin, 2010) showed that the income gradient with respect to dental care utilization in Canada, as well as the number of dental visits per year, increased almost twofold from the lowest income quartile to the highest.

It is also known that income and insurance are positively correlated, whereby higher income individuals are more likely to have dental insurance (Health Canada, 2010). Despite this, however, research demonstrates that dental insurance has an independent effect on the utilization of dental care, thus, regardless of income level, insured people utilize more dental care and have better access compared to the uninsured (Millar & Locker, 1999; Bhatti, Rana, & Grootendorst, 2007; Locker, Maggias, & Quiñonez, 2011).

In terms of affordability, it should be mentioned that income and insurance, from a policy perspective, are queen and king, meaning in the current economic and political environment, it is likely that more can be done about providing insurance than increasing wages or improving income redistribution, for example. In this regard, when further examining the influence of insurance, it can be shown that, in Canada, there are a number of issues that create barriers to accessing dental care. Firstly, Canada's dental care system represents an underinsured environment. Results from the CHMS show that nearly a third of Canadians do not have any type of insurance (Health Canada, 2010). Next, public insurance is inadequate, both in the number and type of people covered and in the comprehensiveness of the insurance. As mentioned, in most provinces, public insurance is offered almost exclusively to children, disabled persons and those on social assistance (Quiñonez, Grootendorst, Sherret, Azarpazhooh, & Locker, 2006). Further, most often coverage is basic in nature and does not include services important for proper masticatory function, such as fixed prosthodontics. Lastly, among those that have private insurance, many are under-insured. This is illustrated by the fact that individuals who are privately insured also experience cost barriers to dental care and have unmet dental treatment needs (Millar & Locker, 1999; Bhatti, Rana, & Grootendorst, 2007; Health Canada, 2010; Locker, Maggiriias, & Quiñonez, 2011). Essentially, coverage is limited, and there are issues of high deductibles, high cost-sharing arrangements, and the exclusion of important oral health services.

A note should be made about the role of employment-based dental insurance with respect to the affordability of care. Since employment-based dental insurance is the most common form of coverage, employment characteristics are important factors determining the odds of having insurance coverage (Sadeghi, 2012). The literature shows us that employed individuals are more likely to have dental insurance, even after adjusting for other socio-demographic factors such as age, income and education (Millar & Locker, 1999; Bhatti, Rana, & Grootendorst, 2007). The effect of employment status on facilitating access, however, is only due to the increasing probability of actually having dental insurance. To be sure, when controlling for socio-demographic factors, including dental insurance, employed individuals do not show higher utilization rates (Manski & Magder, 1998; Millar & Locker, 1999).

Unfortunately, the participation of employers in providing employment-based insurance has declined over the past decades (Leake, 2006; Sadeghi, 2012). The continual and invariant increase in the costs of dental care has contributed to the increasing costs of dental plans. These costs ultimately fall back onto employers and have continued to rise at well beyond the rate of inflation (Leake, 2006). In response, the private dental insurance system in Canada is gradually becoming unsustainable by employers since the costs of coverage have outpaced the purchasing power of many employers as the main payer for insurance benefits. For example, in 2001, the Employer Committee on Health Care Ontario (ECHCO) brought to the Ontario Dental Association's attention that "a 3% increase in the fee guide typically yields a 6–7% overall increase [in costs]" (Bowyer, 2001). In response, the ECHCO has stated that it intends to "pursue new models for the delivery of dental care to employees" including possible capitation plans (Bowyer, 2001). Further, it has been suggested that one in ten employers in Ontario were considering cutting back or eliminating dental insurance coverage altogether (Graham, 2004).

The dramatic increase in the costs of providing dental benefits, in conjunction with economic challenges, has not only affected employers, but also employees. For example, employees have begun to decline health benefits due to the increasing costs of enrolment (Sadeghi, 2012). In Canada, the annual growth rate of private health insurance declined from approximately 17 per cent in 1989 to its lowest rate of approximately 4 per cent by 1997 (Quiñonez & Grootendorst, 2011). It has also been proposed that role of the employee in the decline of employment-based dental insurance is more prominent than the employers' (Bailit, 1999).

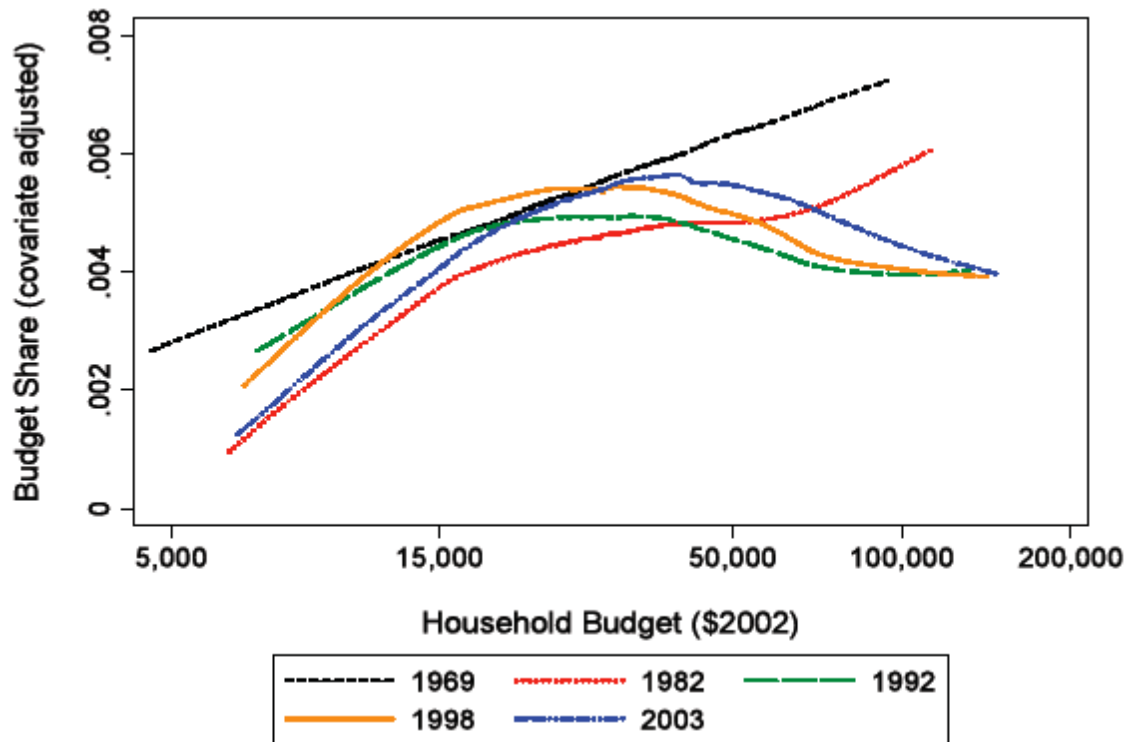
1.4 Affordability and Out-of-Pocket Expenditures

The issue of the affordability of dental care has historically been a central policy issue in Canada, especially since financial barriers, particularly insurance, are one of the most mutable barriers influenced by policy decisions (Locker, Maggiriias, & Quiñonez, 2011) and can positively influence utilization of services when removed (Bendall & Asubonteng, 1995). In the absence of adequate coverage, individuals are required to spend more money out-of-pocket on dental care (if they ultimately decide to seek care) (Quiñonez C. R., 2009). In this way, out-of-pocket expenditures on dental care represent a proxy of access to care (Quiñonez, Grootendorst, Sherret, Azarpazhooh, & Locker, 2006; Quiñonez C. R., 2009). To illustrate, evidence demonstrates that

the more an individual has to spend out-of-pocket, the more difficult it may actually be to obtain care (Quiñonez & Grootendorst, 2011).

Quiñonez and Grootendorst’s research (Quiñonez & Grootendorst, 2011) on the historical changes in dental care financing in Canada demonstrate that, since the 1980s, dental care expenditures have increased greater than the rate of inflation and population. Importantly, the increase in expenditures was found to be mainly associated with the rise in private out-of-pocket expenditures as opposed to an increase in public financing or insurance (Quiñonez & Grootendorst, 2011). Figure 1 represents the results of their study. The curves on the graph show the degree of out-of-pocket expenses determined by the level of insurance coverage and household income at the specified time periods.

Figure 1: Household budgetary shares for dental care in Canada, 1969-2003



Source: (Quiñonez & Grootendorst, 2011)

As you can see in Figure 1, up until the 1960s, there was a strong and linear correlation between dental expenditures and household income for all income earners. This was at a time where public and private financing was at its lowest. The 1970s experienced rapid growth in public and

private financing, reaching its peak in the early 1980s, where it accounted for approximately 25 per cent of all dental expenditures (Quiñonez & Grootendorst, 2011). Consequently, all households spent less on dental care during that time. Throughout the remainder of the 1980s and 1990s, the economic recession resulted in a significant decline in government financing and employment-based dental insurance, giving rise to an increase in household out-of-pocket expenditures on dental care (Quiñonez & Grootendorst, 2011). Notably, those in the lower and middle income range were more significantly affected by the changes in financing over these years, meaning that lower and middle incomes show the most sensitivity to changes in amounts and types of available private and public dental insurance plans. Another important finding is that those paying out-of-pocket for their dental care were more likely to report unfavourable oral health conditions (e.g. oral pain) (Quiñonez & Grootendorst, 2011). The authors concluded that removing the price barrier to care is essential for the ability of households to access dental care.

1.5 Previous Reports on Financial Barriers to Care

In recent years, public opinions on affordability of dental care have become a topic of interest. Policy attention has been given to this issue, especially within the context of working poverty. It has been argued that a significant minority of the adult population is likely to experience financial barriers in accessing dental care, especially among those who do not have any form of dental insurance. To illustrate, cross-sectional survey data published in 2007 (Quiñonez & Locker, 2007) assessed the opinions of Canadians on their dental care behaviours, experiences and perceived treatment needs. Results from the survey revealed that 26 per cent of Canadians deem dental care cost-prohibitive. Over 30 per cent of these individuals mentioned check-ups, cleanings and fillings as treatments they required, but could not afford. Results from this study highlighted access issues for the working poor and limited-income families ineligible to receive public benefits. Furthermore, a national telephone survey conducted in 2009 (Muirhead, Quiñonez, Figueiredo, & Locker, 2009) collected data from working poor Canadian adults and confirmed that almost 30 per cent of individuals had not been able to afford needed dental care in the past. In addition, 12.6 per cent reported a competing need, having sacrificed other spending to pay for dental care.

Recent research has examined the issue of affordability of dental care by assessing associations between income, dental insurance and financial barriers to care. In a national telephone survey of Canadian adults, Locker *et al.* (Locker, Maggias, & Quiñonez, 2011) demonstrated that low income subjects and those without dental insurance were the most likely to report financial barriers to dental care. Almost half of the subjects responded positively to one or more of the three financial barriers questions: “*In the past 3 years has the cost of dental care been a financial burden to you?*”; “*In the past 3 years have you delayed or avoided going for a dental examination or treatment because of cost?*”, and “*In the past 3 years have you been unable to have all the treatment recommended by a dentist or specialist because of the cost?*” Thirty per cent reported avoiding or delaying dental visits and 32.2 per cent admitted not being able to receive all the treatment recommended due to cost. These results corroborated Millar and Locker’s previous research (Millar & Locker, 1999) which showed that the lowest income earners and those without dental insurance were most likely to experience financial barriers to dental care. Most recently, a Canadian case study (Wallace & MacEntee, 2012) revealed that low-income participants, along with dentists and other healthcare providers, identified the cost of dentistry and the inaccessibility of public insurance arrangements as major barriers to dental services for low-income people.

Notably, affordability difficulties and oral health inequalities have been documented not only among the poorest subpopulations, but also among middle-income earners. To illustrate, Sadeghi recently examined (Sadeghi, 2012) the issue of affordability and changes in the accessibility of dental services among middle-income Canadians. It was discovered that the number of middle-income Canadians who reported financial barriers to dental care almost tripled between 1996 and 2009, increasing from 12.6 per cent to about 34 per cent. This finding relates back to the discovery that low and middle income earners are more significantly affected by the changes in financing of dental care. Additionally, among all middle-income groups, insured Canadians were least likely to report cost-barriers to dental care since 1996.

1.6 Access and Inequity

As has been demonstrated, inadequate financial support from governments in reducing barriers to dental care in addition to the prevailing role of employer-employee contracts (i.e. non-wage

benefits) in the dental care market have fostered an environment where access to dental care is strongly associated with one's level of income and insurance. Much of this speaks to the "inverse care law", meaning, people that need the most care tend to receive the least (Hart, 1971) and is a term that has been used to describe the dental care situation in Canada. In turn, Canada's dental care system has been described as 'pro-rich,' suggesting that in all of its ten provinces, the probability of visiting a dentist is much higher for those with the least need (Allin, 2008). Equity, or fairness in healthcare, is of critical importance to Canadians (Romanow, 2002). Despite this, differences in financing and delivery mechanisms lead to different degrees of inequity in access to oral health services. Using data from the 2003 Canadian Community Health Survey, Allin (Allin, 2008) examined the level of inequity in the utilization of physician, specialist, hospital and dental services. Using an index of needs-adjusted inequity, it was discovered that, when compared with physician, specialist and hospital visits, inequity was the highest in dental care, notably because dental services are almost entirely excluded from the public system, and private insurance coverage is held almost exclusively by the wealthy and younger age groups (Bhatti, Rana, & Grootendorst, 2007; Locker, Maggiri, & Quiñonez, 2011). Further analyses revealed that the main contributors to inequity in dental care were income and dental insurance coverage, with income contributing more to the pro-rich inequity than insurance (Allin, 2008).

Subsequent research conducted by Grignon *et al.* (Grignon, Hurley, Wang, & Allin, 2010) supported these findings, illustrating that income and dental insurance were the most important contributors to the pro-rich distribution of dental care visits. Their study in particular showed that the impact of income inequality explained between 50 and 60 per cent of total income-related inequity in dental care utilization. The concentration of private insurance among the highest-income individuals explained another 30 per cent of the inequity. Importantly, it was found that the relationship between income and insurance on dental care utilization was not affected by need factors. Essentially, the wealthy and insured individuals used more dental services, and oral health needs rarely played a role in determining utilization.

1.7 Access and the Impact on Oral Health

To date, very little data exists on the oral health impact of financial barriers to dental care in Canada. International studies have begun to highlight the impact cost-prohibitive dental treatment has on the health and general well-being of an individual. To illustrate, a health care

survey conducted in the United Kingdom (Simplyhealth Access, 2010) found that 43 per cent of respondents reported avoiding the dentist due to cost implications. Of these, 26 per cent reported suffering long term tooth decay and 13 per cent suffered a periodontal abscess as a result. Furthermore, an Australian study (Sanders, Spencer, & Slade, 2006) observed an inverse relationship between dental visiting frequency and Oral Health Impact Profile (OHIP-14) scores. The OHIP-14 scale evaluates the consequences of oral conditions across dimensions of functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability and handicap. Results from the study showed that differences in mean OHIP-14 scores between groups with low and high dental visit patterns was greater than two-fold, indicating worse oral conditions among those who were unable to visit a dentist in the past year. Most recently, Locker, Maggiriias and Quiñonez (Locker, Maggiriias, & Quiñonez, 2011) used a more direct analysis, demonstrating that those reporting financial barriers to access also reported worse oral health outcomes after controlling for private insurance coverage, household income, sex, age and education. Specifically, their results showed that the extent and severity of OHIP-14 scores increased alongside the number of positive responses to financial barrier questions.

1.8 Rationale for this Study

Prior to the release of the CHMS, there was essentially no data on the oral health outcomes of Canadians experiencing financial barriers to care. From a public health and program planning perspective, it is important to identify population subgroups experiencing barriers to access, in addition to their oral health needs, in order to determine priorities for the most effective use of resources. The CHMS has now made available information about the clinical oral health status of our population and self-reported financial barriers to dental care. With this, nationally representative evidence pertaining to the affordability of dental care and the potential affects this has on the oral health of Canadians is possible. This information can be used to inform future policy and facilitate targeted programming to fulfill the needs of underserved populations, with the overall aim to improve the oral health of the Canadian population.

1.9 Central Research Question

What are the demographic and socioeconomic characteristics of Canadians who report cost barriers to dental care, and what does their oral health status look like?

1.10 Overall Aim

To determine the demographic and socioeconomic characteristics of Canadians who avoid the dentist and decline recommended dental treatment due to cost, and to determine their oral health status and dental treatment needs.

1.11 Objectives

- 1) To determine the socio-economic and demographic characteristics of Canadians reporting cost barriers to dental care.
- 2) To examine the oral health status of Canadians reporting cost barriers.
- 3) To assess the clinically determined treatment needs among those reporting cost barriers.
- 4) To determine what predicts reporting cost barriers.

Chapter 2: Methodology

2.1 Study Design and Protocols

This study is a secondary data analysis of the 2007-09 Canadian Health Measures Survey (CHMS), a cross-sectional, national survey conducted by Statistics Canada in partnership with Health Canada and the Public Health Agency of Canada. Data were accessed from Statistics Canada's Research Data Centre at the University of Toronto. Health Canada's Research Ethics Board (REB), the Office of the Privacy Commissioner of Canada, and the Data Access and Control Services Division at Statistics Canada, provided advice to the CHMS on ethical, social and legal issues. The REB reviewed and approved all issues related to consent, privacy, confidentiality of data, reporting of results, inclusiveness, and storage of blood and urine samples (Day, Langious, Tremblay, & Knoppers, 2007). Consent for participation in the health interview was implied when agreeing to respond to the questions. Written consent was obtained for the physical measures collected at clinic sites, including the dental examination (Tremblay, Wolfson, & Connor Gorber, 2007).

2.2 Population and Study Sample

The CHMS targeted the Canadian population aged 6 to 79 living in privately occupied dwellings and residing in the ten provinces and three territories (Tremblay, Wolfson, & Connor Gorber, 2007). In order to produce reliable estimates at a national level, it was determined that the survey must be conducted on a sample of at least 5,000 persons with a minimum of 500 individuals from each sex and age groups: 6 to 11, 12 to 19, 20 to 39, 40 to 59 and 60 to 79 (Tremblay, Wolfson, & Connor Gorber, 2007). Persons living on Indian Reserves or Crown lands, residents of institutions, full-time members of the Canadian Forces and residents of certain remote regions were excluded (Tremblay, Wolfson, & Connor Gorber, 2007).

Overall, the CHMS collected health measures from approximately 5,600 people living in privately occupied dwellings across Canada, representing approximately 97 per cent of the Canadian population between 6 and 79 years of age. From this, a total of 5,586 individuals were clinically examined (Health Canada, 2010).

2.3 Data Collection

Data collection for the CHMS took place over two years, from March 2007 to February 2009 (Tremblay, Wolfson, & Connor Gorber, 2007). Dwellings were selected using 2006 Census household composition data. Within each CHMS collection site, dwellings with known compositions were stratified by age from which random sampling occurred (Giroux, 2007). Collection sites, defined as “geographic area(s) with a population of at least 10,000 and a maximum respondent travel distance of 100 kilometres” were selected using the Labour Force Survey area frame to ensure minimal travel time for participants (Giroux, 2007). The 15 collection sites were stratified in five regions (British Columbia, the Prairies, Ontario, Quebec, and the Atlantic provinces) to ensure a representative distribution of the sample across the country (Giroux, 2007). Data were collected in two stages: a health questionnaire administered in the respondents’ homes, and a clinical examination in a mobile clinic.

2.3.1 Household Interview

During the household questionnaire (Appendix A), there were 34 specific oral health questions which sought information on topics pertaining to the respondents’ oral health, satisfaction with the appearance of their teeth, oral symptoms, oral care habits including dental utilization and source of funds to pay for dental care. In addition, there were sections of the interview where respondents reported details about their general health, diet, smoking behaviours and socio-economic and demographic information.

2.3.2 Clinical Examination

The clinical examinations, including the clinic questionnaire (Appendix B) and oral examination, were conducted in a mobile examination center. Examiners were Canadian licensed dentists supplied by the Canadian Forces and were calibrated to World Health Organization standards (Health Canada, 2010). For the oral exam, the dentist-examiner asked 18 questions pertaining to details on dental symptoms (pain, bleeding, dry mouth, etc.) and an additional 15 medical history questions to ensure the person was eligible to participate (Health Canada, 2010). During the oral exam, the dental examiners recorded conditions of edentulism, dental prosthetics, oral lesions, dental fluorosis, debris and calculus, gingivitis and periodontal status, probing depths, loss of

attachment, trauma, crown and root caries, and recommendations for the type of treatment needed by the participant (Health Canada, 2010).

2.4 Variables of Interest

The variables used in this study were selected based on:

- 1) Information collected and available in the CHMS;
- 2) Variables that have been previously been explored in the literature on cost barriers to care;
- 3) Variables in line with Health Canada's report on the oral health component of the CHMS (Health Canada, 2010) for ease of comparison;
- 4) Variables in line with the groupings suggested by Andersen's emerging model of health services (Andersen, 1995).

Importantly, this study was not meant to test the Anderson model, but uses it more to conceptualize the choice of variables selected, as well as organize them logically. As reported by Andersen (1995), the model was designed to represent the many influences that affect an individual's use of health services and subsequently, their health status. With this model, Andersen suggests that access to, and use of health services, is a function of predisposing, enabling and need factors (Andersen, 1995). This model depicts these factors as a set of interrelated feedback loops, illustrating how health service outcomes influence, and are influenced by these factors (see Figure 2).

Predisposing factors include demographic characteristics, one's social structure and health beliefs. These factors are present prior to an individual's health condition and influence the likelihood that they can, and will use health services (Andersen, 1995). Enabling factors include both community and personal resources and must be present for use to take place. Income and insurance, for example, are important enabling measures (Andersen, 1995). Lastly, need factors include perceived need (how individuals view their health) in addition to evaluated need (how health professionals determine health status and one's need for care) (Andersen, 1995). The use of health services is the main outcome of this model, however; the final phase has been expanded to include health status outcomes (Andersen, 1995).

For the purposes of conceptualizing and grouping the variables in this study, Andersen's emerging model was modified to summarize the factors that influence cost barriers to dental care (Figure 3). Using this modified model, this study thus explores the extent to which predisposing characteristics, enabling resources and need factors influence cost barriers to dental care and ultimately health status outcomes. Again, it is important to note that this study did not venture to test this model, but rather, was used strictly as a means to organize and group variables in a way that was meaningful.

Figure 2: Andersen's Emerging Model (adapted from Andersen, 1995)

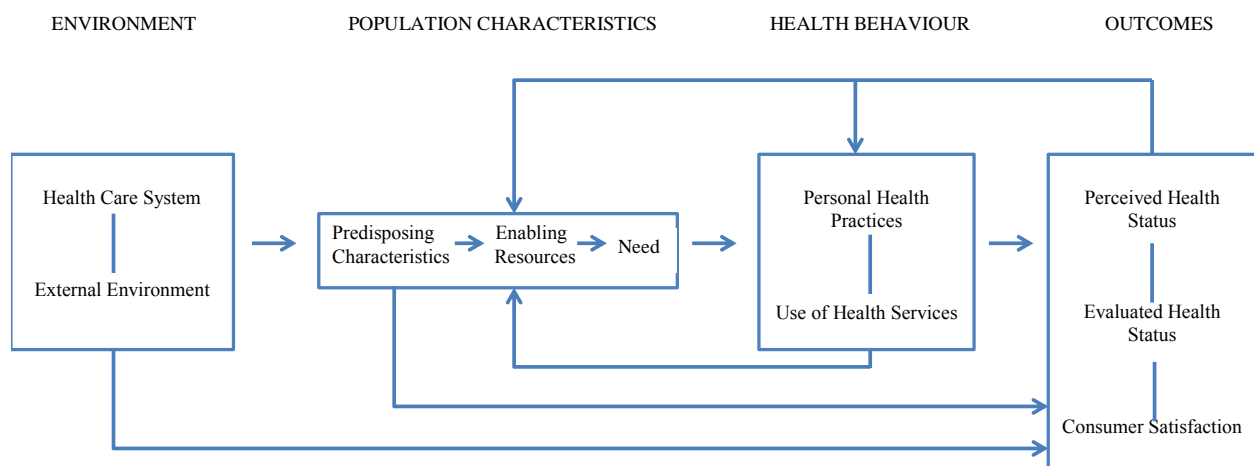


Figure 3: Modification of Andersen's Emerging Model (adapted from Andersen, 1995)

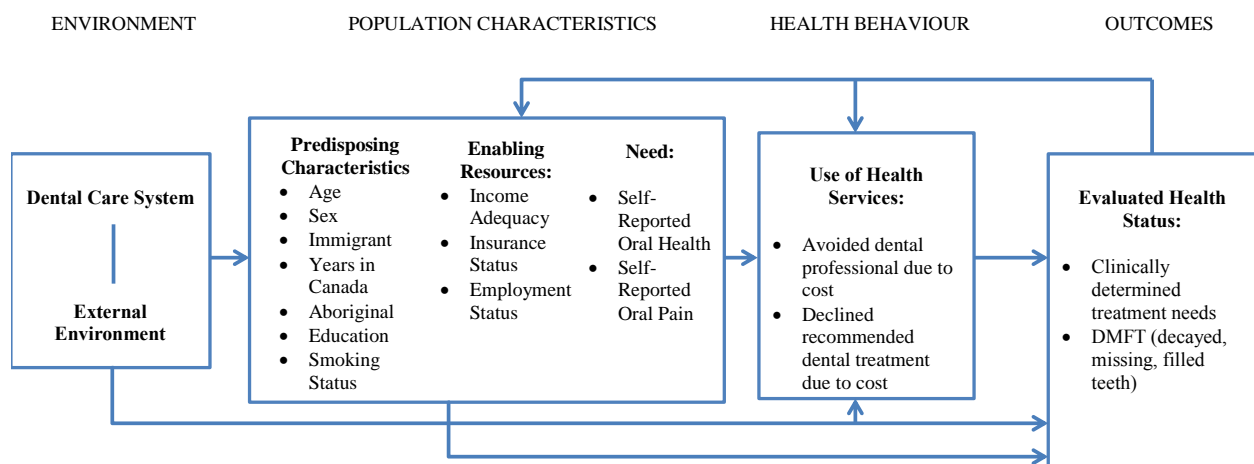


Table 1 outlines each variable used in this study, including a description of how the variables were coded and categorized for the statistical analyses.

Table 1: Variables of Interest

Variable	Categories and Coding
Avoided dentist due to cost	“0” – No “1” – Yes
Declined treatment due to cost	“0” – No “1” – Yes
Age	“0” – 6-11 “1” – 12-19 “2” – 20-39 “3” – 40-59 “4” – 60-79
Sex	“0” – Male “1” – Female
Immigrant status	“0” – Non-immigrant “1” – Immigrant
Years in Canada	“0” – > 10 years “1” – < 10 years
Aboriginal status	“0” – Non-aboriginal “1” – Aboriginal
Education	“0” – > high school “1” – < high school
Smoking Status	“0” – Non-smoker “1” – Smoker
Income	“0” – Higher “1” – Upper Middle “2” – Lower Middle “3” – Lower
Insurance status	“0” – Private “1” – Public “2” – None
Employment status	“0” – Full-time employed “1” – Part-time employed “2” – Unemployed
Self-reported oral health	“0” – Excellent to good “1” – Fair to poor
Self-reported oral pain	“0” – Often and sometimes “1” – Rarely and never
Treatment Needs (all)	Dichotomous variables “0” – No “1” – Yes
Decayed teeth	Continuous (0-28)

Missing teeth	Continuous (0-28)
Filled Teeth	Continuous (0-28)

2.4.1 Predisposing Characteristics

The predisposing characteristics used in this study include:

Age

Age was a continuous variable that was re-coded and categorized into five groups. The age groups used in this study are identical to the age groups used in Statistics Canada’s report from the oral health component of the CHMS (Health Canada, 2010) to maintain consistency and for ease of comparison. These groups are: 6-11, 12-19, 20-39, 40-59, 60-79.

Sex

The variable for sex was dichotomized as male and female.

Immigrant Status

Immigrant status is a variable determined by the household question that asked: “*Were you born a Canadian citizen?*” This variable was dichotomized as either “yes” or “no” and was labelled as either “immigrant” or “non-immigrant”.

Years in Canada

This is a derived variable that indicates the length of time the respondent has been in Canada since his/her immigration. The household question corresponding to his variable is: “*In what year did you first come to Canada to live?*” The outcome was derived by subtracting the year the respondent moved to Canada from the current year. This was a continuous outcome that was dichotomized into “greater than 10 years” and “less than 10 years” to identify newer and older immigrants. Non-immigrants were excluded from this population.

Aboriginal Status

This variable indicates whether the respondent self-identified being an Aboriginal person. This was dichotomized into “Aboriginal” or “non-Aboriginal” for purposes of this study.

Education

Education was also a derived variable indicating the highest level of education acquired by any member of the household. The outcome is dichotomized into “less than high school” and “greater than high school” to maintain consistency with other literature on this topic (Locker, Maggrias, & Quiñonez, 2011; Ramraj & Quiñonez, 2012; Sadeghi, 2012).

Smoking Status

The smoking status variable indicates the type of smoker the respondent is, based on his/her smoking habits. Smoking was dichotomized into “smoker” and “non-smoker”. “Smoker” included both daily and occasional smokers and “non-smoker” included both former and never smokers.

2.4.2 Enabling Resources

Income

The measure of income adequacy was used in this study. Income adequacy is a derived variable classified into four categories based on the respondent’s total household income and the number of people living in the household. Table 2 illustrates how each income category was derived.

Table 2: Categories of Income Adequacy

Income Category	Number of People in Household	Total Household Income
Lower	1 or 2	\$14,999 or less
	3 or 4	\$19,999 or less
	More than 4	\$30,000 or less
Lower Middle	1 or 2	\$15,000 to \$29,999
	3 or 4	\$20,000 to \$39,999
	More than 4	\$30,000 to \$59,999
Upper Middle	1 or 2	\$30,000 to \$59,999
	3 or 4	\$40,000 to \$79,999
	More than 4	\$60,000 to \$79,999
Upper	1 or 2	\$60,000 to \$100,000+
	More than 2	\$80,000 to \$100,000+

Insurance Status

Dental insurance was derived from two questions in the oral health section of household survey: “Do you have insurance or a government program that covers all or part of your dental expenses?” and “Is it: ...an employer-sponsored plan? ...a provincial program for children or seniors? ...a private plan? ...a government program for social service (welfare) clients? ...a government program for First Nations and Inuit?” The insurance variable was re-coded and classified into three groups: private, public or no insurance.

Employment Status

Employment status was categorized into three groups: full-time, part-time, and unemployed. This variable was determined by the respondent’s job status over the past year and the total number of hours the respondent worked per week. Full time was classified as working more than 30 hours per week, and part-time was classified as working less than 30 hours per week.

2.4.3 Need Variables

Self-Reported Oral Health

Respondents were asked to rate the health of their mouth using the following categories: excellent, very good, good, fair, and poor. These categories were then dichotomized into two groups: “excellent to good” and “fair to poor” and were used this way in the analyses.

Self-Reported Oral Pain

Respondents reported whether they experienced pain in their mouth based on the following question in the household questionnaire: “In the past 12 months, how often have you had any other persistent or on-going pain anywhere in your mouth?” Answers were dichotomized into categories “often and sometimes” and “rarely or never” for the analyses.

2.4.4 Use of Health Services: Cost Barriers to Dental Care

Two variables were used to measure cost barriers to dental care. Each is a self-reported measure and corresponds to a question in the household questionnaire. The first question asked, “In the past 12 months, have you avoided going to a dental professional because of the cost of dental

care?” The second question asked: “*In the past 12 months, have you avoided having all the dental treatment that was recommended because of the cost?*” For both questions, respondents answered either “yes” or “no”, and the data was dichotomized in this manner for the statistical analyses.

2.4.5 Evaluated Health Status

Treatment Needs

During the clinical examination, the dentist examiner determined recommendations for the type(s) of treatment needed for each participant. The following treatment categories were used in this study:

- Prevention (i.e. Examination, prophylaxis, fluoride, sealants, radiographs)
- Restorative (i.e. Fillings, crowns, bridge for restoration of carious lesions)
- Surgery
- Periodontal (i.e. Scaling, root planning, periodontal surgery)
- Endodontic (i.e. Root canal therapy)
- Prosthodontic (i.e. Removable/fixed, partial/full dentures, implant, bridge or crown)
- Urgent (i.e. Treatment needed within a week; includes urgent problems from all treatment categories)

The quantity of needs within each treatment category could not be specified since recommendations for needing treatment were categorized as either a “yes” or “no”.

Decayed, Missing and Filled Teeth

The number of decayed, missing and filled teeth (DMFT) were clinically determined and recorded for each tooth crown for both adults and children. The total DMFT value used in the analyses is a combined DMFT figure. That is, decayed, missing and filled teeth for both primary and permanent dentitions were added to give a combined value for each respondent. This is a continuous outcome variable.

2.5 Statistical Analyses

2.5.1 Weighting of Data

In order for estimates produced from the CHMS to be representative of the population covered, and not merely of the sample itself, survey weights were used in all statistical calculations using STATA v.12. A survey weight was assigned to each respondent included in the final sample. The weight corresponds to the number of people represented by the survey respondent in the population as a whole.

In addition to survey weights, a total of 500 bootstrap weights were applied prior to any statistical analyses. The bootstrap method takes into account the multi-stage sample design when calculating the variance estimates. A total of 500 bootstrap weights were applied since the sample was allocated over 10 age-sex groups, and it was estimated that 500 units per group was required to produce national estimates, for a total of 5,000 reporting units. As part of the disclosure process at Statistics Canada's Regional Data Centre, only weighted proportions and counts were permitted for release.

2.5.2 Statistical Tests

Univariate and bivariate descriptive frequencies were calculated to observe the sample's characteristics, to assess the socioeconomic and demographic characteristics within each sub-sample, and to describe the oral health status and treatment needs of each sub-sample.

Multivariate logistic regressions were conducted for each dependent variable to see if any characteristics were predictive of reporting cost barriers to dental care and to determine which factors were the strongest predictors of reporting cost barriers. Before each independent variable was entered into the logistic model, STATA v.12 was used to determine collinearity amongst and between each of the variables. The variance inflation factor (VIF) is a measure which quantifies the severity of multicollinearity. Only those variables with a variance inflation factor (VIF) equal to, or less than three, were entered into the model. In addition, only variables with a p-value of less than 0.25 in the bivariate analyses were entered into the logistic regression models. The adjusted odds ratio, 95 per cent confidence interval and p-values were recorded.

Chapter 3: Results

3.1 Sample Characteristics

The total weighted number of participants interviewed and clinically examined equated to 29,157,460. Table 3 shows the distribution of the CHMS sample by predisposing characteristics, enabling resources and need factors. There was nearly an equal distribution of males (49.9%) and females (50.1%) among the sample and the majority were 20 to 39 (30.9%) and 40 to 59 (33.5%) years of age. The sampled households were relatively highly educated (74.4%), over half were employed full time (50.3%), and most of the sample comprised upper-middle and higher income categories (31.9% and 47.9%, respectively). Nearly two-thirds have private dental insurance (62.6%) and almost all were non-Aboriginal (96.9%). The majority of the population was born in Canada (79.0%) and, among those born outside of Canada; most (59.7%) had resided in Canada greater than 10 years. Almost all (84.5%) reported good to excellent oral health and rarely or never had oral pain (88.4%).

Table 3: CHMS Sample Characteristics

	Weighted %
All	100.00 (n = 29157460)
Age	
6-11	7.4
12-19	11.4
20-39	30.9
40-59	33.5
60-79	33.5
Sex	
Male	49.9
Female	50.1
Income	
Higher	47.9
Upper Middle	31.9
Lower Middle	14.8
Lower	5.5
Insurance	
Private	62.6
Public	5.5
No Insurance	31.9

Education	
>high school	74.4
<high school	25.6
Smoking Status	
Smoker	20.3
Non-Smoker	79.7
Immigrant Status	
Immigrant	21.0
Non-Immigrant	79.0
Years in Canada	
>10 years	59.7
<10 years	40.4
Aboriginal Status	
Aboriginal	96.9
Non-Aboriginal	3.1
Employment Status	
FT Employed	50.3
PT Employed	8.9
Unemployed	40.8
Self-Reported Oral Health	
Good to Excellent	84.5
Fair to Poor	15.5
Self-Reported Oral Pain	
Sometimes and Often	11.6
Rarely or Never	88.4

3.2 Cost Barriers to Dental Care

Tables 4 and 5 outline who reported avoiding a dental professional and who declined recommended dental treatment due to cost. Results show that 17.3 per cent of those surveyed reported avoiding a dental professional due to cost and 16.5 per cent reported declining recommended dental treatment due to cost. Currently, the Canadian population is at nearly 35 million (Statistics Canada, 2012), which translates into about six million people in each category.

Table 4: Per cent of persons avoiding visiting a dental professional within the last year because of costs

	Weighted %	95% Confidence Interval	P-value
All (N= 29129460)	17.3	(14.7,20.3)	
Age			
6-11	11.4	(7.9,16.2)	0.000

12-19	9.5	(7.2,12.4)	
20-39	23.7	(19.1,29.0)	
40-59	17.5	(14.4,21.2)	
60-79	13.2	(10.7,16.2)	
Sex			
Male	15.5	(12.4,19.1)	0.042
Female	19.2	(16.1,22.7)	
Income			
Higher	8.8	(6.2,12.2)	0.000
Upper Middle	19.5	(16.0,23.5)	
Lower Middle	34.2	(28.9,39.9)	
Lower	35.2	(27.1,44.3)	
Insurance			
Private	8.6	(7.3,10.1)	0.000
Public	8.9	(4.4,17.1)	
No Insurance	35.9	(30.4,41.9)	
Education			
>high school	17.9	(14.9,21.3)	0.071*
<high school	15.2	(12.2,18.7)	
Smoking Status			
Smoker	25.9	(19.7,33.3)	0.002
Non-Smoker	15.7	(13.6,18.2)	
Immigrant Status			
Immigrant	23.0	(19.7,26.7)	0.003
Non-Immigrant	15.8	(12.8,19.4)	
Years in Canada			
>10 years	17.5	(13.2,23.0)	0.006
<10 years	31.2	(25.2,37.9)	
Aboriginal Status			
Aboriginal	13.4	(5.4,29.3)	0.426
Non-Aboriginal	17.4	(14.9,20.3)	
Employment Status			
FT Employed	16.2	(13.0,20.0)	0.090*
PT Employed	20.0	(13.2,29.0)	
Unemployed	20.7	(17.3,24.5)	
Self-Reported Oral Health			
Good to Excellent	13.6	(11.2,16.3)	0.000
Fair to Poor	37.9	(30.6,45.7)	
Self-Reported Oral Pain			
Sometimes and Often	34.5	(27.0,42.9)	0.000
Rarely or Never	15.1	(12.9,17.5)	

*Not significant: $P > 0.05$

Table 5: Per cent of persons declining recommended dental treatment within the last year due to cost

	Weighted %	95% Confidence Interval	P-value
All (N= 29129613)	16.5	(15.0,18.2)	
Age			
6-11	7.7	(5.4,11.0)	0.000
12-19	8.9	(6.0,13.2)	
20-39	19.4	(16.4,22.7)	
40-59	18.7	(16.0,21.7)	
60-79	15.9	(13.2,19.0)	
Sex			
Male	14.4	(12.1,17.0)	0.010
Female	18.6	(16.9,20.4)	
Income			
Higher	9.9	(8.3,11.7)	0.000
Upper Middle	18.3	(15.2,21.9)	
Lower Middle	29.0	(24.0,34.7)	
Lower	31.6	(24.7,39.3)	
Insurance			
Private	10.9	(9.5,12.5)	0.000
Public	18.1	(11.7,27.0)	
No Insurance	27.4	(23.1,32.1)	
Education			
>high school	18.0	(16.2,19.9)	0.002
<high school	12.4	(10.0,15.4)	
Smoking Status			
Smoker	24.0	(18.9,29.8)	0.006
Non-Smoker	15.5	(13.7,17.5)	
Immigrant Status			
Immigrant	20.6	(17.0,24.9)	0.026
Non-Immigrant	15.4	(13.5,17.5)	
Years in Canada			
>10 years	18.7	(13.9,24.8)	0.335*
<10 years	23.5	(16.3,32.6)	
Aboriginal Status			
Aboriginal	15.8	(8.2,28.2)	0.866*
Non-Aboriginal	16.5	(15.0,18.1)	
Employment Status			
FT Employed	16.2	(14.5,18.0)	0.170*
PT Employed	20.9	(14.3,29.6)	
Unemployed	19.1	(16.1,22.6)	
Self-Reported Oral Health			
Good to Excellent	12.7	(11.6,13.8)	0.000
Fair to Poor	37.4	(31.8,43.3)	
Self-Reported Oral Pain			

Sometimes and Often	32.6	(26.3,39.6)	0.000
Rarely or Never	14.4	(13.2,15.7)	

Table 6 shows us that 11.1 per cent of the Canadian population reported both avoiding a dental professional and declining recommended dental treatment in the past year due to cost. This table also shows us that 77.3 per cent of respondents did not report experiencing a financial barrier to dental care in the past year. In other words, 22.7 per cent of the Canadian population reported experiencing a cost barrier to dental care, whether it was avoiding a dentist due to cost, declining recommended dental treatment due to cost, or both.

Table 6: Proportion of Canadians Reporting Cost Barriers to Dental Care

		Declined Recommended Treatment Due to Cost	
		Y	N
Avoided Dentist Due to Cost	Y	11.1% (9.37,13.13)	6.2% (4.84,7.95)
	N	5.3% (4.28,6.74)	77.3% (74.9,79.53)

3.2.1 Objective 1: To determine the socio-economic and demographic characteristics of Canadians reporting cost barriers to dental care

Figure 4 illustrates who reported cost barriers by age group. The left side of the graph shows the results for those that avoided a dental professional and the right side of the graph shows results for those that declined recommended treatment due to cost. It can be seen that Canadians aged 20 to 39 reported cost barriers to dental care more frequently than all other age groups. Nearly 25 per cent of Canadians aged 20 to 39 reported avoiding a dental professional in the last year due to costs (23.7%, CI: 19.1, 29.0) and nearly 20 per cent reported declining recommended dental treatment due to cost (19.4%, CI: 16.4, 22.7). This graph also shows that children aged 6 to 11 and adolescents aged 12 to 19 experienced cost barriers least often. For example, only 11.4 per cent (CI: 7.9, 16.2) of children and 9.5 per cent (CI: 7.2, 12.4) of adolescents avoided due to cost

and 7.7 per cent (CI: 5.4, 11.0) of children and 8.9 per cent (CI: 6.0, 13.2) of adolescents declined treatment due to cost.

Figure 4: Age of Canadians reporting cost barriers to dental care

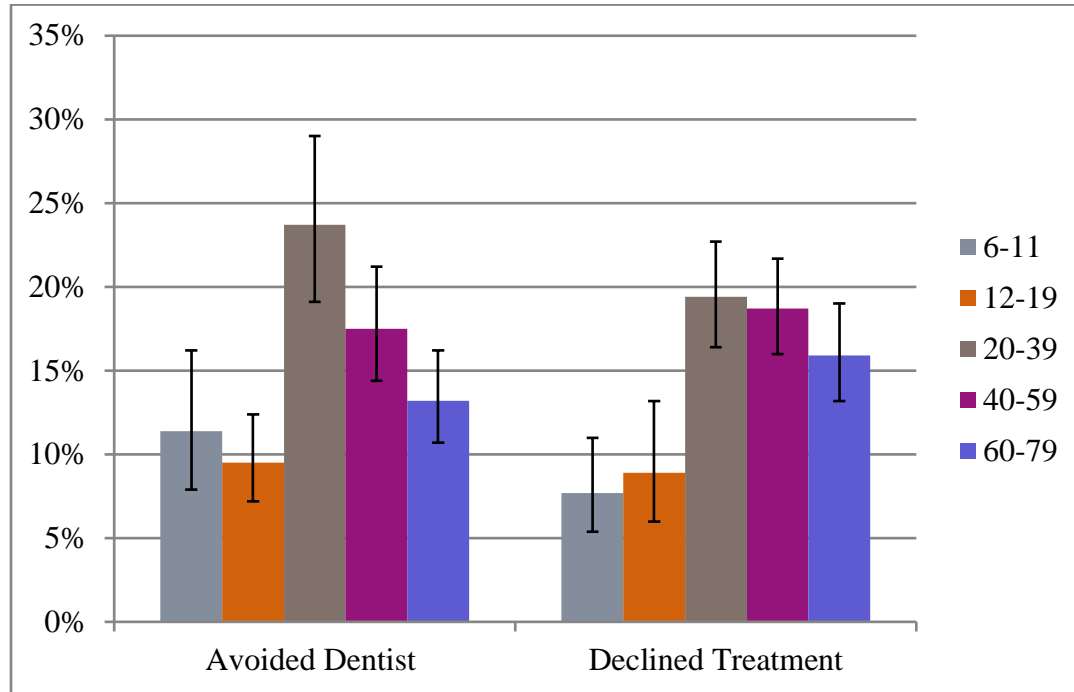
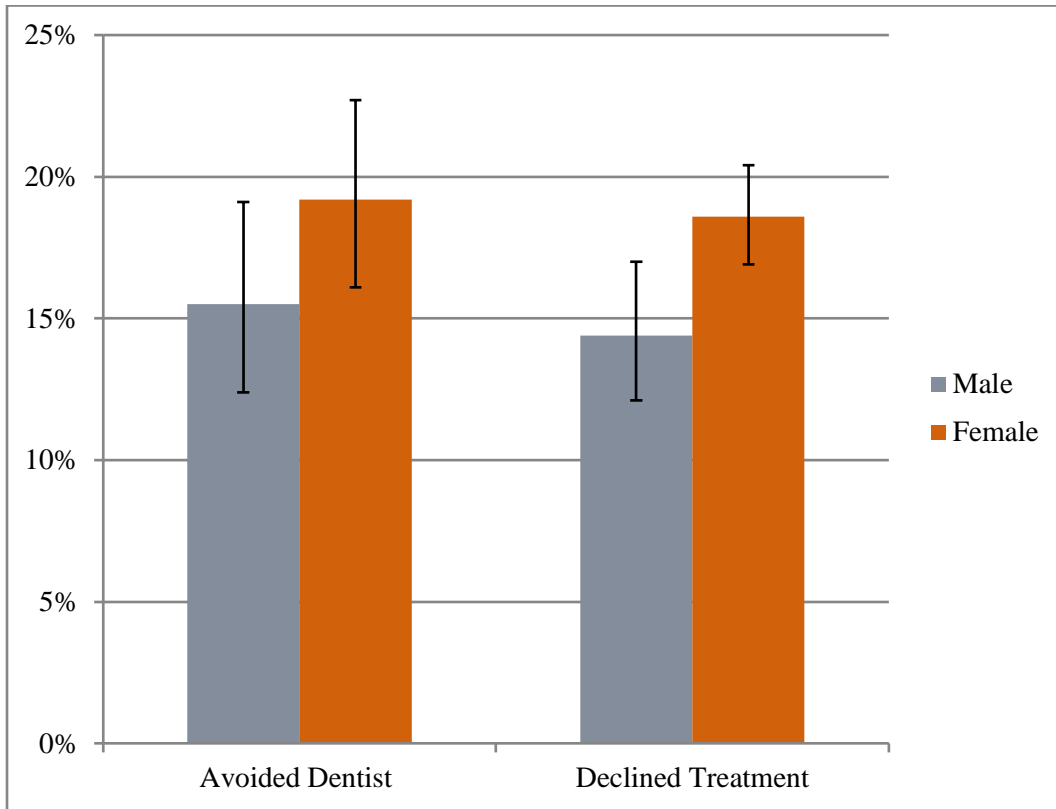


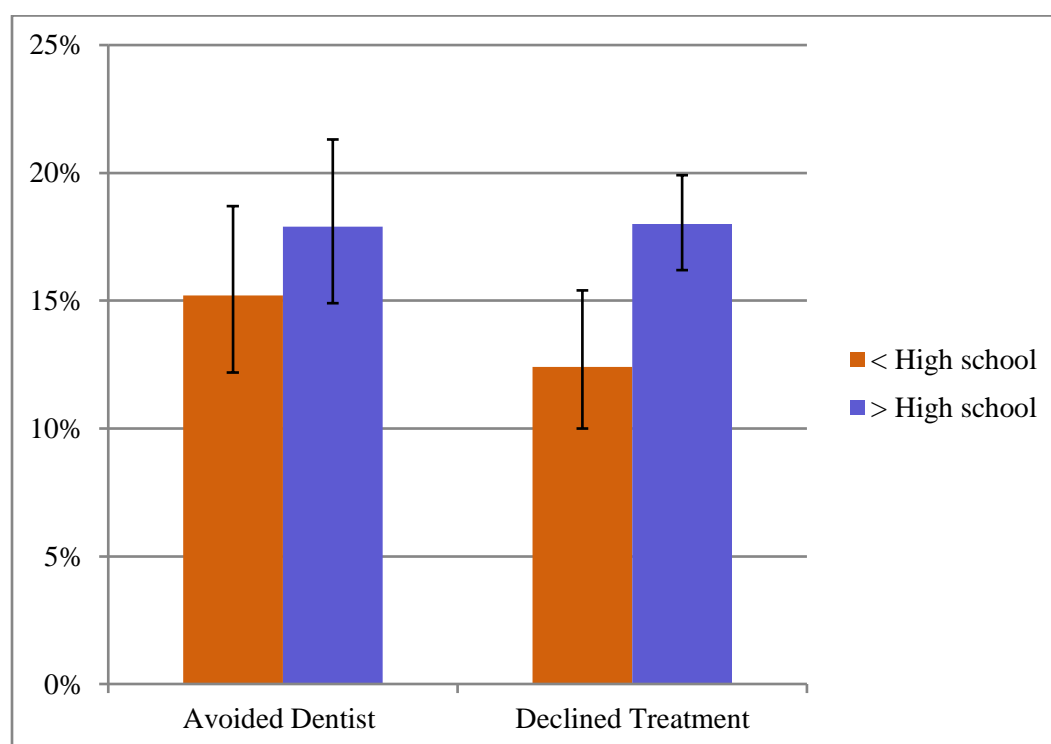
Figure 5 demonstrates that slightly more females reported avoiding (19.2%, CI: 16.1, 22.7) and declining treatment (18.6%, CI: 16.9, 20.4) due to cost compared to males (15.5%, CI: 12.4, 19.1 and 14.4%, CI: 12.1, 17.0, respectively).

Figure 5: Sex of Canadians reporting cost barriers to dental care



Based on previous literature on this topic, one would expect to see those with less education report cost barriers more often. Contrary to this, results from this study (Figure 6) show that there was no statistical difference in avoiding a dental professional because of costs among those with greater than and less than high school education (17.9%, CI: 14.9, 21.3 vs. 15.2%, CI: 12.2, 18.7). Figure 6 also shows that among those reporting declining recommended treatment due to cost, Canadians with greater than high school education reported declining treatment due to cost more than those with less than a high school education (18.0%, CI: 16.2, 19.9 vs. 12.4%, CI: 10.0, 15.4), which is the opposite of what has been previously found in the literature.

Figure 6: Educational attainment of Canadians reporting cost barriers to dental care



Immigrants were more likely to report avoiding a dental professional and declining recommended treatment due to cost (23.0%, CI: 19.7, 26.7 and 20.6%, CI: 17.0, 24.9), compared to individuals born in Canada (15.8%, CI: 12.8, 19.4 and 15.4%, CI: 13.5, 17.5, respectively). When looking more closely at immigrants (Figure 7), newer immigrants living in Canada reported avoiding a dental professional due to cost more frequently than immigrants living in Canada greater than ten years (31.2%, CI: 25.2, 37.9 vs. 17.5%, CI: 13.2, 23.0). Interestingly, there was no statistical difference among newer and older immigrants who declined recommended treatment due to cost (23.5%, CI: 16.3, 32.6 vs. 18.7%, CI: 13.9, 24.8).

Not surprisingly, when looking at the household income level of those reporting cost barriers, the majority are from the lower and lower-middle income categories (Figure 8). Among Canadians of lower and lower-middle income categories, 35.2 per cent (CI: 27.1, 44.3) and 34.2 per cent (CI: 28.9, 39.9) reported avoiding a dental professional in the last year due to cost, respectively. Similarly, 31.6 per cent (CI: 24.7, 39.3) and 29.0 per cent (CI: 24.0, 34.7) of lower and lower-middle income Canadians reported declining recommended dental treatment in the last year because of cost. Overall, Figure 8 shows that there is an income gradient with respect to

reporting cost barriers to dental care, meaning, as the household income lowers, the greater the proportion of people reporting cost barriers.

Figure 7: Canadian immigrants reporting cost barriers to dental care

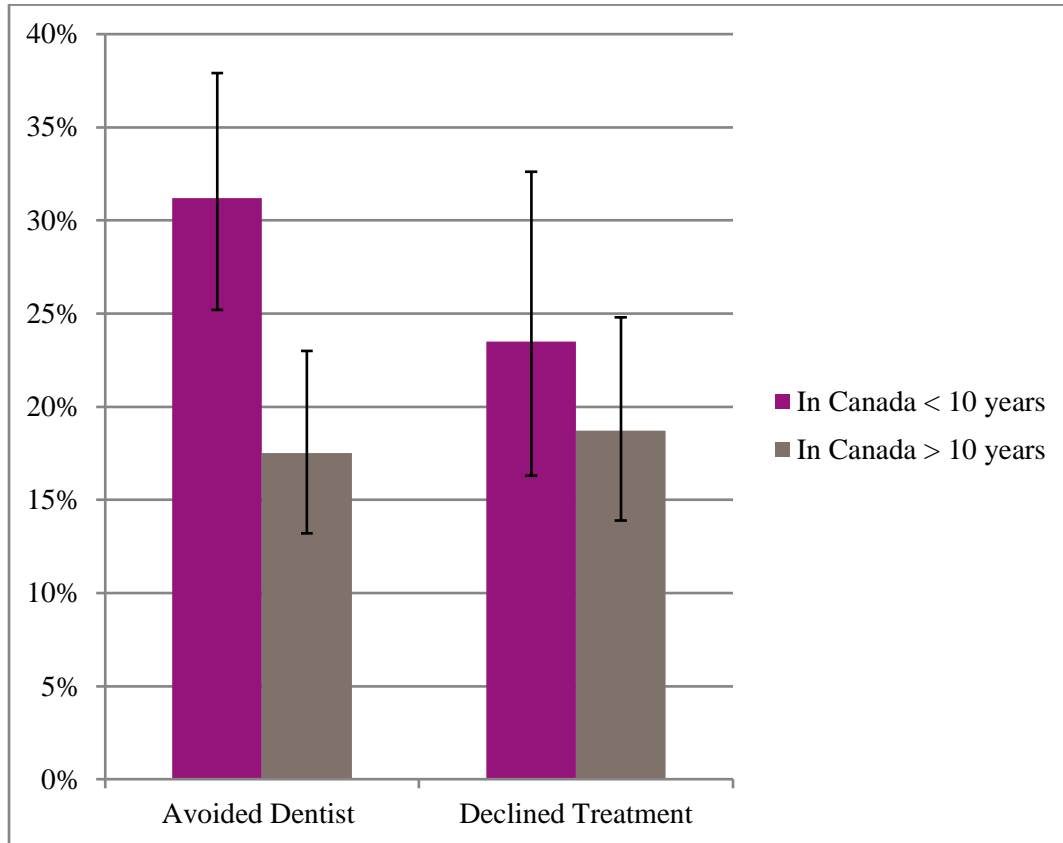
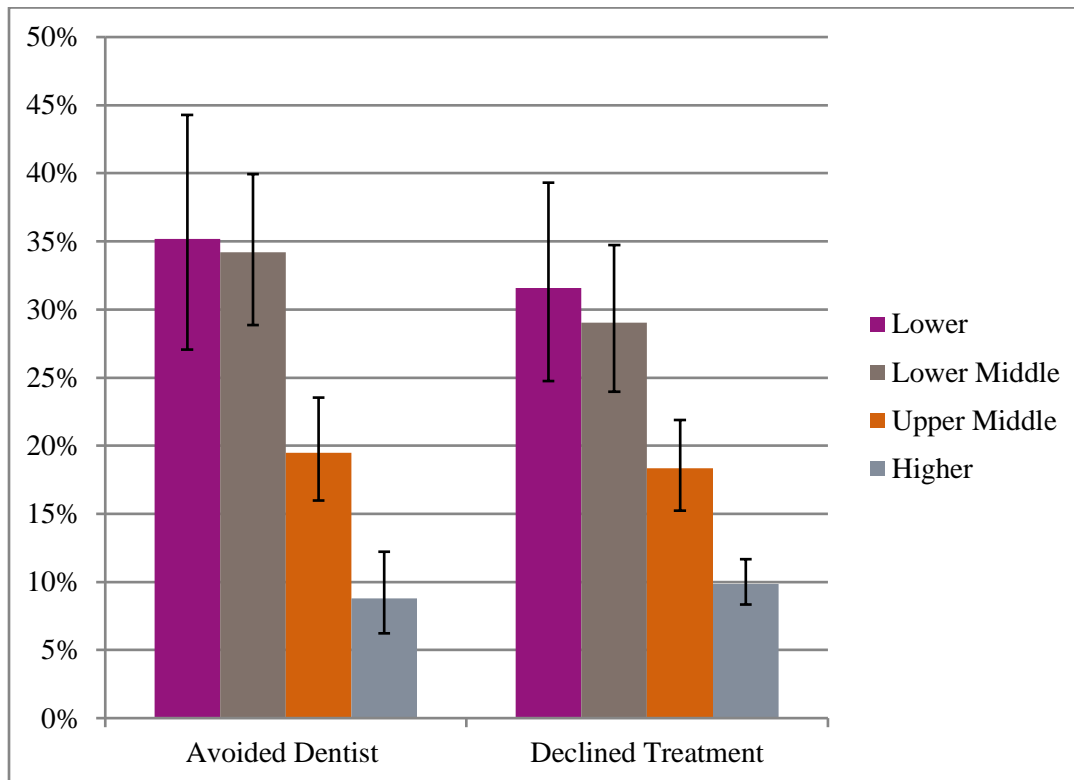
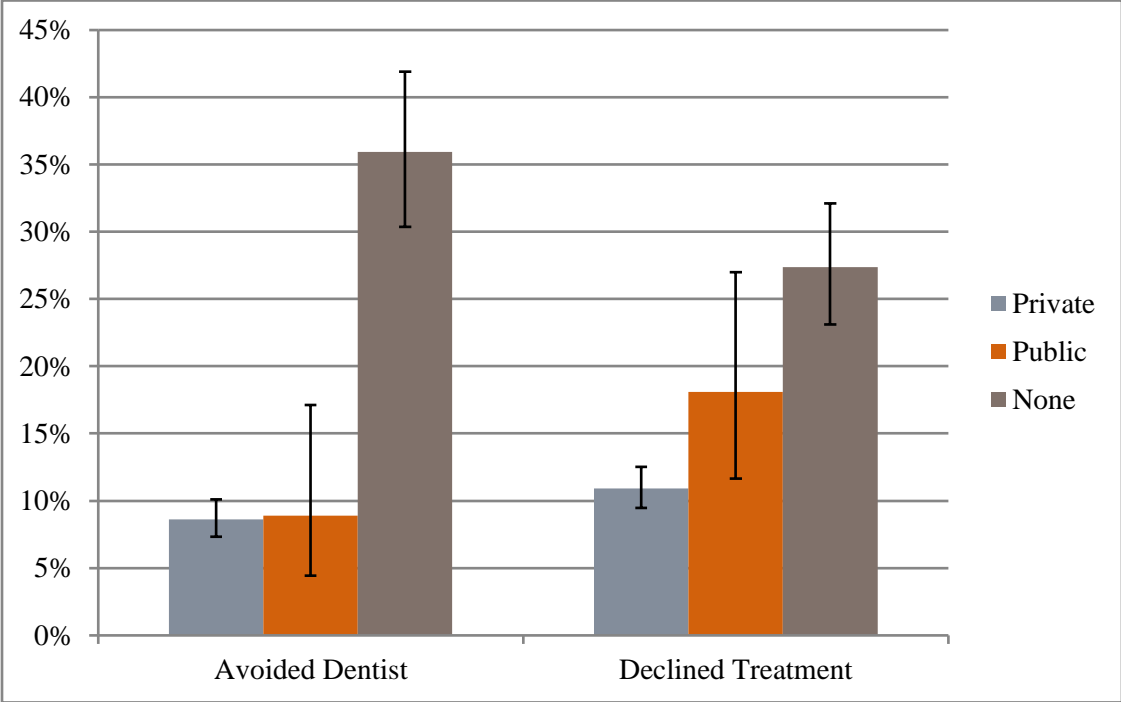


Figure 8: Level of income among Canadians reporting cost barriers to dental care



Canadians without any type of dental insurance coverage reported cost barriers more than those with dental insurance (Figure 9). Nearly 36 per cent (35.9%, CI: 30.4, 41.9) of Canadians without dental insurance reported avoiding a dental professional due to cost compared to less than ten per cent of Canadians with public insurance (8.9%, CI: 4.4, 17.1) or private insurance coverage (8.6%, CI: 7.3, 10.1). Furthermore, nearly a third of Canadians without insurance (27.4%, CI: 23.1, 32.1) reported declining recommended treatment due to cost compared to only 18.1 per cent (CI: 11.7, 27.0) with public insurance and 10.9 per cent (CI: 9.5, 12.5) with private insurance.

Figure 9: Dental insurance status among Canadians reporting cost barriers to dental care



When examining both the insurance and employment status of all respondents, most were employed with insurance (Table 7). However, when examining both the insurance and employment status of Canadians who reported cost barriers to dental care, most were employed but without insurance (Tables 8 and 9). Tables 8 and 9 highlight the importance of insurance when examining access to care. For example, in Table 8, it can be seen that 41.7 per cent (CI: 33.3, 50.6) and 35.0 per cent (CI: 29.8, 40.5) of Canadians without insurance reported avoiding, compared to only about 10 per cent (8.1%, CI: 6.4, 10.2 and 10.7%, CI: 7.7, 14.6) of insured individuals in each employment category. The same trend can be seen in Table 9, where nearly 30 per cent of uninsured Canadians in each employment category (29.6%, CI: 23.0, 37.1 and 28.5%, CI: 23.0, 35.0) reported declining recommended dental treatment due to cost.

Table 7: Employment and insurance status among Canadian adults

	Employed (95% CI)	Unemployed (95% CI)
Insured	43.92% (39.0, 48.97)	23.85% (22.41, 25.36)
Uninsured	15.34% (12.24, 19.06)	16.89% (13.98, 20.25)

Table 8: Employment and insurance status among Canadian adults who avoided a dental professional in the last year due to cost

	Employed (95% CI)	Unemployed (95% CI)
Insured	8.1% (6.4, 10.2)	10.7% (7.7, 14.6)
Uninsured	41.7% (33.3, 50.6)	35.0% (29.8, 40.5)

Table 9: Employment and insurance status among Canadian adults who declined recommended dental treatment in the last year due to cost

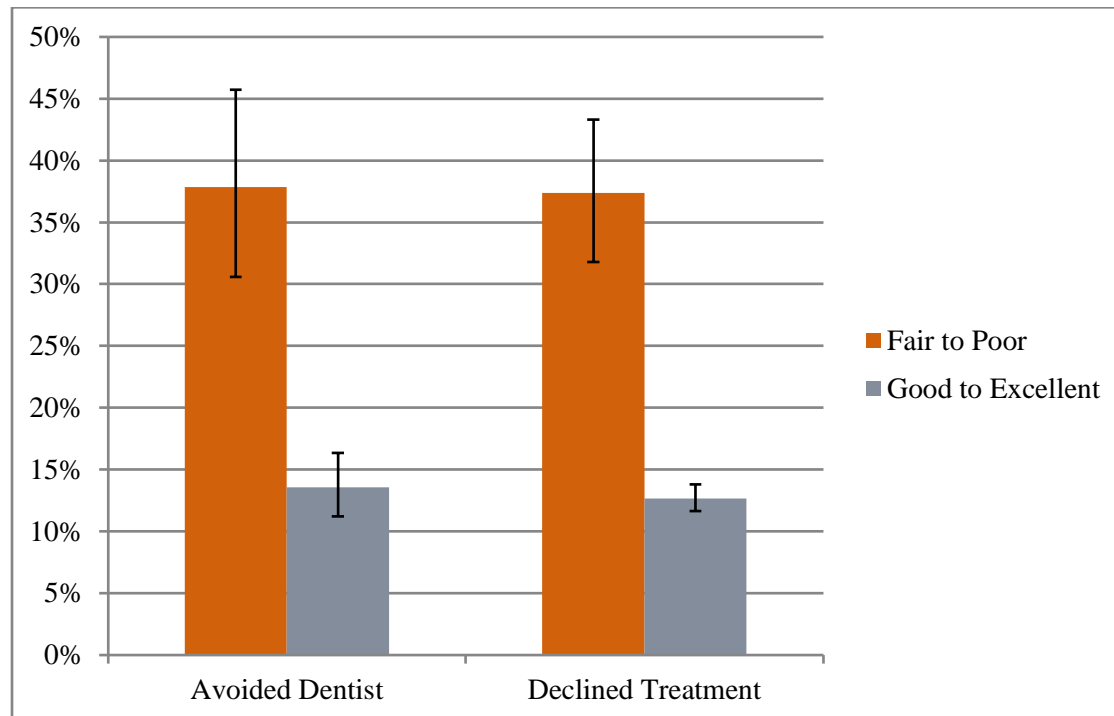
	Employed (95% CI)	Unemployed (95% CI)
Insured	12.6% (10.5, 15.0)	12.6% (10.3, 15.5)
Uninsured	29.6% (23.0, 37.1)	28.5% (23.0, 35.0)

3.2.2 Objective 2: To examine the oral health status of Canadians reporting cost barriers to dental care

In terms of self-reported oral health, a far greater proportion of Canadians who rated their oral health fair to poor also reported cost barriers to care (Figure 10). For example, most Canadians

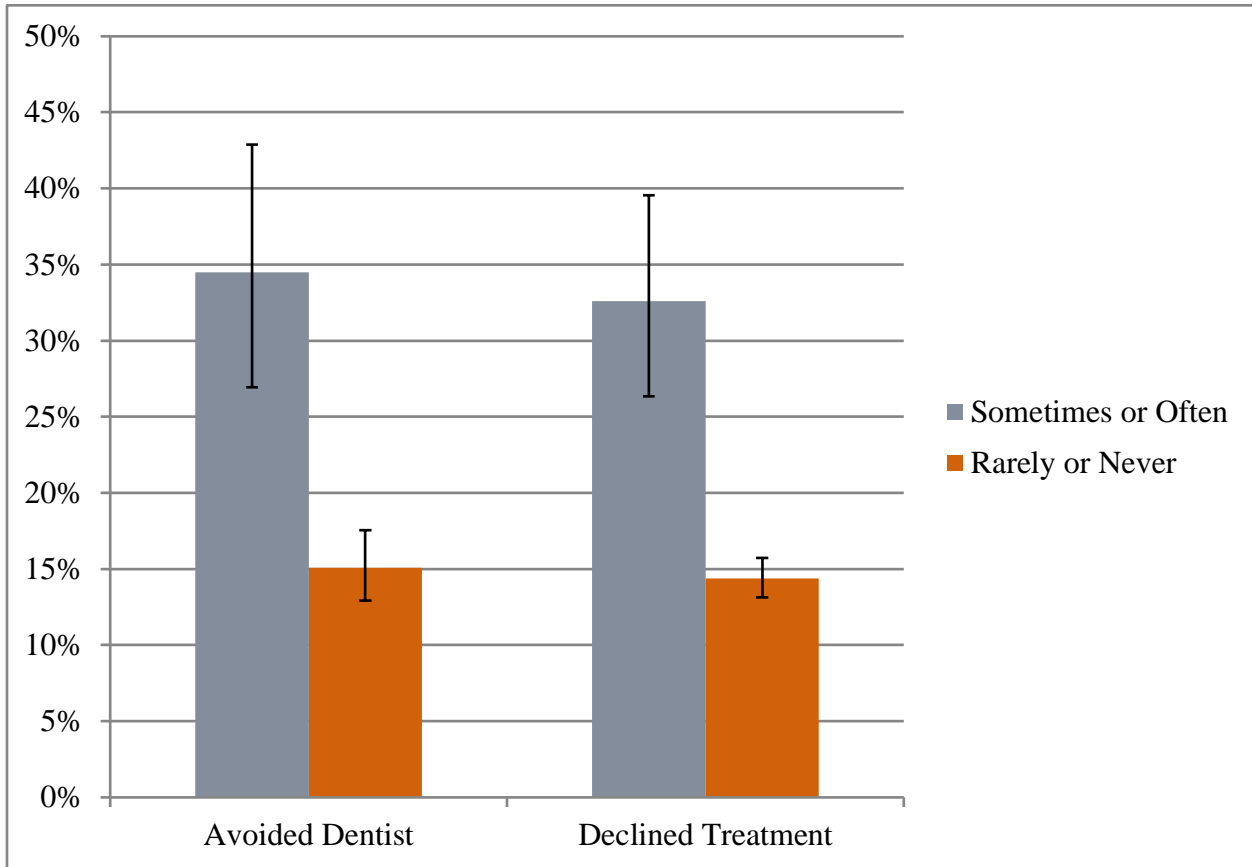
reporting fair to poor oral health also reported avoiding a dental professional due to cost (37.9%, CI: 30.6, 45.7) and declining recommended dental treatment due to cost (37.4%, CI: 31.8,43.3).

Figure 10: Self-reported oral health among Canadians reporting cost barriers to dental care



In addition, the majority of respondents reporting having oral pain sometimes or often also avoided a dental professional due to cost (34.5%, CI: 27.0, 42.9) and declining recommended dental treatment due to cost (32.6%, CI: 26.3, 39.6) (Figure 11).

Figure 21: Self-reported oral pain among Canadians reporting cost barriers to dental care



Tables 10 and 11 show that a greater proportion of individuals who reported avoiding a dental professional due to cost also reported having fair to poor oral health (33.8%, CI: 27.8, 40.4) and having oral pain sometimes or often (23.1%, CI: 19.4, 27.3), compared to their counterparts (11.7%, CI: 9.9, 13.7 and 9.2%, CI: 7.9, 10.7, respectively).

Table 10: Self-reported oral health among Canadians who avoided a dental professional in the last year due to cost

	Avoided Dentist Due to Cost (95% CI)	Did Not Avoid Due to Cost (95% CI)
Good to Excellent	66.2% (59.6, 72.2)	88.4% (86.3, 90.2)
Fair to Poor	33.8% (27.8, 40.4)	11.7% (9.9, 13.7)

*P-value = 0.000

Table 11: Self-reported oral pain among Canadians who avoided a dental professional in the last year due to cost

	Avoided Dentist Due to Cost (95% CI)	Did Not Avoid Due to Cost (95% CI)
Sometimes and Often	23.1% (19.4, 27.3)	9.2% (7.9, 10.7)
Rarely or Never	76.9% (72.7, 80.6)	90.8% (89.3, 92.1)

*P-value = 0.000

Furthermore, Tables 12 and 13 show that a greater proportion of individuals who reported declining recommended dental treatment due to cost also reported having fair to poor oral health (33.8%, CI: 27.8, 40.4) and having oral pain sometimes or often (23.0%, CI: 19.1, 27.4), compared to their counterparts (11.6%, CI: 10.0, 13.4 and 9.4%, CI: 8.0, 10.9, respectively).

Table 12: Self-reported oral health among Canadians who declined recommended dental treatment in the last year due to cost

	Declined Treatment Due to Cost (95% CI)	Did Not Decline Treatment Due to Cost (95% CI)
Good to Excellent	66.2% (59.6, 72.2)	88.4% (86.6, 90.0)
Fair to Poor	33.8% (27.8, 40.4)	11.6% (10.0, 13.4)

*P-value = 0.000

Table 13: Self-reported oral health among Canadians who declined recommended dental treatment in the last year due to cost

	Declined Treatment Due to Cost (95% CI)	Did Not Decline Treatment Due to Cost (95% CI)
Sometimes and Often	23.0% (19.1, 27.4)	9.4% (8.0, 10.9)
Rarely or Never	77.1% (72.6, 80.9)	90.6% (89.1, 92.0)

*P-value = 0.000

When examining clinically evaluated oral health status, a greater proportion of individuals who reported avoiding a dental professional due to cost experienced dental caries in their lifetime compared to those who did not (93.5%, CI: 0.91, 0.95 vs. 87.6%, CI: 0.86, 0.90). In addition, they had over three times the amount of untreated decay, with a mean decay score of 1.37 (CI: 0.98, 1.77), compared to 0.37 (0.29, 0.45) among their counterparts. Table 14 shows the breakdown of mean DMFT among Canadians who avoided visiting a dental professional in the last year due to cost and those who did not.

Table 14: Mean DMFT among Canadians who avoided visiting a dental professional in the last year due to cost

	Avoided Dentist Due to Cost (95% CI)	Did Not Avoid Dentist Due to Cost (95% CI)	P-value
Mean D	1.37 (0.98,1.77)	0.37 (0.29,0.45)	0.000
Mean M	2.22 (1.86,2.58)	1.61 (1.43,1.79)	0.015
Mean F	5.98 (5.32,6.63)	6.80 (6.44,7.17)	0.030
Mean DMFT	9.57 (8.77,10.37)	8.78 (8.38,9.18)	0.097*

*Not significant: $P > 0.05$

Similar findings were found among those who declined recommended dental treatment due to cost (Table 15). More individuals who declined treatment due to cost had experienced dental caries in their lifetime compared to those who did not decline treatment (93.9%, CI: 91.3, 95.8 vs. 87.6%, CI: 85.7, 89.2). In addition, they had nearly three times the amount of untreated decay, with a mean decay score of 1.18 (CI: 0.79, 1.56), compared to 0.42 (CI: 0.33, 0.51) among their counterparts.

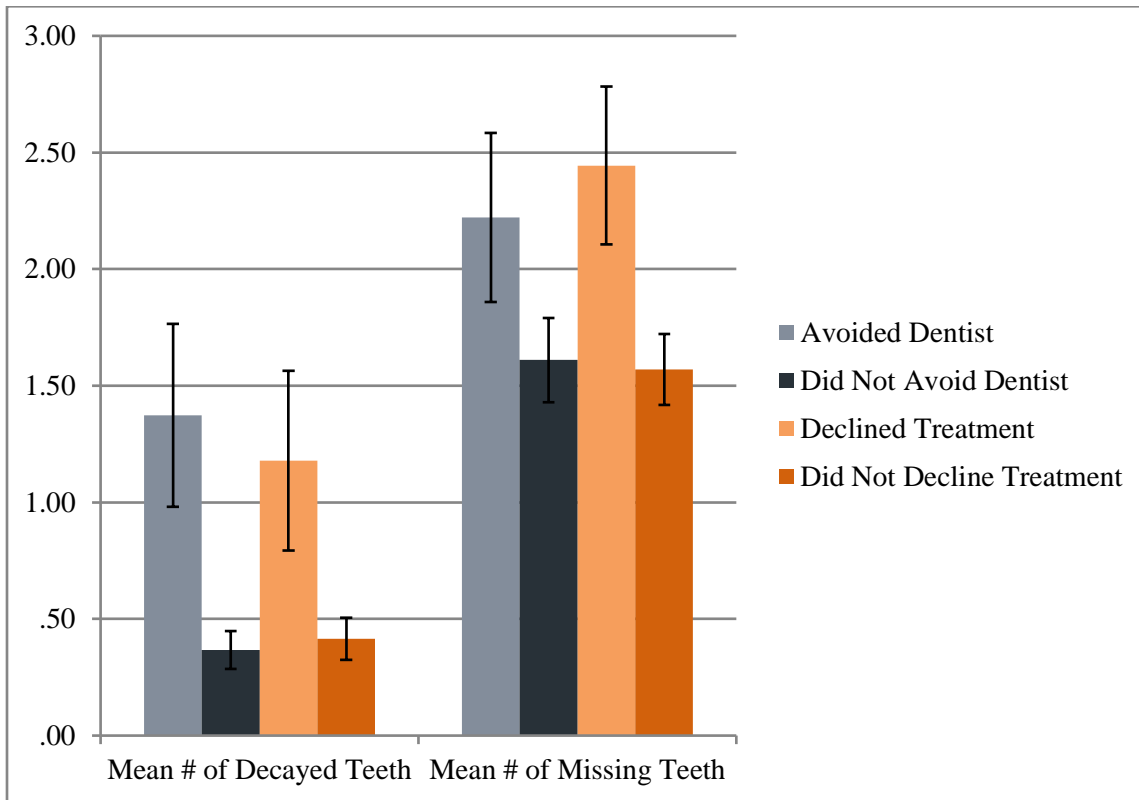
Table 15: Mean DMFT among Canadians who declined recommended dental treatment in the last year due to cost

	Declined Treatment Due to Cost (95% CI)	Did Not Decline Treatment Due to Cost (95% CI)	P-value
Mean D	1.18 (0.79,1.56)	0.42 (0.33,0.51)	0.000
Mean M	2.44 (2.12,2.78)	1.57 (1.42,1.72)	0.000
Mean F	6.95 (6.12,7.80)	6.60 (6.27,6.93)	0.353*
Mean DMFT	10.57 (9.91,11.24)	8.58 (8.23,8.94)	0.000

*Not significant: $P > 0.05$

Figure 12 is a graphical representation of the mean number of decayed and missing teeth among Canadians reporting cost barriers to dental care. The y-axis represents the mean number of teeth and the x-axis represents decayed and missing teeth for each of the two cost barrier variables.

Figure 12: Mean number of decayed and missing teeth among Canadians reporting cost barriers to dental care



3.2.3 Objective 3: To assess the clinically determined treatment needs among those reporting cost barriers to dental care

The proportion of individuals with a treatment need was the much higher for those reporting cost barriers to dental care. Approximately 55 per cent (55.4% CI: 46.7, 63.8) of Canadians who avoided a dental professional due to cost were clinically determined to have a dental treatment need compared to only 28 per cent (28.1% CI: 23.2, 33.7) among their counterparts (Figure 13). A greater proportion of those avoiding due to cost also had multiple treatment needs (33.9%, CI: 28.0, 40.3 vs. 12.7%, CI: 9.0, 17.4) (Figure 14).

Figure 13: Proportion with a clinical treatment need among Canadians who reported avoiding a dental professional in the last year due to cost

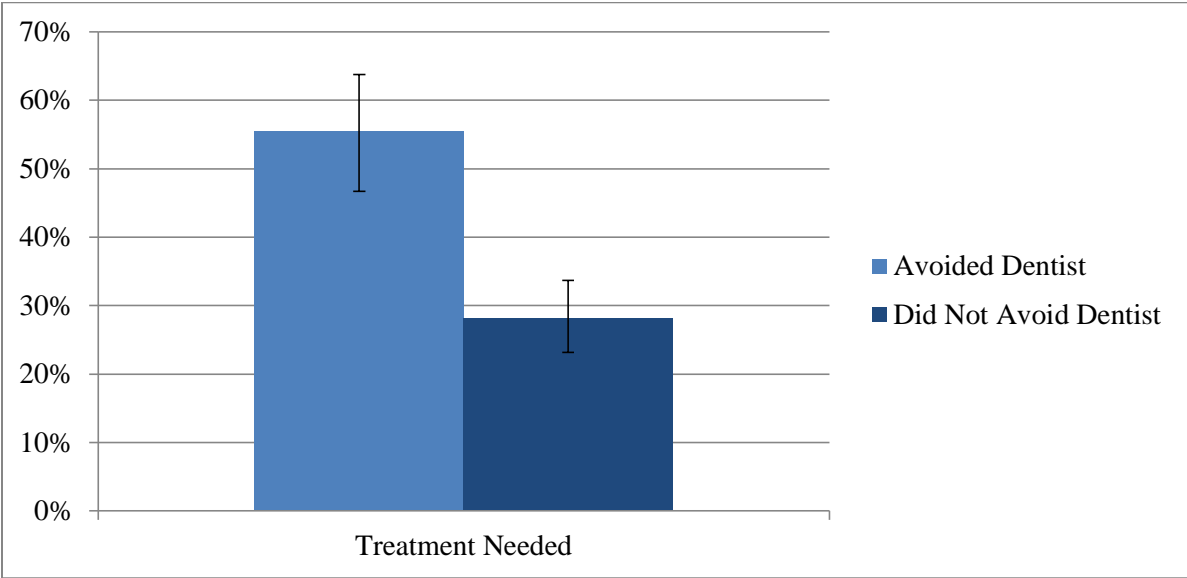


Figure 14: Proportion with multiple treatment needs among Canadians who reported avoiding a dental professional in the last year due to cost

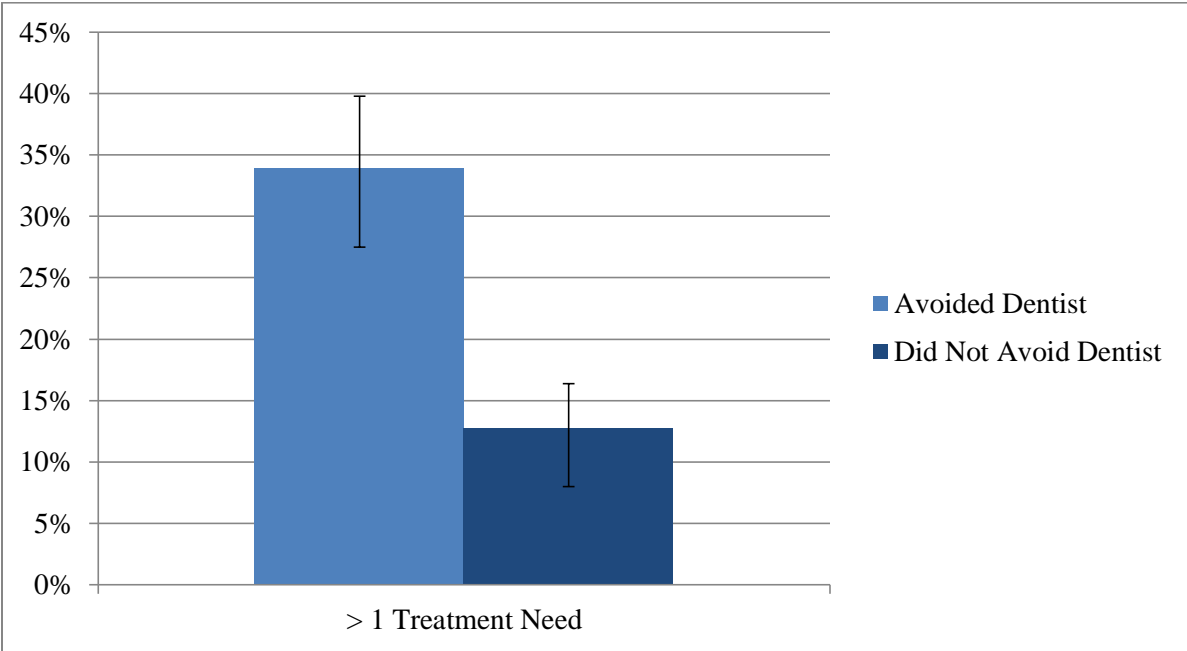


Table 16 highlights the types of treatments needed by Canadians that reported avoiding a dentist due to cost and their counterparts. There is a general trend that those who avoided a dentist had a higher prevalence of needing treatment; more than double in all treatment need categories (besides urgent needs). Restorations were needed most with 37.7 per cent (CI: 31.8, 44.0) of

respondents requiring fillings, compared to only 16.8 per cent (CI: 14.0, 20.0) among those who did not report avoiding due to cost.

Table 16: Type of treatment needed by those who avoided a dental professional in the last year due to cost

	Avoided Dentist Due to Cost (%, 95% CI)	Did Not Avoid Dentist Due to Cost (%, 95% CI)
Prevention	27.4 (20.9, 35.1)	10.9 (7.9, 14.9)
Restorative	37.7 (31.8, 44.0)	16.8 (14.0, 20.0)
Surgery	15.8 (12.2, 20.1)	5.7 (4.1, 7.8)
Periodontic	9.6 (6.7, 13.5)	4.1 (2.8, 6.1)
Endodontic	6.1 (3.9, 9.4)	1.1 (0.6, 2.1)
Prosthodontic	16.2 (13.1, 19.8)	8.4 (6.2, 11.3)
Urgent*	5.7 (3.4, 9.5)	5.9 (2.5, 13.4)

*Not significant: $P > 0.05$

The proportion of Canadians with a treatment need was also much higher for those reporting declining recommended dental treatment due to cost (Figure 15). Approximately 55 per cent (55.4%, CI: 44.4, 60.5) of Canadians who declined treatment due to cost were clinically determined to have a dental treatment need compared to only 28 per cent (28.1%, CI: 23.6, 35.0) among their counterparts. A greater proportion of those declining treatment due to cost also had multiple treatment needs (29.4%, CI: 22.2, 37.8 vs. 13.7%, CI: 9.8, 18.9) (Figure 16).

Figure 15: Proportion with a clinical treatment need among Canadians who declined recommended dental treatment in the last year due to cost

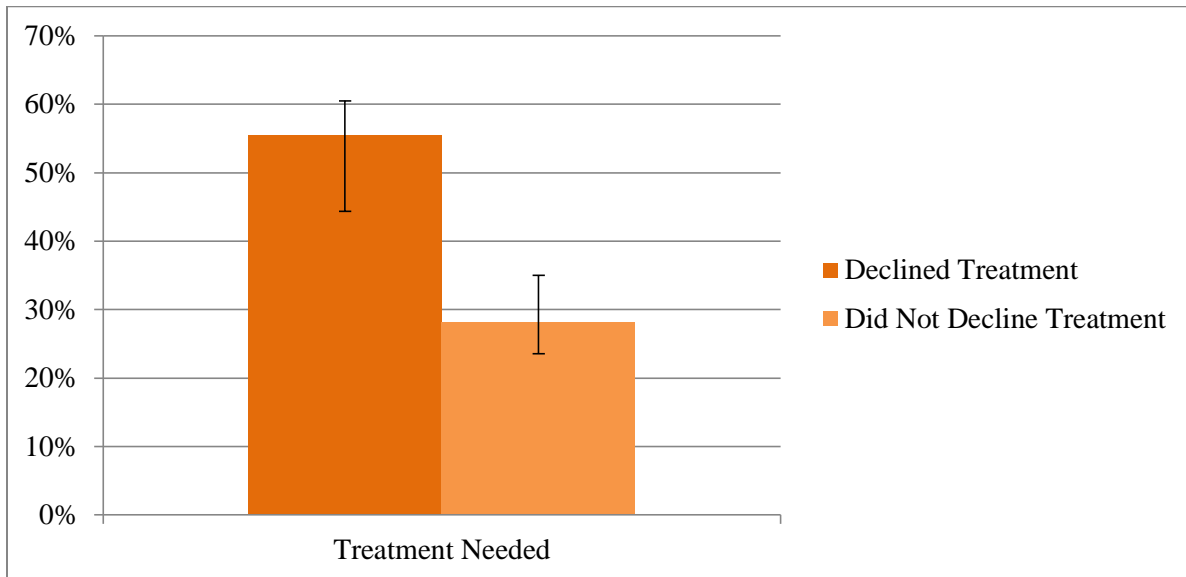


Figure 16: Proportion with multiple treatment needs among Canadians who reported declining recommended treatment in the last year due to cost

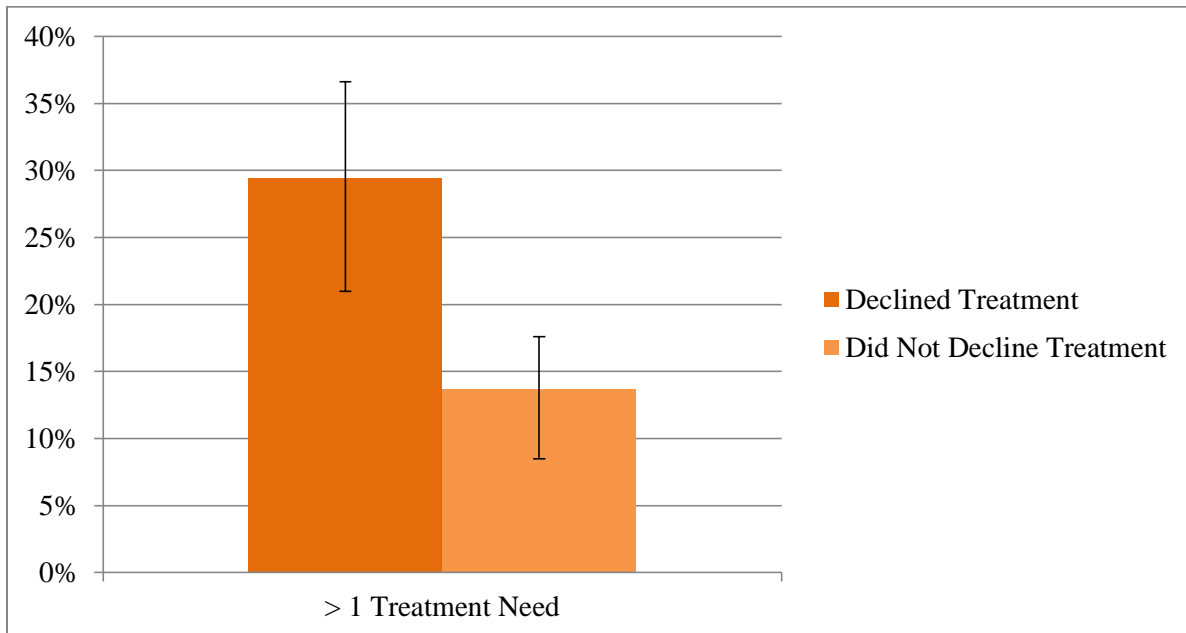


Table 17: Type of treatment needed by those who declined recommended dental treatment in the last year due to cost

	Declined Treatment Due to Cost (% , 95% CI)	Did Not Decline Treatment Due to Cost (% , 95% CI)
Prevention	21.1 (15.0, 28.9)	12.3 (9.0, 16.6)
Restorative	36.9 (30.0, 44.4)	17.2 (14.2, 20.6)
Surgery	15.9 (11.7, 21.3)	5.8 (4.1, 8.2)
Periodontic	8.0 (6.1, 10.4)	4.5 (3.0, 6.6)
Endodontic	6.0 (3.3, 10.7)	1.2 (0.7, 1.9)
Prosthodontic	15.7 (11.0, 21.9)	8.6 (6.6, 11.1)
Urgent *	6.7 (3.2, 13.6)	5.6 (2.8, 10.9)

*Not significant: $P > 0.05$

Similarly, there is a trend that those who declined treatment due to cost also had a higher prevalence of needing treatment (with the exception of urgent needs). Restorations were also needed most with 36.9 per cent (CI: 30.0, 44.4) of respondents requiring fillings, compared to only 17.2 per cent (CI: 14.2, 20.6) among their counterparts (Table 17).

3.2.4 Objective 4: To determine which factors predict reporting cost barriers to dental care

Logistic regression analyses were undertaken to evaluate which variables predict reporting cost barriers to dental care. Table 18 shows the adjusted odds ratio of individuals who avoided a dental professional in the last year due to cost. Individuals aged 20 to 39 were 2.46 times (CI: 1.18, 5.12, $P = 0.021$) more likely, and individuals aged 40 to 59 were 1.76 times (CI: 1.09, 2.83, $P = 0.025$) more likely to avoid, than those aged 6 to 19. In addition, females had significantly higher odds than men for avoiding a dental professional due to cost (OR 1.43, CI: 1.00, 2.05, $P = 0.048$).

Consistent with the literature, income and insurance were the dominant predictors in this model. After controlling for all other factors, those without any dental insurance coverage were 5.85 times (CI: 4.20, 8.15, P = 0.000) more likely to avoid compared to individuals with private dental insurance coverage. Further, respondents with the lowest level of income were 4.27 times (CI: 1.69, 10.74, P = 0.005) more likely to avoid and those with lower-middle incomes were 3.79 times (CI: 2.16, 6.67, P = 0.000) more likely to avoid compared to those with the highest income.

Having untreated decay was also predictive of avoiding due to cost (OR 1.12, CI: 1.02, 1.23, P = 0.021). Individuals who reported having fair to poor oral health were 3.09 times (CI: 2.11, 4.54, P = 0.000) more likely to avoid a dental professional due to cost compared to those that reported having good to excellent oral health.

Table 18: Logistic regression analysis for avoiding a dental professional in the past year due to cost

Variables	Adjusted Odds Ratio (95% CI)	P-value
Age		
6-19 (reference)		
20-39	2.46 (1.18,5.12)	0.021
40-59	1.76 (1.09,2.83)	0.025
60-19	0.71 (0.42,1.21)	0.183*
Sex		
Males (reference)		
Females	1.43 (1.00,2.05)	0.048
Immigrant Status		
Non-immigrant (reference)		
Immigrant	1.19 (0.75,1.88)	0.417*
Education		
> high school (reference)		
< high school	0.85 (0.54,1.34)	0.451*
Employment Status		
FT Employed (reference)		
PT Employed	0.80 (0.40,1.60)	0.495*
Unemployed	0.90 (0.59,1.36)	0.591*
Income		
Higher (reference)		

Upper Middle	1.82 (1.18,2.80)	0.011
Lower Middle	3.79 (2.16,6.67)	0.000
Lower	4.27 (1.69,10.74)	0.005
Insurance		
Private (reference)		
Public	0.42 (0.12,1.56)	0.175*
None	5.85 (4.20,8.15)	0.000
Oral Health		
D (decayed teeth)	1.12 (1.02,1.23)	0.021
M (missing teeth)	1.02 (0.97,1.08)	0.343*
Good to Excellent Self-Reported Oral Health (reference)		
Fair to Poor Self-Reported Oral Health	3.09 (2.11,4.54)	0.000

*Not significant: $P > 0.05$

Table 19 shows the adjusted odds ratio of individuals who declined recommended dental treatment in the last year due to cost. Individuals aged 20 to 39 were 1.85 times (CI: 1.00, 3.43, $P = 0.050$) more likely and individuals aged 40 to 59 were 1.83 times (CI: (1.03, 3.25, $P = 0.042$) more likely to decline recommended dental treatment compared to those aged 6 to 19. Furthermore, females had significantly higher odds than men for declining recommended treatment due to cost (OR 1.47, CI: 1.10, 1.97, $P = 0.015$).

In this model, self-reported oral health is the dominant predictor. Canadians who reported having fair to poor oral health were over 3 times (OR 3.04, CI: 2.34, 3.94, $P = 0.000$) more likely to decline recommended treatment compared to those that reported having good to excellent oral health.

Income and insurance were less dominant predictors in this model as compared with the previous one. Canadians without any dental insurance coverage were 2.35 times (CI: 1.62, 3.40, $P = 0.000$) more likely to decline recommended treatment due to cost compared to individuals with private dental insurance coverage. Further, respondents with the lowest level of income were 2.64 times (CI: 1.59, 4.38, $P = 0.001$) more likely to decline treatment due to cost compared to those with the highest income, and those with lower-middle income were 2.95 times (CI: 1.69, 5.15, $P = 0.001$) more likely to decline treatment due to cost compared to those with the highest income. In this model, Canadians in the upper-middle income category were also more likely

(OR 1.61, CI: 1.25, 2.08, P = 0.002) to report declining recommended treatment due to cost compared to the highest income category.

Having untreated decay was predictive of declining recommended dental treatment due to cost (OR 1.09, CI: 1.02, 1.17, P = 0.018).

Table 19: Logistic regression analysis for declining dental treatment in the past year due to cost

Variables	Adjusted Odds Ratio (95% CI)	P-value
Age		
6-19 (reference)		
20-39	1.85 (1.00,3.43)	0.050
40-59	1.83 (1.03,3.25)	0.042
60-79	1.41 (0.70,2.85)	0.305*
Sex		
Males (reference)		
Females	1.47 (1.10,1.97)	0.015
Immigrant Status		
Non-Immigrant (reference)		
Immigrant	1.15 (0.76,1.75)	0.479*
Education		
> high school (reference)		
< high school	0.63 (0.39,1.04)	0.068*
Employment Status		
FT Employed (reference)		
PT Employed	1.01 (0.52,1.97)	0.964*
Unemployed	0.83 (0.66,1.05)	0.104*
Income		
Higher (reference)		
Upper Middle	1.61 (1.25,2.08)	0.002
Lower Middle	2.95 (1.69,5.15)	0.001
Lower	2.64 (1.59,4.38)	0.001
Insurance		
Private (reference)		
Public	1.21 (0.49,2.97)	0.655*
None	2.35 (1.62,3.40)	0.000
Oral Health		

D (decayed teeth)	1.09 (1.02,1.17)	0.018
M (missing teeth)	1.04 (0.99,1.10)	0.140*
Good to Excellent Self-Reported Oral Health (reference)		
Fair to Poor Self-Reported Oral Health	3.04 (2.34,3.94)	0.000

*Not significant: $P > 0.05$

Chapter 4: Discussion

This study is the first to examine cost barriers to dental care among Canadians using recent and nationally representative normative data. Results from this study met four objectives:

- ❖ The first aimed to determine the socio-economic and demographic characteristics of Canadians reporting cost barriers to dental care, and it was found that adults aged 20 to 59, individuals of lower and lower-middle income categories and those without dental insurance reported cost barriers to care most often.
- ❖ The second objective was to examine the oral health status of Canadians reporting cost barriers to care, and it was discovered that individuals reporting cost barriers had more untreated decay, missing teeth, and reported having poor oral health and oral pain often.
- ❖ The third objective was to assess the clinically determined treatment needs of Canadians reporting cost barriers. It was found that individuals reporting cost barriers had a higher prevalence of needing treatment, had more treatment needs and required restorations most often.
- ❖ The final objective was to determine the factors that predicted reporting cost barriers to dental care. Findings show that having no insurance, lower income, and reporting fair to poor oral health were the greatest predictors of reporting cost barriers to care.

4.1 Key Findings

4.1.1 Dental Insurance

This study confirms the fundamental role that insurance plays in facilitating the utilization of and access to dental care by removing financial barriers. In a privately financed dental care system like Canada's, dental insurance mitigates the potential barrier of upfront costs, meaning that the insured report cost barriers much less often than the uninsured. This study showed that, after controlling for other factors, including income, uninsured Canadians were almost six times more likely to avoid the dentist due to cost compared to their insured counterparts.

It was also demonstrated that financial factors, especially insurance, appeared to operate through a reduction in the price paid at point of service. To illustrate, results from the logistic regression

analyses confirmed a previous finding in the literature, namely that insurance had a greater influence on the probability of receiving dental care, but once in the door, income and insurance were less dominant predictors. Oral health status, it appears, had a greater impact on whether treatment was declined because of cost. In other words, income and insurance influenced the decision to receive *any* care and oral health status influenced the *amount* or *type* of services received. Again, these findings were consistent with Canadian research conducted by Bhatti *et al.* in 2007 (Bhatti, Rana, & Grootendorst, 2007).

Another important finding of this study involves the role of employment status and insurance on the affordability of dental care. Understanding that many Canadians rely heavily on employment-based dental insurance in order to access dental care, one would expect employment status to have an influence on access to care. This study, however, confirmed what other studies have found (Manski & Magder, 1998; Millar & Locker, 1999; Sadeghi, 2012): the effects of employment status on facilitating access is shown to be only due to the increasing the odds of having dental insurance coverage. To illustrate, after controlling for socio-demographic and economic factors, including dental insurance itself, unemployed individuals did not show higher rates of reporting cost barriers to care. Tables 8 and 9 demonstrate how important insurance really is: over 40 per cent and 35 per cent of individuals without insurance reported avoiding a dental professional due to cost compared to only about ten per cent of insured individuals in each employment category. Similarly, employment status showed no real influence on whether one reported declining recommended treatment due to cost. Again, insurance status was shown to be the main factor, whereby nearly 30 per cent of uninsured Canadians in each employment category reported declining treatment due to cost compared to only about 13 per cent of insured individuals in each employment category.

4.1.2 Income

Results from this study corroborate findings from previous research demonstrating that Canadians with lower incomes report cost barriers to dental care most often (Millar & Locker, 1999; Bhatti, Rana, & Grootendorst, 2007; Locker, Maggiras, & Quiñonez, 2011; Ramraj & Quiñonez, 2012). There is a clear income gradient with respect to reporting cost barriers to care—the number of people reporting cost barriers increases as household income decreases (see Figure 8). Regression analyses showed that Canadians with the lowest level of income were over

four times more likely to avoid dental care than those of the highest income group. In addition, individuals from lower-middle incomes were nearly four times more likely to avoid dental care compared to those with the highest incomes. Furthermore, lower and lower-middle income respondents were almost three times more likely to decline treatment due to cost compared to those with the highest incomes. Regression analyses demonstrated that even Canadians in the upper-middle income category were more likely to report declining recommended treatment due to cost compared to the highest income category. Essentially, upper-middle income earners were able to access a dental professional, but once they were in the door they were unable to afford all of the treatment recommended by their dental provider. Surprisingly, nearly ten per cent of Canadians in the highest income category also reported financial barriers to care.

These findings support the work of Sadeghi (Sadeghi, 2012), whose research examined middle income Canadians and access to dental care, and suggested that access issues are no longer just a problem for the lowest income groups, but might be ascending to involve middle income earners as well. Her research found that middle income Canadians who reported financial barriers to dental care nearly tripled from 1996 to 2009 (Sadeghi, 2012). She notes: “Although most middle-income Canadians still enjoy good access to dental care, compared to the past their access conditions are now much closer to low-income earners” (Sadeghi, 2012, p. 82).

4.1.3 Consequences of Cost Barriers to Dental Care

Reporting avoidance in seeking dental care because of cost represents a barrier that is present prior to seeking care, while foregoing recommended dental treatment due to cost occurs when, after making an initial visit, cost prevents one from proceeding with recommended care. Both of these circumstances suggest the potential of progressive damage to the teeth or the worsening of oral health precipitated by untreated disease due to financial barriers. For example, in terms of self-reported oral health, results demonstrated that a far greater proportion of Canadians who rated their oral health fair to poor experienced cost barriers to care. In addition, the majority of respondents reporting having oral pain sometimes or often also reported experiencing financial barriers. These results corroborate the work conducted by Bhatti *et al.* (Bhatti, Rana, & Grootendorst, 2007), Locker *et al.* (Locker, Maggiriias, & Quiñonez, 2011), and Ramraj and Quiñonez (Ramraj & Quiñonez, 2012), who showed that those with poorer self-reported oral

health were less likely to receive dental care and more likely to have a cost-prohibitive dental care needs.

Importantly though, while self-reported data are the most convenient and readily attained method for assessing oral health outcome information, it has been shown to be heavily influenced by one's culture, personal beliefs, and other social factors, such as age, education and income (Liu, et al., 2010). Additionally, research suggests that patients are not always accurate at assessing their own oral health status and dental treatment needs (Ramraj, 2012). As such, this study makes an important contribution by highlighting the oral health status of Canadians who reported experiencing financial barriers to dental care by examining their clinical oral health status and needs. With this information, this study demonstrated that financial barriers to care have the potential to impact upon oral health, whereby individuals who reported cost barriers to care had more treatment needs, more decay and more missing teeth. In fact, having untreated decay was found to be predictive of reporting financial barriers to care, suggesting the likelihood of negatively progressing dental conditions related to the inability to secure treatment based on financial barriers to care.

4.2 International Comparisons

Results from this study show that approximately one in five Canadians report cost barriers to dental care. To put this in perspective, comparisons can be made to other OECD countries with respect to the affordability of dental care and cost barrier issues. Australia appears to have conducted the most research to date relating to cost barriers to dental care. The Australian National Survey of Adult Oral Health 2004–06 (Slade, Spencer, & Roberts-Thomson, 2007) asked *'During the last 12 months, have you avoided or delayed visiting a dental professional because of the cost?'* and found that 30.0 per cent of the Australian population aged 15 years or more answered 'yes'. The authors also found more than double the amount of people reporting delaying or avoiding receipt of dental care due to cost did not have dental insurance (40.0% vs. 19.1%). Furthermore, the survey asked *'Has the cost prevented you from having any dental treatment that was recommended during the last 2 years?'* One fifth (20.6%) of the Australian population aged 15 years or more responded 'yes'. People without dental insurance were 1.7 times more likely than people with dental insurance to have foregone recommended dental treatment due to cost (26.8% vs. 15.4%).

A recent publication (Harford, Ellershaw, & Spencer, 2011) examined trends in access to dental care among Australian adults using data from the 1994, 1996, 1999, 2002, 2005 and 2008 National Dental Telephone Interview Surveys (NDTIS). It was found that the proportion of individuals who reported that they had avoided or delayed visiting a dentist in the previous 12 months due to cost increased from 27.1 per cent in 1994 to 34.3 per cent in 2008. With the exception of a decrease in 2002, the proportion of adults aged 18 years or older who reported that cost had prevented them from receiving recommended dental treatment remained constant at approximately 20 per cent throughout the period. Further, the proportion of adults who reported that dental visits in the previous 12 months were a large financial burden increased from 10.1 per cent in 1994 to 13.5 per cent in 2008. Finally, a survey conducted in 2008 on Australian adults aged 18 years and older (Australian Research Centre for Population Oral Health, The University of Adelaide, South Australia, 2012) found that cost was the number one cited reason (45.4%) for people avoiding going to the dentist. Additionally, approximately 65 per cent of all respondents stated that they were at least somewhat anxious about the cost associated with making a dental visit.

In the United Kingdom, research using the 2009 Adult Dental Health Survey (Nuttall, Freeman, Beavan-Seymour, & Hill, 2011) also examined cost barriers to dental care. This survey asked *'In the past, have you had to delay dental care or treatment because of the cost?'* and *'Has the cost of dental care affected the type of dental care/treatment you have received in the past?'* Results show that almost one-fifth (19%) of respondents delayed dental treatment due to cost and just over a quarter of adults (26%) said that the type of dental treatment they opted to have in the past had been affected by the cost of the treatment.

In the United States, only one study was found that used data from the 1989 National Health Interview Survey (NHIS) (Bloom, Gift, & Jack, 1992), asking *'What are the reasons you have not visited the dentist in over 12 months/never gone to the dentist?'* Results showed that cost was the second main reason for not visiting a dentist in the past year (13.7%), especially among those with lower incomes and no dental insurance. Approximately 20 per cent of those with family incomes less than \$10,000, compared to 6.8 per cent of those with incomes of \$35,000 or more, gave cost as a reason for not visiting a dentist in the past year. Also, 18.5 per cent of those

without dental insurance, compared with 7.2 per cent of those with coverage, reported cost as a reason.

The financing and delivery of Canada's dental care system does differ from the aforementioned countries and the price of dental care services vary from country to country. It is, therefore, difficult to make direct comparisons. Despite this, findings from international research suggest that Canada is neither the worst nor the best in terms of financial barriers to care, falling somewhere in the middle compared to reports from other OECD countries.

4.3 Policy Recommendations

4.3.1 Public Programming

With the results obtained from this study, policy makers now have empirical evidence to support their decision-making. Given present political and economic environments, arguing for increased public funding for dental care is likely unrealistic, thus it may be more strategic to argue for better, more efficient use of our existing resources (an issue which is reviewed below). That said, current public dental care programming in Canada focuses primarily on children and welfare recipients. Low-income programs also have strict income eligibility criteria, which makes it difficult for those just above the eligibility cut-off to receive care. The results from this study provide information by which to assess whether current programs match the treatment needs of Canadians experiencing access issues and demonstrates that there is a need to broaden eligibility criteria for certain public programs. While the challenges of the working poor are now well established (Muirhead, Quiñonez, Figueiredo, & Locker, 2009; Quiñonez & Figueiredo, 2010), middle-income earners, for example, have not been on the policy agenda for public programming to this point. This study's results support previous research (Sadeghi, 2012) indicating that middle income Canadians are now experiencing accessibility issues similar to what has been seen historically by the lowest income earners.

Another dimension to targeted approaches for those in financial need involves the contribution of allied dental health providers in the public health sector, particularly dental hygienists. The growth of dental hygiene numbers and the introduction of independent dental hygiene practice in

several provinces, further present new avenues by which to target more affordable services to specific populations (Quiñonez C. , Grootendorst, Sherret, Azarpazhooh, & Locker, 2006).

4.3.2 Enhancing Affordability through Insurance

These results emphasize the premiere importance of insurance on the ability to afford and access dental care. It has been suggested that the quality of dental insurance plans has lessened as a result of cost control policies imposed by third-party payers, which have promoted financial barriers to accessing dental care (Quiñonez & Grootendorst, 2011; Sadeghi, 2012). Results from this study only support this idea, and point to the need for future studies to investigate the *quality* of dental insurance plans and how they influence the ability of Canadians to afford and access care. Gathering a more detailed, qualitative analysis of employment-based dental insurance issues, particularly for vulnerable groups, is especially important.

Further, the need for policies aimed at controlling the costs of dental services, and/or increasing their affordability for vulnerable groups is evident. The Canadian dental care system can be cost-prohibitive resulting in limited access to dental care for those who lack the resources to afford it. This study has clearly shown that dental insurance acts to diminish the potential barrier of upfront costs. Thus, as mentioned, there is an arguable need to improve the quality of dental insurance coverage, or to ensure that cost-sharing amounts are kept low and that important services are not excluded from insurance plans. To illustrate, over 25 years ago, the RAND Health Insurance Experiment, a large-scale study of health care costs, utilization and outcomes in the United States (Bailit, et al., 1985) confirmed the importance of affordable dental insurance to oral health. Investigators found that reducing cost-sharing for dental services actually improved oral health, especially for subgroups of the population with the poorest oral health outcomes.

The point can also be made again about making better use of existing funds simply by taking a more evidence-based approach in deciding which services ought to be covered. Leake (Leake, 2006) suggests that many Canadians are provided services, especially diagnostic and preventive services, for which the cost-effectiveness is uncertain. Employers and insurance companies, as well as governments, must focus on funding services that have a strong evidence base supporting their effectiveness and cost-effectiveness.

In public programs specifically, after nearly three decades of economic challenges and professional pressures, Canadian governments have shifted from investing largely in public health programs delivered in public clinics, to social assistance-type programs delivered in private dental offices. As a consequence, dental professionals have increasingly influenced what services public programs finance. As such, governments have added services to the public fee schedules that demonstrate limited evidence for their cost-effectiveness, but have proved beneficial for providers (Quiñonez, 2012). The biggest example of this is the delivery of composite resin restorations in public programs. From the perspective of public policy, funding of composite resins is problematic since they have been shown to be less effective among populations with high levels of disease (Bernardo, et al., 2007) and consequently are not necessarily the appropriate choice for publicly insured populations. This is a very difficult issue, but one that deserves attention, as it has major implications for the sustainability of dental public programming.

Next, governments need to reconsider current tax policy. Under current tax law, Canadians (except in Quebec) do not pay income tax on health care insurance premiums paid by employers. In essence, this legislation permits more affluent, insured Canadians to receive tax-free health care (including dental care) and requires all, including the poor, to pay for their care with after-tax dollars. Even more socially challenging is that all Canadians, including the poor, pay additional tax in the form of harmonized sales tax, gasoline taxes, income taxes, etc. to make up for taxes that are not collected on these health insurance premiums. In his criticism of this approach to taxation, Leake expresses, “as our tax system becomes less progressive, lower-income, non-insured people contribute more and more to finance care for the insured” (Leake, 2006, p. 317d). Essentially, health care policy makers need to recognize that, in the extreme, it can be argued that Canada has laws that allow those in financial need to pay higher taxes to subsidize tax-free dental care (and other health benefits) for wealthier, insured Canadians.

As mentioned in Chapter 1, the cost of health benefit plans to the employee has risen and the overall availability of employment-based dental insurance has declined. In response, employees have started to decline health benefits due to the increases in costs of being enrolled in such plans; with low and middle-income earners being most affected (Quiñonez & Grootendorst, 2011). It is evident that policies aimed at increasing the enrolment of workers in employment-

based dental insurance plans are necessary to improve the affordability of dental care. It is important for governments to consider policies that attempt to control the costs of health care plans and contribute to plans for vulnerable populations. These policies may, for example, include mandating, through legislation, the presence of health care benefits in all employment-employee contracts.

A logical presumption is that the removal of financial barriers, through the provision of universal dental insurance, would increase utilization rates and reduce disparities in oral health needs. However, the literature demonstrates that simply enhancing affordability of care does not necessarily remove all access issues and treatment needs. Data from Canada and other countries (Zammit, 1993; Ismail & Sohn, 2001; Lave, Keane, Lin, & Ricci, 2002; Mofidi, Slifkin, Freeman, & Silberman, 2002; Hughes, Duderstadt, Soobader, & Newacheck, 2005) have demonstrated that universal dental insurance programs can improve utilization and dental outcomes, yet it does not eliminate the relative inequalities in oral health between low and high socioeconomic groups.

To further illustrate, findings from the oral health component of the CHMS (Health Canada, 2010) demonstrate that even those with dental insurance and higher incomes do not regularly visit the dentist and also have untreated dental conditions. Thus, while the removal of financial barriers for dental services may result in an increase in the uptake of dental treatment, a proportion of the insured population will not visit the dentist regularly. So while 55 per cent of Canadians reporting avoiding and declining recommended dental treatment due to cost have unmet dental needs, the effects of enhanced dental insurance coverage on the dental treatment needs of these individuals is unknown.

Importantly, discrepancies in dental care utilization, even after the removal of financial barriers, result from the complex interplay between the many dimensions of access. As was mentioned earlier, access is a combination of affordability, availability, accessibility, accommodation, and acceptability to care; therefore, there is a need to consider a multifactorial approach that addresses family and community determinants of oral health, and not just the issue of affordability.

4.3.3 Surveillance of Oral Health Data

Canadians lack an ongoing surveillance system to measure the oral health status of the population, cost barriers to care, oral health inequities, and other trends. In fact, the CHMS is the first nationally representative study of the two most prevalent oral diseases, dental caries and periodontal disease, since the Nutrition Canada Survey of the early 1970s. Without this information, the capacity to develop dental health policy based on evidence and best practices is limited. Going forward, it is important that oral health research be supported, particularly to avoid a future gap in clinical oral health data. Federal and provincial/territorial governments must make a commitment to invest in oral health data collection on a regular basis, including information pertaining to access issues and clinical oral health assessments of all Canadians, including those excluded from the CHMS.

4.4 Limitations

There are several limitations of this study. First and foremost, this is a secondary data analysis of a national survey. As such, errors made in the original survey methods cannot be distinguished and it is not possible to differentiate interviewing, or data entry errors. Second, since the CHMS is a cross-sectional survey, only associations can be assessed. This study design does not permit causal inferences since the measurements are made at a single point in time, thereby preventing the ability to establish a temporal relationship between the independent and dependent variables. Also, the CHMS excluded individuals living on First Nations reserves or Crown lands, residents of institutions, full-time members of the Canadian Forces and residents of certain remote regions, which weakens the generalizability of the results and may underestimate the findings. Further, certain variables, such as those related to periodontal status (i.e. clinical attachment loss and probing depths), could not be evaluated in this study due to rules related to Statistics Canada's disclosure risk policy. This data could not be released due to low frequency cell counts. DMFT data and treatment needs were used instead to assess the oral disease state of adults. Next, the dependent variables and some independent variables are self-reported measures, which introduce recall bias and may not be as accurate as observed measures. Further, the dependent variables and utilization determinants are limited in breadth and detail. For example, information about the scope or type of dental insurance coverage for dental services was not collected and details pertaining to the type and actual cost of the treatment declined were not collected. Lastly, within

the confines of the data collected, it is not possible to understand *what* treatments were considered unaffordable. This is important information to know, particularly from a public health perspective, where the inability to afford basic restorative services is much different than not being able to afford orthodontic services, for example.

Chapter 5: Conclusion

Findings from this study indicate that approximately one in five Canadians experience financial barriers to dental care. This study confirms that these individuals are from lower and lower-middle income groups and do not have dental insurance. It highlights the reality that access issues are no longer just a problem for the lowest income groups, but involve middle-income earners as well. Being the first of its kind in the Canadian dental care context, this study makes an important contribution in highlighting the oral health of Canadians who report financial barriers to dental care by examining their normative clinical status and needs. This study demonstrates that financial barriers to care may impact oral health, establishing that Canadians who report cost barriers to dental care have more dental treatment needs, more dental decay and more missing teeth. This substantiates the potential likelihood of progressive dental problems caused by an inability to treat existing conditions due to financial barriers to care.

Results from this study provide information by which to assess whether current programs are meeting the needs of vulnerable populations in Canada. It has demonstrated that there is a need to broaden eligibility criteria for certain public programs, particularly for middle income Canadians who are now experiencing accessibility issues similar to what has been seen in the past by the lowest income earners. It is possible that, through better use of existing resources, programs can be expanded to meet what appears to be a growing public need.

This study also highlights the importance of insurance on the ability to afford and access dental care and emphasizes the need to improve the quality of dental insurance plans. In addition, a change in tax legislation should be considered, specifically implementing tax laws that do not favour affluent insured Canadians, but rather, ensures dental insurance is more affordable for those experiencing cost barriers to care. Governments must establish policies to control the costs of health care plans for vulnerable populations by mandating, through legislation, the presence of health care benefits.

Overall, this study provides valuable baseline information for future studies to assess whether financial barriers to dental care are getting better or worse for Canadians. Going forward, governments must make a commitment to invest in ongoing surveillance systems to ensure oral

health data collection is conducted on a regular basis and collects information relating to access issues and clinical oral health assessments of all Canadians. It is essential that the appropriate data is collected, particularly on the issues of affordability to properly understand the scope and comprehensiveness of dental insurance plans and to determine what types of services certain sectors of the population deem unaffordable.

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Appendices

Appendix A: Questions from the Oral Health Component of the Canadian Health Measures Survey Cycle 1 Household Questionnaire

OHM_Q11 In general, would you say the health of your mouth is:

- 1 ... excellent?
- 2 ... very good?
- 3 ... good?
- 4 ... fair?
- 5 ... poor?

OHM_Q12 How satisfied are you with the appearance of your teeth and/or dentures?

- 1 Very satisfied
- 2 Satisfied
- 3 Neither satisfied nor dissatisfied
- 4 Dissatisfied
- 5 Very dissatisfied

OHM_Q21 In the past 12 months, that is, from [date one year ago] to yesterday, how often have you found it uncomfortable to eat any food because of problems with your mouth?

- 1 Often
- 2 Sometimes
- 3 Rarely
- 4 Never

All respondents

OHM_Q22 (In the past 12 months,) How often have you avoided eating particular foods because of problems with your mouth?

- 1 Often

2 Sometimes

3 Rarely

4 Never

OHM_Q23 In the past 12 months, how often have you had any other persistent or ongoing pain anywhere in your mouth?

1 Often

2 Sometimes

3 Rarely

4 Never

OHM_Q24 (In the past 12 months,) Have you taken time away from work, school or your normal activities for dental check-ups or treatments or because of problems with your mouth?

1 Yes

2 No (Go to OHM_Q31)

OHM_Q25 (In the past 12 months,) How many hours were you away from your normal activities?

(insert respondent answer between 0.5 and 95.5)

OHM_Q31 How often do you usually brush your teeth and/or dentures? (For example: twice a day, three times a week, once a month)

(insert respondent answer between 0 and 500)

OHM_Q32 How often do you usually floss your teeth?

(insert respondent answer between 0 and 500)

OHM_Q33 Do you usually see a dental professional:

1 ... more than once a year for check-ups or treatment?

2 ... about once a year for check-ups or treatment?

3 ... less than once a year for check-ups or treatment?

4 ... only for emergency care?

4 ... never?

OHM_Q34 When was the last time you saw a dental professional?

- 1 Less than 1 year ago
- 2 1 year to less than 2 years ago
- 3 2 years to less than 3 years ago
- 4 3 years to less than 4 years ago
- 5 4 years to less than 5 years ago
- 6 5 or more years ago

OHM_Q41 In the past 12 months, have you avoided going to a dental professional because of the cost of dental care?

- 1 Yes
- 2 No

OHM_Q42 (In the past 12 months,) Have you avoided having all the dental treatment that was recommended because of the cost?

- 1 Yes
- 2 No

OHM_Q43 Do you have insurance or a government program that covers all or part of your dental expenses?

- 1 Yes
- 2 No

OHM_Q44 Is it:

- 1 ... an employer-sponsored plan?
- 2 ... a provincial program for children or seniors?
- 3 ... a private plan?
- 4 ... a government program for social service (welfare) clients?
- 5 ... a government program for First Nations and Inuit?

Appendix B: Questions from the Oral Health Component of the Canadian Health Measures Survey Cycle 1 Clinic Questionnaire

OHQ_Q11 Do you think you have any untreated dental conditions?

1 Yes

2 No (Go to OHQ_Q21)

OHQ_Q12 What untreated dental condition(s) do you think you have?

1 Prevention

2 Fillings

3 Temporomandibular joint disorder (TMD)

4 Surgery

5 Periodontics

6 Esthetics

7 Endodontics

8 Orthodontics

9 Soft tissue

10 Prosthetics – partial or full denture

11 Prosthetics – implant, bridge or crown

12 Other – Specify (insert condition to a maximum of 80 characters)

OHQ_Q21 In the past month, that is, from [date last month] to yesterday, have you had a toothache?

1 Yes

2 No

OHQ_Q22 In the past month, have you had pain in your teeth when consuming hot or cold foods or drinks?

1 Yes

2 No

OHQ_Q23 In the past month, have you had:

... severe tooth or mouth pain at night?

1 Yes

2 No

OHQ_Q24 In the past month, have you had:

... pain in or around your jaw joints?

1 Yes

2 No

OHQ_Q25 In the past month, have you had:

... other pain in your mouth?

1 Yes

2 No

OHQ_Q26 In the past month, have you had bleeding gums when brushing your teeth?

1 Yes

2 No

OHQ_Q27 In the past month, have you had:

... persistent dry mouth?

1 Yes

2 No

OHQ_Q28 In the past month, have you had:

... persistent bad breath?

1 Yes

2 No