The Impact of Insurance on Dental and Physician Visits in Ontario

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Abstract

This paper is an empirical study of the influence of dental insurance and prescription insurance on the probability and number of dental and physician visits using the Canadian Community Health Survey, Cycle 3.1 (2005). My findings confirm that insurance matters, and can have a differential impact on different groups in society. Particularly, the effect can differ across the age and gender of individuals. I also investigate if the type of the insurance – government, employer or private – makes a difference on the probability of seeing a physician or dentist and on the frequency of visits. My findings suggest that government-sponsored insurance has a greater effect on the odds of physician visit in comparison to other types, while employer-sponsored insurance has stronger effect on the odds of a dental visit.

1. Introduction

Many studies are interested in analyzing the determinants of health care usage.[1] Typically, studies look either at the effect of insurance on the use of physician services or on the use of dental services. In Canada, visits to a physician are covered by universal public insurance, while visits to a dentist are not. In this sense, physician services are publicly financed while dentists are privately provided. This gives us the opportunity to look at the potential role played by insurance on the usage of public and private services. I may seem strange to think about insurance affecting publicly-funded services – but this

[1] For instance, Kosteniuk & D'Arcy, 2006; Millar & Locker, 1999; Godfried, Oosterbeek & Tulder, 2001; Nguyen & Hakkinen, 2004; Bendall & Asubonteng, 1995; Deri, 2005; Grytten & Holst, 1990; Bhatti & Grootendorst, 2006; Buchmueller, Couffinhal, Grignon & Perronnin, 2004; Sepehri, Simpson & Sarma, 2006; Sarma & Simpson, 2006; Sarma & Rempel, 2007. More details of relevant empirical papers are found in Table6.

may happen because while visits to physicians are covered by public insurance, other services arising from this visit may not be. In particularly, prescription drugs are not covered outside hospitals. Although Canada does not have the universal prescription drug coverage policy, government sponsored drug insurance plans, employer provided drug benefit plans and privately purchased prescription insurance policies play an important role. It is conceivable that private insurance may affect the use of publicly provided health services.

The main goal of this paper is to look at whether the type of insurance affects how individuals use health services. I look at how prescription insurance affects visits to family physicians, and how dental insurance affects visits to dentist. I look at the probability of visiting a physician or dentist over the year of the survey, as well as the frequency of visits over that year.

The paper is organized as follows. The next section describes the data set used in the paper, followed by a description of the sample and variables used. The paper then discusses the econometric models applied, and the discussion of the results. The final section concludes the paper.

2. Data Source

The data for this paper are taken from the Statistics Canada's Canadian Community Health Survey (CCHS), which is a nationally representative cross-sectional survey. This survey is conducted based on a two-year cycle and includes information about dental health care, such as dental service use, dental insurance, and oral health status. The CCHS Cycle 3.1, the third cycle, is a Public Use Microdata File collected between January 2005 and December 2005. The respondents are aged 12 years or over, covering approximately 98% of the Canadian population in 12 years or older. (CCHS Cycle 3.1

Public Use Microdata File User Guide, 2006). It applies telephone interviews by random digit dialing and self-administered questionnaires with a randomly chosen household member. The survey collects individuals and household level data, including information about demographic, socioeconomic, occupational and environmental characteristics. This survey describes individuals living in private households rather than those who are living in long-term care hospitals, facilities, aboriginal reserves and prisons (CCHS Cycle 3.1 Public Use Microdata File User Guide, 2006). The CCHS Cycle 3.1 is a sample of 128,700 respondents.

This survey represents a component of the Population Health Survey Program of Statistics Canada, which tries to furnish data on health issues in Canada. This paper uses the CCHS Cycle 3.1 because it is the most recent data and it asks detailed questions regarding type of insurance to the residents of Ontario. I thus focus on the respondents from Ontario (CCHS 3.1 Public Use Microdata File User Guide, 2006).

3. The Sample Size and Variable Description

The goal of this paper is to examine the influence of insurance, as well as other determinants, on the probability of seeing a dentist or family physician, and the frequency of visits within a year. I separate the data into two groups by age: one is from 25 to 64 years old, and the other is 65 years old and over. These age groups are analyzed separately because these two groups have a different level of insurance coverage. The sample is also disaggregated according to gender. Kosteniuk and D'Arcy, (2006) suggest that males and females behave differently when they seek dental care. Our data set is large enough to allow us to separate the sample by men and women.

The explanatory variables in this paper have been chosen based on the existing literature on health care utilization (see, for instance, Sarma and Simpson (2006)) and consistent

with microeconomic theory. Standard variables related to health care usage are insurance coverage, gender, marital status, age, education, income, working status and immigration status. For the dental analysis, we use dental insurance because dental services are privately offered. For physician usage analysis, we include the factor that denotes whether or not the individual has insurance for prescription drugs. The second factor that is not always taken into account in literature is health status. For the physician sector, we include self-reported health, and for the dental sector, we use the presence of oral problems.

I define two dummy variables for whether or not a patient visits a family physician or a general practitioner and a dentist. If he or she visits, the dummy variable equals one, otherwise it is zero. These variables are the dependent variables in the Probit equations, which examine the probability of whether to visit a dentist or physician. Also, we use a negative binomial count model to examine the factors which determine the number of visits in one year among the individuals who decided to visit a family physician or a general practitioner and dentist. Hence in this model, one can see how insurance and the other factors affect health care utilization choices– when the care is private (dental) and public (physicians).

We consider only the responses of people in Ontario since we only have data on the type of insurance coverage for people in this province. The CCHS cycle 3.1 did not ask the insurance questions in other provinces. The individual-level variables considered in this paper are the respondent's income, age, gender, marital status, education level, immigration, health status, or dental condition.

Income is characterized by four dummy variables, denoting whether household income is in the range of $15,000 to $29,000, $30,000 to $49,000, $50,000 to $ 79,000, and

$80,000 or more. I use household income in the range of $15,000 or less as the reference group. For the age group of 25 to 64 years, we include four dummy variables: one for those aged 25-34 (our reference group), another for those aged 35-44 years, one for those in the 45-54 age group, and lastly, a dummy variable for those aged 55-64. For the 65 years old and over sample, we include three dummy variables: those 65-74 (reference category), the 75-79 years old group, and those 80 years of age or older. Gender is characterized by a dummy variable, which equals to 1 if the individual is female, otherwise 0. Marital status is represented by two dummy variables, one which assumes a value of 1, if the respondent is married, otherwise 0; Wsd equals 1, if respondent is widow, separated, and divorced, otherwise 0, leaving single or never married as the reference group. Immigration status is represented by two dummy variables: one reflecting the fact that the immigrant has been in the country fewer than 10 years, and the other indicating if he or she has been in the country for 10 or more years. Native born individuals comprise the reference group.

Educated attainment is captured by four dummy variables: secondary school graduation, some-post-secondary schooling, post-secondary graduation, and leaving less than secondary school as the reference category. Working status is represented by a dummy variable which takes the value 1 if the individual is working in the paid labour market. Here, this variable equals to 1 if the respondent has a part-time or full-time job, 0 otherwise. Self-reported health status is characterized by four dummy variables representing whether the individual is in very good health, good health, fair or poor health, leaving excellent health as the reference group. The existence of dental problems is represented by a dummy variable which equals one if the respondent has a dental problem often or sometimes, otherwise it is 0. Like Godfried, Oosterbeek and Tulder (2001), we define the "dental problem" variable as including seven general oral problems: a) toothache; b) teeth sensitive to hot or cold; c) pain in or around jaw joints; d) pain in

mouth or face; e) bleeding gums; f) dry mouth; and g) bad breath.

Whether or not the individual has insurance which covers dental visits or insurance for prescription drugs may affect visits to the dentist and doctor. The type of insurance coverage also matters. In the data set used in this paper, the August 2006 CCHS, insurance coverage is disaggregated into three categories: privately purchased insurance, employer-provided insurance, and government insurance. I include dummy variables for the presence of insurance: I run regression analysis with one global variable for insurance, as well as regressions with insurance disaggregated into the three possible types.

All together, there are four sub-samples analyzed in this study: females aged 25-64, males aged 25-64, females aged 65 and over, and men aged 65 and older. Table 1 presents the definition of all the variables used here, while table 2 presents some summary statistics for the four sub-samples.

In table 2, the mean value for the dummy variable in the sample indicates the proportion of the sample with that characteristic. For example, in part (a) for age 25-64, the mean value of the variable "dental insurance" is 0.72. It means that 72% of individuals in this sub-sample have dental insurance. Furthermore, among these individuals, around 6% of the population has government-sponsored dental insurance; 62% of insured has employer-sponsored insurance for both genders; and 3% of the population has privately-financed insurance.

The mean value of the variable "prescription medications insurance", 0.77, means that around 77% of the population has this type of insurance, across both sexes. Among these people, 9% of the insurance is provided by the government, 64% by employers and 4% by private plans.

Part (b) of table 2 shows that 31% of the 65 and older population has dental insurance. About 6% of females and 7% for males have government-sponsored dental insurance; 21% of females and 26% of males in this group has employer-sponsored dental insurance; 4% of females and 5% of males in this group has privately-financed insurance.

The mean value of the variable prescription medications insurance indicates that 77% of the older population has prescription medication insurance across both sexes. Those who have government insurance include 47% of the female group and 43% of the male group. About 48% of females and 43% of males have government-provided insurance, and 5% of females and 7% of males are insured by private plans.

4. Econometric Model Section

I employed the Probit regression model and negative binomial count regression model in this analysis. Theoretically, the negative binomial count model is better than the usual Poisson model in our analysis, because the negative binomial model relaxes the conditional variances of the disturbance term equal to the conditional mean. (e.g. Cameron and Trivedi (1998))

I use two types of regression models to analyze the problem (the first type of equation is called an incidence model; the second type is called a count model): one is the Probit model, which reflects the patient decision of whether to use the physician or dental services over a certain interval of time; the other is negative binomial count regression model, which processes the number of visits to the physician or dentist during the last 12 months. The reason to choose negative binomial count regression model is that it allows for cross-sectional heterogeneity in the count variable by introducing an unobserved individual effect in the conditional mean function (e.g. Cameron and Trivedi (1998)). A

negative binomial count model is the appropriate econometric framework to model the number of visits, although previous studies such as Bhatti et al. (2006) employ the linear regression model. In this paper, I estimated both the Probit and the negative binomial count models using STATA version 7.

I conduct a Probit and negative binomial analysis on the four sub-samples previously discussed, using the independent variables just described. I also execute all of the analysis including one dummy variable representing the presence of insurance coverage. Then I estimate all of the regressions with the three types of insurance coverage.

Since this study is restricted to the province of Ontario, we cannot include variables that vary only across provinces. For instance, we cannot include the influence of the dentist-to-population ratio by province, as used in Bhatti et al. (2006) and Grytten et al. (1990). They conclude that individuals who live in Ontario are more likely to visit a dentist in comparison to those who live in Newfoundland, because the dentist-to-population ratio is higher in Ontario. Similarly, those who live in regions with low dentist-to-population ratio will use less dental care than the average level. For example, individuals who live in Newfoundland, Saskatchewan and New Brunswick receive fewer opportunities to use dental care than people who reside in Ontario and British Columbia (e.g. Bhatti et al., (2006)).

There are some issues to be discussed before turning to the regression results for analysis. Some positive correlations exist between some variables. For instance, if individuals have higher income, their teeth will be healthier. Individuals with higher income use dental services more often because dental care is a normal good. However, it is also the case that individuals with healthier teeth will use dental services less often. Another difficulty of including the oral health variable in the model is that oral health might be endogenous,

because oral health may be determined by the dentist visit frequency. If some respondents care about their oral health more, they will visit the dentist more often. As a result, he or she will have healthier teeth.

The standard model to use when looking at the decision to use a health service is the Probit procedure (e.g., Meer and Rosen (2004)). Here, I use the same article framework to look at the relation between health insurance and the utilization of health care services. I can express this model as:

$$\Pr ob(Y=1) = \Phi[\alpha_0 + \alpha_1(Ins) + \alpha_2(X) + \varepsilon].$$

Two Probit models are estimated. In the first model, the left-hand side variable is the probability of a dental visit, while the second looks at the probability of a physician visit. On the right hand side, α_0 represents the constant term, $\alpha_1(Ins)$ expresses the effect of insurance, and, $\alpha_2(X)$ expresses the effect from other variables related to the utilization of health care services, and ε is the error term. Φ is the cumulative normal distribution (e.g. Meer and Rosen (2004)).

For the negative binomial count model, we can describe the model in the following way:

$$f(Z) = \Theta[\beta_0 + \beta_1(Ins) + \beta_2(X) + \upsilon],$$

where, Z is the number of dental or physician visits, X is the vector of exogenous covariates which affect the frequency of visits, υ is the error term, and the function Θ is the negative binomial distribution function.

5. Results

The main focus of this paper is to examine the extent to which insurance affects health care utilization. In particular, we are interested in whether it has a different impact on the

utilization of services provided when health care is privately funded, as opposed to when it is (mostly) publicly funded. Visits to the dentist reflect the former situation while visits to physicians reflect the latter.

Tables 4.1-4.4 and 5.1-5.4 present the estimated coefficients for the Probit and negative binomial count models for the four sub-samples under investigation. Every model is estimated twice: the first specification includes a single dummy variable for the presence of insurance, while the second includes three variables denoting the type of insurance held by the individual (employer-based, private, or government). Table 3 uses information from these tables to examine the effects arising from the insurance variables that were included in the analysis. We begin by focusing on these effects.

The first point to note is that the estimated effects across the probability and frequency of visit measures are all positive and statistically significant, except for older males in the physician model. Probability values are also presented in the table. Normally, we consider an estimated coefficient to be statistically significant if $p \leq 0.05$.

How does insurance affect on the decision and frequency of visit to a physician or dentist during last 12 months? To address this question, we look at the impact of insurance on a reference individual who is female or male, with insurance, married, aged 45-54, with post-secondary graduation, living in a household with income in the $50,000-$79,000 range, he or she is employed and a native-born Canadian. Table 3 reports the predicted probabilities of visiting a physician and visiting a dentist for the four sub-samples under consideration. We now turn to an examination of physician visits first, followed by dental visits.

5.1 Impact of Insurance on Public Sector: Physician Visits and Frequency

From table 3a we see that the predicted probabilities of visiting a physician for males and females in the under 65 years of age group (hereafter referred to simply as males and females), and senior males and females are 0.756, 0.866, 0.869 and 0.879, respectively. It is interesting to note that females tend to be more likely to visit a doctor more often than males, ceteris paribus, but that the difference in this behaviour seems to diminish with age. Older people are more likely to see a doctor in comparison to younger people, which makes a lot of sense.

The estimated marginal effects generated from the Probit model (from tables 4.1-4.4) are also presented in table 3. We see from table 3a that the probability of visiting a physician increases by a factor of 0.076 (or 10%) for males, by a factor of 0.058 (or 6%) for females, by a factor of 0.03 (3%) for older males, and by a factor of 0.056 (6%) for older females as a result of having prescription insurance.[2]

All of these estimates suggest that individuals with prescription insurance are more likely to visit a physician relative to those who do not. This result is consistent with results of the paper of Sepehri, Simpson and Sarma (2006) and Buchmueller et al. (2004)[3], which also finds that the estimated coefficients of insurance dummies are positive and statistically significant – in other words that the presence of insurance increases the odds of utilizing health care services.

Before looking at how insurance affects the frequency of visits, I turn to an examination of the effects arising from the three different types of insurance providers. One can get a sense of which kind of insurance is affecting the utilization of health services in pubic sector by examining the effects of pubic-financed, employer-financed and

[2] The percentages are calculated as follows: 0.076/0.756*100, 0.058/0.866*100, 0.027/0.869*100, 0.056/0.879*100.

[3] This study of Buchmueller et al (2004) is based on France.

private-financed insurance schemes. Tables 3 b, c, and d, present the results for these insurance types. We see that the effect of government-sponsored insurance has a statistically significant impact on visits for all but senior males. As expected, the effect of employer-sponsored insurance is statistically significant for the working age group 25-64, but not for seniors. Finally, private-plan insurance affects the probability that females visit doctors, but not males. We see from these tables that, for young males having government-sponsored insurance increases the odds of a physician visit by a factor of 0.083 (11%), compared to a factor of 0.075 (10%) and 0.048 (6%) for employer- and private-financed insurance, respectively; for senior males, having public insurance increases the odds of visits by a factor of 0.037 (4%), compared to 0.006 (0.7%) and 0.022 (3%) for employer- and private-financed insurance.

In terms of the frequency of visits, table 3 provides the predicted number of visits in the sample year based on the results from the negative binomial estimations. The NB procedure indicates that having insurance increases the number of visit by a factor of 0.360 (17%) for males, 0.485 (17%) for females, 0.171 (6%) for older males and 0.326 (11%) for older females compared to having no insurance. These figures are considerably higher than those arising from the Probit model. This means that if the individual has prescription insurance he or she is not only more likely to visit a doctor in the sample year, but he or she is even more likely to visit the doctor more frequently in that year, relative to those without insurance.

The type of insurance matters a lot in terms of its impact on the frequency of physician visits. From tables 3b-3d we see that males in the 25-64 age group will increase the number of visits by 53% if they have public insurance, compared to 29% for females in the same age group. By far, the impact of publicly-provided prescription insurance is much higher on the number of visits in comparison to the other two types of insurance.

This result may partly be explained by the type of people who have access to public insurance, and thus may be endogenous (therefore, I am dealing with a selected sample). For instance, people with health problems who cannot work may find themselves on welfare and hence eligible for public insurance: so it is not so much the presence of insurance that matters than the fact that they are sick.

Employer-provided insurance has a significant impact on the number of doctor visits as well. Working-aged men (women) will visit their family physicians 14% (16%) more times relative to those with no insurance. Private insurance has a slightly larger impact on visits. Privately purchased health insurance may be subject to adverse selection, causing endogeneity bias because those who are expected use more uninsured services are likely to purchase such policies.

Overall, we can see clearly that the presence of prescription insurance has a positive impact on the probability that an individual visits a doctor and on the number of visits undertaken. One of the implications of this result is that individuals without such insurance will tend to see physicians relatively less. Who does not have prescription insurance? One group which is unlikely to have this insurance is the "working poor" – those individuals who work in jobs paying low wages and getting few benefits. These people are unlikely to meet the criteria for government prescription assistance (given to those on welfare or with very low incomes). This point is discussed further in the conclusions.

5.2 Impact of Insurance on Private Sector: Dental Visit and Frequency

Tables 3a-d also indicate the predicted probability of visiting a dentist and the predicted frequency of visits for the reference group. Once again, we can look at the impact of having dental insurance on these predictions. We expect that dental insurance will have a

much larger impact on dental visits and the frequency in comparison to physician visits and frequency because dental services are fully privately funded, whereas physician visits are publicly funded (whereas prescriptions are not).In the dental sector, having dental insurance increases the probability of a visit by a factor of 0.236 (32%) for males in the 25-64 range, 0.210 (26%) for females, 0.162 (20%) for older males, and 0.124 (14%) for older females.

Dental insurance is almost always financed by the employer or private sector, only 6% of individuals are covered by government plans. From tables 3 b-d we see that employer-provided insurance affects the likelihood of a dental visit by a factor of 0.243 (33%) and 0.210 (26%) for young females and males, respectively. Interestingly, employer insurance still has a strong impact on retired individuals: 21% on males and 15% on females. This result can be explained by the fact that many employee insurance plans extend benefits to their retired employees. The impact of dental insurance on the probability of a dental visit is higher for the working-aged groups than for the older groups. When older people have to visit the dentist, they appear to be less motivated by insurance considerations, than by other factors, ceteris paribus. It is also interesting to note that males appear to be more responsive to the presence of dental insurance than females.

The results from the negative binomial count models tell us how insurance affects the frequency of dental visits for our four sub-groups. The presence of insurance has a statistically significant impact on the number of dental visits undertaken by all groups in the sample period. It increases the number of visits by a factor of 0.591 (40%) for men in the 25-64 age group, 0.639 (39%) for women, 0.597 (31%) for older men and 0.538 (29%) for older women. Once again, we see that the number of dental visits taken by working-aged individuals is more responsive to the presence of insurance than is the case

for the older groups. Men and women appear to behave similarly in the presence of insurance for all but the publicly-insured group.

In my paper, we find that dental insurance has a larger relative effect on the number of visits undertaken in the sample period rather than on the probability of visiting a dentist. This result contrasts with Bhatti et al. (2006) and Bendall et al. (1995)[4], who find that the dental insurance affects the decision to visit a dentist but not the frequency of visits.

The results of this paper indicate that individuals with dental-insurance covered by a employer-sponsored plan or a private plan are more likely to visit a dentist and use more dental services than those with public dental insurance. This result is not very surprising in the sense that public dental coverage is typically provided to poor families and covers basic services. Employer-financed insurance plans may cover more services, covering more dental therapies and prevention than the public plan. (Unfortunately, the data set does not provide details on coverage so we cannot test this proposition). Furthermore, individuals who are employed in positions that provide employer insurance plans may be better educated and thus have more health knowledge in comparison to others.

5.3 Comparing the Impacts of Insurance in Pubic versus Private Sectors

My results accord with expectations: the presence of dental insurance has a much larger impact on the probability of seeing a dentist and the frequency of such visits, in comparison to the impact of the presence of prescription insurance on physician visits. The effect of dental insurance on the use of dental services is statistically significant for all groups in this analysis. Furthermore, although the predicted number of dental visits is lower than the physician ones, the marginal effects on both odds and frequency of visit are much bigger. Thus, insurance in the private sector has a much stronger impact on

[4] This paper of Bendall et al. (1995) is based on USA data.

behaviour than insurance in the public sector.

5.4 Impact of Other Variables on Public Sector: Physician visits and Frequency

In addition to insurance influencing the odds and frequency of a physician and/or a dental visit, several other factors affect the utilization of health care services. For instance, health status and dental conditions clearly matter in this regard. In this section, I examine the effects of socioeconomic and other factors for different sub-samples of the population, on the probability and frequency of physician and dental use. I present the probability values associated with the estimated coefficients, and the tables indicate three different significant levels: 10%, 5% and 1%. The results are contained in tables 4-1 to 4-4.

5.4.1 Females

The results in table 4-1 describe the marginal effects of all variables on the odds and the frequency of physician visits with types of insurance. Beginning, with females in the 25-64 category, we see that marital status does not matter for the probability of visiting a physician, but being widowed, separated or divorced seems to have a positive impact on the number of times that she visits a doctor. Widowed, separated or divorced females have 17% more physician visits than other females. The education level of these women also matters: women with higher levels of education have a higher likelihood to visit a physician and to visit more often, compared to those with lower education level. The age of the respondent also matters. Women in the 35-44 year old bracket tend to have the lowest probability of seeing a physician, while all other women have a probability that it is about the same. Child bearing may account for the increased activity for that variable of younger women, and the general deterioration of health associated with age may account for the increased activity of the older group.

A number of characteristics that I thought might affect the utilization of health care

services are not statistically significant in my model. For instance, the income variables are not significant even at the 10% significant level. The result is consistent with the paper of Sarma and Simpson (2006)[5], which found that family income was not an important factor in explaining the utilization of health care. Also, whether the respondent is native born or not is not very important. Native-born Canadian females are more likely to use the health care system, but have a lower frequency of visits than immigrants.

Females working in the labour market are more likely to visit a physician but to visit less frequently than females without jobs. This result accords with Sarma and Rempel (2007), among others. We also look at health status, and find, not surprisingly, that females with fair or poor health status have a higher probability of seeing a physician and more often relative to those with excellent health.

It would seem that it is more difficult to explain the behaviour of older females relative to the younger ones. Among senior females, only a few variables seem to have explanatory power, such as age, and whether or not she was native born. Females aged 80 or older use more physician services than other seniors, which makes perfect sense. Native-born seniors tend to use physician services more than immigrants. Unemployed or inactive males or females have more time to visit physician.

5.4.2 Males

Married males are more likely to visit a physician than unmarried men (perhaps they are nagged more). Age also matters: older males visit a physician more often and more frequently in comparison to their younger counterparts. However, income and education variables are insignificant for males. Working status has the opposite result to my expectations. Males who do not work use more health care than the ones with part-time

[5] This paper of Sarma and Simpson is a Canadian study.

or full-time jobs. Of course, we cannot rule out the possibility that it is poor health that causes males not to work, and thus this result makes a lot of sense. The opportunity cost of time might be a relevant variable.

Native born males tend to visit physicians and more frequently, than immigrants. One possibility is the so called "healthy immigrant" effect whereby immigrants tend to have higher than average health when compared to the population, and thus they tend to visit the doctor less often (e.g., Deri, 2005). Curiously, this result is not consistent with females' behaviour. In contrast to females, senior males' income effects are statistically significant in the NB count regression model: the richer males see their physicians more often than the poorer ones.

5.5 Impact of Other Variables on Private Sector: Dental visits and Frequency

5.5.1 Females

Tables 5.1-5.4 present the results for the regression analysis for dental visits. We see that single females have a higher probability of visiting a dentist and a higher likelihood of doing so more frequently in comparison to other females. Age also matters when it comes to explaining the odds and frequency of dental visits. However, the largest impact is found in the 45-54 age range. The slightly higher marginal effects imply that the most frequent period for dental treatment is not for the age bracket of 55-64 years old but rather for the age bracket of 45-54 years old. The education effect matters: individuals with post-secondary education have a higher probability of seeing a dentist and visiting more frequently compared to those with less education.

As expected, females with household income above $50,000 are more likely to utilize dental services than poorer women. Since dental visits are expensive and not usually entirely covered by insurance, higher household income may help patients to afford this

expense. This result accords with a previous study by Millar and Locker (1999)[6], who found that only 41% of people in the lowest income bracket visited a dentist in the past year, while 78% of individuals in the highest income bracket did so. Being employed and being a native Canadian have a positive influence on the probability of seeing a dentist, but their impact is only around 2%. The presence of dental problems, however, does contribute, not surprisingly, to dental visits, consistent with the findings of Bhatti et al. (2006), in which oral health status is a statistically significant influence in the utilization of dental care service.

Among senior females, working status is not a statistically significant determinant. As one might expect because usually senior females are unemployed. Otherwise, older women appear to behave similarly to their younger counterparts. It may be that dental practices that are established earlier in the early life cycle, carry over as people age.

5.5.2 Males

From table 5.2 we see that young males who are married are more likely to visit a dentist than unmarried males – again, we may be picking up the influence of their wives. By contrast, single senior males do not seem to require wives to encourage them to visit a dentist, as they have the highest likelihood and frequency to use dental services even compared to married ones. As described in the paper of Sarma and Simpson (2006), the status of being married increases the utilization of health care services. Education level remains a significant positive influence on the incidence of dental visits of young and senior males. Sarma and Simpson (2006), also mention that education may have a relationship with medical knowledge, and thus patients with more education will improve their health more efficiently. Also, Millar and Locker (1999) conclude that a higher education level causes a higher rate of utilization of dental services. As household income

[6] This study is base on Canadian National Population Health Survey.

increases, so too does the probability that a male will visit the dentist, and do so more frequently. This result also was mentioned in the study of utilization of dental services in Finland (e.g. Nguyen and Hakkinen, (2004)); higher income people use more dental care than lower income ones. Of course, dental problems appear to have the strongest influence on the utilization of dental care – once again, there may be some endogeneity issues here.

5.6 Comparing across the Public and Private Sectors

The variables of education and income consistently have explanatory power in determining the usage rates of physician and dental services. This makes sense. Education tends to foster a better understanding of the merits of preventative care. Income facilitates the use of the health-care system. By contrast, the impact of marital status, working status and immigrant status seems to vary across sub-groups. Without a doubt, in both the public and private sectors, health status is an extremely important determinant.

6. Conclusions

The main goal of this study is to examine how the types of insurance and other related determinants affect the utilization of physician and dental services. Using the 2005 CCHS survey, I try to explain the odds and frequency of physician and dental visits, with particular emphasis on the role played by insurance coverage. I find that insurance coverage matters (not surprisingly), and has a differential impact across the two sectors.

The presence of prescription drug insurance coverage has a positive and important impact on the probability that an individual will visit a physician and on the number of times that he or she will visit a physician over the sample period. This is a significant result. While we might consider our primary health care system as being publicly funded, and hence

equally accessible to everyone, the fact that some of the services, notably, prescription drugs, are not publicly funded, can and will affect the use of family physicians' services. The absence of prescription drug insurance coverage inhibits the use of the physicians' services. From a policy perspective, it is not clear that such a result is desirable: at the very least, it seems like this is a topic that deserves a richer treatment and analysis. Although we did not investigate the issue in this paper, it may well be that the presence of insurance for other services not covered in the public regime will also affect the use of the publicly-provided component of health care services.

Dental insurance has a clear impact on whether or not an individual visits a dentist. Private and employer-based dental plans exert a greater influence on usage in comparison to government-sponsored plans, possibly as a result of the type of coverage provided across the different plans. Nevertheless, one of the contributions of this present paper is that it was able to look at the impact of three different kinds of insurance on usage. We conclude that the types of insurance variables have an explanatory power.

The question of the accessibility of health care services – both private and public – has been raised in this paper and is clearly a topic of much interest in the current policy climate. The fact that private insurance affects the usage of physicians and dentists suggest that accessibility is affected by insurance. It may come as no surprise to learn that individuals who are insured tend to belong to households with higher income. In other words, if we look at who has insurance, 6% of individuals living in households with income of less than $15,000 per year has prescription insurance, 11% of individuals in households with income $15,000 to $29,000 per year have prescription insurance, and these percentages rise progressively with income, with 31% of individuals in households with $80,000 or more having insurance. The same pattern can be seen with respect to dental insurance: 4% of the lowest income group has dental insurance, while 36% of the

highest income group has dental insurance. These figures mean that individuals do not appear to have equal access to insurance, and thus may not have equal access to the relevant health services.

This paper represents a small step towards furthering our understanding of the link between insurance coverage and the utilization of physician and dental services. It contributes to the small literature on this subject. I am the first to look at the type of insurance and how this may affect individuals' behaviour in Canada. However, there are many avenues for future research. One weakness of this paper is that it does not take into account of the potential endogeneity of some of the independent variables used in the analysis. Data on out-of-pocket payments on deductibles and co-payments would be very useful and would certainly help to improve our understanding of the links between insurance and usage.

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Table 1 Definition of Variables

Variable	Definition
Dependent Variables	
Visit Dentist	=1 if a patient visits a dentist, otherwise=0.
Visit Physician	=1 if a patient visits a physician or GP, otherwise=0.
NumVisit Dentist	Number of consultations in one year to dentists.
Num Visit Phy	Number of consultations in one year to family physician or GP.
Insurance Coverage	
Dental ins	=1 if respondent has dental insurance, otherwise=0.
Den ins gov	=1 if respondent has government-sponsored dental insurance plan, otherwise=0.
Den ins emp	=1 if respondent has employer-sponsored dental insurance plan, otherwise=0.
Den ins prt	=1 if respondent has private dental insurance plan, otherwise=0.
Pre ins	=1 if respondent has prescription medication insurance, otherwise=0.
Pre ins gov	=1 if respondent has government-sponsored prescription insurance plan, otherwise=0.
Pre ins emp	=1 if respondent has employer-sponsored prescription insurance plan, otherwise=0.
Pre ins prt	=1 if respondent has private prescription insurance plan, otherwise=0.
Other Covariates	
Male	=1 if respondent is male, otherwise=0.
Female	=1 if respondent is female, otherwise=0 (**reference group**).
Married	=1 if married or common law, otherwise=0.
Wsd	=1 if respondent is widowed, separated or divorced, otherwise=0.
Single	=1 if respondent is single or never married, otherwise=0 (**reference group**).
Age 25-34	=1 if age is from 25 to 34, otherwise=0 (**reference group** for age 25-64 sub-section).
Age 35-44	=1 if age is from 35 to 44, otherwise=0.
Age 45-54	=1 if age is from 45 to 54, otherwise=0.
Age 55-64	=1 if age is from 55 to 64, otherwise=0.
Age 65-74	=1 if age is from 65 to 74, otherwise=0 (**reference group** for age 65-74 sub-section).
Age 75-79	=1 if age is from 75 to 79, otherwise=0.
Age 80+	=1 if age is from 80 or older, otherwise=0.
Less sec	=1 if respondent has less than secondary graduation, otherwise=0 (**reference group**).

Variable	Definition
Sec grad	=1 if respondent has secondary school graduation, otherwise=0.
Some post	=1 if respondent finishes some post-secondary school, otherwise=0.
Post grad	=1 if respondent has post-secondary graduation, otherwise=0.
Income 15k-	=1 if respondent's household income is less than $15,000, otherwise=0 (**reference group**).
Income 15k-29k	=1 if respondent's household income is $15,000-$29,000, otherwise=0.
Income 30k-49k	=1 if respondent's household income is $30,000-$49,000, otherwise=0.
Income 50k-79k	=1 if respondent's household income is $50,000-$79,000, otherwise=0.
Income 80k+	=1 if respondent's household income is $80,000 or more, otherwise=0.
Working	=1 if respondent has a full-time or part-time job, otherwise=0.
Canadian	=1 if respondent is born in Canada, Immigrant = 0 (**reference group**).
Immigrant	=1 if respondent is immigrant, otherwise=0.
Imm 0-9	=1 if respondent's length of time in Canada since immigration is 0 to 9 years, otherwise=0.
Imm 10	=1 if respondent's length of time in Canada since immigration is 10 or more years, otherwise=0.
Dental problem	=1 if respondent has dental problem of a to g in past month, otherwise=0. The 7 items are: a) toothache; b) teeth sensitive to hot or cold; c) pain in or around jaw joints; d) pain in mouth or face; e) bleeding gums; f) dry mouth; g) bad breath.
Health exc	=1 if respondent's self-perceived health status is excellent, otherwise=0 (**reference group**).
Health vgd	=1 if respondent's self-perceived health status is very good, otherwise=0.
Health gd	=1 if respondent's self-perceived health status is good, otherwise=0.
Health fp	=1 if respondent's self-perceived health status is fair or poor, otherwise=0.
Ontario	=1 if province of resident of respondent is Ontario, otherwise=0.

Table 2 Descriptive Statistics for Sample Variables*

a) Age 25-64

	Female			Male		
Variable	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
Variable	N	mean	sd	N	mean	Sd
Den ins	13115	.711	.453	11440	.719	.45
Den ins gov	13092	.0632	.243	11428	.0567	.231
Den ins emp	13092	.613	.487	11428	.626	.484
Den ins prt	13092	.0338	.181	11428	.0357	.186
Pre ins	13123	.77	.421	11438	.762	.426
Pre ins gov	13096	.087	.282	11427	.0711	.257
Pre ins emp	13096	.639	.48	11427	.647	.478
Pre ins prt	13096	.0434	.204	11427	.0444	.206
Age 25-34	13481	.249	.432	11759	.23	.421
Age 35-44	13481	.263	.44	11759	.302	.459
Age 45-54	13481	.23	.421	11759	.234	.423
Age 55-64	13481	.258	.437	11759	.234	.423
Male	13481	0	0	11759	1	0
Female	13481	1	0	11759	0	0
Married	13481	.655	.475	11759	.648	.477
Wsd	13481	.178	.382	11759	.129	.336
Single	13481	.167	.373	11759	.221	.415
Immigrant	13481	.203	.402	11759	.192	.394
Imm 0-9	11369	.0544	.227	9990	.0486	.215
Imm 10	12863	.164	.37	11273	.157	.364
Less sec	13481	.109	.311	11759	.128	.335
Sec grad	13481	.172	.378	11759	.165	.371
Some post	13481	.0616	.24	11759	.0652	.247
Post grad	13481	.631	.483	11759	.615	.487
Income 15k	13481	.0613	.24	11759	.0466	.211
Income 15k-29k	13481	.107	.309	11759	.0724	.259
Income 30k-49k	13481	.183	.387	11759	.173	.378
Income 50k-79k	13481	.246	.431	11759	.258	.437
Income 80k+	13481	.292	.455	11759	.359	.48
Working	13481	.688	.463	11759	.808	.394
Health exc	13481	.235	.424	11759	.215	.411
Health vgd	13481	.387	.487	11759	.384	.486
Health gd	13481	.261	.439	11759	.284	.451

Health fp	13481	.116	.32	11759	.116	.321
Dental problem	13227	.503	.5	11462	.435	.496
Visit physician	13481	.725	.446	11759	.651	.477
Visit dentist	13481	.844	.362	11759	.723	.448
Ontario	13481	1	0	11759	1	0
Num vis dentist	13475	1.52	1.62	11744	1.34	1.53
Num vis physician	13447	3.69	4.74	11733	2.59	3.88

b) Age 65+

	Female			Male		
Variable	Obs	Mean	Std.Dev.	Obs	Mean	Std. Dev.
Den ins	5163	.314	.464	3431	.393	.488
Den ins gov	5152	.0573	.232	3429	.0767	.266
Den ins emp	5152	.213	.409	3429	.261	.439
Den ins prt	5152	.0427	.202	3429	.0548	.228
Pre ins	5192	.768	.422	3442	.774	.418
Pre ins gov	5172	.475	.499	3435	.425	.494
Pre ins emp	5172	.243	.429	3435	.281	.449
Pre ins prt	5172	.0485	.215	3435	.0678	.251
Age 65-74	5401	.51	.5	3597	.578	.494
Age 75-79	5401	.22	.414	3597	.221	.415
Age 80+	5401	.27	.444	3597	.201	.401
Male	5401	0	0	3597	1	0
Female	5401	1	0	3597	0	0
Married	5401	.374	.484	3597	.691	.462
Wsd	5401	.576	.494	3597	.257	.437
Single	5401	.0491	.216	3597	.0512	.22
Immigrant	5401	.252	.434	3597	.283	.45
Imm 0-9	4071	.00761	.0869	2596	.00616	.0783
Imm 10	5370	.248	.432	3581	.28	.449
Less sec	5401	.408	.491	3597	.367	.482
Sec grad	5401	.179	.383	3597	.108	.311
Some post	5401	.0487	.215	3597	.0495	.217
Post grad	5401	.32	.467	3597	.426	.495
Income 15k	5401	.131	.337	3597	.0528	.224
Income 15k-29k	5401	.302	.459	3597	.265	.442
Income 30k-49k	5401	.192	.394	3597	.255	.436
Income 50k-79k	5401	.113	.316	3597	.177	.382
Income 80k+	5401	.0402	.196	3597	.089	.285

Working	5401	.0409	.198	3597	.106	.308
Health exc	5401	.119	.324	3597	.123	.329
Health vgd	5401	.309	.462	3597	.287	.452
Health gd	5401	.32	.467	3597	.308	.462
Health fp	5401	.25	.433	3597	.279	.449
Dental problem	5089	.38	.485	3256	.315	.465
Visit physician	5401	.544	.498	3597	.528	.499
Visit dentist	5401	.89	.313	3597	.864	.342
Ontario	5401	1	0	3597	1	0
Num vis dentist	5389	1.09	1.47	3593	1.06	1.42
Num vis physician	5354	4.39	4.31	3582	4.25	4.53

* Note that for part a) and b) in Table2, all the variables illustrated are dummy variables except "Num vis dentist" and "Num vis physician". For the dummy variables, the minimum value is 0 and maximum value is 1. For "Num vis dentist", the minimum value is 0 and the maximum value is 12. For "Num vis physician:, the minimum value is 0 and the maximum value is 31.

Table3 Analysis of The Marginal Effect of Insurance Coverage on Physician and Dental Visits and Frequency*

a) Estimated Marginal Effect of Insurance=1
(Indicator variable=1 if insured)

	25-64				65+			
	Male		Female		Male		Female	
	Dentist	Phy.	Dentist	Phy.	Dentist	Phy.	Dentist	Phy.
Pred. P	0.741	0.756	0.810	0.866	0.795	0.869	0.868	0.879
Probit (P-Value)	0.236 (0.000)	.076 (0.000)	.210 (0.000)	.058 (0.000)	.162 (0.000)	.027 (0.212)	.124 (0.000)	.056 (0.001)
%Change	0.32	0.10	0.26	0.07	0.20	0.03	0.14	0.06
Pred. N	1.46	2.13	1.62	2.88	1.92	2.88	1.88	2.95
NB (P-Value)	.591 (0.000)	.360 (0.000)	.639 (0.000)	.485 (0.000)	.597 (0.000)	.171 (0.324)	.538 (0.000)	.326 (0.014)
%Change	0.40	0.17	0.39	0.17	0.31	0.06	0.29	0.11

Estimated Marginal Effect of Types of Insurance

b) Government-Provided

	25-64 age group				65+ age group			
	Male		Female		Male		Female	
	Dentist	Phy.	Dentist	Phy.	Dentist	Phy.	Dentist	Phy.
Pred. P	0.741	0.758	0.808	0.867	0.788	0.853	0.870	0.859
Probit (P-Value)	.127 (0.000)	.083 (0.001)	.111 (0.000)	.035 (0.048)	.063 (0.066)	.037 (0.084)	.057 (0.006)	.054 (0.000)
%Change	0.17	0.11	0.14	0.04	0.08	0.04	0.07	0.06
Pred. N	1.47	2.12	1.62	2.89	1.93	2.77	1.87	2.93
NB (P-Value)	.678 (0.000)	1.115 (0.000)	1.002 (0.000)	.846 (0.001)	.501 (0.074)	.268 (0.202)	.622 (010)	.389 (0.024)
%Change	0.46	0.53	0.62	0.29	0.26	0.10	0.33	0.13

c) Employer-Financed

	25-64 age group				65+ age group			
	Male		Female		Male		Female	
	Dentist	Phy.	Dentist	Phy.	Dentist	Phy.	Dentist	Phy.
Pred. P	0.741	0.758	0.808	0.867	0.788	0.853	0.870	0.859
Probit	.243	.075	.210	.060	.167	.006	.127	.033
(P-Value)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.813)	(0.000)	(0.137)
%Change	0.33	0.10	0.26	0.07	0.21	0.007	0.15	0.04
Pred. N	1.47	2.12	1.62	2.89	1.93	2.77	1.87	2.93
NB	.608	.288	.0.641	.461	0.625	.016	.529	.297
(P-Value)	(0.000)	(0.007)	(0.000)	(0.000)	(0.000)	(0.937)	(0.000)	(0.059)
%Change	0.41	0.14	0.40	0.16	0.32	0.006	0.28	0.10

d) Private

	25-64 age group				65+ age group			
	Male		Female		Male		Female	
	Dentist	Phy.	Dentist	Phy.	Dentist	Phy.	Dentist	Phy.
Pred. P	0.741	0.758	0.808	0.867	0.788	0.853	0.870	0.859
Probit	.162	.048	.148	.044	.148	.022	.096	.072
(P-Value)	(0.000)	(0.119)	(0.000)	(0.018)	(0.000)	(0.591)	(0.000)	(0.010)
%Change	0.22	0.06	0.18	0.05	0.18	0.03	0.11	0.08
Pred. N	1.47	2.12	1.62	2.89	1.93	2.77	1.87	2.93
NB	.818	.413	1.006	.502	.928	.196	.947	.283
(P-Value)	(0.000)	(0.077)	(0.000)	(0.068)	(0.004)	(0.477)	(0.000)	(0.290)
%Change	0.56	0.19	0.62	0.17	0.48	0.07	0.51	0.10

* Note that in Table3, "% change" =Marginal Effect/Predicted Probability of Visits in Probit model, and "% change" =Marginal Effect/Predicted Number of Visits in Negative Binomial count model.

Table 4-1 Estimated The Marginal Effects of The Remaining Exogenous Variables in Probit and NB Count Models of Using Prescription Services for Females Aged 25-64

physician sector-age 25-64 female result				
	Probit-the whole insurance	Probit-types of insurance	NB-the whole insurance	NB-types of insurance
Married	0.002	0.003	0.048	0.057
	(0.847)	(0.808)	(0.283)	(0.212)
Wsd	0.013	0.014	0.169***	0.170***
	(0.433)	(0.397)	(0.003)	(0.003)
Age 35-44	-0.025**	-0.026**	-0.248***	-0.249***
	(0.014)	(0.013)	(0.000)	(0.000)
Age 45-54	-0.016	-0.016	-0.233***	-0.234***
	(0.220)	(0.216)	(0.000)	(0.000)
Age 55-64	-0.003	-0.004	-0.326***	-0.326***
	(0.820)	(0.782)	(0.000)	(0.000)
Sec grad	0.022	0.022	0.074	0.077
	(0.195)	(0.204)	(0.180)	(0.166)
Some post	0.041**	0.041**	0.043	0.050
	(0.040)	(0.044)	(0.542)	(0.484)
Post grad	0.064***	0.064***	0.119**	0.124**
	(0.001)	(0.001)	(0.017)	(0.013)
Income 15k-29k	0.010	0.010	0.138**	0.135**
	(0.597)	(0.592)	(0.032)	(0.035)
Income 30k-49k	-0.002	-0.002	0.010	0.015
	(0.919)	(0.897)	(0.854)	(0.796)
Income 50k-79k	0.005	0.004	-0.043	-0.037
	(0.725)	(0.794)	(0.407)	(0.487)
Income 80k+	0.012	0.010	-0.073	-0.068
	(0.412)	(0.478)	(0.161)	(0.211)
Working	0.019*	0.018	-0.108***	-0.099***
	(0.092)	(0.120)	(0.003)	(0.006)
Immigrant	0.007	0.007	-0.021	-0.019
	(0.498)	(0.500)	(0.540)	(0.581)
Health vgd	0.055***	0.055***	0.326***	0.328***
	(0.000)	(0.000)	(0.000)	(0.000)
Health gd	0.068***	0.068***	0.648***	0.648***
	(0.000)	(0.000)	(0.000)	(0.000)
Health fp	0.102***	0.102***	1.232***	1.220***
	(0.000)	(0.000)	(0.000)	(0.000)
Observations	13123	13096	13091	13066
Robust p values in parentheses	* significant at 10%; ** significant at 5%; *** significant at 1%			

Table 4-2 Estimated The Marginal Effects of The Remaining Exogenous Variables in Probit and NB Count Models of Using Prescription Services for Males Aged 25-64

physician sector-age 25-64 male result				
	Probit-the whole insurance	Probit-types of insurance	NB-the whole insurance	NB-types of insurance
Married	0.031**	0.030*	0.025	0.040
	(0.046)	(0.053)	(0.635)	(0.448)
Wsd	-0.005	-0.008	0.098	0.083
	(0.823)	(0.714)	(0.200)	(0.269)
Age 35-44	0.037**	0.037**	0.088*	0.082
	(0.019)	(0.019)	(0.095)	(0.117)
Age 45-54	0.081***	0.081***	0.185***	0.184***
	(0.000)	(0.000)	(0.001)	(0.002)
Age 55-64	0.091***	0.091***	0.219***	0.223***
	(0.000)	(0.000)	(0.000)	(0.000)
Sec grad	0.011	0.013	-0.001	0.019
	(0.618)	(0.569)	(0.986)	(0.781)
Some post	0.018	0.020	0.035	0.051
	(0.528)	(0.498)	(0.704)	(0.586)
Post grad	0.048**	0.050**	0.003	0.024
	(0.017)	(0.014)	(0.962)	(0.687)
Income 15k-29k	-0.008	-0.010	0.031	0.008
	(0.787)	(0.743)	(0.738)	(0.931)
Income 30k-49k	0.014	0.016	0.005	0.031
	(0.532)	(0.485)	(0.942)	(0.654)
Income 50k-79k	0.000	0.002	-0.033	0.007
	(0.995)	(0.915)	(0.603)	(0.916)
Income 80k+	0.040*	0.042*	-0.022	0.015
	(0.062)	(0.055)	(0.713)	(0.815)
Working	-0.031*	-0.030	-0.273***	-0.237***
	(0.099)	(0.118)	(0.000)	(0.000)
Immigrant	0.035**	0.036**	0.095**	0.101**
	(0.022)	(0.020)	(0.025)	(0.017)
Health vgd	0.047***	0.047***	0.224***	0.224***
	(0.005)	(0.005)	(0.000)	(0.000)
Health gd	0.060***	0.060***	0.521***	0.523***
	(0.000)	(0.000)	(0.000)	(0.000)
Health fp	0.130***	0.129***	1.125***	1.118***
	(0.000)	(0.000)	(0.000)	(0.000)
Observations	11438	11427	11418	11407
Robust p values in parentheses	* significant at 10%; ** significant at 5%; *** significant at 1%			

Table 4-3 Estimated The Marginal Effects of The Remaining Exogenous Variables in Probit and NB Count Models of Using Prescription Services for Females Aged 65+

physician sector-age 65 female result				
	(1)	(2)	(3)	(4)
	Probit-the whole insurance	Probit-types of insurance	NB-the whole insurance	NB-types of insurance
Married	0.043	0.050	0.084	0.097
	(0.198)	(0.180)	(0.291)	(0.220)
Wsd	0.035	0.039	0.129*	0.142*
	(0.177)	(0.182)	(0.092)	(0.062)
Age 65-74	-0.003	-0.004	-0.128***	-0.127***
	(0.865)	(0.832)	(0.009)	(0.009)
Age 75-79	-0.021	-0.023	-0.122**	-0.126**
	(0.329)	(0.322)	(0.018)	(0.015)
Sec grad	-0.001	-0.001	0.029	0.032
	(0.964)	(0.969)	(0.623)	(0.590)
Some post	0.020	0.024	-0.042	-0.040
	(0.461)	(0.421)	(0.560)	(0.575)
Post grad	0.018	0.021	-0.002	0.001
	(0.314)	(0.292)	(0.965)	(0.978)
Income 15k-29k	0.007	0.007	-0.019	-0.019
	(0.670)	(0.687)	(0.678)	(0.676)
Income 30k-49k	0.003	0.005	-0.052	-0.053
	(0.873)	(0.814)	(0.332)	(0.326)
Income 50k-79k	0.020	0.025	-0.064	-0.059
	(0.417)	(0.362)	(0.285)	(0.331)
Income 80k+	0.050*	0.058*	-0.058	-0.057
	(0.087)	(0.079)	(0.473)	(0.481)
Working	-0.057**	-0.064**	-0.142*	-0.144*
	(0.030)	(0.030)	(0.077)	(0.073)
Immigrant	0.061***	0.066***	0.084**	0.082**
	(0.000)	(0.000)	(0.026)	(0.029)
Health vgd	0.044*	0.044*	0.243***	0.245***
	(0.058)	(0.088)	(0.003)	(0.003)
Health gd	0.071***	0.079***	0.560***	0.561***
	(0.000)	(0.000)	(0.000)	(0.000)
Health fp	0.084***	0.094***	0.868***	0.871***
	(0.000)	(0.000)	(0.000)	(0.000)
Observations	5192	5172	5155	5136

Robust p values in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 4-4 Estimated The Marginal Effects of The Remaining Exogenous Variables in Probit and NB Count Models of Using Prescription Services for Males Aged 65+

physician sector-age 65 male result				
	(1)	(2)	(3)	(4)
	Probit-the whole insurance	Probit-types of insurance	NB-the whole insurance	NB-types of insurance
Married	0.051	0.057	-0.099	-0.094
	(0.178)	(0.159)	(0.325)	(0.356)
Wsd	0.028	0.032	-0.092	-0.091
	(0.380)	(0.365)	(0.386)	(0.393)
Age 65-74	-0.016	-0.016	-0.120*	-0.120*
	(0.494)	(0.511)	(0.053)	(0.053)
Age 75-79	0.026	0.029	-0.081	-0.080
	(0.300)	(0.298)	(0.229)	(0.242)
Sec grad	0.037	0.043	-0.021	-0.014
	(0.164)	(0.134)	(0.797)	(0.863)
Some post	0.008	0.012	-0.024	-0.017
	(0.834)	(0.784)	(0.818)	(0.871)
Post grad	0.029	0.035	-0.086	-0.081
	(0.174)	(0.142)	(0.144)	(0.168)
Income 15k-29k	0.016	0.014	0.162**	0.153**
	(0.505)	(0.581)	(0.021)	(0.029)
Income 30k-49k	0.026	0.032	0.180**	0.186**
	(0.303)	(0.247)	(0.026)	(0.022)
Income 50k-79k	0.086**	0.097**	0.182**	0.191**
	(0.017)	(0.013)	(0.021)	(0.016)
Income 80k+	0.051	0.059*	0.093	0.101
	(0.105)	(0.085)	(0.329)	(0.294)
Working	-0.028	-0.030	-0.186**	-0.183**
	(0.289)	(0.284)	(0.035)	(0.041)
Immigrant	0.004	0.003	0.035	0.035
	(0.837)	(0.895)	(0.513)	(0.517)
Health vgd	0.033	0.038	0.265***	0.270***
	(0.247)	(0.215)	(0.003)	(0.003)
Health gd	0.057***	0.063***	0.495***	0.498***
	(0.007)	(0.006)	(0.000)	(0.000)
Health fp	0.090***	0.100***	0.889***	0.892***
	(0.000)	(0.000)	(0.000)	(0.000)
Observations	3442	3435	3427	3420

Robust p values in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 5-1 Estimated The Marginal Effects of The Remaining Exogenous Variables in Probit and NB Count Models of Using Dental Services for Females Aged 25-64

Dental sector-age 25-64 female result				
	(1)	(2)	(3)	(4)
	Probit-the whole insurance	Probit-types of insurance	NB-the whole insurance	NB-types of insurance
Married	-0.004	-0.004	-0.114***	-0.116***
	(0.807)	(0.803)	(0.007)	(0.007)
Wsd	-0.014	-0.013	-0.025	-0.025
	(0.451)	(0.485)	(0.644)	(0.648)
Age 35-44	0.068***	0.068***	0.122***	0.120***
	(0.000)	(0.000)	(0.001)	(0.001)
Age 45-54	0.097***	0.098***	0.295***	0.294***
	(0.000)	(0.000)	(0.000)	(0.000)
Age 55-64	0.096***	0.095***	0.280***	0.279***
	(0.000)	(0.000)	(0.000)	(0.000)
Sec grad	0.080***	0.080***	0.339***	0.338***
	(0.000)	(0.000)	(0.000)	(0.000)
Some post	0.093***	0.092***	0.429***	0.424***
	(0.000)	(0.000)	(0.000)	(0.000)
Post grad	0.183***	0.180***	0.378***	0.376***
	(0.000)	(0.000)	(0.000)	(0.000)
Income 15k-29k	-0.042**	-0.043**	-0.222***	-0.225***
	(0.045)	(0.041)	(0.002)	(0.002)
Income 30k-49k	0.026	0.025	0.054	0.050
	(0.118)	(0.143)	(0.320)	(0.368)
Income 50k-79k	0.081***	0.079***	0.128***	0.126***
	(0.000)	(0.000)	(0.006)	(0.008)
Income 80k+	0.110***	0.110***	0.208***	0.207***
	(0.000)	(0.000)	(0.000)	(0.000)
Working	0.023*	0.022*	0.003	-0.001
	(0.063)	(0.078)	(0.918)	(0.976)
Immigrant	-0.028**	-0.028**	0.049	0.048
	(0.011)	(0.010)	(0.101)	(0.109)
Dental problem	0.021**	0.022**	0.190***	0.190***
	(0.028)	(0.026)	(0.000)	(0.000)
Observations	12938	12915	12933	12911

Robust p values in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 5-2 Estimated The Marginal Effects of The Remaining Exogenous Variables in Probit and NB Count Models of Using Dental Services for Males Aged 25-64

Dental sector-age 25-64 male result				
	(1)	(2)	(3)	(4)
	Probit-the whole insurance	Probit-types of insurance	NB-the whole insurance	NB-types of insurance
Married	0.005	0.002	-0.040	-0.053
	(0.757)	(0.909)	(0.369)	(0.231)
Wsd	-0.014	-0.014	-0.029	-0.053
	(0.555)	(0.537)	(0.648)	(0.382)
Age 35-44	0.030*	0.030*	0.060	0.056
	(0.062)	(0.060)	(0.168)	(0.202)
Age 45-54	0.078***	0.079***	0.176***	0.177***
	(0.000)	(0.000)	(0.000)	(0.000)
Age 55-64	0.103***	0.102***	0.260***	0.264***
	(0.000)	(0.000)	(0.000)	(0.000)
Sec grad	0.095***	0.095***	0.250***	0.248***
	(0.000)	(0.000)	(0.000)	(0.000)
Some post	0.103***	0.102***	0.175*	0.175*
	(0.000)	(0.000)	(0.058)	(0.058)
Post grad	0.176***	0.174***	0.289***	0.284***
	(0.000)	(0.000)	(0.000)	(0.000)
Income 15k-29k	-0.065**	-0.059*	-0.217*	-0.190*
	(0.041)	(0.064)	(0.061)	(0.097)
Income 30k-49k	-0.043*	-0.045*	-0.180***	-0.177***
	(0.065)	(0.058)	(0.007)	(0.008)
Income 50k-79k	0.020	0.018	-0.054	-0.054
	(0.360)	(0.424)	(0.341)	(0.340)
Income 80k+	0.105***	0.103***	0.152***	0.152***
	(0.000)	(0.000)	(0.006)	(0.006)
Working	0.037*	0.028	0.066	0.055
	(0.053)	(0.155)	(0.174)	(0.255)
Immigrant	0.008	0.008	0.092***	0.093***
	(0.577)	(0.593)	(0.008)	(0.007)
Dental problem	0.007	0.008	0.113***	0.110***
	(0.549)	(0.513)	(0.000)	(0.000)
Observations	11195	11183	11186	11174

Robust p values in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 5-3 Estimated The Marginal Effects of The Remaining Exogenous Variables in Probit and NB Count Models of Using Dental Services for Females Aged 65+

Dental sector-age 65+ female result				
	(1)	(2)	(3)	(4)
	Probit-the whole insurance	Probit-types of insurance	NB-the whole insurance	NB-types of insurance
Married	-0.009	-0.009	-0.175*	-0.176*
	(0.748)	(0.748)	(0.063)	(0.062)
Wsd	-0.076**	-0.075**	-0.334***	-0.334***
	(0.019)	(0.019)	(0.000)	(0.000)
Age 65-74	0.027*	0.027*	0.104	0.102
	(0.095)	(0.093)	(0.107)	(0.116)
Age 75-79	0.025	0.024	0.151**	0.150**
	(0.107)	(0.119)	(0.040)	(0.042)
Sec grad	0.066***	0.065***	0.269***	0.271***
	(0.000)	(0.000)	(0.000)	(0.000)
Some post	0.054**	0.053**	0.249**	0.250**
	(0.017)	(0.016)	(0.035)	(0.033)
Post grad	0.153***	0.150***	0.401***	0.399***
	(0.000)	(0.000)	(0.000)	(0.000)
Income 15k-29k	0.006	0.006	-0.045	-0.053
	(0.654)	(0.680)	(0.482)	(0.412)
Income 30k-49k	0.036**	0.036**	0.124*	0.121*
	(0.014)	(0.015)	(0.063)	(0.069)
Income 50k-79k	0.118***	0.117***	0.325***	0.320***
	(0.000)	(0.000)	(0.000)	(0.000)
Income 80k+	0.073***	0.072***	0.310***	0.308***
	(0.005)	(0.006)	(0.003)	(0.004)
Working	0.014	0.015	-0.050	-0.048
	(0.634)	(0.606)	(0.588)	(0.602)
Immigrant	-0.021*	-0.021*	-0.079	-0.080
	(0.087)	(0.090)	(0.127)	(0.124)
Dental problem	0.065***	0.064***	0.336***	0.332***
	(0.000)	(0.000)	(0.000)	(0.000)
Observations	4913	4902	4906	4895

Robust p values in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 5-4 Estimated The Marginal Effects of The Remaining Exogenous Variables in Probit and NB Count Models of Using Dental Services for Males Aged 65+

Dental sector-age 65+ male result				
	(1)	(2)	(3)	(4)
	Probit-the whole insurance	Probit-types of insurance	NB-the whole insurance	NB-types of insurance
Married	-0.023	-0.025	-0.246	-0.252
	(0.556)	(0.523)	(0.179)	(0.167)
Wsd	-0.110**	-0.113**	-0.435**	-0.437**
	(0.023)	(0.022)	(0.026)	(0.025)
Age 65-74	0.018	0.007	0.170**	0.151**
	(0.486)	(0.797)	(0.018)	(0.039)
Age 75-79	0.018	0.013	0.122	0.110
	(0.529)	(0.661)	(0.155)	(0.200)
Sec grad	0.067**	0.068**	0.235**	0.241**
	(0.034)	(0.035)	(0.021)	(0.019)
Some post	0.070*	0.076*	0.234*	0.245*
	(0.083)	(0.062)	(0.076)	(0.068)
Post grad	0.109***	0.112***	0.257***	0.267***
	(0.000)	(0.000)	(0.002)	(0.001)
Income 15k-29k	-0.057*	-0.048	-0.211*	-0.188*
	(0.082)	(0.144)	(0.062)	(0.099)
Income 30k-49k	0.015	0.016	0.101	0.107
	(0.619)	(0.587)	(0.336)	(0.309)
Income 50k-79k	0.126***	0.128***	0.295***	0.301***
	(0.002)	(0.001)	(0.003)	(0.003)
Income 80k+	0.126***	0.130***	0.380***	0.392***
	(0.000)	(0.000)	(0.001)	(0.001)
Working	-0.014	-0.015	0.057	0.061
	(0.681)	(0.677)	(0.577)	(0.549)
Immigrant	-0.016	-0.021	-0.019	-0.034
	(0.459)	(0.335)	(0.770)	(0.601)
Dental problem	0.058***	0.062***	0.260***	0.269***
	(0.005)	(0.003)	(0.000)	(0.000)
Observations	3126	3124	3122	3120

Robust p values in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 6 Literature Review

Paper	Methodology and Data	Main Objective	Main Result
Kosteniuk and D'Arcy. 2006	Data from the 1999–2000 Saskatchewan Population Health and Dynamics Survey: 5,003 respondents ages 18 years and older. Uses a logistic regression model to analyze the influences on visits to the dentist. The variables examined include: a) socioeconomic factors; i.e. education level; labour force status; household income; b) demographic factors, i.e. ages; marital status; urban or rural; first nation. c) health-related factors, i.e. food security or insecurity; dental insurance or no dental insurance; illness support available or unavailable; d) health related behaviors, i.e. general checkups; eye checkups; skin examinations; daily smoker or non-smoker	Examine determinants of visits to the dentist.	The results show that the effects for the factors on the odds for dental services use are different between men and women.
Nguyen and H¨akkinen. 2004	The data was collected from the Finnish Health Care Survey of 1996. Methodology: concentration and horizontal inequity indices and decomposition. This study applies an OLS regression model to estimate the measures of inequality and inequity. The dependent variables are: total number of visits, odds of visiting and conditional number of visits to those three measures. The explanatory variables are: income, males of different age groups, females of different age groups, natural teeth, number of missing teeth, dentures, tooth pain, dental treatment, education level, employed status, fear of visiting, those with ages between 20 and 40 at the interview time, visit times, dentist-to-population ratio, service range and patient recalled.	To examine the income-related inequality for dental utilization by three measures: the frequency of visits; the odds of dental visits; the conditional frequency of positive visits for types of dentists.	The results indicate that there are pro-poor inequities in all three measures, but there are pro-rich inequities in first two. Income and dentist's recall are the main factors for pro-rich distribution of use. Supply factors and other incentive factors should be focus on the equity examination.

Godfried, Oosterbeek and Tulder. 2001	The Dutch Council of National Health Insurance commissioned the information collection about the choices of individuals insurance and the condition of individuals' teeth among the Dutch population in 1995. This paper is descriptive study of the adverse selection effect. They use Probit regression model with the following explanatory variables: inflamed gums, retracted gums, ignition of teeth, sensitive teeth, bad breath, chewing, teeth condition (factor analysis and unweighted factor), age, sex, income, premium and education.	To examine the adverse selection effect on dental insurance and the supply and demand for dental insurance.	The results show that an adverse selection effect does happen in dental insurance: individuals with poor teeth condition have higher odds of choosing insurance. Prices influence the dental insurance, but income does not.
Grytten, Holst and Laake. 1990	The data were collected by Norges Markedsdata A/S in 1987 using a two-stage stratified group sample of 1,216 respondents in the non-institutionalized Norwegian population who were 20 years old or older. This econometric study uses a two-part model to analyze the effect of supplier inducement on dental services in Norway. The logit model is used to estimate the probability of dental service use; and the OLS regression model is used to analyze the expenditure of dental services depending on dentist-to-population ratio. The explanatory variables for both estimations are: family income, family member, age, education level, number of teeth and dental visits during the last five years. In this paper, the time cost factor was also considered, describing the variables of travel time and mode of transportation.	To examine the influence of supplier inducement on the utilization of dental services in Norway, holding other conditions constant.	The demand and utilization for dental services are influenced by supplier inducement. By the Logit regression estimation, this paper indicated that the demand for dental service use was increased by the dentist-to-population ratio. By the analysis of expenditure, a significant negative association exists between the dentist-to-population ratio and the expenditure for dental service use. Expenditure increased as the dentist-to-population decreased. Regular attenders also had less expenditure on dental services than irregular ones. The number of teeth has a significant association with demand. In the short run, as the prevalence of dental diseases decrease, the demand of dental services may not necessarily be reduced.

Millar and Locker. 1999	Data from the 1996/97 National Population Health Survey: a sample of 70,884 respondents ages 15 years and older. This econometric study uses the logistic regression model to analyze the relationship between the variables related to dental insurance coverage and to dental visits within the last 12 months. The following variables are related to insurance and dental visits: sex, age group, province, residence (rural or urban), household income, education levels (less than secondary graduation; secondary graduation; some postsecondary; postsecondary graduation) and employment status (currently working; not currently working; worked in last one year and current work status unknown).	To examine the socioeconomic differences in insurance coverage for dental services, as well as other factors for dental service use.	Almost half of the population reported that they have had dental insurance and have visited a dentist during the previous year. Individuals with higher income and education have higher odds for visiting a dentist than individuals with lower incomes and education.
Sarma and Simpson. 2006	The data were collected from the National Population and Health Survey (NPHS) of 1998-1999. This econometric paper analyzes the utilization of types of heath care services using different types of negative binomial regression models. The dependent variables employed in this paper reflect the intensity of types of health care services use, including Doctor (the number of general practitioner or specialist visits), GP (the number of general practitioner visits), Specialist (the number of specialist visits) and Nights (the number of nights in a hospital as a visiting patient). Also, there are four types of explanatory variables which include: demographic/household/ socio-economic (age, sex, and other socio-economic backgrounds), enabling (income, education, and supplemental health insurance), need (self-reported health status, and the number of disability days), and life style (drinking, physical activity and smoking behaviour) variables.	To find out the odds, frequency and intensity for patient visits to a health professional.	This paper illustrated that the non-hospitalized health care utilization was positively affected by supplemental health insurance. Furthermore, the non-hospitalized health care was also positively affected by the physician density. This paper also suggested that Canadian policy needs to focus more on the design of the health care system, especially for the efficient and cost-effective health care services.

Bendall and Asubonteng. 1995	Not applicable.	To examine the primary studies regarding dental care research about effects of dental insurance coverage, demand and utilization for dental services in the USA.	The result shows that there is a positive relationship between dental insurance coverage and the demand for dental services.
Sepehri, Simpson and Sarma. 2006	The data were collected from National Population and Health Survey (NPHS) of 2001-2002 of Vietnam. This econometric paper uses the negative binomial regression model to illustrate the influence of Vietnam's health insurance on in-patient care, which includes hospital admission and the different lengths of stay (LOS) by insurance schemes. As dependent variables, Hospital admission and the LOS are affected by the following factors: different types of insurance, income level, age, sex, education, marital status, current health status, household size, ethnicity and types of illness. The inclusion of the types of insurance is used to reflect the real cost of health care under different health insurance schemes in Vietnam. Types of insurance are: the compulsory insurance scheme, the insurance for the poor and the voluntary insurance scheme.	To investigate the effect of health insurance on hospital admission and LOS varied by different schemes.	The findings of this paper indicate that the compulsory insurance and the insurance for poor has a positive relationship with the LOS, however, the voluntary insurance has little effect on the LOS. Also, insurance is increased by many compulsory factors. Again, the effects of health insurance on hospital admission and the LOS are varied across income, regions and types of health factors. The compulsory and voluntary insurance also increase the odds of hospital admission more for the low and middle income respondents than other types of respondents. For the patients visiting provincial hospitals, the effect of insurance on the LOS is greater than for the ones visiting district hospitals.

Bhatti, Rana and Grooten dorst. 2006	The data were collected from the Statistics Canada's Canadian Community Health Survey (CCHS) in 2003. Methodology: two-part regression model. This econometric paper uses the two-part regression model (the probit and linear regression) to analyze the effect of dental insurance on the decision and frequency of using dental services. The explanatory variables are: five groups of income, five groups of oral health, 25-75+ age group, sex, four groups of education, three groups of marital status (married or common-law; windowed, separated or divorced; single or never married) and the varying provinces in Canada. This study considered the oral health status as the important factor that affected the number of annual dental visits.	To examine the effect of general oral health, income, age, sex education and other factors on the dental services use and dental insurance coverage.	The results show an important gradient of socioeconomic status in the dental service use. The number of dental visits is higher among the individuals with higher incomes, female, married, or with higher education levels. The mean number of dental visits is higher among the people who have excellent or poor oral health status. For the age variable, the number of visits is decreasing sharply after 65 years of age and varies among different provinces. Obviously, the frequency of dental visits is higher for the provinces with higher dentist-to-population ratio, such as Ontario and British Columbia.
Buchmueller, Couffinhal, Grignon and Perronnin. 2004	The data were collected from the 1988 Enquête sur la santé et la protection sociale (ESPS) which is conducted by CREDES every two years. This econometric analysis uses the multinomial logit regression model to investigate the effect of different variables on two types of supplemental insurance coverage (employer-provided and individually purchased insurance coverage); and applies the Probit model to analyze the effect of the same variables on the probability of any supplemental insurance and the probability of any physician visits. The explanatory variables are insurance coverage (covered supplemental insurance; employment based coverage; individually purchased insurance), demographic characteristics which are: age, sex, married status, education level, and household income.	To examine the relationship of supplement insurance coverage and physician service use.	The effect of supplement insurance is significant in the probability of physician visits. However, this paper found that the supplement insurance is not significant in the frequency of physician visits or the types of different physician chosen.

Deri, 2005	The author used the data of three cycles of Canadian National Population Survey to analyze the network effects, especially regional and language factors, on the utilization of health care. The author also used a 20% sample of Canadian Census in 1996 to collect the information about the characteristics of neighborhoods. Based on Andersen Model (1995), the author constructed a regression model with the following indicators: age variables, gender, marital status, education level, household size, children, chronic condition and activity limitations, as well as urban, household income, working status and provinces. During the analysis, the author also considered two factors which affected utilization behaviors: one, the evidence of differences between the health care system for the locally born residents and immigrants; and two, the recent change of the "health immigrant" effect.	To exploit the network effect on the health care utilization, especially the language group effects on the utilization behavior.	The findings in this paper show that the network surely affects the utilization behaviour. The utilization of health services by immigrants has a positive relationship based on the number of doctors who speak the same language(s) as the immigrants in their neighborhoods.
Sarma and Rempel. 2007	The data were collected from the Government of India's National Sample Survey (NSS) Organization from July 1995 to June 1996. This empirical paper utilizes the two-stage regression model to analyze the utilization of maternal healthcare in rural and urban India. It employed the logistic and negative binomial regression model to estimate the determinants of the different types of health care utilization in urban and rural areas. The explanatory variables include: individual specific variables, household specific variables, awareness variables and accessibility variables.	To analyze the utilization of maternal healthcare in both rural and urban regions in India and the determinants of the decisions for women to register for the pre- and post-natal healthcare.	The result of this paper indicates that the education level of the mother significantly and positively affects the decisions to register and use the health care services in both rural and urban regions. However, the distance to a maternal health facility affects the decision of the mother in rural regions. Furthermore, the awareness of healthy behavior is an important determinant that affects the utilization of maternal-child health care services. This paper also demonstrates that the government can improve and effect change of the health status for women and children by reinforcing the

			information, education and communication efforts.
Meer and Rosen. 2004	The data were collected from Medical Expenditure Panel Survey (MEPS) of the waves in 1996, 1997 and 1998, which includes the information about insurance status and coverage, utilization of health care services, health condition and employment status. This paper uses the two-stage regression model to analyze the effect of insurance on the health care utilization, taking advantage of the individual's self-employment status as the instrumental variable. This study employs several medical treatments as the dependent variables, including Office-based provider, chiropractor, prescription, alternate care, night in hospital, outpatient hospital stay, dentist, optometrist, blood pressure, cholesterol check, physical, flu shot, prostate exam, breast exam, mammogram and pap smear. The right-hand side variables include: region, household size, race, gender, education level, age, age squared, and yearly effects.	To solve the endogeneity (which is derived from the relationship between the insurance and the utilization of health services) by using the instrumental variables strategy.	The main finding in this paper is that there are positive and statistically significant effects of insurance after adding the instrumental variable. In fact, the estimated impact of insurance on the diverse medical treatments by the instrumental method is greater than the counterpart. Unfortunately, this paper also finds that self-instrumental variable is not appropriate as the instrumental variable in this analysis about the insurance and utilization of health care services. Also, this problem leads to further studies.