CAHIER DE RECHERCHE #1716E
Département de science économique
Faculté des sciences sociales
Université d'Ottawa

WORKING PAPER #1716E
Department of Economics
Faculty of Social Sciences
University of Ottawa

Unmet Health Care and Health Care Utilization*

Vicky Barham†, Hana Bataineh‡, and Rose Anne Devlin§

November 2017

* The analysis presented in this paper was conducted at the COOL RDC which is part of the Canadian Research Data Centre Network (CRDCN). The services and activities provided by the COOL RDC are made possible by the financial or in-kind support of the SSHRC - Social Sciences and Humanities Research Council of Canada, the CIHR - Canadian Institutes of Health Research, the CFI - Canada Foundation for Innovation, Statistics Canada, Carleton University, the University of Ottawa and the Université du Québec en Outaouais. The views expressed in this paper do not necessarily represent the CRDCN's or that of its partners. We thank Catherine Deri Armstrong, Gilles Grenier and Mehdi Ammi for their comments on H. Bataineh's Ph.D. thesis (chapter 1) upon which this paper is based. R. A. Devlin acknowledges with gratitude the financial support of SSHRC grant number: 435-2012-0489.
† Department of Economics, University of Ottawa, 120 University Private, Ottawa, Ontario, Canada, K1N 6N5; e-mail: vbarham@uottawa.ca.
‡ Department of Economics, University of Ottawa, 120 University Private, Ottawa, Ontario, Canada, K1N 6N5; e-mail: hbataine@uottawa.ca.
§ Department of Economics, University of Ottawa, 120 University Private, Ottawa, Ontario, Canada, K1N 6N5; e-mail: radevlin@uottawa.ca.

Abstract

Objective: *To examine the causal effect of health care utilization on unmet health care needs.*

Methods: *An instrumental variables approach deals with the endogeneity between the use of health care services and unmet health care. The presence of drug insurance and the number of physicians in each health region are used to identify the causal effect. The reasons for unmet health care needs are grouped into system and personal ones. We use four biennial confidential master files (2001-2010) of the Canadian Community Health Survey.*

Results: *We find a clear and robustly negative relationship between health care use and unmet health care needs; a higher probability of unmet health care needs is attributable to a low use of health care services. One more visit to a medical doctor on average decreases the probability of having unmet health care needs by 0.028 points. If the unmet need is due to accessibility related reasons, this effect is 0.02 compared to only 0.015 point for personal related reasons.*

Conclusion: *Health care use reduces the likelihood of reporting unmet health care. That the link between health care utilization and unmet health care needs is stronger for accessibility related reasons than for personal reasons, suggests that policies like increasing the coverage of public drug insurance, and increasing the number of physicians can reduce the likelihood of unmet health care.*

Key words: *Unmet health care needs; Health care utilization; Instrumental Variables (IV); Canada.*

1. Introduction

Reported self-perceived unmet health care (UHC) is commonly used by researchers as an indicator of a range of difficulties that people face in accessing health care services (OECD, 2011). While it may represent a failure by the health care system to properly meet a person's health care needs, some amount of unmet health care is expected in a publicly-funded health care system when resources are efficiently distributed.

There is a widely-shared public perception that unmet health care need in Canada is 'too high' and that the distribution of unmet needs is socioeconomically skewed. Some population groups are reporting an increased likelihood of having an unmet health care need, including females, people in poor health, people with lower income, and those with chronic conditions (Chen et al., 2002; Law et al., 2005; Wu et al., 2005; Guend and Tesseron, 2009; Sibley and Glazier, 2009). Somewhat surprisingly, the data reveal that individuals reporting high UHC are also higher users of the health care system when compared to those with no UHC. Much of the literature finds that people who have more frequent visits with a GP, specialist or physiotherapist have an increased odds of reporting unmet health care needs, even after adjusting for health status and demographics (Chen et al., 2002; Kasman and Badley, 2004; Nelson and Park 2006). Previous mental health service users were more likely to report unmet mental health care needs as a result of acceptability or accessibility problems (Nelson and Park, 2006). Several other studies include UHC as a determinant of health care utilization and show that UHC is associated with higher utilization than expected based on health status and personal characteristics **(**Zuckerman and Shen, 2004; Allin et al., 2008; Allin and Masseria, 2009; Allin et al., 2010; Mojtabai and Crum, 2013).

Allin et al. (2008; 2010) provide a rich analysis of the factors underlying subjective unmet health care needs. They suggest that subjective UHC may reflect both the individual's experience with the health care system and the complexity of their health problem. Among other things, they assess whether subjective UHC is a signal of socioeconomic inequality and conclude that it does not signal income-related inequality in health care utilization. In another study, Zuckerman and Shen (2004) found that people with UHC needs were more frequent users of hospital emergency services. They were also found to be higher users of alcohol and drug treatment services (Mojtabai and Crum, 2013). Allin and Masseria (2009) report a positive association between forgone health care (an indicator of UHC) and the use of health care services (i.e., *ex post* higher HCU) in Europe. No relation between forgone health care and the number of physician's visits was detected in a Swedish descriptive analysis (Elofsson et al., 1998).

The factors influencing the use of services may be the same as those influencing unmet needs, leading to biased estimates of its impact on unmet health care needs and thwarting our ability to make a causal inference. We deal with this endogeneity problem by identifying the impact of health care use on unmet health care needs with two instruments: the presence of prescription drug insurance and the number of physicians per 100,000 inhabitants in an individual's area of residence. To reduce further problems that may be associated with omitted variables, we include a much richer set of determinants than is typically found in the literature.

In contrast to most existing studies that report a positive correlation between health care utilization and the probability of having unmet health care, we find it to be robustly negative once account is taken of endogeneity: individuals who are low-users of the system are more likely to have unmet health care needs when compared to their high-user counterparts. We also

find that the impact of HCU on unmet needs is larger for people who report that these needs arise for system (e.g., accessibility) reasons rather than for personal ones. This result suggests some potential policy avenues.

2. Methodology

When estimating a model with a dichotomous outcome variable and instruments, an IV probit approach comes immediately to mind. But this approach renders ascertaining the acceptability of instruments difficult. A common practice is to estimate a linear probability model (LPM) and verify that it yields estimates comparable with those arising from the probit. In this case, one can then rely on the IV LPM estimates. Furthermore, the use of the two-stage (IVLPM) procedure allows us to test the appropriateness of the instruments used. The IV approach is modeled as two stages:

$$\boldsymbol{HCU_i = \beta_0 + \beta_1 Z_i + \beta_2 X_i + \mu_i} \qquad (\mathbf{1})$$

$$\boldsymbol{UHC_i = \alpha_0 + \alpha_1 \widehat{HCU}_\iota + \alpha_2 X_i + \varepsilon_i} \qquad (\mathbf{2})$$

Equation (1) is estimated in the first stage. $\boldsymbol{HCU_i}$ is an indicator for the health care utilization over the past 12 months; Z_i is a vector of exogenous instruments; $\boldsymbol{X_i}$ is a vector of demographic, socioeconomic, health status, chronic condition and lifestyle indicators, and $\boldsymbol{\widehat{HCU}_\iota}$ represents the fitted values of $\boldsymbol{HCU_i}$ which are then used in the second stage (2). Two instruments are employed: the presence of drug insurance and the number of physicians per 100,000 in each health region. Identification relies on these instruments being highly correlated with health care utilization but not correlated with the error term in the $\boldsymbol{UHC}$ equation ($\boldsymbol{UHC_i}$ is a dichotomous indicator equal to 1 if individual i reports UHC needs and 0 otherwise) (Wooldridge, 2010). It is hard to test directly this latter exclusion restriction, but evidence available elsewhere finds that

prescription drug insurance and physician density affect health care utilization (and UHC therefrom, as discussed below). We test for the orthogonality between the instruments and the second stage using the Hansen *J* test for over-identification. Conditional on the validity of the instruments used, we reject the hypothesis of no correlation between health care utilization and the error term, and conclude that there is an endogeneity problem.

The linear IV method may not produce consistent estimates with a dichotomous dependent variable (Wooldridge, 2010). Thus, as a robustness test we also employ a Control Function (CF) approach and compare the results to those obtained from the conventional two-stage (IVLPM). The CF approach entails estimating equation (2) by ordinary least squares and obtaining the estimated residuals $\hat{\mu}_i$ and then including them in the probit model of equation (1).

To study the relationship between health care utilization and UHC needs, we use three different indicators of health care use in the last 12 months as independent variables: the number of visits in the last 12 months to a family doctor, the number of visits to a specialist and visits to any medical doctor. The model is also estimated for several subgroups, including: urban and rural residents; individuals with a household income below $40,000 and those with greater than $40,000.

We are also able to divide the reasons for UHC needs into two categories: those due to system problems and those arising from personal choice (based on the categorizations developed by Chen et al. (2002); Allin et al. (2008)). This allows us to examine "systematic" reasons, such as; health care accessibility barriers, from "personal" reasons that are related to circumstances and choices unrelated to the health care system.

Numerous studies have linked prescription drug insurance to health care use: some focus on regimes with predominantly private health insurance (Christensen et al., 1987; Finkelstein,

2004; Pagan and Pauly, 2006); others on those with little public insurance (Buchmueller et al., 2004; Höfter, 2006); and some studies look at fully-public primary health insurance (Sarma et. al., 2007; Allin et al., 2009; Allin and Hurley, 2009; Devlin et al., 2011). In a publicly funded primary health care regime with zero costs for a physician consultation, like in Canada, Devlin et al. (2011) found that the presence of drug insurance increased the likelihood of consulting a physician, an effect that was more pronounced for less heavy users of the health-care system. It seems reasonable that the presence of prescription drug insurance would affect health care utilization, but there is no reason to believe that it would otherwise have an impact on unmet health care.

In Canada, as elsewhere, there are three types of prescription drug insurance programs: employer-sponsored insurance; government-funded insurance (for targeted groups); and individual-initiated insurance. Employer-sponsored drug insurance covers most full-time employees and represents the highest percentage of drug insurance coverage in the dataset used here (about 65%). Government drug insurance targets specific groups such as seniors (65 years and above) and social assistance recipients (Daw and Amorgan, 2012). Individually-initiated (private or group) plans are privately purchased and run the gamut of ages. The problem of adverse selection in drug-insurance coverage in which those who need coverage are more likely to seek it, is much less acute in the Canadian context than in the US one. Universal primary-care coverage dampens adverse selection in employer-sponsored plans (Devlin et al., 2011), and seniors and social assistance recipients are covered by government insurance regardless of their health status. To reduce further the possibility of adverse selection, we control for health status and the presence of different chronic conditions that may affect drug insurance choices. The

presence of drug insurance lowers the costs associated with use of the health care system, thus directly affecting health care utilization.

We expect our second instrument, the number of physicians per 100,000 residents in the individual's health region which reflects the supply of physicians, to influence health-care use directly.[2] McDonald and Conde (2010) finds this variable to be positively associated with the number of GP visits by individuals. It may influence UHC through the rate of health care utilization as the number of physicians per 100,000 residents (by region) captures the mismatch between the spatial distribution of physicians across health regions and the spatial distribution of potential patients require their services.

We test for orthogonality between the instruments and the second stage (main regression) using the Hansen J test for over-identification (reported at the bottom of table 5). In all cases, we cannot reject the null hypothesis, meaning that at least one of our instruments is valid. We also test for the presence of endogeneity (again, reported at the bottom of table 5) and reject the hypothesis of no correlation between health care utilization and the error term, confirming that there is an endogeneity problem.

3. Data, Variables and Descriptive Statistics

Four confidential master files (2001; 2003; 2005 and 2010) of Statistics Canada's Canadian Community Health Surveys (CCHS) are employed. These surveys are conducted every two years on a representative sample of Canadian residents, aged 12 and over, living in private dwellings in all provinces and territories (excluding people living on Crown lands, Canadian force bases, Indian reserves and institutions and some remote regions). The CCHS is ideally

[2] In 2001, Alberta, Saskatchewan and British Colombia had no information about the number of GPs at the health region level; therefore, we used provincial-wide information for that year. After 2001, all provinces have health regions except for Canada's least populous province, Prince Edward Island for which we use the number of physicians per 100,000.

suited for our research question as it includes information about the use of health care services, health status, chronic conditions and socioeconomic factors. The presence of unmet health care needs is measured by the response to the question: "during the past 12 months, was there ever a time when you felt you needed health care but you didn't receive it?". The respondents also provide different reasons for not receiving the care, which we group into those related to the system such as, unavailable services and waiting time, and those that are personal, like the dislike of the doctor.

Pooling all four cycles of the CCHS together yields 453,891 observations; but several sample restrictions are necessary. We coded the missing information on socioeconomic variables like education and income by dummy variables to reduce their effect on the sample size. Because we are interested in UHC, we eliminate all individuals under the age of 18, reducing the sample by 44,068 observations. Once the sample excludes persons with missing information on UHC and health care utilization (reducing the sample by 2,370 observations) as well missing information on the instruments (a further reduction of 14,122 observations), and missing information on other control variables (loosing 11,120) on the usable sample for my analysis becomes 382,211. Table 1 defines the variables used in the analyses.

Unfortunately, information on drug insurance is not available for all cycles of the CCHS: it is contained in the CCHS 2003 sample and for residents of Ontario in 2005. To overcome this problem, we construct a proxy variable for the presence of drug insurance and then test to see how the proxy holds up against the actual data. Drug insurance is deemed to be present if the individual is: a senior (65 and over), is a recipients of social assistance or employed full time.[3]

3. Social assistance recipients are eligible for the public drug insurance across all provinces in Canada; there are some interprovincial differences in the eligibility for this coverage for seniors. In four provinces, seniors are eligible for coverage only if they belong to low income groups (Daw and Amorgann, 2012). We first create the proxy variable using only the provinces that offer seniors public coverage and then compare these results to those that arise

For this proxy variable to be useful it has to be highly related with those who actually have drug insurance – and indeed it is. Table 2 provides some sub-sample means for the CCHS 2003 and 2005 (Ontario) surveys (n=143,979) in which the question about source of prescription drug insurance was asked. The first two columns of table 2 describe some characteristics of the average respondent who reported having drug insurance (n=111,073) and not having insurance (32,906); the second two columns presents the same information but this time we use our proxy measure of the presence of insurance (103,123 and 40,856).

We note that the proxy measure is picking up 7% fewer observations when compared to the actual holders of insurance. The average characteristics of the actual holders of insurance and those of the proxy variable are reasonably comparable, with a few exceptions. For instance, fewer females have insurance in the proxy group (47% versus 51%), and fewer individuals are married in the proxy group (56% versus 59%). One way to ascertain if the proxy indicator of drug insurance performs similarly to the actual data, is to estimate the model (described by equations (2) and (3)) with the restricted sample (2003 and 2005-Ontario) using both measures of the presence of drug insurance as instrument. Table 3 presents these results when medical doctor visits are the measure of health care utilization for brevity, although we ran regressions for all three measures of HCU separately. The estimated coefficient for medical doctor visits is similar whether the IV procedure uses actual data on drug insurance (-0.032) or our proxy variable (-0.037). The difference in these estimates may arise because the proxy understates the presence of prescription drug insurance in the sample.

---

when we include the seniors from all ten provinces in the proxy variable. The results are very similar; hence we include seniors from all provinces in the proxy, and control for provincial jurisdiction to take account of differences between provinces.

In addition to indicators of health care utilization, socio-demographic characteristics, health status, and chronic conditions are included to help explain the presence of unmet health care. The possibility of omitted variable bias is reduced by controlling for several other potential determinants of unmet-health care needs: lifestyle indicators (smoking and drinking); the complexity of health problems (whether the individual experiences a health problem that affects his or her life most of the time); individual expectations and preferences (partially captured by whether the individual is a recent or long-term immigrant, as well as the level of education); provincial and year fixed effects capture geographic variations and changes in UHC over the 10 years.

To ensure that each survey year is accorded the same overall weight in the regression, we use normalized CCHS weights, where the sum of the weights in each cycle is unity (e.g., Brochu, Deri and Morin, 2012). As a robustness check, we re-estimated all the regressions using the Statistics Canada master weights for each cycle – this did not make any significant difference.

Table 4 presents the means of the variables used for the full sample (n=382,211), and for those who report UHC=1 (n=46,603) and UHC=0 (n=335,608). We see from these simple averages that females are more likely to report UHC than males; individuals with UHC are younger on average than individuals with no UHC; married people are less likely to report UHC than not, and so too are immigrants. There is a little higher risk of UHC among lower income groups compared to higher income ones; but the higher educated are more likely to report UHC than not. People in poor to fair health are twice as likely to report UHC as not (21.6% vs. 10.5%); for the most part, individuals with heart problems, arthritis, cancer, stroke or injury are more likely to report UHC; there is not much difference between those who report and do not report UHC for respondents with diabetes.

The descriptive statistics in table 4 reveal higher health care utilization among individuals who report UHC compared to those with no UHC: they have on average more visits to their family, specialist and any medical doctors, and they are more likely to have at least one consultation with doctors. Smoking appears to be associated with a higher likelihood of reporting UHC; those who never consume alcohol are slightly less likely to have UHC.

5. Results and Discussion

We begin by not controlling for endogeneity. Three regressions with three different measures of HCU were estimated. This exercise was instructive: the estimated coefficient on HCU was always **positive** and statistically significant, corroborating much of the published work to date that finds health-care utilization to be positively correlated with the presence of unmet health care needs. For space reasons, we present only one specification of this model – the one which uses the number of visits to a medical doctor (family plus specialist) over the past year as the HCU indicator. These results are found in table 5, column (1) and suggest that an additional visit to a medical doctor is associated with an **increase** in the likelihood of having unmet health care of 0.003 points.

Once we control for endogeneity – again using three indicators of health-care use – and even after parsing the sample in a number of ways, the estimated coefficient on HCU is always **negative**: without exception, use of health care services leads to a reduction in the likelihood of reporting UHC, *ceteris paribus*. Column (2) of table 5 contains the IVLPM for the same specification as in the first column. This is followed by the results when the data set is divided into those who specify "system" reasons for their UHC (column (3)), and those who cite "personal" ones (column (4)). Columns (5) and (6) report the IVLPM results for females and

males separately. The final column presents the marginal effects from the Control Function approach to estimating the basic model (again, comparable to column (2)).

Across the board, we find that one more medical doctor visit decreases the likelihood of experiencing unmet health care needs of between 0.015 and 0.041 points depending on group analyzed (table 5). To put these numbers in perspective, recall that the estimated coefficient on the constant term provides the estimated probability of, in our case, reporting unmet health care for the base group. To this number, we need to add in the effect from the age of the individual. Suppose we have an individual of average age (46) this would add another 0.001*46 or 0.046 to the constant: from our main results in column (2) the estimated probability for our average aged individual is thus 0.451, for the system reasons group it is 0.355 and so on. These are reported after the constant term and help to provide a better context for the point changes associated with the variables in our analyses. For instance, an additional one medical doctor visit decreases the estimated probability of reporting UHC by 0.028 which represents a reduction of 0.028/0.451 or 6.2%.

Irrespective of which measure of HCU is employed, when we separate the sample into those who report "system" reasons for the UHC, and those who report "personal" ones, we find a much larger impact of health-care utilization on unmet health care needs for the system group relative to the personal group. For instance, columns (3) and (4) of table 5 reveal that one extra visit to a medical doctor leads to a 0.02 point decrease in the probability of having UHC due to system reasons and a 0.015 decrease due to personal reasons. The fact that UHC seems to be more responsible to the presence of systemic barriers to health-care utilization bodes well for public policy solutions to this problem.

Although the focus of this paper is the link between health care use and unmet health care, a number of other factors influence unmet health care needs. From table 5, we see that the sex of the respondent matters: one extra visit to a medical doctor leads to a 0.041 point decrease in the probability of reporting UHC for females, and a much smaller 0.017 decrease for males. One possible explanation is that, since women often have the responsibility for accessing primary care for themselves and for their children, women may actually see their physicians more often and may profit from consultations for their children to discuss their own health problems as well.

When we employ the control function technique rather than the IVLPM, the results are similar to those reported in the other columns. Health care use has a negative impact on UHC, and one more visit to the family doctor reduces the likelihood of reporting UHC by 0.027 points as opposed to 0.028 in the IV LPM model with the identical specification.

Earlier studies found a higher prevalence of UHC for individuals living in urban areas than rural areas (e.g., McDonald and Conde, 2010). We parsed the data into urban and rural residents and found that an extra visit to a medical doctor decreases the probability of UHC by 0.026 points for urban residents and 0.04 points for rural residents, as reported in table 6. We separated the data into those living in households with an income of $40,000 or less, and those with an income above $40,000. We found a much larger a negative link between health care utilization and reported UHC for households below $40,000, compared to the richer group: one more visit to a medical doctor decreases the probability of UHC for the poor group of 0.05 points and 0.024 for the richer one.

Many other variables are associated with reporting UHC. Focusing on the basic specification of column (2), we see that, *ceteris paribus*, females have a large, 0.069 point higher probability of reporting UHC when compared to males. Urban residents have a 0.015 point

higher probability of UHC than rural ones. The results above are largely consistent with most of the studies on UHC (Kasman and Badley, 2004; Nelson and Park, 2006; Sibley and Glazier, 2009; Marshall, 2011) which found a high prevalence of UHC among females, and individuals living in urban areas, but our findings about urban residents contrast with those of Chou et al. (2002), and McDonald and Conde (2010).

We include age squared to account for non-linearities, the squared term dampens slightly the positive effect of age on UHC. While married individuals are a bit more likely (0.006) to experience UHC relative to singles, those in a common law relationship have a much higher likelihood (0.02) of experiencing UHC relative to singles. For married people, this effect is entirely driven by those who report unmet needs because of system problems, whereas common law people report both types of reasons. The findings in other studies with respect to marital status are mixed: insignificant in explaining overall UHC according to Nelson and Park (2006) and Bryant et al., (2009); but positively linked to being married according to Nelson and Park (2006).

Income is an important determinant of UHC. People with low income are more likely to report UHC than people in higher income groups: for instance, *ceteris paribus*, people with household income $20,000- $40,000 thousand dollars have a 0.022 point lower probability of reporting UHC than people with an income of less than $20,000. The probability of reporting UHC for people with an income of $80,000 and above is further lowered by 0.04 points compared to people in the lowest income group. Individuals in wealthier households have the lowest risk of reporting unmet health care needs. This relationship is also found in Kasman and Badley (2004), Sibley and Glazier (2009) and Marshall (2011), and highlights the importance of income and education in shaping health status (Spencer et al., 2004). Even when health care

services are publicly funded, there are several factors that can explain the lower prevalence of UHC among wealthy individuals. For instance, they may live in areas that have better access to health care services or they can afford the cost associated with the travel to visit their doctors.

The level of education has a positive impact on UHC: compared to people with post–secondary education, the probability of UHC for individuals with less than secondary is lower by 0.051 points, while it is lower by 0.037 points for individuals with secondary education. These findings are consistent with those found elsewhere (Kasman and Badley, 2004; Sibley and Glazier, 2009; Marshall, 2011). The positive relation between the level of education and the probability of having UHC may also reflect their high expectations about the health care system

We find that being self-employed or being a student is not significantly associated with the risk of UHC. Self-employed individuals may have a more flexible time when scheduling for an appointment to see his doctors. And health care is usually provided on campus for most universities in Canada, making access for students easy.

Household size has a negative impact of having the risk of UHC; living attached to more household members is associated with a decrease in the likelihood of having UHC. This result highlights the importance of the availability of tangible support in reducing the barriers to health care.

There is a strong negative association between health status and the probability of UHC: people with excellent health are 0.24 points less likely to report UHC compared to those in fair or poor health. Chronic conditions like heart disease, arthritis or diabetes all contribute to reporting UHC; an injury in the last 12 months increases the probability of having UHC 0.094 points. These findings undoubtedly reflect the extent to which medical professionals can effectively deal with these various conditions (e.g., Kasman and Badley, 2004). We do not take

account of co-morbidities which would, in fact, increase the likelihood of reporting UHC even further. The strong relation between UHC and the presence of chronic conditions are consistent with most other studies on UHC (Kasman and Badley, 2004; Nelson and Park, 2006; Sibley and Glazier, 2009; Marshall, 2011). The impact of health problem complexity is captured by the variable representing health problems that affect an individual's life most of the time – which has a large positive estimated coefficient (0.187).

In addition to the usual list of determinants of UHC, we include variables not commonly discussed in the literature on unmet health care needs:[4] lifestyle, obesity, self-employment, being a student and the number of people living in the same household. We see clearly from the results reported in table 5 that smoking has an impact on having UHC: daily smokers have a probability of UHC that is 0.022 points higher than that of a nonsmoker; smoking occasionally leads to a 0.016 point increase in reporting UHC. Alcohol consumption has no significant impact on the overall UHC.

Still looking at column (2) of table 5, we see that, in general, immigrants are no different than Canadian born when it comes to reporting UHC. If we examine the reasons for any UHC, however, this finding becomes nuanced. New immigrants (under ten years) are more likely to report UHC for system reasons and less likely to report it for personal reasons, relative to Canadian born. These two effects cancel each other out in the regressions with the reasons combined. This finding certainly suggests that there are some systemic issues potentially affecting access to care by new immigrants and would be worthy of further investigation.

For more than half of those who reported unmet health care, accessibility problems were cited as the main reasons for not having their needs met. These problems reflect the

[4] Only one paper, Bryant et al., (2009), controls for smoking behaviour in the analysis of the UHC of urban residents in British Columbia, Canada.

unavailability of services in some areas, the costs of accessing health care, language barriers, transportation and long waiting times. One concern is the higher prevalence of these barriers among disadvantaged individuals. In contrast, UHC that is due to personal reasons may stem from personal circumstances and attitudes such as: deciding not to seek care, being busy, the dislike of doctors, and believing that the care would be inadequate.

Looking at the estimated coefficients from the sample which is decomposed into accessibility and personal reasons for UHC, one finds that these coefficients, whenever statistically significant, are larger for system reasons compared to personal ones. The significantly larger magnitude found for the system-related group may reflect the fact that this group is facing real access problems when trying to get health care.

6. Conclusions

This paper examines the causal effect of health care utilization on unmet health care needs by carefully dealing with the problem of endogeneity. This is accomplished by including two instruments for HCU in the unmet health care needs regressions. We also pay close attention to the relationship between different indicators of health care utilization and the stated reasons for unmet healthcare needs, differentiating between system problems which include availability of services in the individual's area, and individual-specific issues, like being too busy. And, we examine how the causal effect of health care utilization on UHC varies by geographic area (urban, rural), education status and by household income.

The results indicate a clear and robustly negative relation between health care use and reported UHC which is contrary to the findings of most studies that do not take account of endogeneity. Individuals who are more likely to report UHC are those who do not use the system very much, *ceteris paribus*. Our results indicate that one more visit to a doctor **decreases**

the probability of having unmet health care needs by 0.028 points (or by 0.071 points if we restrict our measure of health-care use to visits to family doctors only). In other words, we find that the more the individual uses the health care system, the more likely that his or her health needs are met.

The reasons behind the reporting of unmet health care needs matter. For instance, one more visit to a medical doctor reduces the probability of having unmet needs by 0.02 points when we look at needs arising from system reasons, but by 0.015 points when we look at needs arising from personal reasons. These results suggest that increasing access to physicians (by increasing supply or offering alternatives) would help reduce the reported UHC – which is somewhat comforting insofar as increasing access can be affected through policy levers.

We also find differences between rural and urban dwellers. Health care use causes a bigger reduction in the likelihood of reporting UHC for rural dwellers than for urban ones; it also causes a bigger reduction in this likelihood for poorer individuals relative to richer ones. These suggest that target policies affecting access to services for specific populations could yield important benefits.

Despite the fact that Canada has universal access to "free" primary health care, one finds significant differences in accessibility across sub-groups of the population. This may be due to the fact that coverage does not extend to all services: it does not cover, for example, the cost of prescription drugs (Marshall, 2011). Polices like increasing the coverage of public drug insurance lower the costs of implementing physician treatment plans, reducing the cost barriers associated with visiting physicians. Polices like an increase in the number of general physicians in health regions, and encouraging interdisciplinary health teams, can also help reduce access barriers.

One limitation of our study is its reliance on cross-sectional data, which can confound causality and cohort effects. Detailed time series data on unmet health care needs and a rich set of covariates would improve the empirical analysis.

References

Allin S., Grignon M., Le Grand J. (2010). Subjective unmet need and utilization of health care services in Canada: What are the equity implications? *Social Science & Medicine,* 70: 465–472.

Allin S., Masseria C. (2009). Unmet need as an indicator of access to health care in Europe. *The London School of Economics and Political Science* available from: http://ec.europa.eu/social/BlobServlet?docId=4741&langId=en

Allin S., Hurley J. (2009). Inequity in publicly funded physician care: what is the role of private prescription drug insurance? *Health Economics,* 18 (10): 1218–32.

Allin S., Grignon M., Hurly J., Jamal T. (2008). The relationship between self –reported unmet need for health care and health care utilization. *McMaster RDC Research Paper* No. 23.

Brochu P., Deri C., Morin L. (2012). The 'trendiness' of sleep: an empirical investigation into the cyclical nature of sleep time. *Empir Econ,* 43:891–913.

Bryant T., Leaver C., Dunn J. (2009). Unmet healthcare need, gender, and health inequalities in Canada. *Journal of Health Policy,* 91: 24-32.

Buchmueller T., Couffinhal A., Grignon M., Perronnin M. (2004). Access to physician services: does supplemental insurance matter? Evidence from France. *Health Economics,* 13:669–87.

Canadian Institute for Health Information (CIHI) (2011). Supply, distribution and migration of Canadian physicians.

Canadian Institute for Health Information: *Health indicators* http://www.cihi.ca/hirpt/?language=en&healthIndicatorSelection=Phys_GP&healthIndicatorSelection=Phys_Splists.

Chen J., Hou F., Sanmartin C., Houle C., Tremblay S., Berthelot J. (2002). Unmet health care needs. *Canadian Social Trends,* 11 –008: 18 –22.

Christensen S., Long S., Rodgers J. (1987). Acute health care costs for the aged Medicare population: overview and policy options. *The Milbank Quarterly,* 65:397–425.

Daw J., Amorgan S. (2012). Stitching the gaps in the Canadian public drug coverage patchwork? A review of provincial pharmacare policy changes from 2000 to 2010, *Health Policy*, 104(1): 19–26.

Devlin RA., Sarma S., Zhang Q. (2011). The role of supplemental coverage in a universal health insurance system: some Canadian evidence. *Health Policy,* 100: 81-90.

Elofsson S., Undén L., Krakau I. (1998). Patient charges - a hindrance to financially and psychosocially disadvantaged groups seeking care. *Social Science and Medicine,* 46 (10): 1375-1380.

Finkelstein A. (2004). The interaction of partial public insurance programs and residual private insurance markets: evidence from the US Medicare program. *Journal of Health Economics,* 23:1–24.

Guend H., Tesseron L. (2009). Unmet needs for primary care in the context of a universal healthcare system: The case of Québec. *Montreal: Centre – Urbanisation Culture Societe.*

Höfter R. (2006). Private health insurance and utilization of health services in Chile *Applied Economics,* 38:423–39.

Kasman N. M., Badley E. M. (2004). Beyond access: who reports that health care is not being received when needed in a publicly-funded health care system? *Canadian Journal of Public Health,* 95 (4): 304–308.

Law M., Wilson K., Eyles J., Elliott S., Jerreta M., Moffat T., et al. (2005). Meeting health need, accessing health care: the role of neighbourhood. *Health & Place,* 11:367–377.

Marshall E., (2011). Do young adults have unmet healthcare needs? *Journal of Adolescent Health,* 49: 490–497.

McDonald J., Conde H. (2010). Does geography matter? The health service use and unmet health care needs of older Canadians. *Canadian Journal on Aging, Volume* 29: 23 -37.

Mojtabai R., Crum R. (2013). Perceived unmet need for alcohol and drug use treatments and future use of services: Results from a longitudinal study. *Drug and Alcohol Dependence,* 127 (1-3): 59-64. Retrieved from http://search.proquest.com/docview/1313404414?accountid=14701.

Nelson C., Park J. (2006). The nature and correlates of unmet health care needs in Ontario, Canada. *Social Science and Medicine,* 62 (9): 2291 –2300.

OECD (2011), "Unmet health care needs", in *Health at a Glance 2011: OECD Indicators*, *OECD Publishing.* http://dx.doi.org/10.1787/health_glance-2011-52-en.

Pagan J., Pauly M. (2006). Community-level uninsurance and the unmet medical needs of insured and uninsured adults. *Health Services Research,* 41(3 Pt 1): 788–803.

Sarma S., Basu K., Gupta A. (2007). The influence of prescription drug insurance on psychotropic and non-psychotropic drug utilization in Canada. *Social Science and Medicine,* 65:2553–65.

Sibley L., Glazier R. (2009). Reasons for self-reported unmet healthcare needs in Canada: a population-based provincial comparison. *Healthcare Policy,* 5 (1): 87–101.

Spencer, B, Buckley, N. J., Denton, F. T. Denton, Robb, A. L. (2004). Healthy Aging at Older Ages: Are Income and Education Important?. *Canadian Journal on Aging*, Vol. 23, Supplement 1, pp. S155-S169.

Theriault L. (2012). Canadians are less satisfied the deeper they go into the health system. *The Conference Board of Canada.* Available from: http://www.conferenceboard.ca/press/newsrelease/12-10-26/canadians_are_less_satisfied_the_deeper_they_go_into_the_health_system.aspx.

Tremblay S., Ross N., Berthelot J. (2002). Regional socio-economic context and health. Ottawa: Supplement to Health Reports 13, *Statistics Canada, Catalogue* 82-003.

Terza V., Basu A., Rathouz J. (2008). Two-stage residual inclusion estimation: Addressing endogenuity in health econometric modeling. *Journal of Health Economics*, 27: 531-543.

Vingilis E., Lote R., Seeley J. (1998). Are trade agreements and economic co-operatives compatible with alcohol control policies and injury prevention? *Contemporary Drug Problems,* 25: 579-620.

Weissman J., Stern R., Fielding S., Epstein A. (1991). Delayed access to health care: risk factors, reasons, and consequences. *Ann Intern Med,* 114:325-331.

Westin M., Ahs A., Persson K., Westerling R. (2004). A large proportion of Swedish citizens refrain from seeking medical care – lack of confidence in the medical services a plausible explanation? *Health Policy,* 68: 333–344.

Wooldridge J. (2010). Econometric analysis of cross section and panel data, 2nd ed. *The MIT Press,* Cambridge, MA.

Wu Z., Penning M., Schimmele C. (2005). Immigrant status and unmet health care needs. *Canadian Journal of Public Health,* 96 (5): 369–373.

Zuckerman S., Shen Y. (2004). Characteristics of occasional and frequent emergency department users – do insurance coverage and access to care matter*? Medical Care*, 42 (2): 176–182.

Table 1: Variable definitions

Dependent variables	
UHC	1= unmet health care needs, 0 otherwise
System	1= system reasons, 0 if no UHC
Personal	1= personal reasons, 0 if no UHC
Health care utilization	
Num Visit Med	number of visits in the last 12 months to any medical doctor.
Socio-demographic variables	
Female	1= female, 0 otherwise.
Male	1= male, 0 otherwise: **reference**
Age	age in years
Age sq	age square
Marital status	
Married	1= married, 0 otherwise
Common	1= common law relationship, 0 otherwise
Single	1= single, widow, separated or divorced, 0 otherwise: **reference**
Immigration status	
Canadian born	1= Canadian born; 0 otherwise: **reference**
Imm 0-9	1= immigrated to Canada < 10 years, 0 otherwise
Imm 10	1= immigrated to Canada >= 10 years, 0 otherwise
Total household income	
Income 20K	1= total household income in Dollar <20,000, 0 otherwise: **reference**
Income 20K-39K	1= total household income in Dollar >=20, 000 and <=39, 999, 0 otherwise
Income 40K-59K	1= total household income in Dollar >=40, 000 and <=59, 000, 0 otherwise.
Income 60K-79K	1= total household income in Dollar >=60, 000 and <=79, 999, 0 otherwise.
Income 80K+	1= total household income in Dollar >=80, 000, 0 otherwise.
Income ns	1= household income not stated, 0 otherwise.
Educational status	
Less sec	1= less than secondary education, 0 otherwise.
High Schl	1= secondary school degree, 0 otherwise.
Some post	1= some post-secondary education, 0 otherwise.
Post grad	1= post-secondary school degree, 0 otherwise: **reference**
Education ns	1= education not stated, 0 otherwise.
Student	1= student, 0 otherwise
Student ns	1= student not stated, 0 otherwise
Self employed	1= work self-employed, 0 otherwise
House size	Total number of household size
Health status & chronic conditions	
Health exc	1= health status excellent, 0 otherwise

Health vgd	1= health status very good, 0 otherwise
Health gd	1= health status good, 0 otherwise
Health fp	1= health status fair or poor, 0 otherwise: **reference**
Heart	1= heart problems, 0 otherwise
Cancer	1= cancer, 0 otherwise
Arthritis	1= arthritis, 0 otherwise
Diabetes	1= diabetes, 0 otherwise
Stroke	1= stroke, 0 otherwise
Injury	1= an injury in the last 12 months, 0 otherwise
Health impact	1= health problem impacts his/her life most of the time, 0 otherwise
Life-style variables	
Obesity	1= BMI $\geq$ 30 kg/m^2, 0 otherwise
Obesity na	1=BMI non-applicable, 0 otherwise: in all cycles of the CCHS, information on obesity was not collected from pregnant women, also in 2001 and 2003 information was not collected from individuals aged 65 and older
Obesity ns	1=BMI applicable but not stated, 0 otherwise
Alcohol consumption	
Drink never	1= non-drinker, 0 otherwise: **reference**
Drink regular	1= regular drinker, 0 otherwise
Drink occasional	1= occasional drinker, 0 otherwise
Smoking behaviour	
Smoke never	1= never smoked, 0 otherwise: **reference**
Smoke daily	1= daily smoker, 0 otherwise
Smoke occasional	1= occasional smoker, 0 otherwise
Geographical variables	
Urban	1= living in an urban area; 0 if rural
Rural	1= living in rural areas, 0 otherwise: **reference**
BC	1= living in the province of British Columbia, 0 otherwise
QC	1= living in the province of Quebec, 0 otherwise
ON	1= living in the province of Ontario, 0 otherwise: **reference**
Atlantic	1= living in the province of Newfoundland, Prince Edward, Nova Scotia or New Brunswick, 0 otherwise
Prairies	1= living in the province of Manitoba, Saskatchewan or Alberta, 0 otherwise

Table 2: Summary statistics selected variables -for 2003 and 2005 (Ont.)					
Variables	**Total sample**	**Actual drug insurance**		**Proxy drug insurance**	
		Actual drug insurance=1	**Actual drug insurance=0**	**Proxy drug insurance=1**	**Proxy drug insurance=0**
N	**143,979**	**111,073**	**32,906**	**103,123**	**40,856**
Female	0.510	0.513	0.500	0.472	0.596
Age	45.45	45.81	44.19	46.89	42.16
Married	0.567	0.589	0.487	0.556	0.593
Canadian born	0.753	0.777	0.669	0.755	0.749
Imm 0-9	0.062	0.048	0.114	0.054	0.082
Income 20K-	0.091	0.076	0.145	0.089	0.097
Income 20K-39K	0.180	0.156	0.264	0.173	0.197
Income 40K-59K	0.180	0.178	0.186	0.175	0.192
Income 60K-79K	0.153	0.164	0.112	0.157	0.143
Income 80K+	0.303	0.340	0.171	0.319	0.265
Some post	0.082	0.082	0.083	0.072	0.104
Post grad	0.539	0.557	0.477	0.547	0.519
Student	0.104	0.106	0.097	0.073	0.175
Self employed	0.113	0.083	0.219	0.026	0.312
Health exc	0.223	0.223	0.223	0.217	0.236
Health fp	0.114	0.113	0.123	0.111	0.124
Heart	0.053	0.055	0.047	0.060	0.038
Diabetes	0.051	0.053	0.042	0.054	0.043
Stroke	0.011	0.011	0.010	0.013	0.008
Urban	0.828	0.835	0.802	0.837	0.807
Rural	0.172	0.165	0.198	0.163	0.193
BC	0.095	0.088	0.123	0.089	0.110
QC	0.172	0.197	0.085	0.170	0.176
ON	0.562	0.551	0.601	0.570	0.545
Atlantic	0.055	0.051	0.068	0.057	0.051
Prairies	0.116	0.113	0.123	0.114	0.118

Note: Summary statistics are weighted by the provided person weight variable. The weights are normalized in each survey to add up to one, to give equal weights to each survey when I pool the data.

Table 3: The effect of health care utilization on UHC- CCHS 2003 and 2005 (Ont.) using actual drug insurance and proxy drug insurance.

Variables	IVLPM		CFA	
	UHC		UHC	
	Actual drug insurance	Proxy drug insurance	Actual drug insurance	Proxy drug insurance
Num Visit Med	-0.032***	-0.037**	-0.031***	-0.035***
	(0.007)	(0.013)	(0.005)	(0.009)
Female	0.076***	0.081***	0.071***	0.076***
	(0.009)	(0.017)	(0.007)	(0.011)
Age	-0.001	-0.001	-0.000	-0.000
	(0.001)	(0.001)	(0.000)	(0.000)
Age sq	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
Married	0.007	0.008	0.007**	0.008**
	(0.005)	(0.005)	(0.003)	(0.004)
Common	0.015**	0.016**	0.013**	0.013**
	(0.007)	(0.007)	(0.005)	(0.005)
Imm 0-9	-0.001	-0.002	0.002	0.000
	(0.009)	(0.010)	(0.007)	(0.007)
Imm 10	-0.004	-0.004	-0.004	-0.004
	(0.005)	(0.005)	(0.004)	(0.004)
Income 20K-39K	-0.019**	-0.020**	-0.016***	-0.016***
	(0.007)	(0.007)	(0.005)	(0.005)
Income 40K-59K	-0.027***	-0.028***	-0.021***	-0.022***
	(0.007)	(0.008)	(0.005)	(0.005)
Income 60K-79K	-0.040***	-0.041***	-0.032***	-0.034***
	(0.007)	(0.009)	(0.005)	(0.006)
Income 80K+	-0.039***	-0.040***	-0.030***	-0.032***
	(0.007)	(0.008)	(0.005)	(0.006)
Income ns	-0.038***	-0.039***	-0.032***	-0.034***
	(0.008)	(0.009)	(0.006)	(0.006)
Less sec	-0.050***	-0.053***	-0.047***	-0.050***
	(0.006)	(0.009)	(0.005)	(0.006)
High Schl	-0.037***	-0.039***	-0.036***	-0.037***
	(0.005)	(0.007)	(0.004)	(0.005)
Some post	0.001	0.001	-0.001	-0.001
	(0.007)	(0.007)	(0.005)	(0.005)
Education ns	-0.023	-0.024	-0.022*	-0.023*
	(0.014)	(0.015)	(0.012)	(0.012)
Student	-0.011	-0.012	-0.009*	-0.011**
	(0.007)	(0.008)	(0.005)	(0.006)
Student ns	0.045	0.050	0.018	0.022
	(0.034)	(0.039)	(0.046)	(0.047)
Self employed	-0.001	-0.003	-0.001	-0.004
	(0.006)	(0.008)	(0.005)	(0.006)
House size	-0.002	-0.002	-0.002	-0.002
	(0.002)	(0.002)	(0.001)	(0.001)

Health exc	-0.250***	-0.269***	-0.230***	-0.250***
	(0.031)	(0.055)	(0.023)	(0.038)
Health vgd	-0.210***	-0.226***	-0.186***	-0.204***
	(0.028)	(0.049)	(0.020)	(0.034)
Health gd	-0.156***	-0.169***	-0.136***	-0.150***
	(0.023)	(0.040)	(0.017)	(0.027)
Heart	0.056***	0.064**	0.064***	0.072***
	(0.015)	(0.025)	(0.010)	(0.016)
Cancer	0.096***	0.107**	0.094***	0.106***
	(0.021)	(0.036)	(0.015)	(0.024)
Arthritis	0.042***	0.046***	0.043***	0.047***
	(0.007)	(0.011)	(0.005)	(0.008)
Diabetes	0.038**	0.045**	0.038***	0.046**
	(0.014)	(0.022)	(0.010)	(0.015)
Stroke	0.053**	0.061*	0.062***	0.070***
	(0.026)	(0.032)	(0.013)	(0.018)
Injury	0.110***	0.116***	0.093***	0.099***
	(0.011)	(0.017)	(0.007)	(0.012)
Health impact	0.192***	0.202***	0.164***	0.176***
	(0.017)	(0.031)	(0.013)	(0.021)
Obesity	0.008	0.010	0.009**	0.010**
	(0.005)	(0.007)	(0.004)	(0.004)
Obesity na	0.138***	0.157**	0.132***	0.153***
	(0.039)	(0.063)	(0.028)	(0.043)
Obesity ns	0.001	0.000	0.000	-0.001
	(0.013)	(0.014)	(0.009)	(0.010)
Drink regular	-0.005	-0.007	-0.006	-0.008
	(0.008)	(0.010)	(0.007)	(0.008)
Drink occasional	0.008	0.009	0.007	0.007
	(0.008)	(0.008)	(0.007)	(0.007)
Smoke daily	0.030***	0.031***	0.028***	0.028***
	(0.004)	(0.005)	(0.003)	(0.004)
Smoke occasional	0.019***	0.020***	0.019***	0.019***
	(0.005)	(0.005)	(0.004)	(0.004)
Year 2003	-0.010**	-0.009*	0.010**	0.009**
	(0.005)	(0.005)	(0.004)	(0.004)
Urban	0.016***	0.018**	0.015***	0.017***
	(0.005)	(0.006)	(0.004)	(0.004)
BC	0.016**	0.017**	0.017***	0.018***
	(0.006)	(0.007)	(0.005)	(0.005)
QC	-0.010	-0.014	-0.008	-0.013
	(0.009)	(0.013)	(0.007)	(0.009)
Atlantic	0.010	0.011	0.009**	0.010**
	(0.006)	(0.007)	(0.005)	(0.005)
Prairies	-0.001	-0.001	-0.001	-0.001
	(0.005)	(0.005)	(0.004)	(0.004)
Constant	0.442***	0.471***		
	(0.052)	(0.092)		
Observations	143979	143979	143979	143979

Cragg- Donald Wald F Statistic	82.468	30.618	82.468	30.618
Hansen J Statistic	0.802	1.643	0.802	1.643
(P-value)	(0.370)	(0.199)	(0.370)	0.199
Durbin-Wu-Hasuman Chi2 statistic	37.429	17.593	37.429	17.593
(P-value)	(0.000)	(0.000)	(0.000)	(0.000)

Note: The regression models are weighted using the provided person weight variable. The weights are normalized in each survey to add up to one, to give equal weights to each survey when I pool the data. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 4: Summary statistics-for total sample and subgroups by UHC (2001-2010).

Variables	Total Sample	No UHC	Any UHC	UHC		
				System	Personal	Both
N	**382,211**	**335,608**	**46,603**	**31,975**	**14,378**	**3,049**
Female	0.509	0.500	0.576	0.592	0.535	0.576
Age	45.65	46.09	42.43	43.37	39.39	40.58
Married	0.544	0.553	0.478	0.496	0.432	0.440
Common	0.103	0.099	0.129	0.129	0.129	0.130
Single	0.353	0.348	0.393	0.375	0.439	0.430
Canadian born	0.776	0.774	0.797	0.782	0.831	0.785
Imm 0-9	0.059	0.059	0.058	0.064	0.043	0.065
Imm 10	0.165	0.167	0.145	0.154	0.126	0.150
Income 20K-	0.092	0.088	0.121	0.125	0.114	0.130
Income 20K-39K	0.173	0.172	0.184	0.189	0.182	0.197
Income 40K-59K	0.171	0.172	0.168	0.168	0.176	0.195
Income 60K-79K	0.147	0.147	0.142	0.139	0.146	0.141
Income 80K+	0.284	0.287	0.265	0.260	0.250	0.210
Income ns	0.133	0.134	0.120	0.119	0.132	0.127
Less sec	0.178	0.182	0.149	0.146	0.156	0.144
High Schl	0.183	0.186	0.158	0.151	0.172	0.148
Some post	0.085	0.083	0.103	0.098	0.121	0.127
Post grad	0.546	0.541	0.580	0.595	0.542	0.576
Education ns	0.008	0.008	0.010	0.010	0.009	0.005
Student	0.102	0.099	0.121	0.112	0.144	
Student ns	0.001	0.001	0.001	0.001	0.001	
Self employed	0.112	0.112	0.110	0.109	0.114	0.096
House size	2.894	2.895	2.888	2.852	2.977	2.842
Health exc	0.230	0.244	0.133	0.130	0.138	0.110
Health vgd	0.368	0.374	0.318	0.309	0.337	0.293
Health gd	0.284	0.277	0.333	0.336	0.333	0.343
Health fp	0.118	0.105	0.216	0.225	0.192	0.254
Heart	0.053	0.052	0.059	0.062	0.049	0.063
Cancer	0.025	0.024	0.030	0.032	0.022	0.026
Arthritis	0.174	0.166	0.228	0.244	0.190	0.230
Diabetes	0.054	0.054	0.052	0.056	0.038	0.051
Stroke	0.011	0.010	0.015	0.015	0.013	0.015
Injury	0.128	0.118	0.206	0.201	0.220	0.224
Health impact	0.242	0.213	0.453	0.465	0.429	0.536
Obesity	0.149	0.147	0.169	0.172	0.161	0.176
Obesity na	0.060	0.061	0.048	0.048	0.062	0.056
Obesity ns	0.021	0.022	0.025	0.025	0.020	0.026
Drink never	0.099	0.101	0.087	0.092	0.055	0.074
Drink regular	0.640	0.640	0.641	0.631	0.667	0.622

Smoke never	0.552	0.560	0.499	0.504	0.490	0.477
Urban	0.819	0.818	0.829	0.829	0.823	0.821
BC	0.131	0.132	0.130	0.128	0.132	0.108
QC	0.242	0.238	0.270	0.284	0.250	0.282
ON	0.389	0.391	0.369	0.365	0.373	0.366
Atlantic	0.076	0.076	0.072	0.072	0.072	0.075
Prairies	0.162	0.163	0.159	0.151	0.173	0.169
Num Visit Med	4.140	3.822	6.453	6.934	5.535	7.005

Note: All descriptive statistics are weighted. The weights are normalized for each cycle to add up to one to give equal weights to each survey when I pool the data.

Table 5: The effect of health care utilization on UHC (reference category is no UHC) - total sample (2001-2010).

Variables	LPM: UHC	IVLPM: UHC	IVLPM: System	IVLPM: Personal	IVLPM: UHC Females	IVLPM: UHC Males	CF: UHC
Num Visit Med	0.003***	-0.028***	-0.020***	-0.015***	-0.041**	-0.017**	-0.027***
	(0.000)	(0.007)	(0.006)	(0.005)	(0.014)	(0.007)	(0.005)
Female	0.030***	0.069***	0.053***	0.026***			0.066***
	(0.002)	(0.009)	(0.007)	(0.006)			(0.007)
Age	0.001***	0.001**	0.002***	-0.001***	-0.001	0.001**	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)
Age sq	-3.4E-05***	-4.2E-05***	-4.0E-05***	-4.8E-05	-4.4E-05***	-3.2E-05***	-4.5E-05***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Married	-0.003	0.006*	0.008**	0.000	0.006	-0.005	0.006**
	(0.002)	(0.003)	(0.003)	(0.002)	(0.006)	(0.004)	(0.003)
Common	0.013***	0.020***	0.018***	0.005**	0.012*	0.019***	0.017***
	(0.004)	(0.004)	(0.004)	(0.003)	(0.007)	(0.005)	(0.003)
Imm 0-9	0.006	-0.005	0.009*	-0.014***	-0.026**	0.011	-0.002
	(0.005)	(0.006)	(0.005)	(0.003)	(0.013)	(0.007)	(0.005)
Imm 10	0.002	0.000	0.005	-0.002	-0.011	0.005	0.001
	(0.003)	(0.004)	(0.003)	(0.002)	(0.007)	(0.004)	(0.003)
Income 20K-39K	-0.014***	-0.022***	-0.017***	-0.007**	-0.023**	-0.026***	-0.017***
	(0.004)	(0.005)	(0.004)	(0.003)	(0.008)	(0.006)	(0.003)
Income 40K-59K	-0.025***	-0.037***	-0.029***	-0.012***	-0.035***	-0.041***	-0.030***
	(0.004)	(0.005)	(0.004)	(0.003)	(0.009)	(0.007)	(0.004)
Income 60K-79K	-0.027***	-0.040***	-0.033***	-0.015***	-0.041***	-0.039***	-0.033***
	(0.004)	(0.006)	(0.005)	(0.003)	(0.009)	(0.007)	(0.004)
Income 80K+	-0.027***	-0.040***	-0.032***	-0.017***	-0.037***	-0.040***	-0.031***
	(0.004)	(0.005)	(0.004)	(0.003)	(0.009)	(0.007)	(0.004)
Income ns	-0.026***	-0.041***	-0.030***	-0.015***	-0.049***	-0.033***	-0.035***
	(0.004)	(0.006)	(0.005)	(0.004)	(0.011)	(0.007)	(0.004)
Less sec	-0.038***	-0.051***	-0.042***	-0.015***	-0.064***	-0.034***	-0.048***

	(0.002)	(0.004)	(0.003)	(0.002)	(0.008)	(0.004)	(0.003)
High Schl	-0.029***	-0.037***	-0.031***	-0.012***	-0.045***	-0.026***	-0.037***
	(0.002)	(0.003)	(0.003)	(0.002)	(0.007)	(0.004)	(0.003)
Some post	0.000	-0.002	-0.003	0.003	-0.005	-0.002	-0.004
	(0.004)	(0.004)	(0.004)	(0.003)	(0.007)	(0.006)	(0.003)
Education ns	-0.009	-0.016	-0.017*	-0.002	-0.014	-0.008	-0.016*
	(0.009)	(0.011)	(0.009)	(0.007)	(0.021)	(0.014)	(0.009)
Student	0.006	-0.006	-0.004	-0.005	-0.026*	-0.006	-0.006
	(0.004)	(0.005)	(0.004)	(0.003)	(0.015)	(0.006)	(0.004)
Student ns	0.038	0.084**	0.046	0.024	0.089*	0.054	0.080**
	(0.032)	(0.039)	(0.030)	(0.019)	(0.051)	(0.055)	(0.030)
Self employed	0.013***	0.002	0.000	0.000	-0.005	0.004	0.002
	(0.003)	(0.004)	(0.004)	(0.003)	(0.009)	(0.005)	(0.004)
House size	-0.002**	-0.002**	-0.003**	-0.000	-0.006**	-0.000	-0.002**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
Health exc	-0.108***	-0.243***	-0.180***	-0.103***	-0.338***	-0.168***	-0.226***
	(0.004)	(0.031)	(0.025)	(0.018)	(0.070)	(0.028)	(0.024)
Health vgd	-0.081***	-0.202***	-0.151***	-0.085***	-0.283***	-0.136***	-0.179***
	(0.004)	(0.027)	(0.022)	(0.016)	(0.062)	(0.025)	(0.021)
Health gd	-0.050***	-0.147***	-0.110***	-0.062***	-0.203***	-0.100***	-0.128***
	(0.004)	(0.022)	(0.018)	(0.013)	(0.049)	(0.022)	(0.017)
Heart	-0.010**	0.037**	0.025**	0.020**	0.053**	0.015	0.046***
	(0.004)	(0.012)	(0.010)	(0.008)	(0.021)	(0.012)	(0.009)
Cancer	0.002	0.088***	0.065***	0.041**	0.122**	0.056**	0.087***
	(0.005)	(0.020)	(0.016)	(0.013)	(0.042)	(0.020)	(0.015)
Arthritis	0.020***	0.043***	0.035***	0.014***	0.051***	0.046***	0.043***
	(0.003)	(0.006)	(0.005)	(0.004)	(0.013)	(0.008)	(0.005)
Diabetes	-0.023***	0.023**	0.016*	0.014*	0.038*	0.002	0.026**
	(0.004)	(0.011)	(0.009)	(0.008)	(0.021)	(0.012)	(0.009)
Stroke	-0.002	0.035**	0.021*	0.013	0.037	0.026	0.045***

	(0.008)	(0.015)	(0.012)	(0.008)	(0.024)	(0.017)	(0.009)
Injury	0.058***	0.094***	0.068***	0.043***	0.124***	0.077***	0.080***
	(0.003)	(0.009)	(0.007)	(0.005)	(0.021)	(0.009)	(0.007)
Health impact	0.111***	0.187***	0.140***	0.079***	0.224***	0.154***	0.160***
	(0.003)	(0.017)	(0.014)	(0.011)	(0.037)	(0.017)	(0.013)
Obesity	-0.004	0.004	0.002	0.003	0.011	0.002	0.004
	(0.003)	(0.004)	(0.003)	(0.002)	(0.008)	(0.004)	(0.003)
Obesity na	-0.011**	0.024**	0.021**	0.009	0.049**	-0.004	0.026***
	(0.004)	(0.009)	(0.007)	(0.006)	(0.022)	(0.006)	(0.007)
Obesity ns	-0.001	-0.009	-0.011	-0.006	-0.012	-0.015	-0.007
	(0.007)	(0.010)	(0.007)	(0.006)	(0.014)	(0.014)	(0.006)
Drink regular	0.015***	-0.000	-0.001	0.005*	-0.010	-0.001	0.001
	(0.004)	(0.006)	(0.005)	(0.003)	(0.011)	(0.007)	(0.005)
Drink occasional	0.007*	0.009*	0.005	0.010***	0.002	0.006	0.009**
	(0.004)	(0.005)	(0.004)	(0.002)	(0.007)	(0.007)	(0.004)
Smoke daily	0.020***	0.022***	0.014***	0.008***	0.027***	0.013***	0.019***
	(0.002)	(0.003)	(0.002)	(0.001)	(0.005)	(0.004)	(0.002)
Smoke occasional	0.016***	0.016***	0.010**	0.007**	0.023***	0.008*	0.015***
	(0.003)	(0.004)	(0.003)	(0.002)	(0.006)	(0.004)	(0.003)
Year2003	-0.026***	-0.030***	-0.011***	-0.026***	-0.034***	-0.026***	-0.029***
	(0.002)	(0.003)	(0.003)	(0.002)	(0.005)	(0.004)	(0.002)
Year2005	-0.022***	-0.032***	-0.019***	-0.039***	-0.038***	-0.026***	-0.030***
	(0.002)	(0.004)	(0.003)	(0.002)	(0.007)	(0.005)	(0.003)
Year2010	-0.011***	-0.023***	-0.009**	-0.039***	-0.027***	-0.023***	-0.023***
	(0.003)	(0.005)	(0.004)	(0.003)	(0.008)	(0.006)	(0.004)
Urban	0.004*	0.015***	0.011***	0.006**	0.024***	0.009**	0.015***
	(0.002)	(0.003)	(0.003)	(0.002)	(0.007)	(0.004)	(0.003)
BC	0.001	0.011**	0.006*	0.005**	0.014*	0.009**	0.010**
	(0.003)	(0.004)	(0.003)	(0.002)	(0.008)	(0.004)	(0.003)
QC	0.024***	-0.006	0.003	-0.011**	-0.032*	0.014*	-0.005

	(0.003)	(0.007)	(0.006)	(0.005)	(0.017)	(0.007)	(0.006)
Atlantic	-0.005*	-0.007**	-0.003	-0.004**	-0.017**	0.003	-0.006**
	(0.003)	(0.003)	(0.003)	(0.002)	(0.005)	(0.004)	(0.003)
Prairies	0.001	-0.003	-0.003	-0.001	-0.001	-0.003	-0.002
	(0.003)	(0.003)	(0.003)	(0.002)	(0.005)	(0.004)	(0.003)
Constant	0.183***	0.405***	0.263***	0.225***	0.704***	0.281***	
	(0.011)	(0.050)	(0.041)	(0.031)	(0.157)	(0.039)	
Estimated Likelihood UHC=1		**0.451**	**0.355**	**0.179**	**0.704**	**0.327**	
Observations	382,211	382,211	367,583	349,986	208,990	173,221	382,211
Cragg-Donald Wald F Statistic		111.995	121.896	87.722	33.575	84.492	111.995
Hansen *J* Statistic		0.855	1.921	1.994	0.135	2.314	0.855
(P-value)		(0.355)	(0.166)	(0.158)	(0.714)	(0.128)	(0.355)
Durbin-Wu-Hasuman Chi2 statistic		28.911	22.403	16.188	17.898	8.158	28.911
(P-value)		(0.000)	(0.000)	(0.000)	(0.000)	(0.004)	(0.000)

Note: All the regressions are weighted. The weights are normalized for each cycle to add up to one to give equal weights to each survey when I pool the data. System=1 if UHC is due to system reasons, and 0 if UHC=0. Personal=1 if UHC is due to personal reasons, 0 if UHC=0. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 6: The effect of health care utilization on UHC- Subsamples				
	Geographic location		Income	
Variables	**Urban**	**Rural**	**Income <$40,000**	**Income >=$40,000**
Num Visit Med (IVLPM)	-0.026***	-0.040**	-0.050**	-0.024**
	(0.007)	(0.016)	(0.020)	(0.009)
Num Visit Med (CFA)	-0.025***	-0.038**	-0.048***	-0.024***
	(0.006)	(0.012)	(0.012)	(0.007)
# Observations	282,925	99,286	137,425	193,539
% with UHC	12.23	11.42	13.29	11.54
Cragg- Donald Wald F Statistic	90.679	20.625	18.070	74.106
Hansen J Statistic	0.508	1.459	0.033	2.535
(P-value)	(0.476)	(0.227)	(0.855)	(0.114)
Durbin-Wu-Hasuman Chi2	20.656	10.652	16.297	12.676
statistic and (P-value)	(0.000)	(0.001)	(0.000)	(0.000)

Note: All other independent variables suppressed for brevity. All the regressions are weighted. The weights are normalized for each cycle to add up to one to give equal weights to each survey when I pool the data. Controls for all variables previously described, but suppressed for brevity. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.