Government Expenditures and Health Care Satisfaction

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Abstract

It is not a surprise that both government and health care organizations want patients to be satisfied with the care they receive. The purpose of this paper is to examine the major factors that determine patient satisfaction with the quality and availability of health care services and with the quality and provision of health care services provided by hospitals and physicians in Canada, with particular attention being paid to the relationship between public sector health expenditure and patient satisfaction. I address this question with the use of Canadian Community Health Surveys (CCHS) and Canadian Institute for Health Information (CIHI) for the years 2003 and 2009/10.

My results show that age, gender, household income, life stress, self-perceived health status, level of education and immigrant status are determinants of satisfaction with the quality and availability of the health care services, while only age, self-perceived health status and household income are the determinants of patients' satisfaction with the quality and provision of the health care services provided by hospitals and physicians. My analysis also points out that government expenditures on health care services are positively related to patients' satisfaction with the quality and availability of the total health care services. However, patients' satisfaction with the quality and provision of hospitals or physician care are not associated with government expenditures on hospitals or physicians.

1.0 Introduction

Patients' satisfaction with the health care system is of importance to both patients and health care providers. For patients, their satisfaction with health care services can directly affect their positive or negative attitudes towards medical treatment, medical recommendations, and many other aspects of health care services (Ware & Davies 1983; Aharony & Strasser 1993). In fact, a satisfied patient has a much higher probability of obeying the instructions of health care service providers, have health care treatment regularly and develop a solid and longer lasting relationship with the health care services providers, either hospitals and physicians, relative to a dissatisfied one (Fitzpatrick 1991). Eventually, better health outcomes may be achieved and better health care services delivery systems designed if patients are satisfied. For health care providers, satisfaction is a critical indicator of patients' judgment of the quality and availability of care. It is not a surprise that both government and health care organizations want patients to be satisfied with the care they receive, and that this has become an area of interest to researchers and policy makers, particularly since the mid-1970s (Pascoe 1983).

Over the 1970s and 1980s, a number of researchers investigated how to correctly measure patients' satisfaction. According to the previous studies, there are mainly two methods of measuring patients' satisfaction: direct measures, which use micro level data on an individual level, and indirect measures, which use a macro level data of health care services (Howell, Osterweis & Huntley 1976; Westbrook & Oliver 1981; Ware, Snyder, Wright & Davies 1983). From the 1980s onwards, an

increasing amount of work has been done on the determinants of patients' satisfaction with health care services. Both theoretical and empirical research on patients' satisfaction find that it is significantly associated with many demographic variables, such as age, gender and education background (Locker and Dunt 1978; Pascoe 1983). However, most of the socio-demographic variables, including age, gender, race and marital status, education background, household income and household size, are not significantly related to patients' satisfaction with the quality of health care services and with the way health care provided (Hall and Dornan, 1990). According to Hall and Dornan (1990) satisfaction has a significantly positive relationship with age and a negative relationship with level of education, while other socio-demographic variables, such as gender, race, household income and household size, have almost no effect on patients' satisfaction with health care services. Researchers have also investigated the effects of physical and mental health care on patients' satisfaction. For instance, Kaldenberg (2001) and Kane et al. (1997) show that the relationship between physical health care and patients' satisfaction with health care services is weak. In contrast, the relationship is strong between mental health care and patients' satisfaction (Kaldenberg, 2001; Atkinson and Caldwell, 1997).

In addition to micro and individual characteristics, macro characteristics may also have an effect on patients' satisfaction with health care services. Especially starting from 2000s, more and more researchers are interested in the influences of macro characteristics (Adang and Borm 2007; Edlund et al. 2003; Sloan et al. 2005).

Some macro factors, such as the implemented patient protection laws, have been found to have little influences on patients' satisfaction (Adang and Borm 2007; Sloan et al. 2005) while others, including organizational characteristics, may be a significant determinant of patients' satisfaction (Jimmieson and Griffin 1988).

The purpose of this paper is to examine the major factors that determine patient satisfaction with the quality and availability of health care services in Canada, with particular attention being paid to the relationship between public sector health expenditure and patient satisfaction. I also investigate the determinants of patient satisfaction with the quality of hospitals and physicians and patient satisfaction with the way care is provided by hospitals and physicians.

This paper is an attempt to contribute to the previous academic research and knowledge in two ways: First, even though a number of papers has examined the factors affecting patients' satisfaction with health care provision and with the quality of the health care system, little work has been done using Canadian data. Second, the question as to whether patient satisfaction with the health care system is associated with government expenditures on health care has been virtually neglected in the literature. Although the available data to examine this question is sparse, this paper represents a first step at trying to understand better the relationship between public sector health expenditures and patient satisfaction. From a policy perspective, it would be useful for governments to know if their health-care expenditures are resulting in satisfied patients.

The paper is organized as follows. The next section provides a brief literature review. Section 3 describes the data and variables used in this paper while section 4 presents the econometric models used to address the determinants of patients' satisfaction with the quality and availability with health care services and with the quality and providing way of hospital services and physician services. Section 5 presents my results. Finally, section 6 concludes.

2.0 Literature Review

2.1 Measurement of patients' satisfaction

Since there are few standardized rules for measuring patients' satisfaction, most researchers measure patients' satisfaction by asking them directly using questionnaires, which include either broad questions about their satisfaction or specific questions about a few dimensions of satisfaction (Stamps & Finkelstein 1981; Ware et al. 1978). There are two ways to measure patients' satisfaction: direct measures and indirect measures (Howell, Osterweis & Huntley, 1976). Direct measure includes community samples and micro level data on an individual level, while the indirect measure uses macro level data of health care services (Westbrook & Oliver 1981; Ware, Snyder, Wright & Davies 1983).

2.2 Determinants of patients' satisfaction with health care services

2.2.1 Demographic characteristics and Socio-demographic characteristics

Patient satisfaction has long been considered an important factor that should be taken into account when measuring health outcomes and quality of health care services (Ware et al. 1988). In the economics literature, a large number of studies

have examined the factors which would affect patient satisfaction with the health care system. According to Locker and Dunt (1978) and Pascoe (1983), older patients are usually more satisfied with the health care system than younger patients; and female patients have a higher probability of satisfaction than male patients. However, other factors, such as race and marital status, have less significant effect on patient satisfaction (Weiss 1988).

During the 1980s and 1990s, the relationship between socio-demographic characteristics, like age, gender, level of education, marital status, and household size, and patient satisfaction were examined frequently. Hall and Dornan (1990) found that the relationship between socio-demographic characteristics and patient satisfaction is very weak. However, in comparison to other demographic and socio-demographic variables, such as age, gender and marital status, income and education background has a less significant effect on patients' satisfaction (Weiss 1988). Similar results have been found by Hall and Dornan (1990). They concluded that socio-demographic characteristics are not major determinants of patients' satisfaction but only minor predictors.

Language and race may affect patients' satisfaction in a significant way as well. Seid et al. (2003) collected data from 3,406 parents of children in kindergarten and students in elementary school in California from 1999 to 2000. According to their research race and ethnicity is an important factor that determines patients' satisfaction because African Americans and white parents were shown to have significantly higher levels of satisfaction than Asian and Latino parents. They

concluded that in order to achieve higher level of satisfaction with health care systems government should have the policies aimed at increasing potential access and providing multi-languages health care services.

2.2.2 Physical and mental health status

Starting from 1990s, an increasing number of researchers have examined the influence of the patient's own health status on his or her satisfaction with the quality of health care systems (Wensing et al. 1994). Most of the papers find a weak association between physical health status and patients' satisfaction with health care services, while concluding that a strong association between mental health status and satisfaction with health care services does exist (Kaldenberg, 2001; Atkinson and Caldwell, 1997; Kane et al., 1997).

Kaldenberg (2001) investigated the association between patients' satisfaction and their current health status. The author addressed this issue using a unique microdata set containing 463 patients from three hospitals. He used statistical methods, such as means and difference in means rather than econometrics modeling in his paper. The data show that patient satisfaction is weakly associated with physical health status and significantly and positively related to mental health status. Similarly, Kane et al. (1997) found a weak relationship between patients' satisfaction with the health care system and their current state of health and health improvements while Atkinson and Caldwell (1997) use the data of patients in mental health clinics and find that there is an association between poor mental health status and low satisfaction with health care services scores.

Bleich et al. (2009) used data from the World Health Survey for the year 2003, which includes data from 21 European Union countries, to explore what are the factors that determine patients' satisfaction with the health care system. They found that not only are patient expectations, health status and type of care significantly associated with satisfaction, but patient experience is a significant predictor of health care system satisfaction as well.

2.2.3 Macro characteristics

In addition to patient characteristics, many macro characteristics account for a large proportion of the variance in patient satisfaction with the health care system. Adang and Borm (2007) estimated the relationship between the economic performance of the health care system and patient satisfaction by using data from the OECD health database and the Eurobarometer survey. The Eurobarometer is a cross-national longitudinal survey conducted by the European Commission twice a year and this survey contains many separate supplementary surveys and studies which address different major topics, such as health and the environment. Adang and Borm (2007) found that there is no significant relationship between the economic performance of the health care system and patient satisfaction. Edlund et al. (2003) used a micro data set containing 9,585 observations over the two-year period 1997 to 1998 and found that using appropriate technology would significantly increase the level of patient satisfaction. Appropriate technology refers to either appropriate counseling or appropriate pharmacotherapy during the last 12 months. According to Edlund et al. (2003, page 634), "Appropriate counseling was defined as 4 or more visits with a

mental health specialist or primary care provider that included counseling for mental health problems. Appropriate pharmacotherapy was based upon AHCPR and other published guidelines, and included parameters for the type of medication, dosage, and duration of treatment". Sloan et al. (2005) accessed data from the Community Tracking Study (CTS) household surveys throughout the U.S. for three periods, 1996 to 1997, 1998 to 1999, and 2000 to 2001 and found no association between the implemented patient protection laws and their satisfaction with the health care system. Jimmieson and Griffin (1988) also controlled for major patient characteristics and estimated the influence of organizational characteristics, such as procedures, location and fees (Berger, 1983), on patient satisfaction with health care services. Their results suggest that organizational characteristics accounted for a significant proportion of the variance in client satisfaction with the health care system.

2.3 Determinants of patients' satisfaction with hospitals and physicians

Patients' satisfaction with hospitals' or physicians' health care services seem to have been largely ignored by both researchers and practitioners (Lekidou et al. 2007). Starting from the 2000s, an increasing number of researchers are trying to fill in this gap. Most of the current studies are patient-centered and trying to determine which factors are important to improve patients' satisfaction. Compared with well-developed countries, developing and newly developed countries should pay attention to the health care delivery systems. Patients in developing and newly developed countries are more sensitive to the quality of their health care delivery systems (Haddad et al. 1998). As a developing country, hospitals in Swaziland are

usually short of health care providers, government spending on health care systems, and advanced medical equipment, facilities, drugs, and physicians. The authors use a qualitative research strategy and are focused on determining patients' satisfaction and determining whether the services being offered satisfy the needs of the patients. The final results showed that the patients are dissatisfied with the health care services provided by RFM hospital. Therefore, RFM hospital should take measures to improve health care service delivery systems to increase patients' satisfaction.

Another case study was done by Lekidou et al. (2007). They randomly selected 164 patients from a central public hospital in Greece and collected data by conducting a self-designed survey. They investigated the association between patients' satisfaction and a series of other factors, including patients' admission, parking, accommodation and external environment and the health care services that are provided by doctors and nurses. Their results showed that: first, some factors may positively affect patients' satisfaction with health care they received in hospitals, such as visiting hours, doctors' and nurses' professionalization and consistency, the classification of insurance and the duration of hospitalization. However, they also observed some other circumstances under which patients are more dissatisfied, including when quiet is not observed, when there is difficulty in locating doctors, nurses and related personnel, when patients' admission process is complicated and when the communication with doctors, nurses and other related personnel is insufficient and inefficient.

3.0 Data and Variables

3.1 Data

I use data from the Canadian Community Health Surveys (CCHS) for the years 2003 and 2009/10 and from the Canadian Institute for Health Information (CIHI). The CCHS is a cross-sectional survey that provides information about the health and health care of the population aged 12 years and older living in the ten provinces and the three territories in Canada. Prior to 2007, the CCHS was carried out every two years. After 2007, data were collected annually. CIHI provides an annual overview of national health care spending from 1975 to 2012: it provides data about public sector health expenditures, private sector health expenditures, provincial and federal health expenditures and other related information in both current and constant dollars.

In the CCHS, the data on patients' satisfaction with the quality of care received from hospitals and physicians and with the way care provided by hospitals and physicians are not available for the years 2005, 2007 and 2008. Therefore, I chose data from the surveys of 2003 and 2009/10 (two years together). In 2003, the question on satisfaction with health care services in general is asked in three provinces, Ontario, New Brunswick and Quebec, while the question on satisfaction with hospitals and physicians is asked in four provinces, Ontario, New Brunswick, Nova Scotia and Prince Edward Island. Therefore, when using the CCHS 2003 survey my research relies on variation across provinces to help identify the government expenditure effects. Similarly, I can only exploit across time variation

for the province of Ontario where the questions on satisfaction are asked in the survey years 2003 and 2009 /10. I thus pool these two surveys and have time controls in the model.

From CIHI, I acquire data on public sector health expenditure for different provinces and on public sector health expenditures by use of funds. In order to eliminate the effect of inflation, all expenditure data are in constant dollars.[1]

3.2 Variables

The dependent variables are patients' satisfaction with six different aspects of health care services: the quality of health care services, the availability of health care services, the quality of care received at hospitals, the way care was provided by hospitals, the quality of care received from physicians, the way care was provided by physicians. All of these variables are dichotomous and they describe the overall satisfaction with each of the six aspects. When patients are very satisfied or somewhat satisfied, the dependent variable takes the value of 1; however, if the patients are neither satisfied nor dissatisfied, somewhat dissatisfied or very dissatisfied, the dependent variable takes the value of 0. Independent variables have been chosen with respect to those already used in the literature and include: age, gender, self-perceived physical and mental health, stress in life, working hours per month, immigrant status, minority status, satisfaction with life in general, household size, education background, household income, and the number of child below 12

[1] Government expenditure is adjusted for inflation using the consumer price(CPI) index. 2002 was selected by Statistics Canada as the base year. Retrieved on 4 November 2012, from http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/econ46a-eng.htm

years old in the household. I pay particular attention to the relationship between public sector health expenditure and patient satisfaction by including per capita public sector health expenditures in constant dollars as a policy variable, whenever possible. Among the variables that I chose, some are demographic, such as age, gender, marital status and household size. Some are socio-demographic variables, which include immigrant status, minority, education background and the number of child below 12 years old in the household.

Table 1 provides the definitions of all of the variables used in the regression analysis. Table 2 lists the dependent variables and specifies in which provinces the respondents reside; this table also provides a number S1 to S6 to denote the relevant dependent variable and to ease the exposition. Table 3 provides the means of the variables used in the regressions by survey year. We can see from table 3 that 53% of the observations are female in all survey years. The average household size is around 2.2, and about 40% of the households consist of 2 people.

Table 4 provides the average characteristics of individuals who responded to satisfaction questions S1 and S2 across the two samples, 2003 and 2009/10. A few differences across the two time periods stand out. The demographics of individuals who are satisfied with the system are quite different. For instance, 3% of the respondents are aged 80 and over in 2003 and this number jumps to 7% in 2009/10, similar increases also occur for other 50 and up age groups. It thus follows that the younger age groups (aged 20 to 49) account for a lower percentage of the total respondents – as expected given the ageing demographics of the population. Life

satisfaction decreases over time (91% of respondents are satisfied with life in 2003 whereas only 64% are so reporting in 2009/10). Whereas 61% of those responding to satisfaction questions in 2003 are working full time, this number drops to 47% in 2009/10. In 2003, 29% of respondents are not working during the past 12 months in Ontario while the percentage increases to 48% in 2009/10.

Table 5 shows the components of people who are satisfied with health care services, hospitals or physicians in 2003, across several provinces, while table 6 shows the components of people who are satisfied with health care services, hospitals or physicians in both 2003 and 2009/10, in Ontario only The number in this table indicates the percentage of patients who are satisfied with the health care services in general, health care services provided by hospitals or health care services provided by physicians, by subgroup. For example, the first number in table 5 indicates that among all female respondents, 73% are satisfied with the quality of health care services in general, while the next number shows that among all female respondents, 58% of them are satisfied with the availability of health care services in general. By comparing the data in each of these tables, we can easily discover that some patterns and trends exist. First, patients from all of the subgroups are more satisfied with the quality of health care services than with the availability of the health care services. For example, in the year 2003, among the patients who are married, 75% of them are satisfied with the quality of health care services in general while only 59% of them are satisfied with the availability of health care services. This might be an indication that suggests the government should make health care

services more available instead of only take measures to increase the quality health care services. At the same time, the percentage of patients who are satisfied with the quality of health care services provided by hospitals or physicians does not differ significantly from the percentage of patients who are satisfied with the way in which health care services are provided by hospitals or physicians for all of the subgroups.

Table 7 provides data on government per capita spending on the health care system, hospitals and physicians separately for the years 2003 and 2009/10. Generally speaking, government spending of all provinces in constant dollars on these three aspects increased from the year 2003 to year 2009/10, especially in terms of per capita government spending on hospitals and physicians. For instance, in 2003 the Government of Ontario spent $470 per capita on physicians which increased to $633 in the year 2009/10 – representing an increase of 35% in seven years. Meanwhile, the Government of Ontario spends $849 and $975 per capita on hospitals separately. The spending goes up by 15%, which is also a big change.

Table 7 also shows that Government of Ontario spends $2,356 and $2,758 per capita on health care system in year 2003 and 2009/10 respectively. Comparing to other provinces, we find that Ontario spends the largest per capita amount of money on physicians and health care system while it spent the least on hospitals in both years.

4 Econometric Approach

4.1 Probit Model

In this paper, the dependent variables are dichotomous. There are six different

dependent variables, taking the value one when an individual is satisfied with the quality of health care services, with the availability of health care services, with the quality of the hospitals' service, with the way care provided at hospitals, the quality of with the physicians' service or with the way care provided by physicians, and zero otherwise (defined as S1-S6 in table 2). A simple method to estimate this model is the Linear Probability Model.

Suppose that the dependent binary dependent variable is represented by y and the independent variable is x, a $n\times 1$ vector. Thus, the conditional probability can be written as:

(1) $\Pr(y=1|x)=F(x,\beta)=\beta x$

Then we introduce stochastic disturbances and we come to

(2) $y=\beta x+\mu$

where μ is the error term and, by definition, $E(\mu|x)=0$. This model is the Linear Probability Model.[2]

However, there are some problems with using the Linear Probability Model when we have dichotomous independent variables, because some basic assumptions are violated. For example, the disturbance terms may not be normally distributed and also they may be heteroskedastic variances. The most serious problem with the Linear Probability Model is that the predicted value may not be in the interval of zero and one, which makes it potentially difficult to interpret the outcomes of the regression.

[2] References: Wooldridge (2002) , Introductory Econometric and Greene (2011), Econometric Analysis, 7th edition

One way to get around some of these problems is to use the Probit model,

(3) $F(x_i, \beta) = \psi(x_i, \beta)$ [3]

Where $\varphi(t) = (2\pi)^{-1/2} e^{-t^2/2}$ is standard normal density and $\psi(z) = \int_{-\infty}^{z} \varphi(t)dt$, which is the cumulative distribution functions.

By transforming the model we know that as βx_i approaches negative infinity, $F(x_i, \beta)$ will approach zero, as βx_i approaches infinity, $F(x_i, \beta)$ will approach one. This conforms to the standard probability definition. In this way, we can easily interpret the outcomes of the regression.

Usually, we use the Probit model after the transformations have occurred. However, the regression function is non-linear in parameters, so we cannot use an Ordinary Least Squares estimation; thus, a maximum likelihood estimation method is employed to estimate the βs.

For the Probit model, we have,

(4) $\Pr(y_i = 1 | x_i, \beta) = \psi(x_i, \beta)$ [4] and

(5) $\Pr(y_i = 0 | x_i, \beta) = 1 - \psi(x_i, \beta)$

So the likelihood takes the following form:

(6) $\ln L(\beta | x_i) = \sum[(1 - y_i)\ln[1 - \psi(\beta x_i)] + y_i \ln \psi(\beta x_i)]$

For the Probit model, we cannot interpret the regression coefficients directly. However, we can differentiate with respect to x_i to get the marginal effect which is the effect of the independent variable on the dependent variable.

[3&4] The following discussion taken from Wooldridge (2002) , Introductory Econometric and Greene (2011), Econometric Analysis, 7th edition

$$(7)\ \frac{\partial \Pr(y_i = 1|x_i;\beta)}{\partial x_{ij}} = \varphi(\beta x_i)\beta_i$$

We can see that the marginal effect of the independent variable is not only dependent on its coefficient but is also dependent on the independent variable itself.

4.2 Endogeneity Concerns

It is possible that the fact that an individual is stressed in life would cause him or her to be less satisfied with the care received. Similarly, the fact that the care received is below expectations may cause him or her stress in life. This potential endegeneity between stress and satisfaction is treated using an instrumental variables approach. An instrumental variables approach is adopted when one of the independent variables and the error term are correlated. It violates the assumption that $E(\mu|x) = 0$[5]. In this case, the Ordinary Least Squares estimator is biased and inconsistent.

So in order to get consistent estimates, the variables used as instruments must satisfy the following attributes: first, the instrument variables chosen must be highly correlated with the independent variable which is correlated with error term; second, the instruments cannot be correlated with the error term.

Generally speaking, endogeneity problems can be caused by measurement error, reverse causality and omitted variables. In my model the dependent variable is patients' satisfaction with health care services, hospitals and physicians. I include stress in life as an explanatory variable which might be subject to reserve causality.

[5] The following discussion taken from Wooldridge (2002) , Introductory Econometric and Greene (2011), Econometric Analysis, 7th edition

On the one hand, if patients have high stress in life, they are more likely to be unsatisfied with the health care they received. On the other hand, when the patients are very unsatisfied with the health care services they might be in a bad mood, have lower efficiency and productivity, and ultimately feel more stressful in life. In order to solve this endogeneity problem, I choose household size, full-time working status, drink, smoke and no physical activity as instrumental variables for stress in life. The reason why I chose these five instrumental variables is that they are correlated with the endogeneous variable, stress perceived in life, and they are uncorrelated with the error term in the original equation. In table 11, the estimates show that instrumental variables are significantly correlated with the endogeneous variable. For instance, work full-time, frequently smoke and no physical activities are statistically significant in the year 2003. The definitions of these instrumental variables are shown in table 1. People who have a large family to look after and support usually perceive more stress in daily life while people who work as full time employees always have more pressure from their jobs. What is more, while drinking and smoking is way that people choose to release pressure, drinking or smoking very frequently may be an indication of having some stress in life. Also, it accords with our common sense that doing physical activities is a good way to release the pressure, therefore, when people do no or very few physical actions, they may experience more stress in life.

4.3 Equations to Estimate

I estimate the determinants of six different indicators of patient satisfaction with aspects of health care services (S1-S6), and the relationship between government expenditure on health care and these indicators. To try to disentangle the impact of expenditures (which only vary by province or by time) I attack the problem in two ways. The first exploits interprovincial variation using data from the CCHS for the year 2003 for those who resided in the provinces that responded to the questions of interest. In particular, residents of Ontario, New Brunswick and Quebec responded to questions S1, and S2 (as defined in table 2), and those of Ontario, New Brunswick, Nova Scotia and Prince Edward Island for the remaining four questions S3-S6. There are therefore six regressions associated with satisfaction and including government expenditures. I also run another six regressions but this time instead of including government expenditures, I include provincial dummy variables. Obviously, both per capita expenditures and provincial dummy variables cannot be included in the same regression. Care has to be taken in interpreting the estimated coefficients on expenditures or on the provincial dummy variables as they will be picking up both the effect of government spending plus any other interprovincial policy differences that may affect satisfaction and which are not accounted for in the included variables. In total, 12 regressions are thus run and reported (tables 8 and 9 below).

The second approach relies on intertemporal variation in government spending across one province, Ontario, whose residents were asked all six questions of

interest (S1-S6) in 2003 and in 2009/10. In this case, I pool the data for the years 2003, 2009/10, and have time controls in the model. In addition to adding a dummy variable for the year 2009, I also allow the estimated coefficients to vary in 2009/10 by adding a series of interactive terms. Six regressions are run for this approach, and are reported below in table 10.

The empirical model can be written as:

(8) $S_{it} = \beta_0 + \beta_1 Gov\ \exp_{it} + X\theta + \varepsilon_{it}$

Where the dependent variable, S, is a dichotomous one, which takes the value one when an individual is satisfied with the health care services that he or she receives (recall, there are six such questions and hence six regressions for each specification of the model) and zero otherwise. $Govexp_i$ refers to the per capita expenditure of provincial government i on health care services. The vector of independent variables, X, includes controls for age, gender, marriage status, satisfaction with life in general, stress level, education background, household income, the number of children below 12 years old in the household, immigration status, minority, physical and mental health status. The sign and marginal effects of the estimated parameters on government expenditures are of importance. If positive, this suggests that public sector health expenditure and patient satisfaction with health care services are positively associated. As previously explained, an instrumental variables technique is used to deal with the potential endogeneity problems that may arise between the variable "life stress" and the dependent variable, satisfied with health care. In this paper, I use household size, full-time

working status, drink, smoke and no physical activity as instruments for life stress. All regressions take account of the possibility of heteroskedasticity by estimating robust standard errors.

5 Results

Marginal effects are reported instead of estimated coefficients because these allow one to interpret the impact of a marginal change in the reference individual. The predicted probability that the reference individual is "satisfied" with the given aspect of health care (S1-S6) is provided at the bottom of each results table. Each specification also provides the number of observations used and the proportion of these observations for which the individuals are satisfied. The reference individual is: male, aged20to24, household income less than 20,000, not married, not satisfied with life, perceive low life stress, not visible minority, self-perceived physical and mental unhealthy, not immigrant, with a secondary school diploma or less, living in Ontario. Notice that, for instance, for the dependent variable S1, the predicted probability that the reference person is satisfied with the quality of health care services is 0.75.

5.1 Provincial Variations in Government Spending

The results of the specification that includes government spending that varies across provinces for the year 2003 are presented in table 8. All six regressions are reported, one for each of the dependent variables. Table 9 reports the regressions but with provincial dummy variables rather than government expenditures. Turning first

to the results from S1 and S2 (the first two marginal effects reported in tables 8 and 9), there are six main findings.

First, we see that females are statistically and economically less satisfied with both the quality and availability of health care services. For instance, the predicted probability of being satisfied with the availability of health care services falls by 0.082 if the reference person becomes female rather than male – representing a decrease of 11%. Second, age may also explain some differences in patients' satisfaction. Older age groups are usually associated with significantly higher level of satisfaction. For instance, if the reference group for S1 where aged 70 to 74 instead of aged 20 to 24, there is an increase of 0.14 in the predicted probability of being satisfied with the quality of health care services. However, by using the same base age group and the same year's data, different conclusions are drawn when we use patients' satisfaction with the availability of health care services as the dependent variable rather than with quality. Elderly patients are generally less satisfied. For instance, patients of the age 55 to 59 experiences a decrease of 0.07 in the predicted probability of being satisfied with the availability of health care services when comparing with patients aged 20 to 24. In other words, if we change the age of the reference group from age 20 to 24 to age 55 to 59, the probability of being satisfied with the availability of health care services will be 0.54 instead of 0.61.

Income is negatively and significantly related to patients' satisfaction with the availability of health care services. That means, compared with households who

have low income, households who have higher income are usually less satisfied with the availability of health care services. For example, if we have household income equal to $20,000 to $40,000 per year, the predicted probability of being satisfied with the availability of health care services will decrease by 0.09. Respondents who possess higher levels of education have a higher probability of being satisfied with either the quality of health care services or the availability of health care services. For instance, if we change the level of education of the reference person from secondary school or less to post-secondary school or more, the predicted probability of being satisfied with the quality of health care services will increase by 0.17.

Higher self-perceived health status is usually associated with a higher possibility of being satisfied with health care services, while self-perceived mental health status is not correlated with satisfaction with health care services. The predicted probabilities of being satisfied with the quality and availability of health care services are 0.75 and 0.61 respectively; being physically healthy increases the predicted probabilities for S1 and S2 by 0.11 and 0.12 respectively, higher for patients who think they are physically healthy in comparison with patients who think themselves are physically unhealthy.

Finally, according to table 8 and table 9, we can conclude that compared to Ontario, the probability of being satisfied with either the quality of health care services or with the availability of health care services, is less in both New Brunswick and Quebec. This might result from the fact that these three governments spend different amounts of money on health care services. According to table 7,

government per capita expenditure on health care services in Ontario is the highest one of these three provinces while that of Quebec is the lowest. Per capita government expenditure on health care services of Ontario is $126 dollars higher than the per capita expenditure of New Brunswick, while per capita government expenditure on health care services of Ontario is $220 dollars higher than the per capita expenditure of Quebec. The estimated marginal effect associated with per capita expenditures is consistent with the idea that satisfaction increases with expenditures on health care. Table 8 indicates that government expenditures on health care services are positively and significantly associated with patients' satisfaction. If, for example, government per capita expenditure on health care services goes up by $1, the predicted probability of being satisfied with the quality of health care services will increase by 0.0004. Therefore, if government per capita expenditure on health care services goes up by 100 dollars, the predicted probability of being satisfied with the quality of health care services will increase by 0.04, that is, this predicted probability will increase from 0.75 to 0.79, which is both statistically and economically significant.

Now we come to the discussion of results for the dependent variables S3-S6, which where responded to by residents of four provinces, Ontario, New Brunswick, Nova Scotia and Prince Edward Island. Once again, there are two specifications, one with provincial dummies and another with government expenditures.

From table 8, I find that only a few factors are significantly associated with patients' satisfaction with hospitals and physicians, including age and self-perceived

health status. First, older people, starting from 55 years of age, have a higher predicted probability of being satisfied with either hospitals or physicians. For example, for the age group 55 to 59, the marginal effect is 0.008 when we consider patients' satisfaction with the quality of health care services provided by hospitals. This means that if the dummy variable, age 55 to 59, changes from zero to one, the probability for the dependent dummy variable, patients' satisfaction with the quality of health care services provided by hospitals, taking the value of one increases by 0.008. Second, self-perceived health status is positively correlated with patients' satisfaction with the quality and provision of health care services provided by hospitals and physicians. According to table 8, which includes per capita government expenditure on hospitals and physicians, if the dummy variable, self-perceived health status, changes from zero to one, the predicted probability for patients' to be satisfied with the quality of health care services provided by hospitals increases by 0.02, the probability for patients' to be satisfied with the quality of health care services provided by physicians increases by 0.05. Moreover, according to Table 8 and 9, government expenditure on hospitals and physicians and provincial dummy variables are not associated with patients' satisfaction with the quality and provision of health care services by hospitals and physicians.

There are some similarities and differences between the results, S1 to S6. From table 8 and 9, we can conclude that age and health status are associated with patients' satisfaction for all dependent variables. Government expenditures on health care services and provincial dummies are associated with patients'

satisfaction with the quality and availability of health care services, however, there is no significant association between patients' satisfaction with the quality and provision of health care services provided by hospitals and physicians and government expenditures on hospitals and physicians or provincial dummies. Therefore, by using both government expenditures and provincial dummy variable approach, we estimate that government expenditures can help us to explain patients' satisfaction with health care services, while it cannot account for patients' satisfaction with health care services provided by hospitals and physicians.

5.2 Intertemporal Variations in Ontario

Table 10 presents the six regressions for the province of Ontario over the two surveys of 2003 and 2009/10. Age is neither individually nor jointly significant for S1 to S6. However, from the results of S1, we can find out the factors that determine patients' satisfaction with the quality of health care services: stress, satisfaction with life in general and self-perceived health status. For example, if we change the dummy variable, satisfaction with life in general, from zero to one, the predicted probability of being satisfied with the quality of health care services will decrease by 0.08. Similarly, if we change the dummy variable, self-perceived health status, from zero to one, the predicted probability of being satisfied with the quality of health care services will increase by 0.07, which means the healthier the patients are, the more satisfied they are with the quality of health care services.

We reach some similar conclusions if we change the dependent variable to patients' satisfaction with the availability of health care services. However, we need

to note that apart from stress, satisfaction with life in general and self-perceived health status, household income is also associated with patients' satisfaction with the availability of health care services. The marginal effect for income subgroup from $20,000 to $40,000, -0.09, indicates that comparing with the base group, income less than $20,000, patients with the household income $20,000 to $40,000 are 13% less likely to be satisfied with the availability of health care services.

Moreover, the marginal effect of female is not significant in the year 2003 while the marginal effect of female_2009 is significant, which indicates that in year 2003, female patients have the same probability of being satisfied with the availability of health care services as male patients, when we control all of the other factors; however, in year 2009/10, female patients have a probability of being satisfied with the availability of health care services, which is 0.1 higher than that of male patients. With respect to patients who are satisfied with life in general, when we control all of the other factors, in year 2003, patients who are satisfied with life have the same probability of being satisfied with the availability of health care services as patients who are dissatisfied with life in general; however, in year 2009/10, patients who are satisfied with life have a probability of being satisfied with the availability of health care services, which is 0.07 higher than that of patients who are dissatisfied with life in general.

Table 10 also describes what factors determine patients' satisfaction with the quality and provision of health care services provided by hospitals and physicians. Respondents' level of stress is negatively correlated with patients' satisfaction with

the availability of health care services. Briefly, when people begin to perceive high level of life stress instead of low level of life stress (that is, stress changes from zero to one), their probability of being satisfied decreases. Also, comparing to the base age group, age 20 to 24, elder patient generally have a higher probability of being satisfied with either the quality of hospitals and physicians or the way in which health care are provided by hospitals and physicians. For example, when we consider patients' satisfaction with the quality of health care provided by hospitals, the marginal effect of age 55 to 59 is 0.043. Apart from age groups, some other variables are also associated patients' satisfaction with the quality of health care provided by hospitals, such as stress, satisfaction with life in general and self-perceived health status. This result is very similar to the one we get from table 8 and table 9.

Moreover, the marginal effect of self-perceived health status is not significant in the year 2003 while the marginal effect of female_2009 is significant, which indicates that in the year 2003, patients who think they are healthy have the same probability of being satisfied with the quality of health care services provided by hospitals as patients who do not think themselves as very healthy, when we control all of the other factors; however, in year 2009/10, patients who think they are physically healthy have a probability of being satisfied with the quality of health care services provided by hospitals, which is 0.12 higher than that of patients who believe that they are unhealthy.

6 Conclusions

Using CCHS and CIHI data for the years 2003 and year 2009/10, I examine six different measures of satisfaction with health care in a sample of provinces in Canada, and pay particular attention to the effects from health-care expenditures by the provincial governments. According to the results, some of the independent variables are not associated with patients' satisfaction, such as mental health status and marital status. On the other hand, some other variables are significantly associated with patients' satisfaction. First, age, gender, household income, life stress, self-perceived health status, level of education and immigrant status are determinants of satisfaction with the quality and availability of the total health care services. Second, only age, self-perceived health status and household income are the determinants of patients' satisfaction with the quality and provision of the health care services provided by hospitals and physicians.

My analysis also points out an association between patients' satisfaction and government expenditures on health care services, hospitals and physicians. Government expenditures on health care services are positively related to patients' satisfaction with the quality and availability of the total health care services. The good news is that if this is correct, then governments could potentially increase patients' satisfaction by increasing government expenditures on health care services. However, the bad news is that patients' satisfaction with the quality and provision of hospitals and physicians, does not seem to depend upon government expenditures in these areas.

But, this work can only be considered as preliminary. Little variation in

government spending was available for this study given the cross-sectional nature of the CCHS data sets. I tried to exploit as much as possible the variation, but the data were not ideal. If one could get data on spending by health regions, this would aid in the analysis. Future research would explore further this option. Moreover, it would be interesting to explore further the question about whether satisfaction with the overall quality or availability of health-care services is the appropriate way to go about looking at satisfaction or would it be better to focus in on, say, hospitals or family physicians, or some other specific aspect of the system. It is curious that the results of this paper suggest that satisfaction with hospitals or physicians is not linked to expenditure in those sectors. It may well be that the system is so integrated that it is spending in general that matters rather than in a specific area: in other words, lots of money going to physicians would not be very useful if other aspects of the system were not also well funded. These are areas that are worth looking into with better data.

Finally, it is interesting to note that individuals are more likely to be satisfied with the quality of the services but not with the availability of the services. Again, an avenue for further research need to be explored.

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Table 1: Variable Definitions

Dependent Variables	
Quality HC	1=very satisfied or somewhat satisfied with the quality of health care services, 0=otherwise
Availability HC	1=very satisfied or somewhat satisfied with the availability of health care services, 0=otherwise
Quality Hosp	1=very satisfied or somewhat satisfied with the quality of health care received in hospitals, 0=otherwise
Provision Hosp	1=very satisfied or somewhat satisfied with the way health care provided by hospitals, 0=otherwise
Quality Phy	1=very satisfied or somewhat satisfied with the quality of health care received from physicians, 0=otherwise
Quality Phy	1=very satisfied or somewhat satisfied with the way health care provided by physicians, 0=otherwise
Independent Variables	
female	1=female, 0=otherwise
age20to24	1=age 20-24, 0=otherwise **reference group**
age25to29	1=age 25-29, 0=otherwise
age30to34	1=age 30-34, 0=otherwise
age35to39	1=age 35-39, 0=otherwise
age40to44	1=age 40-44, 0=otherwise
age45to49	1=age 45-49, 0=otherwise
age50to54	1=age 50-54, 0=otherwise
age55to59	1=age 55-59, 0=otherwise
age60to64	1=age 60-64, 0=otherwise
age65to69	1=age 65-69, 0=otherwise
age70to74	1=age 70-74, 0=otherwise
age75to79	1=age 75-79, 0=otherwise
age80up	1=age 80 and up, 0=otherwise
inless20K	1=total household income is less than $20,000, 0=otherwise **reference group**
in20Kto40K	1=total household income from all sources $20,000-$39,999, 0=otherwise
in40Kto60K	1=total household income from all sources $40,000-$59,999, 0=otherwise
in60Kto80K	1=total household income from all sources $60,000-$79,999, 0=otherwise
in80Kup	1=total household income from all sources $80,000 and up, 0=otherwise
child12	1=one or more persons less than 12 years old in household, 0=otherwise
married	1=married or living common-law, 0=otherwise
satislife	"Are you satisfied with life in general?" 1=very satisfied and satisfied, 0=otherwise
stress	1= perceived life stress is high, 0=otherwise
minority	1=visible minority, 0=otherwise
health	1=self-perceived health is good, 0=otherwise
mentalhealth	1=self-perceived mental health is good, 0=otherwise
imm	1=immigrant, 0=otherwise
secsch	1=secondary school graduation or less, 0=otherwise **reference group**
postsec	1=post-secondary graduation or more, 0=otherwise
Expend/pop	Per capita government spending on health care
Hosp/pop	Per capita government spending on hospitals
Physic/pop	Per capita government spending on physicians
ON	1=Ontario, 0=otherwise **reference group**
NB	1= New Brunswick, , 0=otherwise
QUE	1=Quebec, 0= otherwise
PEI	1=Prince Edward Island, 0= otherwise
NS	1=Nova Scotia, 0= otherwise
Instruments	
hhsz	household size

fulltime	1=work full time, 0=otherwise
drink	1=drink more than 2 times a week, 0=otherwise
smoke	1=smoke daily or occasionally, 0=otherwise
nophyact	1=do physical exercises occasionally or infrequently, 0=otherwise

Table 2: Dependent Variables and Relevant CCHS Survey

	2003	2009-2010
S1:satisfied with quality	ON, QUE, NB	ON
S2:satisfied with availability	ON, QUE, NB	ON
S3:satisfied with quality hosp	ON, NB, PEI, NS	ON
S4: satisfied with provisions hosp	ON, NB, PEI, NS	ON
S5: satisfied with quality phy	ON, NB, PEI, NS	ON
S6: satisfied with provisions phy	ON, NB, PEI, NS	ON

Table 3: Variable Means by Respondents to Key Questions on Satisfaction

	2003 (S1+S2)	2003 (S3-S6)	2009-2010 (S1-S6)
Variable	n= 52,145	n=3,948	n=5,027
female	0.541	0.521	0.537
age20to24	0.055	0.044	0.040
age25to29	0.076	0.067	0.059
age30to34	0.093	0.085	0.073
age35to39	0.099	0.076	0.078
age40to44	0.095	0.069	0.066
age45to49	0.088	0.077	0.069
age50to54	0.097	0.098	0.096
age55to59	0.095	0.111	0.105
age60to64	0.079	0.085	0.111
age65to69	0.069	0.077	0.095
age70to74	0.061	0.077	0.075
age75to79	0.048	0.065	0.065
age80up	0.045	0.069	0.068
inless20K	0.110	0.142	0.125
in20Kto40K	0.189	0.234	0.206
in40Kto60K	0.229	0.240	0.189
in60Kto80K	0.248	0.228	0.154
in80Kup	0.224	0.156	0.326
child12	0.215	0.186	0.177
married	0.587	0.561	0.591
hhsz	2.282	2.210	2.170
satislife	0.908	0.889	0.639
stress	0.242	0.241	0.259
minority	0.072	0.028	0.103
health	0.857	0.759	0.763
mentalhealth	0.949	0.919	0.900
workstress	0.223	0.183	0.204
notwork	0.353	0.438	0.481
imm	0.143	0.058	0.183
newimm	0.023	0.005	0.020
secsch	0.296	0.298	0.219
postsec	0.704	0.702	0.781
fulltime	0.602	0.528	0.465
drink	0.364	0.269	0.377
smoke	0.261	0.223	0.203
nophyact	0.333	0.338	0.310
ON	0.575	0.307	1
NB	0.064	0.287	0
QUE	0.361	0	0
PEI	0	0.100	0
NS	0	0.306	0

Table 4: Variable Means by Respondents to Key Questions on Satisfaction (Ontario Only)

	2003 (S1+S2)	2009-2010 (S1-S6)
Variable	n= 24,220	n=5,027
female	0.518	0.540
age20to24	0.059	0.040
age25to29	0.084	0.059
age30to34	0.101	0.073
age35to39	0.110	0.078
age40to44	0.102	0.066
age45to49	0.089	0.069
age50to54	0.094	0.096
age55to59	0.089	0.105
age60to64	0.075	0.111
age65to69	0.064	0.095
age70to74	0.054	0.075
age75to79	0.044	0.065
age80up	0.034	0.068
inless20K	0.065	0.125
in20Kto40K	0.140	0.206
in40Kto60K	0.217	0.189
in60Kto80K	0.277	0.154
in80Kup	0.300	0.326
child12	0.236	0.177
married	0.622	0.591
hhsz	2.412	2.170
satislife	0.910	0.639
stress	0.229	0.259
minority	0.084	0.103
health	0.881	0.763
mentalhealth	0.951	0.900
workstress	0.223	0.204
notwork	0.289	0.481
imm	0.193	0.183
newimm	0.023	0.020
secsch	0.243	0.219
postsec	0.757	0.781
fulltime	0.610	0.465
drink	0.368	0.377
smoke	0.251	0.203
nophyact	0.313	0.310

Table 5: Percentage Respondents Satisfied by Key Characteristics CCHS 2003: Average Across Provinces

Variable	Satisfac-tion quality S1	Satisfac-tion availability S2	Satisfaction quality hospitals S3	Satisfaction provision hospitals S4	Satisfaction quality physicians S5	Satisfaction provision physicians S6
female	73%	58%	89%	89%	94%	94%
male	77%	62%	90%	92%	93%	94%
child12	74%	59%	86%	87%	94%	94%
no child12	75%	60%	91%	91%	94%	95%
married	73%	59%	90%	91%	95%	95%
not married	74%	60%	89%	89%	94%	94%
imm	76%	67%	90%	90%	94%	94%
not imm	74%	58%	90%	90%	94%	95%
postsec	75%	60%	90%	89%	94%	94 %
secsch	72%	59%	91%	92%	94%	95%
ageunder30	73%	63%	80%	83%	90%	92%
age30_49	72%	57%	87%	87%	93%	93%
age50_64	74%	57%	92%	93%	96%	96%
age65up	80%	66%	96%	95%	96%	96%
inunder40K	72%	59%	90 %	92%	94%	94%
in40K-80K	75%	60%	89%	89%	94%	94%
in80Kup	77%	61%	92%	89%	95%	95%

Note. See Table 2 for expanded definitions of S1-S6

Table 6: Percentage Respondents Satisfied by Key Characteristics
CCHS 2009-2010: Ontario Only

Variable	Satisfac-tion quality S1	Satisfac-tion availability S2	Satisfaction quality hospitals S3	Satisfaction provision hospitals S4	Satisfaction quality physicians S5	Satisfaction provision physicians S6
female	67%	55%	87%	88%	92%	92%
male	73%	59%	89%	88%	93%	93%
child12	67%	55%	84%	85%	91%	91%
no child12	69%	57%	89%	88%	92%	93%
married	71%	56%	89%	89%	92%	93%
not married	67%	57%	86%	85%	91%	93%
imm	71%	60%	85%	85%	90%	91%
not imm	69%	56%	89%	88%	92%	93%
postsec	69%	56%	88%	87%	92%	92%
secsch	69%	59%	89%	89%	92%	94%
ageunder30	67%	64%	75%	77%	88%	89%
age30_49	67%	53%	85%	84%	91%	91%
age50_64	67%	51%	91%	91%	93%	94%
age65up	74%	63%	93%	92%	94%	95%
inunder40K	65%	57%	87%	87%	92%	92%
in40K-80K	70%	57%	89%	89%	93%	93%
in80Kup	72%	56%	88%	87%	92%	92%

Table 7: Per Capita Government spending in year 2003 and 2009/10 by Provinces (constant dollars)

	2003			2009-2010		
	total	**hosp**	**phys**	**total**	**hosp**	**phys**
Ontario	2,356	849	470	2,758	975	633
New Brunswick	2,230	1,146	431	2,758	1,544	586
Quebec	2,135	NA	NA	2,595	NA	NA
Nova Scotia	NA	1,057	421	NA	1,379	543
Prince Edward Island	NA	1,038	343	NA	1,206	528

Table 8: Estimated Marginal Effects from IV Probit Regressions with Government Expenditures (S1-S6) CCHS 2003

	2003											
	S1		S2		S3		S4		S5		S6	
	n=42,496		n=42,496		n=2,938		n=2,938		n=2,938		n=2,938	
	M. Effect	z	M. Effect	z	M. Effect	z	M. Effect	z	M. Effect	z	M. Effect	z
female	-0.109	-4.35	-0.082	-2.61	-0.053	-0.59	-0.065	-0.67	0.024	1.31	-0.106	-0.78
age25to29	-0.069	-1.23	-0.125	-2.13	0.022	0.13	0.028	0.16	0.032	0.14	-0.044	-1.65
age30to34	-0.046	-0.78	-0.169	-2.12	0.001	0.70	0.001	0.80	0.076	0.27	-0.051	-2.53
age35to39	-0.038	-0.90	-0.153	-3.10	0.006	2.42	0.041	1.82	0.044	1.61	0.016	0.09
age40to44	-0.045	-0.64	-0.121	-2.59	0.005	2.24	0.015	1.32	0.011	0.49	-0.035	-1.76
age45to49	0.020	0.30	-0.151	-2.48	0.003	1.45	0.100	0.57	0.248	1.43	0.038	0.55
age50to54	0.053	0.58	-0.107	-2.23	0.005	2.19	0.053	2.54	0.035	2.87	0.017	0.93
age55to59	0.076	1.26	-0.074	-3.31	0.008	3.47	0.024	2.12	0.021	3.32	-0.007	-0.02
age60to64	0.117	1.72	-0.128	-3.65	0.007	3.13	0.017	1.44	0.040	2.76	0.060	1.19
age65to69	0.119	1.66	-0.091	-4.40	0.008	3.53	0.078	2.93	0.038	4.45	0.016	2.23
age70to74	0.240	2.70	-0.120	-1.37	0.071	3.28	0.067	1.91	0.035	3.85	0.032	0.79
age75to79	0.139	3.59	0.016	0.20	0.032	2.23	0.378	1.27	0.023	1.56	0.005	1.22
age80up	0.140	4.52	0.127	1.28	0.027	4.43	0.079	2.49	0.043	3.11	0.048	2.43
in20Kto40K	-0.009	-0.21	-0.064	-2.12	0.076	0.80	0.089	0.47	-0.009	-0.04	-0.033	-1.25
in40Kto60K	0.045	0.91	-0.044	-1.32	0.024	1.27	0.054	0.31	0.002	0.57	-0.062	-0.43
in60Kto80K	0.063	1.23	-0.089	-1.95	0.018	1.19	0.049	0.24	0.050	0.24	-0.014	-0.69
in80Kup	0.162	2.98	-0.041	-0.74	0.011	1.63	0.083	0.47	0.009	0.88	-0.010	-0.03
child12	0.021	0.67	0.021	0.38	-0.016	0.13	0.038	0.32	0.041	0.31	0.020	1.27
married	-0.020	-0.91	-0.029	-1.25	-0.069	-1.46	0.082	0.85	-0.046	-0.34	0.018	0.90
satislife	0.120	1.01	0.007	0.10	0.028	0.05	-0.198	-0.61	0.088	0.41	0.052	1.06
stress	-0.174	-0.85	-0.150	-2.02	-0.012	-0.26	-1.303	-1.75	0.012	0.26	0.600	0.51
minority	0.078	1.66	0.138	3.21	-0.019	-0.06	-0.097	-0.36	-0.018	-0.04	0.314	1.54
health	0.111	3.91	0.121	3.05	0.021	2.67	-0.143	-1.10	0.047	2.68	0.026	2.07
mentalhealth	0.175	1.34	-0.017	-0.23	-0.038	-0.11	-0.310	-1.35	0.038	1.46	0.012	0.63
imm	-0.049	-1.26	0.082	2.42	-0. 016	-2.21	0.156	0.78	-0.023	-2.37	-0.044	-0.11
postsec	0.165	4.22	0.066	2.35	0.067	0.61	-0.022	-0.21	0.050	0.32	-0.039	-0.42
Health/pop	0.0004	2.32	0.001	4.96	0.0001	0.31	0.0003	1.18	0.003	1.29	-0.0006	-0.55
Predicted probability	0.75		0.61		0.91		0.91		0.95		0.95	

Note.

1. The reference person is male, aged20to24, household income less than $20,000, not married, not satisfied with life, perceive low life stress, not visible

minority, self-perceived physical and mental unhealthy, not immigrant, with a secondary school diploma or less, living in Ontario.

2. The marginal effect of an independent variable is the slope coefficient (the derivative) of a prediction function. Even though we usually expect the marginal effect lie between 0 and 1, the slope of the prediction function can be greater than one, especially when the slope of the prediction function is changing quickly.

Table 9: Estimated Marginal Effects from IV Probit Regressions with Provincial Dummies Indicators (S1-S6) CCHS 2003

	S1		S2		S3		S4		S5		S6	
	n=42,496		n=42,496		n=2,938		n=2,938		n=2,938		n=2,938	
	M. Effect	z	M. Effect	z	M. Effect	z	M. Effect	z	M. Effect	z	M. Effect	z
female	-0.133	-4.12	-0.142	-4.35	-0.053	-0.61	-0.063	-0.76	0.030	1.02	-0.032	-0.78
age25to29	-0.069	-1.25	-0.061	-1.22	0.017	-0.09	0.036	0.20	0.030	0.14	-0.027	-1.98
age30to34	-0.027	-0.65	-0.046	-0.78	0.023	0.65	0.053	0.88	0.092	0.26	-0.008	-2.36
age35to39	-0.054	-0.73	-0.124	-0.90	0.059	2.93	0.007	1.84	0.020	1.55	0.016	0.08
age40to44	-0.019	-0.56	-0.039	-0.64	0.037	2.53	0.017	1.41	0.016	0.48	-0.039	-1.86
age45to49	0.021	0.81	0.022	0.30	0.333	1.64	0.106	0.68	0.016	1.08	0.015	0.88
age50to54	0.033	0.58	0.052	0.58	0.043	3.06	0.032	2.57	0.027	2.41	0.011	0.56
age55to59	0.077	1.24	0.079	1.26	0.086	4.15	0.075	2.19	0.018	3.59	-0.003	-0.02
age60to64	0.116	1.73	0.126	1.71	0.082	3.58	0.069	1.38	0.019	2.52	0.013	1.06
age65to69	0.118	1.69	0.108	1.65	0.010	4.61	0.083	2.77	0.053	4.64	0.026	2.33
age70to74	0.118	2.72	0.238	2.69	0.040	4.36	0.175	1.87	0.008	4.28	0.031	0.76
age75to79	0.136	3.63	0.161	3.58	0.032	2.06	0.318	1.27	0.033	1.82	0.029	1.32
age80up	0.202	4.11	0.222	4.20	0.032	4.97	0.073	2.48	0.067	2.98	0.024	2.14
in20Kto40K	-0.009	-0.19	-0.009	-0.19	0.175	0.82	0.083	0.24	-0.019	-0.05	-0.028	-1.46
in40Kto60K	0.044	0.91	0.074	0.91	0.025	1.30	0.058	0.28	0.097	0.75	-0.034	-0.47
in60Kto80K	0.062	1.20	0.062	1.25	0.012	1.38	0.036	0.15	0.024	0.27	-0.048	-0.53
in80Kup	0.161	2.50	0.161	2.80	0.008	1.78	0.045	0.38	0.015	0.73	-0.015	-0.09
child12	0.023	0.62	0.021	0.64	-0.011	-0.08	0.046	0.42	0.055	0.29	0.005	1.35
married	-0.020	-0.68	-0.020	-0.77	-0.169	-1.46	0.081	0.85	-0.042	-0.31	0.037	0.97
satislife	0.133	1.07	0.119	1.04	0.049	0.12	-0.016	-0.53	0.016	0.64	0.020	1.33
stress	-0.425	-0.86	-0.342	-0.85	-0.192	-0.17	-0.029	-1.97	0.007	0.36	0.062	0.58
minority	0.078	1.45	0.077	1.45	-0.019	-0.07	-0.100	-0.36	-0.050	-0.17	0.002	1.48
health	0.195	3.90	0.212	3.62	0.025	2.69	-0.129	-1.16	0.031	3.10	0.039	2.53
mentalhealth	0.123	1.22	0.132	0.99	-0.041	-0.13	-0.253	-1.34	0.001	1.29	0.005	0.85
imm	-0.031	-1.32	-0.051	-1.37	-0.407	-2.22	0.113	0.72	-0.140	-2.35	-0.025	-0.27
postsec	0.117	3.87	0.117	4.17	0.059	0.53	-0.007	-0.07	0.127	0.28	-0.085	-0.29
NB	-0.106	-2.32	-0.100	-2.39	0.014	0.12	0.165	1.60	-0.311	-2.64	0.062	0.41
QUE	-0.092	-1.95	-0.090	-1.98	NA	NA	NA	NA	NA	NA	NA	NA
PEI	NA	NA	NA	NA	0.046	0.28	-0.076	-0.59	-0.122	-0.54	0.122	0.42
NS	NA	NA	NA	NA	0.083	0.66	-0.001	-0.01	-0.218	-1.65	-0.065	-0.64
Predicted probability	0.75		0.61		0.91		0.91		0.95		0.95	

Note. The reference person is male, aged20to24, household income less than $20,000, not married, not satisfied with life, perceive low life stress, not visible minority, self-perceived physical and mental unhealthy, not immigrant, with a secondary school diploma or less, living in Ontario.

Table 10: Estimated Marginal Effects from IV Probit Regressions with Pooled Data 2003, 2009/10 CCHS, Ontario Only

	S1		S2		S3		S4		S5		S6	
	n= 4,890		n= 4,890		n= 4,890		n= 4,890		n= 4,890		n= 4,890	
	M. Effect	z	M. Effect	z	M. Effect	z	M. Effect	z	M. Effect	z	M. Effect	z
stress	-0.230	-3.20	-0.110	-3.12	-0.021	-4.01	-0.018	-2.62	0.040	-0.05	0.007	0.52
age25to29	0.321	-1.13	0.331	-1.13	-0.101	-0.55	0.006	0.23	0.030	1.02	-0.027	-0.51
age30to34	0.165	0.57	0.162	0.53	0.013	0.05	0.023	0.42	0.045	1.03	-0.041	-1.80
age35to39	0.578	1.70	0.320	1.77	0.087	3.61	0.018	0.95	0.031	3.22	-0.006	-0.01
age40to44	0.122	0.31	-0.053	-0.19	0.035	0.69	0.015	0.70	0.023	1.45	-0.017	-1.93
age45to49	-0.286	-0.64	-0.343	-0.93	0.094	1.82	0.009	0.72	0.011	2.78	0.057	0.81
age50to54	-0.124	-0.39	-0.202	-0.71	0.089	1.35	0.015	3.20	0.009	2.22	-0.031	-0.06
age55to59	0.313	1.39	0.240	0.92	0.043	2.76	0.027	1.22	0.026	3.01	0.020	0.87
age60to64	0.221	0.41	-0.038	-0.10	0.029	2.50	0.014	1.16	0.018	1.76	-0.013	-0.03
age65to69	0.217	2.02	0.018	0.06	0.064	3.00	0.101	3.38	0.022	3.94	0.022	1.63
age70to74	0.225	0.71	0.059	0.10	0.052	1.02	0.076	2.25	0.009	3.25	-0.015	-0.64
age75to79	0.233	1.32	0.078	0.26	0.075	1.76	0.014	1.43	0.023	1.84	0.035	1.62
age80up	0.275	1.09	0.120	0.89	0.023	1.93	0.063	2.10	0.034	1.75	0.052	0.37
female	-0.229	-2.37	0.141	1.29	-0.034	-1.14	-0.006	-0.05	-0.023	-0.84	-0.019	-1.51
satislife	-0.079	-2.56	-0.092	-1.43	-0.051	-1.33	-0.062	-1.33	0.037	1.74	0.057	2.12
postsec	0.230	1.75	0.106	0.60	0.023	1.17	0.092	1.29	-0.005	-0.03	-0.039	-0.19
in20Kto40K	-0.093	-1.30	-0.147	-2.73	-0.035	-0.26	0.063	0.44	-0.097	-0.68	0.004	0.08
in40Kto60K	-0.237	-1.71	-0.109	-2.26	-0.031	-0.24	0.012	0.08	-0.079	-0.45	-0.033	-0.42
in60Kto80K	-0.204	-1.47	-0.118	-2.24	-0.046	-0.33	-0.017	-0.12	0.005	0.04	-0.006	-0.54
in80Kup	-0.030	-0.20	-0.391	-1.00	0.032	0.24	-0.120	-0.84	-0.049	-0.29	-0.031	-0.51
married1	0.118	1.39	0.021	0.16	-0.033	-0.94	0.119	0.71	-0.060	-0.32	-0.031	-0.19
child12	0.020	0.11	0.057	0.30	0.041	1.54	0.112	0.52	0.071	0.42	0.044	1.75
imm	-0.112	-0.68	-0.126	-0.59	-0.012	-1.20	0.040	0.90	-0.022	-1.89	-0.081	-0.12
minority	0.121	0.43	-0.107	-0.18	-0.081	-0.24	-0.006	-1.22	0.051	0.81	0.006	0.70
health	0.073	2.92	0.218	3.28	0.011	2.35	0.003	0.88	0.036	1.64	0.037	1.61
mentalhealth	-0.060	-0.23	-0.14	-0.53	-0.009	-0.85	-0.011	-1.33	-0.009	-0.57	0.023	0.22
year2009	-0.177	-0.95	-0.371	-0.88	-0.052	-0.61	-0.014	-1.06	0.011	0.42	0.025	0.05
age25to29_2009	0.274	1.27	0.122	0.37	0.037	1.35	-0.034	-0.08	-0.023	-0.87	-0.030	-0.07
age30to34_2009	0.094	0.27	-0.500	-1.52	0.024	1.41	0.016	0.58	-0.030	-0.76	0.027	1.10
age35to39_2009	-0.202	-0.78	-0.283	-1.38	-0.011	-1.20	0.038	0.22	-0.031	-2.70	-0.108	-0.65
age40to44_2009	0.201	0.65	-0.135	-0.38	0.027	1.42	0.011	0.94	-0.010	-0.92	0.041	1.56

age45to49_2009	0.254	1.41	0.302	0.77	0.019	0.46	0.037	1.19	-0.061	-1.38	-0.039	-0.09
age50to54_2009	0.268	0.69	-0.052	-0.09	0.042	0.95	-0.044	-0.97	-0.041	-1.56	0.030	0.28
age55to59_2009	-0.237	-0.67	-0.479	-1.47	0.048	0.14	0.043	1.28	-0.034	-1.26	-0.134	-0.51
age60to64_2009	0.03	0.01	-0.098	-0.61	0.034	0.08	0.040	1.10	-0.004	-0.97	0.012	0.70
age65to69_2009	-0.231	-1.16	-0.102	-0.57	-0.033	-0.69	-0.018	-0.82	-0.023	-2.74	-0.003	-0.29
age70to74_2009	-0.146	-0.12	-0.116	-0.52	-0.008	-0.63	-0.046	-1.17	-0.011	-2.45	0.058	1.00
age75to79_2009	0.087	-0.11	-0.076	-0.96	0.019	0.74	0.026	0.39	-0.035	-0.32	-0.160	-1.12
age80up_2009	0.125	-0.31	-0.105	-1.13	-0.021	-0.88	-0.065	-1.38	0.003	0.23	0.045	1.43
female_2009	0.131	0.74	0.096	2.25	0.020	1.40	0.056	0.34	-0.050	-0.3	0.020	0.81
married_2009	-0.181	-1.14	0.056	0.37	0.022	1.42	0.010	0.69	0.001	0.00	-0.016	-0.09
satislife_2009	0.256	2.57	0.070	2.07	0.028	0.46	0.015	1.41	-0.033	-1.99	-0.125	-1.63
postsec_2009	-0.167	-1.24	-0.129	-0.78	-0.065	-0.37	-0.031	-1.02	-0.022	-0.09	0.004	0.02
child12_2009	-0.045	-0.11	-0.121	-0.71	-0.034	-1.09	0.032	0.13	0.045	0.15	-0.011	-1.01
minority_2009	-0.127	-0.51	-0.001	0.00	-0.006	-0.22	0.019	0.58	-0.059	-0.62	0.035	0.10
mentalhealth_2009	-0.147	-0.58	0.113	0.42	0.098	0.37	0.085	0.97	0.026	1.83	0.018	1.12
health_2009	0.121	-1.17	0.113	-2.13	0.081	-2.42	0.062	-1.22	0.030	0.76	0.005	-1.45
imm_2009	0.051	0.30	0.126	0.56	0.031	0.19	-0.131	-1.15	0.053	1.11	-0.106	-0.48
Predicted probability	0.72		0.59		0.89		0.88		0.94		0.94	

Note. The reference person is male, aged20to24, household income less than $20,000, not married, not satisfied with life, perceive low life stress, not visible minority, self-perceived physical and mental unhealthy, not immigrant, with a secondary school diploma or less, in year 2003.

Table 11: Estimated Marginal Effects and Z values for Instruments (S1-S6) CCHS 2003, 2009/10

	Stress in S1+S2(2003)		Stress in S3-S6(2003)		Stress in S1-S6(2009/10)	
	n= 4,890		n= 2,796		n= 4,890	
	M. Effect	z	M. Effect	z	M. Effect	z
hhsz	0.050	5.34	0.026	0.74	0.129	3.49
fulltime	0.500	19.94	0.306	3.83	0.366	4.62
drink	-0.001	-0.06	0.023	2.26	0.020	0.23
smoke	0.146	3.90	0.248	2.73	0.396	3.39
nophyact	0.085	3.56	0.174	2.06	0.126	1.55