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**The Health Services Use Among Older Canadians in
Rural and Urban Areas**

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SEDAP Research Paper No. 178

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THE HEALTH SERVICES USE AMONG OLDER CANADIANS IN RURAL AND URBAN AREAS[#]

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Abstract

Even though universal health care is one of the fundamental pillars of Canadian society, the rising cost of all services has resulted in the relocation and redistribution of funding and services between rural and urban areas. While most econometric analyses of health service use in Canada include broad controls by province and rural/urban status, there has been relatively little econometric work that has focused specifically on geographical variation in health service use. Using the 2002-03 wave of the Canadian Community Health Survey, we examine the determinants of a range of health services use by older Canadians across different types of urban and rural areas of residence. The regression analysis suggests two general conclusions: 1) other things equal, health service use is lower among older residents of rural areas in terms of visits to a GP, to a specialist and to a dentist compared to residents of urban core CMA/CAs, but there are no significant differences in hospital nights; and 2) these results are surprisingly robust across a range of specifications that control variously for demographic characteristics, socio-economic status, private health insurance, and physical health. However, the magnitude of the estimated differences is quantitatively not very large. In addition, the self-reported incidence of unmet healthcare needs overall shows no systematic variation across rural and urban areas.

Keywords: health service use, rural urban differences

JEL Classifications: I10, I18, J10

Résumé

Bien que l'universalité du système de santé représente un des piliers fondamentaux de la société canadienne, le coût croissant de tous les services s'est traduit par une relocalisation et une redistribution du financement et des services entre les régions rurales et métropolitaines. Alors que la plupart des études économétriques sur l'utilisation des services de santé au Canada incluent une variable de contrôle pour la province de résidence et le milieu rural/urbain, relativement peu de travaux économétriques se sont spécifiquement intéressés à la variation géographique de l'utilisation des services de santé. En s'appuyant sur les données de la vague 2002-03 de l'Enquête sur la santé dans les collectivités canadiennes, nous examinons les facteurs déterminants de l'utilisation d'une gamme de services de santé par les aînés canadiens en considérant différents types de résidence dans les secteurs urbains et ruraux. L'analyse économétrique suggère deux conclusions générales : 1) toutes choses égales par ailleurs, l'utilisation des services de santé est plus faible chez les résidents seniors des secteurs ruraux en termes de visites chez un généraliste, un spécialiste et un dentiste comparativement aux résidents des régions métropolitaines (RMR/AR), on ne trouve cependant aucune différence significative au niveau des nuits d'hospitalisation ; et 2) ces résultats sont étonnamment robustes à l'utilisation de diverses variables de contrôle des caractéristiques démographiques, du statut socio-économique, de l'assurance maladie privée, et de la santé physique. Cependant, l'ampleur des différences estimées n'est quantitativement pas très importante.

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1. Introduction

According to the Canada Health Act, all Canadians are entitled to equitable access to health services, regardless of where in Canada they live. Nevertheless, differences both in the provision of health services and in health outcomes are well-documented across regions of Canada, and in particular between rural and urban areas. The Romanow Report entitled *Building our Values: The Future of Health Care in Canada* found that geography is a determinant of health and that substantial disparities existed between urban and rural areas in Canada. In particular, the Report identified access to health care in rural areas and remote communities as a major problem due to both distance and retention of health workers. Similar conclusions were drawn in the Kirby Report that noted access issues were the most serious problems for residents of rural and remote areas, and also that the health of rural residents was worse than their urban counterparts.¹

Even though universal health care is one of the fundamental pillars of Canadian society, the rising cost of all services has resulted in the relocation and redistribution of funding and services. With limited resources, cutbacks in the provision of health services have sometimes exacerbated the difference in service provision in rural and urban areas. For example, while the percentage of the population living in rural areas fell from 29.2% in 1991 to 22.2% in 1996, the percentage of physicians practicing in rural areas fell from 14.9% to 9.8% over the same period. Further, the ratio of physicians per 1000 population in rural areas is forecast to fall from 0.79 in 1999 to 0.53 in 2021 (Laurent, 2002).

Rationalization of health care provision, including the closure of hospital beds, emergency wards, and the replacement of hospitals with community care centers in less populated areas have all been well documented in the media, giving the impression that

¹ See Nagarajan (2004) for a summary of both reports as they relate to health care in rural and remote areas of Canada.

people in rural areas are experiencing longer waiting times or longer travel times, lower levels of technology and more uneven resource distribution than in other areas.²

There is a substantial literature on the links between geography and health *outcomes* in Canada (see for example, Omariba and Rasugu, 2006, Beaujot and Niu, 2005, Mitura and Bollman, 2003, Shields and Tremblay, 2002, Tremblay et.al., 2002, Rosenberg and Wilson, 2000, and Boyle and Willms, 1999), and one general conclusion is that regional differences in health outcomes are small once differences in socio-economic factors and health-related behaviours are taken into account.³ There has also been substantial research on the determinants of health service use among Canadian residents (see for example, Deri, 2005, Van Houtven and Norton 2004, Newbold et.al., 1995), and while most regression models include broad controls by province and rural/urban status, there has been relatively little econometric work that has focused specifically on geographical variation in health service use.

Wilson and Rosenberg (2004) analyze National Population Health Survey data from 1998-99 and find that overall only 6% of Canadians aged 25 years or more have experienced problems accessing health care. The main determinants of unmet health care needs are found to be specific socio-economic, socio-demographic and health characteristics of individuals. After controlling for these factors, differences in unmet needs by region were relatively small, with rural residents of Atlantic Canada reporting geographic barriers to access and rural residents of the Western provinces reporting economic barriers to access. A number of authors have studied access and use of health

² The effect of rationalization of service provision in rural areas depends on community and government responses to the changes and does not necessarily worsen the health status of residents of the affected community. For example, Liu et.al. (2001) find that the closure of 52 small rural hospitals in Saskatchewan in 1993 did not adversely affect the health of local residents or their access to inpatient hospital services. See also Marchildon (2006) for more analysis of the Saskatchewan experience.

³ In related work, Wilkins et.al. (2002) find that over the period 1971-96, the gap in life expectancy and infant mortality between the poorest and richest neighborhoods narrowed significantly.

services for more narrowly defined regions, including for example Fakhoury and Roos (1996) who consider access to physician resources by rural and urban populations in Manitoba, and Cloutier-Fisher et.al. (2006) who examine trends in avoidable hospital rates across different regions of British Columbia.⁴

This report focuses on the health service use of Canadians aged 55 years and older and seeks to answer two questions. First, to what extent are there differences in health services use between older residents of urban and rural areas? We will consider a range of health services as well as alternative definitions of what constitutes a rural area. Second, are any of the differences in health services use identified in the first part of the analysis due to differences in the socio-economic and demographic characteristics and/or the health status of each region's residents?⁵ We focus on older Canadians as on average they are in greater need of health services than younger people, and so any barriers to the use of necessary health services that are present are likely to be more pronounced and therefore more costly.

The rest of paper proceeds as follows. We begin with the theoretical underpinnings for the regression analysis to follow, and then we discuss the specific methods to be employed including specification of key variables and estimation techniques. Following this, we present and discuss the main results in two stages – descriptive statistics on health service use by urban/rural status, and then regression analysis that controls for various observable factors likely to be important to health status

⁴ See Laurent (2002) for a general overview of issues related to the access to health care in rural areas of Canada.

⁵ It should be noted that a finding that rural people are using less services may not necessarily indicate an under-supply of health services in rural areas. Alternatively, rural individuals may be using the optimal amount of particular health services, and it may be that people in urban areas are over-using those services relative to what is deemed to be optimal. As will be discussed later, considering alternative measures of health service use alongside a measure of unmet needs for health services will help assess the extent to which there is an undersupply of health services in rural areas.

and health service use. Then we briefly discuss some checks on the robustness of the results, and we conclude with a summary of the key findings, implications for policy, and possibilities for further research.

2. Methods and Data

Framework

The typical analytical framework in studies of health service use is due to Andersen (1995) who identifies three types of factors likely to be important determinants of an individual's demand for health services: enabling factors, predisposing factors and needs factors. Enabling factors are characteristics that affect one's ability to use the health system, such as socioeconomic status, knowledge of the health care system and possibly private health insurance. Predisposing factors are those characteristics that determine how much an individual will seek to use the health care system, such as age, education and marital status. The last group of characteristics are need factors, such as general health status, the presence of chronic conditions, and activity limitations. Living in a rural area would affect health service use primarily as an enabling factor since it would reflect longer distances that must be travelled to obtain certain health services, and possibly longer waiting times.

Following the literature, we use this framework to guide selection of control variables within a reduced-form model framework. For demographic controls, we include variables for age, marital status, and immigrant status. For socio-economic status, we include controls for education using a set of indicator variables for the highest level of education attained: less than secondary school graduation, secondary school graduation, some post-secondary and post-secondary graduation. As well, we include indicator

variables for income adequacy by family income quintile: lowest income quintile, lower middle income quintile, middle income quintile, upper middle income quintile and highest income quintile. It is important to note that the effect of higher socio-economic status on health service use may well depend on the nature of the service. For example, as pointed out by Kenkel (1991) a higher education level is correlated with knowledge of the benefits of a healthy lifestyle and a better understanding of the relationship between the choices one makes with regards to their health and the potential consequences. This implies that those who are more educated may be more inclined to see a doctor and a dentist once a year as recommended. There is also evidence that the direction of causality between health (and so health service use) and income can work in both directions and whether both or only one are correct is unknown. (Buckley et al., 2004; Fuchs, 2004) As pointed out by Case et al. (2005), being in poor health, even at an early age, can determine one's level of SES in the future.

Need factors such as health status and health behaviours are likely to be the most important and immediate determinants of health service use, and self-perceived health is widely used in the literature as a proxy for health status (Newbold et al. 1995). We also include variables reflecting smoking status, specifically whether the person is a current regular smoker, a former regular smoker, or was never a regular smoker. The retrospective nature of past smoking behaviour makes it particularly appealing as an explanatory variable since it predates subsequent ill health effects that arose as a result of smoking. We also experiment with the presence of chronic conditions as another measure of physical health. Though often used as explanatory variables in empirical analyses of health service use, health outcome variables can suffer from a clear endogeneity bias. For example, use of preventative health services can reduce the possibility of developing

certain conditions or experiencing worsening health in the future. Further, awareness of certain chronic conditions such as high blood pressure comes about following a (perhaps regular) visit to a doctor. We evaluate the potential endogeneity of both health status and current family income later in the paper.⁶

We include a set of province indicator variables that will reflect provincial-wide differences in the provision of health care. As well, we experiment with the inclusion of controls at the level of the health region: a full set of indicator variables for health region of residence (which can be identified owing to the fact that many health regions span both rural and urban areas) and alternatively variables measuring the number of general practitioners and the number of specialists per 1000 population in each health region.

Another potentially important set of explanatory variables reflect the individual's degree of health insurance coverage. Private health insurance is available in Canada to cover the cost of those services that are not insured under the Medicare, such as dentist visits, pharmaceuticals, eye exams and glasses, and private hospital rooms. We consider the impact of the inclusion of variables for whether the person has health insurance for each of the four different types of service use listed above in an extension to our basic approach.⁷

Identifying rural areas

Our main focus is on how health service use varies between rural and urban areas after controlling for differences in personal and other regional characteristics that

⁶ Panel data such as the Survey of Labour Income Dynamics and National Population Health Survey allow the causality of health status and health care use to be investigated in more detail. See Buckley et.al.'s (2006) study of socio-economic influences on health outcomes for further discussion of such an approach.

⁷ Provinces often make different types of publicly funded health insurance available to seniors for services not covered by Medicare but the availability of insurance is often means tested. For example, the province of New Brunswick covers most of the cost of pharmaceuticals for low income individuals who are over the age of 65.

have been found to be important in the literature. In the Canadian Community Health Survey data that we use for this study, rural/urban status is identified according to the following classification: urban core, urban fringe, secondary urban core, rural fringe, urban outside CMA/CA and rural outside CMA/CA.⁸ Preliminary analysis found that urban core, urban fringe and secondary urban core statistically were very similar and so these categories are grouped together under the label urban core for the balance of the paper. We include indicator variables for each of the four remaining categories - urban core, rural fringe, urban outside CMA and rural outside CMA – with urban core as the reference group. This measure of rural/urban status has the advantage of identifying rural areas more effectively than the conventional two category rural/urban measure often used, as the latter categorization of rural includes both rural outside CMA/CA and rural fringe areas which are within CMA/CA boundaries. From a health services perspective, residents of rural fringe areas are likely to be able to access the health services of the adjacent urban core CMA/CA.

Measures of Health Service Use

An individual's use of health services is a complex and multi-dimensional issue, and there exist many different kinds of health services and many different intensities of health service use, ranging from a regular annual health check-up to a protracted period in the intensive care ward of a hospital. One way to classify various measures of health

⁸ Statistics Canada defines an urban core to be the large area around which a CMA or CA is delineated and with a population of at least 100,000 people for a CMA, or between 10,000 and 99,999 for a CA. Urban fringe includes all areas within a CMA or CA with a population of less than 10,000. Rural fringe is all territory within a CMA or CA that is not classified as urban core or urban fringe. The last 2 categories are distinguished by the fact that to be considered urban outside CMA the area must have a population of at least 1000 and have no fewer than 400 people per square kilometre (Statistics Canada 2006). If not, then the area is considered rural outside CMA.

service use is to distinguish between service use primarily instigated by the patient, such as having a regular doctor or visiting a doctor to treat the onset of an acute ailment, and health service utilization jointly determined by patient and physician, such as number of visits to the doctor, visits to a specialist, or nights in hospital (Deri, 2005). The delineation is not exact however as individuals and physicians may jointly determine the use of preventative or diagnostic services such as regular check-ups, blood pressure tests and cancer screening.

We define eight binary variables for different types of health service use: does the individual have a GP, has the individual consulted with a GP in the last year, has the individual consulted with a medical specialist in the last year (such as a surgeon, allergist, gynaecologist, or psychiatrist), has the individual spent at least one night in hospital last year, has the individual received alternative care in the last year (such as from an acupuncturist, homeopath or massage therapist), has the individual been to the dentist in the last year, has the individual received medical home care in the last year, and does the individual have unmet health care needs. We also analyze the frequency of use for four measures of health services: number of visits with a GP in the past 12 months, number of nights spent in a hospital in the last 12 months, number of visits to a dentist in the past 12 months, and number of visits with a specialist medical doctor in the last 12 months. All variables are self-reported.

Some of the measures are basic services the average Canadian should have regardless of the state of his/her physical health. For example, it is recommended that all Canadians, particularly those individuals over 20 years of age, see a doctor once a year for a health check-up, and most dentists recommend at least annual dental checkups for good oral health (Peckins 2005). As well, there is an increasing body of research that

shows a strong link between dental and physical health. For example there is evidence that periodontal disease is linked to coronary artery disease as well as to problems during and after pregnancy (Abou- Raya et al. 2002; Gajendra et al. 2004). Other types of health service use reflect particular medical needs where the state of one's physical health is likely to be an important determinant. For example, a visit to a specialist or spending a night in the hospital will likely to arise in response to a particular medical condition. By considering how a range of health services differ in use between rural and urban areas, insights into the nature of any possible barriers to access can be gained. For example, a finding that people in rural areas are using basic health care services less than those in urban areas may be a cause for concern for policymakers. If people in rural areas are missing out in the potential benefits of preventative health care use, such as having a yearly check-up, in the future the health care system in rural areas may be put under additional strain from the need to provide more curative (and typically more expensive) health services. As well, even though essential health care services are supposed to be available to all, there might be more pronounced differences in the use of discretionary or specialized services between rural and urban areas, such as visits with a medical specialist. Additional insights can also be gained by considering use of health services that are not typically covered by Canada's Medicare system, such as dental care or visits to alternative health care providers.⁹

Data and Sample Specification

The data used for this paper are from the confidential version of Cycle 2.1 of the Canadian Community Health Survey (CCHS) from 2002-03. The CCHS focuses on

⁹ Private medical insurance covering such services is likely to be a direct determinant of the use of such services.

Canadians 12 and older who live in private dwellings in all of the provinces and territories and does not sample those living on Indian Reserves, Crown Land, in private institutions or members of the Armed Forces. The total sample size is 135, 573 people. Population weights provided by Statistics Canada are used throughout the descriptive and econometric analyses described below. We focus on the health service use of older Canadians – those aged 55 and over – as they constitute a significant and growing proportion of the population, and on average they are significantly more likely to be in need of health services than younger people. Due to small sample sizes in the Canadian territories, we restrict attention to residents of Canada’s provinces only. Given the possible influence of outliers in the data arising from the very old, in results not reported here we repeat the analysis after restricting the sample of Canadians to those aged between 55 and 79 inclusive. There is very little impact on the results.

Econometric Methods

For the main set of results, estimation of the determinants of binary dependent variables is by Probit. For measures of health service use where we are also interested in the frequency of use, we employ the two-part approach where Probit estimation results constitute the first part and OLS estimation on the number of visits or days conditional on positive use constitute the second part. This is a commonly used approach in the literature (see, for example, van Houtven and Norton, 2004, Escarce, 1997, Hurd, 1997 and Duan et.al., 1984) and as illustrated in van Houtven and Norton (2004), incorporation of instrumental variable methods is straight-forward. An alternative to the two-part model is the Heckman two-stage selection model that corrects for the fact that those individuals with positive health service use are not a random sample of all individuals (see Newbold

et.al., 1995). However, the success of the two-stage selection model hinges crucially on having an instrumental variable (IV) that is highly correlated with the likelihood of using the service (e.g., first visit to a GP) but is uncorrelated with the number of uses conditional on positive use (e.g., number of visits to a GP). Since no reasonable IV can be found in practice that satisfies these requirements, we instead opt for the two-part model where relevant.

3. Results and Analysis

Descriptive Statistics

This section presents descriptive statistics on health service use in order to give some sense of how actual use of health services varies across rural and urban areas. Figures 1.1 and 1.2 show the proportion of older Canadians who used particular health services in the year prior to the survey date, as well as the proportion of older Canadians reporting unmet healthcare needs. Figure 1.3 shows the average intensity of use of particular health services, conditional on at least some use. The most striking result from these figures is that for most measures, there is little difference in health service use between urban and rural areas. Particularly noteworthy is the fact that the proportion of older Canadians reporting unmet healthcare needs is almost exactly the same across rural and urban areas. Residents of urban core areas and rural fringe areas are more likely to have had a visit with a medical specialist or dentist than residents of non-CMA urban and rural areas, but are about equally as likely to have a GP, to have visited a GP, to have spent a night in hospital and to have received alternative care or home care.¹⁰

¹⁰ When the figures are decomposed by province, it is only Nova Scotia where rural non-CMA residents have higher levels of unmet healthcare needs than urban core CMA residents. Differences in contact with medical specialists and dentists between rural and urban areas are also found across all provinces.

Access to a specialist doctor may be affected by pecuniary and non-pecuniary travel costs arising from concentration of medical specialists in larger population areas, particularly for older residents who may be dependent on family members for transportation. Lower use of dentists may reflect affordability barriers since rural areas tend to be lower income and dental services for adults are not covered by provincially-funded health insurance. However conditional on use, urban and rural residents have comparable numbers of dental visits and visits with medical specialists (as well as number of GP visits). In contrast, residents of urban areas with positive days in hospital had on average three more days in hospital than residents of rural areas.

In general there do not appear to be marked differences in health service use between rural and urban areas, though what differences are present suggest lower health service use among rural residents. Table 1 illustrates that rural and urban residents on average differ across a range of other respects that are likely to be significant determinants of health service use. Among Canadians older than age 54, residents of rural fringe areas and rural areas outside of CMA/CAs are actually a little younger on average than urban residents and are also more likely to be married. Urban core areas have the highest proportion of residents born outside of Canada while rural non-CMA areas have the lowest. Perhaps not surprisingly, the biggest difference in socio-economic status across regions is between areas in CMA/CA areas (urban core and rural fringe) and non-CMA/CA areas (urban non-CMA and rural non-CMA) rather than between urban and rural areas. Over 20% of urban core and rural fringe residents are in the highest income quintile for Canadian families, and over 40% of these residents have university degrees. Comparable figures for regions outside of CMA/CAs are less than 15% and less than 35% respectively. Related to this, a greater proportion of CMA/CA residents have health

insurance to cover drugs, dental care, eye care and hospital care than non-CMA/CA residents although the gap is smaller for drug coverage than for the other forms of insurance.

Another important determinant of health service use is health status, and Table 2 presents statistics for the prevalence of chronic conditions, self-assessed health status and smoking behaviour by region of residence. Unlike what was found for Table 1, fewer patterns are evident in Table 2. Rates of particular chronic conditions are broadly comparable across rural and urban areas – while rural and urban areas outside CMA/CAs have marginally higher rates of arthritis, hypertension, diabetes, and heart disease, the differences are small. Non-CMA/CA residents are more likely to report being in ‘fair’ self-assessed health and less likely to report being in ‘excellent’ self-assessed health. In terms of smoking behaviour, urban core and urban outside-CMA/CA have larger proportions of people who never smoked although again the differences are small.

One possible conclusion to draw from the descriptive statistics is since overall health service use among older residents resident outside of CMA/CAs is the same or lower than for urban residents but these residents are in poorer health (by some measures) and have lower socioeconomic status, it follows that health service use between these residents and *comparable* residents of CMA/CAs will be more pronounced. It is also notable that where there are differences, the delineation in socio-economic characteristics and in health services use is between CMA and non-CMA areas rather than urban and rural areas *per se*.

Regression Results

For each measure of health service use we report the results in a series of regression steps that help to gauge the extent to which differences in health service use across rural and urban areas are explained by differences in demographic and socio-economic conditions, health behaviours and other factors among the residents of those areas. In the first regression we include controls only for province of residence along with the four controls for rural/urban status (urban core CMA is the omitted category). Second, we add demographic characteristics such as age, marital status and immigrant status to the regressions. Third, we add socio-economic characteristics such as educational attainment and income quintile. Fourth, we add various measures of physical health outcomes and health behaviours. Finally, we add a set of indicator variables for health region of residence. For brevity, we report only results for the indicators for region of residence. Other results are available on request and are summarized at the end of this section. As well, we do not address potential endogeneity issues here but return to them in the next section.

The first set of health service use measures are those based on intensity of use – number of visits to a GP, number of visits to a specialist, number of nights in hospital and number of visits to a dentist. For each measure we present the results for the two-part model as Probit marginal effects for the first part (incidence) and OLS coefficient estimates for the second part (intensity conditional on positive use) after taking logs of the dependent variable. Marginal effects and OLS estimates are therefore interpreted roughly as the proportional increase in the likelihood of use or frequency of use of the service, respectively.¹¹

¹¹ Marginal effects for the probit estimation are appropriate for binary explanatory variables. However, since the dependent variable for the OLS regression is in logs, the estimated proportional change for individuals in other areas compared to areas that are in the urban core is actually given by $(\exp(\hat{\beta})-1)$

The first column of results in Table 5.1a show that only residents of rural areas outside CMA/CAs are significantly less likely than residents of urban core areas to have had a visit with a GP once provincial effects are controlled for. Adding successive sets of explanatory variables does not qualitatively change this result, although the magnitude of the effect is somewhat smaller after the additional inclusion of indicators for health region.¹² This result is of some concern given that all people aged 55 and over should be seeing a GP every year even if in very good physical health. In the second column of results, it can be seen that conditional on at least one GP visit, residents of rural fringe, non-CMA/CA urban and non-CMA/CA rural areas all have significantly fewer visits to a GP than urban core residents even after controlling for demographic and socio-economic characteristics and health status. Adding health region fixed effects again reduces the magnitudes of the estimates somewhat. The magnitude of the estimates indicates that rural residents have about 5% fewer visits to a GP than urban core residents.

The third and fourth columns of results show that patterns of use are similar for visits to a medical specialist. Residents of both urban and rural areas outside of a CMA/CA are around 6-7% less likely to visit with a specialist during the year, even after controlling for health outcomes. The addition of health region fixed effects again reduces the magnitude of the marginal effects but they remain significant at the 1% level. Conditional on at least one visit to a specialist, residents of all areas outside of core CMA/CA regions have around 10% fewer visits on average compared to comparable residents of core CMA/CA regions. This estimate is larger in magnitude than the estimate for number of GP visits and may be because specialist visits are more sensitive to the

where $\hat{\beta}$ is the reported coefficient estimate on the rural indicator variable. However for relatively small values of $\hat{\beta}$, the true marginal effect is very close to the estimated coefficient reported.

¹² The inclusion of health region fixed effects forces identification of the rural/urban effects to be through only those health regions that encompass both urban and rural regions.

many potential barriers to access and other problems, such as cost of overnight trips and longer waiting times.

Table 5.1b gives two-part regression results for nights in hospital and visits to a dentist. For nights in hospital, there are no significant differences in the probability of spending a night in hospital across geographic regions for almost all specifications. In contrast, residents of all regions outside of core CMA/CA areas are less likely to have visited a dentist although the magnitude of the difference appears to be more sensitive to the inclusion of socio-economic controls. Health region fixed effects reduce the estimated marginal effects further but they are again still significant at the 1% level. For number of visits conditional on at least one visit, the main distinction is between residents and non-residents of CMA/CAs, with people outside of CMA/CAs predicted to have around 5% fewer visits to the dentist.

Table 5.2 presents probit marginal effects for the other dimensions of health service use. Residents of areas other than core urban CMA/CA areas are somewhat more likely to have used alternative forms of health care but the marginal effects are not significant except for residents of rural fringe areas. Residents outside of CMA/CAs in both urban and rural areas are less likely to have a family GP but the differences are small (in the order of 1%) and are no longer significant once health region fixed effects are added. Consistent with the descriptive statistics discussed above, there is no evidence of significant difference in unmet health care needs across all specifications. The marginal effects are also quantitatively very small. Together with estimated differences in doctor visits, the results may arise from residents outside of urban CMA/CA regions having less need for health services owing to better unobserved health status. Alternatively, fewer GP visits may imply that some health problems that would require additional treatment may

be going undiagnosed. Finally, receipt of home care also shows very little significant difference between rural and urban areas.

In summary, two main conclusions are apparent. First, visits to a GP, to a specialist and to a dentist are all significantly lower for residents of rural areas and urban areas outside of a CMA/CA and these differences persist after the inclusion of a range of demographic, socio-economic, health outcome and other geographic controls. The key distinction in most cases appears to be between regions within a CMA/CA and regions outside of a CMA/CA. Lower incidence of visits to a GP and to a dentist in particular are of some concern as good health practices should involve annual checkups with a GP and a dentist even if there are no apparent health problems, and this is particularly the case for older individuals. In contrast, nights in hospital and the existence of unmet healthcare needs show no significant variation across rural and urban areas. Second, the estimated marginal effects are broadly and surprisingly consistent across specifications that range from provincial controls only to a full set of controls including indicator variables for health region. The estimated differences are therefore due to differences between rural and urban regions of residence and/or to differences in other unobserved characteristics of the residents of urban and rural regions.

Regression results for the other variables (available on request) reveal some interesting outcomes. As expected, GP visits, specialist visits, and nights in hospital increase with age, but use of alternative health care, unmet health care needs and dentist visits use decrease with age. Immigrants are less likely to spend a night in hospital, spend fewer nights in hospital and have fewer visits to a medical specialist compared to native-born Canadians. The various measures of physical health have a large and predictable effect on both the incidence and frequency of GP visits, visits with specialists, nights in

hospital as well as unmet health needs and use of an alternative care provider all increasing with worse health. Even with the presence of these measures of health, socio-economic status (as measured by education level and family income quintile) is positively related to the likelihood that an individual consults with a GP, a specialist and a dentist. It is also positively associated with the likelihood of experiencing unmet healthcare needs. In contrast, income and education have no significant effect on the number of visits to these health care professionals conditional on positive use. Income and education also have no effect on overnight hospital visits. One possible explanation for these patterns is that higher socio-economic status results in greater prevention and/or early diagnosis of conditions, meaning less intensive treatment.

Even with publicly funded health insurance for primary health care, private health insurance is still found to be positively correlated with the incidence and frequency of GP visits and with the probability of visiting a specialist. It is likely that private health insurance is reflecting additional dimensions of socio-economic status. Not surprisingly, there is also a very strong positive relationship between dental insurance and the probability of visiting a dentist so private health insurance does increase usage of the health services covered by the insurance. However, private health insurance is not a significant determinant of the existence of unmet health care needs.

Finally, dummy variables for nine provinces are included in each step of regression, with Ontario as the reference category. Interpretation in the presence of health region fixed effects is more complicated, so we briefly review the results of the province indicator variables with the inclusion of all explanatory variables except the health region indicators. Relative to Ontario, residents of Quebec are likely to have fewer visits with a dentist, with a GP and with a specialist (although they are more likely to have consulted

with a specialist at least once). They are also less likely to have a family GP and are more likely to have unmet healthcare needs, though they are also more likely to have used alternative care and to have received homecare. Residents of BC are more likely to have consulted with a GP at least once, are more likely to report unmet health care needs, and are more likely to have used alternative healthcare but are less likely to have had at least one visit with a dentist or medical specialist, compared to Ontario residents. Patterns for other provinces are less clear and results more likely to be insignificant. However residents of all provinces except Newfoundland, Nova Scotia and BC are more likely to have spent a night in hospital compared to Ontario residents. (Conditional on at least one night in hospital, residents of all provinces except BC show no significant differences in the number of nights in hospital. BC has lower levels of nights in hospital.)

4. Extensions

As noted earlier, it is quite possible that physical health status is endogenously determined with health service use. For example, early detection and treatment of health problems can reduce the likelihood of developing more serious health conditions or reduce the severity of symptoms, leading to better health status (and so less need for particular health services) than would otherwise have been the case. The main way to deal with this endogeneity problem is via use of instrumental variables, but what is required is an IV that is correlated with current physical health status but is uncorrelated with health service use except through its effect on health. In other words, we need a variable that reflects an exogenous shock to physical health. Given the cross-sectional nature of the data and the close relationship between health outcomes and health service use, identification of an appropriate instrument is difficult, though we initially identified

three possibilities: health conditions present from birth, for current or former smokers the age the person started smoking, and injuries arising from an accident. Unfortunately there was not enough variation in the first variable for it to be used as an IV. In the case of the other two, preliminary investigation of their suitability ruled them out as they were both found to be significant determinants of most measures of health service use even with the full set of explanatory variables included. As well, it is also quite likely that given our focus is on older Canadians, the occurrence of accidental injuries may well be affected by an individual's current health status.¹³ However, since the inclusion of the detailed measures of physical health and health behaviours in the regressions has little effect on our main variables of interest, namely the rural/urban indicators, our estimates of these parameters may not be that susceptible to endogeneity bias arising from the health status measures.

One alternative to the inclusion of indicator variables for health regions is to include instead direct measures of factors at the level of the health region that are likely to be important determinants of health service use, such as direct measures of health service supply. Two such characteristics for which data are available at the health region level are number of full-time equivalent GPs per 100,000 population and number of medical specialists per 100,000 population in 2003.¹⁴ Both of these series show significant variation across rural and urban areas. For urban core regions, the figures for full-time equivalent GPs and specialists are 97.5 and 108.4 respectively. For rural areas

¹³ Similarly, family income quintile may also be endogenous but no suitable instrument could be found. Receipt of dividend income would perhaps be a measure of wealth and so less affected by endogeneity, but that variable also was found to have a significant direct effect on most health services, precluding its use as an instrumental variable for current family income quintile.

¹⁴ Statistics are collected from the publication Health Indicators 2005 published by the Canadian Institutes of Health Information. Data are not available for all health regions, so the results reported in this section are based on regression analysis of individual health service use in a subset of health regions. The results reported in the previous section are unaffected by the omission of health regions for which physician concentration figures are not available.

outside of CMA/CAs, the corresponding figures are 93.9 and 59.8. Figures for non-CMA/CA urban areas are comparable to non-CMA/CA rural areas, while rural fringe areas have around the same concentration of GPs but 79.2 for specialists. There is also substantial variation in these figures across Canadian provinces, though in all provinces urban core regions have higher concentrations of full-time equivalent GPs than rural areas, and markedly higher concentrations of specialists. This is also generally true for rural fringe and non-CMA/CA urban areas relative to urban core areas although with some minor exceptions.

We repeat the range of regressions above with both measures of physician concentration included instead of health region fixed effects. Standard errors are corrected for possible correlation of the error terms within health regions. We find that the probability of having a family GP is greater when the concentration of GPs in a health region is higher. However the incidence and frequency of GP visits is not significantly related to GP concentration, although the number of GP visits is positively related to the concentration of specialists in the health region. Concentration of specialists is also positively related to the probability of consulting with a specialist and to the number of visits to a specialist (although the number of visits to a specialist is found to be negatively related to the concentration of GPs¹⁵). A higher concentration of GPs is associated with a lower probability of experiencing unmet healthcare needs, though only at the 10% level of significance. Concentrations of GPs and specialists have no significant effect on hospital visits or on the use of alternative health care methods. More importantly for our purposes, the magnitudes of the estimated marginal effects of living in other urban and

¹⁵ This apparently odd result likely arises because of the high degree of correlation between the two concentration measures (0.72). GP concentration on its own is not a significant determinant of the number of specialist visits.

rural areas are generally comparable to the marginal effects estimated without the inclusion of health region fixed effects. The only exception is that the probability of having a GP in a rural area outside of a CMA/CA (relative to core CMA/CA residents) is somewhat lower with the inclusion of the concentration variables than with the health region fixed effects.

5. Conclusion

In this paper we have sought to identify and analyze differences in a wide range of different measures of health service use between older residents of rural and urban areas of Canada. Perhaps in contrast to conventional wisdom, there do not appear to be major differences between older residents of rural and urban areas in terms of health service use or the presence of unmet health care needs. The descriptive statistics indicate that rural residents are somewhat less likely to visit with a medical specialist or a dentist and are likely to spend marginally fewer nights in hospital. However, rural and urban residents differ in significant ways – in particular, rural residents have lower family incomes and lower levels of educational attainment on average. They also differ in terms of self-assessed health, in terms of certain chronic conditions and in terms of smoking behaviour. Difference in health service use may also arise due to variations in provincially funded health systems. Since such differences may be acting to obscure underlying differences in health services use among otherwise similar residents of urban and rural areas, we use conventional estimation techniques to identify the various determinants of an individual's health service use.

The regression analysis suggests two general conclusions: 1) other things equal, health service use is lower among older residents of rural areas in terms of visits to a GP, to a specialist and to a dentist compared to residents of urban core CMA/CAs, but there

are no significant differences in hospital nights or in the presence of unmet health care needs; and 2) these results are surprisingly robust across a range of specifications that control variously for demographic characteristics, socio-economic status, private health insurance, and physical health, as well as for unobserved characteristics specific to particular health regions. While the regression results suggest the importance of variables such as education, health status, and province of residence to the use of health services, they do not explain the difference in health service use between rural and urban areas. In addition, for some services the main difference is not between rural and urban areas but rather urban core CMA/CA areas and both rural and urban areas outside of a CMA/CA.

Since measures of the supply of health services (through health region fixed effects and through direct measures of physician concentration) and other observable factors do not explain the observed differences in health service use, to the extent that these differences reflect barriers to the use of health services two implications arise. First, if the differences arise from physical/financial obstacles to accessing existing healthcare services, then the supply of health services may need to be re-distributed between rural and urban areas within health regions, or access costs for existing services need to be lowered; second, if the differences arise from demand side factors in terms of perceived needs then policy makers may need to stress the importance of timely health care (and in particular preventative health care) for people in rural areas.

However, while urban/rural region of residence gives rise to statistically significant differences in particular types of health service use, the magnitude of those estimated effects are quantitatively not very large. That is not to say that particular rural regions of Canada are not characterized by significant barriers in access to essential medical services but *overall* the differences that are found between rural and urban areas

do not appear to suggest widespread access problems. As well, perhaps the most direct measure of barriers to access – unmet healthcare needs – overall shows no systematic variation between rural and urban areas.

There are a number of caveats that should be emphasized when considering these results. It is important to note first that use of health services among older Canadians gives only a partial picture of the extent of barriers in access, even after controlling for physical health status. One reason is that barriers in access to health services at earlier ages can contribute to worse health later in life, leading to greater need for and reliance on health services for older individuals. Although some of our measures of health service use – such as visiting a doctor and a dentist at least once during the year – are recommended for all adults, more specific measures of preventative health service use among younger people – such as cancer screening – would provide a useful complement to the results reported here. A more general caveat is that all information on health service use and health outcomes is self-reported. Under-reporting of experiences with unmet health care needs may arise if for example individuals face barriers to the use of regular health care and so may not be aware of conditions requiring treatment, such as high blood pressure or diabetes.

Another caveat relates to the lack of suitable instruments with which to evaluate more thoroughly the impact of endogeneity of some important explanatory variables. As well, small sample sizes and confidentiality restrictions preclude conducting a similar for each of Canada's provinces in order to determine whether particular regions of particular provinces are characterized by more significant differences in health services use. Options for future research include pooling multiple cross-sections of population level

health data from the NPHS and CCHS (as in McDonald and Kennedy, 2004), or differentiating among rural areas in terms of physical distance to larger urban areas.

Figure 1.1

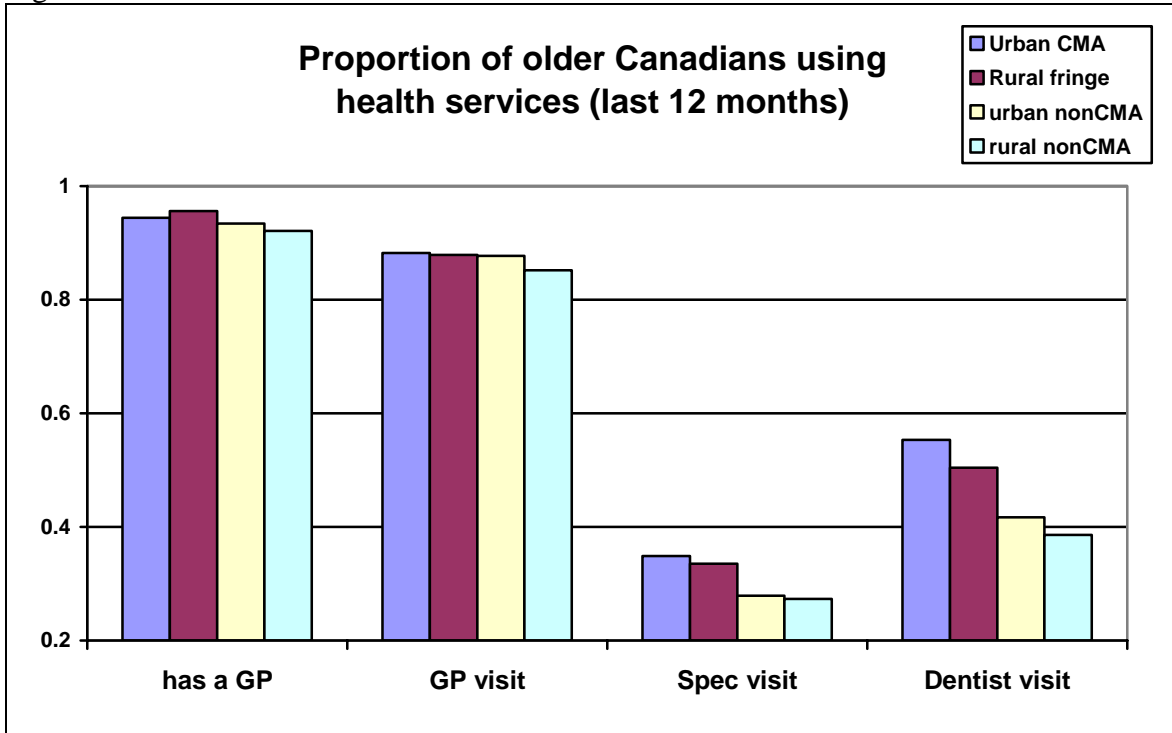


Figure 1.2

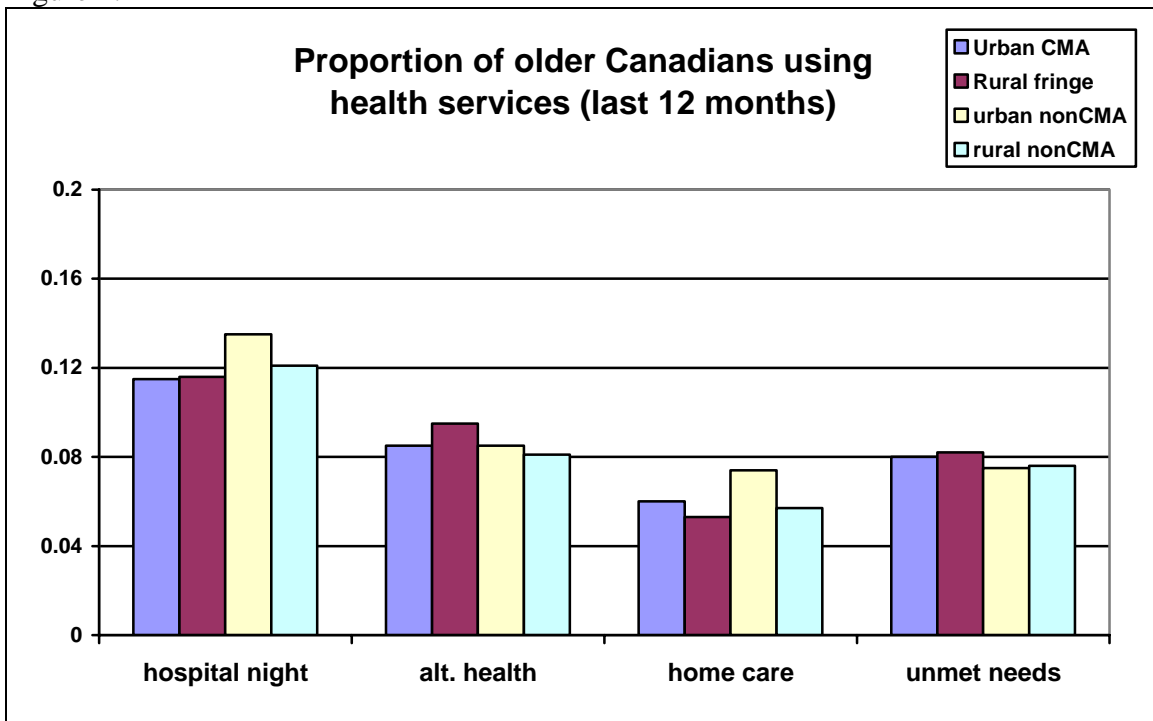
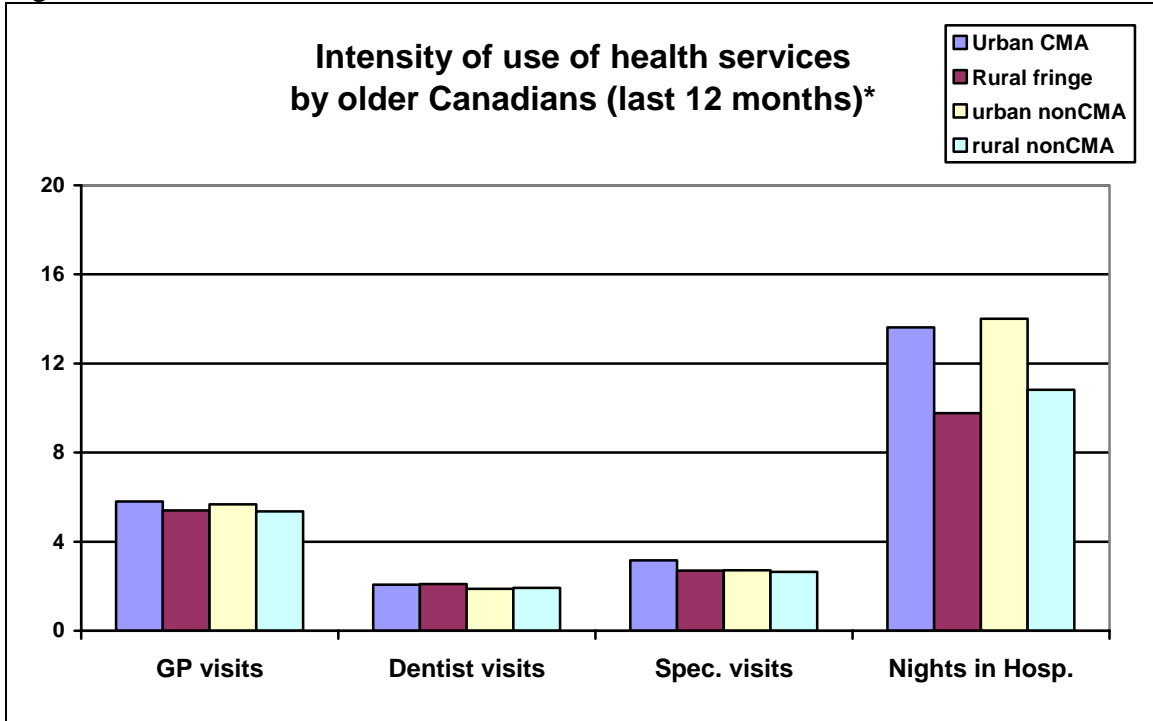


Figure 1.3



- *Conditional on use*

Table 1: Demographic and Socio-Economic Characteristics
(Individuals aged 55+)

	Urban core	Rural fringe	Urban outside CMA/CA	Rural outside CMA/CA
Age (years)	67.2	65.5	67.7	66.6
Male	0.458	0.487	0.458	0.515
Married	0.670	0.792	0.694	0.746
WSD	0.277	0.177	0.268	0.207
Single	0.050	0.031	0.035	0.045
Immigrant	0.315	0.167	0.104	0.088
<u>Family income quintile</u>				
Lowest	0.023	0.014	0.029	0.029
2 nd	0.067	0.058	0.095	0.087
Middle	0.207	0.224	0.253	0.283
4 th	0.287	0.305	0.286	0.277
Highest	0.221	0.217	0.149	0.133
Income missing	0.196	0.182	0.190	0.192
<u>Education</u>				
Less than high school	0.330	0.343	0.454	0.478
High school Grad	0.172	0.160	0.129	0.118
Post-secondary	0.049	0.048	0.048	0.042
University	0.417	0.412	0.342	0.333
Education missing	0.032	0.037	0.028	0.029
<u>Private Insurance</u>				
Pharmaceutical	0.790	0.770	0.769	0.733
Dental	0.432	0.424	0.335	0.310
Eye care	0.436	0.447	0.368	0.359
Hospital care	0.517	0.517	0.461	0.428
Proportion of people aged 55+*	0.691	0.067	0.072	0.146
Proportion of people aged 12+*	0.719	0.066	0.068	0.124
Proportion of people aged 55–80*	0.688	0.061	0.071	0.148

* Proportions for people resident in ‘urban fringe’ are 0.025, 0.024 and 0.025 respectively.

Table 2: Health Outcomes and Health Behaviour
(Individuals aged 55+)

	Urban core	Rural fringe	Urban outside CMA/CA	Rural outside CMA/CA
<u>Chronic conditions</u>				
Asthma	0.075	0.078	0.078	0.080
Arthritis	0.390	0.412	0.448	0.416
Hypertension	0.363	0.343	0.379	0.369
Glaucoma	0.049	0.040	0.052	0.040
Diabetes	0.118	0.110	0.122	0.121
Cancer	0.044	0.049	0.044	0.042
Stroke	0.032	0.025	0.031	0.030
Heart Disease	0.144	0.140	0.154	0.154
<u>Self-assessed health</u>				
Excellent	0.150	0.157	0.128	0.126
Very good	0.278	0.293	0.283	0.281
Good	0.350	0.342	0.341	0.356
Fair	0.164	0.162	0.193	0.181
Poor	0.058	0.045	0.055	0.057
<u>Smoking</u>				
Current smoker	0.145	0.159	0.149	0.154
Former smoker	0.519	0.565	0.544	0.565
Never smoked	0.327	0.269	0.300	0.273

5.1a Two-part regression results for geographic indicators - individuals aged 55+

	Visits to a GP				Visits to a Medical Specialist			
	Probit (m.e.)		Conditional OLS		Probit (m.e.)		Conditional OLS	
	m.e.	p-value	coef.	p-value	m.e.	p-value	coef.	p-value
Provincial controls								
Rural fringe	-.0099	.273	-.1036	.000	-.0162	.186	-.0875	.004
Urban outside CMA/CA	-.0063	.338	-.0401	.040	-.0630	.000	-.0775	.008
Rural outside CMA/CA	-.0293	.000	-.0695	.000	-.0750	.000	-.0914	.000
+ Demographic controls								
Rural fringe	-.0117	.196	-.0744	.002	-.0236	.059	-.1013	.001
Urban outside CMA/CA	-.0116	.082	-.0444	.022	-.0685	.000	-.0940	.001
Rural outside CMA/CA	-.0299	.000	-.0582	.001	-.0816	.000	-.1021	.000
+ Socio-economic controls								
Rural fringe	-.0091	.310	-.0853	.000	-.0185	.142	-.1054	.001
Urban outside CMA/CA	-.0073	.270	-.0685	.000	-.0609	.000	-.1024	.000
Rural outside CMA/CA	-.0234	.000	-.0874	.000	-.0711	.000	-.1157	.000
+ Health controls								
Rural fringe	-.0086	.315	-.0723	.000	-.0202	.117	-.1158	.000
Urban outside CMA/CA	-.0101	.108	-.0686	.000	-.0652	.000	-.1015	.000
Rural outside CMA/CA	-.0251	.000	-.0853	.000	-.0759	.000	-.1167	.000
+ Health region fixed effects								
Rural fringe	-.0047	.569	-.0501	.043	-.0031	.818	-.1024	.014
Urban outside CMA/CA	.0021	.789	-.0261	.190	-.0391	.012	-.0535	.095
Rural outside CMA/CA	-.0170	.004	-.0475	.007	-.0501	.002	-.0792	.002

5.1b Two-part regression results for geographic indicators - individuals aged 55+

	Nights in Hospital				Visits to a Dentist			
	Probit (m.e.)		Conditional OLS		Probit (m.e.)		Conditional OLS	
	m.e.	p-value	coef.	p-value	m.e.	p-value	coef.	p-value
Provincial controls								
Rural fringe	-.0004	.966	-.1271	.132	-.0589	.000	-.0226	.303
Urban outside CMA/CA	.0153	.015	.0119	.864	-.1090	.000	-.0709	.000
Rural outside CMA/CA	-.0007	.896	-.0576	.325	-.1258	.000	-.0669	.000
+ Demographic controls								
Rural fringe	.0087	.336	-.0613	.513	-.0791	.000	-.0227	.308
Urban outside CMA/CA	.0108	.081	-.0345	.601	-.1061	.000	-.0689	.000
Rural outside CMA/CA	-.0016	.758	-.0446	.428	-.1340	.000	-.0626	.000
+ Socio-economic controls								
Rural fringe	.0066	.455	-.0780	.409	-.0623	.000	-.0165	.456
Urban outside CMA/CA	.0061	.313	-.0452	.511	-.0706	.000	-.0563	.001
Rural outside CMA/CA	-.0069	.188	-.0671	.247	-.0882	.000	-.0488	.004
+ Health controls								
Rural fringe	.0085	.322	-.0474	.607	-.0604	.000	-.0183	.409
Urban outside CMA/CA	.0068	.237	-.0373	.573	-.0774	.000	-.0549	.001
Rural outside CMA/CA	-.0065	.190	-.0547	.346	-.0929	.000	-.0491	.004
+ Health region fixed effects								
Rural fringe	.0082	.389	-.0181	.825	-.0440	.010	-.0064	.834
Urban outside CMA/CA	-.0050	.467	-.0737	.340	-.0380	.007	-.0305	.132
Rural outside CMA/CA	-.0152	.006	-.0719	.213	-.0558	.008	-.0372	.030

5.2 Probit regression results for geographic indicators - individuals aged 55+

	Used alternative healthcare		Has a GP		Has unmet needs for healthcare		Received home care	
	Probit (m.e.)		Probit (m.e.)		Probit (m.e.)		Probit (m.e.)	
	m.e.	p-value	coef.	p-value	m.e.	p-value	coef.	p-value
Provincial controls								
Rural fringe	.0144	.063	.0068	.255	.0018	.822	-.0075	.224
Urban outside CMA/CA	.0028	.636	-.0072	.109	-.0035	.518	.0120	.013
Rural outside CMA/CA	.0013	.798	-.0163	.000	-.0039	.425	-.0048	.179
+ Demographic controls								
Rural fringe	.0092	.214	.0040	.493	.0033	.676	.0055	.336
Urban outside CMA/CA	.0027	.631	-.0121	.005	-.0012	.827	.0096	.027
Rural outside CMA/CA	.0009	.857	-.0191	.000	-.0021	.677	.0001	.980
+ Socio-economic controls								
Rural fringe	.0124	.025	.0048	.407	.0036	.655	.0041	.456
Urban outside CMA/CA	.0088	.088	-.0111	.011	-.0019	.727	.0060	.154
Rural outside CMA/CA	.0088	.120	-.0176	.000	-.0027	.586	-.0032	.304
+ Health controls								
Rural fringe	.0126	.080	.0058	.263	.0051	.503	.0054	.268
Urban outside CMA/CA	.0082	.142	-.0118	.003	-.0007	.888	.0051	.146
Rural outside CMA/CA	.0078	.115	-.0180	.000	-.0026	.568	-.0018	.524
+ Health region fixed effects								
Rural fringe	.0180	.019	.0042	.305	.0052	.602	.0028	.586
Urban outside CMA/CA	.0084	.276	-.0048	.399	-.0012	.849	-.0009	.803
Rural outside CMA/CA	.0083	.086	-.0102	.084	-.0029	.512	-.0060	.036

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