Health Service Utilization among Older Adults in British Columbia: Making Sense of Geography*

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RÉSUMÉ

L'utilisation des services de santé de la part des personnes âgées a fait l'objet d'une attention croissante au cours des dix dernières années, mais on ignore pratiquement tout sur la différence d'utilisation des services entre les milieux ruraux et urbains. En cette époque de restructuration et de réduction des effectifs à l'intérieur des systèmes de services de santé canadiens, d'aucuns estiment que les personnes âgées en milieu rural risquent d'être de plus en plus désavantagées en matière d'accès aux services. Cet article se penche sur l'utilisation d'une gamme de services de santé de la part des personnes âgées qui vivent dans des communautés rurales ou urbaines de la Colombie Britannique. L'un des points de force de cet article, c'est qu'il centre également l'attention sur un continuum de communautés géographiques et sur une vaste gamme de services nécessaires utilisés par les populations plus âgées. La recherche se sert de données administratives provinciales provenant des services de santé de la Colombie Britannique concernant 48,407 personnes âgées ayant utilisé ces services en 1998/1999. Des analyses multivariées de covariance font ressortir des modèles particuliers d'utilisation des services en fonction de la géographie et de la population.

ABSTRACT

The utilization of health services by older adults has received increased attention over the past decade, but little is known about how service utilization varies between rural and urban areas. In an era of restructuring and downsizing within the Canadian health care system, there are concerns that rural older adults may be increasingly disadvantaged when it comes to accessing health care. This article examines the utilization of a range of health services by older adults living in urban and rural communities in British Columbia. A major strength of this article is its concurrent focus on a continuum of geographic communities and a broad range of services needed and used by older populations. The research utilizes provincial administrative health data from 48,407 older residents of British Columbia who used services in 1998–1999. Multivariate analyses of co-variance reveal some unique service utilization patterns by geographical area and population.

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Introduction

In the past few decades, substantial health care reforms in Canada have refocused attention on issues of service utilization, access, and equity for vulnerable populations, such as older adults. Recent reform initiatives in the 1990s in British Columbia (BC) have emphasized the importance of providing care closer to home, putting the public first, measuring outcomes, and improving service integration to create an effective, efficient health care system (BC Ministry of Health, 1991; Benoit, Carroll, & Millar, 2002; Canadian Medical Association [CMA], 2003). Despite the increasing recognition of the importance of access to care, research comparing rural and urban contexts in Canada is often either scarce or dated. Thus, much of our understanding of the relationships between service utilization for older populations living in rural and service utilization for older populations living in urban communities comes from American or European contexts, from which findings are extrapolated to the Canadian experience.

The purpose of this article is to examine how service utilization differs in BC across a range of geographic communities and among older populations, aged 65 and over. Historically, rural communities have been at a disadvantage in terms of access and equity in health service provision (Chalifoux, Neese, Buckwalter, Litwak, & Abraham, 1996; Cloutier-Fisher & Joseph, 2000; Shapiro & Havens, 2000). This research aims to increase our understanding of how recent public sector restructuring initiatives have combined with historical patterns of service delivery to influence access to care for older adults in urban and rural communities in BC.

Although the conceptual literature has long supported moving beyond a rural–urban dichotomy in understanding needs and patterns of service use, it is only recently that Statistics Canada has developed a broader set of definitions and categorizations for *rural* and *urban* (du Plessis, Beshiri, & Bollman, 2001). In addition, interest has expanded with regard to the development of rural indices to improve health care planning (Leduc, 1997; Kralj, 2000).

In this article, we emphasize a broader categorization of geographical areas (i.e., a five-category urban–rural index) and a wider spectrum of services (from acute care to alternative practitioners and home care) that are important to the health and well-being of older persons and that vary in availability between rural and urban areas. The geographic typology developed by Statistics Canada and used here ranges from *most urbanized* to *least urbanized / most rural* (du Plessis et al., 2001).

Health Care Provision in Canada and British Columbia

In Canada, as in other jurisdictions, health care restructuring and reform continue to be influenced by concurrent trends in demographic aging and in the affordability crisis in health care (Cheal, 2000; Williams, Deber, Baranek, & Gildiner, 2001). Demographically, as the population aged 65 and over continues to grow, there is debate about whether future older persons will experience better or worse health than seniors today (Cheal, 2000; Penning, 2002). There is general agreement that health care, broadly conceived, can be better organized, integrated, and delivered in order to meet the needs of older populations (Cheal, 2000; Shapiro & Havens, 2000).

Since the 1990s, there has been a substantial re-balancing among the state, marketplace, and civil society with regards to responsibility for providing public services such as health care (Cabeides & Guillen, 2001; Rice & Prince, 2000). Responsibility for the provision of care has devolved to local communities and to families, friends, and neighbours, as government withdrawal and downsizing has occurred. This trend has added to the historical challenges of providing adequate access to care for vulnerable populations, such as those living in rural areas (Cloutier-Fisher & Joseph, 2000).

Health care has been a key target for reform initiatives for provincial governments, given the high costs and large expenditures that characterize this sector (Williams et al., 2001). In 1998, hospitals and physicians accounted for 34 per cent and 14 per cent, respectively, of national health care expenditures, underscoring their significance within the overall health care continuum (Canadian Institute for Health Information [CIHI], 1998). In BC, as in other provinces, the proportion of the budget that is allocated to home care, community-based services, and alternative practitioners remains relatively small (i.e., under 5%) by comparison (BC Ministry of Health, 1991).

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Many small communities have a high proportion of elderly persons, due to the aging-in-place of older populations and the out-migration of younger populations in search of jobs and education (Troughton, 1999). In some rural areas, for example, 20–35 per cent of the population is aged 65 or older (Hodge, 1998). Larger communities mean a greater range of local services (Hodge, 1998). Many small rural communities struggle to provide a range of essential services, given the realities of dispersed and low-density populations, on the one hand, and of limited tax bases on the other (Furuseth, 1998; Cloutier-Fisher & Joseph, 2000; Liu, Hader, Brossart, White, & Lewis, 2001).

In BC, as in other jurisdictions, access to health care, from acute care services to alternative health practitioners (e.g., chiropractors, naturopaths) and home care, varies by both service category and geographical area. The concept of access incorporates many related issues, such as quality of service, referral mechanisms, waiting lists, and the availability of care in the community (Joseph & Phillips, 1984). In the absence of standard measures of access, the utilization of services is commonly used as a proxy measure (Joseph & Phillips, 1984; Millman, 1993). Access also depends on population characteristics (e.g., needs, health status, and expectations) as well as on the organization, distribution, and delivery of services (Joseph & Phillips, 1984).

Under the terms of the Canada Health Act (CHA, 1984), access to medically necessary health care services provided by hospitals and physicians is the right of all Canadians (Williams et al., 2001); yet health care is a provincially mandated responsibility. Despite the fact that many barriers to medically necessary care are removed through the terms of the CHA, access to services continues to have a mediating effect on utilization (Joseph & Phillips, 1984; Lin, Allan, & Penning, 2002). In BC, residents pay health care premiums for the basic services provided by general practitioners, medical specialists, home nursing care practitioners, and hospitals. The costs covered by the public purse for home care services, such as homemakers and personal support workers, is, however, based on income and other factors (e.g., proximity of family or functional ability) that vary by health region.

Differences in Health Service Utilization between Rural and Urban Areas

A growing body of research has addressed broad differences in health service utilization between urban and rural populations (Black & Burchill, 1999; Cohen & MacWilliam, 1995; Dansky, Brannon, Shea, Vasey, & Dirani, 1998; Fakhoury & Roos, 1996; Joseph & Cloutier, 1990; Tataryn, Roos, & Black, 1995), but only a limited number of studies examine how health sector restructuring alters health service utilization patterns (BC Ministry of Health, 1991; Burke & Stevenson, 1998; Church & Barker, 1998; Cloutier-Fisher & Joseph, 2000). However, Gesler, Rabiner, and DeFriese (1998) argue that it is uncertain whether urban–rural differences in the physical and functional health of older adults are related to the effects of residence or to other factors that co-vary with residence.

Urban/Rural Utilization Patterns by Service Category

Research from the United States has found significant differences between rural and urban older adults in certain aspects of health service use (Dansky et al., 1998). In this study, 6,956 older adults receiving medicare benefits were assigned to one of five geographic categories, ranging from *large metropolitan core* counties to *completely rural* counties. Older adults in large metropolitan core counties had the highest levels of physician use, while large metropolitan fringe counties had the highest number of in-patient days. Conversely, completely rural counties had the highest use of home health care services and the lowest use of in-patient days.

Dansky et al.'s (1998) study also found that age was a significant predictor of physician visits, hospital days, and home health care visits, explained largely by the fact that elders in metropolitan areas were older than their rural counterparts. Rural residents visited their family doctors more but saw specialists less often than their urban counterparts, and significant differences in home health care use between the more rural and the more urban categories remained after controlling for co-variates. The researchers concluded that home health care services appeared to provide a "safety net" in remote rural areas where formal and informal health care services were limited or not available, a finding supported by other researchers (Chalifoux et al., 1996; Penning & Keating, 2000). Overall, Dansky et al. (1998) concluded that rural communities had different combinations of services and providers and that these combinations must be considered in order to develop more targeted approaches to improving local rural service delivery.

Similar research examining differential access to services by older adults in rural and urban areas in Canada is limited. Béland, LeMay, Philibert, Maheux, and Gravel (1991) argued that service use by elderly populations in the previous 20 years was related to how the system functioned rather than to aging per se. Other research noted that seniors' use of acute care changed with the availability of alternative health facilities, services, and models

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(Anderson, 1997; Rosenberg & James, 2000). The fact that there are fewer general practitioners in rural areas, and more doctors and specialists in urban environments also has a bearing on service utilization patterns. For example, a recent report by the College of Family Physicians of Canada (CFPC) revealed that rural areas in Canada had 22 per cent of the population and only 9.9 per cent of the doctors (16.5% of general practitioners or family practitioners and 2.8% of specialists), as defined by practice location (Janus Project, 1998).

In a BC context, Barer, Evans, and Hertzman (1995) noted that both physician and specialist use among older populations had increased over time. Black, Roos, Havens, and MacWilliam (1995) linked use of services by older persons to poorer health; those in good health exhibited an increase in number of specialist consultations. From a geographic perspective, older rural adults used more physician services but fewer specialist services than older urban adults (Stuart & Shea, 1996). Furthermore, older rural adults tended to be hospitalized for longer time periods than older urban adults, due to the lack of hospitals or alternative services close to their homes (Martin Matthews, 1988). Recent government documents from a local health authority in BC have also supported this finding (Vancouver Island Health Authority [VIHA], 2002).

Annual visits to physicians are positively correlated with age. Roos, Shapiro, and Roos (1984) estimated that people aged 65 and older experienced 1.7 more physician visits per year than those in the 25–44 age group. Rural residence was consistently and significantly related to a decrease in the number of medical consultations (Wolinsky & Johnson, 1991). Other research indicated that seniors aged 75 and over used approximately half of all hospital days (Decoster & Brownell, 1997). A BC study (Evans, McGrail, Morgan, Barer, & Hertzman, 2001) for 1985/1986 suggested that the population aged 75 and over represented 4.5 per cent of the population but accounted for 43.7 per cent of patient days. Studies from Ontario showed a decrease in rates of hospitalization for older populations during the 1990s as a consequence of restructuring. For example, from 1991 to 1996, the hospital separation rate for the population aged 65 and over decreased from 315/1,000 to 275/1,000, and in the same time period, average length of stay declined from 12.2 days to 10.2 days (Anderson, 1997).

A BC study (Penning, Allan, & Roos, 2002) examined trends in use of alternative health practitioners and other practitioners during the 1990s. While utilization increased for specialist services, their research showed greater variation by age in use of alternative health practitioners (i.e., chiropractors, osteopaths, naturopaths, massage therapists, and physiotherapists), with the highest rates of use among those between the ages of 65 and 84 and the lowest among those aged 85 and over. Utilization rates for alternative practitioners peaked in BC from 1992/1993 to 1995/1996 and then dropped to around 1990/1991 levels in 1998/1999. Among the services that were examined in this category, the majority of medical-services-plan claims were for visits to chiropractors.

There is very little published research on utilization rates for home care services by older adults in Canada. Data from the 1998/1999 National Population Health Survey (NPHS) suggested that only 2.7 per cent of the Canadian population aged 12 and over used home care services (Skinner & Rosenberg, 2002). Of these, the majority reported using nursing services (28%), followed by help with housework (27%) and personal care (21%). Focusing on Ontario specifically, rural populations had the highest per capita use of home care services (3.8%), followed by urban Ontario (3.5%), while the Census Metropolitan Area (CMA) of Toronto had the lowest rates of use, at 2.4 per cent (Skinner & Rosenberg, 2002).

Use of home care services is related to age, as was reported with data from the 1994/1995 NPHS survey. Eight per cent of 65- to 79-year-olds and 22 per cent of those aged 80 and over had used home care services in the year preceding the survey (Wilkins & Park, 1998.). Among home care clients, half reported their health to be *poor* or *fair*; the majority had two or more chronic conditions (i.e., 56%), and 28 per cent had spent 8 or more nights in hospital during the previous year (Wilkins & Park, 1998).

Methods

Study Area

The province of BC was selected as the study area on the basis of available data. BC is also of analytical interest for at least two reasons: First, it has a population that is aging more rapidly than those of other Canadian provinces (Northcott & Milliken, 1998); and second, it underwent extensive health care restructuring in the 1990s (Hollander & Pallan, 1995; Benoit et al., 2002).

Data

Data for this study were assembled as part of a larger study examining the impact of regionalization and downsizing on the use of health services (Penning et al., 1998–2001).[1] Data included provincial administrative health data routinely collected by the British Columbia Ministry of Health and accessed through

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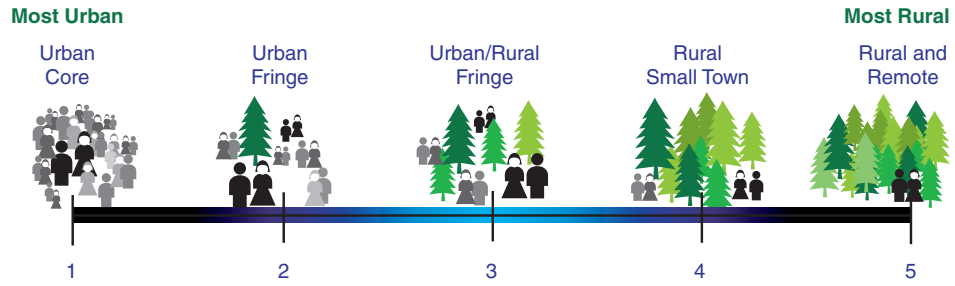

Figure 1: Urban/Rural index

the British Columbia Linked Health Database, housed at the University of British Columbia (Chamberlayne et al., 1998). For the purposes of this article, the medical services plan, hospital separations, and continuing care[2] files were used. It should be noted that the continuing care files and medical services plan data included publicly funded care only. Thus, many alternative health professions, such as chiropractors, as well as privately purchased home support services were not included. Care in which costs were shared was covered. A 10 per cent simple random sample of all those living in British Columbia in 1998/1999 was drawn.[3] From this, 48,407 older residents of BC, aged 65 and over, were identified as using health care services in the period under study.

Urban/Rural Index

For this research an urban/rural index developed by Statistics Canada was used to delineate a broader range of rural and urban communities (du Plessis et al., 2001). This index was created on the basis of population density in enumeration areas, proximity to a census metropolitan area (CMA) / census agglomeration (CA), and degree to which outlying populations commuted into the larger urban core (du Plessis et al., 2001). Five types of geographic communities were identified: (a) *urban core*, (b) *urban fringe*, (c) *rural fringe*, (d) *urban area outside CMAs/CAs*, and (e) *rural area outside CMAs/CAs*. According to Statistics Canada (1996), *CMAs* are large urban centres with a population of 100,000 or more, while *CAs* are smaller urban centres with a population of at least 10,000 people but not more than 100,000. Designations (a) through (c) relate to CMAs and CAs and can be broken down into three components: urban core, urban fringe, and rural fringe. On a continuum, these three types can be considered to reflect the geographic communities most influenced by larger urban centres. Geographic areas (d) and (e) lie outside CMAs and CAs and are associated with Statistics Canada's *rural and small town* (RST) designation. These geographic communities may be considered to be the least influenced by proximate large urban centres and, consequently, are the most rural in character. The RST designation refers to all municipalities between 1,000 and 9,999 persons in which fewer than 50 per cent of employed individuals commute to the urban core of a CMA/CA.

For the purposes of this study, we simplified the Statistics Canada index nomenclature for easier interpretation (see Figure 1). The five geographic category descriptors used in this article that correspond to the Statistics Canada geographical areas ranging from most urban to most rural are (a) *urban core*, (b) *urban fringe*, (c) *urban/rural fringe*, (d) *rural small town*, and (e) *rural and remote*.

Analytical Methods

Initially, a descriptive analysis was carried out using frequencies, means, and percentages to characterize service utilization across the range of geographic categories in the urban/rural index. Univariate analysis of variance (ANOVA) was used to examine the relationships among dependent variables (ranging from *use of acute care services such as physicians and specialists* through *to use of home support hours and nursing visits*) by geographical area. Results are described in order from most urban to most rural areas. The Bonferroni adjustment for multiple comparisons was selected for the post-hoc tests as one of the most conservative estimates of differences between groups (Hair, Anderson, Tatham, & Black, 1998). The urban core was used as the reference category for these tests. After bivariate data were examined, multiple analysis of co-variance (MANCOVA) was performed to control for age, gender, and average household income, the only explanatory variables that were available to the researchers. MANCOVA was selected because the technique could account for the fact the each of the six dependent health-service-use measures was interrelated with the others.[4] MANCOVA adjusted the mean for each, while controlling for the other five simultaneously. Given the large sample size, a significance level of greater than 99 per cent ($p < 0.001$) was selected. Prior to conducting the analyses, all variables were checked for linearity,

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normality, and multi-co-linearity and were transformed where necessary.

Measures

Dependent Variables

Six dependent variables were included in the analyses. These were *general practitioner visits*, *medical specialist visits*, *alternative health practitioner visits*, *in-patient hospital days*, *home support hours*, and *home nursing care visits*. Each of these is elaborated below and is presented by geographic area in Table 1.

a) General Practitioner Visits and b) Medical Specialist Visits. Number of general practitioner visits and medical specialist visits in 1998/1999 for each individual were calculated based on a combination of date and practitioner specialty–code variables found in the Medical Services Plan file.

c) In-patient Hospital Days. Number of in-patient hospital days in 1998/1999 for each individual was calculated based on number of nights spent in hospital. This information was obtained from the hospital separations database. Those not staying overnight in hospital were defined as out-patient separations (coded 0) while those staying at least one night were defined as in-patient separations (coded 1).

d) Alternative Health Visits. Number of alternative health visits in 1998/1999 for each individual was calculated based on a combination of date and practitioner specialty–code variables from the Medical Services Plan file. For this study, alternative health practitioner specialties included chiropractors, naturopaths, osteopaths, massage therapists, and physiotherapists.

e) Home Support Hours. Annual total number of publicly funded home support hours was obtained from the home support portion of the continuing care data.[5] In this database, number of home support hours is tracked on a monthly basis for each individual. Given this, it was possible to calculate the number of total hours in 1998/1999 for each individual over a specific period—in this case a fiscal year.

f) Home Nursing Care Visits. Annual number of home nursing care visits was obtained from the direct care files of the continuing care data. The total number of visits in 1998/1999 for each individual receiving home nursing care was calculated.

Control Variables

Three control variables (i.e., age, gender, and income) were used in the analyses. The descriptive statistics for each, by geographic area are presented in Table 2.

Age. For this article, only those aged 65 and over were retained in the database. The average age of respondents was 74.9 years. This average was not statistically different across geographic areas according to *t*-tests and ranged from 73.5 in the rural and remote areas to 75.3 in the urban fringe.

Gender. Just under 56 per cent (55.9) of the sample was female. This figure differed statistically by geographical area. Females made up a greater proportion of the sample in the two more urban areas and in rural small towns, while the urban/rural fringe and rural and remote areas had the lowest percentages of females (i.e., 49.8 and 47.8), a finding that is consistent with the literature. In the analysis, the coding for gender is *male* = 0 and *female* = 1.

Average Household Income. Average household income is not collected as part of the BC Linked Health Database. In this analysis, an average household income figure was assigned based on the enumeration area in which an individual resided. This was done using the postal code conversion file (Statistics Canada) and the 1996 Census Profiles Series (Statistics Canada). The average income of the sample according to enumeration area was $50,371, ranging from $43,747 in the rural and remote areas to $53,926 in the urban fringe.

Results

The parameter estimates and standard errors for each MANCOVA are reported in Table 3. The ANOVA results are reported first, followed by MANCOVA results. In addition, the reporting of the results is done in order from urban core (most urban) to rural and remote (most rural).

General Practitioner (GP) Visits

The average number of physician visits was 9.1, with over 97 per cent of the sample reporting at least one visit to a general practitioner in the fiscal year. A comparison of means test (ANOVA) between areas suggests that there were significant differences by geography ($p < 0.001$) in GP use. The only areas with non-significant differences were the urban core and urban fringe, urban core and rural small town, and urban/rural fringe and rural and remote areas. These results suggest that the urban core and urban fringe areas and rural small towns were the most similar in terms of physician availability and consequently use. The urban/rural fringe and rural and remote areas were the most similar (i.e., not significantly different) in terms of lower use of GPs.

Not surprisingly, the MANCOVA results (Table 3) suggest that being older, being female, and possessing

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Table 1: Descriptive statistics and ANOVA post-hoc tests for service utilization across urban/rural index ($N = 48,407$)*

Service Use	Urban/Rural Index					
	Urban Core	Urban Fringe	Urban/ Rural Fringe	Rural Small Town	Rural and Remote	Total Sample
GP Visits						
Number	34,038	2,248	3,433	3,988	3,430	47,137
Mean for all persons	9.1	9.5	8.5	9.5	8.3	9.1
Number with 1+ visits	34,038	2,248	3,433	3,988	3,430	47,137
Mean, persons with 1+ visits	9.4	9.7	8.7	9.7	8.6	9.3
Per cent of persons with 1+ visits	97.5	98.0	97.8	97.3	95.8	97.4
Results:[a] 2,4,5,7,8,10						
Specialist Visits						
Number	31,503	2,102	3,155	3,603	3,130	43,493
Mean for all persons	8.8	9.3	7.8	7.5	7.4	8.6
Number with 1+ visits	31,503	2,102	3,155	3,603	3,130	43,493
Mean, persons with 1+ visits	9.8	10.3	8.7	8.5	8.4	9.5
Per cent of persons with 1+ visits	90.2	91.7	89.9	87.8	87.4	89.8
Results:[a] 2,3,4,5,6,7						
Hospital In-patient Days						
Number	6,242	469	624	885	658	8,878
Mean for all persons	5.0	4.5	4.6	5.6	3.9	4.9
Number with 1+ in-patient days	6,242	469	624	885	658	8,878
Mean, persons with 1+ in-patient days	28.0	21.9	25.7	25.9	21.5	26.8
Per cent of persons with 1+ in-patient days	17.9	20.5	17.8	21.6	18.4	18.3
Results:[a] 3,8,10						
Alternative Health Visits						
Number	7,736	588	920	915	868	11,027
Mean for all persons	1.8	2.2	2.1	1.7	1.8	1.8
Number with 1+ visits	7,736	588	920	915	868	11,027
Mean, persons with 1+ visits	8.2	8.6	7.9	7.4	7.5	8.0
Per cent of persons with 1+ visits	22.2	25.6	26.2	22.3	24.3	22.8
Results:[a] 2,8						
Home Support Hours (annually)						
Number	2,917	166	189	396	243	3,911
Mean for all persons	13.2	8.6	8.3	14.6	10.8	12.6
Persons with 1+ visits	2,917	166	189	396	243	3,911
Mean hours, persons with 1+ visits	158.5	118.3	154.1	150.8	158.9	155.8
Per cent of persons with 1+ visits	8.4	7.2	5.4	9.7	6.8	8.1
Results:[a] 2,8,10						

(Continued)

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Table 1: Continued

Service Use	Urban/Rural Index					
	Urban Core	Urban Fringe	Urban/ Rural Fringe	Rural Small Town	Rural and Remote	Total Sample
Home Nursing Care Visits (annually)						
Number	1,020	55	92	151	118	1,436
Mean for all persons	0.4	0.4	0.3	0.5	0.4	0.4
Persons with 1+ visits	1,020	55	92	151	118	1,436
Mean visits, persons with 1+ visits	11.9	15.2	10.7	14.2	13.3	12.4
Per cent of persons with 1+ visits	2.9	2.4	2.6	3.7	3.3	2.9
Results:[a] None						

a 1 = urban core + urban fringe; 2 = urban core + urban/rural fringe; 3 = urban core + rural small town; 4 = urban core + rural and remote; 5 = urban fringe + urban/rural fringe; 6 = urban fringe + rural small town; 7 = urban fringe + rural and remote; 8 = urban/rural fringe + rural small town; 9 = urban/rural fringe + rural and remote; 10 = rural small town + rural and remote.
* Only results reaching a statistical significance of $p < 0.001$ are reported.

Table 2: Descriptive statistics for co-variates across urban/rural index

Individual Characteristics	Urban Core	Urban Fringe	Urban/Rural Fringe	Rural Small Town	Rural and Remote	Total Sample
Age in Years (mean)	75.19	75.30	73.67	74.65	73.53	74.92
Female (%)	57.55	54.74	49.76	54.74	47.80	55.89
Household Income (mean $)	51,028	53,926	53,061	46,151	43,747	50,371

Table 3: MANCOVA results—Parameter estimates ($N = 48,407$)[a]

	General Practitioner Visits		Specialist Visits		In-patient Hospital Days		Alternative Health Practitioner Visits		Home Support Hours		Home Nursing Care Visits	
	b	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*
Age	1.16***	0.04	1.35***	0.05	2.08***	0.05	−0.56***	0.04	3.21***	0.06	0.25***	0.02
Gender (1 = female)	0.01***	0.00	−0.01	0.00	−0.02***	0.00	0.05***	0.00	0.09***	0.01	−0.00	0.00
Household income	0.08***	0.00	0.08***	0.01	−0.02***	0.00	−0.03***	0.00	−0.02***	0.01	−0.00	0.00
Urban fringe	0.01	0.01	0.03	0.01	0.02	0.01	0.03***	0.01	−0.02	0.01	−0.00	0.00
Urban/rural fringe	−0.03***	0.01	−0.03***	0.01	0.00	0.01	0.03***	0.01	−0.02	0.01	0.00	0.00
Rural small town	0.01	0.01	−0.07***	0.01	0.04***	0.01	−0.01	0.01	0.04***	0.01	0.01***	0.00
Rural and remote	−0.04***	0.01	−0.05***	0.01	0.00	0.01	−0.00	0.01	0.01	0.01	0.01	0.00

a Urban core is the reference category for the four geographic area variables.
*** $p < 0.001$.

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a higher average household income were significantly related to greater number of general practitioner visits. Furthermore, the post-hoc results reveal that geographical area was less significant than other factors (i.e., age, gender, and income) in explaining GP use, since the relationships found at the bivariate level disappear with the addition of the control variables. In the MANCOVA analysis, urban/rural fringe and rural and remote areas show significant differences from the reference category (urban core) in physician use. Specifically, those in the urban/rural fringe and rural and remote areas had fewer visits to a GP than their urban core counterparts.

Medical Specialist Visits

The average annual number of medical specialist visits made by the sample was 8.6, ranging from a high of 9.3 in the urban fringe to a low of 7.4 in the rural and remote areas (Table 1). In the bivariate analysis, there is a discernible trend towards higher numbers of medical specialist visits in the urban areas and lower numbers of visits in the more rural areas, consistent with the literature. At the same time, within the total sample, 89.8 per cent of individuals had had at least one visit with a specialist in 1998/1999.

The multivariate results follow a pattern similar to that for general practitioner visits. Being older and having a higher average household income was related to more visits to medical specialists. Unlike general practitioner visits the addition of the control variables does not, however, eliminate the significance of geographic areas at the bivariate level. The results show that, in pair-wise comparisons, those in the urban core and urban fringe (the more urban areas) are more likely to visit a specialist than those in the urban/rural fringe, rural and small town, and rural and remote areas (i.e., the more rural areas).

In-patient Hospital Days

Number of in-patient hospital days for each individual was calculated based on number of nights spent in hospital. Average number of in-patient hospital days for the sample was 4.9 days. This figure varied slightly between a high of 5.6 days in the rural small town areas and a low of 3.9 days in rural and remote areas. Of the total older adult population using health services, only 18.3 per cent or less than 1/5 had experienced an in-patient hospital stay. This is consistent with evidence that only a small proportion of seniors use acute care services. Significant differences ($p < 0.001$) at the bivariate level are evident between three pairings—urban core and rural small town, urban/rural fringe and rural small town, and rural small town and rural and remote areas. Urban core residents recorded a greater number of days than urban fringe and urban/rural fringe community dwellers, while urban core residents recorded fewer days than residents of rural and small town areas (5.0 versus 5.6, respectively). In addition, rural small town residents reported more days than those in rural and remote areas (5.6 versus 3.9, respectively).

Multivariate results for number of in-patient hospital days suggest that being older, being male, and having a lower average household income were significantly associated with a greater number of hospital days. By geographical area, in terms of post-hoc comparisons, the only significant difference found for in-patient hospital days was that rural small towns were associated with higher use than was the urban core.

Alternative Health Visits

The average number of visits made to alternative health practitioners was 1.8, with a range from a high of 2.2 in the urban fringe to a low of 1.7 in rural and small town areas. Unlike general practitioner and medical specialists, less than one quarter (22.8%) of the older adult population who used health services, however, reported seeing an alternative health practitioner. In the ANOVA results, those in the more rural areas and the urban core area experienced fewer visits than the urban fringe and urban/rural fringe areas. In this service category, post-hoc comparisons between the urban core and urban/rural fringe, and urban/rural fringe and rural small town were significant at the $p < 0.001$ level.

MANCOVA results suggest that being younger, being female, and having a lower average household income were related to a greater number of alternative health practitioner visits. In addition, those in urban fringe and urban/rural fringe areas made more use of alternative health practitioners than did their urban core counterparts.

Home Support Hours

The average number of hours of home support in 1998/1999 for the sample was 12.6, ranging from 8.3 in the urban/rural fringe to 14.6 in the rural small town area. When only those individuals who used home support services were included (see Table 1), an average of approximately 156 home support hours was recorded and the urban fringe area reported significantly *fewer* hours (118). Significant differences ($p < 0.001$) between geographic areas were evident, with the urban core and rural and remote areas exhibiting a higher number of hours than the areas between these extremes.

As the results of the MANCOVA suggest, being older, being female, and having a lower average household

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income were related to more hours of home support. Post-hoc comparisons indicate that rural small town areas had significantly higher home support hours than did urban core areas.

Home Nursing Care Visits

The average number of home nursing care visits was 0.4, ranging from 0.3 in the urban/rural fringe to 0.5 in the rural small town areas. As expected, once non-users of home nursing care were excluded, the average number of visits increased, climbing to 12.4 for the sample, with a low of 10.7 in the urban/rural fringe areas and a high of 15.2 in the urban fringe areas. None of the post-hoc tests was significant at the $p < 0.001$ level.

Finally, the MANCOVA results suggest that age was the most significant characteristic related to the number of home nursing care visits. Indeed, the utilization of home nursing care increased with age. At the multivariate level, the relationship between rural small town areas and urban core areas reached significance; specifically, those in rural small town areas utilized home nursing care to a greater degree than those residing in urban core areas.

Discussion

The purpose of this article was to examine geographic variations in the use of a broad range of acute to home-based care services among older populations in BC and to discuss the implications of the findings. Overall, multiple comparisons using ANOVA and MANCOVA analyses suggest that many differences in service use exist.

Several trends for British Columbia have been identified that are consistent with those reported in other jurisdictions. Overall, the trends reveal that there are differential patterns of service use by geographical area that warrant further scrutiny. On this point, in 1998/1999, the use of general practitioners and specialists, as measured by number of visits, was highest in the most urban areas and lowest in the rural areas, but the use of hospitals (i.e., number of days spent overnight in hospital) was higher in the rural and small town areas.

The higher number of general practitioner visits was positively correlated with the most urban areas, consistent with the availability and number of practitioners in these settings. This is generally true of most acute care services and specialist services, the majority of which are located in the most urbanized areas of the province (Centre for Health Services and Policy Research, 2002). Conversely, across the acute sector, older adults living in rural and remote areas had consistently lower use of physicians and specialists.

It is notable that only one fifth of the population aged 65 and over had stayed overnight in the hospital in the previous year. Higher use of hospitals in rural areas is usually explained by population health characteristics and by the fact that fewer health and social services are available in rural communities. Differences in hospital utilization between rural small town areas and rural and remote places are interesting and reflect these access issues, as well as potentially reflecting the fact that rural persons with poorer health may move into adjacent towns or cities from the outlying countryside. Furthermore, multivariate analysis reveals that in-patient hospital days were significantly higher in rural small town areas than in the urban core. These findings correspond to those of Dansky et al. (1998), despite the differences between health care systems in the United States and Canada.

The evidence of higher home support hours and home nursing care visits in the rural and small town areas than in the urban core also illustrates how geographical area and local service context influences service use. In particular, rural and remote areas are the most disadvantaged in terms of revealed access (i.e., utilization) for these types of services.

The use of alternative health practitioners reveals other unique service utilization patterns. Those living in urban core communities who are female, are younger, and have lower incomes are most likely to use these services. As noted earlier, privately paid alternative health visits are not, however, included in these data, and thus the association between lower income and increased alternative health practitioner visits appears stronger. With respect to home support hours, an anomalous finding was the low number of hours of care received by those urban fringe dwellers using these services, despite this group's being the oldest on average. One plausible explanation for this finding is that urban fringe dwellers have the highest income across all geographical areas and consequently may pay privately for some assistance with home support. Mean home support hours and mean home nursing care visits were higher in the rural small town and rural and remote areas than in the urban areas, perhaps reflecting a *substitution* effect in that there were fewer general practitioners, specialists, or alternative practitioners, and fewer services more generally, as has been suggested by other studies (Dansky et al., 1998).

The most distinctive pattern in the MANCOVA analysis by geographical area was that populations in rural areas were clearly less likely, relative to the

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urban core, to see specialists. Patterns across rural small towns and rural and remote areas warrant further scrutiny of access to the overall range of services studied. Indeed, rural small towns were significantly different from the urban core in four of the categories examined: Specialist visits were lower in rural small towns, while in-patient days, home support hours, and home nursing visits were higher.

The differential impact of the control variables on each of the health services measured is revealing. Notably, and not surprisingly, being older was associated with higher service use across all categories, with the exception of alternative health practitioners. In general, higher incomes were associated with more general practitioner and specialist visits. Conversely, lower incomes were associated with more in-patient hospital days, alternative health practitioner visits, and home support hours. Patterns of service use by gender were variably significant, but the inclusion of gender had no impact on either number of medical specialist visits or home nursing care visits. Women were more likely to access general and alternative health practitioners, as well as home support. On the other hand, men were more likely to have lengthier hospital stays. Rural and remote populations were younger, were poorer, and were proportionally more likely to be male. In summary, the co-variates did not behave in the same manner across the different health services, and thus no sweeping generalizations about age, gender, or income can be made in reference to health service utilization by geographic area.

One limitation of this study was the lack of access in the administrative databases to additional co-variates other than age and gender. For example, information on the supply and location of health services, need variables, and other socio-demographic variables would no doubt improve the analysis pertaining to the relationship between health service use among older adults by geographical area. Additionally, information on informal support systems, considered so important in the provision of care to older adults, especially those living in rural communities, was also not available from the data sources used in this analysis but would enrich the interpretation of the observed patterns. Furthermore, the measure of income used here was crude at best, given that it was based on aggregate income for an enumeration area rather than on individual household income. With respect to geographical area, while the five-point index developed by Statistics Canada is a vast improvement over the rural–urban dichotomy, it still cannot fully capture the diversity that exists within and between rural and urban geographical areas. Finally, the databases capture only publicly funded care and therefore underestimate the total number of hours of home support services and alternative health practitioner visits actually used by older adults.

Overall, while there are unique patterns in service use by geographical area, other predictor variables—such as age, gender, and income—appear to have a greater influence on access and use of health services. In BC, individuals generally have access to a broad range of services, despite differences in geographical area; however, some of the patterns of use among rural and small town populations underscore the historical pattern of a lack of access to general practitioners and specialists in small communities. Obtaining information about health status and levels of *unmet need* by geographical area would contribute further insight to the patterns of service use observed in this research. More attention could be given to small-scale qualitative studies of how rural and urban contexts differ in their qualities (e.g., in terms of local populations and the services provided), while quantitative analyses would benefit from the inclusion of other explanatory variables as well as from more recent data. Nevertheless, the results presented here suggest that this five-category urban/rural index is an improvement over the rural–urban dichotomy in being able to tease out some key differences in service use between rural small towns and rural and remote areas, as well as between urban core, urban fringe, and urban/rural fringe areas. The addition of other geographic and spatial variables (e.g., proximity to a CMA/CA, population density, physician/population ratios) might also serve to improve the degree to which the index reflects meaningful geographic categories.

Future research should continue to refine the geographical index to account more fully for the complexity and variation that exists within and between urban and rural communities in regard to access and service-use issues. Having access to longitudinal data would also facilitate an examination of how regionalization and restructuring is influencing shifts in need and use over time. Looking back, this research has provided a starting point for asking additional questions about how geographical area influences patterns of service use among older adult populations. Looking forward, as demographic aging and health sector restructuring continues in BC and across Canada, it is more important than ever to understand how these processes are altering the range and mix of services utilized by older populations in order to help them to live out their lives in communities of their own choosing.

Notes

1 These data were provided through a project entitled Health Care Restructuring and Community-Based

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2 In British Columbia, *continuing care* is the term that refers to a suite of services provided in the home by home support workers, home nurses, and therapists to support independent community living.

3 The most recent complete data for this project were from 1998/1999, which is the rationale for their use in this article.

4 All correlations between the six health services variables were significant ($p < 0.000$), with the exception of the pairings of alternative health visits and home nursing care visits ($p = 0.753$) and alternative health visits and home support hours ($p = 0.018$).

5 In the continuing care database, the counts for home support hours and home nursing visits reflect the provision of publicly funded care and do not account for privately obtained home support or home nursing care.

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