

# Chronic Diseases and Injuries in Canada

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# Patterns of Health Services Utilization in Rural Canada

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## Introduction

### Context of this study

Canadians value ease of access to their health services. Although many studies have focused on accessibility to health services in Canada, few have examined rural-urban differences in this aspect, particularly from a national perspective. Yet disparities in access to health services exist between rural and urban populations, as do the challenges of delivering health care to more remote areas or to those with small populations.

“Canada’s Rural Communities: Understanding Rural Health and Its Determinants” is a three-year research project co-funded by the Canadian Population Health Initiative (CPHI) of the Canadian Institute for Health Information (CIHI) and the Public Health Agency of Canada (PHAC). It involves

investigators from the Public Health Agency of Canada, the Centre for Rural and Northern Health Research (CRaNHR) at Laurentian University, and other researchers. The first publication of the research project was *How Healthy Are Rural Canadians? An Assessment of Their Health Status and Health Determinants*;<sup>1</sup> this, the second publication, is a descriptive analysis of the utilization patterns of a broad range of health services by rural residents compared to their urban counterparts.

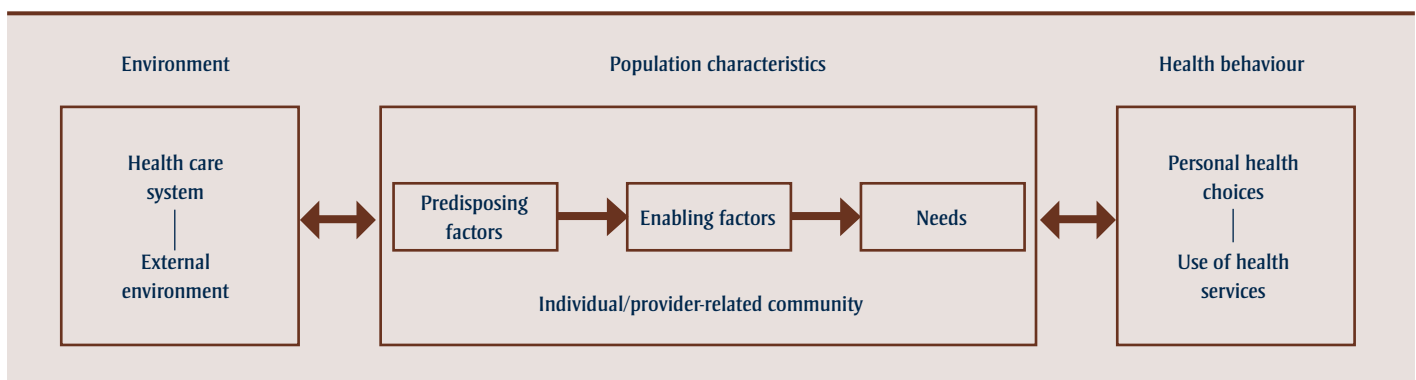
### Framework for analyzing health services utilization

Where we live influences our health through environmental and climatic conditions, socio-economic factors, occupational activities, ethnic composition, culture and community features. The characteristics of places and of the individuals within them are interrelated in complex ways, and

these, as well as the health care system itself, must be considered in any analysis of health outcomes. A theoretical model developed by Andersen<sup>2</sup> was used to guide the research and analysis behind this report. This “Emerging Behavioural Model” includes predisposing factors, enabling factors and needs that are important in influencing the utilization of health services (Figure 1).<sup>2</sup> Predisposing factors include age, sex and social status; enabling factors include external conditions that facilitate or inhibit the use of health services (such as distance to physicians’ offices); needs, which might be viewed from either the individual’s or the health care provider’s perspective, are the individual’s medical conditions or disabilities.

The task for researchers is to determine which of these factors are important in a particular situation and how they interact to facilitate or hinder the use of health services.

**FIGURE 1**  
An adaptation of the Emerging Behavioural Model of people’s use of health services



Adapted with permission from Andersen.<sup>2</sup>

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## The framework's elements

### Environment

Universal health care is meant to ensure that all Canadians have access to essential medical and hospital care. However, geographically isolated communities or those with small populations tend to have proportionately fewer providers and services. For instance, even though 21.1% of the Canadian population lived in rural areas in 2004 only 9.4% of all physicians (16% of family physicians and 2.4% of specialists) practiced in those areas.<sup>3</sup> A study that examined factors affecting referrals to physician specialists in Ontario found that the type of community in which a physician practices—rural area, small town, a community with only primary care physicians or an urban centre with or without teaching hospitals—is the most accurate predictor of referral rates to specialists and that rural areas have the lowest rates of these four types of community.<sup>4</sup>

The external environment refers to such factors as economic conditions, relative wealth, politics and the prevailing norms of the society. For instance, rural communities face a number of economic and employment challenges: technological changes and resource depletion can change employment opportunities in some rural communities, and centralization of services can undermine the economic and social viability of others. Evidence suggests that unemployment and economic insecurity are associated with physical illness, mental stress and higher mortality, which, in turn, may lead to greater need for and use of health services.<sup>5</sup> In addition to economic changes, many health services depend increasingly on sophisticated and expensive technologies that can only be justified in larger hospitals serving larger communities. This may result in a lack of local health care resources and services.

### Predisposing factors

Rural communities have some socio-demographic conditions that affect health care utilization differently from urban communities. For example, many rural

communities have a higher dependency ratio because they have larger proportions of children and seniors,<sup>6</sup> and the very young and the very old tend to use health services to a greater extent than the working-age population.\* Community characteristics can also be an important influence. One study has found a significant relation between women's perceptions of the social quality of their community and their perceived health status and functioning, while men's perceptions of their physical environment were related to their reported functioning and health.<sup>7</sup> Women living in communities with supportive attitudes towards mammography have been found to make greater use of mammography screening than those living in communities where there is less support for this preventive technology.<sup>8</sup>

Health beliefs are an important determinant of health services utilization. For example, rural Australians tend to regard health in negative terms, i.e. the absence of disease,<sup>9</sup> and, as a result, the primary focus for rural residents might be to cure illness and to relieve symptoms and discomfort, rather than to prevent illness or to maintain health.<sup>10</sup> Traditional rural values such as self-reliance, independence and a preference for informal support networks may also lead to underuse of preventive or other health services unless there is a serious impairment to health.

### Enabling factors

Poor transportation is one of rural residents' major concerns in relation to access to health services,<sup>11</sup> and in many rural communities across Canada public transport services have been reduced or have become more costly. However, some provincial programs have been introduced to facilitate access to health care. For instance, in Ontario there are physician outreach programs and visiting specialist clinics as part of the Underserved Area Program. In other provinces and territories, patient travel assistance is offered so that rural residents can access health services that are not available locally. The effects are measurable: for example, rates

of mammography screening in rural areas in Manitoba have increased with the use of mobile screening units.<sup>12,13</sup>

Privacy issues may also deter some rural residents from seeking health care if a small population and close-knit community make anonymity less likely. Privacy is more crucial to decisions about whether to seek medical care among young women in rural areas than among their urban counterparts.<sup>14</sup>

### Needs

Health care resources spent on Canadians with chronic disease account for 67% of total direct health care costs and 60% of indirect costs through lost productivity and income.<sup>15</sup> In general, the mortality risks due to chronic conditions such as circulatory diseases, respiratory diseases and diabetes are higher among rural residents than among urban ones.<sup>1</sup> Other studies have shown that greater proportions of people in rural or northern areas report poor or fair health status, activity limitations and living with disabilities.<sup>16–18</sup> All else being equal, people with worse health conditions or greater needs are more likely to require medical attention or other health services.

### Use of health services

There is a paucity of national data on the patterns of health services use by rural Canadians, though individual provinces have investigated physician visits and hospital admission data. For instance, in 2000, residents of rural and northern regions in Manitoba were found to have lower rates than the provincial average for use of physician services, ambulatory visit rates and ambulatory consultation rates;<sup>13</sup> in Ontario, discharge rates for rural residents from acute care hospitals were almost 50% higher than the provincial average.<sup>17</sup> In Quebec, the rates of hospital discharge have also been found to be higher in rural areas, even though the average length of hospital stay was shorter than for urban residents.<sup>16</sup> Also, rural hospital emergency departments see higher proportions of patients who are deemed to require non-urgent care (i.e. for which

\* The higher dependency ratio in rural areas may not show as higher rates of health service access in our study as our results are either age-standardized or age-adjusted. Age is included in multivariate models only to indicate that it is associated with service use.



interventions could be delayed) than do emergency departments in urban areas.<sup>19</sup>

## Objectives of this study

Building on the framework, this study aims to assess the national patterns of health services utilization by rural Canadians and compare them with those of city dwellers by using the results of both descriptive and bivariate analyses of selected measures of health services use and the findings from multivariate regression analyses of related factors.

We considered the following research questions:

- How do the patterns of utilization of medical and other health services, including in-patient hospital services, differ between rural and urban Canada?
- In addition to urban-rural differences in health services utilization, are there intra-rural variations?
- Are the patterns of utilization by rural and urban Canadians different for different disease categories?
- What are the geographic patterns of utilization of physician and hospital services at the provincial level in Nova Scotia, Ontario and British Columbia?
- Is place of residence a determinant of health services use?

## Methods

### Defining “rural”

In Canada, there is not a universally adopted or officially sanctioned definition of “rural,” and various definitions have been adopted for different reasons. For this research project, we used the Statistics Canada definition<sup>20</sup> of “rural and small town (RST)” when analyzing secondary data. RST refers to populations living outside the commuting zones of larger urban centres, specifically outside census metropolitan areas (CMA) and census agglomerations (CA). To a large extent, the RST definition was chosen because of the

	Population and percent distribution (within 2001 boundaries)				Percent change within MIZ groups between 1996 and 2001
	1996	%	2001	%	
Urban (CMA/CA)	22 654 692	78.5	23 839 086	79.4	+5.2
All RST areas	6 192 069	21.5	6 168 008	20.6	−0.4
Strong MIZ	1 470 493	5.1	1 524 579	5.1	+3.7
Moderate MIZ	2 307 387	8.0	2 285 538	7.6	−0.9
Weak MIZ	2 027 488	7.0	1 969 211	6.6	−2.9
No MIZ	386 701	1.3	388 680	1.3	+0.5
<b>Total</b>	<b>28 846 761</b>		<b>30 007 094</b>		<b>+4.0</b>

Data source: Statistics Canada. Census of Population, 1996 and 2001.

Abbreviations: CA, Census Agglomeration; CMA, Census Metropolitan Area; MIZ, Metropolitan Influenced Zone; RST, Rural and Small Town.

heterogeneity of rural areas, enabling these to be divided into four different degrees of rurality expressed as Metropolitan Influenced Zones (MIZ). It also takes into account distance to urban cities, where many of the specialized health services are located.

An extension of the RST concept, the MIZ approach was developed by Statistics Canada “to better show the effects of metropolitan accessibility on non-metropolitan areas”:<sup>20,21</sup> MIZ commuting flows are calculated using data about place of work from the census. This method recognizes the possibility of “multiple centres of attraction”: flows of commuters from an RST community to *any* urban centre with a population of 10 000 or more for employment reasons are combined to determine the degree of metropolitan influence (i.e. strong, moderate, weak or no influence) of one or more urban centres on that community.<sup>22</sup> The classification and its methodology have been extensively validated by Statistics Canada.<sup>21</sup>

The MIZ method distinguishes rural populations with less access to the labour markets of larger urban centres from those with greater access; distance between urban and rural communities is one of the major determinants of such access. Labour force commuter flow is used as a proxy for the access to such services as health, education, financial services, shopping, government services, and cultural and sports activities. This reflects the relative influence of one or more urban centres on a

rural area. Although all rural communities have, by definition, a population of fewer than 10 000 people, the MIZ method does not reflect differences in population size between types of rural community.

The following geographic categories are used in this study, and the distribution of the Canadian population according to these geographic categories is shown in Table 1:

- Census Metropolitan Areas (CMA) have a population of 100 000 or more in the urban core and include all the neighbouring towns and municipalities where 50% or more of the labour force commutes to the urban core.
- Census Agglomerations (CA) have a population of 10 000 to 99 999 in the urban core and include all neighbouring towns and municipalities where 50% or more of the labour force commutes to the urban core.
- Strong Metropolitan Influenced Zones (MIZ) are areas where 30% to 50% of the labour force commutes to work in any CMA.
- Moderate MIZ are areas where at least 5% but less than 30% of the labour force commutes to work in any CMA or CA.
- Weak MIZ are areas where less than 5% of the labour force commutes to work in any CMA or CA.

- No MIZ are areas with a small labour force (i.e. fewer than 40 people) or with nobody commuting to work in a CMA or CA.

## Data sources and analytical methods

This study used data from Canadian Community Health Survey (CCHS), Health Services Access Survey (HSAS), physician claim files and The Hospital Morbidity Database (HMDB). The data produced several indicators of health services utilization. For each indicator, the urban (CMA/CA) group was used as the reference group and compared with the different rural groups (MIZ categories).

### Canadian Community Health Survey and Health Services Access Survey

Data from the Canadian Community Health Survey (CCHS) Cycle 1.1, 2000–2001, and the Health Services Access Survey (HSAS) was analyzed in two stages. We first performed bivariate analyses to examine the differences in self-reported use of health

services between urban and rural communities. Age-standardized rates for several indicators were calculated by sex in the urban (CMA/CA) and rural (all MIZ categories) groups. Rates for this analysis were standardized to the 2001 Census population. Data were weighted to take into account the complex sampling design and to adjust for non-response. The Bootstrap procedure was used to calculate 95% confidence intervals (CI).

We then performed multivariate logistic regression analyses to ascertain the relation between place of residence and self-reported no family doctor and between place of residence and hospitalization. The goal of this analysis was to assess whether place of residence has an independent effect on specific outcomes after controlling for various health determinant variables. The choice of such health determinants for analysis was based on Anderson's theoretical framework,<sup>2</sup> but was restricted by the availability of these factors in the databases used. As with the

bivariate analysis, the data were weighted to take into account the complex sampling design and to adjust for non-response. We used the Bootstrap procedure to calculate 95% confidence intervals.

The CCHS and the HSAS data were obtained from a sample of all census subdivisions (CSD) in Canada. Both surveys were administered to individuals 12 or 15 years of age or over, respectively, but excluded persons living in First Nations reserves or on Crown lands, those in institutions (e.g. prisons), full-time members of the Canadian Armed Forces and residents of certain remote regions. Consequently, if the rural or remote areas sampled in the two national surveys showed smaller numbers of these subpopulations than they actually had, such as some sampled No MIZ areas with very small First Nations on-reserve populations, the results might not be representative. Generalizing CCHS or HSAS results to these subpopulations should be done with caution.

### Physician claims files

The national-level analysis was complemented by an analysis of rural health services utilization patterns at the provincial level. We used billing data from Nova Scotia, Ontario and British Columbia to examine the use of physician services for three biennial periods: 1997–1998, 1999–2000 and 2001–2002. In each of the three provinces, individuals were classified, using the MIZ method described above, into one of the five geographic categories (using either 1996 or 2001 Census boundaries) with place of residence defined as the CSD in which each individual lived at the beginning of each biennial period examined. For example, if an individual living in a No MIZ area visited a physician in a Weak MIZ area, this individual would be represented in the No MIZ group in these analyses.

We calculated cross-sectional physician-visit rates (i.e. office visits, visits to hospital outpatient departments and visits to hospital emergency departments) as well as physician-visit rates for family physicians (FPs), medical specialists and surgical specialists (Table 2). The “family physician” category includes general practitioners

**TABLE 2**  
**Groupings of physician specialties used in the analysis of physician claims**

Family physicians	Medical specialties	Surgical specialties
General practice, family practice	Rheumatology	Orthopedic surgery
	Internal medicine	Cardiovascular surgery
	Cardiology	General surgery
	Clinical immunology	General thoracic surgery
	Dermatology	Neurosurgery
	Gastroenterology	Obstetrics
	Genetics	Ophthalmology
	Geriatrics	Otolaryngology
	Haematology	Plastic surgery
	Pathology	Urology
	Neurology	
	Nuclear medicine	
	Pediatrics	
	Physical medicine	
	Psychiatry	
	Diagnostic radiology	
	Therapeutic radiology	
	Respiratory disease	
	Anesthesia	

NOTE: Medical scientists and laboratory specialties were excluded from the analyses.

For the British Columbia analyses, the visits based on the laboratory specialties of pathology and medical microbiology were excluded from the study population.

and family physicians providing emergency care in emergency departments. The calculations excluded hospital in-patient care, home care, nursing home care and laboratory- or hospital-associated services.

A physician visit was defined as one patient-doctor encounter per day. Only one visit would be attributed to an individual who had multiple billing records from the same physician on the same day if the same ICD-9\* chapter diagnosis code was used. Multiple visits would be attributed to an individual who had multiple billing records from different physicians in one day. Shadow billings, where available, were also included in the analysis to account for some physicians, especially in northern or remote areas, who were not reimbursed on a fee-for-service basis but were on alternative payment plans. Excluded were provincial residents seeing physicians outside their home province and services used by out-of-province patients.

Physician-claims data are administrative in nature and, thus, are limited to physician services that are fee-for-service or shadow-billed. If physician services are not reported, such as those under alternative payment plans, or if the administrative data codes do not distinguish between different types of services, such as mental health services, the results may not be representative of what actually occurs.

The following indicators were calculated for three biennial periods by sex:

- **physician-visit rates**, or the average number of visits to all physicians per 1000 residents of the area;
- **FP-visit rates**, or the average number of visits to FPs per 1000 residents of the area;

- **specialist-visit rates**, or the average number of visits to medical specialists and surgical specialists per 1000 residents of the area; and
- **physician-visit rates by disease group**, or the average number of physician visits by ICD-9 chapters code and sex per 1000 residents of the area.

All rates were age-standardized using the 1991 Census population age structure. Rate ratios were calculated using the age-standardized rate of CMA/CA as the reference rate. Finally, we also examined specific diagnoses, chosen according to their relevance to rural populations and impact on population health, as well as the availability of data (Table 3).

**TABLE 3**  
**Diagnoses used to compare relative risks of physician visits and hospitalizations for urban and rural populations**

ICD-9 chapter	Disease category	Diagnostic code	Specific diagnosis	Diagnostic code
II	Neoplasms	140–239	Breast cancer	174 (female)
			Lung cancer	162
V	Mental disorders	290–319	Depression	296.2, 296.3, 300.4, 311
VI	Diseases of the nervous system and sense organs	320–389	Alzheimer's/dementia disorders	331
VII	Diseases of the circulatory system	390–459	Coronary heart disease	410–414
			Stroke	430–434
VIII	Diseases of the respiratory system	460–519	Asthma	493
			Chronic obstructive pulmonary disease	490–492, 496
XIII	Diseases of the musculoskeletal system and connective tissue	710–739	Osteoarthritis	715
			Rheumatoid arthritis	714
XVII	Injuries and poisoning	800–999		
XVIII	Endocrine, nutritional and metabolic diseases, and immunity disorders	240–279	Diabetes	250

Data source: World Health Organization.

Abbreviations: ICD-9, International Statistical Classification of Diseases and Related Health Problems, 9th Revision.

\* International Statistical Classification of Diseases and Related Health Problems, 9th Revision

## Hospital Morbidity Database

The Hospital Morbidity Database (HMDB), maintained by the CIHI, provides national data on acute-care hospitalization by diagnosis and procedure. Data are reported according to the region of the patient's residence, not the region of the hospital. Consequently, these figures represent how frequently residents of a given area received hospital care, rather than the volume of services provided by hospitals. Data in the HMDB are based on discharges from (rather than admissions to) a hospital so only people who are alive at the time of discharge are included in the analysis. Stillborn infants and cadaveric donor "discharges" are excluded, and day procedures (such as day surgeries) and emergency department visits are also not captured in the database. For the purposes of this analysis, discharge data for newborns were also excluded.

The HMDB contains data from fiscal years 1994/1995 to 2000/2001 in the ICD-9/CCP\* classification system.<sup>†</sup> In 2001/2002, Yukon, Nova Scotia, Prince Edward Island, Newfoundland and Labrador, and some facilities in Saskatchewan implemented the ICD-10-CA<sup>‡</sup> and CCI<sup>§</sup> systems. As a result, the database from fiscal year 2001/2002 contains data in both classification systems.

Discharge data from the HMDB were extracted for Nova Scotia, Ontario and British Columbia, as well as for Canada as a whole, except Quebec.<sup>||</sup> Hospital data were analyzed using a historical cohort design. Data were extracted in the classification system (either ICD-9 or ICD-10-CA) in which they were originally submitted. The effect of using different ICD-9 and ICD-10-CA diagnostic classifications on national rural-urban patterns is unknown at this time. ICD-10-CA differs from ICD-9 in several respects, with the former being more detailed. Data for fiscal year 2001/2002 (April 1, 2001, to March 31, 2002)

were extracted and translated into 1996 Census boundaries. Rural place of residence was defined according to the MIZ approach.

Discharge rates and length-of-stay figures were based on the number of discharges from an acute-care facility in Canada in fiscal year 2001/2002. If an individual was admitted and discharged from an acute-care facility more than once, that individual would be counted more than once. In addition, cross-sectional discharge rates for different disease groupings were calculated for ICD-9 codes. These ICD-9 diagnosis chapters were created on the basis of the "most responsible diagnosis" extraction criteria. To be included in these criteria, the particular diagnosis had to be listed on the discharge abstract as describing the most significant condition of the patient's stay in hospital. All indicators were sex- and age-standardized using the 1991 Census population. The statistical significance of discharge rates from acute-care facilities was tested using Byar's method and was based on the assumption of a Poisson distribution.<sup>23</sup>

## General statistical notes

Throughout this report, estimates are provided with 95% confidence intervals. Reported statistics are taken to be significantly different if the 95% confidence intervals do not overlap. Rates described as "significantly different" mean that they are statistically different at the 95% confidence interval level. The small population in some Weak MIZ or No MIZ sometimes restricts the amount of data that can be used to calculate the rates. The level of uncertainty associated with rates calculated for these areas is greater than for areas with larger populations, such as CMA and CA. Consequently, confidence intervals have been calculated and rates presented so that the level of uncertainty is clearly expressed. These confidence intervals do

not describe the uncertainty associated with potential bias, such as the uncertainty in proper CSD identification.

The primary boundaries chosen for the analysis were those of the 1996 Census because these were the boundaries available at the beginning of the research program. Differences in census boundaries for the different analyses in the report emerged as a result of the lag time between analyses. For example, requests to access physician claims data in British Columbia and discharge data from the HMDB were made at the beginning of this project. Comparing the use of the Nova Scotian census boundaries from 1996 and from 2001 revealed much greater efficiency in assigning geographic location by applying the more recent 2001 Census boundaries (2% of CSDs were unassigned) versus the earlier 1996 Census boundaries (approximately 18% of CSDs were unassigned). This was attributed to the creation of new postal codes in the period after the 1996 Census boundaries had been identified. Subsequent data extractions and analyses incorporated 2001 Census boundaries where possible.

Finally, although different data sources are presented in this publication, comparisons of results between data sources should be made with caution since they may measure different concepts within similar topic areas.

## Results

### National overview: access to and utilization of health care services

#### Access

According to the HSAS 2000–2001, with the exception of the No MIZ areas, similar proportions of respondents in urban and rural areas reported having a regular family doctor (CMA/CA: 87.3%; Strong,

\* Canadian Classification of Diagnostic, Therapeutic and Surgical Procedures

† Data for years before 1994/1995 are available from the Health Statistics Division at Statistics Canada.

‡ International Classification of Diseases, 10th revision – Canadian Enhancement

§ Canadian Classification of Health Interventions

|| At the time of the analysis, discharge data submitted by Quebec included only the Forward Sortation Area (the first 3 digits) of the postal code. As a result, the MIZ categories, which require 6-digit postal codes for classification purposes, could not be applied to data from Quebec.

Moderate, Weak MIZ: 88.3% to 90.6%; No MIZ: 76.1%). Among those with no regular family doctor, between 35 % and 61 % of rural residents, compared with 13.2 % of urban residents, reported lack of availability of a family doctor as the reason. Aside from Weak MIZ areas, where significantly more residents reported difficulties in getting routine care (14.8%), similar proportions of respondents in urban and rural areas reported such difficulties (range: 9.7% to 11.6%) (Figure 2). After controlling for sex, age, chronic disease, health behaviours and socio-demographic and economic factors, multivariate analysis indicated that place of residence had an independent effect (odds ratio [OR] = 2.65, 95% CI: 1.51 to 4.64) on not having a family doctor only for No MIZ areas.

Significantly greater proportions of HSAS respondents living in Weak MIZ areas reported requiring immediate health care

services for minor health problems during the year prior to the survey, compared with their urban counterparts (CMA/CA: 32.9%; Weak MIZ: 39.6%). As well, significantly greater proportions of respondents living in No MIZ areas reported difficulties accessing immediate health services due to lack of availability in the area, lack of availability at the time of day, or transportation problems (CMA/CA: 8.8%; No MIZ: 61.4%) (Figure 3).

#### ***Waiting time for specialists and non-emergency surgery***

With regard to waiting for specialized care, 57.0% to 77.7% of HSAS respondents reported waiting months for health care services in 2000–2001, and the proportions did not vary significantly according to place of residence (Figure 4). Significantly higher proportions of rural Canadians living in Strong MIZ areas felt that the waiting times were unacceptable, compared

with those living in urban areas (CMA/CA: 31.3%; Strong MIZ: 47.5%). The proportion of No MIZ residents reporting unacceptable waiting times was as high as in Strong MIZ areas but did not reach a statistically significant level.

#### ***Health care resources and health services utilization***

Overall, urban areas had higher FP-to-population ratios than rural areas (10.1 versus 6.9 per 10 000), though in Weak MIZ areas and RST territories (the non-CMA/CA parts of Yukon, the Northwest Territories and Nunavut, i.e. all areas within the Territories outside of Yellowknife and Whitehorse), the ratios were similar to or even higher than in urban areas (10.2 and 14.7 per 10 000, respectively). The differences were much greater with respect to specialist-to-population ratios: 11.0 per 10 000 in urban areas versus 1.0 per 10 000 overall in rural areas (Table 4).

**FIGURE 2**  
Age-standardized proportions of Canadians 15 years of age or over who required access to routine or ongoing health care services, by place of residence, 2000–2001

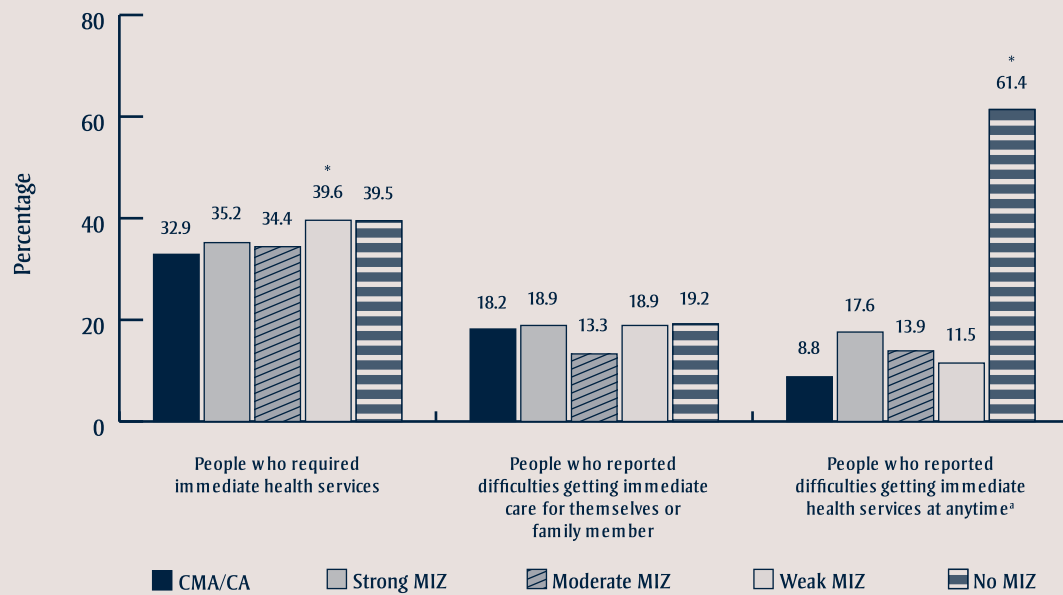


Data source: Health Services Access Survey 2000–2001, Statistics Canada.

Abbreviations: CA, Census Agglomeration; CMA, Census Metropolitan Area; MIZ, Metropolitan Influenced Zone.

\* Statistically significant at  $p < .05$ ; reference group is CMA/CA.

**FIGURE 3**  
Age-standardized proportions of Canadians 15 years of age or over who required access to immediate health services for minor health problems in the past year, by place of residence, 2000–2001



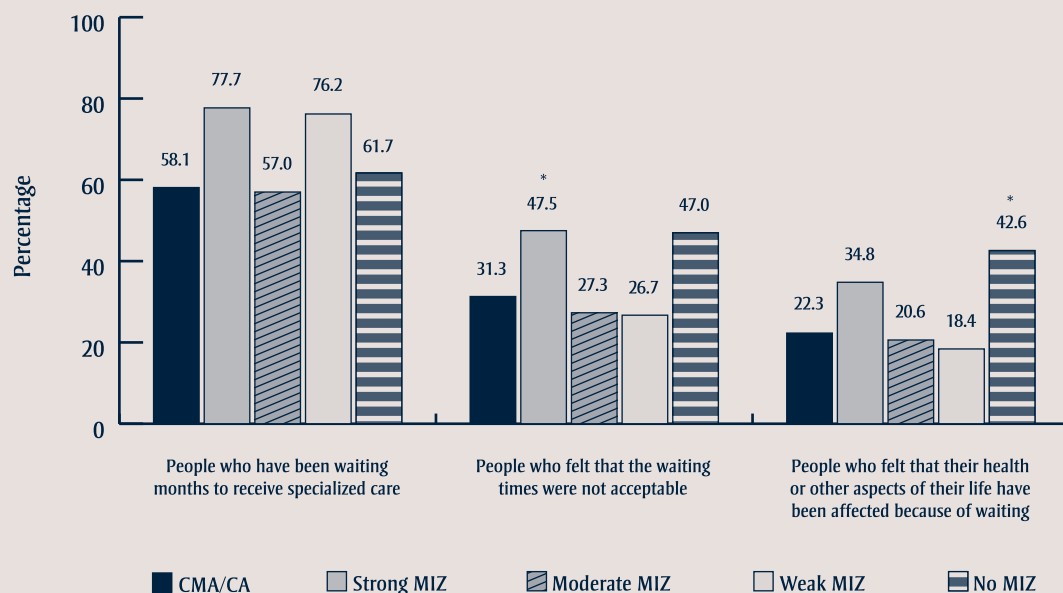
Data source: Health Services Access Survey 2000–2001, Statistics Canada.

Abbreviations: CA, Census Agglomeration; CMA, Census Metropolitan Area; MIZ, Metropolitan Influenced Zone.

\* Statistically significant at  $p < .05$ ; reference group is CMA/CA.

<sup>a</sup> Reasons for not receiving health care: health care services not available in the area; not available at time required; or transportation problems.

**FIGURE 4**  
Age-standardized proportions of Canadians 15 years of age or over who reported waiting for months to access specialized and non-emergency surgery, by place of residence, 2000–2001



Data source: Health Services Access Survey 2000–2001, Statistics Canada.

Abbreviations: CA, Census Agglomeration; CMA, Census Metropolitan Area; MIZ, Metropolitan Influenced Zone.

\* Statistically significant at  $p < .05$ ; reference group is CMA/CA.



**TABLE 4**  
**Number of physicians<sup>a</sup> and physician-to-population ratios per 10 000, by physician type and place of residence, 2001**

	Number of FPs	FPs per 10 000 (population)	Number of medical and surgical specialists	Specialists per 10 000 (population)	Population estimates
CMA/CA	24 133	10.1	26 276	11.0	23 929 310
All MIZ and RST areas	4 244	6.9	626	1.0	6 447 995
Strong MIZ	533	3.5	70	0.5	1 524 335
Moderate MIZ	1 466	6.4	172	0.8	2 283 225
Weak MIZ	2 008	10.2	337	1.7	1 961 235
No MIZ	156	4.6	31	0.9	579 090
RST territories <sup>b</sup>	81	14.7	16	2.9	100 110
<b>Total</b>	<b>28 377</b>	<b>9.5</b>	<b>26 902</b>	<b>8.9</b>	<b>30 377 305</b>

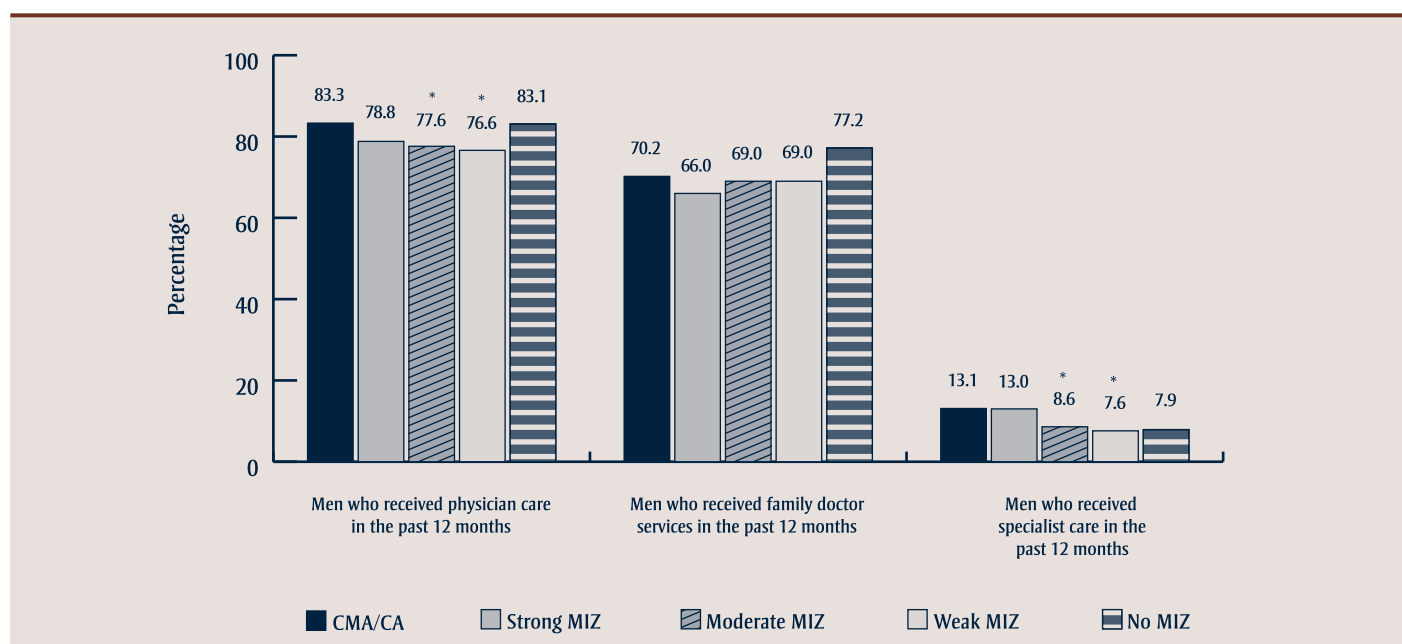
Data source: Southam Medical Database, Canadian Institute for Health Information, 2001.

Abbreviations: CA, Census Agglomeration; CMA, Census Metropolitan Area; MIZ, Metropolitan Influenced Zone; RST, Rural and Small Town.

<sup>a</sup> Excludes residents and physicians with “no publication” status (see Methodological Notes in the CIHI report Supply, Distribution and Migration of Canadian Physicians, 2003); includes physicians who provide both clinical and/or non-clinical services; includes certificants of the College of Family Physicians of Canada (CFPC), non-CFPC general practitioners, foreign-certified specialists and other non-certified specialists.

<sup>b</sup> The non-CMA/CA parts of Yukon, the Northwest Territories and Nunavut, i.e. all areas within the territories outside of Yellowknife and Whitehorse.

**FIGURE 5**  
**Age-standardized proportions of Canadian men 12 years of age or over who reported using physician services in the past 12 months, by type of physician and place of residence, 2000–2001**



Data source: Canadian Community Health Survey 2000–2001, Statistics Canada.

Abbreviations: CA, Census Agglomeration; CMA, Census Metropolitan Area; MIZ, Metropolitan Influenced Zone.

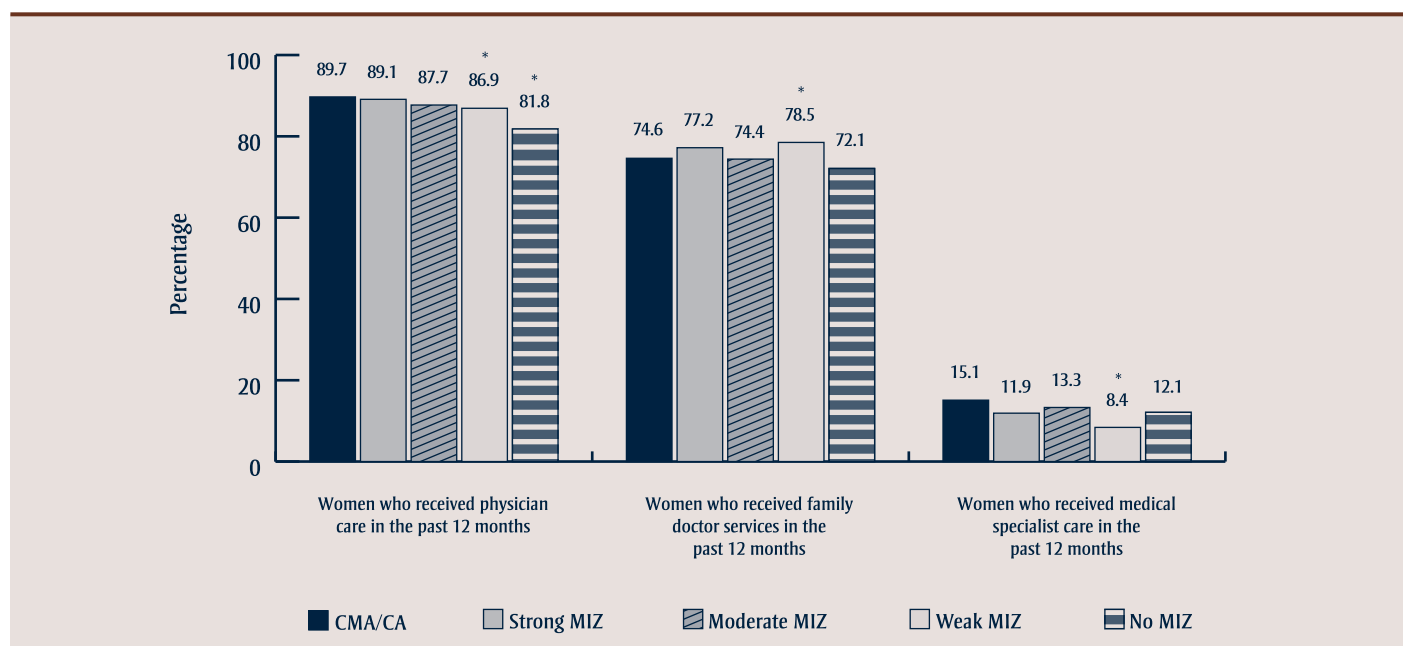
\* Statistically significant at  $p < .05$ ; reference group is CMA/CA.

CCHS 2000–2001 data show that over 75% of male respondents reported receiving physician care in the 12 months prior to the survey. There were no statistically significant differences according to area of residence in the proportions of men who reported that they had received the services of a family doctor (range: 66.0% to 77.2%), but for specialist care in the previous 12 months, men in Moderate and Weak MIZ areas fared worse (8.6% and 7.6%, respectively) than those in urban areas (13.1%) (Figure 5).

There were no statistically significant differences in the proportions of women who reported receiving care from family doctors, except for a higher proportion of those living in Weak MIZ areas (CMA/CA: 74.6%; Weak MIZ: 78.5%). Among those who reported receiving care from specialists, women living in weak MIZ areas reported significantly lower specialist utilization rates, compared with their urban counterparts (CMA/CA: 15.1%; Weak MIZ: 8.4%) (Figure 6).

Among respondents to the CCHS 2000–2001 who reported having consulted a physician in the 12-month period prior to the survey, significantly greater proportions of men in rural areas reported not having consulted a family doctor; a similar pattern held among women, with the exception that there was no statistically significant difference between Strong MIZ areas and urban areas. Among men, similar proportions of rural and urban residents reported four or more consultations with family doctors. A greater proportion of women than men in all geographic categories had

**FIGURE 6**  
Age-standardized proportions of women 12 years of age or over who reported using physician services in the past 12 months, by type of physician and place of residence, Canada, 2000–2001



Data source: Canadian Community Health Survey 2000–2001, Statistics Canada.

Abbreviations: CA, Census Agglomeration; CMA, Census Metropolitan Area; MIZ, Metropolitan Influenced Zone.

\* Statistically significant at  $p < .05$ ; reference group is CMA/CA.

visited their family doctor four or more times. Compared with urban areas and with the exception of Strong MIZ areas, fewer men in all rural areas reported having had at least one consultation with other medical doctors. Fewer women in all rural areas reported consulting other medical doctors (Table 5).

According to the CCHS 2000–2001, residents of Moderate, Weak and No MIZ areas were significantly more likely to report a

consultation with a nurse than residents of urban areas (Table 6). The proportions that had visited a dentist or received community-based care (i.e. services provided outside a hospital or doctor's office) in the 12 months before the survey were significantly lower in rural than in urban areas, with the exception of community-based care in No MIZ areas (Table 6).

With respect to hospital care, data from the HMDB for 2001–2002 indicate higher

hospitalization rates among all rural residents compared with urban residents, and the differences between urban and all rural areas were all statistically significant (Table 7).

The results of the CCHS 2000–2001 agree with these findings: significantly greater proportions of rural residents reported that they had received hospital care in the 12 months prior to the survey. In general, there were few differences in the proportions of people receiving in-patient care,

**TABLE 5**  
**Age-standardized proportions of Canadians aged 12 years and over who reported having consulted a doctor in the previous 12 months, by place of residence, 2000–2001**

Consultation with a doctor		CMA/CA	Strong MIZ	Moderate MIZ	Weak MIZ	No MIZ
People reporting 0 consultations with a family doctor	Men	26.5 (25.9–27.2)	31.6 (29.7–33.4)*	29.4 (27.9–30.8)*	29.2 (28.0–30.5)*	33.6 (29.8–37.5)*
	Women	15.3 (14.8–15.8)	16.5 (15.0–17.9)	17.4 (16.2–18.6)*	17.3 (16.3–18.3)*	20.3 (17.2–23.4)*
People reporting 4 or more consultations with a family doctor	Men	23.1 (22.5–23.7)	21.1 (19.6–22.6)	22.4 (21.2–23.6)	24.1 (23.0–25.2)	23.7 (20.8–26.6)
	Women	34.4 (33.8–35.4)	33.2 (31.4–35.0)	34.9 (33.5–36.2)	37.2 (36.0–38.4)*	38.3 (34.9–41.6)
People reporting 1 or more consultations with other medical doctors	Men	24.0 (23.4–24.6)	23.5 (21.8–25.1)	20.2 (18.9–21.4)*	19.0 (17.9–20.0)*	16.1 (13.4–18.9)*
	Women	34.5 (33.9–35.1)	31.7 (29.9–33.4)*	29.5 (28.2–30.9)*	27.1 (26.0–28.3)*	30.4 (27.0–33.8)*

Data source: Canadian Community Health Survey 2000–2001, Statistics Canada.

Abbreviations: CA, Census Agglomeration; CMA, Census Metropolitan Area; MIZ, Metropolitan Influenced Zone.

\* Statistically significant at  $p < .05$ ; reference group is CMA/CA.

**TABLE 6**  
**Age-standardized proportions of individuals 15 years of age or over who reported consultations with dentists, nurses and other health services providers, by place of residence and sex, Canada, 2000–2001**

Consultations with health care providers		CMA/CA	Strong MIZ	Moderate MIZ	Weak MIZ	No MIZ
People reporting 1 or more consultations with nurse	Men	7.8 (7.4–8.1)	7.7 (6.7–8.8)	9.1 (8.2–10.0)*	10.4 (9.5–11.3)*	10.5 (8.4–12.6)*
	Women	11.6 (11.2–12.0)	12.5 (11.3–13.8)	13.1 (12.2–14.1)*	14.1 (13.3–15.0)*	20.3 (17.3–23.4)*
People reported 1 or more consultations with dentist	Men	59.8 (59.1–60.6)	54.1 (25.2–56.1)*	46.6 (45.1–48.2)*	48.6 (47.2–49.9)*	44.1 (40.3–47.8)*
	Women	64.2 (63.6–64.8)	58.5 (56.7–60.3)*	53.6 (52.2–55.1)*	53.5 (52.3–54.7)*	45.4 (41.7–49.1)*
People who received community-based care in the previous 12 months	Men	15.4 (14.2–16.7)	9.5 (7.1–12.0)*	11.1 (8.6–13.6)*	10.1 (8.1–12.0)*	10.7 (5.0–16.4)
	Women	19.0 (17.9–20.1)	14.2 (11.6–16.7)*	12.5 (10.5–14.5)*	13.6 (11.7–15.4)*	15.6 (9.7–21.5)

Data source: Canadian Community Health Survey 2000–2001, Statistics Canada.

Abbreviations: CA, Census Agglomeration; CMA, Census Metropolitan Area; MIZ, Metropolitan Influenced Zone.

\* Statistically significant at  $p < .05$ ; reference group is CMA/CA.

**TABLE 7**  
**Age-standardized hospital discharge rates per 1000,<sup>a</sup> by place of residence and sex, 2001–2002**

Sex	CMA/CA	Strong MIZ	Moderate MIZ	Weak MIZ	No MIZ
Men	67.8 (67.7–68.0)	72.0 (71.4–72.7)*	83.8 (83.2–84.4)*	107.2 (106.5–107.8)*	116.6 (115.0–118.3)*
Women	88.2 (88.0–88.4)	98.6 (97.7–99.4)*	111.1 (110.3–111.8)*	140.0 (139.2–140.7)*	161.3 (159.2–163.4)*

Data source: Hospital Morbidity Database, 2001–2002, Canadian Institute for Health Information.

Abbreviations: CA, Census Agglomeration; CMA, Census Metropolitan Area; MIZ, Metropolitan Influenced Zone.

<sup>a</sup> Pan-Canadian totals exclude Quebec because of insufficient geographic coding of source data.

\* Statistically significant at  $p < .05$ ; reference group is CMA/CA.

but significantly more rural residents in Strong MIZ (women), Moderate MIZ (men), Weak MIZ (men and women) and No MIZ areas (women) had had outpatient care.

The average lengths of hospital stay increased with increasing age, but decreased with increasing rurality across all age-sex groups. The patterns of lengths of hospital stay among men differed according to age: average lengths of stay for men aged 20 to 44 years were similar in rural and urban areas; men aged 45 to 64 years living in Weak MIZ and No MIZ areas had significantly shorter hospital stays than their urban counterparts; the average lengths of hospital stay among men aged 65 to 74 years living in rural areas were significantly shorter compared

with their urban counterparts; and the average lengths of hospital stay for men aged 75 years or more living in all MIZ areas were shorter than for similarly aged men in urban areas (Table 8).

Average lengths of hospital stay among women living in rural areas were shorter than for their urban counterparts, with the shortest lengths of stay reported by those in No MIZ areas. There was one exception to this pattern: no difference was found between women aged 65 to 74 years living in Moderate MIZ areas and those in urban areas (Table 8).

Multivariate regression analysis of the CCHS 2000–2001 data showed that place of residence had an independent effect

on reported hospitalization during the 12 months prior to the survey in all rural categories except Strong MIZ areas. The risks of hospitalization for these rural residents were 10% to 27% greater than for residents of urban areas. Other independent risk factors were being female, having less than high income, having less than a secondary education degree, being in poor health and having a chronic disease. Those who were aged 45 or over, were non-white and smoked all had lower risks of being admitted to hospital. The direction of risk for some factors was different when the analysis was broken down by sex (Table 9).

### *Satisfaction of health services users*

The 2000–2001 CCHS asked participants about quality of care and user satisfaction

**TABLE 8**  
**Average length of in-patient hospital stay (in days), by age group, sex and place of residence, Canada,<sup>a</sup> 2001–2002**

Age group (years)	Sex	CMA/CA	Strong MIZ	Moderate MIZ	Weak MIZ	No MIZ
All ages	Men	8.58 (7.97–9.18)	7.43 (6.91–7.95)*	6.85 (6.58–7.19)*	6.65 (6.33–6.96)*	6.29 (5.97–6.60)*
	Women	8.28 (7.92–8.64)	6.87 (6.53–7.21)*	6.92 (6.63–7.20)*	6.27 (6.04–6.49)*	6.17 (5.83–6.50)*
20–44	Men	5.91 (5.63–6.20)	5.40 (4.84–5.96)	5.21 (4.70–5.72)	5.27 (4.46–6.09)	5.40 (4.79–6.00)
	Women	5.33 (5.07–5.59)	4.58 (4.17–4.99)*	4.26 (4.04–4.48)*	4.30 (3.91–4.69)*	4.01 (3.71–4.31)*
45–64	Men	8.24 (7.69–8.79)	7.17 (6.08–8.26)	7.21 (6.51–7.91)	6.43 (6.09–6.76)*	6.15 (5.64–6.67)*
	Women	7.81 (7.38–8.24)	6.76 (6.21–7.31)*	6.57 (6.18–6.96)*	6.02 (5.72–6.32)*	6.32 (5.81–6.83)*
65–74	Men	10.7 (9.85–11.6)	7.98 (7.39–8.58)*	8.66 (8.03–9.28)*	7.94 (7.39–8.49)*	7.55 (6.70–8.41)*
	Women	10.9 (10.0–11.8)	8.23 (7.59–8.87)*	9.74 (8.24–11.2)	8.12 (7.29–8.95)*	8.15 (7.06–9.24)*
75+	Men	14.5 (13.7–15.2)	12.6 (11.2–14.1)	10.46 (9.85–11.06)*	11.03 (10.1–12.0)*	9.93 (8.90–11.0)*
	Women	16.3 (14.8–17.8)	12.0 (11.0–13.1)*	12.2 (11.4–13.0)*	10.9 (10.2–11.6)*	10.5 (9.27–11.7)*

Data source: Hospital Morbidity Database, 2001–2002, Canadian Institute for Health Information.

Abbreviations: CA, Census Agglomeration; CMA, Census Metropolitan Area; MIZ, Metropolitan Influenced Zone.

<sup>a</sup> Pan-Canadian totals exclude Quebec due to insufficient geographic coding of source data.

\* Statistically significant at  $p < .05$ ; reference group is CMA/CA.

**TABLE 9**  
**Adjusted odds ratios for the association between place of residence and hospitalization in the previous 12 months, 2000–2001**

		Odds ratios (95% confidence intervals <sup>a</sup> )		
		Men	Women	All
Place of residence	CMA/CA	1.0	1.0	1.0
	Strong MIZ	1.06 (0.90–1.25)	1.11 (0.96–1.28)	1.09 (0.98–1.22)
	Moderate MIZ	1.10 (0.96–1.25)	1.10 (0.98–1.22)	1.10 (1.01–1.20)*
	Weak MIZ	1.18 (1.04–1.33)*	1.16 (1.06–1.28)*	1.18 (1.09–1.27)*
	No MIZ	1.35 (1.05–1.73)*	1.16 (0.93–1.45)	1.27 (1.08–1.49)*
Sex	Male			1.0
	Female	–	–	1.46 (1.37–1.55)*
Age	<45	1.0	1.0	1.0
	≥45	1.36 (1.22–1.52)*	0.56 (0.52–0.61)*	0.78 (0.73–0.84)*
Race	White	1.0	1.0	1.0
	Non-white	0.61 (0.48–0.77)*	0.76 (0.65–0.90)*	0.70 (0.61–0.81)*
Income <sup>b</sup>	High	1.0	1.0	1.0
	Upper high	–	1.21 (1.07–1.36)*	1.15 (1.05–1.26)*
	Low middle	1.21 (1.07–1.37)*	1.35 (1.19–1.52)*	1.31 (1.18–1.44)*
	Low	1.51 (1.29–1.77)*	1.52 (1.33–1.73)*	1.49 (1.34–1.66)*
Education	Post-secondary degree	1.0	1.0	1.0
	Secondary/some post-secondary	1.21 (1.04–1.33)*	0.87 (0.80–0.94)*	–
	Less than secondary	1.42 (1.25–1.60)*	–	1.13 (1.05–1.22)*
Self-rated health	Good/excellent	1.0	1.0	1.0
	Poor/fair	2.66 (2.35–3.00)*	2.75 (2.51–3.02)*	2.76 (2.56–2.98)*
Chronic disease	No	1.0	1.0	1.0
	Yes	2.46 (2.22–2.74)*	1.78 (1.63–1.95)*	2.00 (1.87–2.14)*
Smoking	No		1.0	1.0
	Yes	–	0.90 (0.83–0.98)*	0.90 (0.84–0.96)*

Data source: Canadian Community Health Survey 2000–2001, Statistics Canada.

Abbreviations: CA, Census Agglomeration; CMA, Census Metropolitan Area; MIZ, Metropolitan Influenced Zone; –, excluded during modelling.

<sup>a</sup> Confidence intervals were determined using 500 Bootstrap weights to account for the complex survey design.

<sup>b</sup> Income classification was based on total household income and the number of people living in the household.

\* Statistically significant at  $p < .05$ .

**TABLE 10**  
**Age-standardized proportions of Canadians 15 years of age or over asked about the quality of and satisfaction with selected health care services received in the previous 12 months, by place of residence and sex, 2000–2001**

	Sex	CMA/CA	Strong MIZ	Moderate MIZ	Weak MIZ	No MIZ
<b>Overall health care services</b>						
People who reported receiving poor/fair quality of health care	Men	16.3 (15.1–17.6)	16.1 (13.1–19.1)	14.1 (11.4–16.8)	14.5 (12.4–16.6)	24.2 (15.8–32.6)
	Women	15.4 (14.4–16.5)	12.3 (10.0–14.5)	13.2 (11.1–15.3)	14.3 (12.6–16.1)	17.2 (11.5–22.9)
People who reported being “neither satisfied nor dissatisfied” or “somewhat dissatisfied” with the health care they received	Men	13.2 (12.0–14.4)	13.5 (10.5–16.4)	12.1 (9.6–14.6)	13.2 (10.7–15.6)	8.9 (3.4–14.3)
	Women	12.3 (11.3–13.3)	10.3 (8.1–12.4)	12.3 (10.1–14.6)	11.4 (9.7–13.1)	10.0 (5.2–14.8)
<b>Physician care</b>						
People who reported receiving poor/fair quality of physician care	Men	11.6 (10.4–12.9)	11.6 (8.4–14.8)	9.0 (6.6–11.4)	9.2 (7.1–11.3)	13.6 (5.4–21.8)
	Women	9.8 (8.9–10.7)	8.6 (6.5–10.7)	8.1 (6.3–9.9)	8.7 (7.2–10.2)	12.6 (7.1–18.1)
People who reported being “neither satisfied nor dissatisfied” or “somewhat dissatisfied” with the physician care they received	Men	7.9 (6.9–8.9)	8.7 (6.0–11.4)	6.3 (4.5–8.1)	5.6 (3.9–7.4)	10.3 (2.8–17.8)
	Women	7.4 (6.6–8.1)	6.6 (4.6–8.7)	6.5 (4.5–8.4)	6.8 (5.3–8.3)	7.0 (3.1–11.0)
<b>Community-based care</b>						
People who reported receiving poor/fair quality of community-based care in the past 12 months	Men	24.6 (20.8–28.4)	21.1 (9.7–32.6)	13.9 (5.1–22.7)	10.7 (5.8–15.5)*	23.7 (13.5–33.8)
	Women	20.6 (17.9–23.3)	16.3 (8.0–24.7)	14.7 (7.7–21.7)	12.9 (8.0–17.9)	14.0 (3.8–24.2)
People who reported being “neither satisfied nor dissatisfied” or “somewhat dissatisfied” with the community-based care they received	Men	15.2 (11.7–18.7)	15.6 (6.0–25.2)	8.5 (1.0–16.0)	8.3 (3.3–13.3)	5.9 (0.1–12.0)
	Women	12.8 (10.5–15.0)	9.3 (3.6–15.0)	12.9 (6.1–19.8)	6.9 (3.5–10.2)*	12.5 (4.0–21.0)

Data source: Health Services Access Survey 2000–2001, Statistics Canada.

Abbreviations: CA, Census Agglomeration; CMA, Census Metropolitan Area; MIZ, Metropolitan Influenced Zone.

\* Statistically significant at  $p < .05$ ; reference group is CMA/CA.

in three types of health services: overall health care, physician care and community-based health care. No statistically significant differences were found between urban and rural populations in the perceived quality of and satisfaction with health care, or in the quality of and satisfaction with physician care. When asked about the quality of community-based health services, a lower proportion of men living in Weak MIZ areas reported the quality of care as poor or fair, compared with men in urban areas (CMA/CA: 24.6%; Weak MIZ: 10.7%). No statistically significant differences were found between women in urban and rural areas on this subject, although a significantly smaller proportion of women living in Weak MIZ areas than those in urban areas were dissatisfied with community-based services (CMA/CA: 12.8%; Weak MIZ: 6.9%) (Table 10).

### Provincial patterns in health care resources and utilization

The findings reported in the previous section are based mostly on self-reported data and are at the national level. In this section, administrative data (such as physician billing data) from three provinces are used to describe rural health services utilization patterns.

Rates of physician visits and hospital admission obtained from physician billing and hospital discharge data were analyzed for Nova Scotia, Ontario and British Columbia. These three provinces were selected based on feasibility (i.e. availability of required data and researchers with expertise in rural health) and to be as geographically representative of the country as possible. In Ontario and British Columbia, the vast majority of the population lives in urban areas (87% and

86.2%, respectively); in Nova Scotia, on the other hand, 63.3% live in urban areas and 23.4%—almost a quarter of the population—live in Weak and No MIZ areas, as compared with 2.6% in Ontario and 7.2% in British Columbia (Table 11).

### Nova Scotia

According to CIHI data, between 1991 and 2001, the number of FPs in Nova Scotia increased by only eight, and the FP-to-population ratio decreased in both rural and urban areas. In 2001, there were 11.6 FPs per 10 000 in CMA/CA areas, higher than in any of the rural areas (7.1 per 10 000 in all rural areas combined). From 1997 to 2002, residents of Strong MIZ areas were significantly more likely than urban residents to have visited an FP. Significantly higher rates were also observed among both men and women living in other rural areas. Only in the 2001–2002 period were residents in No MIZ areas significantly less likely to have visited an FP (Figure 7).



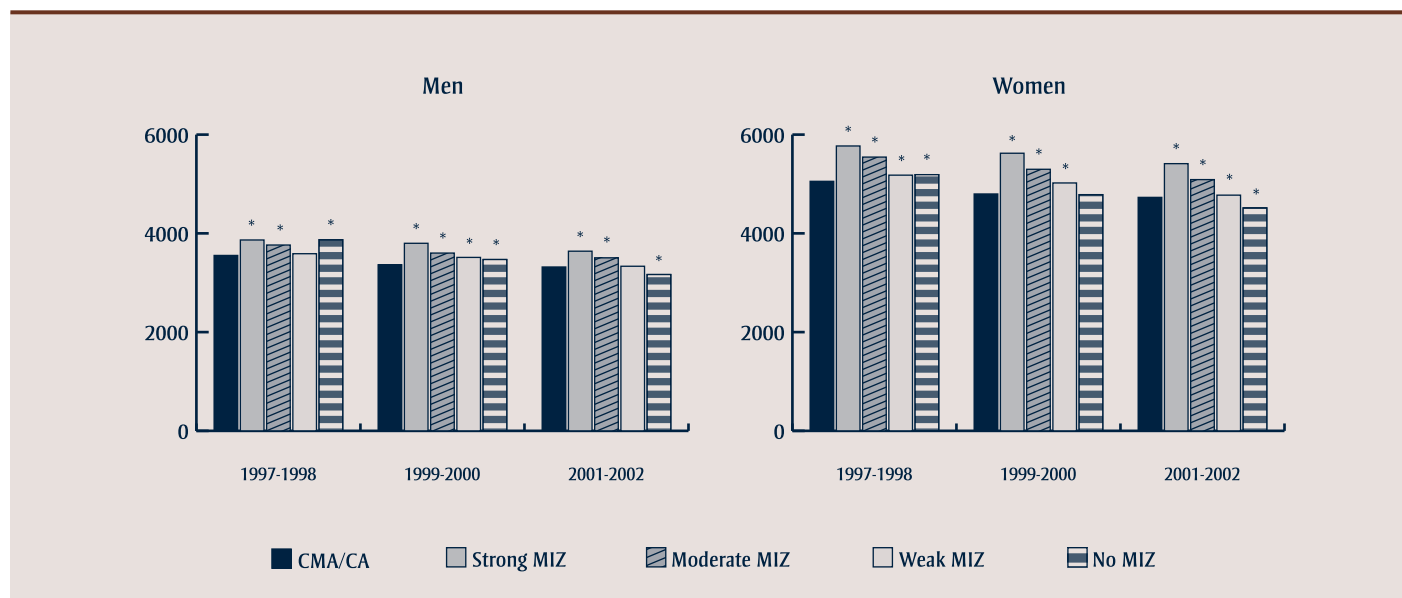
**TABLE 11**  
Population by degree of rurality, Nova Scotia, Ontario and British Columbia, 2001

	Population and percent distribution (within 2001 boundaries)					
	Nova Scotia		Ontario		British Columbia	
	Number	%	Number	%	Number	%
Urban (CMA/CA)	574 696	63.3	9 925 949	87.0	3 369 035	86.2
RST areas	333 311	36.7	1 484 097	13.0	538 703	13.8
Strong MIZ	22 209	2.4	695 979	6.1	71 044	1.8
Moderate MIZ	98 571	10.9	489 378	4.3	188 811	4.8
Weak MIZ	207 881	22.9	270 527	2.4	236 892	6.1
No MIZ	4 650	0.5	28 213	0.2	41 956	1.1
Total population	908 007		11 410 046		3 907 738	
Total area	55 284 km <sup>2</sup>		1 076 395 km <sup>2</sup>		944 735 km <sup>2</sup>	

Data sources: Statistics Canada. Census of Population, 2001; Natural Resources Canada. Canada Centre for Remote Sensing, GeoAccess Division, 2001.

Abbreviations: CA, Census Agglomeration; CMA, Census Metropolitan Area; MIZ, Metropolitan Influenced Zone; RST, Rural and Small Town.

**FIGURE 7**  
Average annual age-standardized physician-visit rates for family physicians, per 1000,  
by place of residence and sex, Nova Scotia, biennial periods, 1997–2002

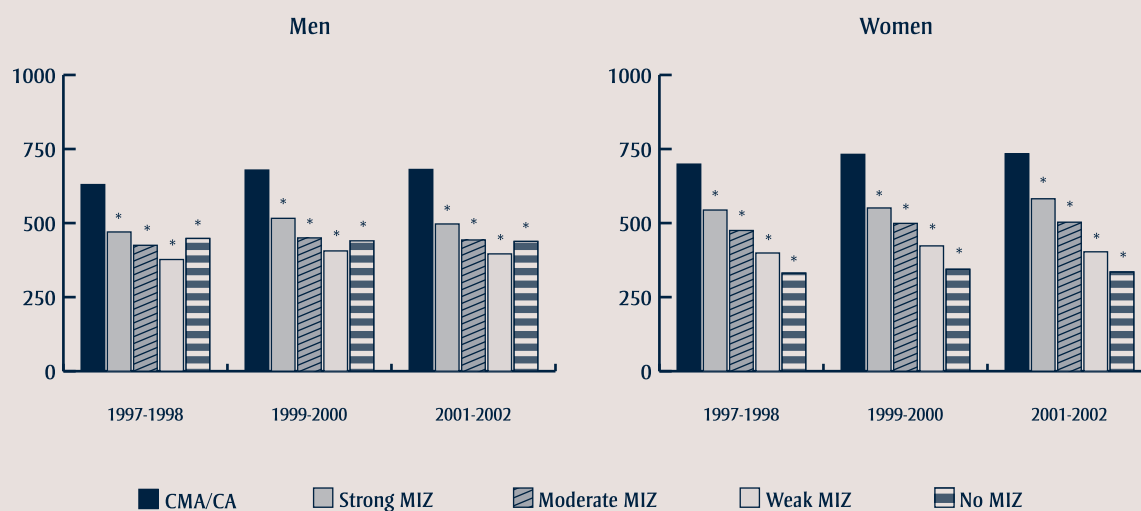


Data source: Nova Scotia Physicians Claims files 1997–2002, Statistics Canada.

Abbreviations: CA, Census Agglomeration; CMA, Census Metropolitan Area; MIZ, Metropolitan Influenced Zone.

\* Statistically significant at  $p < .05$ ; reference group is CMA/CA.

**FIGURE 8**  
Average annual age-standardized physician-visit rates for medical specialists, per 1000,  
by place of residence and sex, Nova Scotia, biennial periods, 1997–2002

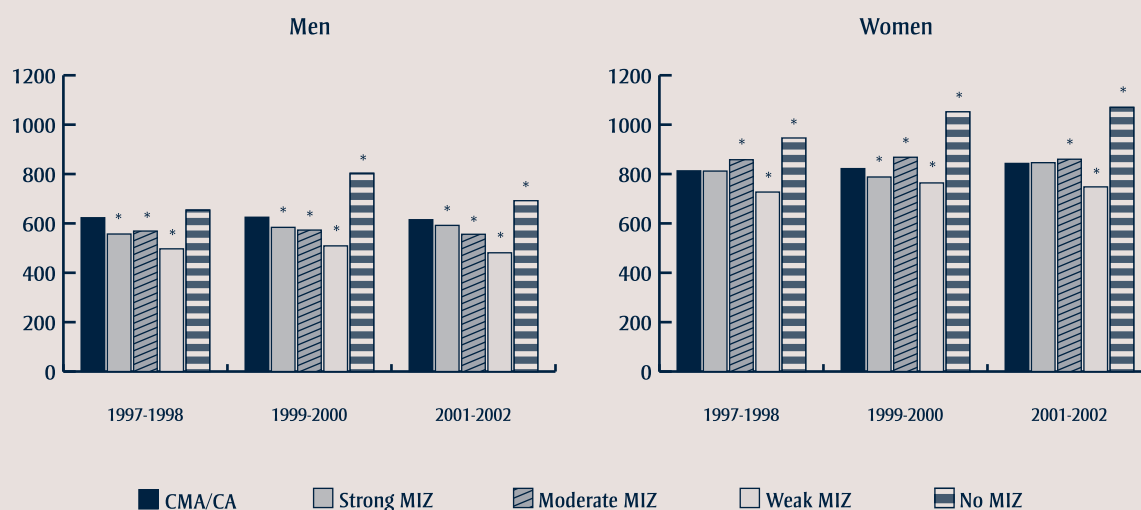


Data source: Nova Scotia Physicians Claims files 1997–2002, Statistics Canada.

Abbreviations: CMA, Census Metropolitan Area; CA, Census Agglomeration; MIZ, Metropolitan Influenced Zone.

\* Statistically significant at  $p < .05$ ; reference group is CMA/CA.

**FIGURE 9**  
Average annual age-standardized physician-visit rates for surgical specialists, per 1000,  
by place of residence and sex, Nova Scotia, biennial periods, 1997–2002



Data source: Nova Scotia Physicians Claims files 1997–2002, Statistics Canada.

Abbreviations: CMA, Census Metropolitan Area; CA, Census Agglomeration; MIZ, Metropolitan Influenced Zone.

\* Statistically significant at  $p < .05$ ; reference group is CMA/CA.

The number of specialists in Nova Scotia increased by 139 between 1991 and 2001, according to CIHI data. The specialist-to-population ratio in urban areas was 13.6 per 10 000 in 2001, as compared with 2.6 per 10 000 in all rural areas combined. Among both men and women, the annual rate of those who had visited a medical specialist over the period 1997–2002 was significantly lower in all rural areas, with a decreasing rate by degree of rurality, with the exception of men in No MIZ areas (Figure 8). In contrast, lower visit rates to surgical specialists were observed for all rural areas except No MIZ areas among men in 1999–2000 and 2001–2002 and No and Moderate MIZ areas among women from 1997 to 2002 (Figure 9).

Compared with their urban counterparts, Nova Scotians living in all rural areas had higher all-cause hospital discharge rates in 2001–2002, and these increased with increasing degree of rurality (CMA/CA: 89.5 per 1000 for men and 72.8 per 1000 for

women; Moderate MIZ: 108.4 per 1000 for men and 87.3 per 1000 for women; No MIZ: 232.3 per 1000 for men and 171.8 per 1000 for women). Lengths of hospital stay during this period were significantly shorter for men in rural areas than men in urban areas (9.01 days in CMA/CA versus 6.39 days in No MIZ); among women the only difference according to area of residence was that those in No MIZ areas spent significantly less time in hospital (6.92 days) than those in urban areas (9.43 days).

### Ontario

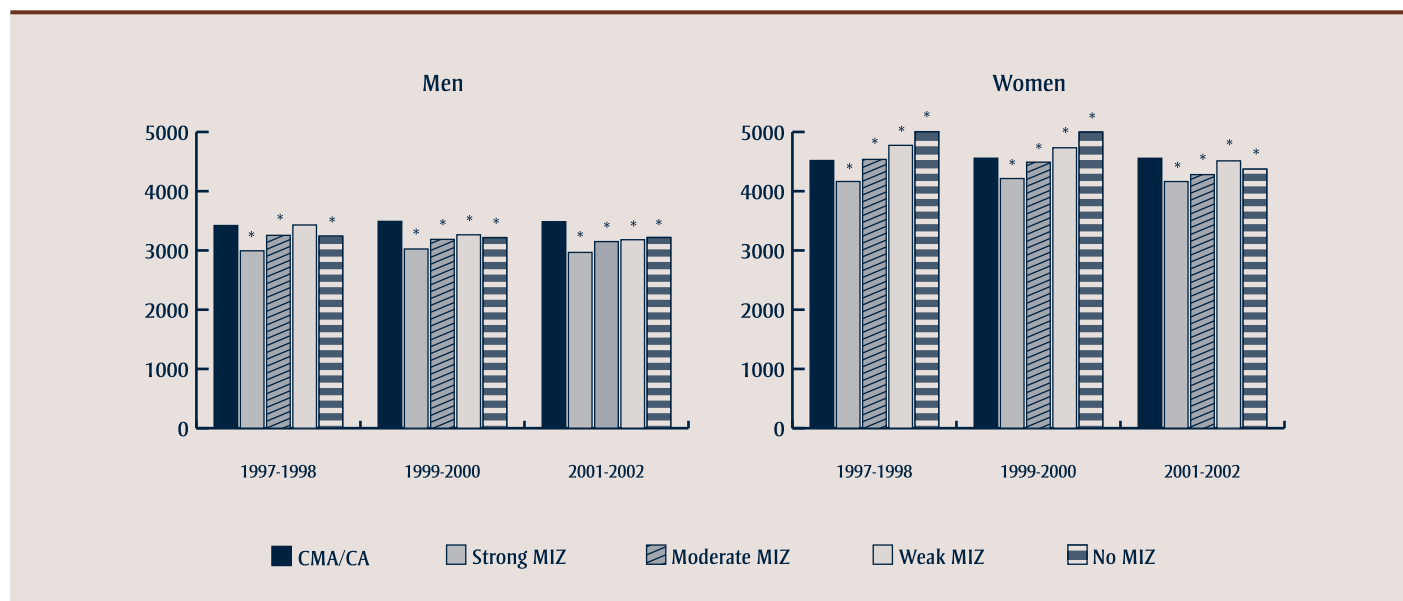
According to CIHI data, the number of FPs in Ontario decreased by 370 between 1991 and 2001, a decline that affected primarily the urban areas, where the number of FPs per 10 000 fell from 11.0 in 1991 to 9.4 in 1996 and 9.0 in 2001. The corresponding figures per 10 000 for all the MIZ areas combined were 5.9 in 1991, 5.5 in 1996 and 6.3 in 2001. In No MIZ areas, the

number increased from 2.1 per 10 000 in 1991 to 5.5 per 10 000 in 2001.

Among men in the various rural areas, the annual rates per 1000 of those who had visited an FP between 1997 and 2002 were similar and significantly lower, on the whole, than among men in urban areas. The rates of FP visits in all rural areas were significantly lower compared with urban areas for both men and women in 2001–2002. Among women in different rural communities, however, with the exception of a decline in No MIZ areas during 2001–2002, the rates increased with greater degree of rurality. Among both men and women, rates of FP visits were significantly lower in Strong MIZ areas than in urban areas throughout the period from 1997 to 2002 (Figure 10).

Between 1991 and 2001, the number of specialists in Ontario increased by 1440, according to CIHI data. The specialist-to-population ratios were stable over time

**FIGURE 10**  
Average annual age-standardized physician-visit rates for family physicians, per 1000,  
by place of residence and sex, Ontario, biennial periods, 1997–2002



Data source: Ontario Physicians Claims files 1997–2002, Statistics Canada.

Abbreviations: CMA, Census Metropolitan Area; CA, Census Agglomeration; MIZ, Metropolitan Influenced Zone.

\* Statistically significant at  $p < .05$ ; reference group is CMA/CA.

in urban areas (10.6 per 10 000 in 1991, 10.2 in 1996 and 10.6 in 2001) and most of the rural areas (all rural areas combined: 0.7 per 10 000 in 1991, 0.7 in 1996 and 0.9 in 2001). Among both women and men, rates of visit to medical specialists were significantly higher—sometimes twice as high—in urban areas of Ontario than in all rural areas between 1997 and 2002, and generally decreased with increasing degree of rurality (Figure 11). Although visits to surgical specialists also followed this pattern, the rates in No MIZ areas were the highest of all rural areas among women throughout the period from 1997 to 2002 and among men in the period from 2001 to 2002 (Figure 12).

According to the HMDB, all-cause hospital discharge rates were higher among women than among men in Ontario in 2001–2002. Compared with their urban counterparts, Ontarians living in all rural areas had higher overall hospital discharge rates, and these increased with increasing degree of rurality (men in CMA/CA, 66.4 per 1000 versus 128.6 per 1000 in No MIZ; women in CMA/CA, 86.1 per 1000 versus 178.8 per 1000 in No MIZ). In general, average lengths of hospital stay for men showed no significant differences between rural and urban Ontario in 2001–2002. Among women, those living in Strong and Weak MIZ areas had shorter average lengths of hospital stay than their urban counterparts (CMA/CA: 7.06 days; Strong MIZ: 5.87 days; Moderate MIZ: 6.00 days).

### **British Columbia**

According to CIHI data, the number of FPs in British Columbia increased by 608 in the decade between 1991 and 2001. In urban areas, the ratio of FPs per 10 000 decreased somewhat (from 11.6 in 1991 to 11.0 in 1996 and 11.2 in 2001) but was higher than in all rural areas, with the exception of Weak MIZ areas (12.6 per 10 000 in 2001). During this period, the number of specialists also increased, by 590, and the number per 10 000 was again higher in urban than rural areas (9.6 in urban areas versus 1.6 in all rural areas) in 2001.

With the exception of Strong MIZ areas, where the rates were significantly lower than in urban areas, rural residents had higher hospital discharge rates than their urban counterparts (CMA/CA: 65.4 per 1000 for men, 84.6 per 1000 for women; Moderate MIZ: 70.3 per 1000 for men, 92.2 per 1000 for women; No MIZ: 105.6 per 1000 for men, 151.2 per 1000 for women). Men living in Moderate, Weak and No MIZ areas had significantly shorter lengths of hospital stay than those in urban areas (CMA/CA: 8.04 days; Moderate MIZ: 6.58 days; Weak MIZ: 6.48 days; No MIZ: 5.79 days). Among women, the only difference in lengths of hospital stay according to place of residence was that those in Weak MIZ areas were in hospital for a significantly shorter time (6.06 days) compared with women in urban areas (8.00 days).

### **Utilization patterns by disease in three provinces**

Data on physician visits and hospitalization (age-standardized rates) for selected diseases categories and diseases in Nova Scotia, Ontario and British Columbia in 2001–2002 were used to calculate the relative probabilities of health services utilization in rural areas compared with urban areas. The conditions analyzed were circulatory diseases, cancer, respiratory diseases, musculoskeletal diseases, mental disorders, diseases of the nervous system and sense organs, and diabetes; physician visits and hospitalization for injuries and poisonings were also examined. Not all conditions could be analyzed for each province because of data extraction problems, particularly in British Columbia, where the analysis of physician visits focused on specific diseases as opposed to broad disease categories.\*

### **Nova Scotia**

In Nova Scotia, the patterns of relative risks of physician visits were highly variable but, in general, residents of Strong MIZ areas had higher risks of physician visits, and those in Weak MIZ and No MIZ areas

had lower risks. The pattern for residents of Moderate MIZ varied considerably according to each of the six disease categories analyzed and for injuries and poisonings (Table 12).

Rural Nova Scotians had consistently lower risks of physician visits for mental disorders than their urban counterparts, but consistently higher physician visits for injuries and poisoning, with the exception of women in Weak and No MIZ areas. (Table 13).

In terms of hospital discharge rates, rural Nova Scotians had higher relative risks of hospitalization compared with urban Nova Scotians, with the exception of mental disorders for which the results were inconsistent, being significantly higher in Weak and No MIZ areas, but lower in Moderate and Strong MIZ areas (Table 14).

### **Ontario**

The patterns with respect to risks of physician visits and hospitalization in Ontario were fairly consistent: rural residents, regardless of sex, were generally less likely to visit a physician than their urban counterparts, though they were more likely to be hospitalized for the same disease categories and for injuries and poisonings (Table 15). However, compared with their urban counterparts, both male and female rural Ontarians were more likely to visit their physician in the case of injuries and poisonings, with the exception of men and women in Strong MIZ area (Table 16).

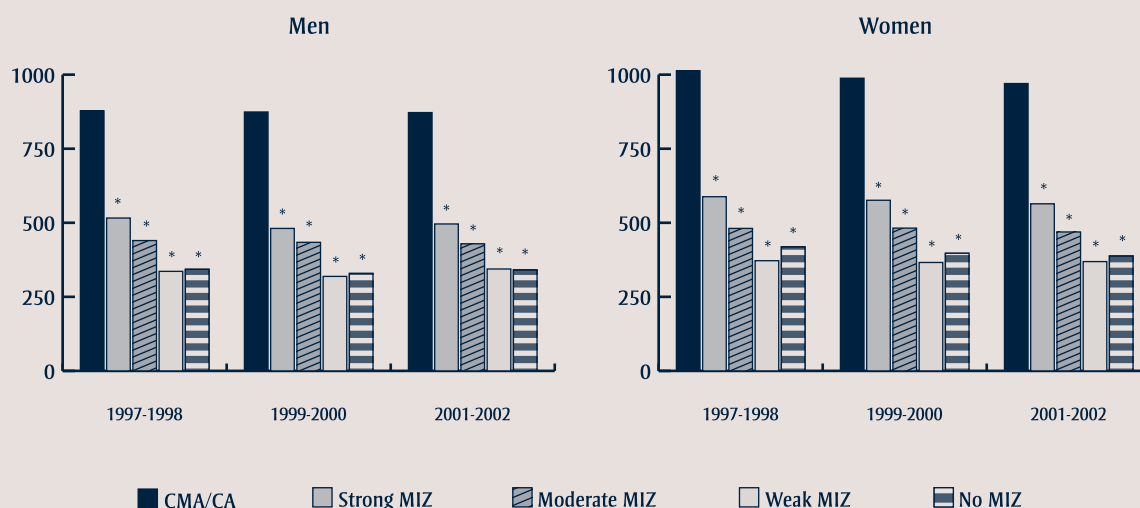
Higher risks of hospital discharge were evident among all rural residents, relative to urban residents, for all disease categories, with the exception of mental disorders for both male and female residents in Strong MIZ areas (Table 17).

### **British Columbia**

In general, physician visits were significantly less likely among residents of Strong and Weak MIZ areas than those in urban areas for most diseases examined.

\* More detailed results are available in tables in Appendix 2.

**FIGURE 11**  
Average annual age-standardized physician-visit rates for medical specialists, per 1000,  
by place of residence and sex, Ontario, biennial periods, 1997–2002

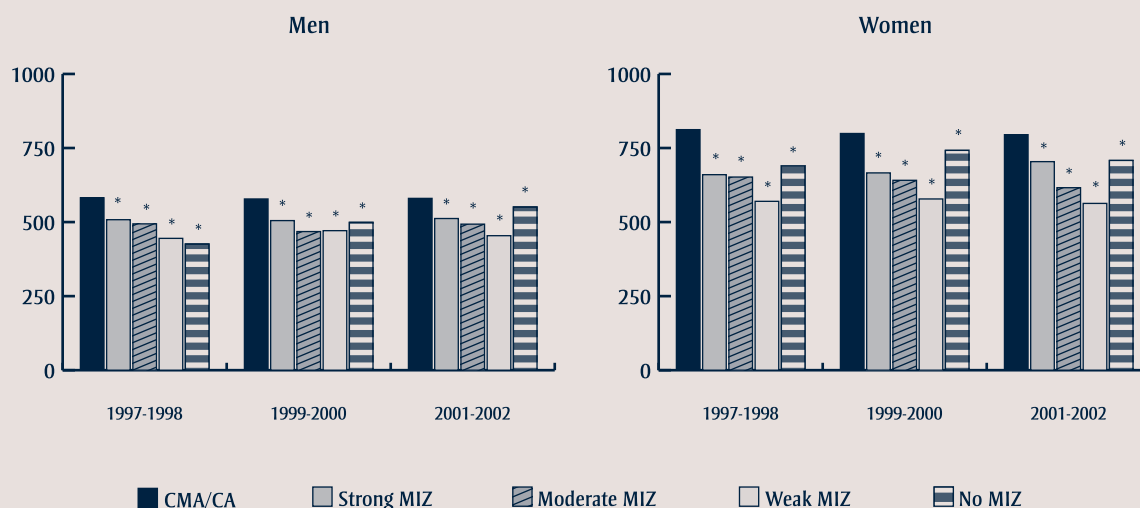


Data source: Ontario Physicians Claims files 1997–2002, Statistics Canada.

Abbreviations: CMA, Census Metropolitan Area; CA, Census Agglomeration; MIZ, Metropolitan Influenced Zone.

\* Statistically significant at  $p < .05$ ; reference group is CMA/CA.

**FIGURE 12**  
Average annual age-standardized physician-visit rates for surgical specialists, per 1000,  
by place of residence and sex, Ontario, biennial periods, 1997–2002



Data source: Ontario Physicians Claims files 1997–2002, Statistics Canada.

Abbreviations: CMA, Census Metropolitan Area; CA, Census Agglomeration; MIZ, Metropolitan Influenced Zone.

\* Statistically significant at  $p < .05$ ; reference group is CMA/CA.

**TABLE 12**  
**Summary of relative risks of physician visits and hospitalizations attributed to selected disease categories,**  
**by place of residence and sex, Nova Scotia, 2001–2002**

Disease category (ICD-9 diagnostic code)	Men				Women			
	Strong MIZ	Moderate MIZ	Weak MIZ	No MIZ	Strong MIZ	Moderate MIZ	Weak MIZ	No MIZ
<b>Relative risks of physician visit</b>								
Circulatory disease (390–459)	↑	↓	↓	↓	↑	↑	↑	↓
Cancers/neoplasms (140–239)	↑	↓	↓	---	---	↓	↓	↓
Respiratory disease (460–519)	↑	↑	↓	↓	↑	↑	↓	↓
Musculoskeletal system disease (710–739)	↓	---	↓	↓	↑	↑	↓	↓
Injuries and poisonings (802–894, 959, 977–998)	↑	↑	↑	↑	↑	↑	↓	---
Mental disorders (290–319)	↓	↓	↓	↓	↓	↓	↓	↓
Nervous system and sense organs disease (320–389)	↓	↑	↓	↓	---	↑	↓	↓
<b>Relative risks of hospitalization</b>								
Circulatory disease (390–459)	↑	↑	↑	↑	↑	↑	↑	↑
Cancers/neoplasms (140–239)	↑	↑	↑	↑	↑	↑	↑	↑
Respiratory disease (460–519)	↑	↑	↑	↑	---	---	↑	↑
Musculoskeletal system disease (710–739)	↑	↑	---	↑	↑	↑	---	↑
Injuries and poisonings (802–894, 959, 977–998)	---	↑	↑	↑	↑	↑	---	↑
Mental disorders (290–319)	---	↓	↑	↑	---	↓	↑	↑
Nervous system and sense organs disease (320–389)	↑	↑	---	↑	↑	↑	↑	↑

Data source: Nova Scotia Physician Claims Files, 2001–2002.

Abbreviations: CA, Census Agglomeration; CMA, Census Metropolitan Area; ICD-9, International Statistical Classification of Diseases and Related Health Problems, 9th Revision; MIZ, Metropolitan Influenced Zone.

↑ Statistically higher relative risk at  $p < .05$ ; ↓ statistically lower relative risk at  $p < .05$ ; --- no statistical difference at  $p < .05$ ; reference group is CMA/CA.

**TABLE 13**  
**Relative risks of age-standardized physician visits for mental disorders and injuries and poisonings,**  
**by place of residence and sex, Nova Scotia, 2001–2002**

Disease category (ICD-9 diagnostic code)	Sex	Strong MIZ	Moderate MIZ	Weak MIZ	No MIZ
Mental disorders (290–319)	Men	0.75 (0.73–0.78)*	0.84 (0.83–0.85)*	0.70 (0.69–0.71)*	0.88 (0.82–0.94)*
	Women	0.94 (0.92–0.95)*	0.89 (0.88–0.90)*	0.73 (0.72–0.74)*	0.80 (0.76–0.84)*
Injuries and poisonings (802–894, 959, 977–998)	Men	1.19 (1.16–1.23)*	1.18 (1.16–1.19)*	1.08 (1.06–1.09)*	1.21 (1.14–1.28)*
	Women	1.22 (1.19–1.25)*	1.11 (1.09–1.12)*	0.98 (0.97–0.99)*	0.96 (0.90–1.03)

Data source: Nova Scotia Physician Claims Files, 2001–2002.

Abbreviations: CA, Census Agglomeration; CMA, Census Metropolitan Area; ICD-9, International Statistical Classification of Diseases and Related Health Problems, 9th Revision; MIZ, Metropolitan Influenced Zone.

\* Statistically significant at  $p < .05$ ; reference group is CMA/CA = 1.00.



TABLE 14

Relative risks of age-standardized discharge from hospital for mental disorders, by place of residence and sex, Nova Scotia, 2001–2002

Disease category (ICD-9 diagnostic code)	Sex	Strong MIZ	Moderate MIZ	Weak MIZ	No MIZ
Mental disorders (290–319)	Men	0.84 (0.65–1.11)	0.81 (0.68–0.96)*	1.37 (1.23–1.53)*	3.69 (2.58–5.29)*
	Women	0.83 (0.62–1.11)	0.83 (0.70–0.98)*	1.24 (1.11–1.38)*	7.56 (5.97–9.58)*

Data source: Hospital Morbidity Database, 2001–2002, Canadian Institute for Health Information.

Abbreviations: CMA, Census Metropolitan Area; CA, Census Agglomeration; ICD-9, International Statistical Classification of Diseases and Related Health Problems, 9th Revision; MIZ, Metropolitan Influenced Zone.

\* Statistically significant at  $p < .05$ ; reference group is CMA/CA = 1.00.

Residents of No MIZ areas, however, were more likely to visit a physician for conditions such as stroke, breast cancer, lung cancer, chronic obstructive pulmonary disease, arthritis and diabetes (Table 18). Those living in Weak and No MIZ areas were at significantly greater risk of hospitalization than urban residents, and for certain conditions this was also true for people residing in Moderate MIZ areas. In Strong MIZ areas, the risks of hospitalization were either lower than or the same as that for urban residents.

### Health services utilization patterns by MIZ

The patterns of health services utilization in Nova Scotia, Ontario and British Columbia can also be presented by focusing on the similarities and differences between degrees of rurality in relation to the relative risks of physician visits and hospitalization.

#### Strong MIZ:

- Nova Scotians living in Strong MIZ areas had equal or higher relative risks of physician visits (except for mental disorders and diseases of the musculoskeletal and nervous systems) and equal or higher risks of hospitalization than their urban counterparts for all conditions examined.
- Ontarians living in Strong MIZ areas typically had lower relative risks of physician visits but higher risks of hospitalization than urban Ontarians. One of the few exceptions was women in Strong MIZ areas, who had higher risks of physician visits for circulatory diseases. The risks of hospitalization were higher for all disease categories

with the exception of mental disorders. Also, there were no statistically significant differences among men with cancer and with diseases of the nervous system and sense organs.

- British Columbians living in Strong MIZ areas consistently showed lower or equal risks of physician visits for the eleven specific diagnoses examined compared with urban residents, except for women with rheumatoid arthritis or Alzheimer's disease. The risks of hospitalization were mostly equal or lower, relative to those in urban areas, except for women with circulatory diseases, who were at increased risk.

#### Moderate and Weak MIZ areas:

- Nova Scotians and British Columbians living in Moderate and Weak MIZ areas showed no consistent patterns in relation to risks of physician visits. There were differences between men and women, and the relative risks varied from one disease category or disease to another in the case of Nova Scotia and British Columbia, respectively. However, Ontarians in Moderate and Weak MIZ areas typically had lower risks of physician visits, with the exception of injuries and poisonings for both men and women.
- On the other hand, residents in Moderate and Weak MIZ areas in all three provinces generally had higher relative risks of hospitalization. The few exceptions were mostly found in Moderate MIZ areas of British Columbia, for both men and women, and in Moderate and Weak MIZ areas

of Nova Scotia, especially among women.

#### No MIZ areas:

- No MIZ areas generally showed risk patterns that were different from those in other types of rural areas. Compared with people residing in CMA or CA, the residents of No MIZ areas in Nova Scotia had lower or similar risks of physician visits (with the exception of injuries and poisonings for men) but higher risks of hospitalization for all of the conditions examined.
- The relative risks of physician visits for Ontarians living in No MIZ areas were lower than or the same as for their urban counterparts, except for injuries and poisonings for both men and women and cancer for women; however, the relative risks of hospitalization were higher for all disease categories for both men and women.
- In British Columbia, no clear patterns emerged for residents in No MIZ areas in relation to the relative risks of physician visits; however, the relative risks of hospitalization were consistently higher than for those in urban areas. These findings are in line with the higher risks of hospitalization in Weak MIZ areas in British Columbia for all of the diseases examined.

## Discussion and conclusion

In the previous sections of this report, we presented data concerning consultations with physicians and use of hospital and other health services by Canadians living

**TABLE 15**  
**Summary of relative risks of physician visits and hospitalizations attributed to selected disease categories,**  
**by place of residence and sex, Ontario, 2001–2002**

Disease category (ICD-9 diagnostic code)	Men				Women			
	Strong MIZ	Moderate MIZ	Weak MIZ	No MIZ	Strong MIZ	Moderate MIZ	Weak MIZ	No MIZ
<b>Relative risks of physician visit</b>								
Circulatory diseases (390–459)	↓	↓	↓	---	↑	↓	↓	↓
Cancers/neoplasms (140–239)	↓	↓	↓	---	↓	↓	↓	↑
Respiratory diseases (460–519)	↓	↓	↓	↓	↓	↓	↓	↓
Musculoskeletal system diseases (710–739)	↓	---	↓	↓	↓	↓	↓	---
Injuries and poisonings (802–894, 959, 977–998)	↓	↑	↑	↑	↓	↑	↑	↑
Mental disorders (290–319)	↓	↓	↓	↓	↓	↓	↓	↓
Nervous system and sense organs diseases (320–389)	↓	↓	↓	↓	↓	↓	↓	↓
<b>Relative risks of hospitalization</b>								
Circulatory diseases (390–459)	↑	↑	↑	↑	↑	↑	↑	↑
Cancers/neoplasms (140–239)	---	↑	↑	↑	↑	↑	↑	↑
Respiratory diseases (460–519)	↑	↑	↑	↑	↑	↑	↑	↑
Musculoskeletal system diseases (710–739)	↑	↑	↑	↑	↑	↑	↑	↑
Injuries and poisonings (802–894, 959, 977–998)	↑	↑	↑	↑	↑	↑	↑	↑
Mental disorders (290–319)	↓	↑	↑	↑	↓	↑	↑	↑
Nervous system and sense organs diseases (320–389)	---	↑	↑	↑	↑	↑	↑	↑

Abbreviations: CA, Census Agglomeration; CMA, Census Metropolitan Area; ICD-9, International Statistical Classification of Diseases and Related Health Problems, 9th Revision; MIZ, Metropolitan Influenced Zone.

Reference group is CMA/CA = 1.00; ↑ statistically higher relative risk at  $p < .05$ ; ↓ statistically lower relative risk at  $p < .05$ ; --- no statistical difference at  $p < .05$ .

**TABLE 16**  
**Relative risks of age-standardized physician visits for injuries and poisonings, by place of residence and sex, Ontario, 2001–2002**

Disease category (ICD-9 diagnostic code)	Sex	Strong MIZ	Moderate MIZ	Weak MIZ	No MIZ
Injuries and poisonings (802–894, 959, 977–998)	Men	0.98 (0.98–0.99)*	1.10 (1.09–1.10)*	1.15 (1.14–1.16)*	1.17 (1.15–1.20)*
	Women	0.94 (0.94–0.95)*	1.01 (1.00–1.02)*	1.06 (1.05–1.07)*	1.23 (1.20–1.26)*

Data source: Ontario Physician Claims Files, 2001–2002.

Abbreviations: CA, Census Agglomeration; CMA, Census Metropolitan Area; ICD-9, International Statistical Classification of Diseases and Related Health Problems, 9th Revision; MIZ, Metropolitan Influenced Zone.

\* Statistically significant at  $p < .05$ ; reference group is CMA/CA = 1.00.

**TABLE 17**  
**Relative risks of age-standardized discharge from hospitals for mental disorders, by place of residence and sex, Ontario, 2001–2002**

Disease category (ICD-9 diagnostic code)	Sex	Strong MIZ	Moderate MIZ	Weak MIZ	No MIZ
Mental disorders (290–319)	Men	0.82 (0.75–0.90)*	1.54 (1.46–1.61)*	1.99 (1.92–2.07)*	2.79 (2.47–3.15)*
	Women	0.82 (0.78–0.87)*	1.54 (1.46–1.61)*	1.99 (1.88–2.12)*	2.79 (2.46–3.16)*

Data source: Hospital Morbidity Database, 2001–2002, Canadian Institute for Health Information.

Abbreviations: CA, Census Agglomeration; CMA, Census Metropolitan Area; ICD-9, International Statistical Classification of Diseases and Related Health Problems, 9th Revision; MIZ, Metropolitan Influenced Zone.

\* Statistically significant at  $p < .05$ ; reference group is CMA/CA = 1.00.

in urban communities and in different types of rural settings. Here we discuss these findings and their implications by asking three questions:

- What do these findings mean from the perspective of rural health?
- Do the findings shed any new light on such issues as place of residence and health, health equity and the relationship between the Canadian health care system and rural health care?
- What are their implications for future rural health research?

This study has used multiple sources of information, including survey and administrative data from different sources, to examine patterns of health services utilization by rural Canadians. It has investigated the relationship between place of residence and health services utilization from the national and provincial perspectives, using national data and provincial data from Nova Scotia, Ontario and British Columbia, so as to ensure that the findings are not solely a methodological artefact attributable to a specific data source from a specific jurisdiction.

Given the massive amount of data used, there are some inevitable variations in the findings, depending on the dataset, jurisdiction, disease category, health service and population group under consideration; however, some broad trends have emerged, and the patterns are reasonably consistent. In addition, this study has gone beyond treating rural Canada as an undifferentiated entity. While many researchers and health care planners have looked at urban-rural differences, few have examined the

heterogeneity of rural Canada, as reflected in the ways health services are used. To rectify this situation, this study has disaggregated rural Canada into finer categories based on the degree of rurality or remoteness to urban centres.

The summaries of findings presented earlier outlined some general patterns of rural health services utilization. Superficially, the relationships between place of residence and use of health services are quite variable and appear to reflect unique situations, individual preferences of patients, different styles of medical practice or special patterns of service provision associated with different diseases. But at the national and provincial level (at least in the three provinces examined in this study) and in terms of major disease categories, there are broad patterns of service utilization: rural residents tend to have lower physician consultation rates than their urban counterparts; on the other hand, they tend to have higher relative risks of hospitalization. These trends are particularly evident for people living in Weak and No MIZ areas. There are some exceptions in British Columbia, which may be due to the fact that the analysis of physician visits in that province focused on specific diseases, whereas the analysis for Nova Scotia and Ontario focused on broad disease categories.

We will discuss the significance and implications of the findings in the following sections.

### **“Rural” is not a unitary concept**

All rural areas are not the same in terms of utilization of health services. In some cases, the differences between types of rural areas

may be greater than between rural and urban communities. For instance, strong MIZ areas appear to be different from other rural areas with respect to health status and utilization of health services. People living in Strong MIZ areas tend to enjoy long life expectancy (men: 77.4 years; women: 81.5 years) and health-adjusted life expectancy (men: 68.7 years; women: 71.3 years)<sup>1</sup> compared with Canadians in general. This may manifest itself in lower relative risks of physician visits. From the point of view of access to health services, residents in Strong MIZ areas may have fewer health care needs, experience fewer access barriers or be in a better position to overcome barriers if they do arise.

Conversely, and perhaps understandably, people in No MIZ areas typically face the greatest challenges in terms of availability of health care resources and access to health services. Furthermore, residents of these areas tend to have poorer health status. They have the shortest life expectancy (men: 74.0 years; women: 81.4) and shortest health-adjusted life expectancy (men: 65.5 years; women: 69.9 years).<sup>1</sup> From a health care planning perspective, Canadians in No MIZ areas (and, to some extent, in Weak MIZ areas) may have the greatest need for support in order to overcome difficulties in accessing care and in improving health status. As the Romanow Commission has pointed out:

*In fact, some would say that there is an “inverse care law” in operation. People in rural communities have poorer health status and greater needs for primary health care, yet they are not as well served and have more difficulty accessing health care services than people in urban centres” (p. 162).<sup>24</sup>*

**TABLE 18**  
**Summary of relative risks of physician visits and hospitalizations attributed to selected disease,**  
**by place of residence and sex, British Columbia, 2001–2002**

Disease category (ICD-9 diagnostic code)	Men				Women			
	Strong MIZ	Moderate MIZ	Weak MIZ	No MIZ	Strong MIZ	Moderate MIZ	Weak MIZ	No MIZ
<b>Relative risks of physician visit</b>								
Coronary heart disease (410–414)	↓	↓	↓	↓	↓	↓	↓	---
Stroke (430–434)	↓	↓	↓	↑	---	↓	↓	↑
Breast cancer (174)	n/a	n/a	n/a	n/a	↓	↑	↑	↑
Lung cancer (162)	---	↑	↑	↑	---	↑	---	↑
Asthma (493)	↓	↓	↓	↓	↓	↓	↓	---
Chronic obstructive pulmonary disease (490–492, 496)	↓	↓	↓	↑	↓	↓	↓	↑
Rheumatoid arthritis (714)	---	↑	↓	↑	↑	↑	↑	↑
Osteoarthritis (715)	↓	↑	↓	↑	↓	↑	↓	↑
Depression (296.2, 296.3, 300.4, 311)	↓	↓	↓	↓	↓	↓	↓	↓
Alzheimer's/dementia disorders (331)	↓	↑	↓	---	↑	↑	↓	↓
Diabetes (250)	↓	↓	↓	↑	↓	↓	↓	↑
<b>Relative risks of hospitalization</b>								
Circulatory disease (390–459)	---	---	↑	↑	↑	↑	↑	↑
Cancers/neoplasms (140–239)	---	---	↑	↑	---	↓	↑	↑
Respiratory diseases (460–519)	↓	---	↑	↑	---	---	↑	↑
Musculoskeletal system diseases (710–739)	---	↑	↑	↑	---	↑	↑	↑
Injuries and poisonings (802–894, 959, 977–998)	---	↑	↑	↑	---	↑	↑	↑
Mental disorders (290–319)	↓	↑	↑	↑	↓	---	↑	↑
Nervous system and sense organs diseases (320–389)	↓	---	↑	↑	---	---	↑	↑

Data source: British Columbia Physician Claims Files, 2001–2002.

Abbreviations: CA, Census Agglomeration; CMA, Census Metropolitan Area; ICD-9, International Statistical Classification of Diseases and Related Health Problems, 9th Revision; MIZ, Metropolitan Influenced Zone.

Reference group is CMA/CA = 1.0; ↑ statistically higher relative risk at  $p < .05$ ; ↓ statistically lower relative risk at  $p < .05$ ; --- no statistical difference at  $p < .05$ .

## Different patterns of service delivery

Residents of urban and rural communities show marked differences in their access to and use of health services. For instance, hospitalization rates increase with increasing degree of rurality, but average lengths of hospital stay decrease. Also, greater proportions of rural residents report receiving care in emergency departments or outpatient clinics. These findings may reflect more than differences in health status or health care needs: they may reflect differences in how health services are organized or provided in non-urban areas and disparities in the availability of health care resources, including health human resources.

For example, Pong and Pitblado<sup>3</sup> described the differences in the practice profiles of rural- and urban-based FPs. The former tend to have a much broader scope of practice, are more inclined to work in different types of care setting and are more likely to provide clinical services and perform procedures that would typically be done by specialists in larger urban centres. In the relative absence of specialists in rural areas, some rural family doctors expand their scope of practice as a way to fill some service gaps. Similarly, the greater reliance on hospital care and emergency departments by rural residents could be due to the lack of community-based ambulatory care facilities, such as walk-in clinics or community health centres.

Consultations with a nurse are more frequent among rural residents. People living in Moderate, Weak and No MIZ areas are more likely than urban residents to have one or more consultations with a nurse, and those living in No MIZ areas are especially likely to have consulted a nurse. Some remote or very small communities have nursing stations staffed by out-post nurses or nurse practitioners who offer a broad range of health services, including diagnosis and treatment of minor diseases, with physicians providing backup and consultation at a distance or through periodic outreach visits.

Such divergent patterns of service utilization are not aberrations but, rather, are to

be expected. It is important to distinguish between regional variations in health services utilization and regional disparities in health status or outcomes. The former are not necessarily undesirable, as long as they reflect different means to the same end and as long as the latter can be minimized. If substantial regional differences in health status persist over time, however, the appropriateness of the service delivery approach or the levels of service consumption may need to be questioned. Although this study has used CMA and CA as the reference group for comparison with rural categories, it does not necessarily endorse the utilization rates of urban areas as the standards or benchmarks for which rural areas should strive.

## The health care system and rural health

While there are differences between rural and urban communities, such regional disparities should not be unduly exaggerated. Neither should it be assumed that the situation in rural areas is always poor or at least worse than in urban areas. While, in general, rural residents have less access to certain types of health services or they use certain types of services to a lesser extent, there are no differences between rural and urban areas in other respects. In a few cases, rural residents actually use certain types of services more often than their urban counterparts.

The Canadian Medicare system, which ensures universal access to necessary medical and hospital care, and the *Canada Health Act*, which specifies “accessibility” as one of its five principles, aim to eliminate financial means as a condition for accessing necessary medical and hospital care. Universal access requires that practitioners and services be available in all regions of the country. As a result, nearly all provincial and territorial governments have established special programs (such as the Underserved Area Program in Ontario, the Fly-In Program of the J.A. Hildes Northern Medical Unit in Manitoba and the Travel Assistance Program in British Columbia) to provide assistance to those who have to travel great distances to receive care. These and other programs help rural residents, particularly those

living in more remote areas, gain better access to health services and reduce inequity. All this attests to the strength of the Canadian health care system.

However, this study has focused primarily on insured health services, such as those provided by physicians and in hospitals. Services not covered under the Medicare system, such as rehabilitation therapy, home care, dental care and community mental health, have not been examined extensively, primarily because data are not widely available. As a result, whether rural residents have more or less access to such services relative to urban residents, or whether they use such services at levels similar to those of urban residents, remains largely unknown at the national level. Further investigation is needed when data become available.

Whether urban and rural residents experience similar ease or difficulty in accessing health services is also unknown. While, in theory, all Canadians have access to needed medical and hospital care, some may achieve such access only with considerable inconvenience and hardship. For instance, although residents of remote communities have the same right to specialist care as those living in large urban centres, they may have to travel great distances to see a specialist. This may require individuals to take time off work, lose income, incur substantial travel costs and endure greater emotional distress. In other words, accessibility is one thing, but the costs entailed (both material and psychological) are another. Because of lack of data, such issues were not dealt with in this study.

## Reasons for regional variations in utilization

Consistent with the Andersen model,<sup>2</sup> regional variations in utilization of health services may be as a result of different health needs and availability of health care resources, among other things. For instance, we observed higher relative risks of physician visits and hospitalization due to injuries and poisoning in rural areas both nationally and in the three provinces examined. These higher risks may reflect

the increased likelihood of accidents and injuries sustained because of the nature of many rural-based occupations such as farming, fishing, logging and mining. Similarly, the much higher relative risk of ambulatory visits in relation to diabetes in No MIZ areas in all three provinces could be due to the higher prevalence of diabetes among Aboriginal people, who make up a large proportion of the population in more remote regions.

Differences in availability of resources and service delivery models have a great impact on service utilization patterns. For instance, limited availability of community-based care, a heavier disease burden and other factors, such as distance to services, could create a greater reliance on hospital care among rural Canadians.

### The role of “place” in health

Does where people live make a difference in terms of access to and utilization of health services? According to the findings of this study and results from the companion study, *How Healthy Are Rural Canadians?*,<sup>1</sup> the answer to this question is: “Yes, place of residence does matter—in some cases.” A series of multivariate regression analyses showed that, after various socio-demographic factors, selected diseases and health behaviours were controlled for, place of residence, whether urban or in different categories of rurality, still has an independent effect on some aspects of health services utilization.

But the importance of place of residence is also a function of the variables being examined. In some cases, it is an important factor; in others, less so. For instance, data from the HSAS show that place of residence has an independent effect on not having a family doctor only in No MIZ areas, after controlling for a number of other variables (Figure 2). On the other hand, place of residence has an independent effect on the likelihood of being hospitalized in all MIZ except Strong MIZ areas (Table 9).

But what is it about place of residence that makes it an important factor to consider in examining health behaviours

and outcomes? This is an equally important and possibly a more difficult question to answer. As pointed out earlier, “place” embodies many things, including the physical environment, population, socio-economic conditions, occupational activities, culture, customs, community structure and social relationships. Thus, when we talk about the role of place of residence in health, we are in fact talking about how health is shaped by an aggregate of interacting factors encapsulated in specific geographic locations. Now that this study, as well as others, has established the fact that there is a place for “place” in our understanding of health, it behoves us to go beyond locality and look at how these interacting factors affect—and are affected by—health in the context of rural Canada.

Furthermore, “rural” is just one aspect of “place.” In addition to rural health, there is a growing interest in other aspects of place of residence and their relationships to health, as exemplified by a growing body of literature on urban health, inner city health, circumpolar health, frontier health and border health (e.g. health issues in areas along the United States–Mexico border). Our understanding of rural health would be further enhanced if we become more aware of the research on the impact on health of neighbourhoods, inner city cores, suburbs, frontiers, isolated locations and other places.

### Where do we go from here?

While this and its companion study<sup>1</sup> have covered a lot of ground, there are still many unknowns about the health of rural Canadians and how they utilize health services. The following are some suggestions for additional work that needs to be done to further our understanding of rural health, particularly health services utilization.

- “Rural” is not a homogeneous entity. In terms of access to and use of health services, Strong MIZ areas are more like cities, No MIZ areas are at the other extreme, with Moderate and Weak MIZ areas somewhere in between. Should special attention and support be given

to those living in No and Weak MIZ areas, since these residents may need help most and may not have as many alternatives? What kinds of support should be given and what additional evidence should be gathered to ascertain such needs and support?

- Differences in the way health services are delivered and used in rural and urban areas are not necessarily undesirable but, rather, may reflect divergent conditions and needs. What works in big cities may not work in remote communities; what is needed in urban areas may not be needed in rural ones. More research is needed to find out whether the service delivery approaches used in rural areas are appropriate in light of their health and social conditions. It might also be interesting to find out whether approaches adopted by rural communities may actually serve as a model for urban areas of the country.
- Regional variations in the delivery of health services are acceptable, but substantial and persistent discrepancies in population health status are not. Many rural health studies, including *How Healthy Are Rural Canadians?*,<sup>1</sup> have documented poorer health status among rural Canadians. Substantial and persistent regional variations in population health status should be seen as signs that something may be problematic or that health care provision strategies are less than adequate. This calls for monitoring of rural health conditions over longer periods of time and longitudinal tracking of rural population health status.
- This study has focused mostly on insured health services since data on such services are more readily available. It is possible that differences between rural and urban Canadians with respect to access to and use of non-insured services like dental care, vision care and rehabilitation therapy are even greater because such services often require out-of-pocket payments, and some of these services are even less available in rural communities. Future



research on rural health issues should not be restricted just to those services covered under national Medicare. Better and more systematic data collection for services other than physician and hospital services is urgently needed.

- Also as a result of the lack of data, this study has not paid much attention to such services as health promotion, disease prevention, early intervention and accident/injury/suicide deterrence. From a population health standpoint, these are just as important as curative care. While curative and remedial services are required, equally important are efforts to address adverse determinants that have a negative impact on the health of the population. But even less is known about non-curative care in rural areas, and the need to explore these issues is clearly a priority.
- Variations in access to and utilization of health services may be a function of many things, not just the unavailability of services or resources in local areas. For instance, lack of means of transportation could deter some rural residents from seeking care that is available only in distant urban centres. Thus, solutions to the problem of lack of access do not reside exclusively in the health care domain and improving transportation services could be just as important. As such, research on rural health issues should pay attention to factors that are not usually considered a health concern, but are nonetheless relevant to how rural Canadians access and use health care.
- The nature of the data and the methods used in this study does not allow the disentangling of the complex relationships between health care resources, health services delivery models and disease burden in order to determine their relative contributions to the patterns and extent of utilization. In addition, this study cannot estimate the extent

to which health services utilization is a determinant of health status among rural Canadians. While it is safe to say that health services are important to the improvement of rural health status, particularly in light of the generally heavier disease burden in rural Canada, the more difficult question is: “To what extent?” These are important issues for rural health research and planning, and they require further investigation.

- Perfect equality with respect to the distribution of health care resources and access to care is probably unachievable, but we do not know what level of inequality is acceptable. This is as much a policy issue as a philosophical or ethical question. Society may have to seek a balance between convenience of access on the one hand and economic viability, practicality and quality of care on the other. Rural Canadians should be given a voice in this important discussion. In addition, there is a role for those interested in health ethics to be involved in this debate and to conduct research on ethical issues in rural health.
- As noted earlier, “rural” is just one aspect of “place.” There is a growing interest in how different aspects of “place” influence health status and behaviours. Ultimately, we would like to know whether there are underlying principles or common theoretical frameworks that can guide research on rural health, inner city health, remote health, circumpolar health and so forth, and that can inform our understanding of the relationships between “place” and health. To this end, rural health researchers need to work with health researchers who are interested in other aspects of “place” with a view to achieving research synergy and theoretical breakthrough.

To enhance equity in health for Canadians living in different parts of the country, we

need to better understand variations in health status and variations in utilization patterns of health services. To this end, this report has focused on the latter, while its companion report, *How Healthy Are Rural Canadians?*,<sup>1</sup> sought to address the former subject. This study has examined in considerable detail how rural Canadians access and use a broad array of health services. It has used multiple sources of data and data of different types (survey and administrative data), and the analyses were conducted at the national and the provincial level. It has examined health services utilization patterns on a broad scale and in relation to selected disease categories. Moving beyond a simple rural-urban dichotomy, it has disaggregated rural into finer categories, with a view to understanding intra-rural variations in health care consumption. It is hoped that by shedding new light on utilization behaviours and answering previously unanswered questions, this study will lead to better provision of health care for rural Canadians and a better understanding of the role of place in health.

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## Appendix 1. Glossary

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CA	Census Agglomeration
CCHS	Canadian Community Health Survey
CCI	Canadian Classification of Health Interventions
CCP	Canadian Classification of Diagnostic, Therapeutic and Surgical Procedures
CIHI	Canadian Institute for Health Information
CMA	Census Metropolitan Area
CSD	Census Subdivision
FP	Family physician
ICD-9	International Statistical Classification of Diseases and Related Health Problems, 9th Revision
ICD-10-CA	International Classification of Diseases, 10th Edition – Canadian Enhancement
HMDB	Hospital Mortality Database
HSAS	Health Services Access Survey
MIZ	Metropolitan Influenced Zone
RST	Rural and Small Town

## Appendix 2. Provincial patterns by disease: detailed tables

**TABLE A1**  
Relative risks of age-standardized physician visits for circulatory system diseases, by place of residence and sex, Ontario and Nova Scotia, 2001–2002, and British Columbia, 2000–2001

	Men				Women			
	Strong MIZ	Moderate MIZ	Weak MIZ	No MIZ	Strong MIZ	Moderate MIZ	Weak MIZ	No MIZ
<b>Circulatory Disease System (390-459)<sup>a</sup></b>								
Ontario	0.92 (0.92–0.92)*	0.92 (0.92–0.92)*	0.84 (0.84–0.85)*	0.99 (0.97–1.00)	1.01 (1.01–1.01)*	0.97 (0.96–0.97)*	0.93 (0.92–0.93)*	0.83 (0.81–0.85)*
Nova Scotia	1.19 (1.17–1.21)*	0.97 (0.96–0.98)*	0.99 (0.98–1.00)*	0.89 (0.85–0.93)*	1.33 (1.31–1.35)*	1.04 (1.03–1.05)*	1.06 (1.05–1.07)*	0.87 (0.83–0.91)*
<b>Coronary Heart Disease (410-414)<sup>a</sup></b>								
British Columbia	0.68 (0.65–0.71)*	0.83 (0.81–0.85)*	0.60 (0.59–0.62)*	0.88 (0.82–0.93)*	0.88 (0.83–0.92)*	0.84 (0.82–0.87)*	0.67 (0.65–0.70)*	0.98 (0.91–1.06)
Nova Scotia	1.15 (1.09–1.20)*	1.02 (0.99–1.04)	1.01 (0.99–1.03)	1.06 (0.94–1.19)	1.46 (1.36–1.56)*	1.13 (1.09–1.18)*	1.02 (0.99–1.05)	0.78 (0.64–0.95)*
<b>Stroke (430-434)<sup>a</sup></b>								
British Columbia	0.74 (0.61–0.89)*	0.80 (0.72–0.89)*	0.60 (0.53–0.67)*	1.34 (1.08–1.66)*	0.96 (0.80–1.15)	0.78 (0.69–0.88)*	0.58 (0.51–0.66)*	1.75 (1.42–2.17)*
Nova Scotia	0.88 (0.57–1.38)	1.20 (0.98–1.46)	1.07 (0.92–1.25)	0.51 (0.14–1.94)	1.78 (1.17–2.70)*	1.68 (1.35–2.09)*	1.43 (1.20–1.71)*	1.17 (0.40–3.39)

Data sources: Nova Scotia Physician Claims Files, 2001–2002; Ontario Physician Claims Files, 2001–2002; British Columbia Medical Services Plan, 2000–2001.

Abbreviations: CA, Census Agglomeration; CMA, Census Metropolitan Area; ICD-9, International Statistical Classification of Diseases and Related Health Problems, 9th Revision; MIZ, Metropolitan Influenced Area.

<sup>a</sup> ICD-9 diagnostic codes.

\* Statistically significant at  $p < .05$ ; reference group is CMA/CA = 1.00.

**TABLE A2**  
Relative risks of age-standardized discharges from hospitals for circulatory system diseases, by place of residence and sex, Ontario, Nova Scotia and British Columbia, 2001–2002

Province	Sex	Strong MIZ	Moderate MIZ	Weak MIZ	No MIZ
Ontario	Men	1.15 (1.10–1.20)*	1.28 (1.25–1.32)*	1.58 (1.54–1.61)*	2.10 (1.95–2.25)*
	Women	1.27 (1.23–1.31)*	1.48 (1.43–1.53)*	1.91 (1.83–2.00)*	2.10 (1.90–2.31)*
Nova Scotia	Men	1.88 (1.71–2.06)*	1.33 (1.24–1.42)*	1.19 (1.13–1.26)*	3.38 (2.83–4.02)*
	Women	2.38 (2.12–2.68)*	1.88 (1.73–2.03)*	1.46 (1.36–1.56)*	5.79 (4.86–6.90)*
British Columbia	Men	1.01 (0.92–1.10)	1.02 (0.96–1.07)	1.29 (1.24–1.35)*	1.82 (1.64–2.02)*
	Women	1.39 (1.25–1.54)*	1.29 (1.21–1.38)*	1.70 (1.61–1.79)*	2.37 (2.08–2.69)*

Data source: Hospital Morbidity Database, 2001–2002, Canadian Institute for Health Information.

Abbreviations: CA, Census Agglomeration; CMA, Census Metropolitan Area; MIZ, Metropolitan Influenced Area.

\* Statistically significant at  $p < .05$ ; reference group is CMA/CA = 1.00.

**TABLE A3**  
**Relative risks of age-standardized physician visits for cancers (neoplasms), by place of residence and sex,**  
**Ontario and Nova Scotia, 2001–2002, and British Columbia, 2000–2001**

	Men				Women			
	Strong MIZ	Moderate MIZ	Weak MIZ	No MIZ	Strong MIZ	Moderate MIZ	Weak MIZ	No MIZ
<b>Cancers/neoplasms (140-239)<sup>a</sup></b>								
Ontario	0.95 (0.94–0.96)*	0.99 (0.98–1.00)*	0.91 (0.90–0.92)*	0.98 (0.94–1.02)	0.92 (0.92–0.93)*	0.85 (0.84–0.86)*	0.90 (0.88–0.91)*	1.12 (1.08–1.16)*
Nova Scotia	1.09 (1.05–1.14)*	0.94 (0.92–0.97)*	0.83 (0.82–0.85)*	1.01 (0.91–1.11)	0.97 (0.93–1.02)	0.97 (0.95–1.00)*	0.79 (0.78–0.81)*	0.76 (0.68–0.85)*
<b>Breast Cancer (174)<sup>a</sup></b>								
British Columbia	N/A	N/A	N/A	N/A	0.87 (0.79–0.95)*	1.24 (1.19–1.31)*	1.29 (1.24–1.35)*	2.23 (2.03–2.44)*
Nova Scotia	N/A	N/A	N/A	N/A	0.81 (0.72–0.92)*	0.87 (0.82–0.92)*	0.82 (0.78–0.85)*	0.55 (0.40–0.75)*
<b>Lung Cancer (162)<sup>a</sup></b>								
British Columbia	0.91 (0.78–1.07)	1.28 (1.18–1.39)*	1.23 (1.14–1.33)*	1.67 (1.39–2.01)*	0.89 (0.74–1.07)	1.45 (1.33–1.58)*	1.01 (0.92–1.11)	2.81 (2.39–3.31)*
Nova Scotia	1.16 (0.97–1.40)	0.97 (0.88–1.08)	1.23 (1.15–1.32)*	2.34 (1.75–3.14)*	0.84 (0.65–1.09)	0.95 (0.85–1.08)	0.95 (0.87–1.04)	0.36 (0.16–0.82)*

Data sources: Nova Scotia Physician Claims Files, 2001–2002; Ontario Physician Claims Files, 2001–2002; British Columbia Medical Services Plan, 2000–2001.

Abbreviations: CA, Census Agglomeration; CMA, Census Metropolitan Area; ICD-9, International Statistical Classification of Diseases and Related Health Problems, 9th Revision; MIZ, Metropolitan Influenced Area.

<sup>a</sup> ICD-9 diagnostic codes.

\* Statistically significant at  $p < .05$ ; reference group is CMA/CA = 1.00.

**TABLE A4**  
**Relative risks of age-standardized discharges from hospitals for cancers (neoplasms),**  
**by place of residence and sex, Ontario, Nova Scotia and British Columbia, 2001–2002**

Province	Sex	Strong MIZ	Moderate MIZ	Weak MIZ	No MIZ
Ontario	Men	1.00 (0.93–1.07)	1.15 (1.09–1.20)*	1.39 (1.35–1.45)*	1.62 (1.43–1.85)*
	Women	1.06 (1.02–1.10)*	1.19 (1.14–1.24)*	1.17 (1.10–1.24)*	1.34 (1.16–1.54)*
Nova Scotia	Men	1.72 (1.47–2.02)*	1.30 (1.16–1.45)*	1.12 (1.03–1.22)*	4.49 (3.51–5.73)*
	Women	1.69 (1.44–1.98)*	1.44 (1.30–1.59)*	1.24 (1.15–1.35)*	2.85 (2.14–3.80)*
British Columbia	Men	0.91 (0.78–1.06)	1.01 (0.93–1.11)	1.31 (1.21–1.41)*	2.40 (2.06–2.79)*
	Women	0.87 (0.75–1.00)	0.88 (0.81–0.96)*	1.11 (1.04–1.20)*	1.53 (1.28–1.83)*

Data source: Hospital Morbidity Database, 2001–2002, Canadian Institute for Health Information.

Abbreviations: CA, Census Agglomeration; CMA, Census Metropolitan Area; MIZ, Metropolitan Influenced Area.

\* Statistically significant at  $p < .05$ ; reference group is CMA/CA = 1.00.

**TABLE A5**  
**Relative risks of age-standardized physician visits for respiratory system diseases, by place of residence and sex, Ontario and Nova Scotia, 2001–2002, and British Columbia, 2000–2001**

	Men				Women			
	Strong MIZ	Moderate MIZ	Weak MIZ	No MIZ	Strong MIZ	Moderate MIZ	Weak MIZ	No MIZ
<b>Respiratory System Disease (460-519)<sup>a</sup></b>								
Ontario	0.71 (0.70–0.71)*	0.68 (0.67–0.68)*	0.65 (0.65–0.66)*	0.58 (0.57–0.59)*	0.79 (0.79–0.79)*	0.74 (0.74–0.75)*	0.71 (0.71–0.72)*	0.59 (0.58–0.60)*
Nova Scotia	1.15 (1.13–1.17)*	1.01 (1.01–1.02)*	0.94 (0.94–0.95)*	0.96 (0.92–1.00)*	1.17 (1.16–1.18)*	1.05 (1.04–1.05)*	0.96 (0.95–0.96)*	0.97 (0.94–1.00)*
<b>Asthma (493)<sup>a</sup></b>								
British Columbia	0.63 (0.60–0.66)*	0.82 (0.80–0.84)*	0.64 (0.62–0.65)*	0.75 (0.70–0.81)*	0.70 (0.67–0.73)*	0.94 (0.92–0.96)*	0.69 (0.67–0.71)*	0.97 (0.91–1.03)
Ontario	0.70 (0.69–0.71)*	0.74 (0.73–0.75)*	0.79 (0.78–0.81)*	0.69 (0.34–0.74)*	0.82 (0.81–0.83)*	0.84 (0.83–0.85)*	0.88 (0.86–0.90)*	0.56 (0.51–0.60)*
Nova Scotia	1.05 (0.99–1.12)	0.83 (0.81–0.86)*	0.82 (0.80–0.84)*	0.78 (0.66–0.92)*	1.13 (1.07–1.19)*	0.83 (0.81–0.86)*	0.83 (0.81–0.85)*	0.76 (0.66–0.88)*
<b>Chronic Obstructive Pulmonary Disease (490-492, 496)<sup>a</sup></b>								
British Columbia	0.77 (0.74–0.81)*	0.87 (0.84–0.89)*	0.90 (0.88–0.93)*	1.21 (1.14–1.28)*	0.78 (0.75–0.82)*	0.93 (0.90–0.95)*	0.96 (0.93–0.98)*	1.33 (1.23–1.41)*
Nova Scotia	1.58 (1.50–1.66)*	1.34 (1.30–1.37)*	1.01 (0.98–1.03)	1.22 (1.08–1.39)*	1.19 (1.12–1.26)*	1.34 (1.31–1.38)*	1.03 (1.01–1.06)*	1.35 (1.21–1.50)*

Data sources: Nova Scotia Physician Claims Files, 2001–2002; Ontario Physician Claims Files, 2001–2002; British Columbia Medical Services Plan, 2000–2001.

Abbreviations: CA, Census Agglomeration; CMA, Census Metropolitan Area; ICD-9, International Statistical Classification of Diseases and Related Health Problems, 9th Revision; MIZ, Metropolitan Influenced Area.

<sup>a</sup> ICD-9 diagnostic codes.

\* Statistically significant at  $p < .05$ ; reference group is CMA/CA = 1.00.

**TABLE A6**  
**Relative risks of age-standardized discharges from hospitals for respiratory diseases, by place of residence and sex, Ontario, Nova Scotia and British Columbia, 2001–2002**

Province	Sex	Strong MIZ	Moderate MIZ	Weak MIZ	No MIZ
Ontario	Men	1.20 (1.13–1.28)*	1.45 (1.39–1.50)*	1.72 (1.67–1.77)*	2.32 (2.10–2.56)*
	Women	1.21 (1.16–1.26)*	1.49 (1.43–1.56)*	1.88 (1.78–1.99)*	2.97 (2.67–3.30)*
Nova Scotia	Men	1.27 (1.09–1.48)*	1.18 (1.08–1.30)*	1.31 (1.22–1.40)*	3.00 (2.35–3.82)*
	Women	0.93 (0.76–1.13)	1.08 (0.97–1.20)	1.23 (1.14–1.33)*	3.69 (2.91–4.68)*
British Columbia	Men	0.88 (0.78–1.00)*	0.96 (0.89–1.03)	1.71 (1.62–1.81)*	1.47 (1.26–1.72)*
	Women	0.87 (0.74–1.01)	1.02 (0.93–1.10)	1.99 (1.88–2.11)*	1.95 (1.65–2.30)*

Data source: Hospital Morbidity Database, 2001–2002, Canadian Institute for Health Information.

Abbreviations: CA, Census Agglomeration; CMA, Census Metropolitan Area; MIZ, Metropolitan Influenced Area.

\* Statistically significant at  $p < .05$ ; reference group is CMA/CA = 1.00.

**TABLE A7**  
**Relative risks of age-standardized physician visits for musculoskeletal system diseases, by place of residence and sex,**  
**Ontario and Nova Scotia, 2001–2002, and British Columbia, 2000–2001**

	Men				Women			
	Strong MIZ	Moderate MIZ	Weak MIZ	No MIZ	Strong MIZ	Moderate MIZ	Weak MIZ	No MIZ
<b>Musculoskeletal System Disease (710-739)<sup>a</sup></b>								
Ontario	0.92 (0.91–0.92)*	1.00 (0.99–1.00)	0.98 (0.97–0.99)*	0.95 (0.92–0.97)*	0.91 (0.90–0.91)	0.92 (0.91–0.92)*	0.89 (0.89–0.90)*	1.02 (1.00–1.04)
Nova Scotia	0.97 (0.95–0.99)*	0.99 (0.98–1.00)	0.89 (0.88–0.90)*	0.87 (0.83–0.92)*	1.05 (1.03–1.06)*	1.03 (1.02–1.03)*	0.88 (0.87–0.88)*	0.93 (0.90–0.96)*
<b>Rheumatoid Arthritis (714)<sup>a</sup></b>								
British Columbia	1.09 (0.99–1.19)	1.56 (1.49–1.64)*	0.93 (0.88–0.98)*	1.79 (1.60–2.00)*	1.06 (1.00–1.13)*	1.42 (1.38–1.46)*	1.16 (1.13–1.20)*	2.48 (2.33–2.63)*
Nova Scotia	1.38 (1.20–1.59)*	1.11 (1.03–1.21)*	0.89 (0.83–0.95)*	0.60 (0.37–0.97)*	1.10 (1.00–1.22)	1.08 (1.03–1.14)*	0.90 (0.87–0.94)*	1.00 (0.79–1.25)
<b>Osteoarthritis (715)<sup>a</sup></b>								
British Columbia	0.73 (0.69–0.78)*	1.06 (1.03–1.09)*	0.80 (0.78–0.83)*	1.20 (1.12–1.29)*	0.83 (0.79–0.86)*	1.09 (1.07–1.12)*	0.81 (0.79–0.83)*	1.31 (1.24–1.39)*
Nova Scotia	1.14 (1.05–1.23)*	0.96 (0.92–1.00)	0.84 (0.81–0.87)*	1.00 (0.83–1.22)	1.15 (1.07–1.23)*	1.02 (0.98–1.06)	0.94 (0.91–0.97)*	0.99 (0.85–1.16)
<b>Rheumatoid Arthritis and Osteoarthritis combined (714-715)<sup>a</sup></b>								
Ontario	1.07 (1.06–1.09)*	1.16 (1.15–1.18)*	1.05 (1.03–1.07)*	1.20 (1.14–1.27)*	0.95 (0.94–0.95)*	0.97 (0.96–0.99)*	0.94 (0.92–0.95)*	1.39 (1.33–1.44)*

Data sources: Nova Scotia Physician Claims Files, 2001–2002; Ontario Physician Claims Files, 2001–2002; British Columbia Medical Services Plan, 2000–2001.

Abbreviations: CA, Census Agglomeration; CMA, Census Metropolitan Area; ICD-9, International Statistical Classification of Diseases and Related Health Problems, 9th Revision; MIZ, Metropolitan Influenced Area.

<sup>a</sup> ICD-9 diagnostic codes.

\* Statistically significant at  $p < .05$ ; reference group is CMA/CA = 1.00.

**TABLE A8**  
**Relative risks of age-standardized discharges from hospitals for musculoskeletal system disease,**  
**by place of residence and sex, Ontario, Nova Scotia and British Columbia, 2001–2002**

Province	Sex	Strong MIZ	Moderate MIZ	Weak MIZ	No MIZ
Ontario	Men	1.31 (1.20–1.42)*	1.40 (1.33–1.48)*	1.76 (1.69–1.84)*	1.69 (1.42–2.00)*
	Women	1.16 (1.10–1.22)*	1.40 (1.33–1.48)*	1.66 (1.55–1.78)*	1.93 (1.65–2.26)*
Nova Scotia	Men	1.32 (1.05–1.66)*	1.16 (1.00–1.34)*	0.98 (0.87–1.10)	3.95 (2.83–5.52)*
	Women	1.45 (1.14–1.83)*	1.19 (1.03–1.39)*	1.06 (0.94–1.20)	5.35 (3.99–7.18)*
British Columbia	Men	1.10 (0.93–1.30)	1.35 (1.24–1.49)*	1.54 (1.42–1.67)*	1.71 (1.38–2.10)*
	Women	1.13 (0.96–1.34)	1.20 (1.09–1.32)*	1.81 (1.68–1.96)*	2.46 (2.04–2.97)*

Data source: Hospital Morbidity Database, 2001–2002, Canadian Institute for Health Information.

Abbreviations: CA, Census Agglomeration; CMA, Census Metropolitan Area; MIZ, Metropolitan Influenced Area.

\* Statistically significant at  $p < .05$ ; reference group is CMA/CA = 1.00.



**TABLE A9**  
Relative risks of age-standardized physician visits for injuries and poisonings,  
by place of residence and sex, Ontario and Nova Scotia, 2001–2002

	Men				Women			
	Strong MIZ	Moderate MIZ	Weak MIZ	No MIZ	Strong MIZ	Moderate MIZ	Weak MIZ	No MIZ
<b>Injuries and Poisonings (802-894, 977-998 and 959)<sup>a</sup></b>								
Ontario	0.98 (0.98–0.99)*	1.10 (1.09–1.10)*	1.15 (1.14–1.16)*	1.17 (1.15–1.20)*	0.94 (0.94–0.95)*	1.01 (1.00–1.02)*	1.06 (1.05–1.07)*	1.23 (1.20–1.26)*
Nova Scotia	1.19 (1.16–1.23)*	1.18 (1.16–1.19)*	1.08 (1.06–1.09)*	1.21 (1.14–1.28)*	1.22 (1.19–1.25)*	1.11 (1.09–1.12)*	0.98 (0.97–0.99)*	0.96 (0.90–1.03)

Data sources: Nova Scotia Physician Claims Files, 2001–2002; Ontario Physician Claims Files, 2001–2002.

Abbreviations: CA, Census Agglomeration; CMA, Census Metropolitan Area; ICD-9, International Statistical Classification of Diseases and Related Health Problems, 9th Revision; MIZ, Metropolitan Influenced Area.

<sup>a</sup> ICD-9 diagnostic codes.

\* Statistically significant at  $p < .05$ ; reference group is CMA/CA = 1.00.

**TABLE A10**  
Relative risks of age-standardized discharges from hospitals for injuries and poisonings,  
by place of residence and sex, Ontario, Nova Scotia and British Columbia, 2001–2002

Province	Sex	Strong MIZ	Moderate MIZ	Weak MIZ	No MIZ
Ontario	Men	1.31 (1.24–1.39)*	1.52 (1.46–1.58)*	1.94 (1.88–2.00)*	2.46 (2.22–2.73)*
	Women	1.25 (1.20–1.30)*	1.48 (1.41–1.54)*	1.90 (1.80–2.00)*	3.19 (2.88–3.53)*
Nova Scotia	Men	1.15 (0.96–1.39)	1.30 (1.17–1.44)*	1.09 (1.00–1.19)*	2.06 (1.46–2.91)*
	Women	1.32 (1.08–1.62)*	1.29 (1.14–1.45)*	0.97 (0.88–1.08)	2.01 (1.36–2.98)*
British Columbia	Men	0.96 (0.86–1.07)	1.34 (1.27–1.42)*	1.96 (1.88–2.06)*	1.90 (1.68–2.15)*
	Women	1.01 (0.89–1.14)	1.21 (1.13–1.30)*	1.93 (1.83–2.04)*	2.23 (1.94–2.56)*

Data source: Hospital Morbidity Database, 2001–2002, Canadian Institute for Health Information.

\* Statistically significant at  $p < .05$ ; reference group is CMA/CA = 1.00.

Abbreviations: CA, Census Agglomeration; CMA, Census Metropolitan Area; MIZ, Metropolitan Influenced Area.

**Table A11**  
Relative risks of age-standardized physician visits for mental disorders, by place of residence and sex,  
Ontario and Nova Scotia, 2001–2002, and British Columbia, 2000–2001

	Men				Women			
	Strong MIZ	Moderate MIZ	Weak MIZ	No MIZ	Strong MIZ	Moderate MIZ	Weak MIZ	No MIZ
<b>Mental Disorders (290-319)<sup>a</sup></b>								
Ontario	0.64 (0.63–0.64)*	0.65 (0.65–0.66)*	0.60 (0.59–0.60)*	0.54 (0.53–0.56)*	0.74 (0.74–0.74)*	0.70 (0.70–0.71)*	0.69 (0.69–0.70)*	0.50 (0.49–0.51)*
Nova Scotia	0.75 (0.73–0.78)*	0.84 (0.83–0.85)*	0.70 (0.69–0.71)*	0.88 (0.82–0.94)*	0.94 (0.92–0.95)*	0.89 (0.88–0.90)*	0.73 (0.72–0.74)*	0.80 (0.76–0.84)*
<b>Depression (296.2, 296.3, 300.4, 311)<sup>a</sup></b>								
British Columbia	0.49 (0.48–0.51)*	0.78 (0.77–0.79)*	0.50 (0.49–0.51)*	0.54 (0.51–0.56)*	0.59 (0.58–0.60)*	0.84 (0.83–0.85)*	0.59 (0.58–0.59)*	0.64 (0.62–0.66)*
Nova Scotia	0.80 (0.75–0.86)*	0.72 (0.70–0.75)*	0.69 (0.67–0.71)*	0.69 (0.59–0.82)*	0.96 (0.92–1.00)	0.74 (0.73–0.76)*	0.71 (0.70–0.72)*	0.75 (0.68–0.82)*

Data sources: Nova Scotia Physician Claims Files, 2001–2002; Ontario Physician Claims Files, 2001–2002; British Columbia Medical Services Plan, 2000–2001.

Abbreviations: CA, Census Agglomeration; CMA, Census Metropolitan Area; ICD-9, International Statistical Classification of Diseases and Related Health Problems, 9th Revision; MIZ, Metropolitan Influenced Area.

<sup>a</sup> ICD-9 diagnostic codes.

\* Statistically significant at  $p < .05$ ; reference group is CMA/CA = 1.00.

**TABLE A12**  
**Relative risks of age-standardized discharges from hospitals for mental disorders,**  
**by place of residence and sex, Ontario, Nova Scotia and British Columbia, 2001–2002**

Province	Sex	Strong MIZ	Moderate MIZ	Weak MIZ	No MIZ
Ontario	Men	0.82 (0.75–0.90)*	1.54 (1.46–1.61)*	1.99 (1.92–2.07)*	2.79 (2.47–3.15)*
	Women	0.82 (0.78–0.87)*	1.54 (1.46–1.61)*	1.99 (1.88–2.12)*	2.79 (2.46–3.16)*
Nova Scotia	Men	0.84 (0.65–1.11)	0.81 (0.68–0.96)*	1.37 (1.23–1.53)*	3.69 (2.58–5.29)*
	Women	0.83 (0.62–1.11)	0.83 (0.70–0.98)*	1.24 (1.11–1.38)*	7.56 (5.97–9.58)*
British Columbia	Men	0.62 (0.52–0.73)*	1.21 (1.12–1.30)*	1.52 (1.42–1.62)*	1.65 (1.40–1.94)*
	Women	0.63 (0.53–0.74)*	0.98 (0.91–1.07)	1.69 (1.60–1.80)*	1.76 (1.49–2.08)*

Data source: Hospital Morbidity Database, 2001–2002, Canadian Institute for Health Information.

Abbreviations: CA, Census Agglomeration; CMA, Census Metropolitan Area; MIZ, Metropolitan Influenced Area.

\* Statistically significant at  $p < .05$ ; reference group is CMA/CA = 1.00.

**TABLE A13**  
**Relative risks of age-standardized physician visits for nervous system diseases, by place of residence and sex,**  
**Ontario and Nova Scotia, 2001–2002, and British Columbia, 2000–2001**

	Men				Women			
	Strong MIZ	Moderate MIZ	Weak MIZ	No MIZ	Strong MIZ	Moderate MIZ	Weak MIZ	No MIZ
<b>Nervous System Disease (320-389)<sup>a</sup></b>								
Ontario	0.83 (0.82–0.83)*	0.83 (0.82–0.83)*	0.78 (0.78–0.79)*	0.78 (0.76–0.80)*	0.87 (0.86–0.87)*	0.84 (0.84–0.85)*	0.84 (0.83–0.84)*	0.87 (0.85–0.89)*
Nova Scotia	0.97 (0.95–0.99)*	1.01 (1.00–1.03)*	0.97 (0.96–0.97)*	0.85 (0.80–0.89)*	0.99 (0.97–1.01)	1.06 (1.05–1.06)*	0.97 (0.97–0.98)*	0.92 (0.88–0.95)*
<b>Alzheimer's/dementia disorders (331)<sup>a</sup></b>								
British Columbia	0.47 (0.34–0.64)*	1.43 (1.27–1.60)*	0.77 (0.94–0.88)*	0.73 (0.50–1.08)	1.18 (1.02–1.37)*	1.73 (1.61–1.87)*	0.82 (0.74–0.91)*	0.62 (0.45–0.86)*
Nova Scotia	0.83 (0.54–1.29)	1.09 (0.90–1.33)	0.74 (0.62–0.88)*	2.11 (1.13–3.95)*	1.08 (0.73–1.58)	1.22 (1.02–1.46)*	0.84 (0.72–0.98)*	1.66 (0.86–3.18)

Data sources: Nova Scotia Physician Claims Files, 2001–2002; Ontario Physician Claims Files, 2001–2002; British Columbia Medical Services Plan, 2000–2001.

Abbreviations: CA, Census Agglomeration; CMA, Census Metropolitan Area; ICD-9, International Statistical Classification of Diseases and Related Health Problems, 9th Revision; MIZ, Metropolitan Influenced Area.

<sup>a</sup> ICD-9 diagnostic codes.

\* Statistically significant at  $p < .05$ ; reference group is CMA/CA = 1.00.

**TABLE A14**  
Relative risks of age-standardized discharges from hospitals for nervous system diseases,  
by place of residence and sex, Ontario, Nova Scotia and British Columbia, 2001–2002

Province	Sex	Strong MIZ	Moderate MIZ	Weak MIZ	No MIZ
Ontario	Men	1.03 (0.89–1.19)	1.44 (1.32–1.57)*	1.72 (1.61–1.84)*	2.00 (1.56–2.56)*
	Women	1.16 (1.06–1.26)*	1.63 (1.49–1.77)*	2.07 (1.86–2.31)*	1.68 (1.25–2.25)*
Nova Scotia	Men	1.61 (1.23–2.11)*	1.21 (1.01–1.46)*	1.07 (0.92–1.24)	7.40 (5.38–10.2)*
	Women	1.48 (1.09–2.00)*	1.23 (1.02–1.49)*	1.18 (1.02–1.37)*	4.61 (3.05–6.97)*
British Columbia	Men	0.78 (0.61–0.99)*	1.03 (0.91–1.17)	1.49 (1.34–1.65)*	1.54 (1.17–2.02)*
	Women	0.85 (0.66–1.11)	1.01 (0.87–1.16)	1.66 (1.49–1.85)*	2.80 (2.21–3.56)*

Data source: Hospital Morbidity Database, 2001–2002, Canadian Institute for Health Information.

Abbreviations: CA, Census Agglomeration; CMA, Census Metropolitan Area; MIZ, Metropolitan Influenced Area.

\* Statistically significant at  $p < .05$ ; reference group is CMA/CA = 1.00.

**TABLE A15**  
Relative risks of age-standardized physician visits for diabetes, by place of residence and sex,  
Ontario and Nova Scotia, 2001–2002, and British Columbia, 2000–2001

	Men				Women			
	Strong MIZ	Moderate MIZ	Weak MIZ	No MIZ	Strong MIZ	Moderate MIZ	Weak MIZ	No MIZ
<b>Diabetes (250)<sup>a</sup></b>								
British Columbia	0.63 (0.60–0.65)*	0.74 (0.73–0.76)*	0.72 (0.70–0.73)*	1.18 (1.14–1.22)*	0.73 (0.71–0.76)*	0.76 (0.75–0.78)*	0.84 (0.82–0.85)*	1.35 (1.30–1.41)*
Ontario	0.86 (0.86–0.87)*	0.86 (0.85–0.87)*	0.93 (0.92–0.94)*	1.57 (1.52–1.62)*	0.93 (0.92–0.94)*	1.00 (0.99–1.01)	0.98 (0.97–1.00)*	2.11 (2.05–2.17)*
Nova Scotia	1.31 (1.27–1.36)*	0.91 (0.89–0.93)*	0.89 (0.88–0.91)*	1.21 (1.11–1.32)*	1.35 (1.29–1.41)*	1.08 (1.05–1.11)*	1.01 (0.99–1.03)	1.66 (1.53–1.79)*

Data sources: Nova Scotia Physician Claims Files, 2001–2002; Ontario Physician Claims Files, 2001–2002; British Columbia Medical Services Plan, 2000–2001.

Abbreviations: CA, Census Agglomeration; CMA, Census Metropolitan Area; ICD-9, International Statistical Classification of Diseases and Related Health Problems, 9th Revision; MIZ, Metropolitan Influenced Area.

<sup>a</sup> ICD-9 diagnostic code.

\* Statistically significant at  $p < .05$ ; reference group is CMA/CA = 1.00.

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