

# Disability-free life expectancy by health region

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## Abstract

### Objectives

This article presents a profile of variations in disability-free life expectancy (DFLE) by health region.

### Data sources

Mortality data for 1995 through 1997 are from the Canadian Vital Statistics Database. Estimates of disability (major activity limitations) and socio-demographic characteristics are based on data from the 1996 Census. Supplementary information was provided by the Demography and Geography divisions at Statistics Canada.

### Analytical techniques

DFLE was calculated using a modified version of Sullivan's method. Linear regression using 4 factors representing socio-demographic profiles was used to explain the variation of DFLE by health region. These 4 synthetic variables were determined using principal component analysis.

### Main results

In 1996, DFLE for both sexes was estimated to be 68.6 years. Estimates by health region varied considerably. Socio-economic status explains a high proportion of the variation of DFLE by health region.

## Key words

health expectancy, activity limitations, Sullivan's method, geographic comparisons

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Life expectancy is a frequently used indicator of the health of a population. However, because it is based exclusively on mortality and population data, life expectancy measures length of life without considering health-related quality of life. As life expectancy increased throughout the 20th century, chronic illnesses and functional limitations became more common. Thus, although it remains useful, life expectancy is not an entirely satisfactory indicator of overall population health.

Public health officials have long recognized that a more useful measure would expand the concept of life expectancy to include an individual's ability to function in society.<sup>1,2</sup> Disability-free life expectancy (DFLE) is one such measure. It can be used to distinguish between years free of any disability and years lived with at least one disability. DFLE represents an important conceptual expansion of the conventional life expectancy indicator.

This article presents a profile of variations in disability-free life expectancy in Canada's health regions (see *Methods* and *Limitations*). For this analysis, disability is defined as



## Methods

### Data sources

Mortality data for 1995 to 1997 are from the Canadian Vital Statistics Database. Population estimates as of July 1, 1996, adjusted for net census undercoverage, are from Statistics Canada's Demography Division. The numbers of people living in private households and collective dwellings are from the 1996 Census of Population. Estimated data for major activity limitation and the demographic and socio-economic variables for multivariate analysis are from the 20% sample for the 1996 Census long form. Because this sample excludes people living in collective dwellings, the rates of major activity limitations for such individuals were based on two assumptions: (1) that all people living in health care institutions had at least one major activity limitation; and (2) that residents of other collective dwellings (for example, rooming houses, military camps, prisons and missions) had major activity limitation rates, by sex and age group, identical to those of people living in private households.

Estimates of population density and the number of frost-free days were provided by Statistics Canada's Geography Division.

### Analytical techniques

The estimates of disability-free life expectancy were calculated using a modified version of Sullivan's prevalence-based method (1971).<sup>3</sup> Abridged life tables by five-year age groups were calculated using Chiang's method (1984),<sup>4</sup> except for the open age interval (not covered by Chiang), for which the person-years of life lived (LL) were calculated as the product of the number of survivors at the beginning of the age interval (L) times the average remaining life expectancy at that age (LE), which was taken as the inverse of the death rate. Chiang's method includes a formula for calculating the variance in life expectancy estimates that takes into account stochastic fluctuations in the death rates observed.

Sullivan's method is based on point-prevalence rates of disability in a population at a given time, by sex and age group. In the health expectancy table, the number of years lived is calculated separately for each health status in order to calculate life expectancy in health care institutions and life expectancy outside such institutions but with major activity limitations.

The number of years lived in health care institutions and the number of years lived outside such institutions with major activity limitations, for males and females and for each age group, were obtained as follows:<sup>5,6</sup> The number of years lived regardless of health status (LL) was multiplied by the prevalence rates for major activity limitations; that is, the proportion of people in health care institutions (inst) and the proportion of people outside health care institutions who reported limitations in their major activities (lim). As previously mentioned, it was assumed that people living in collective dwellings other than health care institutions had the same major activity limitation rates, by sex and age group, as individuals in private households. Thus:  $LL_{inst} = LL \times inst$  and  $LL_{lim} = (LL - LL_{inst}) \times lim$ . Then, the accumulated total of years lived for each health status (TLL, TLL<sub>inst</sub> and TLL<sub>lim</sub>) from the highest to the lowest age group

was divided by the number of survivors at each age (L) to give the life expectancy at each age and for each health status: conventional life expectancy ( $LE = TLL \div L$ ), life expectancy in health care institutions ( $LE_{inst} = TLL_{inst} \div L$ ) and life expectancy outside health care institutions but with major activity limitations ( $LE_{lim} = TLL_{lim} \div L$ ).

Separate calculations were done for men and women. Then, L, LL, LL<sub>inst</sub>, LL<sub>lim</sub>, TLL, TLL<sub>inst</sub> and TLL<sub>lim</sub> for both sexes combined were calculated using the average of the corresponding values by sex, so that the actual distribution by sex and by age in the health regions has no effect on the results in the health expectancy table.

Disability-free life expectancy (DFLE) was obtained by subtracting the sum of life expectancy in health care institutions and life expectancy outside health care institutions but with major activity limitations from life expectancy:  $DFLE = LE - (LE_{inst} + LE_{lim})$ .

The variances relating to the estimates of DFLE were obtained using the formula proposed by Mathers (1991).<sup>7</sup> This method takes into consideration both the stochastic fluctuations in the death rates observed and the sampling variability of the disability rates. The lower and upper limits of the confidence intervals of those estimates were calculated on the assumption that the sampling distribution of DFLE is normal.

The estimates of DFLE in the health regions are presented by quartile (Map). The health regions of the first quartile comprise the 25% of regions where DFLE was lowest, while those in the fourth quartile make up the 25% of both regions where DFLE was highest. The health regions in the second and third quartiles were in intermediate positions.

A three-step approach was used to identify possible explanations behind differences in DFLE. First, 21 variables, largely demographic and socio-economic, were selected as factors potentially associated with the variations in DFLE in the 138 health regions. Through principal component analysis (a method to reduce the number of variables), the 21 original variables, some of which were strongly collinear, were grouped into 4 synthetic orthogonal variables by construction (principal components), thereby eliminating the problems associated with multicollinearity (Appendix Table A). These 4 synthetic variables—"remote," "prosperous," "cosmopolitan" and "disadvantaged"—are linear combinations of the 21 original variables and account for 73% of their total variance.

The "remote" component contains variables such as a high male/female ratio, a large proportion of Aboriginal residents and low educational attainment. The "prosperous" component is marked by high population growth, high personal incomes and low unemployment; "cosmopolitan," by high proportions of visible minority groups, high population densities and high proportions of recent immigrants. The "disadvantaged" component indicates high proportions of lone-parent families and low proportions of owner-occupied housing. Calculations were done using the SAS PROC factor. The third stage estimates a linear regression model of disability-free life expectancy, with the 4 synthetic variables as explanatory variables.



having a major activity limitation; that is, a limitation that affects activities at home, at work, or at school (see *Definitions*). The association between DFLE and selected socio-economic and demographic characteristics at the health region level is examined. Only two previous studies have examined explanatory factors for disability-free life expectancy at the regional level.<sup>8,9</sup> The findings in this analysis are based on estimates of DFLE for 1996 (Appendix Table B).

### DFLE inequalities considerable

Disability-free life expectancy (DFLE) for both sexes in Canada was estimated at 68.6 years in 1996 (Table 1, Chart). This figure masks the considerable variations in DFLE by health region: from 61 years in the Nunavik region of Québec to close to 73 years in the Richmond, British Columbia region—a gap of close to 12 years. A discrepancy of this magnitude suggests that improvements in health are possible in the health regions where estimates of DFLE are lowest.

Certain characteristics of the Nunavik and Richmond regions may partly explain the discrepancy between the two. Nunavik is an immense, sparsely populated territory situated in northern Québec. In 1996, Nunavik's population of less than 9,000 was mostly Aboriginal (88%). Mortality and morbidity rates are higher in the Aboriginal population than in the general Canadian population.<sup>10</sup> This is reflected in the lower DFLE scores of regions with large Aboriginal populations.

Only 35% of Nunavik's population aged 25 to 54 had a postsecondary degree, certificate or diploma, reflecting the relatively lower levels of education in this region. Moreover, 25% of Nunavik families were headed by lone parents, and less than 1% of the population were immigrants. Nunavik is also far from major urban centres, making access to health care services somewhat problematic for its residents.

By contrast, Richmond is located in the greater Vancouver area, an industrial, port, university and tourist region, where health care services are widely available. Richmond's population—over 1.5 million in 1996—is also highly educated. In 1996, 58% of

Table 1  
Life expectancy and disability-free life expectancy, both sexes, Canada, 1996

	Life expectancy		Disability-free life expectancy	
	Years	95% confidence interval	Years	95% confidence interval
Canada	78.3	78.3, 78.4	68.6	68.5, 68.6
Minimum <sup>†</sup>	65.4	63.0, 67.7	61.0	58.8, 63.2
Maximum <sup>‡</sup>	81.2	80.8, 81.7	72.8	72.3, 73.2
Range <sup>§</sup>	15.8	13.1, 18.7	11.8	9.1, 14.4

**Data sources:** 1996 Census of Population; 1995-1997 Canadian Vital Statistics Database; Demography Division population estimates; Reference 11

<sup>†</sup> Minimum value observed for a health region

<sup>‡</sup> Maximum value observed for a health region

<sup>§</sup> Difference between maximum and minimum values

inhabitants aged 25 to 54 were postsecondary graduates. In addition, close to half (48%) of Richmond's population were immigrants, many of whom (67%) arrived in Canada after 1980. And less than 1% of the population were of Aboriginal origin in 1996.

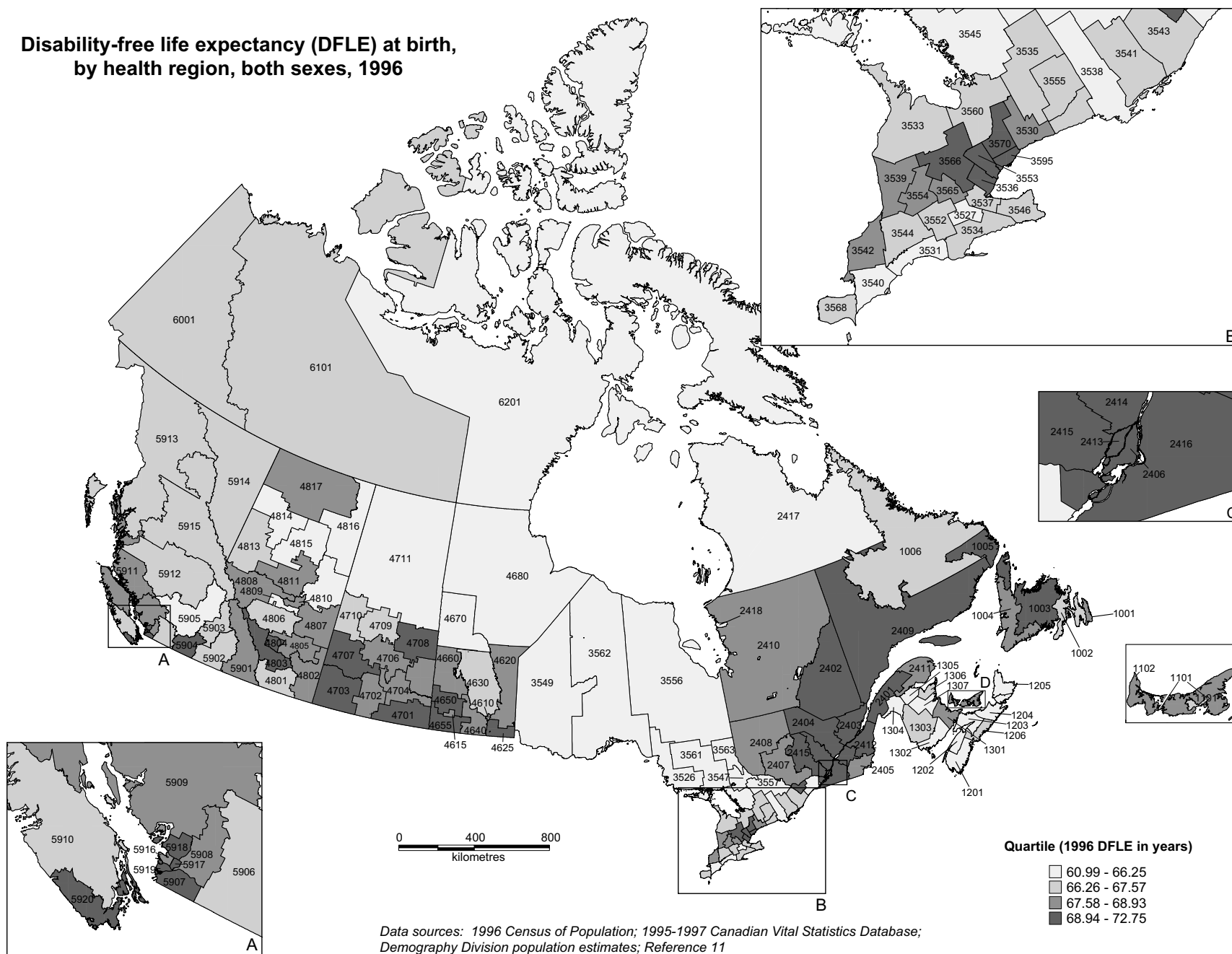
### DFLE higher in urban areas, lower in more remote areas

In 1996, the health regions in the lowest DFLE quartile were generally in northern or rural regions far from major urban centres (Map). In this 25% of health regions, DFLE ranged from 61.0 to 66.3 years. Conversely, the health regions in the top 25%, or the highest quartile, were generally in or adjacent to and highly integrated with urban areas. There, DFLE ranged from 68.9 to 72.8 years. Many of these regions are in southern Ontario and the West, where economies are among the most robust in the country. Few health regions in the highest quartile were in the Atlantic region, where economies are relatively fragile. With the exception of Québec, this regional pattern of DFLE is similar to that pertaining to life expectancy.<sup>12</sup>

In Québec, 11 of 18 health regions were in the highest DFLE quartile, with 15 of the 18 above the median. Rates of major activity limitation are much lower in Québec, compared with the other provinces. This lower disability rate has consistently been observed in the past and with different survey instruments.<sup>5</sup>



# Disability-free life expectancy (DFLE) at birth, by health region, both sexes, 1996





## Definitions

*Life expectancy* is the number of years a person would be expected to live, starting from birth, based on the mortality rates for a given period (1995 to 1997), established by five-year age groups.

*Disability-free life expectancy (DFLE)* differentiates between years of life free of any major activity limitations or residence in a health care institution (where many residents have major activity limitations) and years lived with at least one major activity limitation (see *Methods*). This concept establishes a threshold based on the nature of such limitations. Years of life lived in conditions equal to or above that threshold are counted in full, while those lived in lesser conditions are not counted.

*Major activity limitations* are those caused by a long-term physical or mental condition or a long-term health problem; that is, one that has lasted, or is expected to last, six months or more. Minor activity limitations or non-disabling impairments are excluded. A positive response to either of the following census questions was considered to indicate a major activity limitation: "Is this person limited in the kind or amount of activity that he/she can do because of a long-term physical condition, mental condition or health problem: at home? at school? or at work?"

In general, *health regions* correspond to the administrative areas established by provincial authorities for local health and social services delivery. Although there are actually 139 health regions (Map, Appendix Table A), for this analysis, the Burntwood and Churchill health regions in Manitoba were combined because of their small populations. Health regions are extremely diverse, particularly in terms of population size, demographic and socio-economic characteristics, and level of urbanization.

*Male/Female ratio* is the total number of males in a given health region in 1996 divided by the total number of females.

*Population < 15* is the proportion of a health region's population younger than 15.

*Aboriginal* represents the proportion of the health region's total population who identified themselves as belonging to an Aboriginal group: First Nations, Inuit or Métis on the 1996 Census.

*Strong metropolitan influenced zone (MIZ)* refers to the proportion of the population living in census metropolitan areas (CMAs), census agglomerations (CAs) and communities that fall outside CMAs/CAs in which at least 30% of the employed labour force commutes to the CMAs/CAs. The measure is used to describe the degree of urban influence in the health region. CMAs and CAs are large urban areas, together with adjacent urban and rural areas that have a high degree of economic and social integration with that urban area. CMAs and CAs have attained certain population thresholds: 100,000 for CMAs and 10,000 for CAs.

*Frost-free days* represent the average annual number of days with a temperature above 5 degrees Celsius.

*Housing inaffordability* indicates the proportion of households spending more than 30% of their income on shelter.

*Education 25-54* is the proportion of a health region's population aged 25 to 54 with a postsecondary degree, certificate or diploma.

*Population ≥ 65* is the proportion of the health region's population aged 65 or older.

*Internal migration* is the proportion of the health region's population aged 5 or older that lived in a different census subdivision (municipality) at the time of the previous census (1991). Canadians living in households outside Canada, such as military and government personnel, are excluded.

*Population change* represents any change in the health region's population between 1995 and 1997 (%).

*Population size* is the population of the health region as a proportion of the total Canadian population.

*Average income* includes average post-transfer, pre-tax personal income from all sources, for people aged 15 or older.

*Government transfers* includes payments from federal programs such as Guaranteed Income Supplement, Old Age Security, Canada/Québec Pension Plan, and Employment Insurance, expressed as a proportion of total income from all sources.

*Unemployment* was calculated by dividing the total number of unemployed individuals aged 15 or older by the total number of individuals aged 15 or older participating in the labour force.

*Visible minority* is the proportion of the health region's population belonging to a visible minority group.

*Population density* is the number of persons per square kilometre.

*Immigration* represents the proportion of individuals who came to Canada between 1981 and 1996.

*Housing value* is the average expected value of an owner-occupied, non-farm, non-reserve dwelling, including land, at the time of the 1996 Census.

*Lone-parents families* represents the proportion of lone-parent families, among all census families in the health region, living in private households.

*Income equality* was measured by calculating the total income for all households in the geographic area (health region), then calculating the proportion of this total household income for the less well-off 50% of households within that geographic area (that is, the "median share" of income). In a situation of complete inequality, the bottom half receives 0, and the top half 100%, of all income. With complete equality, the bottom half of the income distribution receives 50% of the total income and the geographic area then has a median share value of 0.50. In this range from 0 to 0.50, higher median shares indicate more equal income distributions.

*Owner-occupied dwelling* is the proportion of total private households in which the owner lives. Band housing and collective dwellings are excluded from both numerator and denominator.



## Long life, good health

A long life and good health generally go hand in hand.<sup>13,14</sup> Life expectancy above the average for Canada is generally accompanied by DFLE that is also higher than the national value, and the converse is also true. This applies to the majority of health regions (72).

Presenting estimated life expectancy and DFLE for each of the 138 health regions in quadrants shows the relationship between the two indicators (Chart, Appendix Table A). Each circle represents a health region, and the centre of the circle represents the intersection of life expectancy and DFLE for the health region. The size of the circle is proportional to the square root of the population size. Quadrant 1 contains those health regions where life expectancy and DFLE were both higher than the corresponding national values. Quadrant 3 represents the opposite situation: life expectancy and DFLE both below the national values. The

remaining Quadrants, 2 and 4, represent situations somewhere in the middle.

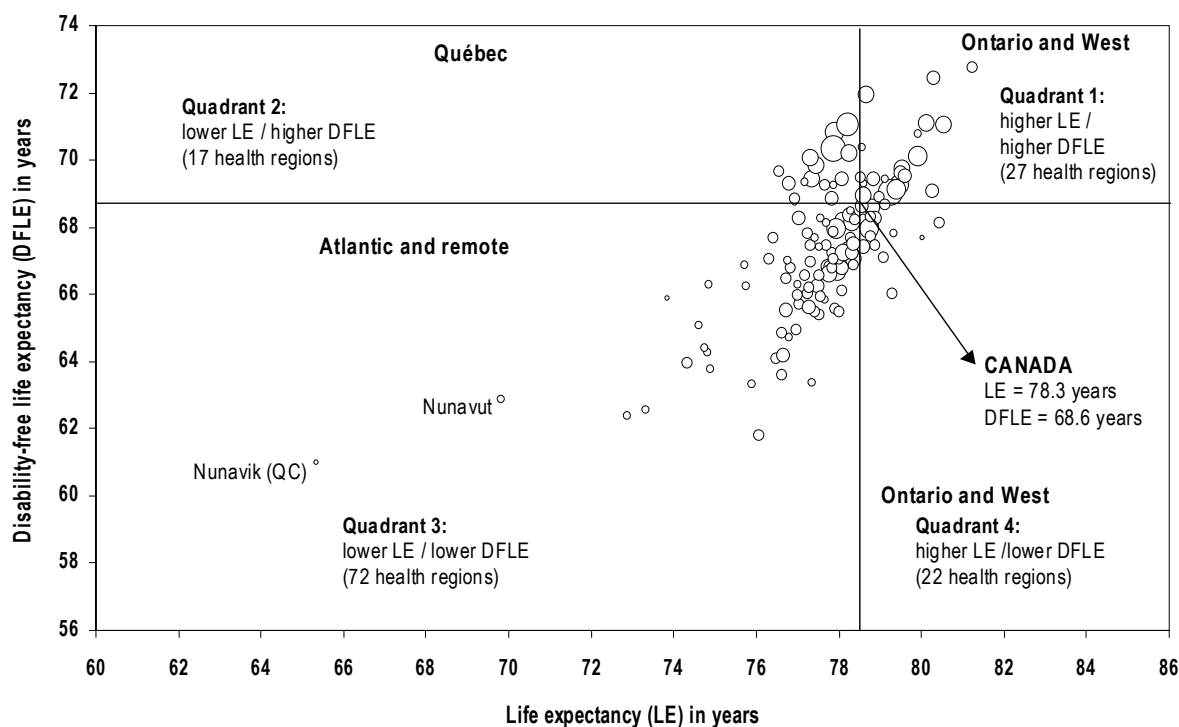
The highest DFLE values were most often found in major urban centres or the heavily populated suburbs close to them, and were less common in remote rural or northern regions.

## Life expectancy, DFLE higher for “main street” regions

Ontario and the western provinces contain most of the health regions in which life expectancy and DFLE were high, compared with the corresponding national values (Chart, Quadrant 1). And these regions are generally either in major urban centres, or areas that are highly integrated with major urban centres. This reflects their “main street” status; that is, their high socio-economic status, high levels of immigration, and accessible health care services. It also reflects the robust economies of these regions.

Chart

Life expectancy (LE) and disability-free life expectancy (DFLE) at birth, by health region, both sexes, Canada, 1996



Data sources: 1996 Census of Population; 1995-1997 Canadian Vital Statistics Database; Demography Division population estimates; Reference 11



However, in some health regions, life expectancy exceeded the national value, but DFLE was lower than the Canadian average (Quadrant 4). Almost all these regions are also in Ontario and the West, but they are located in, or on the periphery of, rural areas.

### Atlantic region—life expectancy and DFLE lower

The least desirable situation, in which life expectancy and DFLE are lower than the national values (Quadrant 3), was most common in rural and northern regions far from major urban centres. This was true for the majority of health regions in the Atlantic provinces.

Health regions where life expectancy was low when compared with the national value, but DFLE was higher (Quadrant 2) were mainly found in Québec. This finding is explained by the low rates of major activity limitation in that province.

### Magnitude of disparities important

The implications of the unequal distribution of life expectancy and DFLE by health region depend on the magnitude of those disparities. In some cases, life expectancy and DFLE differed sharply from national values. In Quadrant 1, both values surpassed the national level.

On the other hand, a number of health regions had life expectancy and DFLE well below corresponding national values (Quadrant 3). For example, Nunavik, which is part of this group, ranked last in terms of life expectancy (65.4 years) and DFLE (61.0 years): 12.9 and 7.6 years less than the corresponding national values.

### Associated factors

Variations in disability-free life expectancy were examined using a linear regression model (see *Methods*). Four synthetic variables, representing 21 demographic and socio-economic variables, serve as variables possibly associated with DFLE: remote, prosperous, cosmopolitan, and disadvantaged (Appendix Table B).

Lower DFLE was associated with lower scores on the remote and disadvantaged synthetic variables, while higher DFLE was associated with higher scores on the prosperous and cosmopolitan synthetic variables (Table 2). Census indicators associated with the cosmopolitan synthetic variable include high levels of immigration and visible minorities, as well as high population density. The four factors account for 46% of the regional variation in DFLE.

These findings at the health region level reflect some now familiar relationships between health and socio-demographic characteristics at the individual level.<sup>15</sup> Low socio-economic position in Canada is generally associated with poor health outcomes and higher mortality.<sup>16</sup> Furthermore, the “healthy immigrant effect” has been observed in the past, and can be explained by such things as the tendency of ill persons to not immigrate, the medical screening that potential immigrants must undergo, and the fact that immigrant selection is partly based on employability, which implies good health.<sup>17</sup>

Table 2  
Regression coefficients relating synthetic variables† to disability-free life expectancy, Canada, 1996

Synthetic variable†	Estimated regression coefficient
Remote	-0.72 (<0.01)
Prosperous	0.33 (0.02)
Cosmopolitan	0.87 (<0.01)
Disadvantaged	-0.84 (<0.01)
R <sup>2</sup>	0.46

**Data sources:** 1996 Census of Population; 1995-1997 Canadian Vital Statistics Database; Demography Division population estimates; Reference 11

**Notes:** The estimated value of a coefficient represents the change in DFLE for each increase of 1 standard deviation of that synthetic variable. The sign of the coefficient indicates the direction of the association between those two variables. The numbers in parentheses represent the lowest significance level at which the hypothesis of a zero coefficient can be rejected (p value). When the model was rerun without Nunavut and Nunavik, somewhat exceptional health regions, the explained variation was only marginally reduced and the factors maintained statistical significance. Burntwood and Churchill regions in Manitoba were combined because of small populations.

† Summarizing 21 demographic and socio-economic variables (see Appendix Table B)

df = 133; F-statistic = 27.89 (p < 0.01)



### Limitations

The 1996 Census questions on activity limitations were not designed to provide estimates of activity limitations. Rather, the questions were to be used to establish the sample for a post-censal survey on health and activity limitation. But since this survey was not conducted in 1996, the data on activity limitations from the 1996 Census were not verified to ensure that they were complete and consistent.

The census questionnaire was self-administered, so it is the respondents' perceptions of their own major activity limitations that were actually measured. No independent source verified these self-reported data, and the degree to which they are inaccurate because of reporting error is unknown. Nevertheless, self-reported health is a good predictor of mortality and the use of health care services.<sup>18</sup>

The regional-scale analysis of the determinants of DFLE made no attempt to account for aggregate indicators of behavioural risk factors such as smoking or obesity rates, nor were variations in health and health care policy or indicators of social cohesion considered. All of these might play a role in explaining some additional variation in DFLE, but they are unlikely to surpass the explanatory power of the socio-economic indicators.

In these analyses, "region" is an entity that represents more than the sum of individual inhabitants in the region. Regional DFLE estimates shown are aggregates across heterogeneous communities within the regions. The health-region scale, however, is a much finer scale with which to examine this population health indicator than has traditionally been possible in the Canadian context.

### Concluding remarks

In 1996, the health regions of Ontario and the western provinces generally had life expectancy and disability-free life expectancy (DFLE) higher than the corresponding national values. Life expectancy tended to be lower—often considerably so—in remote rural and northern regions compared with major urban centres. As well, most health regions in the Atlantic provinces had life expectancies and DFLEs lower than the corresponding national values. In the majority of health regions in Québec, life expectancy was lower than the Canadian value. However, because perceived major activity limitation rates are much lower in that province than in the rest of the country, DFLE is generally high in Québec, compared with Canada as a whole.

A health region's indicators of socio-economic status explain a high proportion (46%) of the variation of DFLE by health region observed across Canada. This patterning of health by social indicators has been observed numerous times in Canada,<sup>19-21</sup> as well as elsewhere in the world.<sup>13</sup>

Despite Canada's universal health care system, considerable inequalities in health outcomes remain. Knowledge of the regional profile of health expectancy in Canada, the nature of the health

disparities in the health regions and the magnitude of those disparities should make it possible to target those regions where the needs are most obvious and where intervention is a priority. Moreover, knowledge of the explanatory factors behind DFLE may inform decision-making, particularly by clarifying potential and desirable intervention tools. The magnitude of the disparities in disability-free life expectancy suggests that improvements may be possible in health regions for which estimates were the lowest, notably in the remote rural and northern regions. However, the relatively low rates of disability in Québec compared with the other provinces suggests that systematic differences in the evaluation of their health status may exist between various subsets of the Canadian population and may complicate the interpretation of regional variations in disability-free life expectancy indicators. ●

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## Appendix

Table A  
Four synthetic variables summarizing 21 demographic and socio-economic variables

Synthetic variable	% of total variance explained	Demographic and socio-economic variables with highest weights in synthetic variable (direction of association)
Remote	32	Male/Female ratio (+) Population < 15 (+) Aboriginal population (+) Strong metropolitan-influenced zone (-) Frost-free days (-) Housing inaffordability (-) Education 25-54 (-) Population ≥ 65 (-)
Prosperous	20	Internal migration (+) Population change (+) Average income (+) Government transfers (-) Unemployment (-)
Cosmopolitan	15	Visible minority (+) Population density (+) Immigration (+) Housing values (+) Population size (+)
Disadvantaged	6	Lone-parent families (+) Income equality (-) Owner-occupied dwelling (-)

**Data sources:** 1996 Census of Population; 1995-1997 Canadian Vital Statistics Database; Demography Division population estimates; Reference 11

**Note:** Signs between parentheses indicate direction of association between each synthetic variable and main demographic and socio-economic variables of which it is composed.



Table B

## Life expectancy and disability-free life expectancy at birth, by health region, both sexes, Canada, 1996

Health region				Life expectancy (years)		Disability-free life expectancy (years)	
Number	Name	Type <sup>†</sup>	Quadrant	Estimate	95% confidence interval	Estimate	95% confidence interval
<b>Canada</b>				<b>78.3</b>	<b>78.3, 78.4</b>	<b>68.6</b>	<b>68.5, 68.6</b>
<b>Newfoundland</b>							
1001	St. John's	CHR	3	78.1	77.7, 78.5	68.2	67.8, 68.6
1002	Eastern	CHR	3	76.3	75.8, 76.8	67.0	66.6, 67.5
1003	Central	CHR	2	77.7	77.2, 78.1	69.2	68.8, 69.7
1004	Western	CHR	3	77.3	76.7, 77.8	67.8	67.2, 68.3
1005	Grenfell	CHR	2	78.3	77.0, 79.5	70.8	69.6, 72.0
1006	Labrador	HCO	3	74.9	73.3, 76.4	66.3	64.9, 67.7
<b>Prince Edward Island</b>							
1101	Urban	URA	3	77.0	76.4, 77.7	66.3	65.6, 66.9
1102	Rural	URA	1	79.1	78.5, 79.7	68.8	68.1, 69.4
<b>Nova Scotia</b>							
1201	Yarmouth	ZON	3	77.5	77.1, 78.0	65.4	64.9, 65.8
1202	Kentville	ZON	4	79.3	78.8, 79.8	66.0	65.5, 66.6
1203	Thuro	ZON	3	77.9	77.4, 78.4	65.6	65.1, 66.0
1204	New Glasgow	ZON	3	78.1	77.6, 78.6	66.1	65.6, 66.6
1205	Cape Breton	ZON	3	76.1	75.6, 76.5	61.8	61.4, 62.2
1206	Halifax	ZON	3	77.9	77.6, 78.1	66.8	66.5, 67.1
<b>New Brunswick</b>							
1301	Moncton	HRE	4	78.8	78.4, 79.2	68.1	67.7, 68.4
1302	Saint John	HRE	3	77.5	77.1, 77.9	66.3	65.9, 66.6
1303	Fredericton	HRE	3	77.8	77.3, 78.2	66.8	66.4, 67.2
1304	Edmundston	HRE	3	76.8	76.0, 77.6	64.7	64.0, 65.4
1305	Campbellton	HRE	3	77.4	76.4, 78.3	63.4	62.5, 64.3
1306	Bathurst	HRE	4	79.1	78.5, 79.7	67.1	66.5, 67.7
1307	Miramichi	HRE	3	77.7	76.9, 78.5	65.9	65.1, 66.6
<b>Québec</b>							
2401	Bas-Saint-Laurent	RSS	2	78.1	77.7, 78.5	69.4	69.1, 69.8
2402	Saguenay - Lac-Saint-Jean	RSS	2	76.8	76.5, 77.1	69.3	69.0, 69.6
2403	Québec	RSS	2	77.9	77.7, 78.1	70.8	70.6, 71.0
2404	Mauricie et Centre-du-Québec	RSS	2	77.4	77.1, 77.6	69.4	69.2, 69.7
2405	Estrie	RSS	2	77.9	77.5, 78.2	68.9	68.6, 69.2
2406	Montréal-Centre	RSS	2	77.9	77.7, 78.0	70.3	70.2, 70.4
2407	Outaouais	RSS	3	77.1	76.7, 77.4	68.3	68.0, 68.6
2408	Abitibi-Témiscamingue	RSS	3	76.4	76.0, 76.9	67.7	67.2, 68.1
2409	Côte-Nord	RSS	2	76.6	76.0, 77.1	69.7	69.1, 70.2
2410	Nord-du-Québec	RSS	2	76.9	75.2, 78.6	68.7	67.0, 70.5
2411	Gaspésie-Îles-de-la-Madeleine	RSS	2	76.9	76.4, 77.5	68.8	68.3, 69.3
2412	Chaudière-Appalaches	RSS	2	78.3	78.0, 78.5	70.2	69.9, 70.5
2413	Laval	RSS	1	78.7	78.4, 78.9	72.0	71.7, 72.2
2414	Lanaudière	RSS	2	77.5	77.2, 77.8	69.8	69.5, 70.1
2415	Laurentides	RSS	2	77.3	77.1, 77.6	70.0	69.8, 70.3
2416	Montérégie	RSS	2	78.2	78.1, 78.4	71.1	70.9, 71.2
2417	Nunavik	RSS	3	65.4	63.0, 67.7	61.0	58.8, 63.2
2418	Terres-Cries-de-la-Baie-James	RSS	3	73.9	71.9, 75.9	65.9	63.8, 67.9



Health region				Life expectancy (years)		Disability-free life expectancy (years)	
Number	Name	Type <sup>†</sup>	Quadrant	Estimate	95% confidence interval	Estimate	95% confidence interval
<b>Ontario</b>							
3526	Algoma	PHU	3	77.0	76.5, 77.5	64.9	64.5, 65.4
3527	Brant	PHU	3	77.6	77.1, 78.0	65.9	65.4, 66.4
3530	Durham PHU	PHU	4	78.3	78.1, 78.6	68.1	67.9, 68.4
3531	Elgin-St Thomas	PHU	3	77.1	76.5, 77.6	65.7	65.1, 66.3
3533	Bruce-Grey-Owen Sound	PHU	3	77.8	77.4, 78.2	67.2	66.8, 67.6
3534	Haldimand-Norfolk	PHU	3	77.8	77.3, 78.3	66.8	66.3, 67.3
3535	Haliburton-Kawartha-Pine Ridge	PHU	3	78.2	77.8, 78.6	67.2	66.8, 67.6
3536	Halton	PHU	1	80.1	79.9, 80.4	71.1	70.8, 71.4
3537	Hamilton-Wentworth	PHU	3	78.0	77.7, 78.2	66.6	66.4, 66.9
3538	Hastings-Prince Edward	PHU	3	77.4	77.0, 77.9	65.5	65.1, 65.9
3539	Huron	PHU	4	78.5	77.9, 79.2	68.2	67.6, 68.8
3540	Kent-Chatham	PHU	3	76.6	76.1, 77.1	64.9	64.4, 65.3
3541	Kingston-Frontenac-Lennox-Addington	PHU	3	78.1	77.7, 78.5	66.8	66.4, 67.1
3542	Lambton	PHU	3	78.3	77.9, 78.8	67.7	67.2, 68.1
3543	Leeds-Grenville-Lanark	PHU	3	77.2	76.8, 77.6	66.5	66.1, 66.9
3544	Middlesex-London	PHU	4	78.4	78.1, 78.6	67.0	66.8, 67.3
3545	Muskoka-Parry Sound	PHU	3	77.3	76.6, 77.9	66.0	65.4, 66.6
3546	Niagara	PHU	3	78.3	78.0, 78.5	67.3	67.1, 67.5
3547	North Bay	PHU	3	76.6	76.1, 77.2	63.6	63.1, 64.1
3549	Northwestern	PHU	3	74.3	73.7, 75.0	63.9	63.3, 64.6
3551	Ottawa Carleton	PHU	1	79.5	79.3, 79.7	69.2	69.0, 69.4
3552	Oxford	PHU	3	78.0	77.5, 78.5	67.0	66.5, 67.5
3553	Peel	PHU	1	79.9	79.7, 80.1	70.1	69.9, 70.3
3554	Perth	PHU	1	78.7	78.1, 79.3	68.6	68.0, 69.2
3555	Peterborough	PHU	4	78.4	77.9, 78.8	66.9	66.4, 67.3
3556	Porcupine	PHU	3	76.5	75.9, 77.0	64.1	63.6, 64.6
3557	Renfrew	PHU	3	78.0	77.5, 78.5	65.5	65.0, 66.0
3558	Eastern Ontario	PHU	3	77.3	76.9, 77.7	65.6	65.2, 66.0
3560	Simcoe	PHU	3	78.1	77.8, 78.4	67.2	66.9, 67.5
3561	Sudbury	PHU	3	76.7	76.3, 77.0	64.2	63.8, 64.5
3562	Thunder Bay	PHU	3	76.7	76.3, 77.1	65.5	65.1, 65.9
3563	Timiskaming	PHU	3	75.9	75.0, 76.7	63.3	62.5, 64.1
3565	Waterloo	PHU	1	78.8	78.6, 79.1	68.6	68.3, 68.8
3566	Wellington-Dufferin-Guelph	PHU	1	78.8	78.5, 79.2	69.4	69.1, 69.8
3568	Windsor-Essex	PHU	3	77.8	77.5, 78.0	66.6	66.3, 66.9
3570	York	PHU	1	80.6	80.3, 80.8	71.1	70.8, 71.3
3595	City of Toronto	PHU	1	79.3	79.2, 79.4	69.0	68.9, 69.1
<b>Manitoba</b>							
4610	Winnipeg	HRE	3	77.9	77.7, 78.2	68.0	67.8, 68.2
4615	Brandon	HRE	4	79.3	78.6, 80.1	67.8	67.1, 68.6
4620	North Eastman	HRE	3	77.6	76.6, 78.6	68.3	67.3, 69.2
4625	South Eastman	HRE	1	79.3	78.6, 80.1	69.3	68.5, 70.0
4630	Interlake	HRE	3	77.3	76.7, 78.0	67.4	66.8, 68.1
4640	Central	HRE	1	79.0	78.4, 79.5	68.9	68.4, 69.4
4650	Marquette	HRE	2	77.9	76.9, 78.8	69.3	68.4, 70.1
4655	South Westman	HRE	2	77.2	76.3, 78.1	69.3	68.5, 70.2
4660	Parkland	HRE	3	77.4	76.6, 78.3	67.7	66.9, 68.5
4670	Norman	HRE	3	74.6	73.5, 75.8	65.1	64.0, 66.2
4680/4690	Burntwood and Churchill <sup>‡</sup>	HRE	3	72.9	71.7, 74.0	62.4	61.3, 63.4
<b>Saskatchewan</b>							
4701	Weyburn (A)	SAR	1	79.1	78.4, 79.8	69.4	68.8, 70.1
4702	Moose Jaw (B)	SAR	4	78.7	78.0, 79.5	68.2	67.5, 68.8
4703	Swift Current (C)	SAR	1	79.9	79.1, 80.7	70.8	70.0, 71.5
4704	Regina (D)	SAR	3	78.3	77.9, 78.6	68.4	68.0, 68.7
4705	Yorkton (E)	SAR	3	78.3	77.6, 78.9	68.5	67.8, 69.1



Health region				Life expectancy (years)		Disability-free life expectancy (years)	
Number	Name	Type <sup>†</sup>	Quadrant	Estimate	95% confidence interval	Estimate	95% confidence interval
4706	Saskatoon (F)	SAR	4	78.9	78.5, 79.2	68.3	67.9, 68.6
4707	Rosetown (G)	SAR	1	78.6	77.9, 79.3	70.4	69.7, 71.1
4708	Melfort (H)	SAR	1	78.6	77.8, 79.4	69.3	68.5, 70.1
4709	Prince Albert (I)	SAR	4	78.4	77.7, 79.1	67.2	66.6, 67.9
4710	North Battleford (J)	SAR	3	77.3	76.6, 78.0	66.9	66.2, 67.6
4711	Northern (K)	HSB	3	73.3	72.0, 74.7	62.5	61.3, 63.8
<b>Alberta</b>							
4801	Chinook	RHA	3	77.7	77.2, 78.2	67.4	67.0, 67.9
4802	Palliser	RHA	1	79.1	78.5, 79.7	68.7	68.1, 69.3
4803	Headwaters	RHA	1	78.5	77.9, 79.2	69.5	68.8, 70.1
4804	Calgary	RHA	1	79.4	79.2, 79.6	69.1	68.9, 69.3
4805	Crowfoot-Wild Rose	RHA	3	77.7	76.9, 78.5	68.1	67.4, 68.9
4806	David Thompson	RHA	4	78.3	77.9, 78.8	67.2	66.8, 67.6
4807	East Central	RHA	4	78.6	78.1, 79.2	68.2	67.7, 68.7
4808	WestView	RHA	4	80.4	79.7, 81.1	68.1	67.4, 68.8
4809	Crossroads	RHA	3	74.8	73.8, 75.8	64.3	63.4, 65.2
4810	Capital	RHA	4	78.8	78.6, 79.0	68.0	67.8, 68.1
4811	Aspen	RHA	4	78.8	78.2, 79.4	67.7	67.1, 68.3
4812	Lakeland	RHA	3	77.0	76.5, 77.5	66.0	65.4, 66.5
4813	Mistahia	RHA	3	77.5	76.9, 78.2	66.6	65.9, 67.2
4814	Peace	RHA	3	74.9	73.5, 76.2	63.8	62.6, 65.0
4815	Keeweenaw Lakes	RHA	3	74.8	73.3, 76.2	64.4	63.0, 65.8
4816	Northern Lights	RHA	3	75.8	74.3, 77.3	66.3	64.9, 67.6
4817	Northwestern	RHA	4	80.0	77.9, 82.1	67.7	65.5, 69.8
<b>British Columbia</b>							
5901	East Kootenay	HRE	4	78.8	78.1, 79.4	68.3	67.7, 68.9
5902	West Kootenay-Boundary	HRE	3	77.9	77.2, 78.5	66.8	66.2, 67.4
5903	North Okanagan	HRE	4	78.9	78.4, 79.4	67.4	66.9, 67.9
5904	South Okanagan Similkameen	HRE	1	80.3	79.9, 80.6	69.1	68.7, 69.4
5905	Thompson	HRE	3	77.3	76.8, 77.8	66.2	65.7, 66.7
5906	Fraser Valley	HRE	4	78.6	78.3, 79.0	67.4	67.1, 67.8
5907	South Fraser Valley	HRE	1	79.6	79.3, 79.8	69.7	69.5, 70.0
5908	Simon Fraser	HRE	1	78.6	78.3, 78.9	68.6	68.3, 68.9
5909	Coast Garibaldi	HRE	4	78.4	77.8, 79.0	68.2	67.6, 68.9
5910	Central Vancouver Island	HRE	4	78.4	78.0, 78.7	67.5	67.1, 67.8
5911	Upper Island/Central Coast	HRE	3	77.9	77.3, 78.4	67.9	67.3, 68.4
5912	Cariboo	HRE	3	76.7	76.0, 77.5	66.5	65.8, 67.1
5913	North West	HRE	3	77.9	77.2, 78.6	67.1	66.4, 67.7
5914	Peace Liard	HRE	3	77.5	76.7, 78.4	67.4	66.6, 68.2
5915	Northern Interior	HRE	3	76.8	76.3, 77.4	66.8	66.2, 67.3
5916	Vancouver	HRE	1	78.6	78.4, 78.8	68.9	68.7, 69.2
5917	Burnaby	HRE	1	79.5	79.1, 79.9	69.6	69.2, 70.0
5918	North Shore	HRE	1	80.3	80.0, 80.7	72.5	72.1, 72.8
5919	Richmond	HRE	1	81.2	80.8, 81.7	72.8	72.3, 73.2
5920	Capital	HRE	1	79.6	79.4, 79.9	69.5	69.2, 69.8
<b>Territories</b>							
6001	Yukon	HRE	3	75.7	74.5, 77.0	66.9	65.6, 68.1
6101	Northwest	HRE	3	76.8	75.5, 78.1	67.0	65.8, 68.2
6201	Nunavut	HRE	3	69.8	68.2, 71.5	62.9	61.3, 64.5

**Data sources:** 1996 Census of Population; 1995-1997 Canadian Vital Statistics Database; Demography Division population estimates; Reference 11

<sup>†</sup> CHR=Community Health and Social Services Region; HCO=Health Corporation; URA=Urban or rural area; ZON=Health Zone; HRE=Health Region;

RSS=Région socio-sanitaire; PHU=Public Health Unit; SAR=Service Area; HSB=Health Services Branch; RHA=Regional Health Authority

‡ Burntwood and Churchill regions in Manitoba were combined because of small populations.