

### Article

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# ccording to the 2001 census, 976,000 Canadians (3% of the total population) self-identified as Aboriginal: First Nations (North American Indian), Métis or Inuit. About 5% of the Aboriginal-identity population, numbering more than 45,000, were Inuit. Inuit are descended from Aboriginal people who historically inhabited the Arctic regions of Canada, Alaska, Greenland and Siberia. Most Inuit in Canada now reside in one of four regions: the Inuvialuit region (along the Arctic coast of the Northwest Territories), Nunavut (eastern Arctic territory), Nunavik (northern Quebec), and Nunatsiavut (northern coast of Labrador).

Data on Inuit identity are collected for deaths that occur in Canada's two northern territories—the Northwest Territories and Nunavut—but not for deaths that take place in the provinces. As a result, since one-fifth of deaths to residents of the Northwest Territories and Nunavut occur in the provinces, and 20% of the total Inuit population of Canada (according to self-identification questions on the census) reside in the provinces, basic health indicators such

### **Abstract**

### **Objectives**

Because of a lack of Aboriginal identifiers on death registrations, standard data sources and methods cannot be used to estimate basic health indicators for Inuit in Canada. Instead, a geographic-based approach was used to estimate life expectancy for the entire population of Inuit-inhabited areas.

### Data sources

The data are from the Canadian Mortality Database and the Census of Canada.

### Analytical techniques

Areas where at least 33% of residents were Inuit were identified, based on census results. Vital statistics death records for 1989 through 2003 and census population counts for 1991, 1996 and 2001 were used to compute abridged life tables for the Inuit-inhabited areas in each of the three 5-year periods centered around those census years.

### Main results

In 1991, life expectancy at birth in the Inuit-inhabited areas was about 68 years, which was 10 years lower than for Canada overall. From 1991 to 2001, life expectancy in the Inuit-inhabited areas did not increase, although it rose by about two years for Canada as a whole. As a result, the gap widened to more than 12 years. Life expectancy in the Inuit-inhabited areas was generally highest in the Inuvialuit region (Northwest Territories) and Nunavut (Territory), followed by Nunatsiavut (Labrador) and Nunavik (Quebec). While these results are not specific to the Inuit population, such geographic-based methods can be used with any administrative datasets that include postal codes or municipal-level locality codes.

### Keywords

ethnic groups, infant mortality, Northwest Territories, Nunavut, vital statistics

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as life expectancy at birth cannot be estimated for the Inuit using standard data sources and methods.

Previously, life expectancies had been calculated from nominal list data (no longer available) for Inuit in the former Northwest Territories (including what is now Nunavut) and in Nunavik (northern Quebec) for the years 1941-1950 through 1978-1982.<sup>2,3</sup> Life expectancy at birth for Inuit of the former Northwest Territories rose from 29 years in 1941-1950 (38 years less than for Canada overall), to 37 years in 1951-1960 (33 years less), to 51 years in 1963-1966 (21 years less), and to 66 years in 1978-1982 (19 years less).<sup>4</sup> For Inuit in Nunavik, life expectancy in 1984-1988 was 14 years less than for the total population of Quebec.<sup>5</sup>

Life expectancy figures are regularly published for Quebec's Nunavik health region, and since 2000, for the territory of Nunavut, covering the entire population of those areas, including non-Inuit. Results for 2000-20026 showed that life expectancy at birth was about 67 years in Nunavik and about 69 years in Nunavut, or approximately 13 and 11 years less than for Canada as a whole at the time. However, the estimates are based on only three years of deaths; earlier results for what is now Nunavut are not available; and no figures have been published for the Inuit-inhabited areas of the Northwest Territories and Labrador.

Consequently, there are currently no national life expectancy estimates for the Inuit component of the Canadian population. To partially fill this data gap, a geographic-based approach was used to obtain life expectancy for all of the Inuit-inhabited areas of Canada over a 15-year period.

### **Methods**

Areas with a relatively high proportion of Inuit residents were identified. Vital statistics death records and census population counts were used to compute life expectancy measures for these areas.

From census questions, Aboriginal groupings can be determined on the basis of ancestry, legal status (in the case of First Nations), or self-identification. The self-identification question was used to select communities for this study. The choice is important in the case of First Nations, but of less consequence for Inuit, since most who report Inuit ancestry also self-identify as Inuit.<sup>7,8</sup>

According to the Aboriginal identity question on the census, most Inuit live in Nunavut, followed by Nunavik, the Inuvialuit region and Nunatsiavut, and in each of these regions, the majority of the population self-identified as Inuit. The corresponding communities of residence can be readily determined on the basis of place-name-based locality codes, which are always included on vital statistics death records. Postal codes, which can also be used to determine these communities, are often missing on death records from Nunavut and the Northwest Territories.

For a given census subdivision, if the observed proportion of residents who self-identified as Inuit identity was equal to or greater than a chosen cutoff, it was included in the list of Inuit-inhabited areas. When two communities shared the same rural postal code, as was the case with Kuujjuarapik (predominately Inuit) and Whapmagoostui (predominately Cree) in northern Quebec, the population of the two communities was combined before calculation of the proportion Inuit, since assignment to the correct census subdivision based on postal code (or postal community name) would be uncertain.

The total Inuit-identity population of Canada (all provinces and territories) was 45,070. proportion who would be included in this analysis depended on the cut-off chosen (Table 1). Choosing communities that were "at least 33% Inuit" rather than "at least 20% Inuit" did not change the number of Inuit-inhabited communities included (54). "At least 50% Inuit" would exclude North West River, Labrador (35% Inuit), Inuvik, Northwest Territories (36% Inuit), and Kuujjuuarapik/Whapmagoostui, Quebec (37% Inuit), leaving 51 Inuit-inhabited communities. "At least 67% Inuit" would also exclude Igaluit, Nunavut (59% Inuit) and Aklavik, Northwest Territories (59% Inuit), leaving 49 Inuit-inhabited communities. (The list of communities defined by each of these potential cut-offs was virtually identical in 1991, 1996 and 2001.) In order to include all 54 of the largely Inuit communities (and all communities in

Table 1
Alternate geographic-based definitions of Inuit-inhabited areas: Aboriginal identity of population of census subdivisions† with a high proportion of Inuit residents, Canada, 2001

				Inuit	
Cut-off	Total population	Abo- riginal	Number	Row	Column %
No cut-off (all Canada)	29,639,030	976,305	45,070	0.2	100.0
At least 20% Inuit At least 33% Inuit <sup>‡</sup> At least 50% Inuit At least 67% Inuit	45,615 45,615 40,880 35,055	38,900 38,900 35,690 32,065	36,450 36,450 34,710 31,320	79.9 79.9 84.9 89.4	80.9 80.9 77.0 69.5

<sup>&</sup>lt;sup>†</sup> Areas based on complete census subdivisions, except Kuujjuarapik and Whapmagoosui (formerly Great Whale/Poste-de-la-Baleine), Quebec, which share the same postal code and must be combined. Even when municipal codes are assigned from place names, these two communities are not well distinguished; "Great Whale/Poste-de-la-Baleine" has been and may still be used, especially as a mailing address.

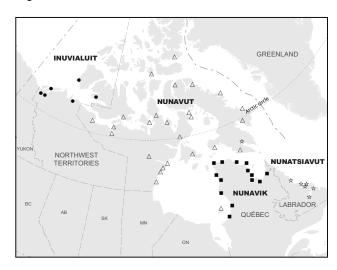
<sup>‡</sup> used in all remaining tables

Source: 2001 Census of Canada, special tabulations.

the four Inuit land claims settlement areas), the 33% cut-off was selected for this analysis, although the area also includes a larger proportion of non-Inuit (20%: 5% other Aboriginal identity and 15% non-Aboriginal) than would have been the case with more restrictive cut-offs.

The census subdivisions selected were grouped into four regions: the Inuvialuit region (Northwest

Map 1 Inuit-inhabited communities (33% or more Inuit identity), by region, Canada, 2001



Source: Statistics Canada population data; Base map © 2002 Government of Canada with permission from Natural Resources Canada.

Territories, 6 communities), Nunavut (the entire territory, 28 communities), Nunavik (Quebec, 14 communities), and Nunatsiavut (Newfoundland and Labrador, 6 communities) (Map 1, Appendix Table A).

Calendar-year deaths were compiled for three 5-year periods: 1989 through 1993, 1994 through 1998, and 1999 through 2003. Person-years at risk were estimated by multiplying by 5 the unadjusted census population counts (100% data, including the institutional population if any) for each mid-period census (1991, 1996 and 2001, respectively). Deaths were compiled based on usual place of residence, regardless of where the death occurred. For example, deaths to Nunavut residents in Ontario or Quebec were assigned to their respective home communities in Nunavut.

Computations were done for males and females, separately and combined. Age was grouped into 19 strata (less than 1, 1-4, 5-9, 10-14, 15-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, 65-69, 70-74, 75-79, 80-84, 85 years or more). For each sex and age group, the death rate was calculated as the number of deaths divided by the estimated number of person-years at risk.

Abridged life tables and associated variances, standard errors, and 95% confidence intervals were calculated according to the method of Chiang<sup>9</sup>. The values of Chiang's a (the fraction of the last interval of life lived by those dying in the interval) was set at 0.1 for stratum 1 (to reflect the relatively high mortality in the first year of life) and to 0.5 for all other strata. Ninety-five percent confidence intervals for life expectancy were calculated as the estimate plus or minus 1.96 times its standard error. Ninety-five percent confidence intervals for differences in life expectancy (temporal increases or decreases) were calculated as the difference in life expectancy plus or minus 1.96 times the square root of the sum of the variances for each of the two life expectancies.

Special tabulations of 2001 census data were used to describe the socio-economic characteristics of the population of the Inuit-inhabited areas.

Trends in life expectancy in the Inuit-inhabited areas were compared with life expectancies reported

for all Canada from 1951 to 2001. 10-14 Results for 1999-2003 (2001) were compared with life expectancies reported for other circumpolar regions (Greenland and Alaska), for Canadian First Nations and for other developed and developing countries. 15-18

### Results

### **Characteristics of the population**

The socio-demographic characteristics of the population in the Inuit-inhabited areas differed from

those of the total population of Canada (Table 2). In 2001, adults in the Inuit-inhabited areas tended to have less formal education. As well, their employment-to-population ratio was somewhat lower, and while households were larger, household incomes were lower, resulting in much lower average income per person. Finally, the percentage of homes in need of major repairs was three times as high as in Canada overall.

To a large extent, these differences reflected the characteristics of Aboriginal people, particularly the Inuit, in the Inuit-inhabited areas. Among adults,

Table 2 Selected socio-demographic characteristics, all Canada and population groups in the Inuit-inhabited areas, 2001

		Inuit-inhabited areas			
	Canada	Total	Inuit	Other Aboriginal	Non-Aboriginal
Total population (number)	29,639,032	45,615	36,450	2,450	6,720
%	100.0	100.0	100.0	100.0	100.0
Sex Male	49.1	51.5	50.9	48.8	55.8
<b>Age (years)</b> 0 to 14 15 to 64 65 or older	19.4 68.4 12.2	36.6 60.3 3.2	40.3 56.4 3.3	37.7 58.0 4.3	16.0 82.0 2.1
Education <sup>†</sup> Elementary or less Some secondary Secondary graduation Some or completed postsecondary non-university Some university University graduation	9.8 21.5 14.1 28.8 10.4 15.4	26.1 25.3 5.8 30.6 4.6 7.6	32.1 29.9 4.7 30.1 2.3 0.9	25.9 23.1 6.5 35.4 5.0 4.0	2.9 8.3 10.0 31.4 13.4 34.1
Employment Unemployment rate <sup>‡</sup> Employment/Population ratio <sup>§</sup>	7.3 70.8	16.9 57.8	22.4 49.6	13.6 55.1	3.3 89.3
Occupation <sup>††</sup> Management Professional Skilled Semi-skilled Unskilled	10.0 15.3 29.6 31.6 13.4	8.9 17.4 27.7 24.3 21.7	5.4 13.3 27.4 27.0 27.0	9.0 11.5 31.0 24.7 23.8	18.9 30.4 27.9 16.7 6.1
Income <sup>‡‡</sup> Average household income (\$) Average household size (number) Average income per person (\$)	68,000 3.6 23,000	60,000 5.1 15,000	54, 000 5.4 11,000	58,000 4.8 14,000	91,000 3.7 36,000
Housing <sup>§§</sup> In need of major repairs	8.3	23.0	24.7	26.1	13.1

<sup>†</sup> non-institutional population aged 15 or older

**Source:** 2001 Census of Canada, special tabulations.

<sup>&</sup>lt;sup>‡</sup> non-institutional population aged 15 to 64, active in labour force (CANSIM table 282-0087 for Canada)

<sup>§</sup> non-institutional population aged 15 to 64 (CANSIM table 282-0002 for Canada)

th based on Human Resources Development Canada occupational coding (detailed definition available on request from first author); non-institutional population aged 15 or older who worked in 2001

<sup>#</sup> income in 2000, non-institutional population

<sup>§§</sup> excluding collective dwellings and band housing

32% of Inuit and 26% of other Aboriginal peoples in these areas had no more than elementary school, compared with just 3% of the non-Aboriginal population. By contrast, only 1% of Inuit and 4% of other Aboriginal peoples had a university degree, compared with 34% of non-Aboriginal people. In the Inuit-inhabited areas, about half of Inuit and other Aboriginal people aged 15 to 64 had a job, compared with nearly 90% of non-Aboriginal people. And among those who were employed, around a quarter of Inuit and other Aboriginal people performed unskilled labour (27% and 24%, respectively), compared with 6% of the non-Aboriginal population. Fewer than one-fifth of employed Inuit and other Aboriginal people, versus almost half the non-Aboriginal group, held professional or managerial positions. And while about a quarter of Inuit and other Aboriginal people lived in homes needing major repairs, this was the case for 13% of non-Aboriginal people in these areas. (For information on progress over time with respect to such socio-economic indicators, see the Inuit social trends series recently published by Indian and Northern Affairs Canada. 19,20 Related information about each community, based on the 2001 Census of Canada, is available as a published document.<sup>21</sup>)

The percentage of the population who were Inuit ranged from 54% in the Inuvialuit region, to 68%

Table 3
Aboriginal identity of population of the Inuit-inhabited areas, by region, Canada, 2001

Region	Number	Total	Inuit	Other Abo- riginal	Non- Abo- riginal
				%	
Total	46,070	100.0	79.9	5.4	14.7
Inuvialuit region Nunavut Nunavik Nunatsiavut	5,225 26,740 10,365 3,740	100.0 100.0 100.0 100.0	54.1 84.0 84.0 68.2	16.9 0.6 7.5 18.9	29.0 14.8 8.5 12.9

Note: Because total is summed from data by sex for 5-year age groups, each independently randomly rounded, it varies from total in Tables 1

Source: 2001 Census of Canada, special tabulations.

in Nunatsiavut, and up to 84% in both Nunavut and Nunavik (Table 3).

### Population and death data

From 1991 to 2001, the population of the Inuitinhabited areas increased considerably (Table 4), mainly because of high birth rates among the Inuit and other Aboriginal inhabitants.<sup>22</sup> In 2001, most of the population of the Inuit-inhabited areas resided in Nunavut (58%), followed by Nunavik (23%), the Inuvialuit region (11%), and Nunatsiavut (8%).

Over the 1991 to 2001 period, there were 3,474 deaths to residents of these areas out of a total of 643,275 person-years at risk. During this time, 18% of the deaths to residents of Nunavut and of the

Table 4
Census population counts, person-years at risk and deaths in the Inuit-inhabited areas, by region, Canada, 1991, 1996 and 2001

	All regions	Inuvialuit region	Nunavut	Nunavik	Nunatsiavut
<b>Population</b> † 1991 1996 2001	39,540 43,045 46,070	5,735 5,740 5,225	21,255 24,680 26,740	8,210 9,285 10,365	4,340 3,340 3,740
Person-years at risk <sup>‡</sup> 1989 to 1993 1994 to 1998 1999 to 2003	197,700 215,225 230,350	28,675 28,700 26,125	106,275 123,400 133,700	41,050 46,425 51,825	21,700 16,700 18,700
<b>Deaths</b> 1989 to 1993 1994 to 1998 1999 to 2003	1,053 1,133 1,288	120 142 156	543 579 642	256 285 357	134 127 133

<sup>†</sup> Because populations are summed from data by sex for 5-year age groups, each independently randomly rounded, they vary from total in Tables 1 and 2.

<sup>&</sup>lt;sup>‡</sup> person-years at risk during each 5-year period estimated at 5 times the population at mid-period census

Source: Population data and person-years at risk from special tabulations of 1991, 1996 and 2001 censuses, unadjusted for net undercoverage; deaths from Canadian Mortality Data Base.

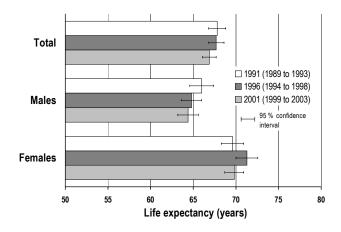
Inuvialuit region occurred outside of those territories, mostly in the adjacent provinces to the south (data not shown). As previously explained, such deaths were included in this analysis, according to the decedents' usual place of residence. Almost all deaths to residents of Nunavik and Nunatsiavut occurred in their respective provinces (Quebec, and Newfoundland and Labrador, respectively).

### Life expectancy

In 1991 (1989-1993), life expectancy at birth (both sexes combined) in the Inuit-inhabited areas was about 68 years (95% CI 66.8 to 68.8) (Chart 1, Table 5). By 2001 (1999-2003), life expectancy in these areas had not increased, and may even have declined by about a year (95% CI -2.2 to +0.4). Life expectancy for males may have fallen by more than a year (95% CI -3.5 to +0.3) and was virtually unchanged for females (95% CI -1.5 to +1.9).

However, levels and trends in life expectancy varied by region (Chart 2). In Nunavut, life expectancy may have increased by about a year (95% CI -0.4 to +3.0), although the increase was limited to females, as that of males hardly changed. Life expectancy fell by nearly 4 years (95% CI -6.4 to -1.0) in Nunavik, and possibly, by about 3 years (95% CI -6.3 to +0.5) in the Inuvialuit region.

Chart 1 Life expectancy at birth in the Inuit-inhabited areas, Canada, 1991, 1996 and 2001



Source: Canadian Mortality Data Base; Census of Canada.

In 1991, life expectancy in the Inuit-inhabited areas had been 10 years less than in Canada overall, with a wider gap for females (11 years) than for males (9 years) (Table 6). By 2001, the difference was more than 12 years, and the gap was similar for males and females. At 67 years in 2001, life expectancy in the Inuit-inhabited areas was about what life expectancy had been for all Canada in 1946.

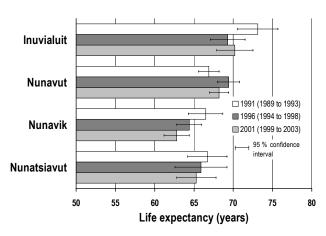
Table 5
Life expectancy at birth in the Inuit-inhabited areas, by sex and region, Canada, 1991, 1996 and 2001

	Total	Inuvialuit region	Nunavut	Nunavik	Nunatsiavut
	95% confidence Years interval	95% confidence Years interval	95% confidence Years interval	95% confidence Years interval	95% confidence Years interval
Both sexes <sup>†</sup> 1991 (1989 to 1993) 1996 (1994 to 1998) 2001 (1999 to 2003) Difference, 1991 to 2001	67.8 (66.8 to 68.8) 67.7 (66.8 to 68.6) 66.9 (66.1 to 67.7) -0.9 (-2.2 to 0.4)	73.1 (70.5 to 75.7) 69.3 (67.1 to 71.5) 70.2 (67.9 to 72.5) -2.9 (-6.3 to 0.5)	66.9 (65.6 to 68.2) 69.4 (68.0 to 70.8) 68.2 (67.0 to 69.4) 1.3 (-0.4 to 3.0)	66.5 (64.3 to 68.7) 64.4 (62.8 to 66.0) 62.8 (61.2 to 64.4) -3.7 (-6.4 to -1.0)	66.7 (64.2 to 69.2) 65.9 (62.6 to 69.2) 65.3 (62.8 to 67.8) -1.4 (-5.0 to 2.2)
Males 1991 (1989 to 1993) 1996 (1994 to 1998) 2001 (1999 to 2003) Difference, 1991 to 2001	66.0 (64.6 to 67.4) 64.8 (63.6 to 66.0) 64.4 (63.2 to 65.6) -1.6 (-3.5 to 0.3)	68.0 (64.7 to 71.3) 66.2 (63.1 to 69.3) 68.1 (64.4 to 71.8) 0.1 (-4.9 to 5.1)	66.8 (64.6 to 69.0) 67.2 (65.3 to 69.1) 66.4 (64.8 to 68.0) -0.4 (-3.2 to 2.4)	63.6 (60.6 to 66.6) 60.6 (58.5 to 62.7) 57.5 (55.4 to 59.6) -6.1 (-9.7 to -2.5)	64.3 (60.5 to 68.1) 60.9 (56.7 to 65.1) 62.5 (58.2 to 66.8) -1.8 (-7.5 to 3.9)
Females 1991 (1989 to 1993) 1996 (1994 to 1998) 2001 (1999 to 2003) Difference, 1991 to 2001	69.6 (68.3 to 70.9) 71.3 (70.0 to 72.6) 69.8 (68.7 to 70.9) 0.2 (-1.5 to 1.9)	79.2 (74.9 to 83.5) 73.1 (69.8 to 76.4) 73.1 (70.0 to 76.2) -6.1 (-11.3 to -0.9)	68.2 (66.5 to 69.9) 70.9 (69.0 to 72.8) 70.0 (68.3 to 71.7) 1.8 (-0.6 to 4.2)	69.0 (65.8 to 72.2) 69.0 (66.4 to 71.6) 67.3 (65.1 to 69.5) -1.7 (-0.6 to 4.2)	68.5 (65.1 to 71.9) 73.4 (68.5 to 78.3) 72.2 (67.8 to 76.6) 3.7 (-1.8 to 9.2)

† calculated from pooled deaths and person-years at risk

Source: Person-years at risk from mid-period census populations; deaths 1989 to 2003 from Canadian Mortality Data Base.

Chart 2 Life expectancy at birth in the Inuit-inhabited areas, by region, Canada, 1991, 1996 and 2001



Source: Canadian Mortality Data Base; Census of Canada.

Table 6
Life expectancy at birth in the Inuit-inhabited areas and all Canada, by sex, selected years

Area/Years	Both sexes	Males	Females
Alea/Teals	SCACS	Maics	i ciliales
Inuit-inhabited areas			
1991 (1989 to 1993)	67.8	66.0	69.6
1996 (1994 to 1998)	67.7	64.8	71.3
2001 (1999 to 2002)	66.9	64.4	69.8
All Canada			
1926 (1925 to 1927)	61.4	60.5	62.3
1931 (1930 to 1932)	61.0	60.0	62.1
1936 (1935 to 1937)	62.5	61.3	63.7
1941 (1940 to 1942)	64.6	63.0	66.3
1946 (1945 to 1947)	66.7	65.1	68.6
1951 (1950 to 1952)	68.5	66.4	70.9
1956 (1955 to 1957)	70.1	67.7	72.9
1961 (1960 to 1962)	71.1	68.4	74.3
1966 (1965 to 1967)	71.8	68.7	75.3
1971 (1970 to 1972)	72.7	69.4	76.5
1976 (1975 to 1977)	73.8	70.3	77.7
1981 (1980 to 1982)	75.4	71.9	79.1
1986 (1985 to 1987)	76.4	73.0	79.7
1991 (1990 to 1992)	77.8	74.6	80.9
1996 (1995 to 1997)	78.3	75.4	81.2
2001 (2000 to 2002)	79.5	77.0	82.0

Note: All Canada life expectancy for both sexes is a simple average of life expectancies calculated for each sex separately.

Sources: Inuit-inhabited areas: Person-years at risk estimated from midperiod census populations; deaths 1989 to 2003 from Canadian Mortality Data Base.

All Canada: 1926 to 1981 (Nagnur, 1986); 1986 (Statistics Canada, 1991); 1991 (Millar and David, 1995); 1996 (Duchesne et al, 2002); 2001 (Statistics Canada, 2006).

In 2001, life expectancy in Canada's Inuit-inhabited areas was the same as in Greenland, which is largely Inuit-populated<sup>16</sup>; slightly lower than for all Alaskan natives<sup>17</sup> (only 47% of whom are Inuit<sup>23</sup>); and about 6 years less than for Canada's First Nations (Table 7). Life expectancy in other developed countries tended to be considerably higher.<sup>18</sup> Only developing countries had levels of life expectancy similar to those in Canada's Inuit-inhabited areas—for instance, the Dominican Republic, Egypt, and Guatemala,<sup>18</sup> which had much lower Gross Domestic Product (GDP) per capita (about \$4,000 to \$5,000 in international dollars in 2004) than did Canada (about \$31,000).<sup>24</sup>

### **Infant mortality**

The infant mortality rate for the Inuit-inhabited areas fell from 25.6 deaths per 1,000 population younger than age 1 (95% CI 21.6 to 30.3) in 1989-1993, to 21.9 (95% CI 18.2 to 26.4) in 1994-1998, and to 18.5 (95% CI 15.0 to 22.9) in 1999-2003 (data not shown elsewhere). These rates were about four times higher than those for Canada overall: 6.0, 5.2 and 4.8 deaths per 1,000 live births, respectively. Nonetheless, the rate difference between the Inuit-inhabited areas and all Canada fell from 19.6 deaths (95% CI 15.2 to 23.9) to 16.7 deaths (95% CI 12.7 to 20.7) to 13.8 deaths (95% CI 9.9 to 17.6) per 1,000 over those years, a decrease of 5.8 deaths per 1,000, or 30%.

### Discussion

Life expectancy in the Inuit-inhabited areas was far below that for the country overall, and considerably below that for other Aboriginal peoples in Canada. As well, while life expectancy in Canada overall continued to rise, it appears to have stagnated in the Inuit-inhabited areas, so the gap widened by more than two years during this period.

The substantial decline in life expectancy in Nunavik during this period is particularly striking. The former extraordinary gains—from 35 years in 1946 (1941-1951) to 61 years in 1976 (1971-1981)<sup>2</sup>—now appear to have stalled, with little if any lasting progress since the mid-1970s.



Table 7 International comparisons of life expectancy at birth, by sex, selected years

			Life expectancy			
	Years	Both sexes	Males	Females		
Circumpolar region and First Nations of Canada Inuit-inhabited areas of Canada	1991 (1989 to 1993) 1996 (1994 to 1998) 2001 (1999 to 2003)	68 68 67	66 65 64	70 71 70		
First Nations of Canada Greenland (total population) Alaska natives	2001 (projected) 2001 (1999 to 2003) 1996 (1994 to 1998)	73 67 69	70 64 	76 70 		
Developed countries Japan Canada Portugal United States Mexico Turkey	2001 2001 2001 2001 2001 2001	81 79 77 77 74 69	78 77 73 74 72 67	85 82 80 80 77 71		
Developing countries Armenia Nicaragua Thailand Dominican Republic Egypt Guatemala Bangladesh Pakistan Gambia Nepal	2001 2001 2001 2001 2001 2001 2001 2001	70 70 69 67 67 66 62 61 59	66 67 66 64 65 64 62 61 56	73 72 72 71 68 69 62 61 61 58		

Notes: According to the 2000 US census, 47% of Alaska natives were "Eskimo" (Inuit) (Ogunwole, 2002). According to Statistics Greenland, in 2001, 88% of the population of Greenland was born in Greenland (Statbank Greenland, accessed 28 April 2007).

... not available

Sources: Inuit-inhabited areas from census populations and Canadian Mortality Data Base; Indian and Northern Affairs Canada, 2005; Statistics Greenland, 2003; Alaska Bureau of Statistics, 2000; World Health Organization, 2005.

However, these findings for the Inuit-inhabited areas do not distinguish life expectancy for Inuit from that of non-Inuit. If the life expectancy of the 15% of the population who were non-Aboriginal is assumed to be the same as that for all Canada (79.5 years in 2001),14 and that of the 5% of the population who were other Aboriginal to be the same as that of all Registered Indians in Canada (72.8 years in 2000), 15,26,27 then, taking into account the relative population sizes of each group, the life expectancy of Inuit-identity residents would have been 64.2 years (95% CI 63.4 to 65.0)—or 2.7 years less (95% CI -3.0 to -1.6) than that of all residents of the Inuit-inhabited areas, and 15 years less than that for Canada as a whole. Also, because the non-Inuit proportion of the population varied considerably by region, the ranking of the regions according to these rough calculations of life expectancy for the Inuit-identity residents would change, putting the two more southern regions on

the bottom and the two Arctic regions on top. Under these assumptions, Inuit life expectancy would have been 60.2 years (95% CI 58.6 to 61.8) in Nunavik, 60.6 years (95% CI 58.1 to 63.1) in Nunatsiavut, 64.4 years (95% CI 62.1 to 66.7) in the Inuvialuit region, and 66.2 years (95% CI 65.0 to 67.4) in Nunavut.

### Limitations

This study used a geographic-based approach, and hence, the estimates (except those made hypothetically in the preceding Discussion) are for regions rather than for ethnic groups. That seriously limits how the findings may be interpreted, but it also has two useful implications. First, all residents of the Inuit-inhabited areas, regardless of ethnicity, may experience similar isolation and difficulty accessing health care and other services. Second, health care and other services are provided mainly on a geographic as opposed to an ethnic basis, so

the target population of such services is all residents of a particular area.

Annual population estimates corrected for net census undercount are not available for census subdivisions, so uncorrected population counts were used to determine person-years at risk. This would have led to a slight overestimate of mortality rates and a corresponding slight underestimate of life expectancy—by about -0.1 year, to judge by a comparison of life tables for Nunavut calculated for 1999-2003 (data not shown) with those based on corrected population estimates.<sup>6</sup>

In the life table calculations, arbitrary values for Chiang's *a* were used, rather than values published for other populations or values calculated specifically for this population. However, use of a wide range of plausible alternative values had only a slight impact on life expectancy at birth: less than one-tenth of a year (data not shown), which is negligible compared with the typical 95% confidence intervals of roughly plus or minus one year in this study.

Deaths to residents of the Inuit-inhabited areas that occurred outside Canada or the United States are not included in Canadian vital statistics, so a few deaths may have been missed. This limitation also applies to deaths to residents of the rest of Canada.

Few long-term care facilities are located in the Inuit-inhabited areas. Former residents of those areas who moved south for long-term care could have been counted as residents of the south at the time of their death. This could result in an undercount of deaths at advanced ages for the usual residents of the regions considered in this study.

With a cut-off of at least 33% Inuit, 5% of the population of the Inuit-inhabited areas were other Aboriginal, and another 15%, non-Aboriginal. While the other Aboriginal group had socioeconomic characteristics similar to those of the Inuit and probably somewhat higher life expectancy, the non-Aboriginal group had much more favourable socio-economic characteristics and probably considerably higher life expectancy. This mixing of high- and low-mortality populations would be expected to reduce overall mortality rates, an effect that might have been apparent had it been possible to confine the study to Inuit rather than to Inuit-inhabited areas.

### **Summary and conclusion**

Areas where at least 33% of residents were Inuit were identified, and census population counts and vital statistics death data were used to calculate life tables for those areas during three five-year periods: 1989 through 1993 (centered around 1991), 1994 through 1998 (1996), and 1999 through 2003 (2001). The population of these areas was 80% Inuit, and included 81% of all Inuit in Canada. In 1991, life expectancy in the Inuit-inhabited areas was approximately 10 years less than for Canada as a whole. And from 1991 to 2001, while life expectancy for Canada overall rose by about two years, it did not increase in the Inuit-inhabited areas (and may have fallen by about a year), further widening the gap.

Analysis of 2001 census data revealed lower levels of education and income, and poorer employment and housing conditions in the Inuit-inhabited areas compared with Canada as a whole, and within the Inuit-inhabited areas, for Inuit compared with the non-Aboriginal population. Any or all of these factors, in addition to others such as lifestyle risk factors and environmental conditions, <sup>28</sup> about which information was not available from death registrations, could be at least partly responsible for the lower life expectancy in the Inuit-inhabited areas. Moreover, although the calculations for these areas are dominated by the life expectancy of Inuit residents, they likely also reflect the presumably higher life expectancies of non-Aboriginal and other Aboriginal residents.

Over the entire study period, the infant mortality rate was approximately four times higher in the Inuitinhabited areas, compared with all Canada. However, the absolute difference in the rates fell by 30% from 1989-1993 to 1999-2003, indicating considerable progress with respect to this key health indicator, although much remains to be accomplished.

This geographic-based method of identifying areas with a high proportion of Inuit residents could be useful for compiling a broad range of administrative data, including birth registrations, hospital morbidity statistics, and disease registry data. Future extensions of this research will examine

causes of death in the Inuit-inhabited areas, and conceptually similar analyses will be undertaken for areas with a high proportion of First Nations and of Métis people. However, other methods of compiling data relevant to Aboriginal health should be considered, such as data linkages to Aboriginal population registries<sup>29,30</sup> and self-reporting (or reporting by next-of-kin) in vital statistics<sup>31</sup> and other health records.

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### **Appendix**

Table A Inuit-inhabited communities and corresponding postal codes and census subdivision (CSD) codes, by region, Canada

CSD 1996	CSD 2001	Postal code	CSD type	CSD name (alternate names, notes)
Inuvialuit region (No 6107025 6107017 6107036	orthwest Territories) - 6 o 6107025 6107017 6107036	communities (shown X0E0A0 X0E0T0 X0E1C0	ordered from West to I HAM T HAM	East) Aklavik Inuvik Tuktoyatuk (formerly Port Brabant)
6107014 6107041 6108095	6107014 6107041 6107095	X0E1N0 X0E0Z0 X0E0S0	SET HAM HAM	Paulatuk Sachs Harbour (Ikahuak) Holman (now Ulukhaktok as of 1 April 2006; note change of census division)
Nunavut (entire territ	ory) - 28 communities (s	shown ordered by C	SD 2001)†	
	Baffin) Region - 14 com			Casililuan
6104001 6104003	6204001 6204003	X0A0W0 X0A1H0/0H0	HAM T	Sanikiluaq Iqaluit (formerly Frobisher Bay)
6104005	6204005	X0A0N0	HAM	Kimmirut (formerly Lake Harbour)
6104007	6204007	X0A0C0	HAM	Cape Dorset (Kinngait)
6104009	6204009	X0A0R0	HAM	Pangnirtung (Pangniqtuuq)
6104010	6204010	X0A0B0	HAM	Qikiqtarjuaq (formerly Broughton Island)
6104011	6204011	X0A0K0	HAM	Hall Beach (Sanirajak)
6104012	6204012	X0A0L0	HAM	Igloolik (Iglulik)
6104015 6104018	6204015 6204018	X0A0E0 X0A0A0	HAM HAM	Člyde River (Kangiqtugaapik) Arctic Bay (Ikpiarjuk)
6104019	6204019	X0A0A0 X0A0X0	SET	Nanisivik
6104020	6204020	X0A0S0	HAM	Pond Inlet (Mittimatalik)
6104022	6204022	X0A0V0	HAM	Resolute (Qausuittuq)
6104025	6204025	X0A0J0	HAM	Grise Fiord (Aujuittuq)
6104030	6204030	X0A0G0	UNO	Baffin, Unorganized (Canada Post=Eureka; weather station/military base)
	watin) Region - 7 comm			
6105014	6205014	X0C0C0	HAM	Coral Harbour (Salliq)
6105015	6205015	X0C0E0	HAM	Arviat (formerly Eskimo Point)
6105016 6105017	6205016 6205017	X0C0J0 X0C0G0	HAM HAM	Whale Cove (Tikirarjuaq)
6105017	6205017	X0C0G0 X0C0B0	HAM	Rankin Inlet (Kangiqiniq or Kangirliniq) Chesterfield Inlet
6105023	6205023	X0C0A0	HAM	Baker Lake (Qamanit'uaq)
6105027	6205027	X0C0H0	HAM	Repulse Bay (Naujaat)
6105033	6205033	*****	UNO	Keewatin, Unorganized
	communities + 1 unorga			
6108047	6208047	X0B0K0	HAM	Kugaaruk (formerly Pelly Bay)
6108059	6208059	X0B0E0	HAM	Kugluktuk (Qurluqtuq; formerly Coppermine)
6108065	6208065	X0B2A0	SET	Bathurst Inlet (Kingoak)
6108068 6108073	6208068 6208073	X0B2A0 X0B0C0	SET HAM	Umingmaktok (Umingmaktuuq formerly Bay Chimo and still that for Canada Post) Cambridge Bay (Iqaluktuuttiaq)
6108081	6208081	X0B1J0	HAM	Gjoa Haven (Uqsuquqtuuq)
6108087	6208087	X0B1B0	HAM	Taloyoak (Talurjuaq; formerly Spence Bay)
6108098	6208098	*****	UNO	Kitikmeot, Unorganized
Nunavik (Quebec) -	14 communities (most o	f which each have t	wo CSD codes)	
	on Strait - 8 communitie	s (shown ordered fro	om East to West)	
2499090	2499090	J0M1N0	VN	Kangiqsualujjuaq (formerly George River)
2499894	2499894	J0M1N0	TI	Kangiqsualujjuaq
2499095	2499095	J0M1C0	VN	Kuujjuaq (formerly Fort Chimo)
2499893	2499893	J0M1C0	TI	Kuujjuaq
2499100 2499892	2499100 2499892	J0M1T0 J0M1T0	VN TI	Tasiujaq
2499092 2499105	2499092 2499105	J0M1X0	VN	Tasiujaq Aupaluk
2499891	2499891	J0M1X0	TI	Aupaluk
2499110	2499110	J0M1A0	VN	Kangirsuk
2499890	2499890	J0M1A0	TI	Kangirsuk
2499115	2499115	J0M1J0	VN	Quaqtaq (formerly Koartuk)
2499889	2499889	J0M1J0	TI	Quaqtaq

Table A Inuit-inhabited communities and corresponding postal codes and census subdivision (CSD) codes, by region, Canada continued

CSD 1996	CSD 2001	Postal code	CSD type	CSD name (alternate names, notes)
2499130	2499130	J0M1K0	VN	Kangiqsujuaq (formerly Wakeham Bay)
2499888	2499888	J0M1K0	TI	Kangiqsujuaq (formerly Payne Bay)
2499135	2499135	J0M1S0	VN	Salluit (formerly Sugluk)
2499887	2499887	J0M1S0	TI	Salluit
Hudson Bay coast	- 6 communities (sho	own ordered North to S	South)	
2499140 <sup>°</sup>	2499140 `	J0M1H0	ÝΝ	lvujuvik
2499125	2499125	J0M1V0	VN	Akulivik
2499883	2499883	J0M1V0	TI	Akulivik
2499120	2499120	J0M1P0	VN	Puvirnituq (formerly Povungnituk, and still that for Canada Post)
2499085	2499085	J0M1M0	VN -	Inukjuak (formerly Port Harrison)
2499879	2499879	JOM1M0	TI	Inukjuak
2499080 2499075	2499080	J0M1Y0	VN	Umiujaq
2499075 2499816	2499075 2499816	J0M1G0 J0M1G0	VN TR	Kuujjuarapik (formerly Great Whale / Poste-de-la-Baleine) Whapmagoostui (formerly Great Whale / Poste-de-la-Baleine)
2499070	2499070	J0M1G0	VC	Whapmagoostui (formerly Great Whale / Poste-de-la-Baleine)
Nunatsiavut (Labr	ador) - 6 communitie	s and 1 unorganized a	area (shown orde	ered North to South)
1010056	1010056	A0P1L0	T	Nain
1010048	1010048	A0P1G0	T	Hopedale
1010044	1010044	A0P1J0	Ţ	Makkovik
1010059	1010059	A0P1N0	T	Postville
1010042	1010042		SUN	Division No. 10 to Subd E (nr Nain, Hopedale, Makkovik, Postville)
1010021	1010021	A0P1P0	I T	Rigolet
1010022	1010022	A0P1M0	T	North West River

<sup>&</sup>lt;sup>†</sup> Nunavut had only rural postal codes. All postal codes beginning with X0A or X0B or X0C are for Nunavut and only Nunavut.

Notes: Census subdivision (CSD) types defined as follows: HAM=Hamlet; T=Town; SET=Settlement; SUN=Subdivision of unorganized area; TI=Terre inuite (Inuit lands); UNO=Unorganized area; VN=Village nordique (Nordic village); VC=Village cri (Cree village). Asterisks in the postal code field means no postal code assigned for this unorganized and essentially unpopulated area. For most of these communities, 1991 and 1996 CSD codes were identical. Exceptions were 1996 CSD 6108095 (Holman) became 2001 CSD 6107095 (now Ulukhaktok), and the first two digits of each CSD in what is now Nunavut changed from "61" in the 1996 CSD to "62" in the 2001 CSD. To use these CSD-based definitions with vital statistics birth, death or stillbirth records, vital statistics geographic codes must first be translated to census standard geographic codes for the nearest census year or 'vintage,' since the vital statistics geographic codes contain various kinds of non-standard codes, including codes specific to vital statistics, inter-censal revised codes, and codes from previous vintages of census standards. Postal codes are shown for reference only, since death data for the northern territories frequently lacked postal codes, so only census subdivision codes (which were always present) were used in the definitions of Inuit-inhabited areas.