ABSTRACT

Objectives. The objective of this article is to measure the contributions of age groups and causes of death to differences in mortality and life expectancy between residents of Inuit Nunangat and the rest of Canada.

Study design. The geographic area of coverage includes communities within Inuit Nunangat, with the addition of Inuvik in the Northwest Territories. Deaths were compiled for 2 5-year periods, 1994 through 1998 and 1999 through 2003, with the mid-year centred on the 1996 and 2001 censuses.

Methods. Abridged life tables were constructed according to the revised Chiang method. Age decomposition of differences in life expectancy and cause-deleted life tables were calculated using a discrete approach. The age groups and causes contributing to differences in life expectancy between Inuit Nunangat and the rest of Canada were calculated.

Results. Specific age groups contribute more to the difference in life expectancy between Inuit Nunangat and the rest of Canada. For males, over 50% of the difference in life expectancy is due to excess mortality before 25 years of age, while for females nearly 65% is due to excess mortality after the age of 60.

Conclusions. Cancer is a major contributor to the difference in life expectancy between residents of Inuit Nunangat and the rest of Canada; reduction in cancer rates would make the greatest contribution to gains in life expectancy. There are clear gender differences in life expectancy and mortality, with the total effect of mortality being greatest for males between 15 and 25 years of age and for females over the age of 60.

(Int J Circumpolar Health 2010; 69(1):38-49)

Keywords: Inuit, Canada, life expectancy, mortality, Inuit Nunangat
INTRODUCTION

Previous research has shown large differences in life expectancy for the population residing in the Inuit-inhabited areas compared to the rest of Canada (1). Life expectancy for the population in the Inuit areas was estimated as being 12 years less than average life span in the rest of Canada in 2001 and has likely decreased in the past decade. Numerous other studies have examined health and disease of the Inuit and other peoples in Canada’s circumpolar north (2–4). Cancer in general is increasing among the Inuit and this population is at an extremely high risk relative to non-Inuit and global populations (5). The hospitalization rate for lower respiratory tract infections for Inuit children is the highest in the world (6). Completed suicides among the Inuit occur at much higher rates than the Canadian population as a whole (7), particularly for males under 30 years of age. However, research has not yet examined the extent to which mortality by age groups and selected causes contribute to differences in life expectancy between these populations. This article analyses what age groups and causes of death contribute to differences in life expectancy between all residents in the Inuit Nunangat region of Canada as compared to the population in the rest of Canada.

Inuit Nunangat is the term used to describe the homeland of the Inuit of Canada in 4 regions. The 2001 census enumerated 45,070 Inuit in Canada, with 37,617 (83%) residing within the Inuit Nunangat land claims area (Fig. 1). Nunavut territory contained 22,567 Inuit, accounting for half of the total Inuit population in Canada and 85% of the population in the territory. Nunavik was home to 8,721 Inuit (84% of the regional population), the Inuvialuit region had a population of 2,994 Inuit (58% of the regional population) and Nunatsiavut had a population of 2,575 Inuit (69% of the regional population) (8). The entire Inuit population in Canada grew by 26% from 1996 to 2001, compared to 8% growth for the total Canadian population.

The socio-economic characteristics of the population in Inuit Nunangat differ from those of the total Canadian population (Table 1). Of the 46,960 individuals in the study area in 2001, 37,617 self-identified as Inuit, 2,465 self-identified as other-Aboriginal and 6,877 were neither Inuit nor other-Aboriginal. In 2001, the population in this region was much younger than the Canadian population as a whole, with fewer individuals 65 years of age or older as a percentage of the total population. Adults in Inuit Nunangat had less formal education and a higher percentage had not graduated from secondary school. The unemployment rate was higher than in Canada as a whole and there was a lower employment-to-population ratio. Household incomes were lower and the average household size was larger, so the average income per person was lower. Additionally, a much greater proportion of housing in Inuit Nunangat was in need of major repairs and household crowding was prevalent.

MATERIAL AND METHODS

Data sources

Vital statistics death records and census population estimates were used to calculate life expectancy for residents of the study area. Calendar-year deaths were compiled for 2 5-year periods: 1994 through 1998 and 1999 through 2003. The mid-year of these 2 periods was centred
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This allowed for use of the adjusted post-censal population estimates to approximate person-years at risk, adjusted for population undercoverage and the components of population growth. Person-years at risk were estimated by multiplying the adjusted population estimates for each mid-period census by a factor of 5.

Vital statistics death records were taken from the Canadian Mortality Database (CMDB). The CMDB contains demographic and medical (cause of death) information from all provincial and territorial vital statistics registries on all deaths in Canada. Deaths were compiled based on the usual place of residence, regardless of where the death occurred. This allowed for the deaths of Inuit Nunangat residents that occurred outside the region to be reported as taking place in their respective home communities.

Table 1. Selected sociodemographic characteristics, all Canada and population groups in the Inuit Nunangat, 2001.

|                         | Canada | Inuit-inhabited areas |              |              |              |
|-------------------------|--------|-----------------------|--------------|--------------|--------------|
|                         | Total  | Total                 | Inuit        | Other Aboriginal | Non-Aboriginal |
| Total Population (#)    | 31,019,020 | 46,960               | 37,617       | 2,465         | 6,877         |
| Population change (% 1996 to 2001) | 4.8    | 8.4                   | 10.7         | 5.9           | -5.5          |
| Sex (%)                 | Male   | 49.1                  | 51.5         | 50.8          | 48.6          | 55.9          |
| Age (years)             | 0 to 14| 19.4                  | 36.6         | 40.3          | 37.3          | 16.0          |
|                         | 15 to 64| 68.4                 | 60.3         | 56.4          | 58.4          | 82.0          |
|                         | 65 or older| 12.2                | 3.2          | 3.3           | 4.3           | 2.0           |
| Education (%)           | No high school | 22.7              | 39.9         | 51.5          | 36.7          | 7.5           |
|                         | High school with/without trades | 36.8          | 33.6         | 33.9          | 39.3          | 31.7          |
|                         | Post-secondary non-university | 20.8          | 16.0         | 13.2          | 18.2          | 23.5          |
|                         | University degree | 19.7          | 10.5         | 1.3           | 5.8           | 37.3          |
| Employment              | Unemployment rate | 7.4           | 16.8         | 22.2          | 13.3          | 3.3           |
|                         | Participation rate | 66.4          | 67.0         | 61.2          | 60.2          | 91.2          |
| Occupation (%)          | Management | 10.2          | 9.2          | 5.6           | 9.2           | 19.1          |
|                         | Professional | 15.5          | 17.7         | 13.5          | 11.5          | 30.6          |
|                         | Skilled     | 29.9          | 27.8         | 27.5          | 30.9          | 27.9          |
|                         | Semi-skilled | 31.5          | 24.3         | 27.0          | 25.0          | 16.5          |
|                         | Unskilled   | 13.0          | 21.1         | 26.4          | 23.4          | 5.9           |
| Income                  | Average household income | 58,000       | 56,000       | 45,000        | 53,000        | 83,000        |
|                         | Average household income per person | 25,000       | 21,000       | 13,000        | 18,000        | 42,000        |
| Housing                 | In need of major repairs (%) | 8.2           | 20.6         | 23.1          | 24.1          | 13.4          |
|                         | Average household size | 2.6            | 3.7          | 4.2           | 3.7           | 2.4           |
| Migration (%)           | Same residence 1 year ago | 94.9          | 91.4         | 95.5          | 90.1          | 75.9          |
|                         | Same residence 5 years ago | 84.1          | 80.9         | 90.1          | 79.6          | 45.3          |

Source: 2001 Census of Canada.
Methods

The geographic area of coverage for this analysis included all communities within the Inuit Nunangat land claims boundary plus Inuvik in the Northwest Territories (Fig. 1). Inuit Nunangat consists of 4 Inuit land claims settlement areas: Inuvialuit Region, Nunavut, Nunavik, and Nunatsiavut. For this analysis, the 4 regions have not been analysed separately.

Calculation of life expectancy was conducted separately for males and females. Age was grouped into 17 groups (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 and 75 years or more). For each sex by age group combination, the death rate was calculated as the number of deaths divided by the estimated person-years at risk.

Causes of death were grouped by codes in the International Classification of Diseases 9th and 10th editions (ICD-9 and ICD-10). Given the small number of deaths for the population under study, it was only possible to group using aggregate classifications rather than specific disease types. Disaggregating by detailed causes of death did not provide for a sufficient number of deaths to have statistical confidence in the results. Deaths were classified as all neoplasms (cancers), circulatory diseases, respiratory diseases, unintentional injury, suicide and self-inflicted injuries and other causes.

Figure 1. Inuit regions and communities within the Inuit Nunangat land claims area.
Abridged life tables were constructed according to the revised Chiang method, along with associated variances, standard errors and 95% confidence intervals (9). The value of \( a \) (the average person-years lived in the interval divided by those dying in the interval) for the last interval of life lived was set to 0.1 for the youngest age group, to reflect high infant mortality, and to 0.5 for all other groups. The revised method differs in the calculation of the standard error in that it allows for 0 deaths in a given age group as the calculation of the variance of the probability of death (\( \text{var}(q_x) \)) involves multiplying by the mortality rate. This has been shown to be a preferred option for small areas, rather than imputing values into age bands with 0 deaths (10).

Differences in life expectancy at birth by age group were calculated using the discrete method of decomposition (11) and applied to abridged life tables (12). This demographic technique can be used to measure the contribution of specific causes of death to the total years of difference between the life expectancy of 2 populations. Here, it is used to estimate what age-specific mortality differences contribute to the total difference in life expectancy between the populations of Inuit Nunangat and Canada. The Canadian population excluding residents of Inuit Nunangat was compared to the population of Inuit Nunangat. The total effect (\( \Delta_0 \)) for a given age group was calculated as the contribution of mortality difference in an age group (\( x \) to \( x+n \)) to differences in life expectancies at birth between 2 populations (12–13).

Cause-deleted life expectancy was calculated via a single decrement life table for selected major causes of death, where cause-deleted mortality rates were calculated by subtracting the cause-specific mortality rate from the overall mortality rate (14). The results of this analysis provide the adjusted life expectancy at birth in the absence of specific causes of death. The causes of death included were neoplasms (all cancer), circulatory diseases, respiratory diseases, unintentional injuries suicide and self-inflicted injuries and other causes. These were calculated for both males and females.

Age and cause decomposition of differences in life expectancy at birth was calculated for all age groups and select causes of death. The method employed is an extension of that used to estimate the contribution of age-specific mortality differences to overall differences between the life expectancies at birth for 2 populations (11). This method assumes that the distribution of deaths by cause is constant within each age group in each population. Under this assumption, the contribution of differences in all-cause mortality in a specific age group can be distributed proportionally to the difference in cause-specific mortality in the corresponding age group (13). This method is more instructive than simple cause-deleted life expectancy as it compares the differences in life expectancy that would be achieved for Inuit Nunangat if its population had the same age-specific mortality rates as the rest of Canada.

RESULTS

The results of this analysis centre on the examination of differences in life expectancy between residents of Inuit Nunangat and the rest Canada and on the composition of those differences by age groups and cause
of death. There were large differences in life expectancy between the population in Inuit Nunangat and the rest of Canada (Table II). The overall difference in life expectancy at birth for males was 9.1 years for the 1994–1998 period, increasing to 11.9 years for the 1999–2003 period. The difference for females was 9.0 years for the 1994–1998 period and 12.3 years for the 1999–2003 period. While the life expectancy for males was lower for residents of Inuit Nunangat than in the rest of Canada, the differences between males and females in the two populations was roughly the same.

Differences in life expectancy at age 65 were also apparent, where for the 1994–1998 period there was a 2.5 year difference for males, and 4.0 years for the 1999–2003 period. The gap between females in Inuit Nunangat and the rest of Canada was wider than for males in the 1999–2003 period (8.7 years) and was an increase from the 1994–1998 period (4.6 years).

**Differences in life expectancy:**

**Age-specific contributions**

Furthering the calculations on life expectancy, Figure 2 displays the contribution of age groups to the differences in life expectancy between Inuit Nunangat and the rest of Canada for the 1999–2003 period. This figure displays some clear sex-specific differences in the contribution of each age group to the differences in life expectancy. The largest contributions to the difference were for those less than 1 year of age for males and females, 15 through 24 years of age for males, and those over 65 years of age for both sexes. Mortality for those less than 1 year of age in 1999–2003 contributed to 8.5% of the difference in life expectancy for males and 8.1% for females.

| Table II. Life expectancy, at birth and at age 65 with confidence interval, by sex, 5-year average, Canada and Inuit Nunangat, 1994–1998, 1999–2003. |
|---------------------------------|-----------------|-----------------|-----------------|-----------------|
| 1994–1998                       | Inuit Nunangat  | Canada          | Difference      |
|                                 | Years (A)       | Years (B)       | A-B             |
|                                 | 95% confidence  | 95% confidence  |                  |
|                                 | interval        | interval        |                  |
| At birth                        |                 |                 |                  |
| Males                           | 66.4            | 75.5            | -9.1            |
| (65.2 to 67.5)                  | (75.4 to 75.5)  |                  |
| Females                         | 72.2            | 81.2            | -9.0            |
| (71.1 to 73.4)                  | (81.1 to 81.3)  |                  |
| At age 65                        |                 |                 |                  |
| Males                           | 13.6            | 16.1            | -2.5            |
| (12.6 to 14.6)                  | (16.0 to 16.1)  |                  |
| Females                         | 15.4            | 20.0            | -4.6            |
| (14.4 to 16.4)                  | (19.9 to 20.0)  |                  |
| 1999–2003                       |                 |                 |                  |
| At birth                        |                 |                 |                  |
| Males                           | 65.1            | 77.0            | -11.9           |
| (64.0 to 66.2)                  | (76.9 to 77.1)  |                  |
| Females                         | 69.8            | 82.1            | -12.3           |
| (68.8 to 70.9)                  | (82.0 to 82.2)  |                  |
| At age 65                        |                 |                 |                  |
| Males                           | 13.1            | 17.1            | -4.0            |
| (12.4 to 13.9)                  | (17.0 to 17.1)  |                  |
| Females                         | 11.9            | 20.6            | -8.7            |
| (11.1 to 12.8)                  | (20.5 to 20.6)  |                  |

Sources: Statistics Canada, Vital Statistics — Deaths Database; Statistics Canada, Demography Division, customized data request.
Deaths among 15- to 19-year-olds and 20- to 24-year-olds contributed the most to differences in life expectancy for males. In the 15–19 year age group, excess mortality in the male population contributed to 23.6% of the difference between Inuit Nunangat and the rest of Canada. This was significantly lower for females at 6.3%. Deaths in the 20–24 year age group contributed to 14.5% of the difference for the male population. These differences stand in contrast to contributions on the order of 5% per age group for males from 25 through 49 years of age.

In the age groups over 60, the age-specific mortality contribution to differences in life expectancy increased in comparison to younger age groups. For females in the 65–69 age group, excess mortality contributed to 16.6% of the life expectancy difference for the 1994–1998 period and 20.1% for the 1999–2003 period. A total of 64.3% of the difference in female life expectancy was due to excess mortality in the last 4 age groups. In each of the age groups, females have higher contributions to differences in life expectancy than males.

**Cause-deleted life expectancy**

Table III displays life expectancy at birth for residents of Inuit Nunangat in the absence of specific causes of death. The difference column shown in Table III represents what the change in life expectancy would be within Inuit Nunangat if all deaths from a specific cause were removed. For males and for females, cancer-related deaths had the largest effect on life expectancy, whereby eliminating cancer-related deaths increased life expectancy by 4.6 years for both males and females in the 1994–1998 period and by 4.6
years for males and 4.5 years for females in the 1999–2003 period.

For males in the 1994–1998 period, the largest contributors to life expectancy were cancers (4.6 years), circulatory diseases (4.6 years) and unintentional injury (3.6 years). This changed in the 1999–2003 period in which the largest contributors were cancers, (4.6 years) suicide and self-inflicted injury (4.6 years) and circulatory diseases (3.5 years). For females the largest contributors were cancers (4.5 years), respiratory diseases (3.9 years) and circulatory diseases (2.7 years) for the 1994–1998 period. These causes did not change greatly for the 1999–2003 period, although the change that would occur from the elimination of respiratory diseases was reduced to 2.7 years.

Age- and cause-adjusted life expectancy for residents of Inuit Nunangat

In the final stage of analysis, the age-cause mortality schedule from the rest of Canada was applied to the population living in Inuit Nunangat. This allowed for an examination of what age groups and causes of death contributed to the differences in life expectancies between the 2 groups (Table IV). The results of this analysis show the change in life expectancy for residents of Inuit Nunangat if they were to have the same age- and cause-specific mortality as the rest of Canada.

For males, the largest differences were for suicide and self-inflicted injury, which accounted for 2.9 years of the difference in life expectancy for the 1994–1998 period and 4.8 years in the 1999–2003 period. The contribution of unintentional injury to differences in life expectancy decreased by 0.5 years between the 1994–1998 and 1999–2003 periods. While the number of years of difference remained constant (1.3 years), the percent difference for respiratory diseases decreased. For cancers there was an increase of 0.7 years in the life expectancy differences between the 1994–1998 and 1999–2003 periods.

For females, the largest differences were in respiratory diseases (3.4 years), cancers (2.1 years) and unintentional injury (1.6 years) for 1994–1998, and cancers (3.8 years), respiratory diseases (3.4 years) and circulatory diseases (1.7 years) for 1999–2003. The contribution of circulatory disease to difference in life expectancy changed from being negative (-0.4 years) in 1994–1998 (lower mortality due to circulatory disease in Inuit Nunangat) to positive (1.7 years) in 1999–2003. However, this may be due to statistical error given the small number of deaths for this population group. While the contribution of respiratory disease remained constant for years of difference between the 2 time periods (3.4 years), the percentage dropped. This is due to the fact that there was a greater overall difference in life expectancy between the 2 populations in 1999–2003 than in 1994–1998, which was reflected in the increased contribution in years for all causes of death except respiratory diseases.

In 2001, life expectancy for residents of Inuit Nunangat was similar to Aboriginal or Indigenous groups in other countries (Table V). In particular, life expectancy for both males and females was similar to that of Greenland, which is largely and Inuit population and similar to Alaska Natives (only 47% of whom are Inuit). In comparison to countries outside the circumpolar areas, life expectancy is slightly lower than it is for New Zealand Māori or Australian Indigenous.
Table III. Life expectancy at birth in the absence of specific causes of death with confidence interval, by sex, 5-year average, Inuit Nunangat, 1994–1998, 1999–2001.

|           | 1994–1998 | 1999–2003 |
|-----------|-----------|-----------|
|           | Adjusted life expectancy | 95% confidence interval | Difference | Adjusted life expectancy | 95% confidence interval | Difference |
| **Males** |           |           |           |                         |           |           |
| All cancers | 71.0 (Crude LE: 66.4) | (70.3 to 71.6) | 4.6  | 69.7 (Crude LE: 65.1) | (69.2 to 70.2) | 4.6  |
| Circulatory diseases | 71.0 | (70.3 to 71.7) | 4.6  | 68.6 | (68.1 to 69.1) | 3.5  |
| Respiratory diseases | 68.9 | (68.2 to 69.5) | 2.5  | 66.9 | (66.4 to 67.4) | 1.8  |
| Unintentional injury | 69.9 | (69.3 to 70.6) | 3.6  | 67.9 | (67.4 to 68.4) | 2.8  |
| Suicide & self-inflicted | 69.3 | (68.7 to 70.0) | 3.0  | 69.7 | (69.2 to 70.2) | 4.6  |
| Other cause of death | 70.1 | (69.4 to 70.8) | 3.7  | 68.5 | (67.9 to 69.0) | 3.4  |
| **Females** |           |           |           |                         |           |           |
| All cancers | 76.8 (Crude LE: 72.2) | (75.9 to 77.6) | 4.5  | 74.3 | (Crude LE: 69.8) | 4.5  |
| Circulatory diseases | 74.9 | (74.0 to 75.8) | 2.7  | 72.6 | (71.9 to 73.4) | 2.8  |
| Respiratory diseases | 76.1 | (75.2 to 77.1) | 3.9  | 72.5 | (71.8 to 73.2) | 2.7  |
| Unintentional injury | 73.9 | (73.1 to 74.8) | 1.7  | 71.4 | (70.7 to 72.0) | 1.5  |
| Suicide & self-inflicted | 73.1 | (72.3 to 74.0) | 0.9  | 70.9 | (70.2 to 71.6) | 1.1  |
| Other cause of death | 77.3 | (76.3 to 78.3) | 5.1  | 72.9 | (72.2 to 73.6) | 3.1  |

Sources: Statistics Canada, Vital Statistics – Deaths Database; Statistics Canada, Demography Division, customized data request.

Table IV. Decomposed difference in life expectancies between Inuit Nunangat and the rest of Canada, years (%), by sex, 1994–1998, 1999–2003.

|           | 1994–1998 | 1999–2003 |
|-----------|-----------|-----------|
|           | Males | Females | Males | Females |
| Cause of death | Years | % | Years | % | Years | % | Years | % |
| All Cancers | 1.1 (11.2) | 2.1 (19.8) | 1.8 (14.0) | 3.8 (27.1) |
| Circulatory diseases | 0.2 (2.4) | -0.4 (3.6) | 0.7 (5.6) | 1.7 (11.9) |
| Respiratory diseases | 1.3 (13.7) | 3.4 (31.8) | 1.3 (10.4) | 3.4 (24.4) |
| Unintentional injury | 2.9 (29.8) | 1.6 (14.7) | 2.4 (19.0) | 1.6 (11.6) |
| Suicide & self-inflicted injury | 2.9 (29.5) | 1.0 (9.1) | 4.8 (37.7) | 1.2 (8.6) |
| Other causes | 1.3 (13.5) | 3.0 (28.3) | 1.7 (13.4) | 2.3 (16.4) |
| Total | 9.8 (100.0) | 10.6 (100.0) | 12.8 (100.0) | 14.0 (100.0) |

Sources: Statistics Canada, Vital Statistics – Deaths Database; Statistics Canada, Demography Division, customized data request.

Table V. Regional and international comparisons of life expectancy at birth.

|                    | Years | Life expectancy |
|--------------------|-------|-----------------|
|                    |       | Males | Females |
| Inuit Nunangat     | 1996 (1994–1998) | 66.4 | 72.2 |
|                    | 2001 (1999–2003) | 65.1 | 69.8 |
|                    | 2001   | 70.4 | 75.5 |
| First Nations of Canada | 2001 | 77.0 | 82.1 |
| Canada (excluding Nunangat) | 2001 (1999–2003) | 77.0 | 82.1 |
| Other countries and regions |       |       |       |
| Greenland (total population) | 2001 | 64.8 | 72.0 |
| Alaska Natives     | 1995 (1990–1999) | 66.5 | 74.3 |
| Russian north (Chukotskiy okrug) | 2005 | 46.9 | 55.4 |
| Norwegian (Sami Development Fund area) | 2006 | 75.3 | 81.9 |
| New Zealand Māori  | 2001 (2000–2002) | 69.0 | 73.2 |
| Australian Indigenous | 2009 (est.) | 67.2 | 72.9 |

Sources: Vital statistics and Census of Population, Statistics Canada; Indian and Northern Affairs Canada 2005 (15); CIA World Factbook 2001 (16); ISER 2004 (17); Petrov AN 2008 (18); Statistics Norway 2009 (19); Statistics New Zealand 2004 (20); Pink B, Ailbhe P 2009 (21).
DISCUSSION

In both of the time periods studied, life expectancy was lower for residents in Inuit Nunangat as compared to the rest of Canada. The gap in life expectancy at birth widened between the 1994–1998 and 1999–2003 periods by 2.8 years for males and 3.3 years for females. This difference was due to both an increase in life expectancy for the rest of the Canadian population and a decrease in life expectancy for the population of Inuit Nunangat. However, these differences were not seen equally between the sexes, across age groups or in causes of death.

Certain age groups contributed to the difference in life expectancy more than others. For example, among males, deaths among those between the ages of 15 and 24 contributed 38.1% of the 11.9 year difference in life expectancy in the 1999–2003 period. Furthermore, over 50% of the difference in life expectancy between males in Inuit Nunangat and males in the rest of Canada was due to mortality before 5 years of age. This differs in the Canadian population, where mortality from suicide and self-inflicted injury is higher in those over 30 years of age. This distribution was different for females, where deaths at later ages exerted a greater contribution to differences in life expectancy, with nearly 65% of the difference due to excess mortality after the age of 60. In both time periods, mortality in the lowest age group (less than 1 year of age) contributed a large but decreasing share of the difference in life expectancy. These results suggest that the relative risk for males and females as compared to the Canadian population is greatest under 40 years of age. However, for males over the age of 75, the increased relative risk as compared to the Canadian population is negligible or negative. For females, this shift in risk occurs over the age of 90.

Specific causes of death had a large influence on changes in life expectancy for the population in Inuit Nunangat. For instance, if the suicide rate for males in Inuit Nunangat was the same as for the rest of Canada from 1999 to 2003, life expectancy for males in Inuit Nunangat would have increased by 4.8 years. Similarly, for females in the 1999–2003 period, if the mortality rate due to respiratory diseases was the same in Inuit Nunangat as it was for the rest of Canada, there would be a 3.4 year increase in life expectancy. For males, the key causes of death contributing to differences in life expectancy were unintentional, suicide and self-inflicted injuries in both periods studied. For females, the key causes of death contributing to differences in life expectancy were cancers and respiratory diseases.

Within the broad diagnosis of all cancers combined (malignant neoplasms), lung cancer (trachea, bronchus and lung) was the largest contributor to the difference in life expectancy, with almost 45% of all deaths due to this type of cancer. Colorectal cancer was also a key contributor to the difference in life expectancy, with approximately 15% of all deaths due to this type of cancer (22). Prostate cancer for males and breast cancer for females, while significant, were not major contributors to the total number of cancer deaths in the periods studied.

Applying the decomposition technique to life expectancy data provides additional information regarding health disparities between populations. This method provides more precision for trend analysis on specific causes of death and the vulnerability of specific
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age groups, on which informed decisions can be made to reduce the life expectancy gap between residents of Inuit Nunangat and the rest of Canada.

Information on Aboriginal identity was not available from vital statistics, thus a geographic approach was used to identify the regions inhabited primarily by Inuit populations (23). Therefore, the results from this study are for all residents of Inuit Nunangat, not just the Inuit population. However, other residents of this geographic area would have similar access to health care and social services. These services are largely provided on a geographic basis, so the target population is all residents of a particular area. In addition, given that few long-term or intensive care facilities are located within Inuit Nunangat, residents who moved south for care could have been counted as residents of the province in which they received care.

In remote communities, records of the cause of death may be inaccurate for a number of reasons, including lack of skilled health personnel, lack of diagnostic resources before death and problems accessing or utilizing post mortems. Incorrect or insufficient coding of mortality represents a significant challenge to the monitoring of a population’s health and its diseases (24). However, for this study, where causes of death are broadly aggregated by the body system (e.g. circulatory system, respiratory system, etc.), this may not be as pressing an issue.

A case can be made for comparing the life expectancy and causes of mortality for residents in Inuit Nunangat to a comparable population, such as other Aboriginal peoples living in the North (25). However, methodological issues with this approach arise when it becomes difficult to define populations with comparable social, economic, and geographic characteristics.

Life table calculations use arbitrary values for Chiang’s $\alpha$; however, this choice was shown to have minimal impact on life expectancy at birth (1). The death of Inuit Nunangat residents that occurred outside of Canada and the United States were not included within the vital statistics database. This limitation is not unique to this geographic area and is applied to residents in the rest of Canada.

Acknowledgements

An earlier version of this paper was presented at the 14th International Congress of Circumpolar Health Yellowknife NWT, 14 July 2009.

I am grateful to the vital statistics registrars of the provinces and territories for providing the death data to Statistics Canada. Rochelle Garner, Lawson Greenberg and Russell Wilkins have provided support in the development of this study and in interpreting the results of the analysis. Additional thanks to the various reviewers of this document for their insightful comments.

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