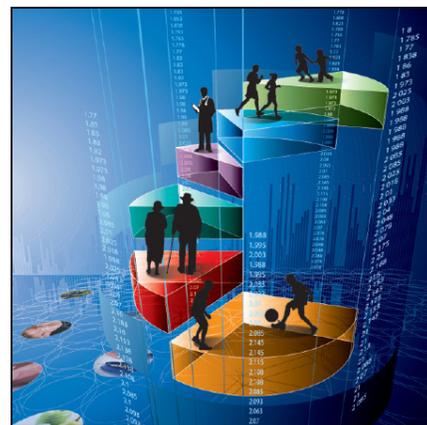


Health Reports

Life expectancy of First Nations, Métis and Inuit household populations in Canada

by Michael Tjepkema, Tracey Bushnik and Evelyne Bougie

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Life expectancy of First Nations, Métis and Inuit household populations in Canada

By Michael Tjepkema, Tracey Bushnik and Evelyne Bougie

Abstract

Background: The Truth and Reconciliation Commission of Canada has called upon the federal government to provide data on a number of health indicators, including life expectancy among First Nations people, Métis and Inuit. In Canada, estimating the life expectancy of Indigenous populations is methodologically challenging since death registrations do not usually collect information on whether the deceased was Indigenous. For the first time in Canada, a series of census–mortality linked datasets has been created that can be used to estimate life expectancies among Indigenous household populations enumerated by a census.

Methods: Life expectancy is the average number of years a person at a given age would be expected to live if the mortality rates observed for a specific period persisted into the future. For this study, abridged period life tables (based on five-year age groups) were calculated for self-reported First Nations, Métis, Inuit and non-Indigenous males and females.

Results: Life expectancy was substantially and consistently shorter for First Nations, Métis and Inuit household populations compared with the non-Indigenous household population across all time periods. In 2011, life expectancy at age 1 for the male household population was 72.5 years for First Nations, 76.9 years for Métis, 70.0 years for Inuit and 81.4 years for non-Indigenous people. Among the female household population, life expectancy at age 1 was 77.7 years for First Nations, 82.3 years for Métis, 76.1 years for Inuit and 87.3 for non-Indigenous people.

Interpretation: With the creation of a series of census–mortality linked datasets, it is now possible to produce national mortality and life expectancy estimates starting at age 1 for Indigenous household populations. The routine monitoring of longevity by population group can inform policy development and planning intended to advance health equity.

Keywords: mortality, life tables, Indigenous, cohort studies

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Significant health gaps exist between the Indigenous and non-Indigenous populations in Canada¹⁻⁶ and other countries such as the United States, Australia and New Zealand.⁷ To identify and close these gaps, the Truth and Reconciliation Commission of Canada⁸ recommendation # 19 has called upon the federal government to publish data and assess long-term trends for a number of health indicators, including life expectancy among First Nations people, Métis and Inuit.

In Canada, estimating the life expectancy of the Indigenous population is methodologically challenging since death registrations do not usually collect information on whether the deceased was Indigenous.^{9,10} Past studies have estimated Indigenous life expectancy through record linkages¹¹⁻¹³ and by applying geographic methods^{14,15} or projections.¹⁶ Despite differences in definitions, geographic coverage and methodology, these studies have consistently shown that life expectancy is shorter for the Indigenous population compared with the rest of the Canadian population.¹¹⁻¹³

To date, a standardized approach has not been developed to estimate Indigenous life expectancy over time at the national level for First Nations people, Métis, and Inuit. In response, a series of census–mortality linked datasets has been created that can be used for routine mortality surveillance among Indigenous populations enumerated by a census. The objectives of this article are to

- 1) estimate life expectancy for First Nations people, Métis and Inuit at various ages and by sex for 2011, and compare it with that of the non-Indigenous population
- 2) examine trends in longevity since 1996 for First Nations people, Métis and Inuit and the non-Indigenous population, and estimate whether the disparity between Indigenous populations and the non-Indigenous population has changed over time.

In doing so, this study aims to fill an important information gap by providing a national picture of the life expectancy of First Nations people, Métis and Inuit.

Methods

Data source

The Canadian Census Health and Environment Cohorts (CanCHECs) are population-based linked datasets that follow the non-institutional (household) population at time of the census for different health outcomes such as mortality, cancer and hospitalizations, as well as for annual place of residence. Data linkages for the 2006 and 2011 CanCHECs were constructed using Statistics Canada's Social Data Linkage Environment (SDLE).¹⁷ The SDLE helps create linked population data files for social analysis through linkage to the Derived Record Depository (DRD), a dynamic relational database containing

only basic personal identifiers. Survey and administrative data are linked to the DRD using a generalized record linkage software that supports deterministic and probabilistic linkage. Because the DRD had not yet been created, the 1991, 1996 and 2001 CanCHECs were constructed by linking to tax records using the same standard generalized record linkage software.¹⁸⁻²⁰ To improve consistency across CanCHECs, the 1991, 1996 and 2001 census–tax linkages were deterministically linked to the DRD using social insurance numbers to update and attach different health outcomes (i.e., mortality, cancer and hospitalizations) in an approach that was identical for the 2006 and 2011 CanCHECs. Since linkages to tax records were required for the 1991, 1996 and 2001 CanCHECs, age was restricted to the adult population (aged 25 and older for the 1991 CanCHEC, and aged 19 and older for the 1996 and 2001 CanCHECs). There were no age restrictions for the 2006 and 2011 CanCHECs.

For the 1991, 1996, 2001 and 2006 censuses, a mandatory long-form questionnaire was administered to the non-institutional population (about one in five households), including individuals in collective dwellings (e.g., rooming houses and hotels) who usually live in Canada on Census Day. In general, the response rate for a mandatory census is very high; in 2006, the response rate for the long-form questionnaire was 93.5%.²¹ In 2011, the long-form census was replaced by the voluntary 2011 National Household Survey (NHS), which was administered to the non-institutional population living in private dwellings (about one in three households, excluding non-private dwellings such as rooming houses and hotels). The unweighted response rate to the NHS was 68.6%.²²

There were 77 incompletely enumerated Indian reserves in the 1996 Census, 30 in the 2001 Census, 22 in the 2006 Census and 36 in the 2011 NHS. In addition, censuses miss a small proportion of the population (typically less than 5% in any given census), with adults aged 20 to 34 the most likely to not be enumerated²³.

In this article, Indian reserves refer to census subdivisions legally defined as Indian reserves, Indian settlements, other land types created by the ratification of self-government agreements, or other northern communities affiliated with First Nations according to criteria established by Indigenous Services Canada.

For this study, the 1991 CanCHEC was excluded because the Aboriginal identity question was not asked.

Statistical analysis

The number of deaths and people living during a five-year follow-up period were calculated for each CanCHEC by sex, age and population group. A five-year follow-up period was chosen to ensure that there were enough deaths to provide reliable estimates and to minimize mortality overlap in follow-up periods across the different CanCHEC years. All counts were weighted.

Life expectancy is the average number of years a person at a given age would be expected to live if the mortality rates observed for a specific period persisted into the future. For this study, abridged period life tables (based on five-year age groups, with the exceptions of the first age group, where rates were computed for ages 1 to 4, and the last age group, where rates were calculated for age 85 and older) were calculated according to the Chiang method²⁴ for First Nations, Métis, Inuit and non-Indigenous males and females. The cohort weight was applied to ensure that the life expectancy estimates were representative of the target population, and the bootstrap replicate weights were used to estimate appropriate standard errors and 95% confidence intervals (CIs). Statistical testing of differences across groups was conducted using the weighted estimates and standard errors with the 500 bootstrap weights provided with each CanCHEC.

Average percent change (APC) over time was estimated using Joinpoint version 4.6.0.0. Life expectancy trends were calculated for each Indigenous and non-Indigenous category by fitting a linear regression model, assuming a constant rate of change in the logarithm

of the weighted life expectancy estimate from one cohort year to the next. The models incorporated the appropriate standard errors, and the significance tests used a Monte Carlo permutation method. The estimated slope from each model was then transformed back to represent an APC. P-values associated with APCs correspond with two-sided tests of the null hypothesis where the underlying APC value is zero (i.e., stable) with a significance level of 0.05. APCs associated with a p-value greater than 0.05 were considered stable. Otherwise, positive (increasing) and negative (decreasing) annual percent changes were considered as actual changes in life expectancy over time.

For comparisons across CanCHECs, Indian reserves that were incompletely enumerated in at least one CanCHEC cycle were excluded from all trend analyses. Non-institutional collectives were also excluded from the 1996, 2001 and 2006 CanCHEC estimates to be consistent with 2011 CanCHEC population exclusions.

Definitions

In this study, Aboriginal identity (First Nations, Métis and Inuit) was defined by the following questions:²⁵

- 1996, 2001 and 2006 censuses: “Is this person an Aboriginal person, that is, North American Indian, Métis or Inuit (Eskimo)?” [No; Yes, North American Indian; Yes, Métis; Yes, Inuit (Eskimo)]
- 2011 NHS: “Is this person an Aboriginal person, that is, First Nations (North American Indian), Métis or Inuk (Inuit)?” [No, not an Aboriginal person; Yes, First Nations (North American Indian); Yes, Métis; Yes, Inuk (Inuit)]

Respondents who had multiple Aboriginal identities were excluded. These typically represent a small proportion of the total population with an Aboriginal identity. For instance, in 2011, less than 1% of the people who identified as an Aboriginal person reported more than one Aboriginal identity.²⁵

The non-Indigenous population was defined by the following criteria: (1) did not self-identify as First Nation, Métis or Inuit (multiple or single responses); (2) did not report being a Registered or Status Indian (Registered Indians, also referred to as Status Indians, refer to people registered under the *Indian Act*); and (3) did not report being a member of an Indian band or First Nation.

Results

Life expectancies for the First Nations, Métis and Inuit household populations were significantly lower than for the non-Indigenous household population (Table 1, Appendix Table A).

2011 life expectancy and probability of survival

In 2011, the life expectancy for the First Nations household population at age 1 was 72.5 years for males and 77.7 years for females. This was 8.9 (95% CI 8.1; 9.7) and 9.6 (95% CI 8.7; 10.5) years shorter than for non-Indigenous males and females (Table 1). At age 65, the gap in life expectancy between First Nations and non-Indigenous people was 4.6 (95% CI 3.8; 5.4) and 6.2 (95% CI 5.3; 7.2) years for men and women, respectively.

For the 2011 Métis household population, life expectancy at age 1 was 76.9 years for males and 82.3 years for females—4.5 (95% CI 3.2; 5.8) and 5.0 (95% CI 3.0; 7.0) years shorter, respectively, than for the non-Indigenous population. At age 65, the gap between Métis and non-Indigenous people narrowed to 2.7 (95% CI 1.4; 4.1) years for men and 3.8 (95% CI 1.7; 6.0) years for women.

Life expectancy at age 1 for the Inuit household population was 70.0 years for Inuit males and 76.1 years for Inuit females, which is 11.4 (95% CI 9.2; 13.6) and 11.2 (95% CI 8.3; 14.2) years shorter than for the non-Indigenous population. At age 65, life expectancy was 4.9 (95% CI 2.4; 7.3) years shorter for Inuit men and 5.9 (95% CI 2.7; 9.2) years shorter

Table 1
Life expectancy (LE) in years at various ages, by group and sex, household population at baseline, Canada, 2011

Age	First Nations people			Métis			Inuit			Non-Indigenous people		
	LE	95% confidence interval		LE	95% confidence interval		LE	95% confidence interval		LE	95% confidence interval	
		from	to		from	to		from	to		from	to
Males												
1	72.5	71.8	73.3	76.9	75.6	78.2	70.0	67.8	72.2	81.4	81.3	81.5
5	68.6	67.8	69.4	73.0	71.7	74.3	66.3	64.1	68.4	77.5	77.3	77.6
10	63.7	62.9	64.4	68.0	66.7	69.3	61.3	59.2	63.5	72.5	72.4	72.6
15	58.8	58.1	59.6	63.0	61.7	64.3	56.6	54.4	58.7	67.5	67.4	67.6
20	54.2	53.4	54.9	58.3	57.0	59.6	53.0	50.8	55.2	62.6	62.5	62.8
25	49.7	48.9	50.4	53.7	52.4	54.9	48.9	46.7	51.2	57.8	57.7	58.0
30	45.3	44.5	46.0	48.8	47.5	50.1	45.4	43.2	47.6	53.0	52.9	53.1
35	40.8	40.1	41.5	44.0	42.7	45.3	41.0	38.8	43.3	48.2	48.0	48.3
40	36.3	35.6	37.1	39.3	38.1	40.6	36.6	34.4	38.9	43.3	43.2	43.5
45	32.0	31.3	32.7	35.0	33.7	36.2	32.1	29.9	34.4	38.6	38.5	38.7
50	27.8	27.1	28.5	30.4	29.2	31.7	28.0	25.7	30.4	33.9	33.8	34.0
55	23.7	23.0	24.4	26.0	24.8	27.3	24.0	21.7	26.3	29.4	29.3	29.5
60	19.9	19.2	20.7	22.1	20.8	23.3	19.9	17.5	22.2	25.1	25.0	25.2
65	16.4	15.7	17.2	18.3	17.0	19.6	16.1	13.7	18.6	21.0	20.9	21.1
70	13.6	12.8	14.4	15.1	13.6	16.5	13.2	10.5	15.9	17.2	17.1	17.3
75	11.1	10.2	12.1	12.2	10.6	13.7	11.0	7.7	14.2	13.8	13.7	13.9
80	8.8	7.8	9.9	9.5	7.7	11.3	9.1	4.9	13.3	10.9	10.7	11.0
85	7.0	5.7	8.3	7.9	5.7	10.0	10.0	3.3	16.6	8.6	8.4	8.7
Females												
1	77.7	76.7	78.6	82.3	80.3	84.3	76.1	73.1	79.0	87.3	87.1	87.4
5	73.7	72.8	74.6	78.3	76.3	80.3	72.3	69.4	75.3	83.3	83.1	83.5
10	68.8	67.9	69.7	73.4	71.4	75.3	67.5	64.5	70.4	78.3	78.2	78.5
15	63.9	63.0	64.8	68.4	66.5	70.4	62.7	59.7	65.6	73.4	73.2	73.5
20	59.2	58.3	60.1	63.5	61.6	65.5	58.0	55.0	60.9	68.4	68.3	68.6
25	54.5	53.6	55.4	58.6	56.6	60.6	53.6	50.7	56.6	63.5	63.4	63.7
30	49.7	48.8	50.6	53.8	51.8	55.8	49.1	46.1	52.1	58.6	58.5	58.8
35	45.1	44.2	46.0	48.9	46.9	50.9	44.5	41.5	47.5	53.7	53.6	53.9
40	40.5	39.6	41.4	44.2	42.2	46.2	40.0	37.0	43.0	48.8	48.7	49.0
45	36.1	35.2	37.0	39.4	37.4	41.4	35.8	32.7	38.8	44.0	43.8	44.2
50	31.7	30.7	32.6	34.9	32.9	36.9	31.9	28.9	34.8	39.2	39.1	39.4
55	27.5	26.6	28.5	30.4	28.4	32.5	27.7	24.6	30.7	34.6	34.5	34.8
60	23.5	22.5	24.4	26.3	24.1	28.4	23.8	20.7	26.9	30.2	30.0	30.4
65	19.7	18.7	20.6	22.1	19.9	24.3	20.0	16.8	23.2	25.9	25.8	26.1
70	16.2	15.1	17.2	18.8	16.5	21.1	16.5	13.0	20.0	21.9	21.7	22.1
75	13.3	12.1	14.4	15.6	13.1	18.1	13.7	9.8	17.5	18.2	18.0	18.4
80	11.1	9.9	12.4	12.6	9.9	15.3	10.9	6.4	15.4	14.9	14.7	15.0
85	9.8	8.1	11.4	10.1	6.8	13.3	10.5	4.1	16.8	12.2	12.0	12.4

Source: Statistics Canada, 2011 Canadian Census Health and Environment Cohort, five-year mortality follow-up period.

for Inuit women than for non-Indigenous men and women.

The probability of living to age 75 was lower for First Nations people, Métis and Inuit when compared with the non-Indigenous population (Table 2). Among the First Nations household population, the probability of living to age 75 was 53% for males and 66% for females—22 and 18 percentage points lower than for

the non-Indigenous household population. The probability of living to age 75 for Métis was 64% for males and 74% for females—12 and 10 percentage points lower than for the non-Indigenous population. For Inuit, the probability of living to age 75 was 51% for males and 63% for females—25 and 21 percentage points lower than for non-Indigenous people.

Table 2
Probability of living to age 75, by group and sex, household population at baseline, Canada, 2011

	Males			Females		
	95% confidence interval			95% confidence interval		
	%	from	to	%	from	to
First Nations people	53.2	50.7	55.8	65.9	63.7	68.1
Métis	64.0	60.3	67.7	73.8	70.7	77.0
Inuit	50.8	45.4	56.3	63.1	57.6	68.7
Non-Indigenous people	75.7	75.4	76.0	83.8	83.5	84.0

Source: Statistics Canada, 2011 Canadian Census Health and Environment Cohort, five-year mortality follow-up period.

Table 3
Life expectancy (LE)[†] in years at selected ages, by group and sex, household population at baseline, Canada, 1996, 2001, 2006 and 2011

	Males						Females					
	Age 1			Age 20			Age 1			Age 20		
	95% confidence interval			95% confidence interval			95% confidence interval			95% confidence interval		
	LE [†]	from	to	LE^{†}	from	to	LE^{†}	from	to	LE^{†}	from	to
First Nations people												
1996	..	..	..	52.6	51.7	53.5	..	..	..	57.9	56.7	59.1
2001	..	..	..	53.4	52.7	54.2	..	..	..	58.2	57.2	59.2
2006	71.6	71.0	72.2	53.5	52.9	54.0	77.1	76.3	77.8	58.8	58.0	59.5
2011	72.6	71.8	73.4	54.3	53.5	55.1	77.7	76.8	78.7	59.3	58.4	60.2
Métis												
1996	..	..	..	54.6	53.0	56.2	..	..	..	59.5	57.4	61.7
2001	..	..	..	57.4	55.7	59.1	..	..	..	61.8	59.8	63.8
2006	76.0	75.1	77.0	57.4	56.5	58.4	81.5	80.0	82.9	62.6	61.2	64.0
2011	76.9	75.6	78.3	58.3	57.0	59.6	82.3	80.3	84.3	63.5	61.6	65.5
Inuit												
1996	..	..	..	49.6	47.7	51.5	..	..	..	58.1	51.1	65.1
2001	..	..	..	51.9	50.1	53.7	..	..	..	54.0	52.1	56.0
2006	68.0	66.5	69.5	50.5	49.0	52.0	75.2	72.4	78.0	56.9	54.1	59.7
2011	70.0	67.8	72.2	53.0	50.8	55.2	76.1	73.1	79.0	58.0	55.0	60.9
Non-Indigenous people												
1996	..	..	..	58.4	58.3	58.5	..	..	..	65.7	65.6	65.8
2001	..	..	..	59.9	59.8	60.0	..	..	..	66.5	66.4	66.6
2006	80.1	80.0	80.1	61.3	61.2	61.4	85.8	85.7	85.9	67.0	66.9	67.1
2011	81.4	81.3	81.5	62.6	62.5	62.8	87.3	87.1	87.4	68.4	68.3	68.6

.. not available for a specific reference period

[†] These exclude the population living in a collective dwelling at the time of census collection and the Indian reserves that were incompletely enumerated in the 1996, 2001, 2006 and 2011 censuses.

Note: 2011 results may not be identical to Table 1 results due to population exclusions in Table 3.

Sources: Statistics Canada, 1996, 2001, 2006 and 2011 Canadian Census Health and Environment Cohort, five-year mortality follow-up periods.

Changes in life expectancy from 1996 to 2011

In general, life expectancy at age 20 increased for First Nations people, Métis, Inuit and the non-Indigenous population from 1996 to 2011 (Table 3).

For First Nations men, life expectancy at age 20 increased from 52.6 years in 1996 to 54.3 years in 2011; for First Nations women, it increased

from 57.9 years to 59.3 years. The APC between each time point ranged from 0.19 ($p \leq 0.06$) for First Nations men to 0.17 ($p \leq 0.05$) for First Nations women (Figure 1). The gain in years for First Nations men was smaller than the gain for non-Indigenous men (4.2 years) ($P < 0.05$). The gain in years for First Nations women was not statistically different than the gain for non-Indigenous women (2.7 years).

The gain in life expectancy at age 20 from 1996 to 2011 was 3.7 years (from 54.6 years to 58.3 years) for Métis men and 4.0 years (59.5 years to 63.5 years) for Métis women. The APC between each time point ranged from 0.38 ($p \leq 0.1$) for Métis men to 0.41 ($p \leq 0.05$) for Métis women (Figure 1). These gains in years were not statistically different than the gains for non-Indigenous men (APC = 0.47 95% CI 0.40; 0.53) and women (APC = 0.24 95% CI 0.06; 0.43).

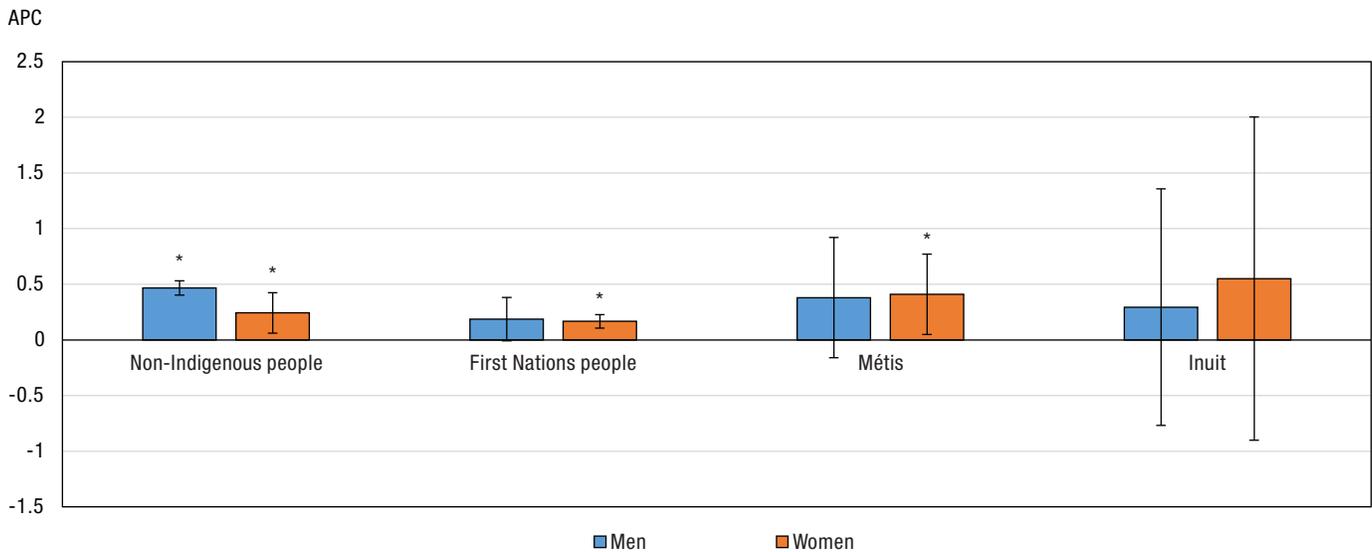
Among Inuit men, life expectancy at age 20 was 49.6 years in 1996 and 53.0 years in 2011 (Table 3). For Inuit women, life expectancy at age 20 was 58.1 years in 1996, 54.0 years in 2001, 56.9 years in 2006 and 58.0 years 2011. The variability in the APCs for Inuit men and women, as indicated by relatively wide confidence intervals, makes it difficult to determine whether the trend over time differs from the non-Indigenous population (Figure 1).

Discussion

Life expectancy was substantially and consistently shorter for the First Nations, Métis and Inuit household populations compared with the non-Indigenous household population across all time periods. The factors that contribute to longevity are complex and interrelated.²⁶ First Nations, Métis and Inuit populations are diverse in their cultures, languages and colonial histories, as well as their social, economic and health statuses;²⁷ however, they share their greater disadvantage relative to the non-Indigenous population in many of the social determinants of health.^{25,28} Moreover, the effects of colonization, racism and intergenerational trauma on Indigenous peoples have contributed to their poorer health outcomes and shorter life expectancies.^{8,28-31} It was beyond the scope of this study to explore the reasons why life expectancy is shorter for the First Nations, Métis and Inuit household populations. This area warrants investigation in future research.

In 2011, life expectancy at age 1 was about 9 to 10 years shorter for First Nations people than for non-Indigenous

Figure 1
Average percent change in life expectancy at age 20, by group and sex, household population aged 20 years or older, Canada, 1996 to 2011



* significantly different from zero ($p \leq 0.05$)

Notes: APC refers to the average percent change. Error bars indicate a 95% confidence interval.

Source: Statistics Canada, Canadian Census Health and Environment Cohort, 1996 to 2011.

Indigenous people. This gap was larger than the 6-year gap found between Status Indians residing in British Columbia and other provincial residents,¹¹ but similar to the gap for Status Indians residing in Alberta¹² and Manitoba.³² For First Nations adults, gains in life expectancy from 1996 to 2011 were not as large as the gains for non-Indigenous adults.

In 2011, life expectancy at age 1 was about 4.5 to 5 years shorter for Métis than for non-Indigenous people. There are no comparable results based on Métis registries. Over time, the increases in life expectancy for Métis men and women were similar to those of the non-Indigenous population. Caution should be exercised when interpreting these trends since there has been a large increase in the number of census respondents identifying as Métis.³³

Life expectancy at age 1 was about 11 years shorter for Inuit than for the non-Indigenous population in 2011. These results were broadly similar to results of studies that used a geographic approach to calculate life expectancy in Inuit

Nunangat.³⁴ Because of small numbers, statistical testing over time was not feasible, but point estimates suggest that life expectancy at age 20 has increased for Inuit since 1996.

Limitations

There are several important limitations to consider when understanding these life expectancy estimates. First, these results are for the household population at the time of census collection and do not reflect the entire Canadian population (excluding people living in institutions). As a result, based on CanCHEC data and depending on the CanCHEC cycle, life expectancy estimates at age 1 are higher than official Statistics Canada life tables by about 2 to 2.5 years for females and 1.5 years for males.

Census cohorts linked to mortality grossly underestimate infant mortality (deaths that occur within the first year after birth) because about three-quarters of all infant deaths occur within the first 28 days, making census enumeration uncertain.³⁵ As a result, life expectancy

at birth could not be reliably estimated. Recently, a birth cohort estimated that the infant mortality rate was more than twice as high for each Indigenous population compared with the non-Indigenous population.³⁶

This study provides only national data for First Nations people, Métis and Inuit. Important regional differences in life expectancy that have been demonstrated in other research^{11,12,34} are masked. Regional analyses can be performed using CanCHECs and warrant investigation in future research.

When data on Indigenous populations are compared across census and NHS cycles, several factors should be taken into account. Among these are differences in methodology, changes to the wording and format of self-reported Aboriginal identity questions, legislative changes (which affect concepts such as Aboriginal identity and Registered Indian status), changes made to the definition of Indian reserves, and differences in the list of incompletely enumerated Indian reserves. Along with these factors, some

What is already known on this subject?

- Significant health gaps exist between the Indigenous and non-Indigenous populations in Canada.
- Estimating the life expectancy of First Nations people, Métis and Inuit is methodologically challenging since death registrations do not usually collect information on whether the deceased was Indigenous.

What does this study add?

- Life expectancy for the Indigenous household population can now be routinely estimated with a series of census–mortality linked datasets for First Nations people, Métis and Inuit.

people, for a variety of reasons, report their Aboriginal identity differently from one data collection period to another.³⁷ To improve comparability over time, trend analysis was restricted to the settlements and reserves that participated in all census and NHS cycles. Incompletely

enumerated reserves may affect the life expectancy estimates for First Nations people with Registered Indian status.

The introduction of the voluntary 2011 NHS was an important methodological change from previous long-form census data. How this change affects the comparability with previous CanCHECs life expectancy results is unknown. This study focuses on respondents who self-identified as First Nations people, Métis or Inuit. There are many ways to define the Indigenous population in Canada, and other stakeholders could use the same data source to produce life expectancy estimates separately for First Nations people with and without Registered Indian status, or separately for First Nations people living on or off reserve, or by geographic region.

Conclusions

Gains in life expectancy were evident for First Nations people, Métis and Inuit from 1996 to 2016. However, these gains were either less than or not statistically different from the gains achieved by the non-Indigenous population. This resulted in a continued life expectancy gap between Indigenous and non-Indigenous populations in Canada. These

findings underscore the importance of ongoing data development for routinely monitoring trends in longevity, which, in turn, can inform policy development and planning intended to advance health equity.³⁸ As more recent CanCHEC datasets become available, future research will enable longer-term trends in life expectancy to be continually monitored among First Nations people, Métis and Inuit in Canada.

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Appendix

Table A
Life expectancy (LE) in years at various ages, by group, both sexes combined, household population at baseline, Canada, 2011

Age	First Nations people			Métis			Inuit			Non-Indigenous people		
	LE	95% confidence interval		LE	95% confidence interval		LE	95% confidence interval		LE	95% confidence interval	
		from	to		from	to		from	to		from	to
1	75.2	74.6	75.8	79.5	78.5	80.6	73.0	71.3	74.6	84.3	84.2	84.4
5	71.2	70.6	71.8	75.6	74.5	76.7	69.2	67.6	70.9	80.4	80.3	80.5
10	66.3	65.7	66.9	70.6	69.5	71.7	64.3	62.7	66.0	75.4	75.3	75.5
15	61.5	60.9	62.1	65.7	64.6	66.7	59.6	57.9	61.2	70.4	70.3	70.5
20	56.8	56.2	57.4	60.9	59.8	61.9	55.5	53.8	57.1	65.5	65.4	65.6
25	52.2	51.6	52.8	56.1	55.0	57.2	51.3	49.6	53.0	60.7	60.6	60.8
30	47.6	47.0	48.2	51.2	50.1	52.3	47.2	45.6	48.9	55.8	55.7	55.9
35	43.0	42.5	43.6	46.4	45.3	47.5	42.7	41.0	44.4	50.9	50.8	51.0
40	38.5	37.9	39.1	41.7	40.6	42.8	38.3	36.6	40.0	46.1	46.0	46.2
45	34.1	33.5	34.7	37.1	36.0	38.2	33.9	32.2	35.7	41.3	41.2	41.4
50	29.8	29.2	30.4	32.6	31.5	33.7	29.9	28.2	31.6	36.6	36.5	36.7
55	25.7	25.1	26.3	28.2	27.1	29.3	25.9	24.1	27.6	32.0	31.9	32.1
60	21.8	21.2	22.4	24.1	23.0	25.3	21.8	20.1	23.5	27.7	27.6	27.8
65	18.2	17.5	18.8	20.2	19.0	21.4	18.1	16.3	19.9	23.5	23.4	23.6
70	15.0	14.3	15.7	16.9	15.7	18.2	14.8	12.9	16.8	19.6	19.5	19.7
75	12.3	11.6	13.1	13.9	12.6	15.3	12.3	10.1	14.6	16.1	16.0	16.2
80	10.1	9.3	11.0	11.2	9.6	12.7	10.1	7.4	12.8	13.0	12.9	13.1
85	8.6	7.5	9.6	9.0	7.2	10.9	10.3	6.4	14.1	10.6	10.5	10.7

Source: Statistics Canada, 2011 Canadian Census Health and Environment Cohort, five-year mortality follow-up period.

References

- Adelson N. The Embodiment of Inequity: Health Disparities in Aboriginal Canada. *Canadian Journal of Public Health* 2005; 96(S2):S45-S61.
- Cameron E. *State of Knowledge: Inuit Public Health, 2011*. Prince George, British Columbia: National Collaborating Centre for Aboriginal Health, 2011.
- Smylie J, Fell D, Ohlsson A, and the Joint Working Group on First Nations, Indian, Inuit, and Métis Infant Mortality of the Canadian Perinatal Surveillance System. A Review of Aboriginal Infant Mortality Rates in Canada: Striking and Persistent Aboriginal/Non-Aboriginal Inequities. *Canadian Journal of Public Health* 2010;101(2):143-48.
- Kumar MB, Wesche S, McGuire C. Trends in Métis-related health research (1980-2009): Identification of research gaps. *Canadian Journal of Public Health* 2012;103(1):23-28.
- Gionet L, Roshanafshar S. Select health indicators of First Nations people living off reserve, Métis and Inuit. *Health at a Glance* (Catalogue 82-624-X) Ottawa: Statistics Canada, 2013.
- Gracey M, King M. Indigenous health part 1: determinants and disease patterns. *Lancet*. 2009; 374(9683):65-75.
- Anderson I, Robson B, Connolly M et al. Indigenous and tribal people's health (The Lancet-Lowitja Institute Global Collaboration): a population study. *Lancet* 2016; 388(10040): 143-57. Doi: 10.1016/S0140-6736(16)00345-7.
- Truth and Reconciliation Commission of Canada (TRC). *Honouring the Truth, Reconciling for the Future: Summary of the Final Report of the Truth and Reconciliation Commission of Canada*. TRC, 2015.
- Smylie J, Firestone M. Back to the basics: Identifying and addressing underlying challenges in achieving high quality and relevant health statistics for Indigenous populations in Canada. *Statistical Journal of the IAOS*: 2015; 31(1):67-87.
- Australia Institute of Health and Welfare. *Comparing life expectancy of indigenous people in Australia, New Zealand, Canada and the United States: conceptual, methodological and data issues* (Catalogue IHW 47) Canberra: AIHW, 2011.
- Provincial Health Officer of BC and First Nations Health Authority. *First Nations Health and Well-being*. Interim Update November 12, 2015.
- Health Canada. *Health determinants for First Nations in Alberta 2016* (Health Canada catalogue H34-217/2016E-PDF) Ottawa: Health Canada, 2016.
- Tjepkema M, Wilkins R. Remaining life expectancy at age 25 and probability of survival to age 75, by socio-economic status and Aboriginal ancestry. *Health Reports* 2011; 22(4): 31-6.
- Peters PA, Oliver LN, Kohen DE. Mortality among children and youth in high-percentage First Nations identity areas, 2000-2002 and 2005-2007. *Rural Remote Health* 2013; 13(3): 2424.
- Pan-Canadian Health Inequalities Data Tool, 2017 Edition. A joint initiative of the Public Health Agency of Canada, the Pan-Canadian Public Health Network, Statistics Canada and the Canadian Institute of Health Information. 2017
- Statistics Canada. *Projections of the Aboriginal populations, Canada, provinces and territories. 2001 to 2017*. (Catalogue no. 91-547-XIE) Ottawa: Statistics Canada, 2015.
- Statistics Canada. *Social Data Linkage Environment*. Available at: <https://www.statcan.gc.ca/eng/sdle/index>. Accessed July 26, 2019.

18. Wilkins R, Tjepkema M, Mustard C, Choinière R. The Canadian census mortality follow-up study, 1991 through 2001. *Health Reports* 2008;19(3): 25-43.
19. Christidis T, Labrecque-Synnott F, Pinault L, et al. The 1996 CanCHEC: Canadian Census Health and Environment Cohort Profile. *Analytical Studies: Methods and References* (Catalogue 11-633-X no. 013) Ottawa: Statistics Canada, 2018.
20. Pinault L, Finès P, Labrecque-Synnott F, et al. The 2001 Canadian Census-Tax-Mortality Cohort: A 10-Year Follow-up. *Analytical Studies: Methods and References* (Catalogue 11-633-X no. 003) Ottawa: Statistics Canada, 2016.
21. Howatson-Leo L, Trépanier J. *Final Report on 2016 Census Options: Proposed Content Determination Framework and Methodology Options*. Ottawa: Statistics Canada, 2012.
22. Statistics Canada. *National Household survey User Guide*, 2011 (Catalogue 99-001-X2011001) Ottawa: Statistics Canada, 2013.
23. Statistics Canada. *Census Technical Report: Coverage*, 2011 (Catalogue 98-303-x2011001) Ottawa: Statistics Canada, 2015.
24. Chiang CL. *The Life Table and its Applications*. Malabar, Florida: Robert E. Krieger, 1984.
25. Statistics Canada. *Aboriginal Statistics at a Glance: 2nd Edition*, (Catalogue 89-645-x2015001) Ottawa: Statistics Canada, 2015.
26. Canada's Chief Public Health Officer. *Report on the State of Public Health in Canada 2008 Addressing Health Inequalities* (Health Canada catalogue HP2-10/2008E) Ottawa: Minister of Health, 2008.
27. Pollock NJ, Healey GK, Jong M, et al. Tracking progress in suicide prevention in Indigenous communities: a challenge for public health surveillance in Canada. *BMC Public Health* 2018; 18: 1320.
28. Health Canada. *A statistical profile on the health of First Nations in Canada: Determinants of health, 2006 to 2010*. Ottawa: Health Canada, 2014.
29. Bombay A, Matheson K, Anisman H. The intergenerational effects of Indian Residential Schools: implications for the concept of historical trauma. *Transcultural Psychiatry* 2014; 51(3):320-38.
30. Czyzewski, K. Colonialism as a Broader Social Determinant of Health. *The International Indigenous Policy Journal* 2011; 2(1).
31. Reading CL, Wien F. *Health Inequalities and Social Determinants of Aboriginal Peoples' Health*. Prince George, British Columbia: National Collaborating Centre for Aboriginal Health, 2009.
32. Katz A, Kinew KA, Star L, et al. *The Health Status of and Access to Healthcare by Registered First Nation Peoples in Manitoba*. Winnipeg, MB: Manitoba Centre for Health Policy, 2019.
33. Caron-Malenfant E, Coulombe S, Guimond E, et al. Ethnic mobility of Aboriginal Peoples in Canada between the 2001 and 2006 Censuses. *Population* 2014; 69(1): 29-53.
34. Statistics Canada. *Health Indicators*, 2018, no. 3 (Catalogue 82-221-X) Ottawa: Statistics Canada, 2018.
35. Statistics Canada. Table 13-10-0712-01 *Infant deaths and mortality rates, by sex*. Ottawa: Statistics Canada.
36. Sheppard AJ, Shapiro GD, Bushnik T, et al. Birth outcomes among First Nations, Inuit and Métis populations. *Health Reports* 2017; 28(11): 11-16.
37. Statistics Canada. *Aboriginal People Reference Guide, Census of Population*, 2016 (Catalogue 98-500-X2016009) Ottawa: Statistics Canada, 2017.
38. Global Burden of Disease 2017 Mortality Collaborators. Global, regional, and national age-sex-specific mortality and life expectancy, 1950-2017: a systematic analysis for the Global Burden of Disease Study 2017. *Lancet*. 2018; 392(10159):1684-1735.