

Narrowing mortality gaps, 1978 to 1995

François Nault

Abstract

Objectives

This article examines the narrowing difference in life expectancy between men and women and among Canadian provincial populations in the context of trends in several major causes of death and risk factors.

Data sources

Canadian Vital Statistics Data Base; 1994/95 National Population Health Survey; 1985 and 1990 General Social Surveys; 1985 and 1990 Health Promotion Surveys; Canadian Provincial Heart Health Surveys, 1986 to 1992.

Analytical techniques

Age-standardized mortality rates were calculated by the direct method, using the adjusted 1991 population of Canada as the standard. Life expectancies at birth were calculated using 1995 deaths.

Main results

Narrowing differences in life expectancy between men and women since 1978 and among provincial populations have coincided with similar trends in several cause-specific age-standardized death rates and a number of behavioural risk factors.

Key words

life expectancy, risk factors, cause of death

Principal release

This article draws upon information from *Births and Deaths, 1995* (Statistics Canada, Catalogue 84-210-XPB). See *How to Order* on page 55.

Author

François Nault (613-951-1764) is with the Health Statistics Division at Statistics Canada, Ottawa K1A 0T6.

Mortality differences between men and women stem from biological, social, and behavioural conditions and from the complex interactions among these conditions.^{1,2}

In most animal species, females tend to outlive males. In human beings, lower female mortality is evident at all ages, even among stillbirths and infants. And with the exception of societies where women's situation is extremely poor relative to that of men, lower female mortality is virtually universal and has prevailed as far back as mortality can be estimated.

Social and behavioural factors have reinforced the female biological advantage. Traditionally, men have had more dangerous occupations. They have tended to smoke and drink more than women, and have engaged in riskier activities. In addition, as indicated by the frequency of consultations with physicians, women are generally more vigilant about taking care of their health.³

Methods

Data sources

The data on leading causes of death are from *Births and Deaths 1995* (Catalogue 84-210-XPB), which provides the age-standardized death rates for the 31 leading causes of death by sex at the Canada level from 1979, and by province for both sexes combined for 1994 and 1995.⁴ The data are from information collected by the provincial and territorial registries of vital statistics, which are responsible for the registration of deaths that occur in their jurisdictions. All causes contributing to a death are entered on the death certificate. In accordance with rules established by the World Health Organization and defined in the Ninth Revision of the International Classification of Diseases (ICD-9), a single, underlying cause of death is selected for each decedent.⁵ The ICD-9 codes for the causes examined in this article are:

Cardiovascular diseases	390-459
Heart diseases	390-398, 402, 404, 410-429
Accidents and adverse effects	E800-E949
Motor vehicle accidents	E810-E825
Cancer	140-208
Lung cancer	162
Chronic obstructive pulmonary diseases	490-496

Data on risk factors are from the 1985 and 1991 General Social Surveys, the 1985 and 1990 Health Promotion Surveys, Canadian Provincial Heart Health Surveys conducted from 1986 to 1992, and the 1994/95 National Population Health Survey.

Analytical techniques

Death rates were calculated based on postcensal revised population estimates, which take into account net census undercoverage and include non-permanent residents. Age-standardized death rates were calculated by the direct method, using the age distribution of the 1991 population of Canada as the standard.

Life expectancy at birth is the average number of years a person is likely to live based on the prevailing age-sex-specific death rates. Life expectancy at birth was calculated using 1995 deaths only and the postcensal revised population estimates.

Body mass index (BMI) is calculated for people aged 20 to 64 and is defined as weight in kilograms divided by the square of height in metres. A BMI greater than 27 indicates that the person is overweight.

Limitations

This analysis compares trends in death rates with those for only a small number of risk factors. Other factors that were not considered may have influenced the outcomes. As a result, the connection between risk factors and mortality noted here is very broad.

It is difficult to establish time trends in the prevalence of even this limited number of risk factors, because the data are from different sources, and methods of collecting and measuring them have varied from survey to survey. More precise correlations would require a much more thorough examination of the surveys, and where possible, recompilation of the data using standard concepts.

As well, any conclusions about individual risk must be made cautiously, if at all, as data on individual behaviour that might influence risks were not collected. Moreover, because the data are from different sources, they do not pertain to the same individuals.

Finally, the life expectancy gap was widest in 1978, but in this analysis, cause-specific 1995 death rates are compared with 1979, the first year that ICD-9 codes were in place. The use of 1978 data would have necessitated recoding to make the categories of causes comparable to 1995.

In Canada from 1921 to 1978, while the life expectancy of both sexes increased, women made faster gains than men. As a result, the gap in life expectancy at birth widened steadily in women's favour from 1.8 to 7.5 years.⁶ Greater life expectancy gains for men than for women since then reduced the gap to 5.9 years by 1995: 75.4 versus 81.3 years (Table 1).⁴ Thus, the longevity advantage that Canadian women have enjoyed over men is diminishing (Chart 1).

This convergence of male and female life expectancy reflects trends in several major causes of death and in a number of risk factors that have benefited men more than women. The narrowing life expectancy gap between the sexes is not unique to Canada: it is a feature of the industrialized world.^{7,8}

Life expectancy differences among the provinces have also been reduced, although an upward east-to-west gradient persists, in part, because of differences in the prevalence of risk factors.

With information from the Canadian Vital Statistics Data Base and a number of health surveys conducted by Statistics Canada and other agencies, this article discusses differences in life expectancy at birth by sex and by province in the context of trends in several leading causes of death and risk factors (see *Methods*).

Causes of death

Trends in several leading causes of death have played a part in the diminishing difference between male and female life expectancy.⁹ For example, the age-standardized death rate for cardiovascular diseases, notably diseases of the heart, decreased among both sexes, but the absolute decline was faster among men than among women. Over the 1979 to 1995 period, the difference between the sexes in the death rate for cardiovascular diseases narrowed by 92 deaths per 100,000 population (Table 2). The gap narrowed for chronic obstructive pulmonary diseases, too, but this was attributable to a sharp

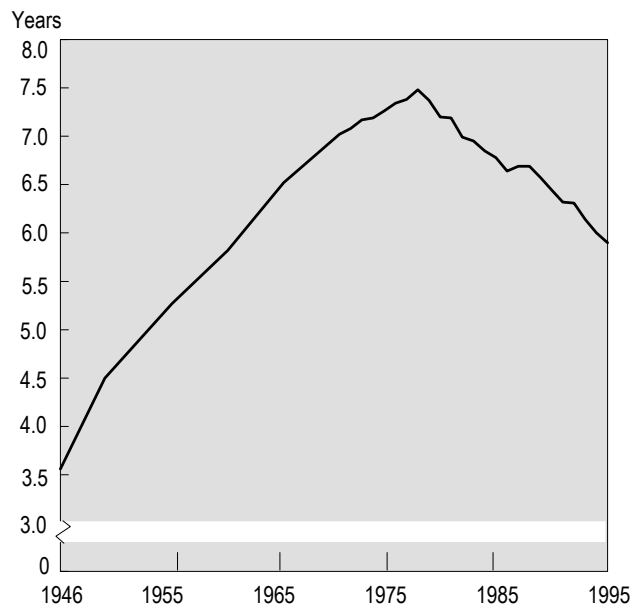
Table 1
Life expectancy at birth,[†] by sex, Canada, provinces and territories, 1995

	Both sexes	Male	Female	Difference
Canada	78.3	75.4	81.3	5.9
Nfld.	77.3	74.4	80.6	6.2
P.E.I.	77.7	74.1	81.5	7.4
N.S.	77.9	74.9	80.8	5.9
N.B.	77.8	74.2	81.5	7.3
Que.	78.0	74.6	81.3	6.7
Ont.	78.5	75.8	81.2	5.4
Man.	77.7	74.8	80.5	5.7
Sask.	78.2	74.9	81.6	6.7
Alta.	78.6	75.8	81.5	5.7
B.C.	79.0	76.2	81.9	5.7
Yukon	72.4	69.5	76.5	7.0
N.W.T.	74.3	72.8	76.0	3.2

Source: Statistics Canada (reference 4)

† Based on one year of mortality data

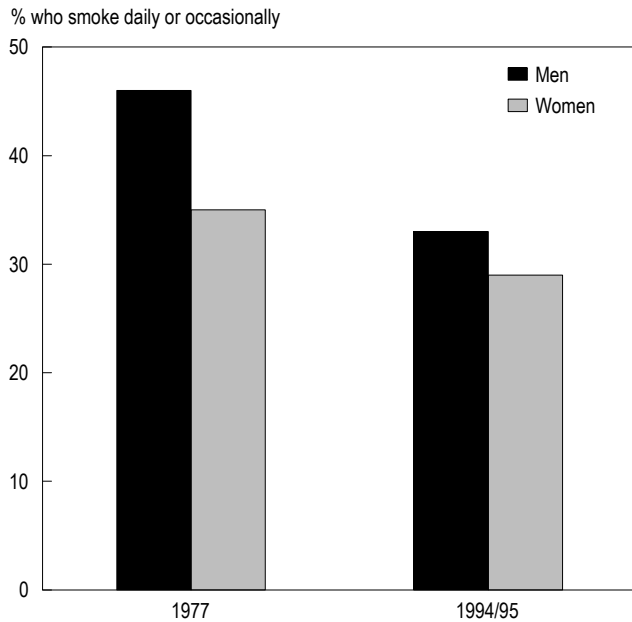
Chart 1
Gap in life expectancy at birth between males and females, Canada, 1946 to 1995



Data source: Canadian Vital Statistics Data Base

Note: Annual data from 1971 to 1995; earlier data presented at five-year intervals

Chart 2
Age-standardized smoking rates, population aged 20 and over, by sex, Canada, 1977 and 1994/95



Source: Millar WJ (reference 12)

increase in women’s death rate. And while the sex difference in overall cancer mortality did not diminish substantially, the exception was lung cancer, where the gap narrowed because of a steep rise in women’s death rate. Lung cancer is now the leading cause of cancer death among women.¹⁰

Declines in mortality due to accidents and adverse effects were also greater for men than for women. As well, fatality rates in several male-dominated industries such as mining, construction, and transportation and storage have fallen since the mid-1970s.¹¹

Sex differences in risk factors reduced

A variety of risks factors may be involved in any specific cause of death. While links with some of these factors are well-established, definitive connections with others have yet to be proven. Moreover, relationships between risk factors and mortality are complex and may involve a time-lag, so current mortality differences may reflect the prevalence of risk factors in the more or less distant past rather than the present situation. Nonetheless, trends in smoking and being overweight, risk factors for some leading causes of death, have mirrored the narrowing gap in male and female life expectancy.

Table 2
Death rates, selected causes, by sex, Canada, 1979 and 1995

Causes	1979			1995			Change in difference 1979 to 1995
	Male	Female	Difference	Male	Female	Difference	
Deaths per 100,000 population							
Cardiovascular diseases	526.4	311.7	214.7	316.9	193.8	123.1	91.6
Diseases of the heart	394.7	212.0	182.7	238.7	134.8	103.9	78.8
Cancer	239.0	150.2	88.8	234.7	150.3	84.4	4.4
Lung cancer	71.6	16.3	55.3	72.1	31.1	41.0	14.3
Accidents and adverse effects	73.3	29.0	44.3	39.9	18.5	21.4	22.9
Motor vehicle accidents	33.8	12.7	21.1	15.5	6.7	8.8	12.3
Chronic obstructive pulmonary diseases	43.1	10.4	32.7	44.7	19.3	25.4	7.3

Source: Statistics Canada (reference 4)
 Note: Age-standardized to the 1991 Canadian population

Smoking is a major risk factor for cardiovascular diseases, lung cancer and chronic obstructive pulmonary diseases—all causes of death in which the difference in death rates between the sexes diminished since 1979. Over roughly the same period, the smoking rates of adult men and women (aged 20 and over) tended to converge.¹² From 1977 to 1994/95, the age-standardized smoking rate fell from 46% to 33% for men and from 35% to 29% for women (Chart 2). The sex difference in smoking rates, therefore, shrank from 11 to 4 percentage points.

Data based on self-reported weight and height from Statistics Canada's 1985 General Social Survey and from the 1994/95 National Population Health Survey (NPHS) show that over this ten-year period, the percentage of people aged 20-64 who were overweight increased for both sexes, but more for women than for men.^{3,13} In 1985, 22% of men and 14% of women were overweight (body mass index over 27), a difference of 8 percentage points. By 1995, 25% of men and 21% of women were overweight, a difference of 4 percentage points (Chart 3).

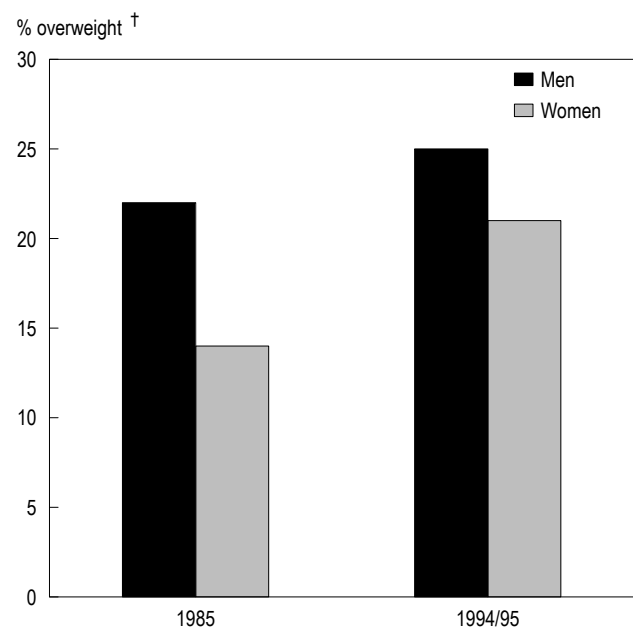
Provincial life expectancy differences less pronounced

Historically, life expectancy has been lower in eastern Canada (Quebec and the Atlantic provinces), but once-wide provincial differences have diminished.³

From 1926 to 1976, Saskatchewan residents generally had the longest life expectancy, and Quebec residents, the shortest.^a This provincial difference, however, fell from 9.3 years in 1926 to 1.8 years in 1976. Thereafter, the gap narrowed only slightly. By 1995, life expectancy at birth ranged from 77.3 years in Newfoundland to 79.0 years in British Columbia, a difference of 1.7 years.

^a Prince Edward Island ranked first in 1926, 1946 and 1951, but because of the small population, life expectancy estimates for the province are less reliable than for other provinces.

Chart 3
Percentage of adult population who are overweight, Canada, 1985 and 1994/95



Data source: Statistics Canada (reference 13) and 1994/95 National Population Health Survey
† Population aged 20-64 with body mass index > 27

The shrinking provincial life expectancy gaps were accompanied by changes in rankings. In 1995, Alberta and Ontario had the second and third longest life expectancies at birth. Saskatchewan ranked fourth, but for the first time, was below the national average. And although Manitoba's life expectancy also used to be above the national average, it is now slightly below those of Quebec, Nova Scotia and New Brunswick.

Estimates of life expectancy for the Yukon and the Northwest Territories are somewhat less reliable because of their small populations. Nonetheless, life expectancy in the territories is estimated to be below the Canadian average by three to six years.

Provincial risk factors

To some extent, the introduction of universal health care insurance contributed to the reduction in provincial life expectancy differences.

Table 3
Death rates, selected causes, Canada and provinces, 1995

	Cardio-vascular diseases	Dis-eases of the heart	Cancer	Lung cancer	Chronic obstructive pulmonary diseases
Deaths per 100,000 population					
Canada	247.1	179.9	184.9	48.6	28.8
Nfld.	311.2	227.4	192.8	49.6	28.8
P.E.I.	281.3	211.5	199.2	62.5	28.7
N.S.	266.2	197.6	205.5	58.2	30.8
N.B.	264.1	193.7	199.9	54.3	31.7
Que.	245.9	184.3	198.2	57.5	34.8
Ont.	248.4	178.9	182.4	44.4	26.3
Man.	271.1	198.2	189.8	49.0	24.5
Sask.	241.3	176.2	172.6	45.1	24.4
Alta.	243.8	174.8	172.8	44.0	27.7
B.C.	223.0	157.6	167.8	43.1	27.3

Source: Statistics Canada (reference 4)

Note: Age-standardized to the 1991 Canadian population

Table 4
Percentage of population aged 18-74 with major risk factors for cardiovascular diseases, by province, Canada, 1986-1992

	At least one major risk factor	Regular smoking [†]	High blood pressure [‡]	Elevated blood cholesterol [§]
%				
All provinces	63	27	15	43
Nfld.	69	35	22	43
P.E.I.	65	29	20	45
N.S.	69	33	19	44
N.B.	67	31	19	46
Que.	67	32	13	48
Ont.	61	23	17	40
Man.	62	25	16	44
Sask.	61	24	16	43
Alta.	58	27	15	37
B.C.	59	25	13	43

Source: Health Canada (reference 14)

Note: Age-sex-standardized to the 1986 Canadian population

† One or more cigarettes per day

‡ Diastolic pressure ≥ 90 mm Hg or being treated with medication, salt-restricted diet or weight-reduction program

§ Total plasma cholesterol level ≥ 5.2 mmol/L

Those differences that persist are reflected in cause-specific death rates and in the prevalence of several risk factors.

In 1995, age-standardized death rates for cardiovascular diseases, cancer (particularly lung cancer), and chronic obstructive pulmonary diseases were generally lower west of Quebec (Table 3). This is not surprising, as a number of risk factors displayed the same geographic pattern.

Canadian Provincial Heart Health Surveys from 1986 to 1992 measured the prevalence of the major risk factors for cardiovascular diseases—smoking, high blood pressure, and elevated blood cholesterol.¹⁴ Close to two-thirds (63%) of Canadian adults had at least one of these risk factors, with the highest percentages in Newfoundland and Nova Scotia, and the lowest in Alberta and British Columbia. Smoking rates were highest in the Atlantic provinces and Quebec (Table 4).

However, other variables not considered in the Heart Health Surveys may have played a role in reducing the provincial life expectancy gaps. For example, because mortality tends to be lower in metropolitan than in rural areas, life expectancy may be longer in more urbanized provinces. In addition, since mortality differences also exist by marital status, level of education and income, provinces with larger percentages of married, highly educated and/or affluent residents might also enjoy an advantage.¹⁵

Concluding remarks

It would appear that while both men and women are living longer, the widest life expectancy gap between them was reached in the late 1970s. Diminishing differences in the prevalence of some risk factors suggest that the gap will continue to narrow. As well, the east-to-west gradient in provincial mortality could be changing. Increasingly, differences in provincial life expectancies may depend on the socioeconomic characteristics of each province's population.

References

- 1 Chesnais JC. La sous-mortalité féminine: de la sociologie à la biologie. Communication présentée au Colloque de l'Association Internationale des démographes de langue française, Sinaia, Sept. 1996.
- 2 Verbrugge LM. The social roles of the sexes and their relative health and mortality. In: Lopez AD, Ruzicka LT (editors). *Sex Differentials in Mortality: Trends, Determinants and Consequences*. Canberra: Australian National University, 1983.
- 3 Statistics Canada. *National Population Health Survey Overview 1994-95* (Catalogue 82-567) Ottawa: Minister of Industry, 1995.
- 4 Statistics Canada. *Births and Deaths, 1995* (Catalogue 84-210-XPB) Ottawa: Minister of Industry, 1996.
- 5 World Health Organization. *International Classification of Diseases: 9th Revision*. Geneva: World Health Organization, 1977.
- 6 Nagnur D. *Longevity and Historical Life Tables 1921-1981 (Abridged), Canada and the Provinces* (Statistics Canada, Catalogue 89-506) Ottawa: Minister of Supply and Services Canada, 1986.
- 7 Trovato F. The narrowing sex differential in mortality in Canada since 1971. *Canadian Studies in Population* 1995; 22(2): 145-67.
- 8 United Nations, Department of International Economic and Social Affairs. Sex differentials in life expectancy and mortality in developed countries: An analysis by age groups and causes of death from recent and historical data. *Population Bulletin of the United Nations* (No. 25-188) 1988; 65-107.
- 9 Wilkins K. Causes of death: How the sexes differ. *Health Reports* (Statistics Canada, Catalogue 82-003) 1995; 7(2): 33-43.
- 10 National Cancer Institute of Canada. *Canadian Cancer Statistics 1997*. Toronto: National Cancer Institute of Canada, 1997.
- 11 Marshall K. A job to die for. *Perspectives on Labour and Income* (Statistics Canada, Catalogue 75-001-XPB) 1996; 8(2): 26-31.
- 12 Millar WJ. Reaching smokers with lower educational attainment. *Health Reports* (Statistics Canada, Catalogue 82-003-XPB) 1996; 8(2): 11-9.
- 13 Statistics Canada. *Health Status of Canadians: Report of the 1991 General Social Survey* (Catalogue 11-612E, No. 8) Ottawa: Minister of Industry, Science and Technology, 1994.
- 14 Health Canada. *Canadians and Heart Health - Reducing the Risk*. Ottawa: Health Canada, 1995.
- 15 Nault F, Berthelot JM, Roberge R. Espérance de vie et espérance de vie en santé selon le sexe, l'état matrimonial et le statut socio-économique au Canada. *Cahiers québécois de démographie*. In press.