

For centuries, information on deaths has been used to study the health status of populations. Statistics tabulated by cause of death, sex and age provide information that is useful in comparing the importance of fatal diseases between males and females, and the ages at which each sex is at highest risk of dying of particular diseases. Life expectancy, an indicator of population health that is based on the age at which people die, is another means of comparing the sexes, and of examining trends over time.

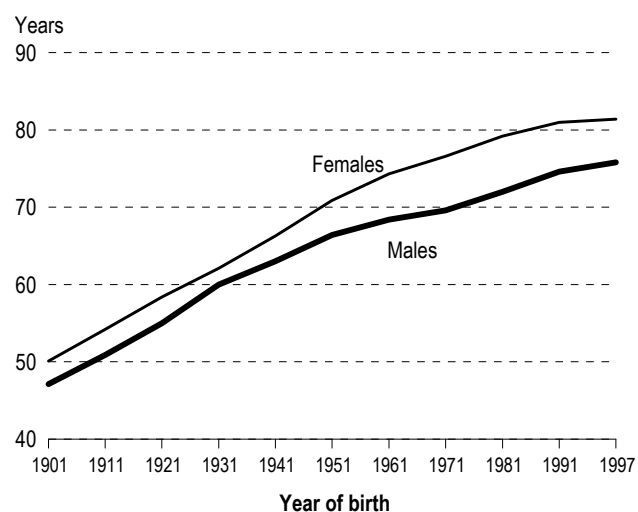
DEATH — SHIFTING TRENDS

Analysis of Canadian death statistics by sex reveals marked differences. Men die at earlier ages than women, on average, and causes of death differ to some extent, especially in youth and early adulthood. As well, more men than women die prematurely of avoidable causes.

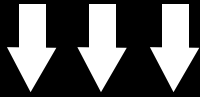
Women live longer

Since 1901, life expectancy in Canada has risen dramatically for both sexes, although females have consistently enjoyed an advantage over males.^{1,2} Females born at the beginning of the 20th century could expect their life to last 50.1 years, three years longer than males. By 1997, female life expectancy had risen to 81.4 years, compared with 75.8 for males—a gap of 5.6 years. The gap was widest in 1981, when life expectancy for females exceeded that for males by 7.1 years. During the 1990s, life expectancy gains for both sexes were smaller than they had been in previous decades, and less for females than for males. (See *Disability-free life expectancy*.)

Life expectancy at birth, 1901 to 1997



Data sources: References 1 and 2



Disability-free life expectancy

Overall population health has traditionally been measured by indicators such as infant mortality and life expectancy. This has largely reflected the availability of detailed data from death certificates. However, as the importance of infectious diseases as major causes of death has declined over the past century, people now survive to older ages when susceptibility to chronic diseases is greater, and frailty and functional limitations are more common. As a result, conventional life expectancy and other mortality-based indicators are becoming less adequate as measures of health in the population.

Recently, a number of health expectancy measures have integrated some assessment of quality of health or morbidity. An obvious advantage of such indicators is that they are responsive both to changes in mortality rates and to changes in the quality of health.

One such measure is disability-free life expectancy (DFLE). This indicator combines information on mortality rates with data on the prevalence of activity limitation. DFLE estimates the number of years of life that can be expected to be free of activity limitation.

Estimates of DFLE for 1995-1997 indicate that women could expect to spend just over 12 years, or 15% of their lives, with a disability, compared with about 10 years (13%) for men. Clearly, women's longer total life expectancy does not mean that they have an equivalent advantage in disability-free years. Although women's total life expectancy exceeded that for men by 5.8 years, the gap in disability-free life expectancy was less—a little more than three years.

Life expectancy and disability-free life expectancy, 1995-1997

	Life expectancy	Disability-free life expectancy	Difference	
	Years	Years	Years	%
Both sexes	78.4	67.1	11.3	14
Male	75.4	65.5	9.9	13
Female	81.2	68.7	12.5	15

Data sources: Canadian Vital Statistics Database; 1996 Census of Population

International comparisons

Since 1961, Canada's life expectancy has consistently ranked among the top 10 of the 29 OECD (Organisation for Economic Co-operation and Development) countries.³ In 1961, 1971, 1981 and 1991, Canadian females' relative ranking was higher than their male counterparts'.

From 1995 to 1997, the pattern changed, with Canadian males ranking higher internationally than Canadian females. In 1997, for example, Canadian male life expectancy was fifth, behind Japan, Sweden, Iceland and Switzerland. Canadian female life

expectancy was eighth, behind Japan, Switzerland, France, Spain, Belgium, Sweden and Italy.

International ranking of life expectancy at birth for Canada, selected years, 1961 to 1997

	Males	Females
1961	8	7
1971	10	6
1981	9	6
1991	4	3
1995	4	5
1996	5	7
1997	5	8

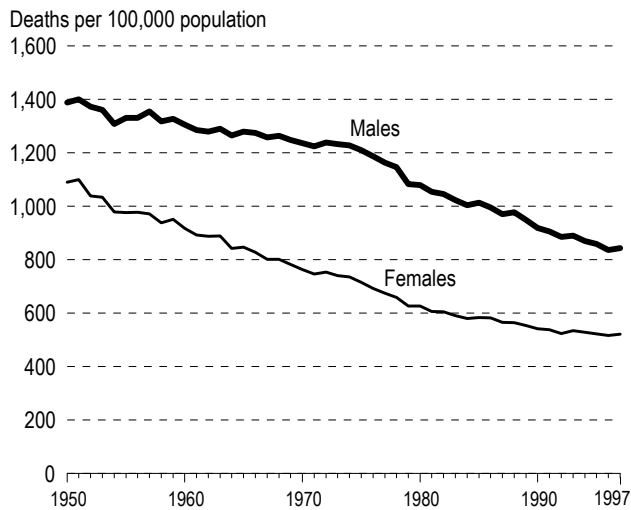
Data source: Reference 3

Notes: Rank = 1 for highest life expectancy among OECD countries

Trends in mortality rates

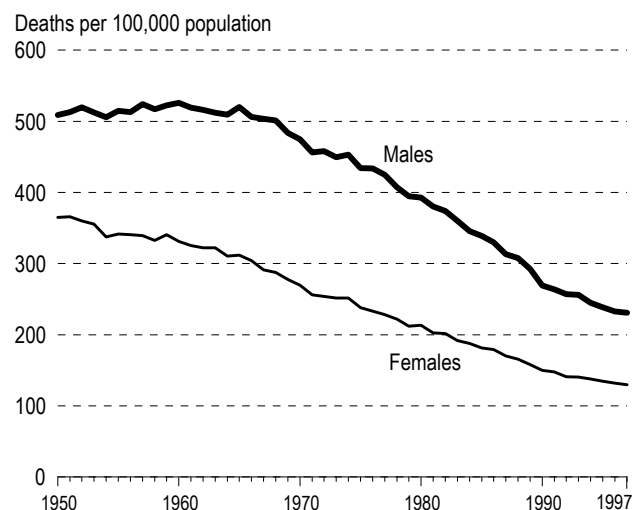
Over the latter half of the 20th century, age-standardized death rates, which remove the effects of changes in population age structure, fell markedly. During these years, the 52% reduction in the female mortality rate for all causes combined considerably exceeded the 39% decrease for males. From 1990 to 1997, however, the death rate declined by twice as much for males (8%) as it did for females (4%).

Age-standardized† mortality rates, all causes, 1950 to 1997



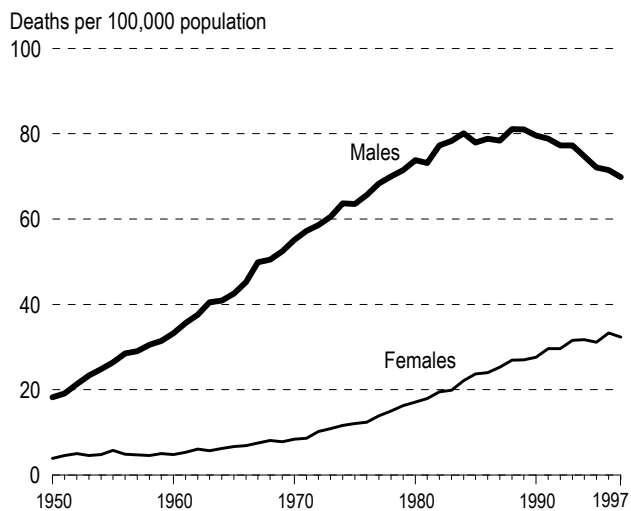
Data source: Canadian Vital Statistics Database
†Standardized to 1991 Canadian population

Age-standardized† mortality rates, heart diseases, 1950 to 1997



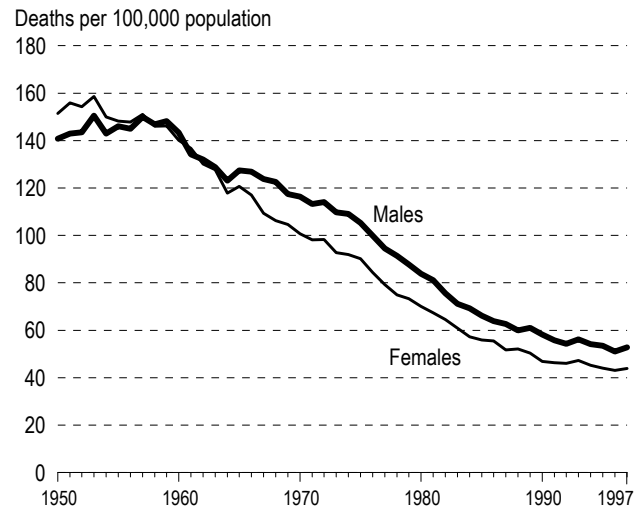
Data source: Canadian Vital Statistics Database
† Standardized to 1991 Canadian population

Age-standardized† mortality rates, cancer of trachea, bronchus and lung, 1950 to 1997

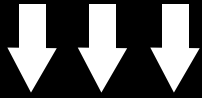


Data source: Canadian Vital Statistics Database
† Standardized to 1991 Canadian population

Age-standardized† mortality rates, cerebrovascular disease, 1950 to 1997



Data source: Canadian Vital Statistics Database
† Standardized to 1991 Canadian population



Cancer survival

Since the mid-1990s, the most common sites in which cancer cases are detected are sex-specific: the breast for women and the prostate for men. For each sex, lung cancer now ranks second in new cases diagnosed, and colorectal cancer, third.

Lung cancer, however, causes the largest number of cancer deaths regardless of sex, and colorectal cancer ranks third. The second-ranking causes of cancer deaths are breast cancer for women and prostate cancer for men.

Relative survival compares the survival rate of cancer patients with the overall survival rate of a population with the same distribution of age, sex, and province of residence. Among these four cancer sites, five-year relative survival is highest for breast and prostate cancer. Except for the very young and very old, women receiving a diagnosis of breast cancer in 1992 were 80% as likely to live another five years as women of the same age in the same province. The outlook was essentially the same for men diagnosed with prostate cancer.

The age-standardized five-year relative survival rate for colorectal cancer was

considerably lower: 56% for men and 58% for women.

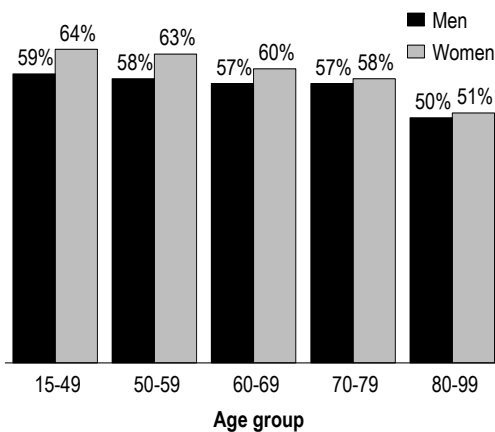
The prognosis for lung cancer was lower still. Age-standardized five-year relative survival rates were 15% for men and 18% for women.

Among people diagnosed with colorectal or lung cancer, the relative survival of women slightly exceeded the relative survival of men. The apparent advantage for women might be partly explained by their more frequent use of health care, leading to a better chance of earlier diagnosis and treatment.

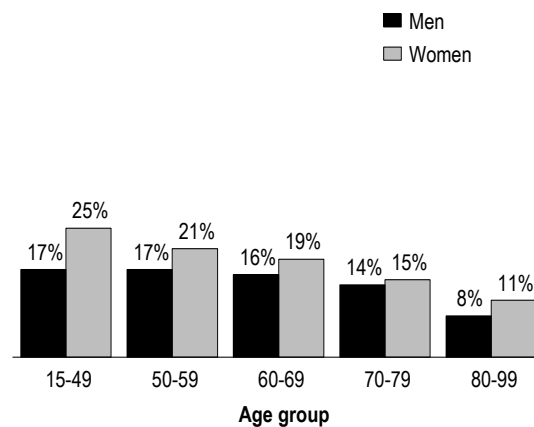
Survival from cancer is substantially influenced by stage at diagnosis.⁴⁻⁶ Patients diagnosed early tend to survive longer than those diagnosed when the cancer has spread beyond the original tumour site. Availability of and access to treatment also play a role in survival. But without data about stage at diagnosis or treatment, it is not possible to determine how differences in five-year survival rates might be affected by these factors.

See also *Health Indicators*, an electronic publication available free on the internet at <http://www.statcan.ca>

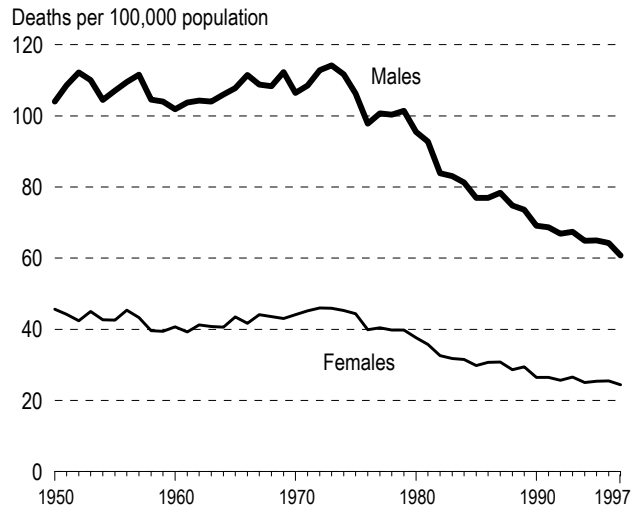
Five-year relative survival for colorectal cancer cases diagnosed in 1992, by age group



Five-year relative survival for lung cancer cases diagnosed in 1992, by age group



Age-standardized[†] mortality rates, external causes of injury and poisoning, 1950 to 1997



Data source: Canadian Vital Statistics Database
[†] Standardized to 1991 Canadian population

steadily since 1950, levelled off in the mid-1980s, then fell throughout the 1990s. For women, however, the rate began increasing only in the mid-1960s, but then in contrast to the rate for men, continued to rise in the 1990s. The dissimilarity between the sexes in the recent patterns in death rates reflects the earlier popularity of smoking in men than women, as well as earlier downturns in smoking prevalence in men (see *Cancer survival*).

During the 1990s, declines in the death rate for diseases of the heart were nearly equal for men and women. Likewise, for other major causes of death, such as cerebrovascular diseases (mainly stroke) and external causes of injury and poisoning (the major components of which are motor vehicle accidents and suicide), decreases in rates during the 1990s were nearly parallel between the sexes.

Top 10 causes

For both males and females, the top 10 causes of death accounted for about 83% of deaths in 1997. The top two causes were reversed: slightly more males died of cancer than of heart disease, while the opposite was true for females. Cerebrovascular diseases (primarily stroke) was the third leading cause for both males and females. The proportion of deaths attributed to cancer and heart diseases

Deaths due to top 10 causes, 1997

	Males	Females
	Number of deaths	
Cancer	31,555	27,148
Heart diseases	30,149	27,268
Cerebrovascular disease	6,675	9,376
Pulmonary diseases	5,607	4,011
Unintentional injuries	5,305	3,321
Pneumonia/Influenza	3,749	4,283
Suicide	2,914	†
Diabetes	2,767	2,932
Diseases of arteries	2,505	2,262
Disease of central nervous system	2,104	2,945
Psychoses	‡	3,084

Data source: Canadian Vital Statistics Database

† Did not rank in top 10 causes for females.

‡ Did not rank in top 10 causes for males.

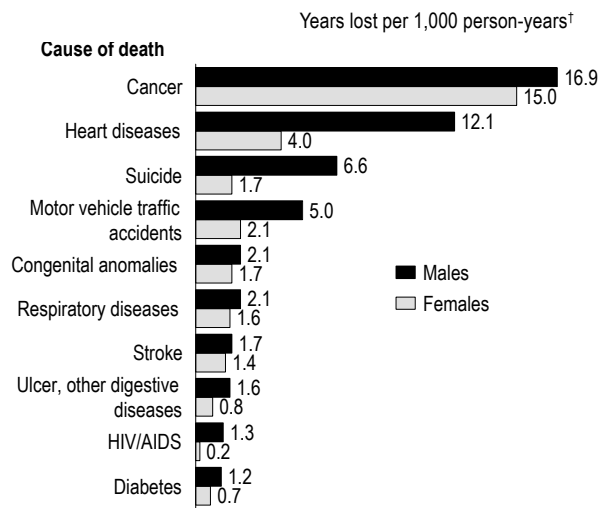
combined was marginally higher for males (55%) than females (52%). Females, however, were more likely to die from cerebrovascular diseases (9% versus 6%).

Six of the seven remaining causes were also the same for both sexes, but the ranking differed. For example, deaths due to pneumonia and influenza ranked fourth for females, but sixth for males. Mortality from hereditary and degenerative diseases of the central nervous system (such as Alzheimer's disease) was also more widespread among females, a reflection of their longer life expectancy. Suicide, the seventh leading cause of death for males, did not register among the top 10 for females. Conversely, deaths traced to psychoses were common enough among females to be included among the top 10.

Potential years of life lost

While mortality rates are useful in evaluating the relative impact of causes of death occurring at any age, potential years of life lost (PYLL) is an indicator of premature mortality. According to convention, PYLL was calculated by subtracting the age at which death actually occurred from age 75; for instance, death at age 3 would result in 72 years of potential life lost, and at age 69, 6 years. The calculation of PYLL thus gives more weight to deaths at younger than at older ages. The PYLL rate for suicide, for example, is high, reflecting the relative importance of this cause during the teenage years and young

Rate of potential years of life lost (PYLL) before age 75, selected causes of death, 1997



Data source: Canadian Vital Statistics Database
† Standardized to 1997 Canadian population

adulthood. By contrast, the age-standardized mortality rate for suicide, calculated without reference to age, ranks lower.

For most major causes of PYLL before age 75, the rate for males exceeds that for females, indicating a higher risk of earlier death. For example, the PYLL rate for heart diseases is three times as high for men as it is for women. And for two causes often involving violence—suicide and motor vehicle accidents—the PYLL rate for men exceeds that for women by factors of four and two, respectively. On the other hand, the male excess in PYLL rates for cancer, congenital anomalies, stroke and chronic obstructive lung disease is less pronounced.

Concluding remarks

Although for the past century women's life expectancy exceeded that of men, the gap began to narrow during the 1990s. This change stems largely

from an important shift in the pattern of mortality rates for smoking-related respiratory cancers. Although the death rate for these cancers in men still greatly surpasses that in women, the rate for men is falling, while that for women is still on the rise.

Recent changes in international rankings of Canadian life expectancy also reflect the changing pattern between the sexes. Life expectancy for both Canadian men and women has always been among the top 10 of the OECD countries, but in recent years, Canadian men's international rankings have improved, while Canadian women's have slipped.

Finally, premature mortality is greater for men for most causes of death. These include causes resulting from conditions such as heart disease, as well as causes due to external events such as motor vehicle crashes.

References

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- 2 Statistics Canada. *The Daily*. Ottawa: Minister of Industry, May 13, 1999.
- 3 Organisation for Economic Co-operation and Development. *Health Data 2000 - Comparative Analysis of 29 Countries* (CD-ROM). Paris: Organisation for Economic Co-operation and Development, July 15, 2000.
- 4 Wingo PA, Gloecker Ries LA, Parker SL, et al. Long-term cancer patient survival in the United States. *Cancer Epidemiology, Biomarkers and Prevention* 1998; 7: 271-82.
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- 6 Welch HG, Schwartz LM, Woloshin S. Are increasing 5-year survival rates evidence of success against cancer? *Journal of the American Medical Association* 2000; 283: 2975-8.