

Causes of death: How the sexes differ

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Biological, social and behavioural factors have resulted in differences in the most common causes of death for males and females. In infancy, the causes are similar, but start to diverge during childhood, and by adulthood, differ sharply. However, as people advance into their senior years, differences in the leading causes of death for men and women tend to diminish.

Not only do the causes of death of males and females differ, but so do the ages at which death occurs. As a result of greater loss of life at younger ages, substantially fewer males than females survive until age 75.

In 1993, a total of 204,912 deaths occurred in Canada: 109,407 males and 95,505 females. The death rates standardized to the age distribution of the 1991 Canadian population were 890 and 534 deaths per 100,000 males and females, respectively. The male-to-female ratio of death rates was 1.67.

This article examines sex-specific variations in death rates and causes of death at different ages in 1993, and trends in cause-specific death rates since 1950 (see *Data source and definitions*).

Death Rates

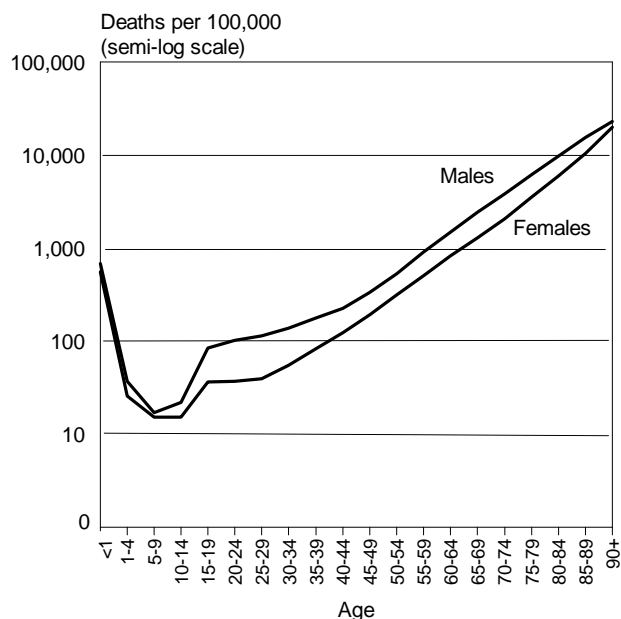
During the first year of life, the death rate is relatively high. In 1993, the rate was 630 deaths per 100,000 infants under age 1. Later in childhood, however, the rate falls dramatically: to 23 deaths per 100,000 children aged 1 to 9, and to 19 deaths per 100,000

children aged 10 to 14. At ages 15 to 19, the rate begins to increase (61 deaths per 100,000). Thereafter, the rate continues to rise, reaching 4,523 deaths per 100,000 at age 65 and over.

At all ages, death rates in 1993 were higher for males than for females. But while the male death rate surpassed the female rate throughout the lifespan (Chart 1), the greatest difference was at ages 15 to 39, largely as a result of external causes (Chart 2).

Chart 1

Age-specific death rates for all causes, by sex, Canada, 1993



Source: Health Statistics Division

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Data source and definitions

The data in this article are derived 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 person's 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),¹ a single, underlying cause of death is selected for each decedent. Each cause of death is assigned a code, according to the ICD-9.

In this report, non-external causes of death, which arise from endogenous or natural physiological processes, are distinguished from external causes. External causes include injury, poisoning, and other adverse effects, both intentional and unintentional. "Broad categories" of causes of death referred to in this article correspond to chapter headings of the ICD-9 and consist of coding ranges. The grouping of particular ICD-9 codes into "specific" causes of death is arbitrary; categories could be defined in other ways.

Categorization of leading causes of death is based on broad as well as specific causes. For example, suicide and accidents, the leading specific causes of death of men aged 20 to 44, are subcategories of the leading broad category, external causes. Similarly, for women aged 65 and over, the leading specific causes of death are ischaemic heart disease and stroke, both subcategories of the leading broad category, diseases of the circulatory system.

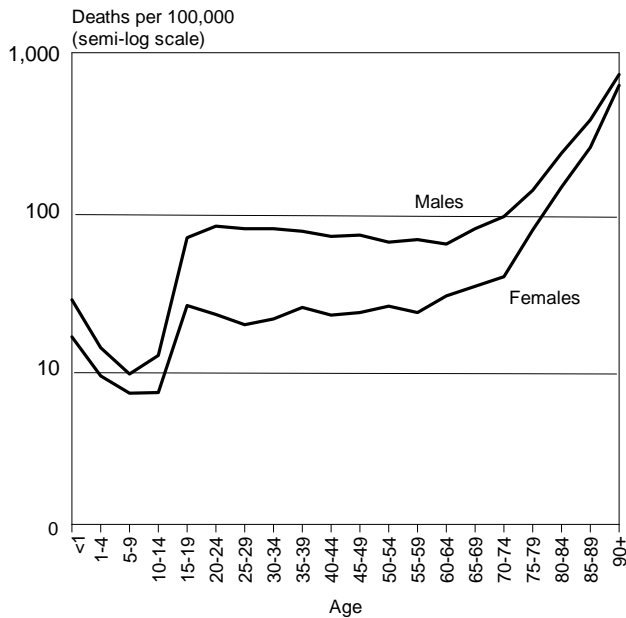
Death rates were calculated based on postcensal revised population estimates, which take into account census undercounts and non-permanent residents. Age-standardized death rates were calculated by the direct method, using the age distribution of the 1991 population of Canada as the standard.

Codes for selected causes of death, International Classification of Diseases (ICD), Ninth Revision, 1975

Cause of death	ICD number
Human immunodeficiency virus (HIV) infection	042-044
Malignant neoplasms	140-208
Colorectal cancer	152-154
Cancer of trachea, bronchus and lung	162
Cancer of female breast	174
Cancer of ovary and other uterine adnexa	183
Cancer of prostate	185
Diabetes mellitus	250
Diseases of circulatory system	390-459
Ischaemic heart disease	410-414
Cerebrovascular disease	430-438
Diseases of the respiratory system	460-519
Pneumonia and influenza	480-487
Chronic liver disease and cirrhosis	571
Congenital anomalies	740-759
Anomalies of circulatory system	745-747
Perinatal mortality	760-779
Obstetric complications	761-763
Other respiratory conditions	770
Sudden infant death syndrome	798.0
External causes of injury and poisoning	E800-E999
Motor vehicle accidents	E810-E825, E929.0
Accidental drowning	E830, E832, E910
Accidental falls	E833-E835, E880-E888
Suicide	E950-E959

Chart 2

Age-specific death rates for external causes, by sex, Canada, 1993



Source: Health Statistics Division

For infants, the male-to-female ratio of death rates in 1993 was 1.23. At ages 1 to 9, the ratio increased slightly to 1.31, and by ages 10 to 14, reached 1.42. At ages 15 to 19, the ratio jumped to 2.32, but then declined steadily to 1.36 for individuals aged 65 and over.

Causes of Death

By broad category, the leading causes of death are similar for infant boys and girls. Of all deaths of children under age 1 in 1993, 72% were due to either perinatal causes, such as prematurity, or to congenital anomalies, such as structural defects of the heart (Table 1).

When more specific causes are considered, sudden infant death syndrome (SIDS) emerges as the leading cause of death before the first birthday, followed by congenital anomalies of the circulatory system and obstetric complications. For each cause, boys had higher death rates than did girls.

Table 1

Leading causes of death* under age 1, by sex, Canada, 1993

	Deaths		
	Number	%	Rate per 100,000
Males			
All causes	1,379	100	685.0
Perinatal mortality	609	44	302.5
Obstetric complications	133	10	66.1
Other respiratory conditions	110	8	54.6
Congenital anomalies	380	28	188.8
Anomalies of circulatory system	151	11	75.0
Sudden infant death syndrome	141	10	70.0
Females			
All causes	1,069	100	557.4
Perinatal mortality	437	41	227.9
Obstetric complications	104	10	54.2
Immaturity	81	8	42.2
Congenital anomalies	330	31	172.1
Anomalies of circulatory system	107	10	55.8
Sudden infant death syndrome	125	12	65.2

Source: Health Statistics Division

* See **Data source and definitions** for ICD-9 codes.

At ages 1 to 9, different causes of death take precedence, but again there is little difference between boys and girls (Table 2). In 1993, motor vehicle accidents accounted for the largest share of deaths (14% of deaths among boys, 18% among girls). Cancer ranked second (14% of deaths among both sexes), and congenital anomalies, third (13% of deaths among boys, 10% among girls). The excess in boys'

Table 2**Leading causes of death* at ages 1 to 9, by sex, Canada, 1993**

	Deaths		
	Number	%	Rate per 100,000
Males			
All causes	477	100	26.1
External causes	200	42	10.9
Motor vehicle accidents	69	14	3.8
Drowning	46	10	2.5
Non-external causes	277	58	15.2
Cancer	65	14	3.6
Congenital anomalies	62	13	3.4
Females			
All causes	347	100	19.9
External causes	134	39	7.7
Motor vehicle accidents	62	18	3.5
Non-external causes	213	61	12.2
Cancer	49	14	2.8
Congenital anomalies	36	10	2.1

Source: Health Statistics Division

* See **Data source and definitions** for ICD-9 codes.

At ages 10 to 14, differences begin to emerge, with external causes accounting for over half (54%) of the deaths among boys, compared with 45% of the deaths among girls in 1993 (Table 3). The leading specific cause of death for both sexes was motor vehicle accidents, followed by suicide.

Among 15- to 19-year-olds, 79% of male deaths, compared with 68% of female deaths, resulted from external causes (Table 4). Motor vehicle accidents were responsible for 40% of deaths among males and a slightly higher percentage (42%) among females. The rate of death due to motor vehicle accidents, though, was twice as high for males as for females: 34 versus 16 deaths per 100,000, respectively. Suicide, the second leading cause of death at these ages, accounted for 23% of male deaths, compared with 13% among females. The respective suicide rates were 19 and 5 per 100,000.

Table 3**Leading causes of death* at ages 10 to 14, by sex, Canada, 1993**

	Deaths		
	Number	%	Rate per 100,000
Males			
All causes	219	100	21.8
External causes	119	54	11.8
Motor vehicle accidents	60	27	6.0
Suicide	26	12	2.6
Non-external causes	100	46	10.0
Cancer	31	14	3.1
Females			
All causes	147	100	15.3
External causes	66	45	6.9
Motor vehicle accidents	28	19	2.9
Suicide	18	12	1.9
Non-external causes	81	55	8.4
Cancer	27	18	2.8

Source: Health Statistics Division

* See **Data source and definitions** for ICD-9 codes.

Table 4**Leading causes of death* at ages 15 to 19, by sex, Canada, 1993**

	Deaths		
	Number	%	Rate per 100,000
Males			
All causes	841	100	84.5
External causes	664	79	66.7
Motor vehicle accidents	333	40	33.5
Suicide	193	23	19.4
Non-external causes	177	21	17.8
Cancer	54	6	5.4
Females			
All causes	346	100	36.4
External causes	235	68	24.7
Motor vehicle accidents	147	42	15.5
Suicide	44	13	4.6
Non-external causes	111	32	11.7
Cancer	35	10	3.7

Source: Health Statistics Division

* See **Data source and definitions** for ICD-9 codes.

For both sexes, starting at ages 20 to 44, death is more likely to result from non-external causes than is the case at younger ages. Even so, in 1993, external causes accounted for about half the deaths among men and a third of those among women in the 20 to 44 age range (Table 5).

Table 5**Leading causes of death* at ages 20 to 44, by sex, Canada, 1993**

	Deaths		
	Number	%	Rate per 100,000
Males			
All causes	9,044	100	151.2
Non-external causes	4,585	51	76.6
HIV	1,077	12	18.0
Cancer	1,045	12	17.5
External causes	4,459	49	74.5
Suicide	1,686	19	28.2
Motor vehicle accidents	1,246	14	20.8
Females			
All causes	3,949	100	67.2
Non-external causes	2,706	69	46.1
Cancer	1,400	35	23.8
<i>Breast cancer</i>	426	11	7.3
<i>Lung cancer</i>	177	4	3.0
External causes	1,243	31	21.2
Motor vehicle accidents	451	11	7.7
Suicide	381	10	6.5

Source: Health Statistics Division

* See **Data source and definitions** for ICD-9 codes.

The leading specific cause of death for men aged 20 to 44 was suicide (28 deaths per 100,000), followed by motor vehicle accidents (21 deaths per 100,000), and HIV (18 deaths per 100,000). HIV caused 1,077 deaths among men aged 20 to 44, compared with only 68 among women (1 death per 100,000).

Although just half of all deaths among men aged 20 to 44 were due to non-external causes,^a in contrast to 69% among women, men's death rate from non-external causes considerably exceeded that of women: 77 versus 46 deaths per 100,000. A large part of this difference was due to HIV.

^a It has been estimated that at least 25% of all deaths at ages 35 to 84 in Canada are caused by tobacco use.² However, most smoking-related deaths are attributed to cancer, heart disease, or chronic respiratory disease, all of which are categorized here as non-external causes. Therefore, the term non-external is somewhat misleading.

Among women aged 20 to 44, the three leading specific causes of death were motor vehicle accidents, breast cancer, and suicide, at rates of around 7 deaths per 100,000. In this age range, the female death rate for all cancers actually surpassed the rate for men (24 versus 18 deaths per 100,000), mostly because of breast cancer.

At ages 45 to 64, the leading causes of death of men and women become more similar (Table 6). In 1993, cancer was the leading broad cause (273 deaths per 100,000 men and 226 deaths per 100,000 women), followed by diseases of the circulatory system (248 and 89 deaths per 100,000, respectively). Together, cancer and diseases of the circulatory system accounted for 71% of the deaths among men and 74% of the deaths among women.

Table 6**Leading causes of death* at ages 45 to 64, by sex, Canada, 1993**

	Deaths		
	Number	%	Rate per 100,000
Males			
All causes	21,371	100	735.9
Non-external causes	19,489	91	671.1
Cancer	7,926	37	272.9
<i>Lung cancer</i>	2,960	14	101.9
<i>Colorectal cancer</i>	835	4	28.8
Diseases of circulatory system	7,207	34	248.2
<i>Ischaemic heart disease</i>	5,144	24	177.1
External causes	1,882	9	64.8
Suicide	760	4	26.2
Motor vehicle accidents	424	2	14.6
Females			
All causes	12,374	100	424.7
Non-external causes	11,672	94	400.6
Cancer	6,572	53	225.6
<i>Lung cancer</i>	1,618	13	55.5
<i>Breast cancer</i>	1,560	13	53.5
Diseases of circulatory system	2,599	21	89.2
<i>Ischaemic heart disease</i>	1,395	11	47.9
External causes	702	6	24.1
Suicide	230	2	7.9
Motor vehicle accidents	202	2	6.9

Source: Health Statistics Division

* See **Data source and definitions** for ICD-9 codes.

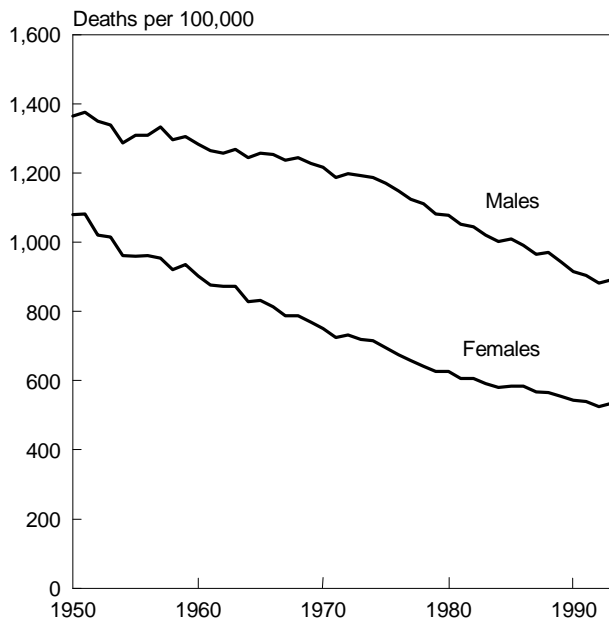
For men aged 45 to 64, the three leading specific causes

Trends in Causes over Time

Since 1950, age-standardized death rates have fallen dramatically, although the drop among females has been sharper than that among males (Chart 3). From 1950 to 1993, the female death rate declined 51%, compared with a 35% decrease for males. As a result, the male-to-female ratio of age-standardized death rates rose from 1.26 in 1950 to 1.67 in 1993. The 1993 sex differential, however, was somewhat lower than in the late 1970s and early 1980s, when the ratio had peaked at 1.73 (Chart 4).

Chart 3

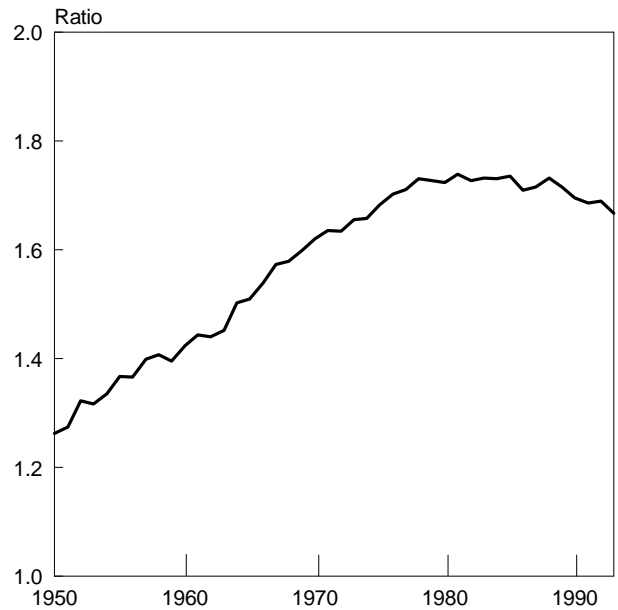
Age-standardized death rates,* by sex, Canada, 1950-1993



Source: Health Statistics Division
 * Standardized to 1991 population of Canada.

Chart 4

Male-to-female ratio of age-standardized death rates,* Canada, 1950-1993

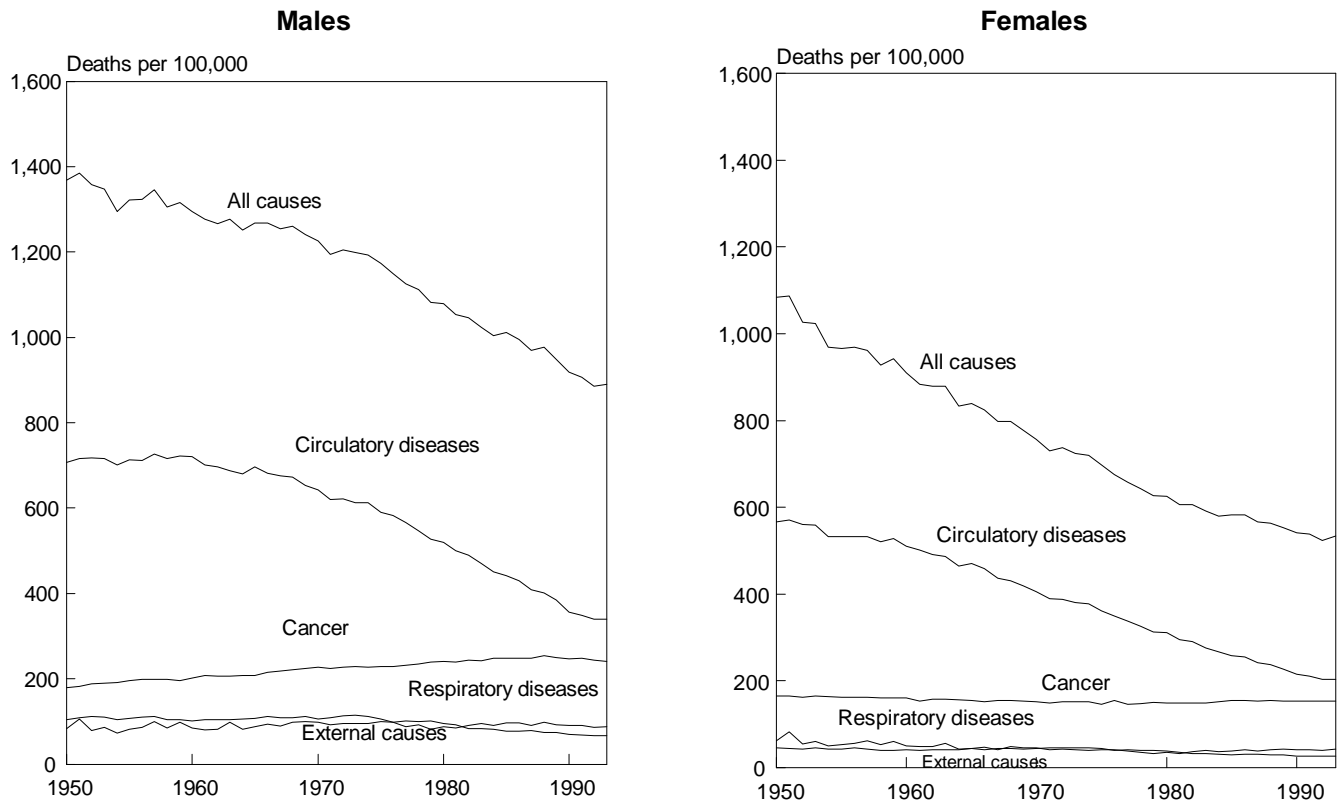


Source: Health Statistics Division
 * Standardized to 1991 population of Canada.

The net increase in the male-to-female ratio of death rates from 1950 to 1993 was largely attributable to changes in the rates for the four leading causes (Chart 5). Over the entire period, female death rates for each of these causes fell (Table 8). By contrast, among males, cancer and respiratory diseases death rates rose, reflecting increases in smoking in earlier decades, and thus, contributed most to the increase in the sex differential in the overall death rate. For circulatory diseases and external causes, male death rates dropped, but not as much as female rates. Similarly, the death rate for all other causes combined fell more among females than males.

Chart 5

Age-standardized death rates* for leading causes, by sex, Canada, 1950-1993



Source: Health Statistics Division
 * Standardized to 1991 population of Canada.

Table 8

Age-standardized mortality rates* (ASMR) for leading causes of death, Canada, 1950 and 1993

Cause of death	1950			1993			% change in ASMR 1950-1993	
	ASMR per 100,000		Male excess	ASMR per 100,000		Male excess		
	Males	Females	%	Males	Females	%	Males	Females
Circulatory diseases	708	567	25	340	204	67	-52	-64
Cancer	179	165	8	241	154	56	+35	-7
Respiratory diseases	84	62	35	88	43	105	+5	-31
External causes	104	46	126	67	27	148	-36	-41
All other causes	294	244	20	154	106	45	-48	-57

Source: Health Statistics Division
 * Standardized to 1991 population of Canada.

Circulatory diseases

Circulatory diseases accounted for the largest share of the overall decline in death rates. From 1950 to 1993, the female death rate for circulatory diseases fell 64%, compared with a 52% drop for males.

The female circulatory diseases death rate fell steadily over the entire period, but among males, the steepest decline began in the mid-1970s. The male-to-female ratio of the death rates was 1.3 in 1950, peaked at 1.7 in 1983, and has since remained fairly constant (1.67 in 1993).

Cancer

Trends in cancer mortality rates differed from those of circulatory diseases. Among males, the cancer death rate rose from 179 deaths per 100,000 in 1950 to peak at 255 in 1988, and then fell to 241 in 1993. This was a net increase of 35% over the 1950 rate.

The sites that contributed most to the increase in the male cancer death rate were the lung, which accounted for nearly one-third of cancer deaths among men in 1993, and the prostate, to which about one-eighth of male cancer deaths were attributed. The lung cancer death rate rose sharply from 18 deaths per 100,000 males in 1950 to 81 in 1988 and 1989, and declined slightly in the early 1990s. The prostate cancer death rate rose slowly from 20 deaths per 100,000 to 31 in 1993.

Females' cancer death rate decreased gradually from 165 deaths per 100,000 in 1950 to 145 in 1976, then rose slightly and remained fairly stable during the 1980s and early 1990s. The 1993 rate was 154 deaths per 100,000 females, which amounted to a net decrease of 7% since 1950.

Malignancies of the lung and breast each accounted for one-fifth of total female cancer deaths in 1993. Since 1950, the death rate for lung cancer rose from 4 to 32 deaths per 100,000 females, with the most rapid relative increase occurring during the 1970s. The death rate from breast cancer, on the other hand, was remarkably stable over the 1950 to 1993 period, at 30 deaths per 100,000.

In 1950, the male-to-female ratio of cancer death rates was 1.08. The ratio peaked at 1.64 in 1988, and has since narrowed slightly (1.57 in 1993).

Respiratory diseases

Trends in male and female death rates due to respiratory diseases have differed since 1950, when the rates were 84 and 62 deaths per 100,000, respectively. Among males, the rate peaked at 99 deaths per 100,000 in the mid-1970s, and then fell gradually to 88 deaths per 100,000 in 1993, slightly above the 1950 level.

By contrast, the female death rate for respiratory diseases fell from 62 deaths per 100,000 in 1950 to a low of 32 deaths per 100,000 in 1979, and then rose slowly to 43 deaths per 100,000 in 1993. The 1993 rate, though well below the 1950 level, was about 35% above the 1979 figure.

In 1950, the male-to-female ratio in death rates from respiratory diseases was 1.35. This difference peaked at 2.60 in 1981. By 1993, it had fallen to 2.0.

External causes

While the male death rate from external causes far surpasses that of females, trends in the rates have paralleled each other. The male death rate, at 104 deaths per 100,000 population in 1950, remained around that level until the early 1980s and then fell steadily to 67 deaths per 100,000 in 1993, for an overall decrease of 36%.

The female death rate from external causes in 1950 was 46 deaths per 100,000, less than half the male rate. The pattern of decline, however, was the same: the rate remained relatively stable until the early 1980s when it began to drop, reaching 27 deaths per 100,000 in 1993, for an overall decrease of more than 40%.

The male-to-female ratio of death rates from external causes was 2.3 in 1950. The ratio fluctuated slightly over the period, but on the whole, varied little. In 1993, it was 2.5.

Potential Years of Life Lost

The number of potential years of life lost (PYLL) at a designated age is a measure of premature death. The upper age limit from which PYLL is determined may be 65 (the age when labour force participation usually ends), 75 (the approximate life expectancy at birth of Canadians in 1993³), or the current life expectancy of each sex.

Conventionally, PYLL is calculated with reference to a single cause of death, with the underlying assumption that if the cause were eliminated, people would survive until the designated age. Thus, a limitation of PYLL is that it slightly overestimates the true number of years lost, because it does not account for the likelihood of dying from other causes.⁴

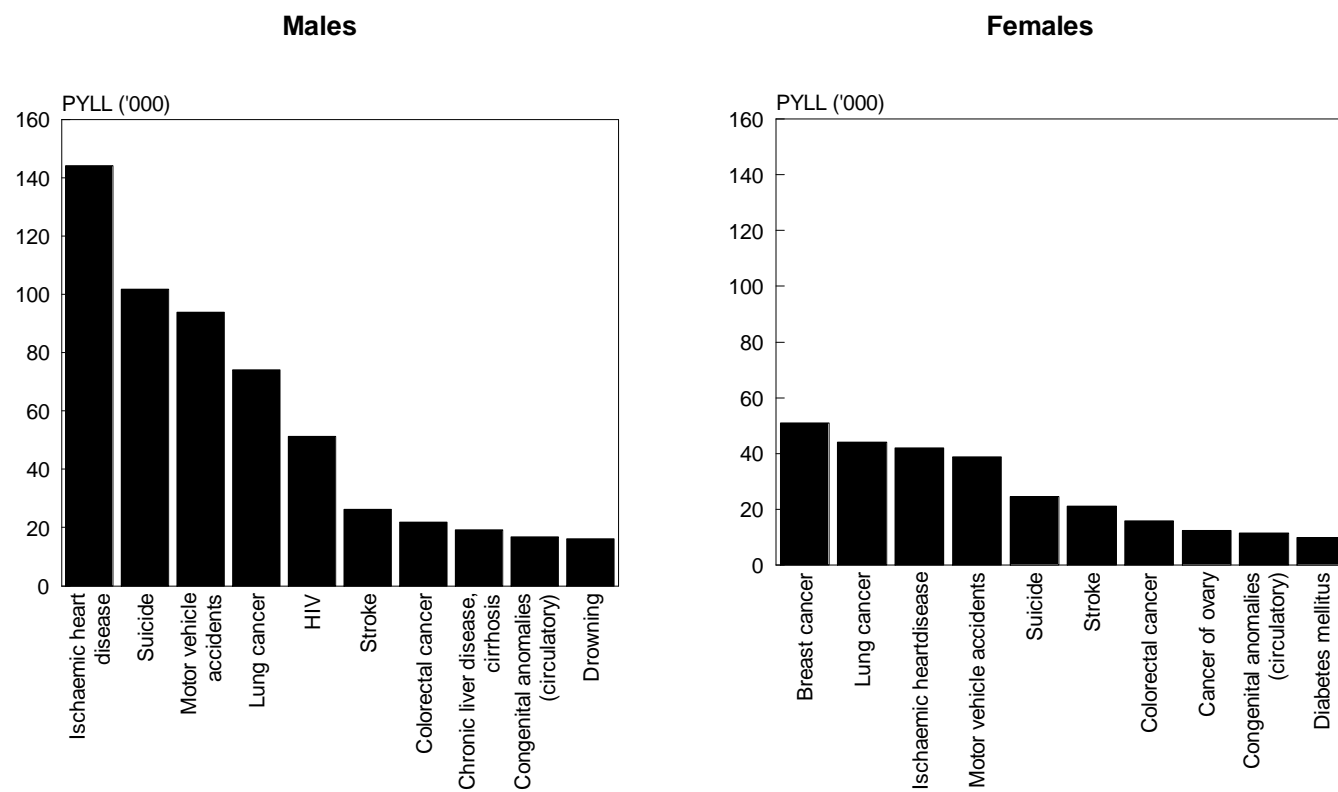
Because PYLL is based on age at death, it gives more weight to causes that typically occur early in life than do other mortality statistics. For example, external causes, which are leading causes of death in childhood and early adulthood, accounted for 24% of PYLL, but only 11% of deaths before age 75 in 1993. On the other hand, cancer and circulatory diseases, from which the risk of dying increases greatly after age 65, together accounted for about 45% of PYLL, but 65% of deaths, before age 75.

Males, whose death rates from external causes are high, are more likely than females to die prematurely, and consequently, lose more potential years of life. In 1993, 56% of male deaths, but just 38% of female deaths, occurred before age 75. These deaths resulted in over one million PYLL among males, compared with 600,000 PYLL among females.

In 1993, the three leading specific causes of PYLL before age 75 among males were ischaemic heart disease (13% of PYLL), suicide (9%) and motor vehicle accidents (9%) (Chart 6, Table 9). Among females, breast cancer was the leading specific cause of PYLL (9%), followed by lung cancer (7%), and ischaemic heart disease (7%).

Chart 6

Leading causes of potential years of life lost before age 75, Canada, 1993



Source: Health Statistics Division

Table 9**Leading causes of potential years of life lost (PYLL) and associated deaths before age 75, by sex, Canada, 1993**

Males	PYLL		Deaths		Females	PYLL		Deaths	
	Number	%	Number	%		Number	%	Number	%
Total	1,077,860.5	100.0	61,189	100.0	Total	592,628.0	100.0	36,480	100.0
Ischaemic heart disease	144,103.5	13.4	12,913	21.1	Breast cancer	50,980.0	8.6	3,224	8.8
Suicide	101,720.0	9.4	2,876	4.7	Lung cancer	44,012.0	7.4	3,612	9.9
Motor vehicle accidents	93,781.0	8.7	2,284	3.7	Ischaemic heart disease	41,950.0	7.1	4,972	13.6
Lung cancer	74,122.5	6.9	6,925	11.3	Motor vehicle accidents	38,878.5	6.6	1,019	2.8
HIV	51,369.5	4.8	1,471	2.4	Suicide	24,520.0	4.1	734	2.0
Stroke	26,338.5	2.4	2,399	3.9	Stroke	21,014.0	3.5	1,908	5.2
Colorectal cancer	21,807.5	2.0	1,901	3.1	Colorectal cancer	15,925.0	2.7	1,382	3.8
Chronic liver disease and cirrhosis	19,282.5	1.8	1,249	2.0	Cancer of ovary and adnexa	12,437.5	2.1	879	2.4
Congenital anomalies of circulatory system	16,784.5	1.6	259	0.4	Congenital anomalies of circulatory system	11,504.0	1.9	202	0.6
Drowning	16,265.5	1.5	383	0.6	Diabetes mellitus	9,900.0	1.7	992	2.7

Source: Health Statistics Division

Comment

Throughout the life cycle, death rates are higher for males than females. Moreover, in 1993, cause-specific death rates were generally^b higher for males than females at every age, as illustrated by higher mortality in infant boys due to perinatal causes and congenital anomalies, and higher rates of circulatory disease death in later life. As a result, based on the age-specific death rates in 1993, life expectancy at birth was 74.9 years for men and 81.0 years for women.³

However, a substantial proportion of the excess in premature death among males is attributable to socioeconomic⁵ and behavioural factors: for example, deaths due to HIV, motor vehicle accidents, and lung and other smoking-related cancers. Consequently, public health interventions to reduce male death rates will probably yield the most gains when targeted at young adult men.

^b Females' death rate exceeded that of males for a few causes such as stroke and falls at age 65 and over.

References

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