

Suicide deaths and suicide attempts

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Abstract

Objectives

This article examines suicide deaths among Canadians aged 10 or older between 1979 and 1998. It also examines hospital records for 1998/99 to provide some insight into suicide attempts.

Data sources

Data are mainly from the Vital Statistics Database, the Hospital Morbidity Database, and the Person-oriented Information Database. Supplementary data are from the Adult Correctional Services and Homicide surveys, the National Longitudinal Survey of Children and Youth, and the World Health Organization.

Analytical techniques

Age-standardized rates for suicide deaths and hospitalized suicide attempts were calculated by sex and province/territory for Canadians aged 10 or older. Age- and sex-specific rates for suicide deaths and parasuicide-related hospitalizations were also calculated for seven age groups.

Main results

The suicide death rate remained fairly stable between 1979 and 1998. The suicide rate of males was four times that of females, but females were hospitalized for attempted suicide at about one and a half times the rate of males. In 1998/99, about 9% of individuals who were hospitalized for an attempted suicide had been discharged more than once for a suicide attempt the same year.

Key words

parasuicide, hospital discharge records, hospital utilization, multiple hospitalizations

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In 1998, approximately 3,700 Canadians took their own lives, an average of about 10 suicides per day. Canadians are seven times more likely to die from suicide than to be the victim of a homicide.¹ Between 1993 and 1998, suicide claimed considerably more lives than motor vehicle accidents.² In fact, from adolescence to middle-age, suicide is one of the leading causes of death for both males and females.³

While the number of attempted suicides is known to exceed that of completed suicides, it is difficult to determine exactly how many attempts do occur. The World Health Organization recently estimated as many as 20 attempts for every suicide death.⁴

This article presents a comprehensive statistical picture of national and provincial/territorial suicide deaths from 1979 to 1998 among Canadians aged 10 or older (see *Methods*). These figures are supplemented by estimates of suicide attempts that do not end in death, based on hospital records for 1998/99. Methods used in completed suicides and hospitalized suicide attempts are also examined. The data are presented by sex and age group to give a general outline of the demographic groups most at risk (see *Limitations*).

Methods

Data sources

Data on suicide deaths for 1979 to 1998 were obtained from the Canadian Vital Statistics Database, which contains information provided by the vital statistics registrars in each province and territory. The database is maintained by Statistics Canada, and is a virtually complete count of all vital statistics. Annual figures refer to the calendar year.

Data on hospitalization related to suicide attempts and self-inflicted injuries were drawn from the Hospital Morbidity Database (HMD), maintained by the Canadian Institute for Health Information. The information in this database comes from the admission/separation form completed by hospitals at the end of each uninterrupted patient stay, when the patient is "separated," either as a discharge or a death. The file contains data on all inpatient cases that were separated from general and allied special care hospitals (acute care, convalescent, and chronic care hospitals) during the fiscal year. Because a patient may be admitted to and discharged from hospital several times a year, the statistics are a count of separations rather than individual patients. To avoid double-counting, only in-province hospitalizations (residents and non-residents of the province/territory where the hospitalization occurred) were included in the analysis.

Statistics Canada's Person-oriented Information (POI) database is a subset of the Hospital Morbidity Database. POI contains patient identification numbers, making it possible to determine readmissions of the same individual (patient names are not provided to Statistics Canada). POI excludes records for non-residents. For this analysis, out-of-province hospitalizations were also excluded.

Population estimates used to calculate rates were provided by Statistics Canada's Demography Division, and were adjusted for net census undercoverage and non-permanent residents. July-adjusted population estimates were used to calculate suicide death rates. October-adjusted estimates were used to determine parasuicide-related hospitalization rates.

Analytical techniques

Based on the *International Classification of Diseases, Ninth Revision (ICD-9)*,⁵ a suicide death was defined as the presence of codes E950 to E959 (suicide and self-inflicted injury) for cause of death.

Hospitalizations related to suicide attempts were defined as the presence of ICD-9 codes E950 to E959 in the first accident code for a patient discharged alive. This ICD-9 category includes injuries resulting from attempted suicide, as well as self-inflicted injuries specified as intentional, but without suicidal intent.

Since suicide deaths and hospitalizations for suicide attempts are rare among young children, this analysis pertains only to Canadians aged 10 or older.

Suicide rates were calculated by dividing the number of suicide deaths occurring in a calendar year among people aged 10 or older by the corresponding population estimates (as of July), and multiplying by 100,000.

Hospitalization rates for attempted suicides (parasuicides) were calculated by dividing the number of hospital separations for a suicide

attempt occurring in a fiscal year among those aged 10 or older by the corresponding population estimates (as of October), and multiplying by 100,000.

Age-standardized rates were calculated using the age distribution of Canadians aged 10 or older in 1991 as a standard population. The age-standardized rate represents the number of suicide deaths or parasuicide-related hospitalizations per 100,000 that would have occurred in the standard population if the actual age-specific rates observed in a given population had prevailed in the standard population. This procedure allows comparisons between sexes, provinces/territories, and years.

Age-specific rates were calculated by dividing the number of suicide deaths or parasuicide-related hospitalizations in each age group by the corresponding estimated population, and multiplying by 100,000. The initial analysis was done using five-year age groups (data not shown), but since many of the groups showed similar suicide rates over time, larger age categories were created to facilitate the presentation of results.

Comparisons between areas may reflect random variation rather than real differences. Confidence intervals (see Appendix A, Tables A through D) were calculated to assess the variation of each province/territory's suicide and hospitalization rates.^{6,7} Two-sided tests were performed to identify statistically significant differences between the age-standardized rate for each province/territory and the age-standardized national rate. Because the suicide and hospitalization rates for large provinces can influence the national rate, these rates cannot be assumed to be independent of the national rate. To account for the degree of correlation between the rate for each province/territory and the national rate, an estimated covariance was calculated between the two rates and was used to calculate the variance of the difference between rates.^{6,8}

Average length of stay was calculated by dividing the total number of patient-days spent in hospital for a suicide attempt by the number of separations related to parasuicides.

To estimate the percentage of people who had multiple hospitalizations for suicide attempts in 1998/99, it was necessary to determine if the hospital discharge records for an individual were for a suicide attempt or for a transfer to another hospital. An examination of admission and separation dates, as well as hospital numbers, made it possible to eliminate records that represented transfers.

Because the POI database is a subset of the Hospital Morbidity Database it gives a less complete picture of the number of suicide attempts resulting in hospitalization. For example, in 1998/99, 94% of all hospital morbidity records representing hospitalizations for a suicide attempt for which the patient was discharged alive were included in the POI database. However, unlike the POI database, the HMD cannot be used to determine the number of individuals who were hospitalized for a suicide attempt once, twice, or more during the fiscal year. Therefore, the POI database was used as a complement to calculate the ratios of number of individuals hospitalized for a suicide attempt (or suicide attempts) over the number of hospital discharges related to suicide attempts. These ratios were then applied to the HMD.

The social, economic and psychological factors associated with suicide and suicide attempts are beyond the scope of this analysis.

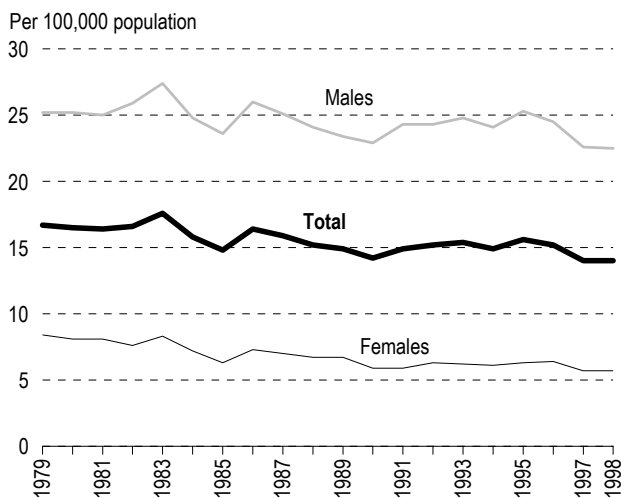
Rate remains fairly stable

In 1998 (most recent statistics available), 3,698 suicide deaths were reported among Canadians aged 10 or older. That year, the age-standardized suicide rate was 14 suicides per 100,000 population. The rate remained fairly stable between 1979 and 1998, reaching a high of 18 in 1983 (Chart 1). (See also *International comparisons*.) Since single-year statistics may provide less reliable rates due to random events, three-year moving averages of these age-standardized rates were examined, revealing a similar stable long-term trend (data not shown).

In 1998, suicide was the leading cause of death for men in the age groups between 25 to 29 and 40 to 44, and for women between the ages of 30 to 34. And for the three age groups from 10 to 14, 15 to 19 and 20 to 24, it was the second-leading cause of death for both sexes, surpassed only by motor vehicle accidents.³

Trends and rates should be interpreted with caution, as official statistics tend to under-report suicide. Further, year-to-year changes may reflect

Chart 1
Age-standardized suicide rates,† population aged 10 or older, by sex, Canada, 1979 to 1998



Data source: Canadian Vital Statistics Database
 † Age-standardized to the 1991 Canadian population aged 10 or older, adjusted for net census undercoverage and non-permanent residents

differences in the reporting and certification of suicide deaths.⁹ Medical and legal authorities can certify a death as suicide only when the victim’s intent is clearly proven.¹⁰

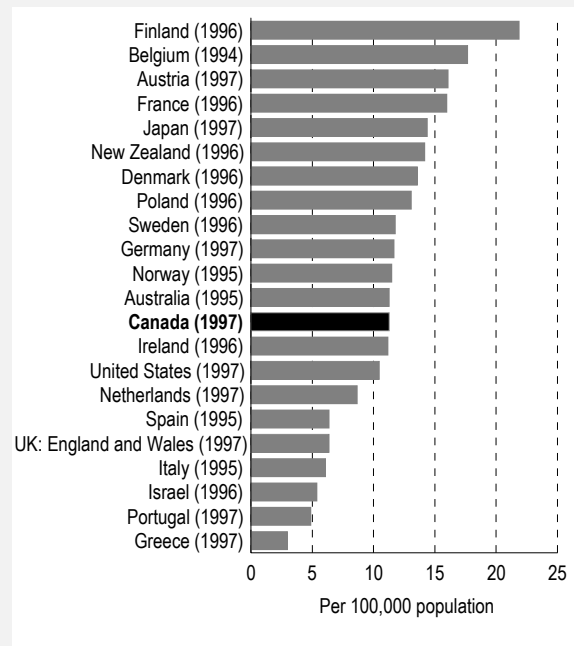
International comparisons

According to information from the World Health Organization, Canada’s suicide rate for the entire population ranked in the middle of 22 western industrialized countries.¹¹ Age-standardized suicide rates ranged from 3 per 100,000 population in Greece (1997) to 22 per 100,000 in Finland (1996). Canada’s 1997 suicide rate was similar to those reported in Australia, Ireland, Norway, Germany and Sweden. However, international comparisons should be interpreted with caution as methods of death certification can vary.¹²

The overrepresentation of men in suicide deaths was consistent across all 22 countries. The male–female ratio ranged from 2 to 1 in the Netherlands to 7 to 1 in Greece, with most around 3 or 4 to 1 (4 in Canada).

Suicide rates for males varied from 5 per 100,000 in Greece to 35 in Finland. Female suicide rates ranged from 1 per 100,000 in Greece to 9 in Finland. Again, Canada ranked in the middle: 18 per 100,000 males; 5 per 100,000 females (data not shown).

Age-standardized suicide rates,† selected countries, 1994 to 1997



Data source: World Health Organization database (Reference 11)
 † Age-standardized to new world population standard (constructed for 2000-to-2025 period)

Rate higher for males

Earlier studies have found males to be at least four times more likely than females to commit suicide.^{9,10,12,13} Males are also more likely to die in their first attempt.¹⁴ In 1998, the age-standardized rate for Canadian males aged 10 or older was 23 suicides per 100,000, compared with 6 per 100,000 for their female counterparts (Appendix A, Table A) (see also *Murder–Suicide*).

Since 1979, both the male and female age-standardized suicide rates have not varied markedly (Chart 1; Appendix B, Tables A and B). The male rate peaked at 27 per 100,000 in 1983, while the female rate never surpassed 8 per 100,000.

The age groups in which suicide was most likely to occur differed somewhat for males and females. Among men, in 1998, rates for the 20 to 29, 30 to

Limitations

The definitions used for suicide deaths and suicide attempts resulting in hospitalization were determined using the *International Classification of Diseases, Ninth Revision (ICD-9)*.⁵ This could overestimate the number of suicide deaths, as well as the number of hospital discharges for suicide attempts, because self-inflicted injuries specified as intentional, but without a suicidal intent, are included.

On the other hand, a number of studies have examined the extent of underreporting of suicide deaths due mainly to possible classification bias in reporting causes of death or failure to include amended death certificates in the national database.¹⁵⁻¹⁸ For example, some ICD-9 categories such as “injury undetermined whether accidentally or purposely inflicted” (E-980 to E-989) could conceal suicide deaths. Differences in the underreporting of suicide deaths were found when the Canadian Vital Statistics Database and individual provincial/territorial coroners’ databases were compared. This is partly because amendments such as reclassification of causes of death made at the provincial/territorial level are not included in the national database.^{17,18} For example, when a cause of death is uncertain, coroners may initially code the death as undetermined and then, after further investigations (which can vary in timeliness among different jurisdictions and exceed the deadline set by Statistics Canada), may reclassify it to a more specific cause, thereby creating some discrepancies with the Canadian Vital Statistics Database. Moreover, a study found that the underreporting of suicide deaths differs by province/territory,¹⁷ which is important to consider when comparing provincial/territorial suicide rates. Unfortunately, the magnitude of potential errors introduced by such limitations cannot be determined. Nonetheless, the Vital Statistics Database remains a reliable source of suicide statistics.^{15,16}

Similarly, this analysis underreports the total number of suicide attempts. The Hospital Morbidity Database (HMD) does not include

cases of attempted suicide that involved outpatient treatment in hospital emergency rooms or other medical facilities. As well, patients who were institutionalized in psychiatric hospitals and who attempted suicide during their stay but did not require acute care hospitalization are not included. And of course, cases for which no medical attention was sought could not be counted. Because of these exclusions, the data from the HMD could be describing a subgroup of suicide attempters who may not be representative of the entire population of attempters.

Hospitalizations for suicide attempts were also underestimated, since only the first accident code of the Hospital Morbidity Database was considered in the analysis. A relatively small number of hospitalizations with a suicide and a self-inflicted injury code (E950 to E959) were found in the second to fifth accident code fields, but because the quality of these variables was doubtful, they were excluded. On the other hand, hospital discharges for attempted suicide could also be overestimated. For example, a person transferred from one hospital to another would result in two different separations in the HMD, although both refer to the same episode.

The risk of suicide is not the same for all members of a population. Certain groups may be considered “high-risk” because they often have higher than average suicide rates: Aboriginal peoples, the young and the elderly, inmates (see *Suicide in correctional institutions*), homosexuals, people who have previously attempted suicide, and those suffering from mental disorders.¹² While a number of studies have attempted to estimate suicide rates among high-risk groups, accurate national suicide rates for these groups cannot be calculated from existing databases. For instance, several studies have estimated that the risk of suicide for the Aboriginal population is two to four times that of the general population.¹⁹⁻²⁴ However, in the absence of reliable national data, it is difficult to determine the suicide rates of Aboriginals or other high-risk groups.

44 and 45 to 59 age groups were significantly higher than the overall crude male rate, while the rate at ages 15 to 19 was significantly lower (Chart 2). Women's rates were significantly higher than the overall female crude rate at ages 30 to 44 and 45 to 59, but were lower at ages 20 to 29.

In every age group, males had a higher suicide rate than did females. The gaps were particularly wide among people in their twenties and those aged 75 or older. Boys and girls aged 10 to 14 had the lowest suicide rates: 3 and 2 deaths per 100,000, respectively.

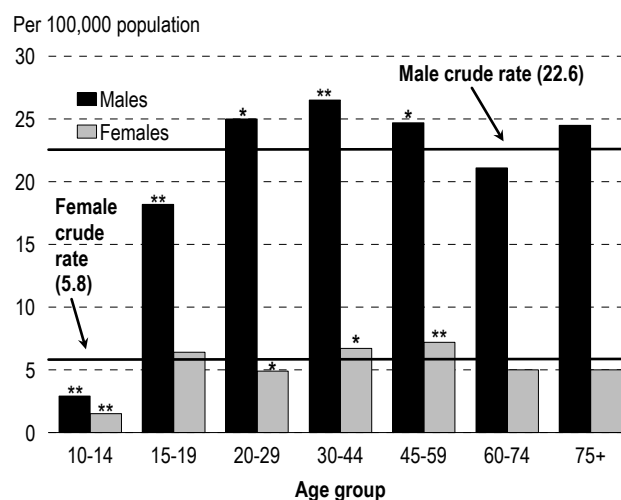
Provincial differences

Looking beyond the national picture reveals a number of provincial differences, although these should be interpreted with caution. Historically, suicide rates have tended to increase from east to west.¹⁰ However, since 1993, Québec has had the highest age-standardized provincial rate (Appendix B, Table C). In 1998, at 21 suicide deaths per 100,000 population aged 10 or older, Québec's rate was significantly above the national rate of 14. Alberta's rate of 16 was also significantly higher than that for Canada. Newfoundland, Ontario and British Columbia reported rates significantly below the national level (Chart 3).

Some of the difference in provincial suicide rates may be attributed to variations in coding practices for causes of death, as well as in the timeliness of reporting mortality data (see *Limitations*). To acquire a partial view of suicide underreporting in 1998, a ratio of the number of undetermined deaths over the number of suicides was calculated by province (data not shown). New Brunswick had the lowest percentage (1%), followed by Québec (3%), while Ontario and Manitoba had the highest (16% and 24%, respectively). However, these ratios are only partial indicators of potential biases and thus their effects on provincial differences and the magnitude of these effects are not known.

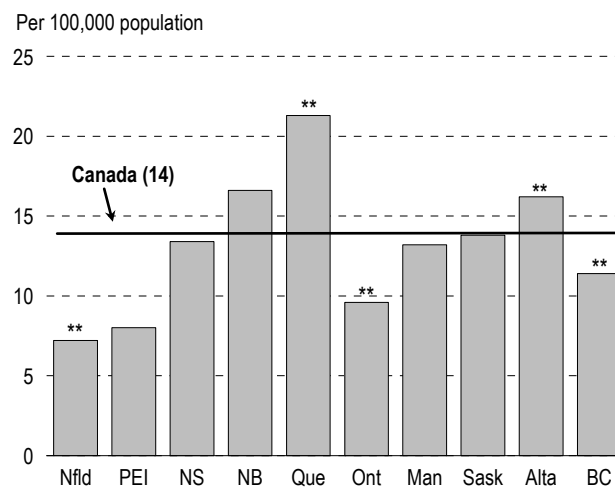
In 1998, the Yukon and the Northwest Territories reported rates of 26 and 56 suicides per 100,000 population aged 10 or older (5 and 35 deaths, respectively). Particular caution is necessary when analyzing suicide rates for the Yukon and the

Chart 2
Age-specific suicide rates, by sex, Canada, 1998



Data source: Canadian Vital Statistics Database
* Significantly different from sex-specific crude rate ($p < 0.05$)
** Significantly different from sex-specific crude rate ($p < 0.01$)

Chart 3
Age-standardized suicide rates,† population aged 10 or older, Canada and provinces, 1998



Data source: Canadian Vital Statistics Database
Note: The age-standardized rate was 26.1 for the Yukon and 55.5 for the Northwest Territories. Only the latter was significantly different from the national rate ($p < 0.05$).
† Age-standardized to 1991 Canadian population aged 10 or older, adjusted for net census undercoverage and non-permanent residents
** Significantly different from age-standardized national rate ($p < 0.01$)

Northwest Territories. Because of their small populations and the low number of suicide deaths, slight changes in the number of suicides may cause dramatic annual fluctuations in the rates when no substantial changes have actually occurred. Despite

this high variability, the Northwest Territories' suicide rate (but not the Yukon's) was significantly above the national level.

Methods differ

In 1998, the most common means of suicide in Canada was suffocation (39%), principally hanging or strangulation (Table 1). Poisoning, which includes drug overdoses and inhalation of motor vehicle exhaust, was the next most common (26%), followed by firearms (22%). By contrast, a recent study in the United States found that nearly 60% of suicides were committed with a firearm.¹⁴

Males tend to use more violent methods than do females.^{10,12} In 1998, 26% of male suicides were committed with firearms, compared with 7% of female suicides. Females were much more likely than males to use poisoning: 41% versus 22%. The most common method for males was suffocation (40%); among females, this method ranked second, accounting for 34% of suicides.

Between 1979 and 1998, the proportion of male suicides committed with firearms declined from 41%

Murder–Suicide

Homicide, the murder of one person by another, is rare in Canada. Even more rare are homicides followed by the suicide of the offender.

Research indicates that the closer the ties between victim and offender, the greater the ensuing guilt and the greater the likelihood of a suicide after the homicide,^{25,26} particularly if the homicide victim is a child.²⁶ Of the 503 separate homicide incidents (an incident could involve more than one victim) reported to police in 1999, 40 (8%) were murder–suicides.²⁷ These incidents resulted in the deaths of 52 homicide victims, where the accused, predominantly male (93%), committed suicide. Almost 9 out of 10 of these murder–suicides were family-related, a trend that has shown relatively little change over the last 20 years.

In 1999, one in four murder–suicide incidents involved more than one victim, and the accused in each of these multiple victim murder–suicides was male. In close to half (48%) of all murder–suicide incidents, men killed their spouse; in 15% of cases, men killed their child(ren). Men killed their spouse and child(ren) in 13% of cases. There were no murder–suicides in which women killed a spouse, but there were two incidents in which women killed their child(ren).²⁷

Table 1
Suicide methods, by sex, population aged 10 or older, Canada, 1998

Method (ICD-9 codes)	Total		Males		Females	
	Number	%	Number	%	Number	%
Total suicide deaths (E950-E959)	3,698	100.0	2,925	100.0	773	100.0
Suffocation (E953), total	1,433	38.8	1,171	40.0	262	33.9
Poisoning (E950-E952), total	965	26.1	646	22.1	319	41.3
Drugs and medication (E950.0-E950.5)	487	13.2	246	8.4	241	31.2
Motor vehicle exhaust (E952.0)	269	7.3	229	7.8	40	5.2
Other carbon monoxide (E952.1)	164	4.4	135	4.6	29	3.8
Other/Unspecified poisoning (E950.6-E950.9, E951, E952.8, E952.9)	45	1.2	36	1.2	9	1.2
Firearms (E955.0-E955.4, E955.9)	816	22.1	765	26.2	51	6.6
Jumping from high place (E957)	160	4.3	115	3.9	45	5.8
Drowning/Submersion (E954)	122	3.3	79	2.7	43	5.6
Cutting/Piercing instruments (E956)	59	1.6	48	1.6	11	1.4
Other/Unspecified means (E955.5, E958, E959) [†]	143	3.9	101	3.5	42	5.4

Data source: Canadian Vital Statistics Database

Note: Because of rounding, detail may not add to totals.

[†] Includes jumping or lying before moving objects, fires/burns, crashing of motor vehicle, other or unspecified means, late effects of self-inflicted injury, explosives.

to 26%, while those involving suffocation rose from 24% to 40%. The pattern among females was similar, with the most dramatic increase in suffocation (from 19% to 34%) (data not shown).

Hospitalization for suicide attempts

Many people who try to kill themselves do not die in their attempts. Therefore, information about attempts would provide a more complete picture of suicide as a public health issue. It is difficult, however, to arrive at accurate national figures for attempted suicide.¹² Suicide attempts may not be reported, and data collection methods for those that are reported vary. Nevertheless, some data can be derived from hospital records.

In 1998/99, a total of 23,225 hospital separations (the discharge or death of an in-patient) of Canadians aged 10 or older were related to suicide and intentional self-inflicted injuries. In 338 of these cases (less than 2%), the patient died. The remaining 22,887 were parasuicide-related hospitalizations (non-lethal, attempted suicide or intentional self-inflicted injuries) after which the patient was discharged alive. Based on these discharges, the crude hospitalization rate for attempted suicide was 87 per 100,000 population aged 10 or older.

Attempts—females at greater risk

While males were far more likely than females to take their own lives, female hospitalization rates for attempted suicide were higher than rates for males (Table 2, Chart 4). In 1998/99, the age-standardized hospitalization rate for attempted suicide was 108 per 100,000 females aged 10 or older and 70 per 100,000 of their male counterparts. Some research has indicated that women are more likely than men to make suicide attempts that are actually intended to be non-fatal, but this view remains controversial.^{28,29}

The hospitalization rate for attempted suicide among females peaked at ages 15 to 19. In 1998/99, the rate was 221 per 100,000 for girls in this age group, over twice the rate for 15- to 19-year-old boys (87 per 100,000). Even among 10- to 14-year-olds, the hospitalization rate for suicide attempts was much higher among girls than boys: 68 versus 16 per 100,000.

Table 2
Rates of suicide death (1998) and hospitalization for attempted suicide (1998/99), population aged 10 or older, by age group and sex, Canada

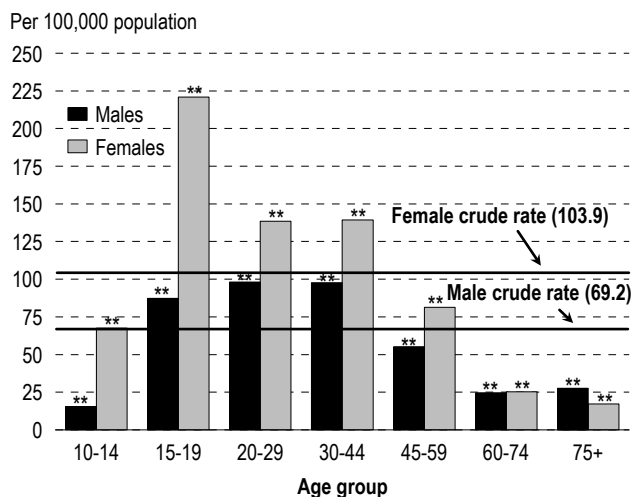
Age group	Suicide deaths			Hospitalizations for attempted suicide		
	Total	Males	Females	Total	Males	Females
Rate per 100,000 age-specific population						
10-14	2.2	2.9	1.5	40.8	15.5	67.5
15-19	12.5	18.2	6.4	152.2	87.3	220.8
20-29	15.1	25.0	4.9	117.9	98.0	138.4
30-44	16.7	26.5	6.7	118.3	97.6	139.3
45-59	15.9	24.7	7.2	68.3	55.1	81.3
60-74	12.6	21.1	5.0	25.0	24.7	25.2
75+	12.3	24.5	5.0	21.0	27.6	17.2

Data sources: Canadian Vital Statistics Database, Hospital Morbidity Database

These figures parallel results from the 1996/97 National Longitudinal Survey of Children and Youth, which found that among young adolescents, girls are more likely than boys to have suicidal thoughts. An estimated 44,000 12- and 13-year-olds (7%) reported that they had contemplated suicide in the previous year: 8.4% of girls and 4.6% of boys.³⁰

Males' hospitalization rates for attempted suicide were highest at ages 20 to 29 and 30 to 44 (about 98 per 100,000), but were still well below those of

Chart 4
Age-specific hospitalization rates for suicide attempts, by sex, Canada, 1998/99



Data source: Hospital Morbidity Database, 1998/99
** Significantly different from sex-specific crude rate (p < 0.01)

Suicide in correctional institutions

Over the last decade, there have been 354 suicides in Canadian correctional institutions, including 36 in 1998/99. Suicide is the most frequent cause of death in correctional facilities, accounting for over one-third (35%) of prison deaths in 1998/99.³¹ It is also well-documented that the rate of suicide among inmates in correctional institutions is more than twice as high as the rate for the general population.^{32,33}

women in the same age ranges (about 138 per 100,000). In fact, up to age 60, rates for women exceeded those for men.

At older ages, hospitalization for suicide attempts was less common. There was little difference between rates for men and women at ages 60 to 74, and by age 75 or older, men's rate surpassed women's.

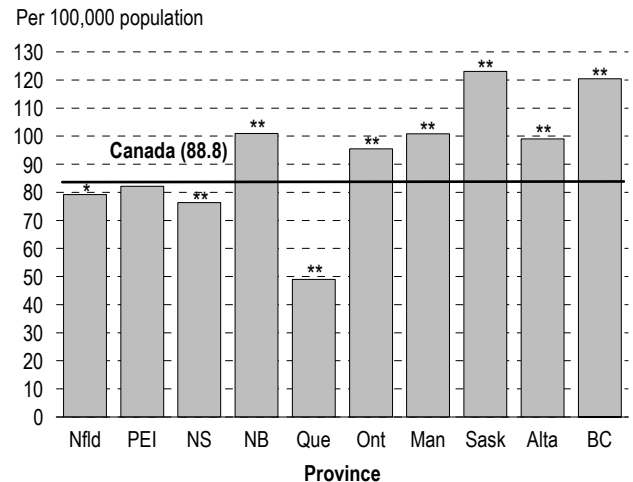
Hospitalization rate lower in Québec

Québec reported the lowest age-standardized hospitalization rate for suicide attempts: 49 per 100,000 population aged 10 or older in 1998/99 (Chart 5). This contrasts sharply with Québec's suicide death rate, which was highest among the provinces.

Newfoundland and Nova Scotia also had relatively low hospitalization rates for suicide attempts. Prince Edward Island's rate did not differ significantly from the national age-standardized rate (89 per 100,000). The other provinces reported rates above the national level. The highest provincial rate was in Saskatchewan at 123 per 100,000, followed by British Columbia with 120. Again, varying methods of reporting hospitalization data could be partly responsible for provincial differences.

In the Yukon and the Northwest Territories, hospitalization rates for attempted suicide were much higher: 169 and 219 per 100,000, respectively. But as was true of suicide death rates, these figures are based on relatively small numbers and so can fluctuate substantially from year to year.

Chart 5
Age-standardized hospitalization rates for suicide attempts,[†] population aged 10 or older, Canada and provinces, 1998/99



Data source: Hospital Morbidity Database, 1998/99

Note: The age-standardized rate was 169.2 for the Yukon and 218.5 for the Northwest Territories. Both were significantly different from the national rate ($p < 0.05$ and $p < 0.01$, respectively).

† Age-standardized to 1991 Canadian population aged 10 or older, adjusted for net census undercoverage and non-permanent residents

* Significantly different from age-standardized national rate ($p < 0.05$)

** Significantly different from age-standardized national rate ($p < 0.01$)

Less lethal methods for attempts

Suicide attempts typically involve less lethal methods than do completed suicides. In 1998/99, poisoning accounted for 83% of hospitalizations for a suicide attempt (data not shown). The figure for females was somewhat higher than that for males: 88% versus 76%. Cutting or piercing instruments were next most common (10%), although the proportion of males using such methods (13%) exceeded the proportion of females (8%).

Repeat admissions

Total discharges for suicide attempts do not indicate the number of individuals who were hospitalized, as one person could make several attempts and be discharged more than once during a year. The 22,887 discharges for attempted suicide in 1998/99 involved approximately 20,000 individuals. About 9% had been discharged more than once during that year for a suicide attempt. Repeat attempts accounted for 10% of total female discharges and 8% of male discharges. Among these repeat

attempters, about 23% of both males and females had been discharged on at least three occasions after a suicide attempt.

Public health impact

In 1998/99, patients admitted for attempted suicide stayed in hospital an average of 7.1 days, a total of 162,498 hospital days that year. Hospital records also indicate that nearly half of these patients had a primary diagnosis of a mental illness, including manic depression (bipolar disorder), schizophrenia, personality disorder, or alcohol or drug dependence syndrome. Patients hospitalized for attempting suicide are likely referred to psychologists or psychiatrists, suicide intervention centres, or other health and social support institutions.

While hospital and other health care services represent one of the direct costs of suicide, the indirect costs include the estimated value of lost productivity due to premature death. Because suicide is a leading cause of death during the teenage years and young adulthood, the loss of potential years of life is high, particularly for men. Potential years of life lost is calculated by subtracting the age at which a death occurs from an arbitrary age, often 75. In 1997, suicide ranked third after cancer and heart diseases in potential years of life lost for men.³⁴ For women, suicide was tied at fourth with congenital anomalies in potential years of life lost, after cancer, heart diseases, and motor vehicle traffic accidents.³⁴

To date, no national figures on the economic cost of suicide are available, although a 1996 New Brunswick study estimated the average cost per suicide death (direct and indirect) at \$850,000.³⁵

Concluding remarks

In 1998, the suicide death rate among Canadians aged 10 or older was around 14 per 100,000, a figure far exceeded by the hospitalization rate for attempted suicides. No age group is without the risk of suicide, as it occurred among children as young as 10 and among seniors aged 75 or older.

Suicide rates for males were three to four times greater than for females, due in large part to males using more lethal methods. Yet females were

hospitalized for attempted suicide at a rate nearly one and a half times that of males. Consequently, suicidal behaviour cannot be characterized as either a male or female phenomenon.

Hospitalizations for attempted suicide occur at a rate six to seven times that of completed suicides. Furthermore, approximately 1 in 10 persons hospitalized for attempted suicide in 1998/99 had been discharged for at least one previous attempt the same year. Earlier research has found that most people who attempt suicide, even repeatedly, do not die this way.^{9,12} On the other hand, although an attempt is a predictor of suicide, many who do commit suicide have not previously attempted it.^{9,12} Thus, it may be that the underlying motivations and emotional state of people who attempt but do not complete suicide differ from those whose attempt ends in death.

Men's suicide rates are highest in the ages from 20 to 59, although the rate is also high at age 75 or older. For women, the age range most at risk is somewhat narrower: 30 to 59. The age distribution of hospitalization rates for attempted suicide is somewhat younger, with the highest rates in the 15-to-44 age range for both sexes. Teenage girls are the group most likely to be hospitalized for having attempted suicide.

Most researchers and professionals involved with suicide agree that it is associated with a complex array of factors: mental illness, social isolation, a previous suicide attempt, family violence, physical illness, and substance abuse, for example.^{12-14,36,37} Some risks vary with age, while others frequently occur in combination. It has been estimated that 90% of people who commit suicide are suffering from depression or another mental illness, or a substance abuse disorder, which could potentially be diagnosed.³⁷ Several studies have pointed to the widespread use of alcohol and drugs among adolescents as influential contributing factors to adolescent suicide.^{38,39}

The gender differences and age differences in completed suicides, hospitalization for suicide attempts, and choice of method suggest that there may also be differences in underlying problems, in responses to stressful situations, and in reaching out for help.⁹

The provincial and territorial differences in suicide rates and hospitalization rates for suicide attempts likely reflect social, economic and cultural factors that cannot be addressed with mortality and hospital statistics. ●

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Appendix A

Table A

Age-standardized suicide rate,[†] population aged 10 or older, by sex and province/territory, 1998

	Both sexes		Males			Females		
	Rate per 100,000 population	95% confidence interval	Rate per 100,000 population	95% confidence interval		Rate per 100,000 population	95% confidence interval	
Canada	14.0	13.5, 14.4	22.5	21.7, 23.4		5.7	5.3, 6.1	
Newfoundland	7.2**	4.6, 9.8	12.3**	7.1, 17.5		2.2	-1.3, 5.7	
Prince Edward Island	8.0	1.0, 15.0	15.0	0.0, 30.0		1.4	-11.3, 14.1	
Nova Scotia	13.4	10.9, 15.9	22.5	17.8, 27.3		4.6	2.1, 7.2	
New Brunswick	16.6	13.4, 19.8	27.7	21.8, 33.7		5.6	2.6, 8.5	
Québec	21.3**	20.2, 22.5	33.4**	31.4, 35.5		9.5**	8.4, 10.6	
Ontario	9.6**	9.0, 10.2	15.6**	14.5, 16.7		3.9**	3.4, 4.5	
Manitoba	13.2	10.9, 15.5	21.3	17.1, 25.4		5.6	3.2, 7.9	
Saskatchewan	13.8	11.2, 16.3	24.6	19.8, 29.4		3.2*	1.1, 5.4	
Alberta	16.2**	14.6, 17.8	25.9*	23.0, 28.7		6.4	4.9, 7.8	
British Columbia	11.4**	10.3, 12.5	18.3**	16.3, 20.4		4.6*	3.6, 5.6	
Yukon	26.2	-30.4, 82.9	24.8	-115.8, 165.3		19.7	-84.0, 123.4	
Northwest Territories	55.5*	17.1, 93.8	88.7	13.2, 164.2		19.3	-51.9, 90.5	

Data source: Canadian Vital Statistics Database, 1998

[†] Age-standardized to 1991 Canadian population, adjusted for net census undercoverage and non-permanent residents

* Significantly different from age-standardized national rate, both sexes or sex-specific ($p < 0.05$)

** Significantly different from age-standardized national rate, both sexes or sex-specific ($p < 0.01$)

Table B

Age-specific suicide rate, by sex, Canada, 1998

	Both sexes		Males			Females		
	Rate per 100,000 population	95% confidence interval	Rate per 100,000 population	95% confidence interval		Rate per 100,000 population	95% confidence interval	
Total (crude rate)	14.1	13.6, 14.5	22.6	21.7, 23.4		5.8	5.4, 6.2	
Age group								
10-14	2.2**	1.6, 2.9	2.9**	1.9, 3.9		1.5**	0.8, 2.3	
15-19	12.5*	11.0, 14.0	18.2**	15.7, 20.8		6.4	4.8, 8.0	
20-29	15.1	13.9, 16.3	25.0*	22.9, 27.1		4.9*	3.9, 5.8	
30-44	16.7**	15.8, 17.6	26.5**	24.9, 28.2		6.7*	5.9, 7.6	
45-59	15.9**	14.9, 17.0	24.7*	22.8, 26.5		7.2**	6.2, 8.2	
60-74	12.6*	11.4, 13.8	21.1	18.8, 23.4		5.0	4.0, 6.1	
75+	12.3*	10.6, 14.0	24.5	20.5, 28.5		5.0	3.6, 6.4	

Data source: Canadian Vital Statistics Database, 1998

* Significantly different from total crude rate, both sexes or sex-specific ($p < 0.05$)

** Significantly different from total crude rate, both sexes or sex-specific ($p < 0.01$)

Table C
Age-standardized hospitalization rate for suicide attempts,[†] by sex and province/territory, population aged 10 or older, 1998/99

	Both sexes		Males			Females	
	Rate per 100,000 population	95% confidence interval	Rate per 100,000 population	95% confidence interval		Rate per 100,000 population	95% confidence interval
Canada	88.8	87.6, 89.9	69.8	68.4, 71.3		108.4	106.6, 110.2
Newfoundland	79.2*	71.1, 87.2	70.0	58.9, 81.1		88.7**	76.8, 100.7
Prince Edward Island	82.1	65.2, 99.0	71.2	47.4, 94.9		93.0	67.2, 118.9
Nova Scotia	76.3**	70.1, 82.5	66.1	57.9, 74.4		86.6**	77.4, 95.9
New Brunswick	101.0**	93.2, 108.8	81.6*	71.6, 91.5		120.8*	108.6, 133.0
Québec	49.0**	47.2, 50.7	41.4**	39.1, 43.7		56.9**	54.2, 59.6
Ontario	95.5**	93.5, 97.5	74.9**	72.4, 77.3		116.6**	113.5, 119.7
Manitoba	100.8**	94.3, 107.3	67.7	60.2, 75.3		135.2**	124.5, 146.0
Saskatchewan	123.0**	115.4, 130.7	92.7**	83.3, 102.2		154.6**	142.4, 166.8
Alberta	99.0**	95.1, 102.9	76.9**	72.1, 81.8		122.5**	116.4, 128.7
British Columbia	120.4**	116.7, 124.1	93.0**	88.4, 97.7		148.8**	142.9, 154.7
Yukon	169.2*	96.4, 242.0	86.7	-62.1, 235.5		256.1**	127.6, 384.6
Northwest Territories	218.5**	168.8, 268.1	138.1	60.4, 215.8		308.1**	215.3, 400.9

Data source: Hospital Morbidity Database, 1998/99

[†] Age-standardized to 1991 Canadian population aged 10 or older, adjusted for net census undercoverage and non-permanent residents

* Significantly different from age-standardized national rate, both sexes or sex-specific ($p < 0.05$)

** Significantly different from age-standardized national rate, both sexes or sex-specific ($p < 0.01$)

Table D
Age-specific hospitalization rate for suicide attempts, by sex, Canada, 1998/99

	Both sexes		Males			Females	
	Rate per 100,000 population	95% confidence interval	Rate per 100,000 population	95% confidence interval		Rate per 100,000 population	95% confidence interval
Total (crude rate)	86.8	85.7, 87.9	69.2	67.8, 70.7		103.9	102.1, 105.6
Age group							
10-14	40.8**	38.0, 43.6	15.5**	13.1, 17.9		67.5**	62.4, 72.7
15-19	152.2**	146.9, 157.6	87.3**	81.7, 92.9		220.8**	211.6, 230.0
20-29	117.9**	114.6, 121.1	98.0**	93.8, 102.2		138.4**	133.3, 143.4
30-44	118.3**	115.9, 120.8	97.6**	94.5, 100.7		139.3**	135.5, 143.0
45-59	68.3**	66.1, 70.4	55.1**	52.3, 57.9		81.3**	77.9, 84.7
60-74	25.0**	23.3, 26.7	24.7**	22.3, 27.2		25.2**	22.8, 27.5
75+	21.0**	18.8, 23.3	27.6**	23.3, 31.8		17.2**	14.6, 19.7

Data source: Hospital Morbidity Database, 1998/99

* Significantly different from total crude rate, both sexes or sex-specific ($p < 0.05$)

** Significantly different from total crude rate, both sexes or sex-specific ($p < 0.01$)

Appendix B

Table A
Number of suicide deaths, by sex and age group, Canada, 1979 to 1998

	Age group							
	Total†	10-14	15-19	20-29	30-44	45-59	60-74	75+
Both sexes								
1979	3,356	22	308	885	853	765	426	95
1980	3,358	21	278	869	815	773	442	157
1981	3,402	34	293	810	898	769	448	147
1982	3,522	27	282	912	928	799	453	115
1983	3,755	23	289	941	1,019	780	524	179
1984	3,439	27	253	852	956	746	444	160
1985	3,258	17	221	817	939	669	449	145
1986	3,669	24	241	902	1,109	722	492	179
1987	3,594	30	244	837	1,090	746	480	164
1988	3,509	27	242	844	1,103	679	440	174
1989	3,492	25	247	790	1,117	697	444	171
1990	3,378	29	225	763	1,189	621	369	181
1991	3,592	28	253	798	1,207	680	456	170
1992	3,709	34	249	808	1,264	753	429	171
1993	3,802	44	237	734	1,333	822	439	193
1994	3,749	49	252	699	1,325	804	422	197
1995	3,970	43	264	729	1,442	883	427	180
1996	3,940	40	231	698	1,422	907	447	195
1997	3,681	51	261	577	1,265	916	413	198
1998	3,698	45	256	629	1,273	876	422	197
Males								
1979	2,520	15	251	705	634	536	314	64
1980	2,534	15	234	702	615	538	301	126
1981	2,569	25	250	666	667	533	320	107
1982	2,725	23	247	749	691	582	339	90
1983	2,885	20	250	792	751	556	374	142
1984	2,660	23	221	715	719	547	311	124
1985	2,565	12	186	695	722	501	337	111
1986	2,849	19	199	757	853	528	350	143
1987	2,794	25	201	698	825	566	360	117
1988	2,733	23	212	694	828	494	352	130
1989	2,696	19	218	648	843	501	335	131
1990	2,673	23	182	649	910	478	282	149
1991	2,874	19	217	673	947	533	346	139
1992	2,923	26	198	667	1,003	573	319	136
1993	3,013	26	193	629	1,057	632	338	138
1994	2,969	37	205	584	1,050	602	330	160
1995	3,158	22	217	615	1,161	676	319	146
1996	3,092	31	190	589	1,101	662	357	162
1997	2,914	39	207	475	1,010	708	319	156
1998	2,925	30	192	529	1,017	676	334	147
Females								
1979	836	7	57	180	219	229	112	31
1980	824	6	44	167	200	235	141	31
1981	833	9	43	144	231	236	128	40
1982	797	4	35	163	237	217	114	25
1983	870	3	39	149	268	224	150	37
1984	779	4	32	137	237	199	133	36
1985	693	5	35	122	217	168	112	34
1986	820	5	42	145	256	194	142	36
1987	800	5	43	139	265	180	120	47
1988	776	4	30	150	275	185	88	44
1989	796	6	29	142	274	196	109	40
1990	705	6	43	114	279	143	87	32
1991	718	9	36	125	260	147	110	31
1992	786	8	51	141	261	180	110	35
1993	789	18	44	105	276	190	101	55
1994	780	12	47	115	275	202	92	37
1995	812	21	47	114	281	207	108	34
1996	848	9	41	109	321	245	90	33
1997	767	12	54	102	255	208	94	42
1998	773	15	64	100	256	200	88	50

Data source: Canadian Vital Statistics Database

† Age groups may not add to totals, as totals may include records for which age was not stated.

Table B
Age-specific suicide death rates, by sex, Canada, 1979 to 1998

	Age group						
	10-14	15-19	20-29	30-44	45-59	60-74	75+
	Suicides per 100,000 age-specific population						
Both sexes							
1979	1.1	12.7	19.6	17.8	20.9	18.3	11.4
1980	1.1	11.5	18.8	16.5	21.0	18.4	18.3
1981	1.8	12.4	17.1	17.5	20.8	18.1	16.5
1982	1.4	12.3	18.9	17.5	21.5	17.8	12.5
1983	1.2	13.2	19.3	18.6	20.9	20.0	18.7
1984	1.4	12.1	17.3	16.9	19.9	16.5	16.2
1985	0.9	10.9	16.5	16.1	17.7	16.3	14.1
1986	1.3	12.1	18.3	18.4	19.0	17.5	16.8
1987	1.6	12.5	17.2	17.5	19.3	16.7	14.8
1988	1.5	12.4	17.6	17.2	17.2	15.0	15.1
1989	1.3	12.7	16.5	16.8	17.2	14.8	14.2
1990	1.5	11.6	16.2	17.3	15.0	12.1	14.5
1991	1.5	13.1	17.4	17.1	16.0	14.6	13.1
1992	1.8	12.9	17.9	17.7	17.1	13.5	12.9
1993	2.2	12.2	16.7	18.3	17.9	13.6	14.2
1994	2.5	12.9	16.3	17.9	16.9	13.0	14.1
1995	2.2	13.3	17.3	19.2	17.9	13.0	12.5
1996	2.0	11.5	16.7	18.7	17.7	13.6	13.1
1997	2.5	12.9	13.8	16.6	17.3	12.5	12.8
1998	2.2	12.5	15.1	16.7	15.9	12.6	12.3
Males							
1979	1.4	20.3	30.9	26.1	29.5	29.0	19.8
1980	1.5	19.0	30.1	24.5	29.4	27.1	37.9
1981	2.5	20.6	28.0	25.7	28.9	28.0	31.3
1982	2.3	21.0	30.9	25.8	31.5	28.9	25.6
1983	2.1	22.3	32.1	27.2	29.9	31.1	39.2
1984	2.4	20.6	28.7	25.3	29.2	25.3	33.1
1985	1.3	17.9	27.8	24.6	26.6	26.8	28.6
1986	2.0	19.5	30.2	28.2	27.7	27.3	35.8
1987	2.7	20.0	28.1	26.3	29.2	27.4	28.1
1988	2.5	21.3	28.4	25.6	25.0	26.1	30.1
1989	2.0	21.9	26.7	25.2	24.7	24.3	29.0
1990	2.4	18.3	27.2	26.4	23.0	20.0	31.7
1991	2.0	21.9	28.9	26.8	25.0	24.0	28.6
1992	2.6	20.0	29.2	27.9	25.9	21.6	27.3
1993	2.6	19.4	28.2	28.9	27.5	22.5	27.1
1994	3.6	20.3	26.8	28.2	25.3	21.7	30.8
1995	2.1	21.3	28.8	30.8	27.4	20.7	27.2
1996	3.0	18.4	27.8	28.9	26.0	23.0	29.1
1997	3.8	19.8	22.4	26.4	26.8	20.4	27.0
1998	2.9	18.2	25.0	26.5	24.7	21.1	24.5
Females							
1979	0.7	4.8	8.0	9.3	12.4	9.0	6.1
1980	0.6	3.7	7.3	8.2	12.7	10.9	5.9
1981	1.0	3.7	6.1	9.2	12.7	9.6	7.3
1982	0.4	3.1	6.8	9.1	11.6	8.3	4.4
1983	0.3	3.7	6.2	9.9	12.0	10.6	6.2
1984	0.4	3.1	5.6	8.5	10.6	9.1	5.8
1985	0.6	3.6	5.0	7.5	8.9	7.5	5.3
1986	0.6	4.3	6.0	8.6	10.2	9.3	5.4
1987	0.6	4.5	5.8	8.6	9.3	7.7	6.8
1988	0.4	3.2	6.4	8.6	9.4	5.5	6.1
1989	0.7	3.1	6.0	8.3	9.7	6.7	5.3
1990	0.7	4.6	4.9	8.1	6.9	5.3	4.1
1991	1.0	3.8	5.5	7.4	6.9	6.6	3.8
1992	0.9	5.4	6.4	7.3	8.2	6.5	4.2
1993	1.9	4.7	4.9	7.6	8.3	5.9	6.4
1994	1.2	4.9	5.4	7.4	8.5	5.3	4.2
1995	2.2	4.9	5.5	7.5	8.4	6.2	3.8
1996	0.9	4.2	5.3	8.5	9.5	5.2	3.5
1997	1.2	5.5	5.0	6.7	7.8	5.4	4.3
1998	1.5	6.4	4.9	6.7	7.2	5.0	5.0

Data source: Canadian Vital Statistics Database

Table C

Number of suicide deaths and age-standardized suicide death rates,[†] population aged 10 or older, Canada, provinces and territories, 1979 to 1998

	Canada	Nfld.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.	Yukon	N.W.T.
Suicides													
1979	3,356	25	16	106	84	981	1,105	151	142	314	418	6	8
1980	3,358	19	14	97	81	947	1,121	121	153	389	396	11	9
1981	3,402	24	9	92	77	1,054	1,074	144	171	344	398	5	10
1982	3,522	34	11	104	90	1,071	1,111	139	171	359	417	7	8
1983	3,755	36	16	104	100	1,208	1,139	165	148	393	417	8	21
1984	3,439	39	15	86	90	1,027	1,101	133	136	405	385	5	17
1985	3,258	23	5	106	86	1,124	1,038	127	133	296	300	8	12
1986	3,669	23	14	94	96	1,147	1,130	153	138	424	425	10	15
1987	3,594	28	11	111	75	1,179	1,069	170	132	384	413	7	15
1988	3,509	44	13	106	108	1,088	1,045	154	145	400	378	7	21
1989	3,492	29	11	96	84	1,042	1,142	147	124	362	419	5	31
1990	3,378	58	14	115	84	1,104	887	140	151	403	399	5	18
1991	3,592	41	22	113	93	1,114	997	136	125	462	464	3	22
1992	3,709	50	16	97	85	1,255	987	132	140	473	455	3	16
1993	3,802	57	12	107	110	1,318	1,078	142	122	414	408	7	27
1994	3,749	49	16	97	104	1,263	1,083	118	143	425	423	7	21
1995	3,970	42	19	122	121	1,431	1,087	118	128	451	426	9	16
1996	3,940	38	12	116	95	1,468	1,086	118	139	454	385	6	23
1997	3,681	46	14	92	89	1,370	925	144	140	403	425	5	28
1998	3,698	34	10	110	108	1,373	960	128	118	405	412	5	35
Age-standardized suicide rates													
	Per 100,000 population												
1979	16.7	6.0	18.6	15.2	14.8	17.8	15.4	17.6	17.6	18.1	18.5	29.4	22.6
1980	16.5	4.1	13.8	13.9	14.6	17.3	15.4	13.8	18.9	21.5	17.0	47.7	24.0
1981	16.4	5.2	9.0	13.2	13.6	19.0	14.5	16.0	21.0	18.8	16.6	20.9	16.3
1982	16.6	7.9	11.3	14.4	15.1	18.9	14.7	15.8	20.0	18.6	16.8	34.6	17.1
1983	17.6	7.9	14.3	14.4	17.3	21.3	14.8	18.8	18.0	20.1	16.8	53.3	42.5
1984	15.8	7.8	15.0	11.6	14.8	17.9	14.0	14.6	16.3	20.9	15.3	19.4	45.4
1985	14.8	5.5	4.9	13.8	14.4	19.5	13.0	13.6	15.9	14.9	11.8	34.5	24.1
1986	16.4	5.7	13.7	12.3	16.0	19.6	13.9	16.2	16.4	20.8	16.3	39.9	34.3
1987	15.9	6.2	10.2	14.4	12.0	19.9	12.9	18.4	15.1	19.1	15.7	28.2	22.9
1988	15.2	9.4	11.9	13.7	17.3	18.2	12.2	16.2	17.1	19.7	14.0	37.8	35.1
1989	14.9	6.1	10.1	12.3	13.5	17.2	13.1	15.6	14.8	17.5	15.1	19.7	57.8
1990	14.2	11.9	13.0	14.6	13.3	18.0	9.9	15.1	18.2	18.8	13.9	22.4	32.3
1991	14.9	8.1	20.4	14.3	14.6	18.0	11.0	14.5	15.4	21.3	15.8	13.4	34.9
1992	15.2	9.9	14.9	12.4	13.2	20.2	10.8	14.2	17.1	21.4	15.2	10.8	27.8
1993	15.4	11.4	10.9	13.2	17.0	21.0	11.6	15.2	15.0	18.6	13.2	35.1	44.5
1994	14.9	10.3	14.0	12.1	16.0	20.1	11.5	12.3	17.2	18.7	13.2	34.7	34.3
1995	15.6	8.4	16.3	15.0	18.8	22.4	11.4	12.5	15.5	19.5	12.9	28.4	24.3
1996	15.2	7.9	10.1	14.2	14.2	23.0	11.1	12.4	16.8	19.1	11.2	28.1	36.6
1997	14.0	9.6	12.1	11.1	13.6	21.1	9.3	15.1	16.3	16.6	12.1	26.3	53.6
1998	14.0	7.2	8.0	13.4	16.6	21.3	9.6	13.2	13.8	16.2	11.4	26.2	55.5

Data source: Canadian Vital Statistics Database

[†] Age-standardized to 1991 Canadian population aged 10 or older, adjusted for net census undercoverage and non-permanent residents