

**Trends in Certain Causes
of Death at Young Ages
in Canada**

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ABSTRACT

This study was produced to provide statistical indications of trends in mortality at ages 10 through 34 for both males and females in Canada. In particular, there was special interest in reviewing the rates of death for certain causes of death, namely: suicide and accidental deaths. The data indicate a sharp rise in the incidence of suicides. This is especially true for males. At the same time, the data indicate a significant drop in the mortality 'hump' normally apparent because of accidental deaths for males between ages 20 and 30. In fact, the male mortality 'hump' has virtually disappeared. The same indications are evident in recent Individual Insured Lives Mortality analysis done for the Canadian Institute of Actuaries.

This information should be of interest to actuaries in trending mortality rates for use in pricing and valuation.

1.0 Introduction

Statistics Canada collects and publishes mortality data categorized by various causes and for different ages for both males and females. This report uses the data from *Statistics Canada* to focus on three of the top five causes of death--Circulatory Diseases, Neoplasms, and External Causes (i.e. Homocides, Suicides and Accidental Deaths). Graphs are also presented for Total Deaths.

Data were available for most years from 1929 to 1991. Where certain data were missing, estimates of missing rates were made by averaging rates from neighbouring years. The results are presented in Figures 1 to 14.

Each graph presents the central rates of death (number of deaths per one thousand people alive mid-year) by age group, year and cause. The data presented for a particular year are actually central rates or averages over the five years centred by the year of presentation. For example a rate listed as '1951' is actually the average of the rates from 1949 to 1953.

The study is designed to present trends in causes of death for Canadians at young ages (aged 10 to 34). There was special interest in reviewing the central rates of death for Suicides and Accidental Causes. It had been noted in Australia that the male mortality 'hump' normally observed in the early 20s was disappearing. Also, the popular press had noted a concern about apparent rising rates of Suicide.

The reader should take care in noting the range for each graph. Each cause uses a different axis for its presentation. In some cases, there are orders-of-magnitude differences in the rates presented. For example, for males aged 20 to 24, rates of death for Accidental causes are anywhere from six to thirty times as large as Circulatory causes. This may not be immediately apparent just by quickly looking at the graphs as presented.

2.0 Trends in Certain Causes of Death

2.1 Circulatory Diseases

The main components of the Circulatory Disease cause of death are heart disease and diseases of the arteries. In general, there has been steady improvement in Circulatory Diseases as a cause of death (see Figures 1 and 2). There is also less slope by age in the mortality curve in 1989 than in the previous years. This may indicate that science has reached its lower bound at the ages under age 20 for Circulatory Diseases, with some improvement still possible at ages 25 and beyond.

2.2 Neoplasms

Neoplasms refer to various types of cancer. The main elements of this cause category are malignant neoplasms and tumours. The graphs for both males (Figure 3) and females (Figure 4) show initial increases in the rates of death after the 1930s. Overall, there have not been the improvements in Neoplasms as a cause of death as is evident for Circulatory Diseases. Also, for the age group 30-34, female rates of death are higher than males rates. This is apparently because of Breast Cancer as a cause. Certainly, this seems to be one area where efforts to reduce mortality might meet with success.

2.3 External Causes

This family of causes includes Homocides, Suicides, and Accidents. These sub-categories are important enough to have been graphed separately.

Homicides have clearly risen in importance over the period of observation. However, the order of magnitude for this cause is much smaller than for Suicides and Accidents. That may also explain some of the apparent variance, as a small number of deaths can have a significant impact on the death rates.

Suicide is one of the two most interesting causes presented, the other being Accidents. As with Homicides, the rates for Suicides have risen

significantly. However, the overall order of magnitude means that Suicides as a cause are much more important than Homocides.

Male rates of suicide are always higher than female rates and this difference is widening rapidly. For example, for the age group 20-24, the male rate of suicide in 1931 was about twice the female rate. However, in 1989, the male rate was about six times the female rate. Clearly this is a trend that is worthy of public policy analysis and is worthy of public dollar expenditures in terms of avoidance. These are young lives with a high 'life value'. If these 'voluntary' deaths can be avoided, the economic return could be significant.

The third category presented (see Figures 9 and 10) is Accidental causes. Accidental causes include poisonings, falls, and car accidents. However, the deaths from car accidents completely overwhelm all other causes of Accidental deaths in terms of the graphical presentation. Accidents are also the leading category of deaths in the graphs labelled External Causes (see Figures 11 and 12), so these two graphs 'act' very much the same and will be described together.

The rate of Accidental deaths among males has decreased markedly over the last few decades, and especially since 1971. This can be related to public policy intervention, especially a toughening of the rules relevant to driving. There are now very restrictive rules having to do with drinking and driving, and there has been a long and intensive media campaign against drinking and driving. Anecdotely, young people today do not drink and drive with the same frequency as was the case even twenty years ago. They often use a designated driver or use taxis if there is no 'safe' driver. Incidents of drunk driving and deaths among young drunk drivers are both down significantly.

The fact is so significant, that the male mortality 'hump' normally seen in the early 20s, has virtually disappeared. This is a new reality that actuaries must introduce into their mortality statistics.

Unfortunately, female mortality rates from Accidental deaths are on the rise. Again, looking at the age group 20-24, in 1931 the male rate of accidental deaths was seven times the female rate. By 1989, the male rate of accidental deaths was only three times the female rate. While the difference is mostly because of reduced male rates, it is true that female rates of accidental death are as high today as they were in the 1930s (although not as high as in 1971).

It is interesting to note the mirror-image trend in two causes of death. As the gap between male and female mortality rates under the Accidental cause have narrowed (from 7-to-1 to 3-to-1), the mortality rates from Suicide have widened almost equally (from 2-to-1 to 6-to-1 using the age group 20-24).

Hence, while the public expenditures targeting male driving accidents has apparently been successful, work is now needed to reduce the female accidental death rate and the male rate of suicide.

2.4 All Causes

The All Cause graphs total all causes of death, not just those otherwise presented. Thus, if one were to total the rates of death from the earlier graphs, the total would be smaller than the rates presented in the All-Cause graphs.

Again, we see evidence that the male mortality 'hump' is disappearing. In recent work for the Canadian Institute of Actuaries, mortality rates for insured lives indicate the same trend.

Both male and female mortality has improved, female rates more than male rates. The small improvement between 1971 and 1989 may indicate that we are approaching some lower bound, however, the rise in male suicide rates and female accident rates would disprove this hypothesis. Obviously a public policy effort targetted at suicides and accidental causes (mostly car accidents) should still result in a positive payback to the economy.

3.0 Conclusion

Over the period of analysis, most causes of death have shown decreasing rates, and rates that are less variable. Females have lower mortality rates for all causes except Neoplasms.

The rise in male suicide rates and female accidental rates has been noted, and public policy reaction has been suggested.

Finally, the graphs indicate the virtual disappearance of the male mortality 'hump' beyond age twenty.

References

1. *Vital Statistics*, The Dominion Bureau of Statistics (1929-1969).
2. *Causes of death, Provinces by Sex and Canada by Sex and Age*, Statistics Canada (1970-1991).

Appendix

Fig. 1

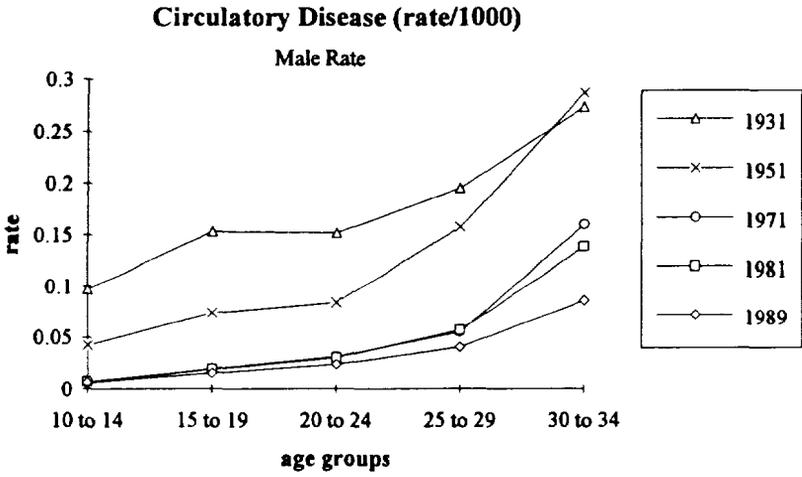


Fig. 2

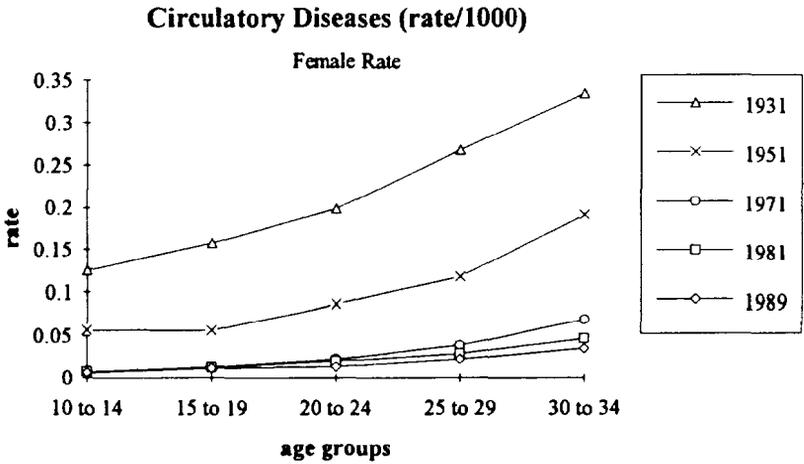


Fig. 3

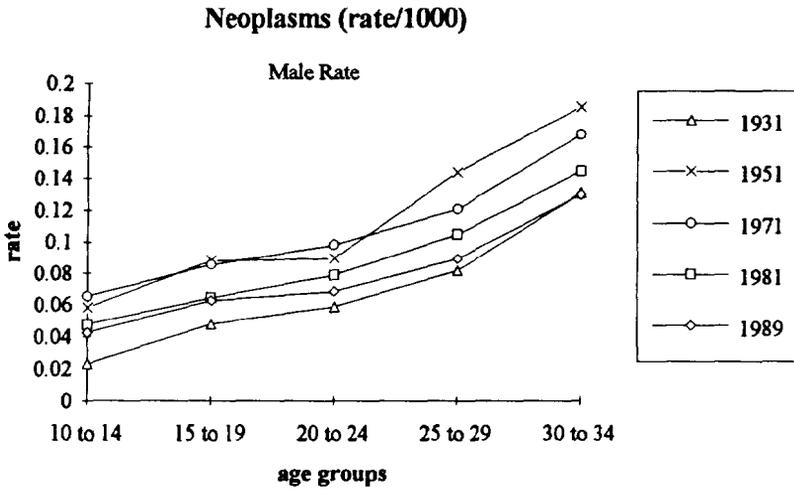


Fig. 4

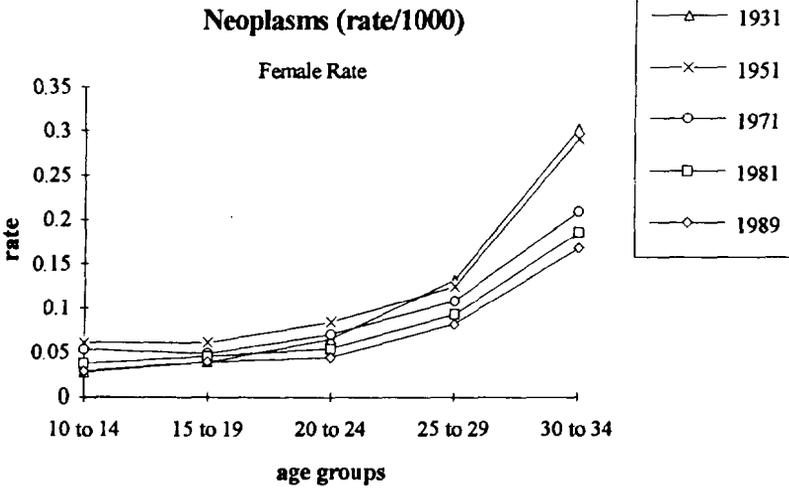


Fig. 5

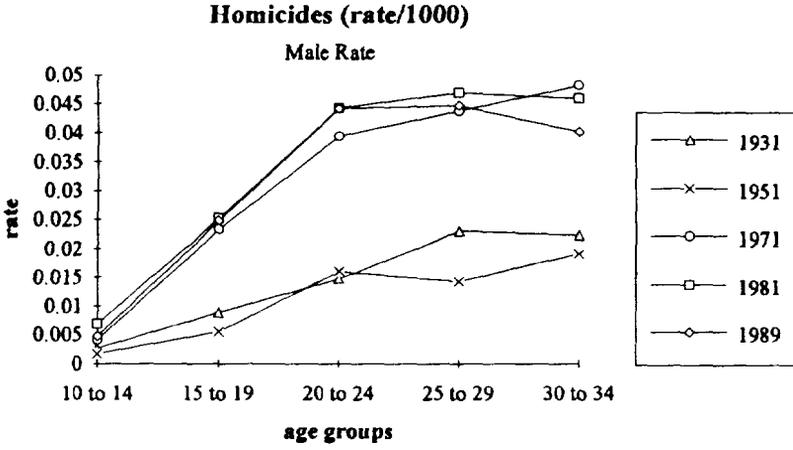


Fig. 6

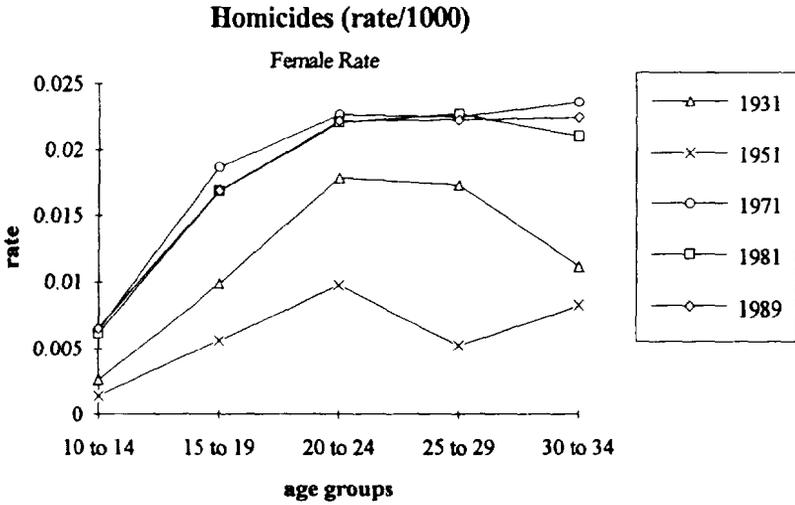


Fig. 7

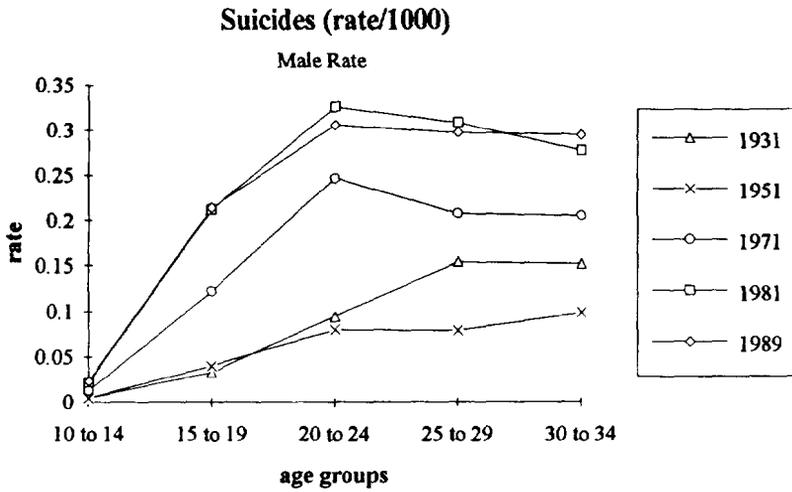


Fig. 8

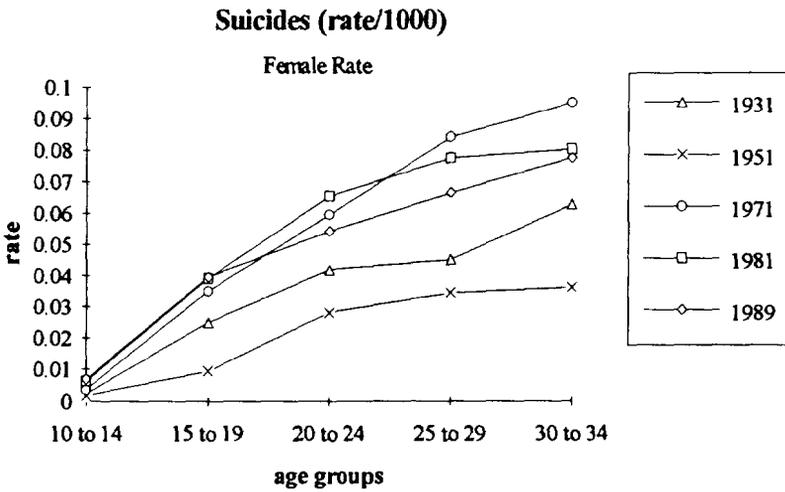


Fig. 9

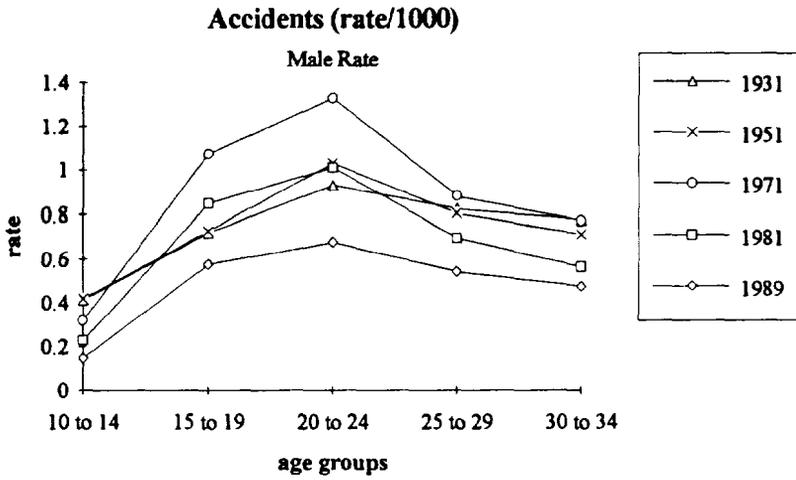


Fig. 10

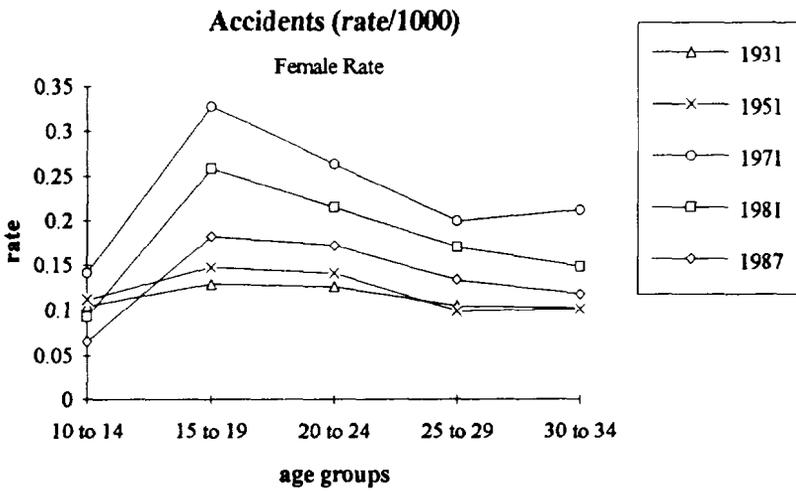


Fig. 11

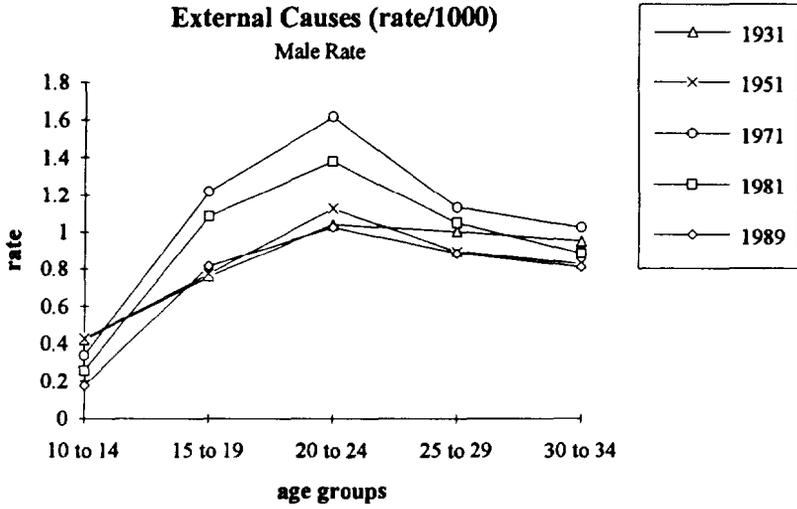


Fig. 12

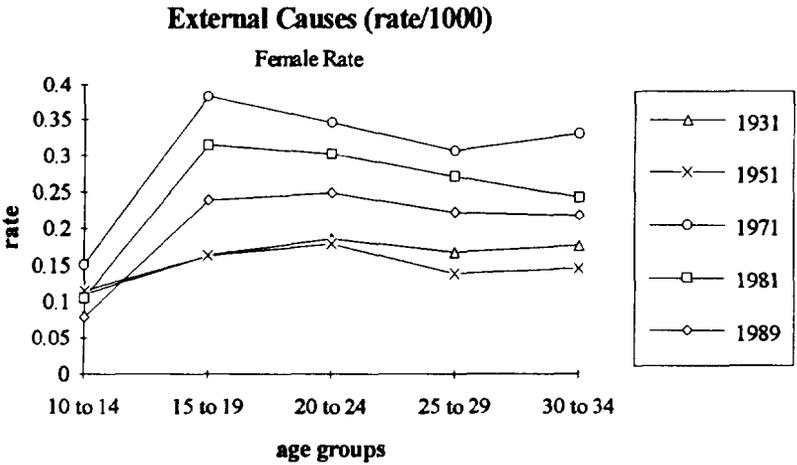


Fig. 13

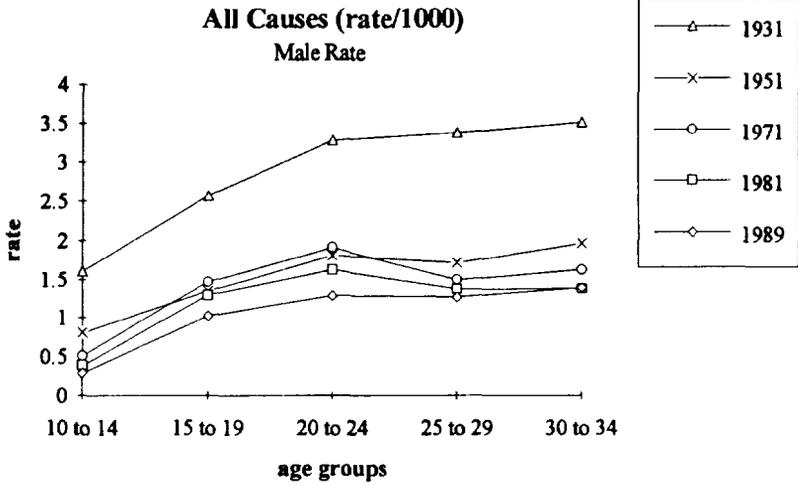


Fig. 14

