# Trends in rates of death from unintentional injury among Canadian children in urban areas: influence of socioeconomic status

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Injury is the leading cause of death and a major cause of morbidity among children aged 14 years and less in Canada. In 1997, 1 of every 2 deaths and 1 of every 8 hospital admissions in this age group were caused by injuries.[1] Socioeconomic status (SES) is a hierarchical continuum that takes into account the lifestyles, attitudes and values that define a person's position in society. Studies from around the world have shown that children of low SES, compared with children of high SES, are at increased risk of death and disability from injury.[2] These inequities may be due to differences in risk exposure and disparities in the adoption of preventive interventions because of barriers such as cost or availability.

Over the last 50 years the rate of death from childhood injury has decreased by more than 50%. In Canada the mean annual rate decreased from 47 per 100 000 in 1952 to 17 per 100 000 in 1997.[1] Similar declines have been seen throughout the developed world. However, it has been argued that the SES disparities in injury-related mortality have actually widened over time. Roberts and Power showed that SES disparities in rates of death from injury in England and Wales widened from 1981 to 1991.[3]

We used data from Statistics Canada and census data to determine the influence of SES levels on trends in rates of death from unintentional injury among Canadian children from 1971 to 1998. We included all children aged 14 years and less living in census tracts in urban areas in Canada (about 60% of the population). We identified childhood

deaths from injury using the International Classification of Disease codes reported on the death certificate. Intentional injuries were excluded because the mechanisms, risk factors and implications for prevention differ from those for unintentional injuries. Deaths from undetermined causes were excluded because these deaths are likely to be intentional. Census population counts of children 14 years of age and less (and interpolated population counts for noncensus years) were used as the denominator for rates of death.

The main measure of SES was the proportion of families living below the low-income cut-off level in a census tract. Using the address on the death certificate, children were coded to a census tract and a corresponding SES quintile. The data sets from Statistics Canada linked childhood deaths caused by unintentional injury with SES quintile data for the years 1971, 1986, 1991, 1996, 1997 and 1998. SES data were available only for urban areas;

therefore, the effect of SES on injury-related mortality among children living in rural areas remains unknown. We also developed and used 3 other measures of SES: proportion of women with an education level of less than grade 9, male unemployment rate and proportion of private dwellings not owned.

During the 6 study years, there were 1571 deaths due to unintentional injuries among children aged 14 and less (33% of all deaths in this age group). The rate of death from unintentional injury per 100 000 children decreased significantly, from 20.65 (95% confidence interval [CI] 19.08–22.22) in 1971 to 3.93 (95% CI 3.27–4.58) in 1998. The relative risk of death in 1998 compared with 1971 was 0.19 (95% CI 0.16–0.23), which indicates that the injury-related mortality declined by 81% (95% CI 73%–89%).

The rate of death from unintentional injury decreased significantly over time in all SES quintiles. In the highest SES quintile the rate decreased from 12.39 (95% CI 9.79–15.00) in 1971 to 2.74 (95% CI 1.62–3.85) in 1998 (Fig. 1). Similarly, in the lowest SES quintile, the rate of death decreased from 25.33 (95% CI 21.25–29.42) in 1971 to 5.90 (95% CI 3.97–7.83) in 1998. The interquintile
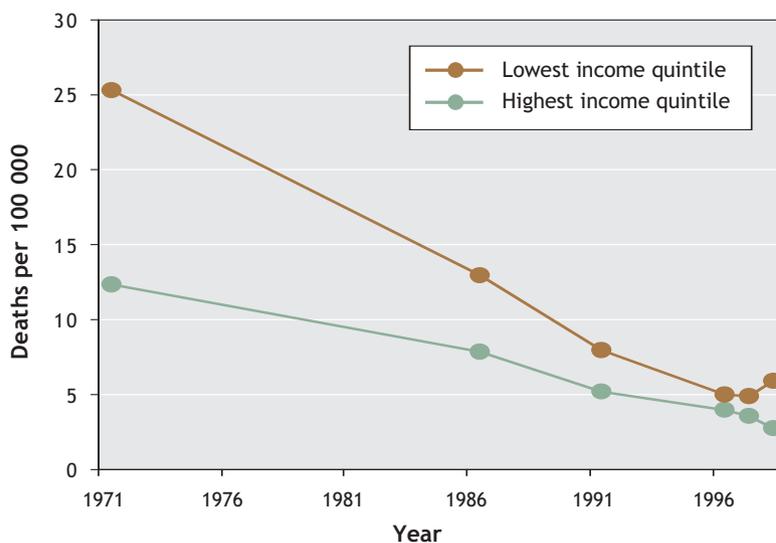


**Fig. 1:** Rates of death from unintentional injury per 100 000 children aged 14 years and less.

rate ratio (lowest:highest income quintile) was similar in 1971 and 1998 (2.04 and 2.15 respectively). However, the interquintile rate difference (lowest – highest income quintile) declined from 12.94 in 1971 to 3.16 in 1998.

We used Poisson regression to model changes in rates of death over time (after adjusting for age and sex) for all unintentional injuries. The association between low-income levels and year was assessed by incorporating an interaction term in the Poisson regression model. The risk of death from unintentional injury increased by 12% (relative risk 1.12, 95% CI 1.07–1.16) for each unit change in income quintile, from highest to lowest SES quintile. The interaction term did not reach statistical significance, which indicated that the difference in rates of death from unintentional injury between low- and high-income quintiles did not widen over time. When we used the other measures of SES, we found similar results (Table 1).

For specific causes of injury, the effect of income quintile on rates of death from motor vehicle collisions and from cyclist collisions with a motor vehicle was not statistically significant. For each unit change in income quintile, from highest to lowest, the risk of death from pedestrian collisions with a motor vehicle, suffocations and falls

increased by 13% (95% CI 5%–22%), 17% (95% CI 5%–32%) and 29% (95% CI 8%–54%) respectively. For these injury types, the interaction term was not statistically significant. The disparity in rates of death from drowning and fires between children living in high- and low-income quintiles, however, significantly narrowed over time, by about 6% and 10% respectively.

There are some differences between our analysis and that of Roberts and Power.[3] They studied the effect of SES on trends in mortality for both intentional and unintentional injuries, included data on children living in both rural and urban areas in England and Wales and used an individual-level SES measure.[3] Several studies have shown that area-based SES measures (such as the one we used) perform as well as individual-based SES measures. Studies using area-level SES measures have shown an independent effect of SES on health outcomes.

The reduction of socioeconomic inequities in health is an explicit health policy objective in Canada. We have shown that the inequities in rates of death from unintentional injury by SES have not increased over time; however, these inequities do persist. Prevention of injuries with the greatest morbidity and mortality (e.g., injuries to pedestrians from motor vehicle collisions) re-

mains a key criterion for action. Alongside this priority is the need to decrease injury-related mortality and morbidity among children living in low-SES areas to at least those seen in high-SES areas. Such targeted prevention should be implemented for injuries with the largest SES rate differences, such as those from fires, drowning and falls. A national injury prevention strategy is needed to articulate and support these priorities.

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**Table 1:** Influence of SES indicators on rates of death from unintentional injury among children 14 years of age and less over time*

| SES indicator | Adjusted RR (95% CI)† | $p$ value for interaction‡ |
|---|---|---|
| Women with education level < grade 9 | 1.13 (1.06-1.19) | 0.10 |
| Male unemployment | 1.10 (1.03-1.17) | 0.35 |
| Home not owned | 1.09 (1.02-1.16) | 0.92 |

Note: SES = socioeconomic status.
*The period studied included the years 1971, 1986, 1991, 1996, 1997 and 1998.
†Adjusted for age, sex and time (in years).
‡$p$ value for interaction: SES $\times$ time (in years).

## REFERENCES

1. Reproductive and Child Health. *Canadian injury data*. Ottawa: Health Protection Branch, Health Canada; 1999.
2. Choiniere R. Injury related mortality and hospitalization disparities. In: *For the safety of Canadian children and youth: from injury data to preventive measures*. Ottawa: Health Canada; 1997.
3. Roberts I, Power C. Does the decline in child injury mortality vary by social class? A comparison of class specific mortality in 1981 and 1991. *BMJ* 1996; 313:784-6.