Accidents in Canada, 1988 and 1993

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Abstract

Using data from Statistics Canada's 1988 and 1993 General Social Survey (GSS), this article examines the incidence and consequences of accidents in Canada and the characteristics of respondents aged 15 and over who were involved in them. In 1993, an estimated 3.9 million Canadians reported that they had been involved in 4.8 million accidents in the previous 12 months. Motor vehicle accidents and sports accidents were the most frequent, each accounting for about 27% of incidents, followed by accidents at work (21%) and at home (14%).

Accidents were most common among young people, particularly men. However, from 1988 to 1993, there was a decline in the proportion of adults reporting accidents, and the sharpest drop was for the age group most at risk — 15- to 24-year-olds. Most of the downturn was attributable to a decrease in the motor vehicle accident rate. Since alcohol is known to be associated with accidents, reduced consumption during the same period may have been partly responsible for the decline in accident rates. Other factors that may have contributed include stricter enforcement of impaired driving legislation and speed limits, and improvements in automobile safety.

Nonetheless, despite the decline in accident rates, the toll taken by accidents reported in 1993 was considerable: 80% of accidents caused personal injury, and almost half of these resulted in medical attention in a hospital. Overall, 62% of accidents resulted in activity-loss days, and 29% involved bed-disability days. Hospital utilization costs associated with these accidents in 1993 were about $1.5 billion. As well, about one-third of accidents involved out-of-pocket expenses, totalling $791 million. Moreover, accidents continue to be the leading cause of death among persons under age 44.

Keywords: *accidents, injuries, health promotion, health surveys, injury prevention*

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Introduction

In the field of injury research, the term accident is avoided, because it implies that such events are random and unpredictable, although a growing body of literature indicates that events regarded as accidents are preventable. Results of the General Social Survey (GSS) appear to support this perspective: between 1988 and 1993, accident rates declined in Canada. Much of the decline was attributable to a reduction in motor vehicle accidents, and this, in turn, suggests that technological advances in vehicle safety, public health campaigns to promote safe driving, and stepped-up enforcement of driving legislation may have had an effect. Nonetheless, accidents of all kinds affect millions of Canadians each year. Accidents are a major cause of death, injury, and lost productivity, and they impose a heavy financial burden.

In 1993, the GSS collected data on the social and demographic characteristics of Canadians who had had an accident in the previous year.[1] This article presents information on the accidents reported to the 1993 GSS and compares the results with those obtained in 1988 (see *Methods*).

Accidents, 1993

In 1993, an estimated 3.9 million Canadians aged 15 and over (18% of the adult population) reported having at least one accident in the previous year (Table 1). A total of 4.8 million separate incidents occurred. While 15% of adults had had a single accident, another 3% had been involved in more than one.

Methods

Data sources

Since 1985, Statistics Canada has conducted the General Social Survey (GSS) to monitor changes in Canadian society and to provide information on current or emerging policy issues. The GSS operates on a five-year cycle, each year focusing on one of five core subjects. Personal risk, which included the incidence and consequences of accidents, was the focus in 1988 and 1993.

The target population of the GSS is persons aged 15 and over, excluding residents of the Yukon and Northwest Territories and full-time residents of institutions. When a private household is contacted, all household members are enumerated. A respondent aged 15 or over is randomly selected, and detailed data are collected for this person.

During the 1993 survey, contact was attempted with 12,722 households. The response rate was 82%, if it is assumed that households for which there was no response were "in scope" (that is, had at least one eligible member). This yielded a sample of 10,385 households.[1,2]

Sample weights (person weights) were adjusted for non-response and for differences between the target population and the surveyed population. Accident incidents were assigned weights equivalent to the person weight. The total number of accidents was calculated by multiplying the number of accidents reported by each person, by the accident incident weight, then summing these figures.

While consistency in data collection methods between the 1988 and 1993 surveys was high, there were some differences. The 1993 GSS collected data monthly, beginning in February and ending in December, the reference period being the previous 12 months. In 1988, data were collected in January and February, and the reference period was 1987. Also, in 1993, the GSS used computer-assisted interviewing, and the interview program detected inconsistencies during the interview. In 1988, the data were collected on paper questionnaires, and editing was completed after the interview. Proxy responses were not accepted in either survey.

Mortality data were obtained from vital statistics files maintained by Statistics Canada's Health Statistics Division. Persons aged 15 and over who had died as a result of an accident in 1987 and 1992 were selected from the file. Age-specific mortality rates were calculated by five-year age groups for motor vehicle accidents and for total accidents, poisoning and violence. The population estimates used to calculate mortality rates are based on adjusted population estimates for 1987 and 1992, which take into account census undercoverage and non-permanent residents.[3]

Definitions

The 1993 GSS asked a series of screening questions to determine if an accident report should be completed. Only events that occurred in the previous 12 months (from the date of the interview) were counted. To be an accident, an incident had to meet one or more of the following criteria:

- it interrupted the respondent's normal activities for at least half a day;
- it caused out-of-pocket expenses of at least $200;
- it required medical attention from a physician or nurse.

Four types of accident were identified: motor vehicle, sports, work, and home. These categories are not mutually exclusive (a previous report showed that about 9% of incidents could not be uniquely classified[2]). To eliminate double-counting, this study established a hierarchy: motor vehicle, work, sports, and home accidents were assigned in that order. For example, a motor vehicle accident that happened at work was classified as a motor vehicle accident. The effect of this was to increase the reported incidence of motor vehicle accidents, while reducing the incidence of other types. Events that did not fall into one of the four categories, or for which information was insufficient to make a classification, were relegated to a residual "unclassified" group.

Accidents involving vehicles such as a car, van, truck, motorcycle, snowmobile, all-terrain vehicle, and so on were classified as motor vehicle accidents. Accidents at a place of work, that is, where respondents spent most of their working day (in an office or factory, at home, on the road, or outside) were work accidents. Those that occurred during sports or recreational activities were classified as sports accidents. Accidents that took place in homes and their immediate surroundings were home accidents.

Medical consequences were assessed through a series of questions about whether respondents received medical attention or experienced activity loss/disability days as a result of the accident. Activity-loss days include bed-disability days, which in turn, include hospital days.

GSS questions also probed the economic consequences of accidents. Personal expenses were measured with questions about financial losses or extra expenses incurred as a result of the accident. Respondents were also asked if they had recovered any of these costs from an insurance policy or Workers' Compensation, and to give their best estimate of out-of-pocket expenses (for instance, the deductible on auto insurance claims, legal expenses, non-insured dental care, extra transportation expenses, prescription drug costs, or chiropractic or physiotherapy services).

Categories of alcohol consumption were determined on the basis of the respondents' frequency and volume of alcohol consumption. Those who reported drinking an alcoholic beverage at least once a month were defined as current drinkers, and those who had less than one drink per month were defined as occasional drinkers. Current drinkers were classified according to their consumption in a typical week: less than 1 drink, 1 to 6 drinks, 7 to 13 drinks, and 14 or more drinks. A drink was defined as one bottle of beer, one small glass of wine, or 1½ ounces of liquor.

Respondents were also asked if they had used medication in the previous month, specifically, Aspirin or similar pain relievers, tranquilizers such as Valium, diet pills or stimulants, anti-depressants, codeine, Demerol, morphine, or sleeping pills. The number of medications used in the previous month was categorized as follows: none, one, and two or more.

The dates in the tables and charts — 1988 and 1993 — refer to the years in which the GSS was conducted, and not to when the accidents occurred.

Limitations

Limitations in the survey design imposed constraints on the analysis. As noted, the survey excluded people living in institutions. The effect of this exclusion was greater for persons aged 65 and over, an estimated 8% of whom were institutionalized.[4] Those in institutions may be there because they have experienced an accident. Therefore, accident rates and the consequences of accidents for older people may be underestimated. As well, people hospitalized as a result of an accident when the survey was conducted were excluded. And of course, the survey could not cover accident fatalities, although the addition of mortality data in this analysis fills the gap to some extent.

One of the definitions of an accident, namely, an event that resulted in economic loss of at least $200, is problematic because it mixes financial and medical consequences. Moreover, the $200-threshold was the same in 1988 and 1993. This failure to adjust for inflation could have increased the number of incidents reported, particularly motor vehicle accidents.

Estimates of out-of-pocket expenses associated with accidents may have been affected by respondents' insurance coverage. Everyone does not have the same level of insurance coverage, and not all workers are covered by Workers' Compensation. People in lower socioeconomic groups, who are least able to afford comprehensive insurance coverage, could be expected to pay more in out-of pocket expenses for accidents and, therefore, to have a higher accident rate according to the GSS definition.

Another important limitation is the lack of any measure of the severity of injuries. A cut could refer to

Table 1

Number of accidents reported, by sex and age group, Canada, 1993

	Total population aged 15 and over	Accidents reported				
		Total	None	One	Two or more	Not stated
	'000			%		
Both sexes	**21,644**	**100**	**80**	**15**	**3**	**2**
15-24	3,788	100	69	23	7	- -
25-44	9,156	100	78	17	3	2
45-64	5,653	100	86	11	1	2
65+	3,047	100	87	7	- -	5
Men	**10,593**	**100**	**76**	**17**	**4**	**2**
15-24	1,934	100	62	27	11	- -
25-44	4,559	100	74	20	4	2
45-64	2,801	100	84	12	1	3
65+	1,300	100	90	6	- -	4
Women	**11,051**	**100**	**83**	**13**	**2**	**2**
15-24	1,855	100	76	19	4	- -
25-44	4,597	100	82	14	2	2
45-64	2,852	100	87	10	1	2
65+	1,747	100	85	8	- -	6

Source: *General Social Survey, 1993*
Note: *Because of rounding and suppression of estimates, row percentages may not total 100%.*

The accident rate reported in 1993 was 223 per 1,000 population, but not everyone was equally likely to have an accident. Generally, men had higher rates than women. As well, accident rates tended to decline with age (Table 2).

The highest accident rate was among men aged 15 to 24 at 514 per 1,000. Accidents among women also peaked at ages 15 to 24, but the rate — 306 per 1,000 — was much lower. For both sexes, rates declined steadily at older ages, although women aged 65 and over reported a higher rate than did their male contemporaries — 94 versus 70 accidents per 1,000.

Table 2

Accident rates, by type of accident, sex and age group, Canada, 1993

	Total	Motor vehicle	Sports	Work	Home
	Accidents per 1,000				
Both sexes	**223**	**60**	**59**	**46**	**31**
15-24	412	106	167	64	31
25-44	245	70	57	59	33
45-64	134	37	20	35	26
65+	84	20	- -	- -	36
Men	**265**	**71**	**84**	**66**	**23**
15-24	514	119	219	99	33
25-44	289	78	83	84	21
45-64	146	45	29	44	21
65+	70	- -	- -	- -	- -
Women	**182**	**50**	**36**	**26**	**39**
15-24	306	92	114	28	28
25-44	202	61	31	35	44
45-64	123	29	- -	27	32
65+	94	- -	- -	- -	47

Source: *General Social Survey, 1993*

Multiple accidents

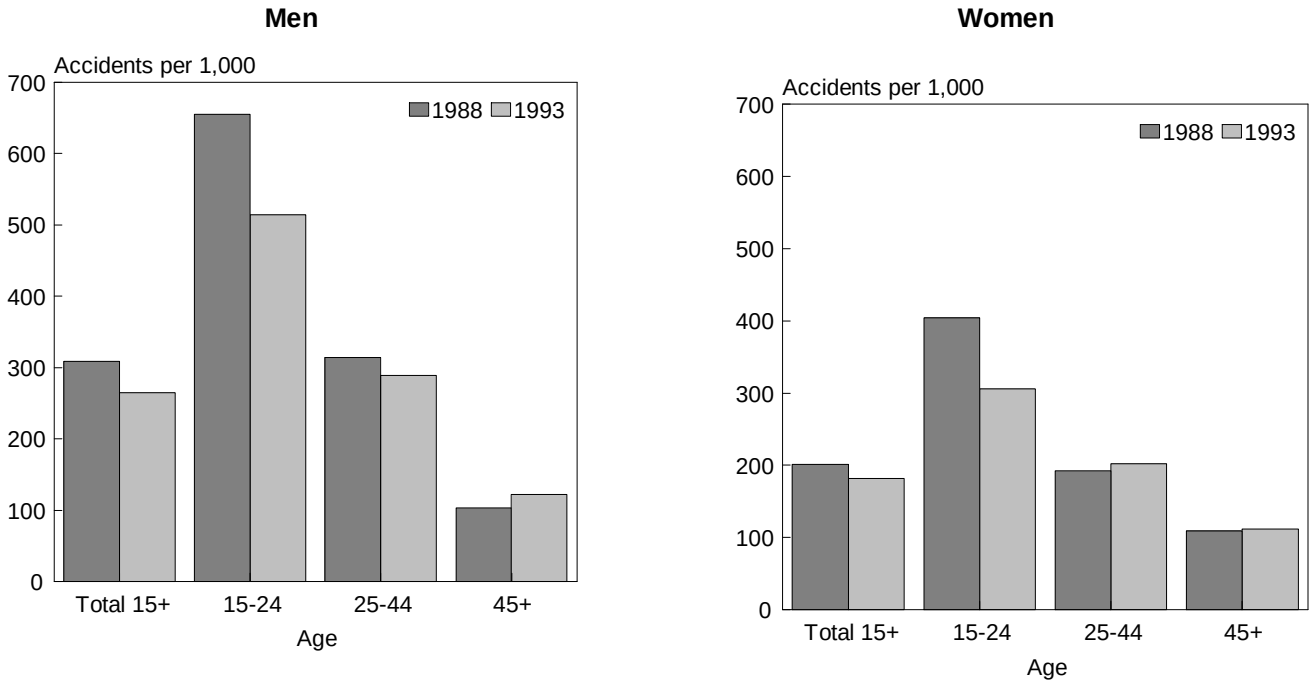
To some extent, the high accident rate of young people reflects their greater likelihood of being involved in more than one incident. In 1993, 11% of men aged 15 to 24, compared with 4% of all men, reported having more than one accident in the previous year. Multiple accidents were less frequent among women, but again, 15- to 24-year-olds were most likely to be involved in more than one incident — 4% versus 2% of women overall.

Accident rates, 1988 and 1993

At 223 accidents per 1,000 population aged 15 and over, the accident rate reported in 1993 was down from 254 per 1,000 population, reported in 1988. This overall drop was largely attributable to a decline in the rate among the group most at risk — 15- to 24-year-olds (Chart 1). Accident rates for men aged 15 to 24 fell from 655 to 514 per 1,000 between 1988 and 1993. Whereas among older men, rates remained relatively stable. The pattern was similar among women: rates dropped from 404 to 306 per 1,000 at ages 15 to 24, and changed little at older ages.

Chart 1

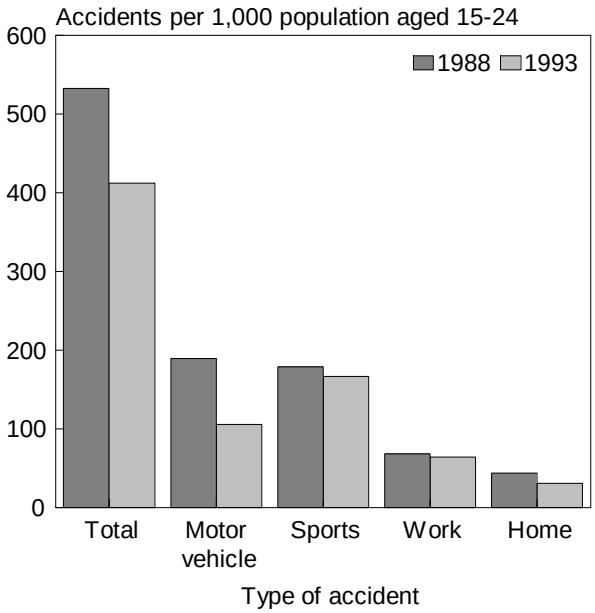
Accident rates, by sex and age group, Canada, 1988 and 1993



Source*: *General Social Survey, 1988 and 1993

Chart 2

Accident rates among 15- to 24-year-olds, by type of accident, Canada, 1988 and 1993



Source:* *General Social Survey, 1998 and 1993

Between 1988 and 1993, the rates of all types of accident declined among 15- to 24-year-olds (Chart 2). The major decline, however, was in motor vehicle accidents. In fact, these accidents had been the type reported most frequently by young people in 1988, but they ranked second after sports accidents in 1993. That year, the rate of motor vehicle accidents among 15- to 24-year-olds was 106 per 1,000, down substantially from 189 per 1,000 five years earlier. Changes in the rates of sports, work, and home accidents were relatively minor.

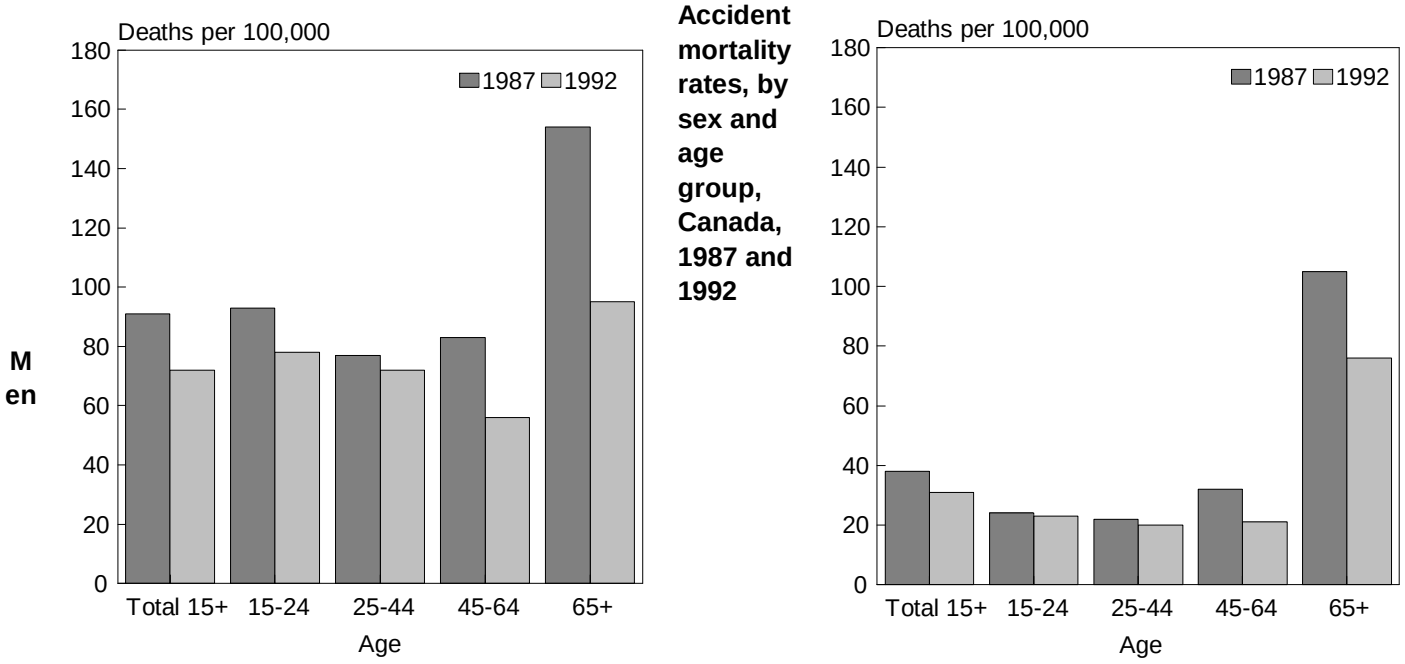
Accident mortality

Paralleling the decline in the incidence of accidents shown by the GSS, age-specific accident mortality rates also decreased between 1987 and 1992 (Chart 3).[a] However, among both men and women, accident mortality rates peaked at ages 65 and over. These high rates are often overlooked because accidents account

[a] *Accident-related mortality includes suicide.*

Chart 3

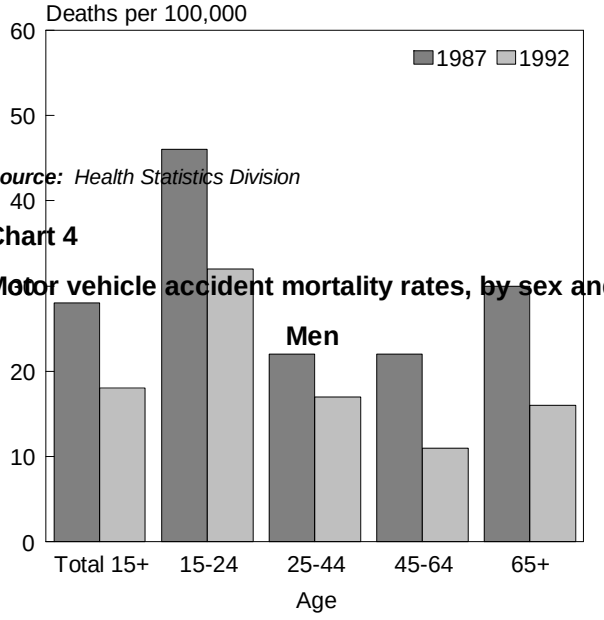
Accident mortality rates, by sex and age group, Canada, 1987 and 1992



Source: *Health Statistics Division*

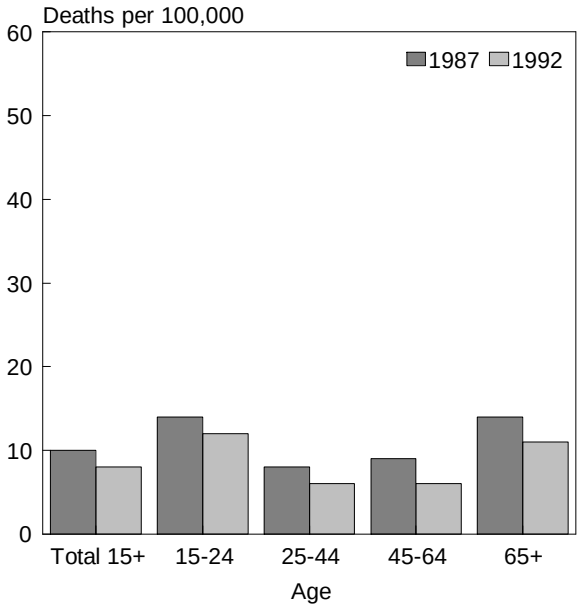
Chart 4

Motor vehicle accident mortality rates, by sex and age group, Canada, 1987 and 1992



Source: *Health Statistics Division*

Women



for only about 2% of deaths among the elderly, compared with about 75% of deaths at ages 15 to 24. Accident mortality among the elderly also tends to be obscured by the much higher rates for cardiovascular disease and cancer.

Motor vehicle accident mortality rates more closely mirror the trends in the incidence of accidents shown by the GSS (Chart 4). From 1987 to 1992, there was a decline in mortality due to motor vehicle accidents in all age groups, particularly among men.

Types of accident

In the 1993 GSS, motor vehicle and sports accidents were reported with almost equal frequency, each accounting for 27% of incidents (Table 3). Work accidents represented another 21%, and home accidents, 14%. The remaining accidents fell into a variety of categories.

Table 3

Type of accident, by sex and age group, Canada, 1993

	Total accidents	Motor vehicle	Sports	Work	Home	Unclassified/ Not stated
	'000			%		
Both sexes	**4,823**	**100**	**27**	**27**	**21**	**14**	**12**
15-24	1,561	100	26	41	16	7	11
25-44	2,247	100	28	23	24	13	11
45-64	760	100	28	15	26	20	12
65+	256	100	24	- -	- -	43	23
Men	**2,811**	**100**	**27**	**32**	**25**	**9**	**8**
15-24	994	100	23	43	19	6	9
25-44	1,317	100	27	27	29	7	8
45-64	410	100	31	20	30	14	6
65+	91	100	- -	- -	- -	- -	4
Women	**2,012**	**100**	**28**	**20**	**14**	**21**	**17**
15-24	567	100	30	37	9	9	14
25-44	930	100	30	15	17	22	15
45-64	350	100	24	- -	22	26	19

65+	165	100	- -	- -	- -	50	33

Source: *General Social Survey, 1993*
Note: *Because of rounding and suppression of estimates, row percentages may not total 100%.*

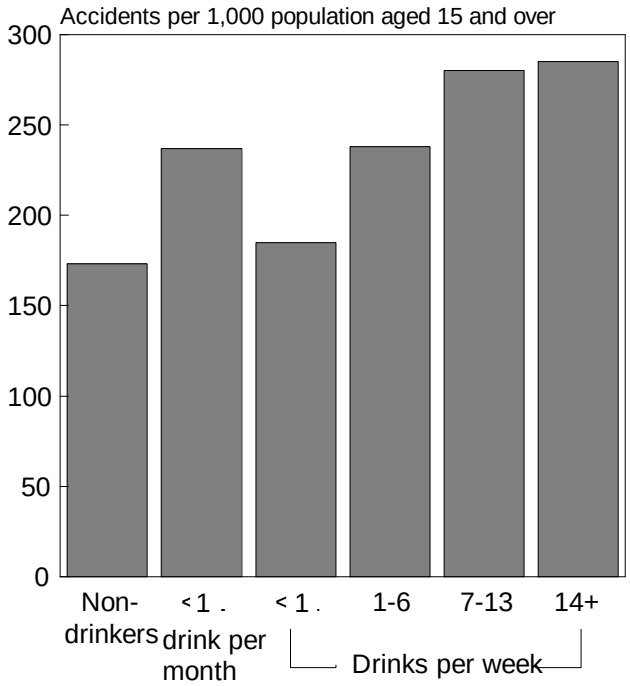
The types of accident in which people were involved varied with their age and sex, and reflected their stage in the life cycle. For example, sports accidents tended to affect younger people; work accidents occurred during the years of prime labour force participation; and for older women, home accidents were more common than any other type.

Alcohol use

Drinkers were more likely than people who did not drink alcohol to be involved in accidents. In 1993, the accident rate reported by current drinkers was 246 per 1,000, and by occasional drinkers, 237 per 1,000, compared with 173 per 1,000 non-drinkers (Chart 5). As the level of alcohol consumption increased, so did the accident rate. While the rate was 185 per 1,000 who consumed less than one drink per week, the figure was 285 per 1,000 whose weekly consumption was 14 or more drinks.

Chart 5

Accident rates, by alcohol consumption, Canada, 1993



Source: *General Social Survey, 1993*

Medication use

The use of medications was also associated with accidents. However, a confounding factor is that the use of medications, particularly more than one, increases with age(in 1993, 16% of people aged 45 and over reported using two or more medications in the previous month, compared with 12% of those under age 45). Age-adjusted accident rates indicate that the proportion of both men and women involved in an accident rose with the number of medications taken (Chart 6). The rate for men who used two or more medications was 846 per 1,000, about twice the rate for men who had taken no medications (442 per 1,000). Among women, the corresponding accident rates were 616 and 250 per 1,000.

This association between medication use and accident rates suggests that medications may be an important risk factor for accidents. In fact, the use of psychotherapeutic drugs has been linked to falls among the elderly.[5] However, it is also possible that the use of these medications was an effect of having had an accident, either to control pain or as an anti-inflammatory.

Chart 6

Age-adjusted accident rates, by medication use and sex, Canada, 1993

Source: *General Social Survey, 1993*

Injuries

Fully 80% (3.8 million) of the accidents reported in 1993 caused personal injury. However, the likelihood of injury varied with the type of accident. The overwhelming majority (more than 90%) of sports, work, and home accidents resulted in injury, compared with less than half (45%) of motor vehicle accidents.

The nature of the injury also varied with the type of accident. For example, bruises/sprains/strains/ dislocations accounted for 59% of sports injuries, but 28% of home injuries. Fully 37% of motor vehicle accident injuries were multiple, compared with 11% of work injuries (Table 4).

Table 4

Type of injury, by type of accident, Canada, 1993

	Total	Motor vehicle	Sports	Work	Home	Unclassified/ Not stated
Accidents with injuries ('000)	**3,841**	**594**	**1,261**	**947**	**621**	**418**
(%)	**100**	**100**	**100**	**100**	**100**	**100**
Fractures	12	- -	12	8	18	18
Burns/scalds	2	- -	- -	- -	- -	- -
Bruises/sprains/ strains/ dislocations	45	40	59	43	28	31
Cuts/scrapes	15	- -	6	24	30	15
Multiple	18	37	15	11	12	24
Other/Not stated	8	--	7	9	--	--

Source: *General Social Survey, 1993*
Note: *Because of rounding and suppression of estimates, column percentages may not total 100%.*

Medical care

Less than half (46%) of all accidents required medical attention in hospital, usually on an outpatient basis (Table 5). Inpatient care was provided for only 5% of accidents, but this represented approximately 2.5 million hospital days. For the 12 months between April 1, 1992 and March 31, 1993, the average daily cost of patient care in a general hospital was $610.[6] Based on this average, hospital costs associated with accidents reported in the 1993 GSS amounted to about $1.5 billion. Moreover, this figure does not include costs for follow-up treatment.

Activity limitation

The majority of accidents reported in 1993 (62%) entailed activity-loss days (days in which normal activity was restricted), and a substantial proportion (29%) also involved bed-disability days. This amounted to 60.6

Table 5

Type of accident, by consequences, Canada, 1993

	Total accidents		Injury	Medical attention in hospital		Medical attention outside hospital	Activity-loss days	Bed-disability days	Financial loss	Financial compensation
				Outpatient	Inpatient					
	'000						%			
Total accidents	**4,823**	**100**	**80**	**41**	**5**	**22**	**62**	**29**	**31**	**12**
Motor vehicle	1,308	100	45	23	5	11	51	23	54	27
Sports	1,284	100	98	44	4	31	62	31	20	6
Work	993	100	95	55						

These expenses were only those paid by individuals and for which reimbursement was not expected. The total cost of accidents is many times higher when litigation, insurance, Workers' Compensation, hospital and medical expenses, and lost productivity are factored in.

Discussion

Studies in the early part of the 20th century were influenced by the public perception of accidents, which associated them with individual carelessness, inattention, and risk-taking. Consequently, early research concentrated on modifying individual behaviour to the exclusion of environmental, technological, and other factors that might be associated with the etiology of accidents.

DeHaven, Gibson and Haddon refocused the orientation of injury prevention research.[7-10] Injuries were studied in the same way as disease, which could be analyzed in the epidemiological framework of host, agent, and environment. This changing perspective contributed to an increase in injury-related research and the implementation of measures designed to reduce and prevent injuries.[11]

An example of the effects of this new research orientation and its impact can be seen in motor vehicle accidents. Technological innovations such as safety glass, anti-lock braking systems, seatbelts, air bags, and structural improvements to the bodies of vehicles are responses to forces within and outside the automobile industry to improve safety. The design of highways, lighting of intersections, and research on road surfaces are examples of modifications to the environment in which vehicles are operated.

Studies have repeatedly shown that the incidence of motor vehicle accidents tends to be highest among young drivers. These high accident rates have been attributed to a combination of young drivers' inexperience, risk-taking, and tendency to under-estimate the effect of alcohol and drugs on driving performance.[12,13] The 1993 General Social Survey, however, shows a decline in the overall accident rate that is largely attributable to fewer motor vehicle accidents among 15- to 24-year-olds. One factor that may be associated with the reduction in accidents in this age group is a lower level of alcohol consumption. Evidence suggests that among 15- to 24-year-olds, the proportion of current drinkers and the frequency of drinking have decreased.[14,15] In addition, in a number of jurisdictions, measures such as restricting adolescent drivers to daylight hours, raising the age for operating vehicles, and introducing graduated licensing systems may have lowered accident rates.[16,17]

As well, possibly in response to campaigns against drinking and driving, the overall incidence of impaired driving has declined.[18] In the past decade, the number of people charged with impaired driving has fallen by about one-third. Random spot checks, combined with more rigorous enforcement of speed limits and educational programs, may have changed attitudes about the acceptability of drinking and driving.

Although data are lacking to provide direct causal links between technological innovations, safe driving and anti-drinking campaigns, and this reduction in accidents, the events have coincided. Moreover, the decline in mortality rates as a result of fewer motor vehicle accidents points to continuation of a longer-term downturn in motor vehicle accident mortality.

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