

**Technical report: Injury resulting from falls  
among Canadians age 65 and over**

**on the analysis of data from the  
Canadian Community Health Survey, Cycle 2.1,  
as presented in:**

***Report on seniors' falls in Canada (2005)***

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## Introduction

It is estimated that one in three people over the age of 65 will fall at least once each year, a rate that increases to one in two people over the age of 80 (Tinetti, Speechley and Ginter, 1988; O'Loughlin et al., 1993). In Canada, this means that an estimated 1.3 million Canadians over age 65 are likely to fall this year. Almost half of those who fall experience a minor injury and between 5% and 25% sustain a serious injury, such as a fracture or a sprain (Alexander, Rivara and Wolf, 1992; Nevitt, Cummings and Hudes, 1991). However, even without an injury, a fall can cause a loss in confidence, increased fear and curtailment of activities, which can lead to a decline in health and function, which may in turn lead to future falls with more serious outcomes. If the fall results in a serious injury, this can lead to long-term disability or even death.

During 2001/02, falls accounted for 57% (N = 114,262) of all injury admissions for all ages in Canada and contributed to over 1.4 million days in hospital, with an average length of stay of 13 days for fall-related hospitalizations (Canadian Institute for Health Information, 2004). Fifty-nine percent (N = 67,876) of the fall-related hospital admissions were for people age 65 years and over. Falls cause more than 90% of all hip fractures in the elderly and 20% die within a year of the fracture. Almost half of the people who survive a hip fracture never recover full function (Zuckerman, 1996). Falls are also directly accountable for 40% of all elderly admissions to nursing homes or long-term care facilities (Rawsky, 1998). Fall-related injuries for all ages accounted for 57 % of all direct health care costs for unintentional injuries in 1996, for a total of \$2.8 billion. Of this amount, 41% was for falls among seniors, with approximately 75% of this for direct costs related to fall injuries among elderly women (Angus et al., 1998).

The urgency to address this issue is heightened by changing demographics, with growing numbers of older people with chronic health problems and disabilities living longer lives and choosing to remain in community settings. In order to target resources effectively to the prevention of falls and related injuries, a better understanding is needed of the scope and nature of the problem of falls among community-dwelling seniors.

The purpose of this report is to present findings from the analysis and interpretation of data from the **Canadian Community Health Survey** (CCHS) pertaining to morbidity due to falls in elderly people in Canada.

## Methods

This report provides national estimates based on data from the Canadian Community Health Survey (CCHS) for 2002/03 (Cycle 2.1) from seniors age 65 and over who indicated that they had suffered a fall-related injury in the previous year, serious enough to limit their normal activities. Included are estimates of cases and rates of injurious falls, types of injury, types of activity, and where treatment was obtained.

The CCHS is a component of the Population Health Survey Program of Statistics Canada. Cycle 2.1 of the Survey provides estimates of health determinants, health status and health system utilization for the health regions across the country (Béland, 2002). The CCHS targets individuals age 12 and over who are living in private dwellings. People living on Indian reserves or Crown lands, residents of institutions, full-time members of the Canadian Armed Forces, and residents of certain remote regions are excluded. The CCHS covers approximately 98% of the Canadian population age 12 and over.

The CCHS uses the area frame designed for the Canadian Labour Force Survey as its primary sampling frame. A multistage stratified cluster design was used to sample dwellings within the area frame. In the first stage of the design, a list of the dwellings was prepared. In the second stage, a sample of dwellings was selected from this list. The households in the selected dwellings then formed the sample of households. The majority (88%) of the targeted sample was selected from the area frame, and face-to-face interviews were held with respondents randomly selected from households in this frame. The selection of individual respondents was designed to ensure over-representation of youths (12 to 19) and seniors (65 and over). Data collection for Cycle 2.1 began in September 2002 and was conducted over 12 months.

The specific CCHS questions used for this falls analysis can be viewed on this site: [www.statcan.ca/english/sdds/instrument/3226\\_Q1\\_V2\\_E.pdf](http://www.statcan.ca/english/sdds/instrument/3226_Q1_V2_E.pdf). A respondent was classed as having an injury resulting from a fall if he or she answered 'yes' to both of the following questions:

1. Now some questions about injuries, which occurred in the past 12 months, and were serious enough to limit your normal activities. In the past 12 months, that is, from one year ago to yesterday, were you injured?
2. Was the injury the result of a fall?

## Results

**Table 1** data have been extrapolated from the sample (CCHS, Cycle 2.1) to the total population age 65 and over. The sample contains approximately 29,000 Canadians age 65 and over, representing a population of approximately 3.8 million residents. For the total sample age 65 and over, 56% were female. The median age for the sample was 72 years. Sixty percent of the sample aged 65 and over was married, while 34% was widowed, separated or divorced.

The CCHS data indicate that, compared to the population of seniors as a whole, those who reported experiencing an injurious fall were more likely to be female (68% vs. 56%), more likely to be in the 80+ age group (28% vs. 21%), more likely to be widowed, separated or divorced (46% vs. 34%), more likely to have post-secondary graduation (34% vs. 32%), and more likely to have a household income of less than \$15,000 (14% vs. 10%).

**Table 1 – Distribution of CCHS (Cycle 2.1) sample\*\* for age 65 and over, 2002/03**

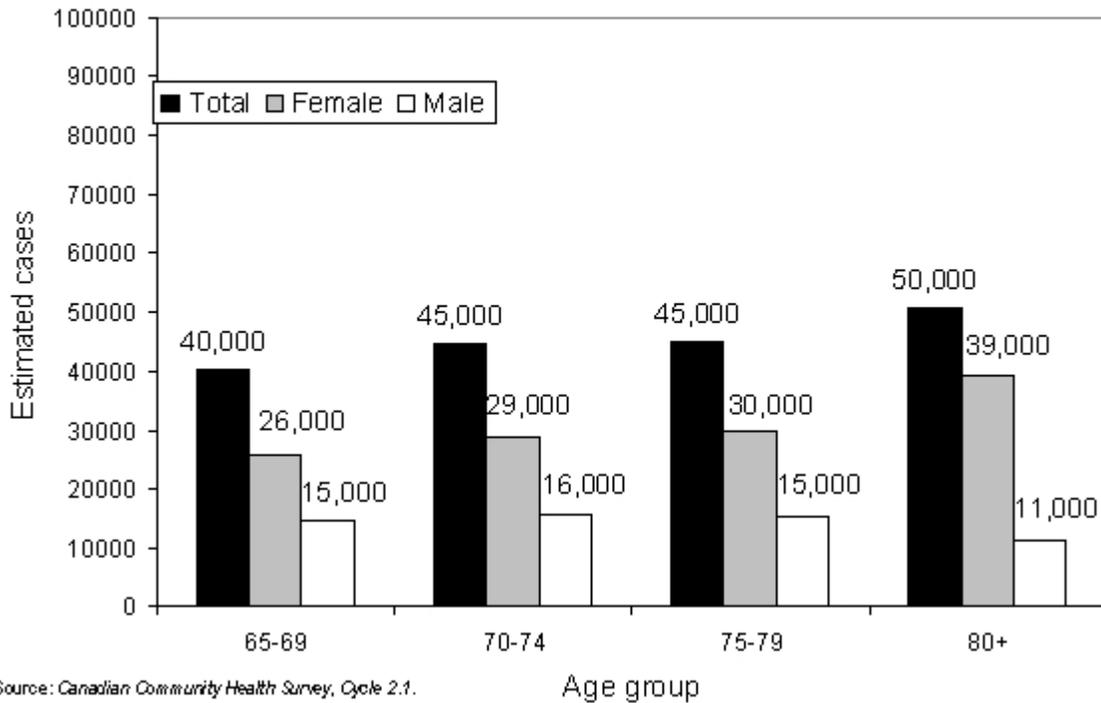
		Total CCHS sample				With a fall causing injury			
		Population	Percent	95% confidence intervals		Population	Percent	95% confidence intervals	
<b>Gender</b>	Male	1,658,918	43.8	42.8	44.9	56,912	31.6	30.8	32.3*
	Female	2,124,857	<b>56.2</b>	55.3	57.1	123,441	<b>68.4</b>	67.3	69.5*
	N	3,783,775				180,353			
<b>Age</b>	65-69	1,154,063	30.5	29.5	31.5	40,274	22.3	21.6	23.1*
	70-74	1,027,278	27.1	26.3	28.0	44,568	24.7	23.9	25.5*
	75-79	804,061	21.3	20.4	22.1	44,977	24.9	23.9	25.9
	80+	798,373	<b>21.1</b>	20.3	21.9	50,534	<b>28.0</b>	26.9	29.1*
<b>Marital Status</b>	Married	2,268,605	60.0	59.0	60.9	86,352	47.9	47.1	48.6*
	Common-law	62,219	1.6	1.4	1.9	1,269	0.7	0.6	0.8
	Widowed/separated/divorced	1,283,672	<b>33.9</b>	32.8	35.0	82,803	<b>45.9</b>	44.4	47.4*
	Single	160,348	4.2	3.9	4.6	9,413	5.2	4.8	5.7*
<b>Education</b>	Less than secondary school graduation	1,711,479	45.2	44.5	46.0	72,419	40.2	39.5	40.8*
	Secondary school graduation	589,166	15.6	14.8	16.4	31,539	17.5	16.6	18.4*
	Some post-secondary	166,470	4.4	4.0	4.8	10,846	6.0	5.5	6.5*
	Post-Secondary graduation	1,190,164	<b>31.5</b>	30.4	32.5	61,620	<b>34.2</b>	33.0	35.3*
<b>Household income</b>	Less than \$15,000	394,564	<b>10.4</b>	9.9	11.0	26,037	<b>14.4</b>	13.7	15.2*
	\$15,000 to \$29,999	1,012,461	26.8	25.8	27.7	45,483	25.2	24.4	26.1
	\$30,000 to \$49,999	793,169	21.0	20.1	21.8	37,258	20.7	19.8	21.5
	\$50,000 to \$79,999	478,270	12.6	11.9	13.3	22,560	12.5	11.8	13.2
	\$80,000 or more	244,189	6.5	6.0	6.9	14,165	7.9	7.3	8.5*
	Not stated	861,122	22.8	21.6	23.9	34,851	19.3	18.3	20.3*

\*significant at p<0.05 level

\*\*Numbers in this table have been extrapolated to the Canadian population from the CCHS sample of 29,000.

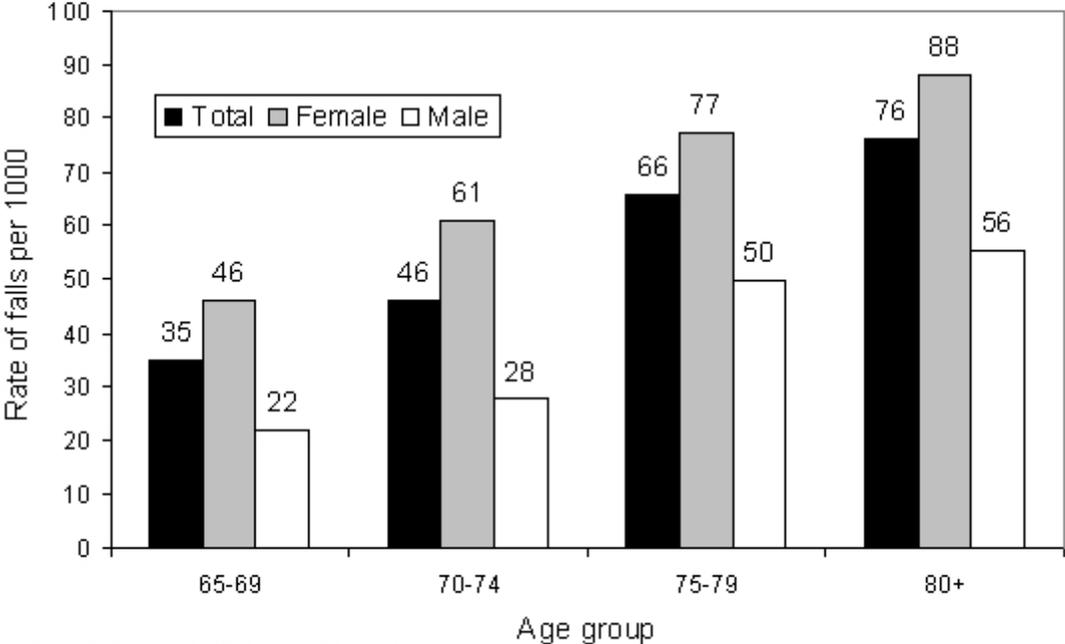
**Figure 1** presents estimated cases of injurious falls based on self-reports from the CCHS sample, broken down by gender and age group. Adding the total cases for each age group, there are approximately 180,000 injurious falls annually in the Canadian population age 65 and over. With N = 3,783,775 as shown in Table 1, overall, survey respondents reported a fall-related injury in the past year, serious enough to limit normal activities, at a national average rate of 47.7 per 1000 population age 65 and over.

**Figure 1 – Estimated cases of injuries resulting from a fall, by age group and gender, age 65+, Canada, 2002/03**



**Figure 2** shows rates of injurious falls for men and women by age group. The rate of injurious falls increased with age from a low of 35 per 1000 population age 65-69 to a high of 76 per 1000 population age 80 and over. Female rates exceed male rates in all age groups – these differences are statistically significant except for ages 75-79.

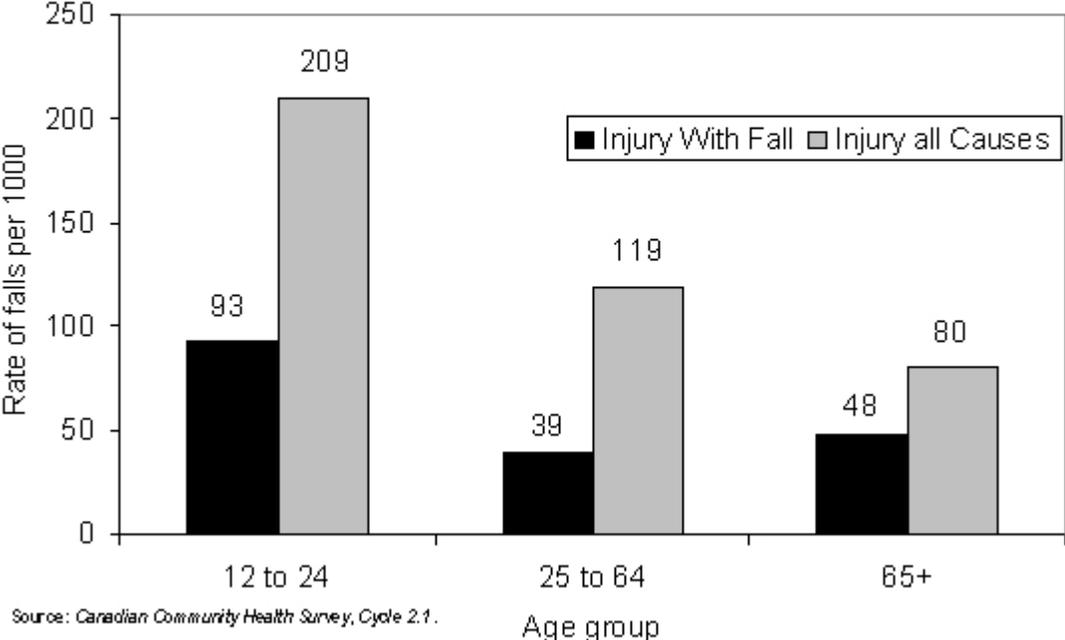
**Figure 2 – Estimated rates of injuries resulting from a fall, by age group and gender, age 65+, Canada, 2002/03**



Source: Canadian Community Health Survey, Cycle 2.1.

A **supplementary figure** is provided here, showing falls as a portion of all causes of injury by age group for all Canadians age 12 and over. Compared to other causes of injury, injuries from falls comprise 45% of the rate of injury for ages 12 to 24, 33% for ages 25 to 64, and 60% for ages 65 and over. Rates of injury from a fall and from all other causes are highest for those aged 12 to 24 years.

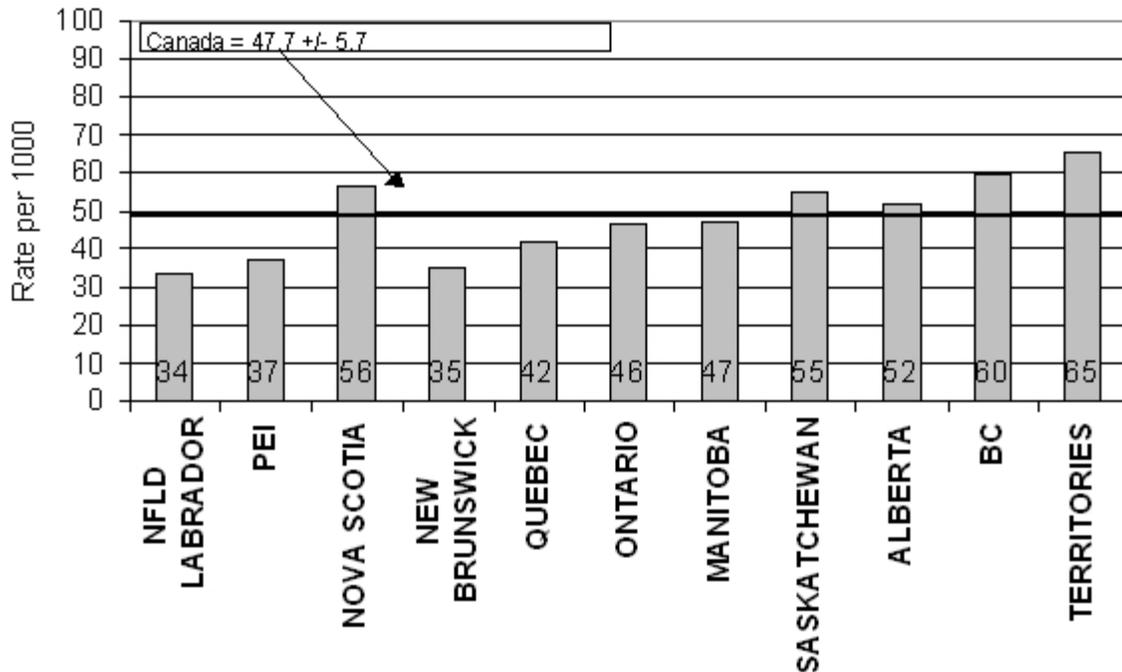
**Estimated rates of injuries, with a fall vs. all causes, by age group, age 12+, Canada, 2002/03**



**Another supplementary figure** shows the rates by province and territory. The average rate of injurious falls among survey respondents in the year prior to the CCHS survey was 47.7 per 1000 population age 65 and over. The rate ranged from a low of 34 per 1000 in Newfoundland and Labrador to a high of 65 per 1000 in the Territories.

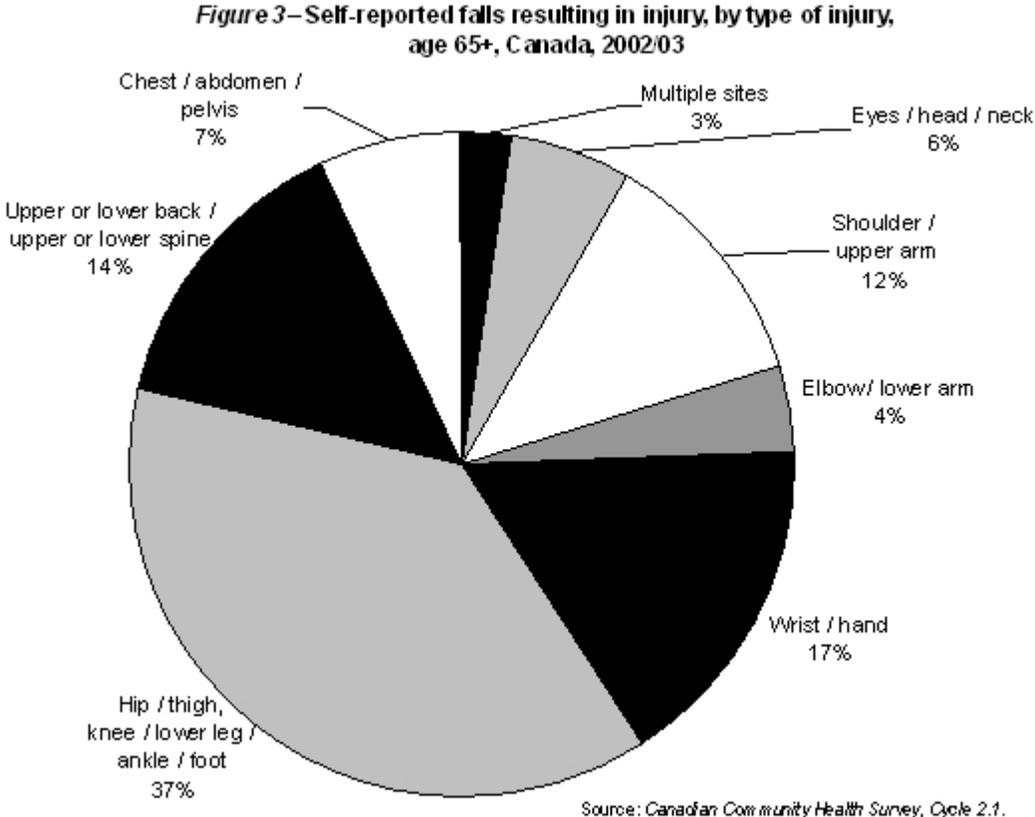
Rates were higher than the national average in the Territories, British Columbia, Alberta, Saskatchewan and Nova Scotia. Ontario and Manitoba had similar rates hovering around the national average. Quebec had a rate lower than the national average. The Maritime Provinces had some of the lowest rates, with injuries due to falls ranging from a low of 34 per 1000 in Newfoundland and Labrador to a high of 56 per 1000 in Nova Scotia. However, none of the differences in rates between the provinces and territories were statistically significant.

**Estimated rates of injuries resulting from a fall, by province/territories, age 65+, Canada, 2002/03**



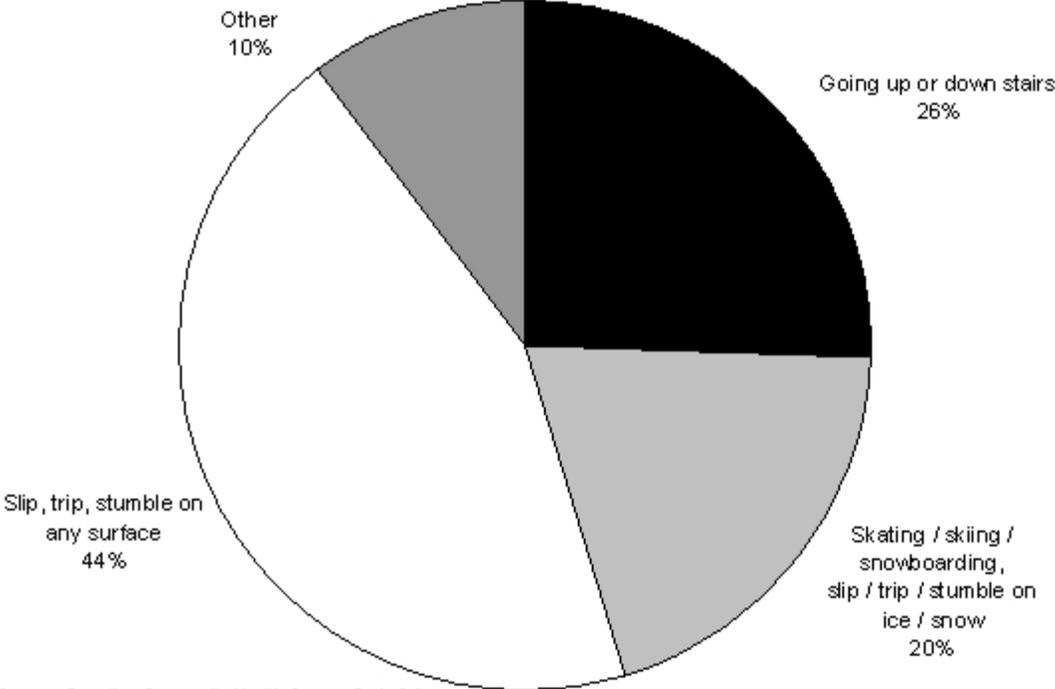
Source: Canadian Community Health Survey Cycle 2.1.

**Figure 3** shows the distribution of the types of injuries reported by seniors who experienced an injury as a result of a fall. Over one third (37%) of the injuries sustained were to the hip, thigh, knee, lower leg, ankle, or foot, followed by the wrist or hand (17%) and the back (14%).



**Figure 4** shows that the majority of respondents (44%) reported slipping, tripping, or stumbling. Over one quarter (26%) reported falling while going up or down stairs. Response categories were combined in the data set due to small numbers and consequently, no further detail is available. It is most likely that the 20% who reported “skating/skiing/snowboarding” or “slipping/tripping/stumbling on ice/snow” had predominantly slipped, tripped, or stumbled on ice/snow.

**Figure 4 – Self-reported falls resulting in injury, by type of activity, age 65+, Canada, 2002/03**

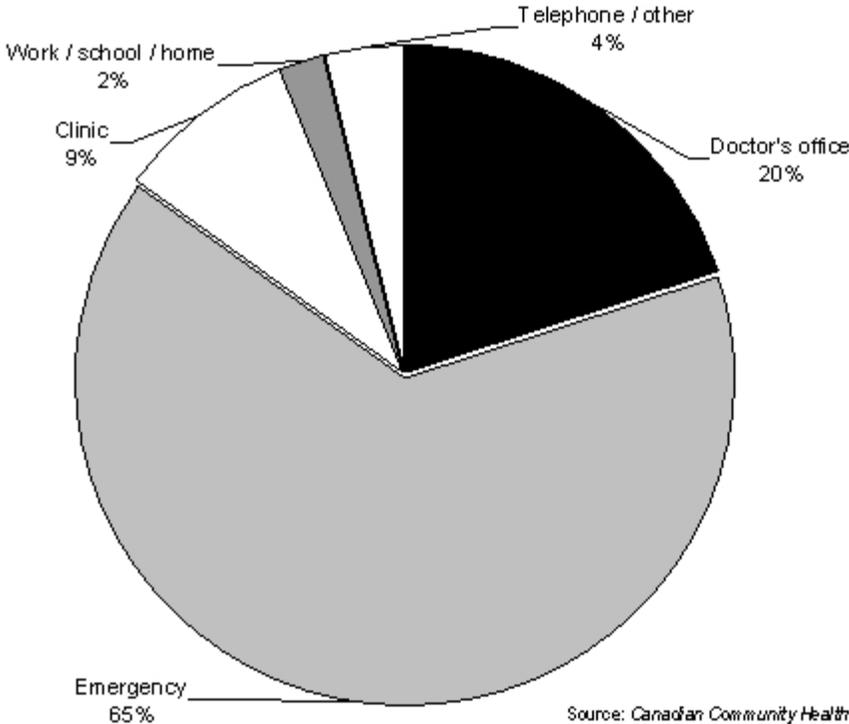


Source: Canadian Community Health Survey, Cycle 2.1.

Seventy-two percent of those aged 65 and over who had a fall resulting in injury indicated that they received medical treatment from a health professional within 48 hours of the injury.

**Figure 5** shows that, for those who received medical treatment within 48 hours, the majority (65%) were treated in a hospital emergency department. Many were treated in a doctor's office (20%) or a hospital day clinic (9%). Of those treated in the emergency department, 38% reported that they were admitted to hospital for at least one night as a result of the injury.

**Figure 5 – Self-reported falls resulting in injury, by type of treatment received within 48 hours, age 65+, Canada, 2002/03**



Source: Canadian Community Health Survey, Cycle 2.1.

## Discussion

The 2002/03 CCHS sample for those aged 65 and over was approximately 29,000 respondents, representing a population of about 3.8 million Canadians age 65 and over. Injuries due to falls for this sample increased with age from a low of 35 per 1000 population age 65-69 to a high of 76 per 1000 population age 80 and over. All totalled, this equates to approximately 180,000 injurious falls in the population age 65 and over annually in Canada.

Compared to the Canadian population as a whole, seniors who reported being injured due to a fall were more likely to be female, more likely to be in the 80+ age group, more likely to be widowed/separated/divorced, more likely to have post-secondary graduation, and more likely to have a household income of less than \$15,000.

The finding that the rates for women are statistically significantly higher than those for men among all but one age group may be related to lower income, greater social isolation and higher rates of chronic disease among women, such as osteoporosis.

The finding that those experiencing an injurious fall were more likely to be age 80 and over is well supported by the literature on falls among community-dwelling seniors (Hirdes and Forbes, 1993; Scott, Peck and Kendall, 2004). What is not well known is the significant association between marital status and fall injury risk. The CCHS data suggests that those without a spouse, who may be living alone, are at greater risk for a fall with injury. It was surprising, and contrary to the literature (Evans, Barer and Marmor, 1994; Hirdes and Forbes, 1993) to find that more years of education were associated with a higher risk of sustaining a fall-related injury.

The contribution of falls compared to all causes of injury in the CCHS sample is considerably lower than reports from other sources. The National Trauma Report on injuries that result in hospitalization (Canadian Institute for Health Information, 2004) show that, among those aged 65 and over, falls comprise 85% of all injury causes compared to only 60% in the CCHS sample. The CCHS data includes all injuries that limit normal activity, whereas the National Trauma Report only includes injuries that result in hospitalization. Therefore, the higher proportion of falls to other causes of injury in the Trauma Report may point to the increased severity of fall-related injuries compared to other causes.

When injury patterns are examined by region, fall rates range from a low of 34 per 1000 in Newfoundland and Labrador to a high of 65 per 1000 in the Territories. Since no statistically significant differences exist by region, these findings may be influenced by small sample sizes in some regions.

Over one third of the injuries sustained were to the hip, thigh, knee, lower leg, ankle or foot followed by the wrist or hand and the back. The greatest proportion of respondents reported slipping, tripping, or falling. Over one quarter reported falling from stairs. These findings are similarly reflected in the National Trauma Registry on major injuries in Canada (Canadian Institute for Health Information, 2004), where 23% of severe injuries from falls among those aged 65 and over were due to a fall on or from stairs or steps.

Where treatment was received within 48 hours of the injury, the majority were treated in the emergency department. Many were treated in the doctor's office or a hospital day clinic. Of those treated in the emergency department, 38% were admitted for at least one night as a result of the injury.

These findings point to the need to pay more attention to the prevention of falls among the very old, women, and those who are more susceptible to injury due to the effects of compounding health problems. It is not likely that age or sex per se increase the likelihood of injury due to a fall, but rather, the underlying health conditions associated with old age and female gender. Attention also should be given to environmental contributors to fall-related injuries, particularly to the design and maintenance of stairs and steps, both within the home and outdoors. Although most falls do not result in death or significant physical injury, the psychological impact of a fall or near fall often results in a fear of falling and an increased self-restriction of activities. Fear of future falls and subsequent institutionalization often leads to dependence and increasing immobility, followed by functional deficits and a greater risk of falling.

## Study Limitations

The study limitations are those related to sampling error, non-sampling error and non-response as described below.

### *1. Sampling error*

The survey produces estimates based on information collected from a sample of individuals. Sampling error is the error attributed to studying a fraction of the population rather than carrying out a complete census under the same general conditions (questionnaire, interviewers, processing methods, etc.). The extent of this error depends on factors such as sample size, the variability of the characteristic of interest, sample design and estimation method. Because of the complexity of the sample design, sampling error for CCHS estimates was calculated using the bootstrap resampling technique (Béland 2002).

### *2. Non-sampling error*

Errors not related to sampling are called non-sampling errors; these errors can arise during any survey activity. For example, interviewers may misunderstand instructions about questionnaire administration, respondents may give erroneous answers, responses may be incorrectly recorded, and errors may be introduced in data processing. Over a large number of observations, randomly occurring non-sampling errors will have little effect on overall estimates derived from a survey. However, errors that occur systematically will contribute to biased estimates. Considerable time and effort have been expended to reduce non-sampling error in the CCHS. Extensive training of interviewers with respect to survey procedures and questionnaire content, use of skilled interviewers for follow-up of non-respondents, monitoring interviewers to detect problems, and quality assurance protocols were among the measures implemented to minimize non-sampling error (Béland, 2002).

### *3. Non-response*

Non-response is a major source of non-sampling error. The extent of non-response ranges from item-non-response (failure to answer single questions) to total non-response. Partial non-response to the CCHS was rare; once an interview was started, the questionnaire was usually completed with very little item-non-response. Total non-response occurred either because a respondent refused to participate in the survey, or because the interviewer was unable to contact the selected respondent (Béland, 2002).

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