

# Work injuries

*Kathryn Wilkins and Susan G. Mackenzie*

## Abstract

### Objectives

This article compares work injury occurrence by occupational category, and examines its relationship with selected factors reflecting work organization and environment. Associations between work injury and socio-demographic and other health-related variables are also considered.

### Data sources

Data are from the 2003 Canadian Community Health Survey (cycle 2.1).

### Analytical techniques

Cross-sectional estimates of the proportion of workers injured on the job were calculated by occupational category, and by selected work-related, personal and socio-demographic characteristics. Multivariate analyses were used to study associations between work injury and job-related factors, while controlling for other influences.

### Main results

In 2003, an estimated 630,000 Canadian workers experienced at least one activity-limiting occupational injury. Of people in trades, transport and equipment operation, 9% sustained an on-the-job injury, compared with 2% of workers in the "white-collar" sector. Work injury was more common in male (5%) than in female workers (2%). In multivariate analysis, some work-related variables were related to occupational injury for both sexes: employment in trades, transport and equipment operation; primary industries; and processing, manufacturing and utilities; shift work; and heavy labour. Income under \$60,000 and working long hours were associated with injury in men, but not in women. Women reporting their jobs as stressful had higher odds of injury; in men, no association with work stress emerged.

## Keywords

occupational health, health surveys, workplace, sprains and strains, hand injuries

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In the years 2002 to 2004, acute injuries occurring on the job resulted in an average of 465 deaths annually, and close to 300,000 compensated time-loss claims.<sup>1</sup> The consequences of occupational injuries can be appreciable: lost work time and income, medical expenses, compensation costs, possible long-term health problems or disability, and a burden on the family of the injured worker.

As with all injuries, a substantial share of those that occur on the job can be prevented. An improved understanding of the circumstances associated with occupational injuries should contribute to more effective preventive strategies.

To date, much of the research on work-related injury in Canada has focused on specific occupational categories—such as farmers—and usually in specific geographic regions. A search of the PubMed data base<sup>2</sup> for Canadian papers on occupational injury published from 1990 to January 2007 yielded 33 descriptive or analytic studies, 14 of which concerned the agriculture sector; only 6 were based on data for all of Canada.

## Methods

### Data source

The analysis was based on cycle 2.1 of the Canadian Community Health Survey (CCHS), which was conducted from January to December 2003. The CCHS is a general health survey that collects cross-sectional information about the health of Canadians every two years. It covers the non-institutionalized household population aged 12 or older in all provinces and territories, except regular members of the Canadian Armed Forces and residents of Indian reserves, Canadian Forces bases, and some remote areas. In cycle 2.1, the CCHS collected detailed data on the occupational category of employed respondents, as well as data on the work environment.

The overall response rate to cycle 2.1 was 80.6%; the total sample size was 135,573 respondents. Of these, 75,184 respondents were aged 18 to 75 and had worked at some time during the year; the analysis was based on weighted data from these respondents. Age 75 was chosen as the upper age cut-off because an estimated 15% of the household population aged 65 to 75 was employed at some time during the year (data not shown).

A description of the CCHS methodology is available in a published report.<sup>3</sup>

### Analytical techniques

Based on the 2003 CCHS, frequencies, cross-tabulations and multiple logistic regression models were produced using data weighted to the 2003 Canadian population. To minimize bias due to the “healthy worker effect,” the analysis sample comprised data from respondents who had been employed at some time during the year

leading up to their survey interview, even if they were not employed at the time of their interview. These respondents were included so that those who had been injured and then ceased working—perhaps because of their injury—would not be missed.<sup>6</sup>

The analysis was undertaken in two stages: crude (unadjusted) frequency estimates were produced, and then multivariate models were fitted that controlled for selected variables. In the first stage, weighted cross-tabulations were used to estimate on-the-job injury occurrence by occupational category, as well as by selected work- or health-related variables, and socio-demographic characteristics.

In the second stage of the analysis, multiple logistic regression modeling was used to examine associations between occupational injury and work-related conditions, while controlling for potentially confounding factors. Models were sex-specific. Variables entered into regression models were selected based on findings from the literature and their availability in the survey. Models were fitted in two stages: variables reflecting work-related variables were entered into the first model and regressed on occupational injury; a second model was fitted by adding variables reflecting personal and socio-demographic characteristics. To maximize the sample of respondents included in the analysis, a dummy variable for missing income was included in the models (see *Definitions*).

The bootstrap technique, which accounts for the design effects of the survey, was used to calculate variance.<sup>7-9</sup> Statistical significance was established as  $p < 0.05$ .

Most statistics on occupational injury in Canada are collected by administrative agencies involved in injury compensation, and are thus limited in coverage and the information they provide. For example, self-employed people and some professionals may not be included, and data on socio-economic characteristics and other health-related risk factors are not collected. As well, only compensated injuries are documented, although fewer than half of workers who sustain an injury file a claim.<sup>4,5</sup> Thus, injury statistics from compensation boards would not be expected to correspond with estimates from survey data.

The availability of data from Statistics Canada’s Canadian Community Health Survey (CCHS) offers several advantages in the study of occupational injury. The dataset is large, permitting more analytical precision than is usually possible. The data are population-based and provide information on a broad range of social and personal factors, as well as work-related variables and injury occurrence, and they do not rely on workplace-based reporting.<sup>10,11</sup> An additional advantage of the CCHS is that within the questionnaire, items on work-related injury are separated from those on work conditions, thus reducing the bias that may arise in studies based on more focused questionnaires.

## Definitions

The Canadian Community Health Survey (CCHS) contains detailed information about a single injury event for each respondent who reported having sustained at least one activity-limiting injury during the year before the interview. If more than one such injury was reported, the focus was on the injury that the respondent identified as most serious. CCHS interviewers instructed respondents to report injuries that were “serious enough to limit your normal activities.” *Occupational injury* was defined as a “yes” response to the question, “(Not counting repetitive strain injuries), were you injured in the past 12 months?” together with the response “working at a job or business” to the question, “Thinking about the most serious injury, what type of activity were you doing when you were injured?” Injuries sustained while commuting were not considered to be work injuries in this analysis. Respondents also provided information about their single, or most serious, injury that occurred during “sports or physical exercise,” “leisure or hobby,” “travel to or from work,” “household chores, other unpaid work,” “sleeping, eating, personal care,” or “other activities.”

*Body part injured* was indicated in response to the question, “What part of the body was injured? (Multiple sites; Eyes; Head (excluding eyes); Neck; Shoulder/Upper arm; Elbow/Lower arm; Wrist; Hand; Hip; Thigh; Knee/Lower leg; Ankle/Foot; Upper back or upper spine; Lower back or lower spine; Chest (excluding back and spine); Abdomen or pelvis (excluding back and spine).”

*Type of injury* was indicated in response to the question, “What type of injury did you have? For example, a broken bone or burn. (Multiple injuries; Broken or fractured bones; Burn, scald, chemical burn; Dislocation; Sprain or strain; Cut, puncture, animal or human bite (open wound); Scrape, bruise, blister; Concussion or other brain injury; Poisoning; Injury to internal organs; Other).”

Those types of injuries that are usually more harmful (burn or scald, concussion, fracture, internal injury, multiple injuries) were defined as *serious injuries*.

Information about *treatment* for injury was ascertained in the questions, “Did you receive any medical attention from a health professional in the 48 hours following the injury?” and “Where did you receive treatment? (Doctor’s office; Hospital emergency room; Outpatient clinic; Walk-in clinic; Appointment clinic; Community health centre/CLSC; At work; At school; At home; Telephone consultation only; Other. Were you admitted to a hospital overnight?).”

*Job category* was defined using the Standard Occupational Classification (SOC) 1991-Canada. The SOC specifies 10 occupational categories:

- management occupations;
- business, finance and administrative occupations;

- natural and applied sciences and related occupations;
- health occupations;
- occupations in social science, education, government service and religion;
- occupations in art, culture, recreation and sport;
- sales and service occupations;
- trades, transport and equipment operators;
- occupations unique to primary industry;
- occupations unique to processing, manufacturing and utilities.

For some of the analysis, the first six categories were combined into a “white-collar” category; the remaining four sectors were combined as a “blue-collar” category. The occurrence of occupational injury within some individual occupations was examined for some categories (for instance, sales and service occupations).

Respondents indicating that they had had a job (including full- or part-time, seasonal or contract work, self-employment, baby-sitting or any other paid work) throughout, or during part of, the year were classified as having been *employed in the past year*.

To determine *self-employment*, respondents who had worked at a job or business at any time in the past 12 months were asked, “Are you an employee or self-employed?”

*Hours worked per week* was ascertained by asking, “About how many hours a week do you usually work at your job/business? If you usually work extra hours, paid or unpaid, please include these hours.” For people who worked at more than one job during at least 26 weeks of the year, the usual number of hours worked per week was defined as the total hours worked at all jobs. For those who worked at more than one job during fewer than 26 weeks of the year, the number of hours worked was based on their main job only. For the analysis, the following categories of hours per week were used: less than 35; 35 to 44; 45 to 79; 80 or more.

*Type of shift* was ascertained with the question, “Which of the following best describes the hours you usually work at your job/business? (Regular daytime schedule or shift; Regular evening shift; Regular night shift; Rotating shift; Split shift; On call; Irregular schedule).” Respondents indicating that they worked a regular daytime schedule or shift were defined as working a regular daytime schedule; all others were combined into a category labeled “shift worker.”

*Physical work demands* was defined using the question, “Thinking back over the past three months, which of the following best describes your usual daily activities or work habits? (Usually sit; Stand or walk quite a lot; Usually lift or carry light loads; Do heavy work or carry very heavy loads).” A response of “Do heavy work or carry very heavy loads,” was defined as “strenuous” activity; the other categories

## Definitions - continued

combined were defined as “light” activity.

*Income* was based on the respondent’s total annual personal income (before taxes and deductions) from all sources, and for the analysis was categorized into the following groups: less than \$20,000; \$20,000 to \$39,999; \$40,000 to \$59,999; \$60,000 or more. Income data were missing for 6,683 (9%) of the 75,184 respondents included in the analysis (data not shown).

*Self-perceived work stress* was measured by the question, “The next question is about your main job or business in the past 12 months. Would you say that most days were (not at all stressful; not very stressful; a bit stressful; quite a bit stressful; extremely stressful)?” For the regression, “not at all stressful” and “not very stressful” were combined; the other three responses were used as distinct categories.

*Age groups* were specified as follows: 18 to 24; 25 to 34; 35 to 44; 45 to 54; 55 to 64; and 65 to 75.

*Chronic conditions* were assessed by asking respondents if they had specific conditions that had been diagnosed by a health professional and had lasted, or were expected to last, six months or more. Data on the following conditions were used for this analysis: diabetes, heart disease, stroke, high blood pressure, migraine, asthma, arthritis, bronchitis, chronic obstructive lung disease, epilepsy, gastric or intestinal ulcers, Crohn’s disease, cataract, glaucoma, thyroid condition, fibromyalgia, chronic fatigue syndrome and multiple chemical sensitivities. Respondents were categorized as having 0 to 2, or 3 or more chronic conditions.

Respondents who indicated that they currently smoke every day were classified as *daily smokers*.

For bivariate analysis, *alcohol consumption* was categorized as: not one drink in past year; one or more drink(s) in past year but heavy drinking never, or at most monthly; heavy drinking not more than three times per month; heavy drinking at least weekly. Heavy drinking was defined as consuming at least five drinks on one occasion. For multivariate analysis, alcohol consumption was categorized into three groups: no alcoholic drinks in past year; at least one alcoholic drink in past year, but less than weekly heavy drinking; weekly heavy drinking in past year.

*Educational attainment* (household) was defined as “lower” if no

household member reported education beyond secondary graduation, and “higher” if at least one household member’s education exceeded secondary graduation.

*Personal stress* was measured by the question, “Thinking about the amount of stress in your life, would you say that most days are: not at all stressful; not very stressful; a bit stressful; quite a bit stressful; extremely stressful?” Responses of “quite a bit” and “extremely” stressful were defined as “high personal stress;” the other categories were combined and defined as “low personal stress.”

*Race* was identified by the question, “People living in Canada come from many different cultural and racial backgrounds. Are you: White? Chinese? South Asian? Black? Filipino? Latin American? Southeast Asian? Arab? West Asian? Japanese? Korean? Aboriginal? Other?” Race was categorized as White or visible minority (applied to all other groups).

*Type of residence area* was determined using the Statistical Area Classification Type, which classifies each census subdivision as a census metropolitan area (CMA), a census agglomeration (CA), a zone influenced by a CMA or CA, or the territories. For this analysis, “urban or urban-influenced” areas were those that are within a CMA or CA and those that have been determined to be strongly or moderately influenced by a CMA or CA. “Rural or remote” was applied to areas that have been determined to be weakly or not influenced by a CMA or CA, and the territories.

*Body mass index* (BMI) is a measure of weight adjusted for height, and is calculated by dividing weight in kilograms by height in metres squared. The CCHS collected self-reports of height and weight, from which BMI was calculated for each respondent. Using the body weight classification standards adopted by Health Canada,<sup>12</sup> the following BMI categories were used in the analysis:

- Underweight: less than 18.5
- Normal: 18.5 to 24.9
- Overweight: 25.0 to 29.9
- Obese: 30.0 or more

A typical theoretical model of occupational injury suggests that risk arises from an interplay of tangible conditions in the work environment or tasks directly related to the job (for example, exposure to hazardous materials or equipment), the organization of the work (such as working overtime or shifts), and individual or behavioural characteristics, including socio-demographic and psychological characteristics and chronic disease morbidity.<sup>13-16</sup> To the extent that variables reflecting these factors were available, the models described by Schuster and Rhodes<sup>13</sup> and Veazie et al.<sup>14</sup> serve as the basis for this study.

Using data from the 2003 CCHS (cycle 2.1), this article provides estimates of the number of employed Canadians aged 18 to 75 who sustained at least one non-fatal, activity-limiting injury on the job in 2003 (see *Methods* and *Definitions*). The analysis concerns only acute injuries; repetitive strain injuries are not included. The specific objectives were to compare injury occurrence by occupational category, and to examine relationships between on-the-job injuries and selected work-related and personal factors. Results are presented first for unadjusted, weighted estimates, and then for adjusted (multivariate) models.

### Substantial share of injuries work-related

In 2003, an estimated 630,000 Canadians experienced at least one activity-limiting occupational injury, representing 5% and 2% of employed men and women, respectively (Table 1). Because the estimates pertain only to the most serious injury, and also because of respondents' memory decay (see *Limitations*), these figures underestimate the actual frequency and proportions of work-related injury.

Occupational injuries comprised a substantial proportion of all injuries. More than a quarter (28%) of employed people aged 18 to 75 who reported an activity-limiting injury in 2003 (one-third of men and one-fifth of women) sustained their most serious injury at work.

Despite methodological differences, these results were strikingly similar to the estimated share of

Table 1  
Number and percentage who sustained at least one activity-limiting injury of any origin/at least one work injury in past year, employed household population aged 18 to 75, Canada, 2003

	Any injury		Work injury		% of any that were work-related
	'000	%	'000	%	%
<b>Total</b>	<b>2,249</b>	<b>13.4</b>	<b>630</b>	<b>3.8</b>	<b>28.3</b>
<b>Sex</b>					
Men	1,396	15.6	460	5.1	33.2
Women	853	11.0*	170	2.2*	20.1*
<b>Age group</b>					
18 to 24	469	18.4*	108	4.2	23.1*
25 to 34	532	14.8	157	4.4*	29.9
35 to 44	589	12.9*	174	3.8	29.9
45 to 54	450	11.9*	131	3.5	29.4
55 to 64	180	9.4*	53	2.8*	29.7
65 to 75	29	9.0*	7 <sup>E</sup>	2.0 <sup>E*</sup>	23.0 <sup>E</sup>

\* In male-female comparisons, estimate differs significantly from that for men; in age group comparisons, estimate differs significantly from that for Total ( $p < 0.05$ )

<sup>E</sup> use with caution (coefficient of variation 16.6% to 33.3%)

Source: 2003 Canadian Community Health Survey

medically treated injuries reported to be work-related in the United States over the 1997-to-1999 period (29%), based on data from the National Health Interview Survey.<sup>10</sup>

### Blue-collar workers at higher risk

Not surprisingly, injury was more common in "blue-collar" than "white-collar" jobs (see *Definitions* and *Geographic differences*). Close to one worker in ten (9%) in trades, transport and equipment operation sustained an on-the-job injury, more than four times the rate (2%) for those employed in business, finance or administration, or in social science, education, government service or religion (Table 2). People employed in processing or manufacturing, or in primary industries, were also at higher risk of work injury, relative to the total workforce.

Men in trades, transport and equipment operation; processing or manufacturing; and primary industries were significantly more likely to be injured, compared with male workers overall. For women, the likelihood of injury was significantly elevated in the same occupational categories, as well as in sales and service.

Table 2

Number and percentage who sustained at least one activity-limiting work injury in past year, by occupational category and sex, employed household population aged 18 to 75, Canada, 2003

Occupational category	Both sexes		Men		Women	
	'000	%	'000	%	'000	%
<b>Total</b>	<b>630</b>	<b>3.8</b>	<b>460</b>	<b>5.2<sup>†</sup></b>	<b>170</b>	<b>2.2</b>
Management	33	2.4 <sup>*</sup>	27	3.0 <sup>*†</sup>	7 <sup>E</sup>	1.4 <sup>E*</sup>
Business, finance, etc.	49	1.6 <sup>*</sup>	28 <sup>E</sup>	2.7 <sup>E*†</sup>	21	1.0 <sup>*</sup>
Natural and applied sciences, etc.	28	2.4 <sup>*</sup>	24	2.6 <sup>*</sup>	F	F
Health	28	3.0	8 <sup>E</sup>	4.4 <sup>E</sup>	20	2.7
Social science, education, etc.	18	1.6 <sup>*</sup>	7 <sup>E</sup>	1.6 <sup>E*</sup>	12 <sup>E</sup>	1.5 <sup>E*</sup>
Art, culture, etc.	11 <sup>E</sup>	1.9 <sup>E*</sup>	F	F	F	F
Sales, service	133	3.3	60	3.7 <sup>*</sup>	73	3.0 <sup>*</sup>
Trades, transport, etc.	201	8.5 <sup>*</sup>	194	8.8 <sup>*†</sup>	8 <sup>E</sup>	4.4 <sup>E*</sup>
Primary industries	43	6.6 <sup>*</sup>	37	7.0 <sup>*</sup>	6 <sup>E</sup>	4.9 <sup>E*</sup>
Processing, manufacturing, etc.	81	7.2 <sup>*</sup>	68	8.3 <sup>*†</sup>	14 <sup>E</sup>	4.2 <sup>E*</sup>

\* Significantly different from estimate for both sexes combined or from sex-specific estimate for Total ( $p < 0.05$ )

† Significantly different from corresponding estimate for women ( $p < 0.05$ )

<sup>E</sup> use with caution (coefficient of variation 16.6% to 33.3%)

<sup>F</sup> too unreliable to be published (coefficient of variation greater than 33.3%)

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

**Source:** 2003 Canadian Community Health Survey

In both the white- and blue-collar sectors, men's injury rate significantly exceeded women's. Men in management; business, finance and administration; trades, transport and equipment operation; and processing and manufacturing were about twice as likely as their female counterparts to have been injured.

In white-collar occupations, health care workers were more likely to be injured (3%), compared with all white-collar workers combined (2% - data not shown). Those in business, finance or administration had a significantly lower likelihood of injury.

### Cooks, machinists injured more

For blue-collar workers, the higher frequency of injury (relative to white-collar workers), together with the large sample size of the CCHS, permitted comparisons of injury occurrence between occupations within each category.

In the sales and service group, 7% of those employed as chefs or cooks were injured, significantly higher than the proportion (3%) for all workers in that group (Table 3). Also at higher risk were workers in food and beverage services, and those in protective services.

Among workers in trades, transport and equipment operation, a strikingly high share (13%) of machinists, metal formers, shapers and erectors

were injured on the job. The risk was also significantly higher for mechanics, compared with all workers in the category.

Agriculture workers (a group that includes contractors, operators and supervisors, but not labourers) accounted for 55% of workers in primary industries (data not shown), so it was not surprising that the proportion who were injured did not differ significantly from the proportion for the category overall.

Within processing, manufacturing and utilities, machine operators were injured significantly more frequently, compared with all people in this category (Table 3).

### Different mechanisms

Two mechanisms—overexertion/strenuous movement and falls—accounted for nearly half (49%) of occupational injuries reported to the CCHS (Table 4). These findings corresponded closely with those from the United States. According to data from the National Health Interview Survey of 1997-1999, 48% of occupational injuries were caused by falls and overexertion or strenuous movement.<sup>10</sup>

CCHS results indicated that another 32% of work-related injuries were due to accidental contact with a sharp object, tool or machine, or being accidentally struck or crushed by an object.

Table 3  
**Percentage in selected occupational categories who sustained at least one activity-limiting work injury in past year, employed household population aged 18 to 75, Canada, 2003**

	%
<b>Total employed</b>	<b>3.8</b>
<b>Total sales and service occupations<sup>†</sup></b>	<b>3.3</b>
Sales and service supervisors	3.3 <sup>E</sup>
Wholesale, technical, insurance, real estate sales specialists and retail, wholesale and grain buyers	1.0 <sup>E*</sup>
Retail salespersons and sales clerks	2.9 <sup>E</sup>
Cashiers	1.9 <sup>E*</sup>
Chefs and cooks	7.2 <sup>E*</sup>
Occupations in food and beverage service	4.9 <sup>E*</sup>
Occupations in protective services	5.1 <sup>*</sup>
Occupations in travel and accommodation including attendants in recreation and sport	F
Childcare and home support workers	2.7 <sup>E</sup>
Sales and service occupations, n.e.c.	4.0
<b>Total trades, transport and equipment operators and related occupations<sup>†</sup></b>	<b>8.5</b>
Contractors and supervisors	5.5 <sup>E*</sup>
Construction trades	8.1
Stationary engineers, power station operators and electrical trades and telecommunications occupations	7.3
Machinists, metal forming, shaping and erecting occupations	12.6 <sup>*</sup>
Mechanics	10.9 <sup>*</sup>
Other trades, n.e.c.	6.6 <sup>E</sup>
Heavy equipment and crane operators including drillers	8.2 <sup>E</sup>
Transportation equipment operators and related workers, excluding labourers	7.5
Trades helpers, construction and transportation labourers and related occupations	9.3
<b>Total occupations unique to primary industry<sup>†</sup></b>	<b>6.7</b>
Occupations unique to agriculture excluding labourers	7.3
Occupations unique to forestry operations, mining, oil and gas extraction, fishing, excluding labourers	5.3 <sup>*</sup>
Primary production labourers	6.6 <sup>E</sup>
<b>Total occupations unique to processing, manufacturing and utilities<sup>†</sup></b>	<b>7.2</b>
Supervisors in manufacturing	5.2 <sup>E</sup>
Machine operators in manufacturing	8.5 <sup>*</sup>
Assemblers in manufacturing	5.9 <sup>E</sup>
Labourers in processing, manufacturing and utilities	5.2 <sup>E</sup>

<sup>†</sup> Reference category

\* Significantly different from estimate for reference category ( $p < 0.05$ )

<sup>E</sup> use with caution (coefficient of variation 16.6% to 33.3%)

<sup>F</sup> too unreliable to be published (coefficient of variation greater than 33.3%)

n.e.c. Not elsewhere classified

Source: 2003 Canadian Community Health Survey

The mechanisms underlying work injuries differed from those of non-work injuries. Work injuries were more than twice as likely as those occurring elsewhere to have involved accidental contact with a sharp object, tool or machine or being struck or crushed by (an) object(s). Accidental contact with a hot object, liquid or gas was four times as likely to have resulted in a work injury, compared with a non-work injury.

## Geographic differences

With a few exceptions, the rate of occupational injury generally did not vary across the provinces and territories. However, in Saskatchewan, the proportion of workers injured (5%) was significantly high relative to Canada overall (4%), and in Ontario and the Northwest Territories, proportions were low. To some extent, these findings reflect the degree to which workers are exposed to hazardous occupational conditions, which varies with the types of work that predominate in each region.

Compared with Canada as a whole, a significantly higher proportion (56%) of workers in Saskatchewan were in "blue-collar" occupations—in which work injury is relatively frequent (data not shown). In Ontario and the Northwest Territories, the proportions of "white-collar" workers were relatively high, consistent with the lower rates of injury in those jurisdictions.

At the local level, those residing in areas that were weakly or not at all influenced by an urban area were more likely to be injured at work, compared with those living in urban areas or in areas of moderate urban influence. A difference in the risk of work injury by degree of urban influence emerged for men but not women (data not shown).

## Percentage who sustained at least one activity-limiting work injury in past year, by province/territory and degree of urban influence on place of residence, employed household population aged 18 to 75, Canada, 2003

	Number '000	%
<b>Total</b>	<b>630</b>	<b>3.8</b>
<b>Province/Territory</b>		
Newfoundland and Labrador	11	3.9
Prince Edward Island	3 <sup>E</sup>	4.4 <sup>E</sup>
Nova Scotia	19	3.9
New Brunswick	19	5.0
Québec	153	4.1
Ontario	217	3.3 <sup>*</sup>
Manitoba	27	4.5
Saskatchewan	24	4.8 <sup>*</sup>
Alberta	70	3.9
British Columbia	85	3.8
Yukon	1 <sup>E</sup>	4.0 <sup>E</sup>
Northwest Territories	1 <sup>E</sup>	2.1 <sup>E*</sup>
Nunavut	0.3 <sup>E</sup>	3.7 <sup>E</sup>
<b>Place of residence</b>		
Urban or urban-influenced <sup>†</sup>	572	3.7
Rural or remote	57	5.0 <sup>*</sup>

<sup>†</sup> Reference category

\* Significantly different from estimate for Total ( $p < 0.05$ )

<sup>E</sup> use with caution (coefficient of variation 16.6% to 33.3%)

Source: 2003 Canadian Community Health Survey

Table 4  
**Percentage distribution of mechanisms of work and non-work injury among people who sustained at least one activity-limiting injury in past year, employed household population aged 18 to 75, Canada, 2003**

Mechanism	Work injury	Non-work injury
	%	%
<b>Total</b>	<b>100</b>	<b>100</b>
Overexertion or strenuous movement	26.4*	21.3
Fall	22.3*	36.9
Accidental contact with sharp object, etc.	19.3*	7.3
Accidentally struck or crushed by object(s)	12.4*	6.4
Accidental contact with hot object, liquid, gas	6.0*	1.5
Accidentally bumped, pushed, bitten, etc.	3.1*	7.0
Transport accident	1.7*	8.3
Physical assault	1.5 <sup>E</sup>	2.5
Other	7.2*	9.0

\* Significantly different from corresponding estimate for "Non-work injury" ( $p < 0.05$ )

<sup>E</sup> use with caution (coefficient of variation 16.6% to 33.3%)

Source: 2003 Canadian Community Health Survey

### Hand, lower back injuries most common

The hand was the body part most frequently injured on the job (Table 5). Over one-quarter (28%) of work injuries were to the hand, followed by the lower back (16%). Compared with all workers who sustained an occupational injury, those in sales and service were more likely, and white-collar workers (combined) less likely, to injure a hand. White-collar workers were more likely to injure the lower back: one-fifth of the occupational injuries sustained by white-collar workers affected this part of the body.

The most frequent type of occupational injury was a sprain or strain, followed by cuts, then fractures

(Table 6). Sprains or strains were more common among white-collar workers, compared with workers overall. Fractures accounted for nearly one-fifth (19%) of injuries to primary industry workers, significantly above the share (11%) for all workers. Burns or scalds made up 15% of injuries sustained by sales and service workers—significantly higher than the proportion of all work injuries (6%).

### Treatment

To assess the severity of occupational injuries reported to the CCHS, the proportion of people injured at work who sought treatment was compared with the corresponding proportion for people injured in other circumstances. Two-thirds (66%) of people injured at work sought treatment, significantly higher than the proportions for people injured during sports (52%) or while performing household chores or other unpaid work (60%) (Table 7). Although this suggests that occupational injuries were more severe, the requirement that injuries be medically certified for compensation benefits might have influenced treatment-seeking behaviour.

To further examine the gravity of work injuries, those that are usually more harmful (burn or scald, concussion, fracture, internal injury, multiple injuries) were grouped together in a "serious" category. Fully 15% of the people who sustained such injuries were hospitalized, compared with 1% of those who had other types of injuries (data not

Table 5  
**Percentage distribution of body part injured among people sustaining at least one activity-limiting work injury in past year, by occupational category, employed household population aged 18 to 75, Canada, 2003**

Occupational category	Body part injured								
	Total	Hand	Lower back	Ankle/ Foot	Knee	Shoulder	Elbow	Wrist	Other
<b>Total<sup>T</sup></b>	<b>100.0</b>	<b>27.6</b>	<b>15.7</b>	<b>12.1</b>	<b>9.5</b>	<b>8.4</b>	<b>4.0</b>	<b>3.7</b>	<b>16.7</b>
White collar	100.0	20.8*	19.7*	14.6	11.5 <sup>E</sup>	7.6	2.8 <sup>E</sup>	F	18.8
Sales, service	100.0	33.0*	13.8	13.1 <sup>E</sup>	10.0 <sup>E</sup>	6.2 <sup>E</sup>	F	3.8 <sup>E</sup>	12.8*
Trades, transport, equipment operation	100.0	29.1	14.2	9.5*	9.4	10.6	3.8 <sup>E</sup>	3.2 <sup>E</sup>	16.8
Primary industries	100.0	25.5	12.9 <sup>E</sup>	13.5 <sup>E</sup>	10.6 <sup>E</sup>	4.1 <sup>E*</sup>	F	7.5 <sup>E*</sup>	17.9 <sup>E</sup>
Processing, manufacturing, utilities	100.0	30.4	15.8 <sup>E</sup>	11.0 <sup>E</sup>	F	10.6 <sup>E</sup>	F	F	17.7 <sup>E</sup>

<sup>T</sup> Reference category

\* Significantly different from estimate for Total ( $p < 0.05$ )

<sup>E</sup> use with caution (coefficient of variation 16.6% to 33.3%)

<sup>F</sup> too unreliable to be published (coefficient of variation greater than 33.3%)

Source: 2003 Canadian Community Health Survey

Table 6  
**Percentage distribution of type of injury among people sustaining at least one activity-limiting work injury in past year, by occupational category, employed household population aged 18 to 75, Canada, 2003**

Occupational category	Type of injury							
	Total	Sprain/ Strain	Cut	Fracture	Burn/ Scald	Scrape	Dislocation	Other
<b>Total<sup>†</sup></b>	<b>100.0</b>	<b>39.8</b>	<b>21.1</b>	<b>10.9</b>	<b>6.2</b>	<b>5.8</b>	<b>3.1</b>	<b>13.2</b>
White collar	100.0	48.4*	18.3	8.3 <sup>E</sup>	F	5.9 <sup>E</sup>	3.0 <sup>E</sup>	13.6
Sales, service	100.0	37.7	20.9	8.9 <sup>E</sup>	14.7 <sup>E*</sup>	5.4 <sup>E</sup>	3.2 <sup>E</sup>	9.2 <sup>E*</sup>
Trades, transport, equipment operation	100.0	37.2	21.0	10.9	4.4 <sup>E</sup>	6.5 <sup>E</sup>	3.3 <sup>E</sup>	14.8
Primary industries	100.0	38.9	22.4 <sup>E</sup>	18.5 <sup>E*</sup>	F	F	3.2 <sup>E</sup>	8.8 <sup>E*</sup>
Processing, manufacturing, utilities	100.0	32.7*	21.7	15.2 <sup>E</sup>	5.9 <sup>E</sup>	F	F	17.3 <sup>E</sup>

<sup>†</sup> Reference category

\* Significantly different from estimate for Total ( $p < 0.05$ )

<sup>E</sup> use with caution (coefficient of variation 16.6% to 33.3%)

<sup>F</sup> too unreliable to be published (coefficient of variation greater than 33.3%)

Source: 2003 Canadian Community Health Survey

shown), a difference that validates the designation of these injuries as serious.

Based on this definition, 20% of work injuries were “serious,” significantly below the corresponding proportions for injuries sustained during other activities (Table 7). For example, 28% of people injured while travelling to or from work had a serious injury, as did 23% of those injured while engaging in sports or exercise. Clearly, these findings do not support the suggestion that

occupational injuries are relatively more serious than those sustained elsewhere.

However, the proportion of work injuries that were serious varied by occupational category—27% of injuries sustained by sales and service workers were serious, more than twice the share among white-collar workers (13%) (data not shown). Serious injuries were also significantly more common among workers in trades and transport, primary industries, and processing and manufacturing.

Most work injuries for which treatment was sought were treated in emergency rooms (51%), followed by doctors’ offices (Table 8). Fewer than one in twenty non-fatal work injuries required hospitalization.

Table 7  
**Number and percentage who sought treatment for injury, and percentage who sustained serious injury, by activity when injury occurred, employed household population aged 18 to 75 who sustained at least one activity-limiting injury in past year, Canada, 2003**

Activity when injury occurred	Number who sought treatment '000	% who sought treatment	% who sustained serious injury <sup>‡</sup>
<b>Total</b>	<b>1,372</b>	<b>61.6</b>	<b>23.6</b>
Working at job or business <sup>†</sup>	417	66.2	19.8
Sports or physical exercise	314	51.5*	23.4*
Household chores, other unpaid work	219	60.4*	23.6
Leisure or hobby	169	62.9	27.4*
Travel to or from work	91	73.3*	27.8*
Sleeping, eating, personal care	32	70.0	16.1
Other	129	69.9	30.6*

<sup>†</sup> Reference category

<sup>‡</sup> Defined as a burn or scald, concussion, fracture, internal injury or multiple injuries

\* Significantly different from estimate for reference category ( $p < 0.05$ )

Source: 2003 Canadian Community Health Survey

## Strenuous jobs risky

Although CCHS respondents were not asked about their specific job tasks or the materials and tools they used, they did provide information about the physical effort their daily activities involved. As reported in previous research, the likelihood of occupational injury was markedly elevated for workers whose jobs required strenuous effort, compared with those without such demands.<sup>11,15,17-19</sup>

The risk of injury for people doing heavy work was twice as high in men, and three times as high for women, compared with those with less physically demanding jobs (Table 9).

Table 8

Percentage treated, by treatment facility, employed household population aged 18 to 75 who sustained at least one activity-limiting work-related injury in past year and sought treatment, Canada, 2003

	Treatment facility					
	Emergency room <sup>†</sup>	Doctor's office	Clinic	Hospital admission	Outpatient department	Work clinic
	%	%	%	%	%	%
Total	51.1	20.6*	20.3*	4.3 <sup>E*</sup>	4.2 <sup>E*</sup>	3.6*
Men	55.3	16.6*	18.8*	5.3 <sup>E*</sup>	4.6 <sup>E*</sup>	4.4 <sup>E*</sup>
Women	39.4	31.4	24.4*	F	3.0 <sup>E*</sup>	F

<sup>†</sup> Reference category

\* Significantly different from corresponding estimate for reference category ( $p < 0.05$ )

<sup>E</sup> use with caution (coefficient of variation 16.6% to 33.3%)

<sup>F</sup> too unreliable to be published (coefficient of variation greater than 33.3%)

**Note:** Because multiple responses for treatment facility were permitted, detail may total more than 100%.

**Source:** 2003 Canadian Community Health Survey

### Long hours linked to injury

In addition to occupational category and the effort involved in a job, several organizational aspects of employment emerged as significant correlates of work injury.

For men, the number of hours worked per week was associated with injury (Table 9). The likelihood of injury was greater for men who worked 35 or more hours, compared with those who typically worked fewer hours. Furthermore, the results suggested a gradient in risk corresponding to hours of work. This was consistent with previous research, showing that jobs routinely requiring overtime increase the risk of occupational injury.<sup>20</sup> No significant differences by hours of work emerged for women.

Both men and women with a regular daytime schedule were at significantly lower risk of injury, compared with those who worked other shifts. These results corroborate previous research indicating that shiftwork is associated with a higher risk of occupational injury.<sup>21,22</sup> As well, men and women who were self-employed were less likely to sustain an occupational injury, compared with those who worked for others.

The amount that workers are paid is another aspect of the organization of work. Among men with annual earnings of \$60,000 or more, 3% were injured on the job, significantly below the proportions for men with income less than \$60,000

Table 9

Percentage who sustained at least one activity-limiting work injury in past year, by sex and selected work-related factors, employed household population aged 18 to 75, Canada, 2003

	Men	Women
	%	%
<b>Total</b>	5.2	2.2
<b>Hours worked per week</b>		
Less than 35 <sup>†</sup>	3.3	2.0
35 to 44	5.2*	2.2
44 to 79	5.4*	2.4
80 or more	8.8*	3.8 <sup>E</sup>
<b>Work shift</b>		
Regular daytime schedule <sup>†</sup>	4.8	1.8
Shift work	6.0*	3.1*
<b>Employer</b>		
Self-employed	4.1*	1.4 <sup>E*</sup>
Not self-employed <sup>†</sup>	5.4	2.3
<b>Employment income</b>		
Less than \$20,000	5.6*	2.5*
\$20,000 to \$39,999	6.1*	2.6*
\$40,000 to 59,999	6.2*	1.4
\$60,000 or more <sup>†</sup>	3.1	1.6 <sup>E</sup>
<b>Number of jobs</b>		
One <sup>†</sup>	5.0	2.0
More than one	6.6*	3.5*
<b>Physical demands of job</b>		
Heavy work/Carry very heavy loads	10.5*	6.0*
Do not do heavy work/carry very heavy loads <sup>†</sup>	4.2	2.0
<b>Work stress</b>		
Not at all	4.5	1.5 <sup>E*</sup>
Not very	5.0	1.7*
A bit	5.0	2.0*
Quite	5.8	2.6*
Extremely <sup>†</sup>	5.5	4.2

<sup>†</sup> Reference category

\* Significantly different from estimate for reference category ( $p < 0.05$ )

<sup>E</sup> use with caution (coefficient of variation 16.6% to 33.3%)

**Source:** 2003 Canadian Community Health Survey

(Table 9). Women whose annual income was less than \$40,000 had a significantly higher risk of work injury, compared with women earning \$40,000 or more. Of course, analysis of injury in relation to income is far more informative when occupation is taken into account; this was undertaken in multivariate analysis (see below).

For both sexes, having more than one job was significantly associated with an elevated likelihood of work injury, compared with workers who had only one job.

The results of previous research on the relationship between stress and work injury are inconclusive, perhaps because of the variety of measures that have been used to assess stress as well as injury.<sup>23</sup> A significant association has emerged in some studies,<sup>24-26</sup> but not in others.<sup>27</sup> Analysis of the CCHS data indicated that women's injury risk differed significantly in relation to the perceived stressfulness of their job, but no pattern emerged for men. Just over 4% of women who described their job as "extremely" stressful had sustained a work injury, compared with less than 2% of those who said their job was "not a bit" or "not very" stressful.

### Young men at higher risk

Factors such as a disposition to risk-taking have been shown to influence the likelihood of work injury.<sup>28</sup> Although the CCHS contained no direct measures of such factors, it did collect data on personal and socio-demographic characteristics that are relevant to the study of occupational injury, including sex, age, race, educational attainment, smoking, alcohol use, body mass index, diagnosed chronic conditions and life stress.

For men, the proportion injured generally decreased with age, which could, in some cases, be related to experience on the job. Compared with male workers aged 18 to 24, those aged 25 to 34 were significantly more likely to be injured at work, and those aged 45 or older were less so (Table 10). To some extent, the low proportion of men aged 18 to 24 who were injured may have reflected a greater likelihood of part-time work among this group, and thus, less exposure to risk. In fact, when

hours of work were taken into account, the percentage of men aged 18 to 24 who were injured was not significantly different from that for those aged 25 to 34 (data not shown). Among women, the likelihood of work injury was similar at all ages. The findings for men support those of previous studies showing a higher risk of occupational injury at younger ages than in middle or older adulthood.<sup>29-31</sup>

**Table 10**  
Percentage who sustained at least one activity-limiting work-related injury in past year, by sex and selected characteristics, employed household population aged 18 to 75, Canada, 2003

	Men	Women
	%	%
<b>Total</b>	<b>5.2*</b>	<b>2.2</b>
<b>Age group</b>		
18 to 24 <sup>†</sup>	6.0	2.4
25 to 34	6.5*	2.1
35 to 44	5.4	2.0
45 to 54	4.4*	2.4
55 to 64	3.2*	2.1
65 to 75	2.5 <sup>E*</sup>	F
<b>Race</b>		
White <sup>†</sup>	5.6	2.3
Non-white	3.0*	1.7
<b>Highest level of education in household</b>		
Secondary graduation or less	6.2*	3.3*
More than secondary graduation <sup>†</sup>	5.0	2.0
<b>Chronic conditions</b>		
0 to 2 <sup>†</sup>	5.1	2.0
3 or more	7.8*	4.0*
<b>Smoking</b>		
Daily smoker	7.5*	3.5*
Non-/Occasional smoker <sup>†</sup>	4.5	1.9
<b>Alcohol use</b>		
No alcohol in past year	5.0	2.3
One or more drink(s) in past year, but heavy <sup>‡</sup> drinking never or less than monthly	4.8*	2.1
Heavy <sup>‡</sup> drinking not more than 3 times per month	5.7	2.0 <sup>E</sup>
Heavy <sup>‡</sup> drinking at least weekly <sup>†</sup>	6.2	3.5 <sup>E</sup>
<b>Body mass index category</b>		
Underweight	6.1 <sup>E</sup>	2.4 <sup>E</sup>
Normal weight <sup>†</sup>	5.1	1.9
Overweight	4.8	2.1
Obese	6.1	4.0*
<b>Life stress</b>		
Not at all/ Not very <sup>†</sup>	4.5	2.0
A bit stressful	5.2	2.0
Quite a bit	5.5	2.5
Extremely	7.3*	3.4 <sup>E*</sup>

<sup>†</sup> Reference category

<sup>‡</sup> At least five drinks per occasion

\* Significantly different from estimate for reference category ( $p < 0.05$ )

<sup>E</sup> use with caution (coefficient of variation 16.6% to 33.3%)

<sup>F</sup> too unreliable to be published (coefficient of variation greater than 33.3%)

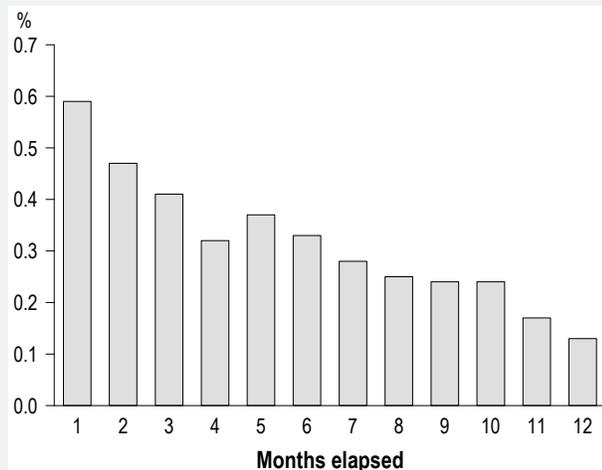
**Source:** 2003 Canadian Community Health Survey

## Limitations

Although the Canadian Community Health Survey (CCHS) asked respondents how many activity-limiting injuries they had sustained during the past year, they were asked to provide details only about “the most serious injury.” As a result, estimates related to injury severity are somewhat exaggerated, and not representative of all injuries that occurred.

Several features of the CCHS data precluded complete estimates of the frequency of occupational injury. First, data on fatal injuries were unavailable. Second, the survey asked about only the most serious injury, so if a person had sustained an occupational injury and another injury perceived to be more serious, the occupational injury would not have been reported. Of those who reported an occupational injury as their most serious injury, 19% reported more than one injury (data not shown); the number of these respondents who experienced two or more occupational injuries is unknown. Third, the analysis does not cover repetitive strain injuries. Fourth, the survey data indicate a decreasing likelihood of reporting occupational injury with the amount of time elapsed between the injury and the date the respondent was interviewed. The decline over time of non-occupational injuries was similar (data not shown). This suggests that injury was under-reported because of diminishing recall over time—a phenomenon that has been noted in previous research.<sup>32-37</sup>

### Percentage who sustained at least one activity-limiting work injury, by number of months elapsed between interview and injury occurrence, employed household population aged 18 to 75, Canada, 2003



**Note:** Injuries occurring in same month as interview are not included.  
**Source:** 2003 Canadian Community Health Survey

Information about the length of time in the current job was not available. Some respondents who reported an occupational injury in the past year may have been in a different job when they were injured. The extent to which this may have happened is unknown. Any resultant misclassification (of job type or “exposure”) may have led to underestimation or overestimation of the true associations between job type and injury risk.

Not all factors that affect the risk of work injury were included in the analysis, either because the information was unavailable from the survey, or because the association with work injury is unknown. For example, previous research indicates that the risk of occupational injury is related to poor sleep and snoring.<sup>29,38,39</sup> Other research indicates that “human” factors such as inexperience and a propensity to take risks contribute to injury risk.<sup>28,40</sup> However, because cycle 2.1 of the CCHS did not collect data on these variables, or on factors directly related to the job, such as work activity, machinery or tools used, or noxious substance exposure, their relationships with injury could not be examined. As a result of the unavailability of information or the failure to include variables that influence injury risk, some associations that emerge from the analysis may result, in part, from factors not considered.

This analysis is based on self-reported data; no independent verification of the information reported by respondents was undertaken. The degree to which the data may be biased because of reporting error is unknown. In particular, the accuracy of information about socially sensitive behaviours such as smoking and alcohol consumption may be affected. A tendency of smokers or heavy drinkers to deny or underreport use would contribute to misclassification, and misrepresent the true associations between injury and smoking and drinking. Similarly, underestimates of body mass index due to inaccuracies in self-reported height and weight<sup>41</sup>—especially among people who are truly overweight or obese—would alter the strength of associations involving BMI. Data on employment income were not available; self-reported personal income was used instead.

The severity of the injuries is unknown. Although respondents were asked to report injuries that were “serious enough to limit [their] normal activities,” an examination of treatment sought suggested that the severity of the injuries reported ranged widely.

The data are cross-sectional; therefore, no inference of causality or temporal ordering of variables is possible from the results of the analysis.

Other socio-demographic characteristics—race and level of household education—were also related to the risk of work injury. Non-white men had a lower risk of occupational injury than did white men, a finding consistent with reports from Canada and the United States.<sup>28,40</sup> Workers living in households in which at least one member had been educated beyond secondary graduation were also at lower risk of injury, compared with those from households in which no one had gone beyond secondary completion. The findings related to education are consistent with those of a study conducted in Israel, showing that workers with less than 12 years of education had elevated odds of injury, compared with those with more years of schooling.<sup>19</sup>

### Smokers more often injured

Occupational injury was also linked to health-related risk factors. Workers with at least three chronic conditions were more likely to have had a work injury, compared with those reporting two or fewer conditions. Specific conditions that were significantly associated with work injury included migraine, arthritis, stomach ulcer and multiple chemical sensitivities (data not shown).

Consistent with observations reported elsewhere, men and women who smoked daily had a higher likelihood of injury, compared with occasional or non-smokers (Table 10).<sup>24,42-44</sup> Although the mechanism linking smoking to injury risk is not fully understood, previous research has identified smoking as a precursor to injury.<sup>45</sup>

Heavy alcohol consumption was also related to the likelihood of injury. Of men who reported heavy episodic drinking (that is, over the past year they had consumed at least five drinks per occasion, at least once a week), 6.2% were injured at work, significantly higher than the corresponding percentage (4.8%) for those who had consumed one or more drink(s) in the past year, but whose heavy drinking (if any) had occurred less than once per month. For women, 3.5% of weekly heavy drinkers were injured, compared with 2.1% of those whose heavy drinking occurred less than monthly; because of smaller numbers, this difference fell just short of statistical significance ( $p=0.06$ ). In a number of

previous studies, a positive association has been observed between heavy drinking and occupational injury,<sup>17,18,28,46-48</sup> although in other research, this relationship failed to emerge.<sup>38</sup>

Obese women were twice as likely to be injured at work as were those whose weight was in the normal range: 4% compared with 2%. The finding for women is consistent with previous research indicating a positive relationship between obesity and risk of occupational injury.<sup>19,49</sup> No significant difference emerged for men.

Before the influence of other factors (including work stress) was taken into account, personal life stress was also associated with work injury. Among men and women who reported that on most days their lives were “extremely” stressful, the likelihood of injury was significantly higher than among those reporting lives that were “not at all,” or “not very” stressful. This observation corroborates findings of previous studies on the role of stress, although the variety of measures used makes comparability problematic.<sup>23</sup>

### Work-related influences persist

To examine the relationship between work-related variables and injury, while controlling for other influences, successive multivariate models were fitted for each sex—the first containing work-related variables, and the second containing socio-demographic and other health-related risk factors as well (Table 11).

In each of the second, fully controlled models, the relationships observed in the first models between work-related factors and occupational injury generally persisted. For men, regardless of age, race, household education, health-related risk factors and level of job stress, those employed in trades, transport or equipment operation; primary industries; and processing, manufacturing or utilities had over twice the odds of work injury as did those in white-collar occupations (Table 11). Aside from occupational category, physical exertion on the job was also significant for men; the odds of injury associated with heavy lifting or strenuous activity were 70% higher than the odds associated with less physically taxing jobs.

Table 11

Adjusted odds ratios relating selected characteristics to activity-limiting work injury in past year, by sex, employed household population aged 18 to 75, Canada, 2003

	Men				Women			
	Model 1		Model 2		Model 1		Model 2	
	Adjusted odds ratio	95% confidence interval						
<b>Work-related factors</b>								
<b>Occupational category</b>								
White collar <sup>†</sup>	1.0	...	1.0	...	1.0	...	1.0	...
Sales, service	1.3	1.0 to 1.6	1.3	1.0 to 1.7	2.1*	1.6 to 2.7	2.0*	1.5 to 2.6
Trades, transport, equipment operation	2.8*	2.3 to 3.5	2.8*	2.3 to 3.5	3.0*	1.7 to 5.4	2.8*	1.4 to 5.4
Primary industries	2.2*	1.7 to 2.9	2.1*	1.5 to 2.8	3.7*	2.1 to 6.5	3.6*	2.0 to 6.5
Processing, manufacturing, utilities	2.5*	1.9 to 3.3	2.6*	2.0 to 3.5	2.8*	1.8 to 4.3	2.4*	1.5 to 3.8
<b>Hours, shift, employer</b>								
Less than 35 hours per week <sup>†</sup>	1.0	...	1.0	...	1.0	...	1.0	...
35 to 44 hours per week	1.4*	1.0 to 1.9	1.3	0.9 to 1.7	1.2	0.9 to 1.6	1.2	0.9 to 1.7
45 to 79 hours per week	1.6*	1.2 to 2.2	1.4*	1.0 to 1.9	1.3	0.9 to 1.9	1.4	1.0 to 2.1
80 or more hours per week	2.1*	1.5 to 3.1	1.9*	1.3 to 2.9	1.5	0.8 to 3.2	1.4	0.6 to 3.2
Regular daytime schedule <sup>†</sup>	1.0	...	1.0	...	1.0	...	1.0	...
Shifts	1.3*	1.1 to 1.5	1.2*	1.0 to 1.5	1.6*	1.2 to 2.0	1.5*	1.1 to 1.9
Self-employed <sup>†</sup>	0.8*	0.6 to 0.9	0.8	0.6 to 1.0	0.5*	0.4 to 0.8	0.6*	0.4 to 0.9
<b>Employment income, nature of work</b>								
Less than \$20,000	1.9*	1.4 to 2.6	1.8*	1.3 to 2.5	1.3	0.8 to 2.2	1.3	0.8 to 2.3
\$20,000 to \$39,999	1.6*	1.3 to 2.1	1.6*	1.3 to 2.1	1.5	0.9 to 2.4	1.5	0.9 to 2.5
\$40,000 to \$59,999	1.7*	1.4 to 2.2	1.7*	1.3 to 2.2	0.9	0.5 to 1.5	0.9	0.5 to 1.6
\$60,000 or more <sup>†</sup>	1.0	...	1.0	...	1.0	...	1.0	...
Two or more jobs <sup>†</sup>	1.3*	1.1 to 1.6	1.2	1.0 to 1.5	1.7*	1.2 to 2.2	1.5*	1.1 to 2.1
Heavy work/Carry heavy loads <sup>†</sup>	1.8*	1.5 to 2.1	1.7*	1.5 to 2.0	2.2*	1.6 to 3.0	2.0*	1.5 to 2.9
<b>Work stress</b>								
Not at all/Not very <sup>†</sup>	1.0	...	1.0	...	1.0	...	1.0	...
A bit	1.1	0.9 to 1.3	1.0	0.8 to 1.3	1.3	1.0 to 1.8	1.3	1.0 to 1.9
Quite	1.4*	1.1 to 1.7	1.2	0.9 to 1.6	1.9*	1.4 to 2.7	1.7*	1.2 to 2.5
Extremely	1.2	0.9 to 1.7	1.0	0.7 to 1.5	3.1*	2.1 to 4.7	2.8*	1.8 to 4.5
<b>Socio-demographic factors</b>								
<b>Age group</b>								
18 to 24 <sup>†</sup>	...	...	1.0	...	...	...	1.0	...
25 to 34	...	...	1.2	0.9 to 1.5	...	...	1.0	0.7 to 1.4
35 to 44	...	...	1.0	0.8 to 1.3	...	...	0.9	0.6 to 1.4
45 to 54	...	...	0.8	0.6 to 1.1	...	...	1.1	0.8 to 1.7
55 to 64	...	...	0.6*	0.4 to 0.9	...	...	1.0	0.6 to 1.6
65 to 75	...	...	0.6	0.3 to 1.1	...	...	0.8	0.3 to 1.8
<b>Race</b>								
White <sup>†</sup>	...	...	1.0	...	...	...	1.0	...
Non-white	...	...	0.5*	0.4 to 0.8	...	...	0.8	0.5 to 1.2
<b>Place of residence</b>								
Urban-influenced zone <sup>†</sup>	...	...	1.0	...	...	...	1.0	...
Rural or remote	...	...	1.1	1.0 to 1.4	...	...	0.8	0.6 to 1.1
<b>Highest level of education in household</b>								
Secondary graduation or less	...	...	0.9	0.8 to 1.1	...	...	1.3	1.0 to 1.8
More than secondary graduation <sup>†</sup>	...	...	1.0	...	...	...	1.0	...

continued...

Table 11 - continued

**Adjusted odds ratios relating selected characteristics to activity-limiting work injury in past year, by sex, employed household population aged 18 to 75, Canada, 2003**

	Men				Women			
	Model 1		Model 2		Model 1		Model 2	
	Adjusted odds ratio	95% confidence interval						
<b>Health-related risk factors</b>								
<b>Chronic conditions</b>								
0 to 2 <sup>†</sup>	...	...	1.0	...	...	...	1.0	...
3 or more	...	...	1.8*	1.3 to 2.4	...	...	1.6*	1.1 to 2.3
<b>Smoking</b>								
Daily smoker	...	...	1.3*	1.1 to 1.5	...	...	1.5*	1.1 to 1.9
Non-/Occasional smoker <sup>‡</sup>	...	...	1.0	...	...	...	1.0	...
<b>Body mass index category</b>								
Underweight	...	...	1.4	0.7 to 2.8	...	...	1.1	0.6 to 2.0
Normal weight <sup>‡</sup>	...	...	1.0	...	...	...	1.0	...
Overweight	...	...	1.0	0.8 to 1.2	...	...	1.0	0.8 to 1.3
Obese	...	...	1.1	0.9 to 1.4	...	...	1.9*	1.4 to 2.6
<b>Alcohol consumption</b>								
No alcohol in past year	...	...	1.1	0.9 to 1.4	...	...	1.1	0.8 to 1.5
At least 1 drink in past year, but less than 5 drinks/occasion weekly <sup>†</sup>	...	...	1.0	...	...	...	1.0	...
5 drinks per occasion at least weekly	...	...	1.0	0.8 to 1.2	...	...	1.4	0.8 to 2.4
<b>Life stress</b>								
Quite a bit/Extremely	...	...	1.2	0.9 to 1.4	...	...	1.1	0.8 to 1.4
Not at all/Not very/A bit <sup>†</sup>	...	...	1.0	...	...	...	1.0	...

<sup>†</sup> Reference category<sup>‡</sup> Reference category is absence of condition; for example, reference category for "Self-employed" is Employed by others.\* Significantly different from estimate for reference category ( $p < 0.05$ )

... Not applicable

**Notes:** For men, Model 1 was based on 36,271 records; Model 2 was based on 34,239 records. For women, Model 1 was based on 35,541 records; Model 2 was based on 32,011 records. Because of rounding, odds ratios with 1.0 as the lower or upper confidence limit may be statistically significant. A variable for missing data on income was included in the models; the odds ratios are not shown.

**Source:** 2003 Canadian Community Health Survey

Men whose annual income was below \$60,000 had higher odds of injury, compared with those at \$60,000 or above. The relationship between injury and long hours also persisted; compared with men who worked less than 35 hours per week, the odds of injury were 40% higher for those who worked 45 to 79 hours per week, and nearly twice as high for those who worked 80 hours or more. Male shift workers also had higher odds of on-the-job injury.

Some of the findings for women were similar to those for men (Table 11). As well as in the three occupational categories in which men's odds of injury were elevated, women in sales and services had high odds of injury. Physical exertion on the job also conferred higher odds of injury for women, as did shiftwork and having more than one job.

Being self-employed was protective. However, for women, no significant relationships emerged between injury and level of employment income or number of hours worked.

### Link to job stress persists in women

In contrast to the findings for men, women's odds of injury rose in relation to work stress. Compared with women who felt that their job was "not at all" or "not very" stressful, those perceiving more job stress had increasingly higher odds of injury (Table 11). Women in jobs they reported as "extremely" stressful had nearly three times the odds of work injury as did those in jobs identified as not stressful, even when personal life stress was taken into account. This indicates that the association

between work stress and injury risk was unique, over and above any influence from “life” stress in general. Of course, this observation is based on cross-sectional data and may reflect reverse causation: the experience and consequences of having sustained an injury on the job may lead to increased stress.

Independent of work-related factors, some health-related risk factors were significantly related to occupational injury. Those that are modifiable are worth noting. Both men and women who smoked daily had significantly elevated odds of on-the-job injury. For women, obesity was also independently significant; obese women had nearly twice the odds of injury as did those whose weight was in the normal range. The findings of previous research about smoking and obesity in relation to occupational injury are contradictory. Some studies have suggested that individual factors including weight and smoking were not significantly associated with occupational injury when work-related factors were considered,<sup>38,50,51</sup> while others are more consistent with results from the CCHS.<sup>44,49</sup>

### **Concluding remarks**

Well over half a million Canadian workers were injured on the job in 2003. The majority (72%) of them were men, and nearly three-quarters were employed in blue-collar occupations. These findings serve as a reminder that despite recent improvements,<sup>52</sup> large numbers of workers are still being injured, and the risk is unevenly distributed within the workforce.

A better understanding of the circumstances that give rise to injury should contribute to the success

of injury prevention efforts. Analysis of the CCHS data revealed a number of factors that were strongly associated with occupational injury. Some of these factors were intrinsic to the job, while others reflected personal or socio-economic conditions.

A number of factors associated with work injury were similar between the sexes, including shiftwork, physically demanding jobs, chronic health conditions, and smoking. Other factors differed between men and women. Women with more than one job, and those in sales and service, were at higher risk of injury relative to female white-collar workers, but these relationships were not significant in men. Income and long working hours were associated with injury in men, but not in women. Obese women were at higher risk of injury, but this relationship did not emerge in men. Finally, perceived work stress was highly related to occupational injury in women, but not at all in men.

Findings from the CCHS help to identify individual characteristics and work-related conditions that are linked to an increased risk of work injury, and thus to suggest areas where injury prevention strategies might be directed. As well as programs to promote smoking cessation, healthy weight and stress reduction, workplace-based safety programs could be emphasized for workers in occupations at higher risk. The findings also underscore the importance to injury risk of factors that are modifiable by employers, including workplace hazards, equipment design, work schedules and workload distribution. ●

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