

Fruit and vegetable consumption

Claudio E. Pérez

Abstract

Objectives

This article focuses on associations between the frequency of fruit and vegetable consumption and other health-related behaviours or conditions, including physical activity, smoking, obesity and alcohol-dependence.

Data source

The data are from the first half of cycle 1.1 of the Canadian Community Health Survey, collected from September 2000 through February 2001.

Analytical techniques

Weighted means provide information on average frequency of fruit and vegetable consumption in relation to selected health behaviours and conditions, health status and socio-demographic characteristics. Multivariate linear regression is used to model the associations between eating fruit and vegetables and health behaviours, while controlling for other influences.

Main results

Women consume fruit and vegetables more often than do men. When other influences are taken into account, the frequency of eating fruits and vegetables is positively related in both sexes to being physically active, not smoking and not being overweight, and in women, to not being alcohol-dependent.

Key words

diet, food habits, health behaviour, health surveys

Author

Claudio E. Pérez (613-951-1733; perecla@statcan.ca) is with the Health Statistics Division at Statistics Canada, Ottawa, Ontario, K1A 0T6.

- *For the first time in several decades, population-based information on fruit and vegetable consumption across Canada is available from the Canadian Community Health Survey.*
- *Low frequency of fruit and vegetable consumption is associated with other health risk behaviours (namely, physical inactivity, smoking, obesity and alcohol-dependence).*
- *Women consume fruit and vegetables more frequently than do men, although men diagnosed with cancer, heart disease, high blood pressure or diabetes tend to consume these foods more often than do men without these conditions.*

Numerous studies indicate that a diet rich in fruits and vegetables may help to prevent cardiovascular disease and certain cancers, which are leading causes of death in Canada.¹⁻⁸ Despite the importance of nutrition to good health, information on food consumption patterns at the national level has been scarce since the early 1970s.^{9,10} To partially address this gap, the Canadian Community Health Survey (CCHS) has begun to collect information on the frequency with which people are eating fruit and vegetables.

Methods

Data source

The Canadian Community Health Survey (CCHS) collects information on the health of the Canadian population for use at the regional level (see “Canadian Community Health Survey—Methodological overview” in this issue). This analysis uses data collected during the first half (September 2000 through February 2001) of the first cycle (cycle 1.1) of the CCHS (see *Limitations*).

The analysis is based on a sample of 46,866 people living in households in the 10 provinces. The analysis was restricted to the population aged 20 or older, because they are more likely than younger people to make their own food choices. The data were weighted to represent 22.4 million people, the household population aged 20 or older in the 10 provinces, averaged over September 2000 through February 2001. The response rate for the first half of cycle 1.1 was 80%.

Analytical techniques

Respondents were asked how many times they consumed specific fruits and vegetables and “other” vegetables, and for each person, the total daily frequency of eating any fruit or vegetable was derived. Because the data were right-skewed, outliers (defined as values above three standard deviations from the mean) were capped, and reassigned the value of the mean plus three standard deviations. Thus for men, 216 records (1.0%) were reassigned the value of 12.157; for women, 309 records (1.2%) were reassigned the value

of 12.238. Means of daily frequencies were estimated for selected sub-populations using these capped values. The data were analyzed separately for males and females. Differences between means for specific sub-populations were tested for statistical significance, which was established as $p < 0.05$.

Multiple linear regression models were fitted to study the associations between selected health-related behaviours (independent variables) and frequency of fruit and vegetable consumption (dependent variable), while controlling for the effects of other influences known to affect what people eat. These included variables reflecting health status and socio-demographic characteristics. The models were fitted to a log transformation of the daily intake frequency values (non-capped), which resulted in a better fit of the models than did non-transformed or capped data. Daily frequency values of zero were converted to the value of 0.005 before computing the log. The full models were applied. Some interaction terms were included in preliminary models (for example, between smoking and alcohol-dependence), but were subsequently dropped because they were not statistically significant. To account for the multi-stage sample design of the survey, the bootstrap technique was used to estimate variance; the variance estimates were used to calculate confidence intervals and coefficients of variation and for testing the statistical significance of differences.¹⁵⁻¹⁷ A significance level of $p < 0.05$ was applied in all cases.

Research conducted in the United States suggests that healthy food choices are closely related to other health-promoting behaviours.¹¹⁻¹⁴ Based on data from the first half-year of the initial CCHS data collection cycle (cycle 1.1), this article focuses on the association of fruit and vegetable consumption frequency with selected health-related conditions and behaviours, including physical activity, smoking, body mass index (BMI) and alcohol-dependence (see *Methods*).

Low fruit and vegetable intake, other health risks linked

Consistent with the findings of previous research, the frequency of eating fruit and vegetables was associated with other health-related behaviours.¹¹⁻¹⁴ The average consumption frequencies for men and

women whose level of physical activity was moderate or active and for those who were not daily smokers were significantly higher than the respective averages for men and women who were physically inactive or who smoked daily (Table 1). Of course, for physically active people, greater energy needs may partially explain more frequent fruit and vegetable consumption. In fact, because complete information is not available, it is not possible to determine if the intake frequency of other—including less nutritious—foods, was higher in response to the higher caloric expenditure among these people.

Relationships between the frequency of eating fruit and vegetables and body mass index (BMI) also emerged. Men in the acceptable weight range ate fruit and vegetables more frequently than did obese

men. Women who were underweight, of acceptable weight or overweight consumed fruit and vegetables more frequently than did those who were obese. These findings differ from research results in the United States; one study reported an association between BMI and fruit and vegetable intake only for women;¹¹ in another, no pattern emerged for either sex.¹³ A recent study in Alberta, however, reported findings consistent with those of the CCHS; the average number of daily servings of fruit and vegetables was lowest in people who were overweight.¹⁸

Fruit and vegetable consumption frequency was also higher among men and women who were not alcohol-dependent, compared with those who were. Although this relationship may be due to a tendency for people who are not alcohol-dependent to practice generally more healthful behaviours, it might also be partially explained by the contribution of alcohol to daily calorie requirements. People who drink heavily may receive a substantial proportion of their energy needs from alcohol, resulting in lowered intake not only of fruit and vegetables, but also of other foods.

Table 1
Average daily frequency[†] of fruit and vegetable consumption, by sex and selected characteristics, household population aged 20 or older, Canada excluding territories, September 2000 to February 2001

	Men		Women			Men		Women	
	Times per day	95% confidence interval	Times per day	95% confidence interval		Times per day	95% confidence interval	Times per day	95% confidence interval
Total	4.2	4.2, 4.3	4.9 ^{††}	4.8, 4.9					
Behavioural characteristics					Self-perceived health				
Physical activity					Excellent	4.5	4.5, 4.6	5.3*	5.2, 5.4
Active	4.9*	4.8, 5.0	5.7*	5.6, 5.8	Very good	4.1*	4.1, 4.2	4.8*	4.8, 4.9
Moderate	4.3*	4.3, 4.4	5.3*	5.2, 5.3	Good	4.1*	4.0, 4.2	4.7*	4.6, 4.8
Inactive‡	3.9	3.8, 4.0	4.5	4.5, 4.6	Fair	4.1*	3.9, 4.2	4.6	4.5, 4.7
Smoking status					Poor†	4.4	4.2, 4.7	4.5	4.2, 4.7
Non-smoker	4.4*	4.4, 4.5	5.1*	5.0, 5.1	Socio-demographic characteristics				
Occasional	4.5*	4.2, 4.7	5.0*	4.8, 5.2	Age group				
Daily†	3.7	3.6, 3.7	4.1	4.0, 4.2	20-24†	4.2	4.0, 4.4	4.6	4.5, 4.8
Body mass index					25-34	4.0	3.9, 4.1	4.7	4.6, 4.8
Underweight	4.2	3.8, 4.6	5.0*	4.7, 5.2	35-44	4.1	4.0, 4.2	4.7	4.6, 4.8
Acceptable weight	4.3*	4.2, 4.4	4.9*	4.9, 5.0	45-64	4.3	4.2, 4.3	5.0*	4.9, 5.0
Overweight	4.2	4.2, 4.3	4.9*	4.8, 5.0	65+	4.8*	4.7, 4.9	5.1*	5.1, 5.2
Obese‡	4.1	4.0, 4.2	4.7	4.6, 4.8	Household income				
Alcohol-dependent					Lowest†	3.7	3.5, 4.0	4.5	4.3, 4.7
No	4.3*	4.2, 4.3	4.9*	4.8, 4.9	Lower-middle	3.8	3.7, 4.0	4.5	4.4, 4.7
Yes‡	3.8	3.6, 4.1	3.9	3.5, 4.3	Middle	4.3*	4.2, 4.4	4.8*	4.7, 4.8
Measures of health					Upper-middle	4.2*	4.1, 4.2	4.9*	4.8, 5.0
Chronic condition(s)[§]					Highest	4.3*	4.3, 4.4	5.1*	5.0, 5.2
Yes†	4.6	4.5, 4.7	4.9	4.8, 5.0	Education				
No	4.2*	4.1, 4.2	4.9	4.8, 4.9	Less than secondary graduation†	4.1	4.0, 4.2	4.6	4.5, 4.7
Disability					Secondary graduation	4.1	4.0, 4.2	4.6	4.5, 4.7
Yes†	4.6	4.3, 4.8	4.7	4.6, 4.9	Some postsecondary	4.3	4.1, 4.5	4.8	4.6, 4.9
No	4.2*	4.2, 4.3	4.9	4.8, 4.9	Postsecondary graduation	4.4*	4.3, 4.4	5.1*	5.1, 5.2
					Marital status				
					Married/Common-law	4.3*	4.3, 4.4	5.0*	4.9, 5.0
					Single	4.0*	3.9, 4.1	4.7	4.6, 4.8
					Divorced/Separated/Widowed†	4.1	4.0, 4.3	4.6	4.5, 4.7

Data source: Canadian Community Health Survey, preliminary file, September 2000 to February 2001
Notes: Analysis based on samples of 21,267 men and 25,599 women; missing values shown in Appendix Table A. Because of rounding, the values of an estimated mean may be contained in the confidence interval of another estimated mean from which it differs significantly.
 † Based on data with reassigned values for outliers.
 ‡ Reference category
 § Cancer, heart disease, high blood pressure, diabetes
 †† Significantly different from men ($p < 0.05$); other male-female comparisons not tested.
 * Significantly different from reference category ($p < 0.05$).

Definitions

The *frequency of fruit and vegetable consumption* was assessed using the following questions from the Behavioral Risk Factor Surveillance System in the United States:¹⁹ “The next questions are about the foods you usually eat or drink. Think about all the foods you eat, both meals and snacks, at home and away from home.

- (1) How often do you usually drink fruit juices such as orange, grapefruit or tomato? (for example, once a day, three times a week, twice a month)
- (2) Not counting juice, how often do you usually eat fruit?
- (3) How often do you (usually) eat green salad?
- (4) How often do you usually eat potatoes, not including French fries, fried potatoes, or potato chips?
- (5) How often do you (usually) eat carrots?
- (6) Not counting carrots, potatoes, or salad, how many servings of other vegetables do you usually eat?”

Level of *physical activity* was based on total energy expenditure during leisure time. Information about energy expenditure at work was not available. Values for energy expenditure were calculated using information on the frequency and duration of respondents' reported leisure-time activities in the previous three months, as well as the metabolic energy demand of each of these activities. Only activities lasting at least 15 minutes contributed to the energy expenditure calculations. Frequency of physical activity was based on the number of times in the previous three months that respondents had participated in an activity for more than 15 minutes. For bivariate analysis, three categories were defined: active (3.0 or more kilocalories per kilogram of body weight per day), moderate (from 1.5 to less than 3.0 kcal/kg/day), and inactive (less than 1.5 kcal/kg/day). In multivariate analysis, kcal/kg/day was used as a continuous variable.

Smoking status was determined by asking individuals if they smoked cigarettes daily, occasionally, or not at all. Three groups were established: daily, occasional, and non-smokers.

Body mass index (BMI) is calculated by dividing reported weight in kilograms by the square of reported height in metres. For bivariate analysis, BMI categories were defined according to the World Health Organization standards: less than 18.5 (underweight), 18.5 to less than 25 (acceptable weight), 25 to less than 30 (overweight), and 30 or more (obese).²⁰ In multivariate analysis, BMI was used as a continuous variable.

Alcohol-dependence was assessed only in people who reported having five or more drinks at least once a month during the year before the survey. The set of questions used to derive the measure of probability of alcohol-dependence was developed by Kessler and colleagues.²¹ Respondents were coded as *alcohol-dependent* if the score derived from their responses to these questions was 0.85 or higher.

Four chronic conditions were included in the analysis: cancer, heart disease, high blood pressure and diabetes. Respondents were asked if they had any “long-term conditions that have lasted or are expected to last six months or more and that have been diagnosed by a health professional.” Presence of *chronic conditions* was defined as a reported diagnosis of at least one of the four conditions noted above.

The capacity to independently perform instrumental activities of daily living (IADL) is a commonly used indicator of *disability*. Respondents who reported that they needed assistance with either or both of two specific IADLs (selected in part because they may affect the foods people eat) were categorized as having a disability. Respondents were asked: “Because of any condition or health problem, do you need the help of another person ... in preparing meals? ... in shopping for groceries or other necessities?”

Self-perceived health was assessed with the question, “In general, would you say your health is: excellent? very good? good? fair? poor?”

Five *age groups* were established for bivariate analysis: 20 to 24, 25 to 34, 35 to 44, 45 to 64, and 65 or older. For multivariate analysis, actual age was used as a continuous variable.

Household income groups were based on household size. For bivariate analysis, five categories were derived:

Household income group	People in household	Total household income
Lowest	1 to 4	Less than \$10,000
	5 or more	Less than \$15,000
Lower-middle	1 or 2	\$10,000 to \$14,999
	3 or 4	\$10,000 to \$19,999
	5 or more	\$15,000 to \$29,999
Middle	1 or 2	\$15,000 to \$29,999
	3 or 4	\$20,000 to \$39,999
	5 or more	\$30,000 to \$59,999
Upper-middle	1 or 2	\$30,000 to \$59,999
	3 or 4	\$40,000 to \$79,999
	5 or more	\$60,000 to \$79,999
Highest	1 or 2	\$60,000 or more
	3 or more	\$80,000 or more

These categories were used as a continuous variable in multivariate analysis.

Education was categorized into four groups: less than secondary graduation; secondary graduation; some postsecondary; and postsecondary graduation.

Marital status was categorized into three groups: married or living in a common-law relationship; single (never married); and divorced, separated or widowed.

Even allowing for the effects of health status and socio-demographic variables, all health-related behaviours examined, except alcohol-dependence in men, were independently associated with the frequency of eating fruit and vegetables (Table 2). In fact, of all the factors considered, being physically active was most strongly related to frequent fruit and vegetable consumption for men and women.

Being a non-smoker was also linked to frequent fruit and vegetable consumption for both sexes. As expected from the bivariate findings, higher BMI was negatively associated with the frequency of eating fruit and vegetables. Finally, alcohol-dependence was negatively associated with the frequency of fruit and vegetable consumption for women.

Table 2
Multivariate regression results describing association between log-transformed daily frequency of fruit and vegetable consumption and selected characteristics, by sex, household population aged 20 or older, Canada excluding territories, September 2000 to February 2001

	Men			Women				
	Unstandardized coefficient (b)	95% confidence interval		Standardized coefficient (beta)	Unstandardized coefficient (b)	95% confidence interval		Standardized coefficient (beta)
Physical activity	0.05*	0.04,	0.06	0.17*	0.06*	0.05,	0.06	0.18*
Smoking status								
Non-smoker	0.18*	0.15,	0.21	0.14*	0.20*	0.18,	0.23	0.16*
Occasional	0.20*	0.14,	0.25	0.06*	0.21*	0.16,	0.26	0.08*
Daily†	...	...		...	...	...		...
Body mass index	-0.005*	-0.01,	-0.002	-0.03*	-0.002*	-0.004,	-0.0003	-0.02*
Alcohol-dependent								
No	0.08	-0.004,	0.16	0.02	0.14*	0.01,	0.27	0.02*
Yes†	...	...		...	...	...		...
No chronic conditions§††	-0.09*	-0.12,	-0.06	-0.05*	-0.01	-0.04,	0.02	-0.01
No disability§	-0.06	-0.12,	0.01	-0.02	0.01	-0.03,	0.06	0.005
Self-perceived health‡	0.04*	0.02,	0.05	0.06*	0.03*	0.02,	0.04	0.05*
Age	0.01*	0.004,	0.01	0.14*	0.01*	0.01,	0.01	0.17*
Household income‡	0.02*	0.001,	0.03	0.03*	0.01*	0.003,	0.03	0.03*
Education‡	0.02*	0.01,	0.03	0.04*	0.04*	0.03,	0.05	0.09*
Marital status								
Married/Common-law	0.13*	0.10,	0.17	0.10*	0.09*	0.06,	0.11	0.08*
Single	0.11*	0.07,	0.16	0.08*	0.04*	0.001,	0.08	0.03*
Divorced/Separated/Widowed†	...	...		...	...	...		...
Intercept	0.62				0.52			

Data source: Canadian Community Health Survey, preliminary file, September 2000 to February 2001
Note: Based on samples of 18,721 men and 21,093 women; records for 2,546 men and 4,506 women were excluded because of missing values for one or more variables.
† Reference category
‡ Coded from low to high (for self-reported health, lowest is "poor," highest is "excellent")
§ Reference category is presence of characteristic.
†† Cancer, heart disease, high blood pressure, diabetes
... Not applicable
* $p < 0.05$
 $R^2 = 0.09$ for men, 0.11 for women; adjusted $R^2 = 0.09$ for men, 0.11 for women
d.f. men = 13, 18,707; women = 13, 21,079

Links with health differ by sex

Consistent with recent Canadian data showing pronounced differences between the sexes in their attention to nutrition,²² women reported eating fruit and vegetables more often than men did (Table 1). However, average fruit and vegetable consumption frequency among men with a diagnosis of one or more of four chronic conditions—heart disease, high blood pressure, diabetes and cancer—was higher than among men without any of these conditions. Similarly, men with a disability, as

measured by the reported need for help with meal preparation or shopping, ate fruit and vegetables more frequently, on average, than did those without a disability.

When the effects of other influences on food choices were considered, the positive relationship between fruit and vegetable consumption frequency and chronic disease persisted for men. On average, men without the selected chronic diseases reported less frequent fruit and vegetable consumption than did those with a diagnosis of at least one of the

Limitations

The nutrition questions in the Canadian Community Health Survey (CCHS) were developed for the Behavioral Risk Factor Surveillance System (BRFSS) by the United States Centers for Disease Control.¹⁹ The questions address only fruit and vegetable consumption; no information is available about other food groups. The questions ask about the *number of times* any fruits or vegetables are consumed, but not about amounts consumed. Because the questions do not specify portion sizes, compliance with daily intake recommendations, such as those in the Canada Food Guide, are not assessed.²³ Other research indicates that consumption estimates based on the BRFSS questions are lower than those based on 24-hour recalls or food diaries.²⁴ The extent to which the questions may misclassify respondents in relation to fruit and vegetable consumption is unknown, and mean estimates should be interpreted with caution.

Significant variations in the performance of the BRFSS questions have been reported among different ethnic populations in the United States.²⁵ The measurement properties of the questions have not been validated in specific Canadian sub-populations, and it is possible that response accuracy, and thus the proper classification of respondents, may vary between ethnic or cultural subgroups.

Eating patterns vary throughout the year.²⁶ Therefore, observations based on the data used for this study, which cover only the period from September 2000 through February 2001, may differ from those based on the full file. However, inclusion of a variable representing month of data collection in the multivariate models did not change the significance or direction of results for the other variables (data not shown). Hence, use of the preliminary data to compare consumption frequency among population subgroups seems appropriate.

Of the 54,788 interviews (of people aged 12 or older) conducted during the first half of cycle 1.1 data collection, 7.6% were completed

by proxy respondents. However, specific sections of the questionnaire, including the section on fruit and vegetable consumption frequency, were designed for self-response only; thus, responses to these sections were missing for persons whose interviews were completed by proxy. During data processing, imputation was used to complete data that were not obtained because of proxy response (see “Canadian Community Health Survey—Methodological overview” in this issue). The effects of imputation on the associations observed are unknown.

Data from the CCHS are cross-sectional, and therefore, no temporal or causal relationships among variables can be inferred.

The data are self-reported, and the degree to which they are accurate is unknown. To reduce reporting error related to chronic diseases, respondents were instructed to report only conditions that were (or were expected to be) of at least six months’ duration and that had been diagnosed by a health professional.

The small proportions of the variance ($R^2 = 0.09$ for men and 0.11 for women) explained by the independent variables included in the multivariate models suggest that other important factors related to fruit and vegetable consumption frequency were not examined in the analysis. Also, the small proportions of variance explained may partially result from a poor correlation between the measured frequency of eating fruit and vegetables, based on the survey questions, and actual consumption quantities.

The large number of CCHS respondents provides statistical power at the national level previously unseen in any Canadian sample survey. By virtue of this number of respondents, many of the differences and associations observed are statistically significant. However, the clinical or biological significance of results is not addressed in this analysis.

chronic conditions (Table 2). In contrast to the findings for men, no associations emerged for women between fruit and vegetable intake and chronic disease or disability (Tables 1 and 2).

For both sexes, self-perceived health contributed positively to the multivariate models (Table 2). For men, however, this association was inconsistent with the positive relationship observed between fruit and vegetable intake frequency and chronic disease. The association between self-reported health and fruit and vegetable consumption frequency is curvilinear (U-shaped), with higher averages for men in poor health and for those in excellent health.

The cross-sectional nature of the data limits interpretation of these findings. However, one explanation is that for men, but probably not women, the diagnosis of a specific disease, rather than simply self-perceived ill health, influences fruit and vegetable consumption. That is, once men are diagnosed with a specific chronic condition, they increase the frequency of eating fruit and vegetables in the hope of improving or preventing further deterioration in their health. Indeed, further analysis revealed that men reporting poor or fair health and one or more of the four selected chronic conditions ate fruits and vegetables 4.6 times daily, on average, compared with 3.9 times for men at similar levels of health but without the chronic conditions (data not shown). Consistent with these findings, other recent cross-sectional Canadian data indicate that men who have been diagnosed with cancer or heart disease are more aware of selecting food in consideration of their health than are men without these conditions.²²

Age, socio-economic status

Fruit and vegetable consumption was higher among seniors than among younger people. For both sexes, as age increased, so did the frequency of eating fruit and vegetables (Table 2). This is consistent with survey results from the mid-1990s, indicating that people aged 55 or older were more likely than younger people to rate their eating habits as excellent or very good.²⁷

Previous studies have revealed that people of lower socio-economic status are at greater risk of

low frequency of fruit and vegetable consumption, compared with people of higher socio-economic status.^{13,28} The CCHS data corroborate these findings. Consumption of fruit and vegetables was higher for people in the middle, upper-middle and highest income categories, compared with those in the lowest category (Table 1). Similarly, people with postsecondary graduation reported higher consumption frequency than did people with less than high school graduation. When other factors were taken into account, income and education remained significantly and positively associated with consumption frequency (Table 2).

Concluding remarks

To the extent that frequency of fruit and vegetable consumption correlates with the amount consumed, this analysis of preliminary data from the Canadian Community Health Survey is consistent with previous research indicating that fruit and vegetable intake is higher in people who practice other health-promoting behaviours. Conversely, people who are physically inactive, obese or smoke—and are thus at extra risk of numerous major chronic diseases—tend to eat fruit and vegetables less frequently, compared with people without these risk factors. Even when the effects of health status and socio-economic status were controlled, health-related behaviours were independently associated with the frequency of fruit and vegetable intake. These results support a multi-factorial approach to health promotion consisting, for example, of programs that address multiple-risk behaviours simultaneously.

The CCHS data also indicate that the frequency of eating fruit and vegetables was higher among men who had been diagnosed with specific chronic diseases, compared with men without these conditions. This finding highlights an opportunity for health education. Campaigns designed to appeal especially to men could promote the value of dietary measures not only in coping with disease once it is diagnosed, but also in preventing disease and protecting health. ●

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Appendix

Table A

Distribution of selected characteristics, by sex, household population aged 20 or older, Canada excluding territories, September 2000 to February 2001

	Men			Women		
	Sample size	Estimated population '000	%	Sample size	Estimated population '000	%
Total	21,267	10,957	100.0	25,599	11,432	100.0
Physical activity						
Active	4,696	2,432	22.2	4,186	1,828	16.0
Moderate	4,895	2,588	23.6	5,842	2,615	22.9
Inactive	11,432	5,846	53.4	15,323	6,913	60.5
Missing	244	91	0.8	248	76	0.7
Smoking status						
Non-smoker	14,512	7,648	69.8	18,877	8,594	75.2
Occasional	860	457	4.2	955	440	3.8
Daily	5,842	2,825	25.8	5,736	2,386	20.9
Missing	53	27	0.2	31	12	0.1
Body mass index						
Underweight	224	135	1.2	934	441	3.9
Acceptable weight	8,467	4,713	43.0	12,080	5,584	48.8
Overweight	8,786	4,400	40.2	7,009	2,988	26.1
Obese	3,631	1,634	14.9	3,882	1,538	13.5
Missing	159	75	0.7	1,694	881	7.7
Alcohol-dependent						
No	20,464	10,570	96.5	25,260	11,280	98.7
Yes	587	299	2.7	200	97	0.8
Missing	216	88	0.8	139	55	0.5
Chronic conditions						
Yes	3,085	1,370	12.5	3,973	1,489	13.0
No	18,143	9,563	87.3	21,588	9,927	86.8
Missing	39	24	0.2	38	16	0.1
Disability						
Yes	1,011	462	4.2	2,133	877	7.7
No	20,243	10,490	95.7	23,460	10,550	92.3
Missing	13	5	0.0	6	5	0.0
Self-perceived health						
Excellent	4,994	2,908	26.5	5,486	2,686	23.5
Very good	7,347	3,860	35.2	8,829	3,995	34.9
Good	5,802	2,898	26.4	7,202	3,151	27.6
Fair	2,280	942	8.6	3,023	1,182	10.3
Poor	837	348	3.2	1,052	416	3.6
Missing	7	1	0.0	7	2	0.0
Age group						
20-24	1,506	1,105	10.1	1,713	1,033	9.0
25-34	3,645	2,094	19.1	4,289	2,076	18.2
35-44	4,988	2,616	23.9	5,567	2,651	23.2
45-64	7,244	3,558	32.5	8,017	3,630	31.8
65+	3,884	1,584	14.5	6,013	2,042	17.9
Household income						
Lowest	834	324	3.0	1,322	449	3.9
Lower-middle	1,329	539	4.9	3,248	1,021	8.9
Middle	4,556	2,170	19.8	6,200	2,520	22.0
Upper-middle	7,360	3,710	33.9	7,602	3,548	31.0
Highest	5,337	3,267	29.8	4,514	2,710	23.7
Missing	1,851	947	8.6	2,713	1,184	10.4
Education						
Less than secondary graduation	5,757	2,407	22.0	7,062	2,620	22.9
Secondary graduation	3,877	2,084	19.0	4,879	2,333	20.4
Some postsecondary	1,620	984	9.0	2,039	974	8.5
Postsecondary graduation	9,794	5,384	49.1	11,377	5,395	47.2
Missing	219	98	0.9	242	110	1.0
Marital status						
Married/Common-law	13,826	7,582	69.2	14,545	7,409	64.8
Single	4,514	2,438	22.3	3,943	1,873	16.4
Divorced/Separated/Widowed	2,908	929	8.5	7,072	2,136	18.7
Missing	19	8	0.1	39	14	0.1

Data source: Canadian Community Health Survey, preliminary file, September 2000 to February 2001