

## Article

# Beverage consumption of Canadian adults

by Didier Garriguet

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## Abstract

According to results from the 2004 Canadian Community Health Survey—Nutrition, total beverage consumption among adults declined steadily with age. This reflects drops in the percentage of adults consuming most beverages and in the amounts consumed. While water was the beverage consumed most frequently and in the greatest quantity by adults, for many of them, coffee ranked second. Largely as a result of drinking coffee, more than 20% of men and 15% of women aged 31 to 70 exceeded the recommended maximum of 400 milligrams of caffeine per day. About 20% of men aged 19 to 70 consumed more than two alcoholic drinks a day. Owing to declines in the consumption of soft drinks and alcohol, the contribution of beverages to adults' total calorie intake falls at older ages. Regardless of age, men were generally more likely than women to report drinking most beverages, and those who did, drank more. There were, however, a few exceptions, with higher percentages of women than men reporting that they drank water and tea.

## Keywords

alcohol drinking, caffeine, carbonated beverages, coffee, energy intake, milk, water consumption

## Author

Didier Garriguet (1-613-951-7187; didier.garriguet@statcan.gc.ca) is with the Health Information and Research Division at Statistics Canada, Ottawa, Ontario, K1A 0T6.

**F**luid intake, notably water, is essential for good health.<sup>1</sup> Water plays a role in almost all body functions and is a major component of every cell, tissue and organ. It regulates temperature, transports oxygen and nutrients through the blood, helps get rid of waste, and provides a medium for biological reactions. Water is important for the digestion and absorption of food. It lubricates joints and moistens tissue in the eyes, mouth and nose.

The result of insufficient intake is dehydration, which can contribute to a number of health problems. Over the age of 65, thirst tends to diminish,<sup>2</sup> and individuals are unlikely to drink without consciously thinking about it. Dehydration, in fact, is one of the most frequent causes of hospitalization of elderly people.

While some water comes from solid food, most of it comes from beverages, either as plain water or as part of other beverages such as coffee, tea and soft drinks.

Beverages also make up an important component of nutrition. They contribute to healthy eating by helping to meet Food Guide<sup>3</sup> recommendations for the consumption of dairy products and vegetables and fruits. But beverages, especially those rich in added sugar

such as soft drinks, may take individuals over recommended levels for calorie consumption. As well, beverages are responsible for excess intake of caffeine and alcohol.

This article is an overview of beverage consumption among Canadians aged 19 or older. Based on data from the 2004 Canadian Community Health Survey—Nutrition (CCHS), the analysis examines the type and quantity of beverages consumed, highlighting differences by age and sex. The information from the 2004 CCHS makes it possible to study Canadians' beverage consumption, a topic about which relatively little is known.

All nutrient information from the CCHS, and consequently, in this article, is reported in grams. A gram of water

is roughly the equivalent of one millilitre of water.

### Consumption declines with age

Adults' total beverage consumption drops steadily with age. In 2004, daily beverage consumption of 19- to 30-year-olds averaged 2,610 grams for men and 2,056 grams for women (Table 1). For people aged 71 or older, the figures were substantially lower, at 1,584 grams and 1,532 grams, respectively.

### Water

Water (excluding water in other drinks and foods) was the beverage consumed in the greatest quantity by the greatest number of Canadian adults. The day before they were interviewed, 77% of men and 84% of women aged 19 to 30 drank water, consuming averages of 1,360 and 1,194 grams (Table 2). The proportion of women reporting that they drank water did not change at older ages, but among men, the figure fell to 65% at age 71 or older. However, for both sexes, the average amount of water consumed declined among seniors to 774 grams for men and 799

grams for women. As a result, daily water consumption for the total population aged 71 or older (both consumers and non-consumers) averaged 500 grams for men and 654 grams for women (Table 1).

### Coffee, caffeine and tea

After water, the beverage that the largest proportion of adults reported consuming the day before they were interviewed tended to be coffee (Table 2). In fact, men older than age 50 were more likely to report having had coffee than water. The exception to the trend toward coffee was 19- to 30-year-olds, who were more likely to report having had milk the previous day. As well, the proportion of men in this age group who reported having had regular soft drinks exceeded the proportion who had coffee.

Among those who drank coffee, consumption peaked at ages 31 to 50, averaging 639 grams for men and 586 grams for women. By age 71 or older, the average amounts were considerably lower at 489 grams and 398 grams.

Coffee accounted for almost all the caffeine that adults consumed: 80.6%. (Tea and soft drinks made up 12.3%

and 5.9%.) Caffeine has a number of biological effects resulting from its diuretic and stimulant properties. For some sensitive individuals, these can include restlessness, anxiety, irritability, muscle tremors, insomnia, headaches and abnormal heart rhythms. Health Canada advises healthy adults to limit their daily caffeine intake to 400 milligrams,<sup>4,5</sup> the equivalent of three 8-ounce cups of coffee.

More than 20% of men and around 15% of women in the 31-to-70 age range exceeded the 400 milligram per day recommendation (Figure 1). Not surprisingly, the age and sex patterns of caffeine intake paralleled those of coffee.

Contrary to the trend for most beverages, the proportion of Canadians who reported drinking tea rose steadily with advancing age. Among men, the increase was from 20% at ages 19 to 30 to 49% at age 71 or older; for women, from 30% to 56%. And unlike many other beverages, the amount of tea consumed remained relatively stable regardless of age. For example, among male tea drinkers, 19-to-30-year-olds consumed an average of 525 grams;

**Table 1**  
Average daily consumption (in grams) of selected beverages, by age group and gender, total household population aged 19 or older, Canada excluding territories, 2004

	19 to 30		31 to 50		51 to 70		71 or older	
	Men	Women	Men	Women	Men	Women	Men	Women
	Grams							
Total beverage consumption	2,610 <sup>†</sup>	2,056 <sup>†</sup>	2,345 <sup>†*</sup>	2,206 <sup>†</sup>	2,051 <sup>†*</sup>	1,891 <sup>†</sup>	1,584 <sup>†</sup>	1,532 <sup>†</sup>
Water	1,045	1,000	861 <sup>†*</sup>	1,065	705 <sup>†*</sup>	840 <sup>†</sup>	500 <sup>†*</sup>	654 <sup>†</sup>
Coffee	227 <sup>*</sup>	183	451 <sup>†*</sup>	375 <sup>†</sup>	474 <sup>*</sup>	364	365 <sup>†*</sup>	270 <sup>†</sup>
Tea	105 <sup>*</sup>	136	131 <sup>†*</sup>	178 <sup>†</sup>	174 <sup>†*</sup>	227 <sup>†</sup>	246 <sup>†</sup>	262 <sup>†</sup>
Regular soft drinks	304 <sup>*</sup>	142	193 <sup>†*</sup>	97 <sup>†</sup>	115 <sup>†*</sup>	62 <sup>†</sup>	37 <sup>†</sup>	29 <sup>†</sup>
Diet soft drinks	32	44	61 <sup>†</sup>	69 <sup>†</sup>	53	55	39 <sup>E*</sup>	13 <sup>E†</sup>
Beer	300 <sup>*</sup>	54	232 <sup>†*</sup>	49	174 <sup>†*</sup>	36 <sup>E</sup>	69 <sup>E†*</sup>	9 <sup>E†</sup>
Wine	19 <sup>E</sup>	18 <sup>E</sup>	28	36 <sup>†</sup>	52 <sup>†*</sup>	34	27 <sup>†</sup>	20 <sup>†</sup>
Spirits and liquor	8 <sup>E</sup>	8 <sup>E</sup>	7 <sup>E</sup>	6 <sup>E</sup>	8 <sup>*</sup>	2 <sup>E†</sup>	7 <sup>E*</sup>	2 <sup>E</sup>
Milk	201	178	158 <sup>†</sup>	154	133 <sup>†</sup>	120 <sup>†</sup>	166	136
Milk-based beverages	42 <sup>E</sup>	30	17 <sup>E†</sup>	16 <sup>†</sup>	11 <sup>E</sup>	18 <sup>E</sup>	6 <sup>E†</sup>	8 <sup>E†</sup>
Other types of milk	F	8	6 <sup>E</sup>	8 <sup>E</sup>	4 <sup>E*</sup>	8 <sup>E</sup>	F	5 <sup>E</sup>
Fruit juice	176 <sup>*</sup>	136	108 <sup>†*</sup>	86 <sup>†</sup>	98	80	76 <sup>†</sup>	84
Vegetable juice	10	10	15	12	20	13	12	8
Fruit drinks	135	107	77 <sup>†*</sup>	55 <sup>†</sup>	31 <sup>†</sup>	34 <sup>†</sup>	31	32

\* significantly different from estimate for women of same age ( $p < 0.05$ )

† significantly different from estimate for same sex in preceding age group ( $p < 0.05$ )

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

F suppressed because of extreme sampling variability (coefficient of variation greater than 33.3%)

Note: Fruit and vegetable juice and coolers are included in total beverage consumption.

Source: 2004 Canadian Community Health Survey – Nutrition.

**Table 2**  
**Percentage who consumed selected beverages the previous day and their average daily consumption (in grams), by age group and gender, household population aged 19 or older, Canada excluding territories, 2004**

Beverage	19 to 30		31 to 50		51 to 70		71 or older	
	Men	Women	Men	Women	Men	Women	Men	Women
<b>Percentage who consumed beverage (%)</b>								
Water	77*	84	77*	84	72*†	82	65*†	82
Coffee	40	39	71*†	64†	79*†	74†	75*	68†
Tea	20*	30	27*†	35†	33*†	47†	49*†	56†
Regular soft drinks	47*	27	32*†	21†	22*†	15†	12†	10†
Diet soft drinks	6*	8	9*†	13†	11	12	8*	4 <sup>E†</sup>
Beer	26*	8	26*	8	21*†	6†	12*†	2 <sup>E†</sup>
Wine	5 <sup>E</sup>	6	8*†	13†	17†	15	13	11†
Spirits and liquor	5	5	6	4	8*	3	9*	3
Milk	49	54	57†	61†	56	58	64†	69†
Milk-based beverages	7	8	4†	5†	3	4	2 <sup>E</sup>	3 <sup>E</sup>
Other types of milk	1 <sup>E*</sup>	3 <sup>E</sup>	2 <sup>E*</sup>	3 <sup>E</sup>	2 <sup>E*</sup>	3	2 <sup>E</sup>	2 <sup>E</sup>
Fruit juice	34	34	28†	29	32	33	35	38†
Vegetable juice	2 <sup>E</sup>	4 <sup>E</sup>	4 <sup>E</sup>	5 <sup>E</sup>	6	5	5	4
Fruit drinks	22	22	15†	14†	8†	10†	13†	12
<b>Average daily consumption (grams)</b>								
Water	1,360*	1,194	1,121*†	1,270	974†	1,027†	774†	799†
Coffee	574 *	473	639†	586†	599 *	490†	489*†	398†
Tea	525 *	452	486	501	527	486	507	468
Regular soft drinks	649 *	534	598*	465	519*†	406	321†	305†
Diet soft drinks	577	533	697 *	532	479†	445†	487 <sup>E</sup>	319†
Beer	1,159 *	704	908*†	590	829 *	607	567†	452
Wine	402	291 <sup>E</sup>	340 *	265	304 *	223†	198†	178†
Spirits and liquor	158	173 <sup>E</sup>	112	146 <sup>E</sup>	100 *	68†	78	60
Milk	408*	328	276*†	253†	239*†	206†	260	198
Milk-based beverages	572 <sup>E</sup>	366	381	315	333	401	233	264†
Other types of milk	297 <sup>E</sup>	281	394 <sup>E*</sup>	223	226†	235	229 <sup>E</sup>	217
Fruit juice	523 *	401	382*†	293†	310*†	245†	221†	221†
Vegetable juice	417 *	253	342	260	318 <sup>E</sup>	252	236	216
Fruit drinks	610 *	496	497*†	391†	369†	326	236†	257†

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

\* significantly different from estimate for women of same age (p < 0.05)

† significantly different from estimate for same sex in preceding age group (p < 0.05)

Note: Fruit and vegetable juice and coolers are included in total beverage consumption.

Source: 2004 Canadian Community Health Survey – Nutrition.

those aged 71 or older averaged 507 grams.

### Soft drinks

Adults' consumption of regular soft drinks drops sharply at older ages. While close to half of men (47%) and over a quarter of women (27%) aged 19 to 30 reported having consumed regular soft drinks the previous day, by age 71 or older, the figure was around 10% for both sexes. Also, the quantity consumed fell in successively older age groups. For instance, male soft drink consumers aged 19 to 30 averaged 649 grams, about twice the intake of those aged 71 or older (321 grams).

Relatively few adults reported drinking diet soft drinks. The highest proportion was around 10% at ages 31 to 70. However, those who had diet soft drinks tended to drink just as much as those who reported consuming regular soft drinks. For example, women aged 19 to 30 who reported consuming diet soft drinks drank an average of 534 grams; those who reported regular soft drinks drank an average of 533 grams.

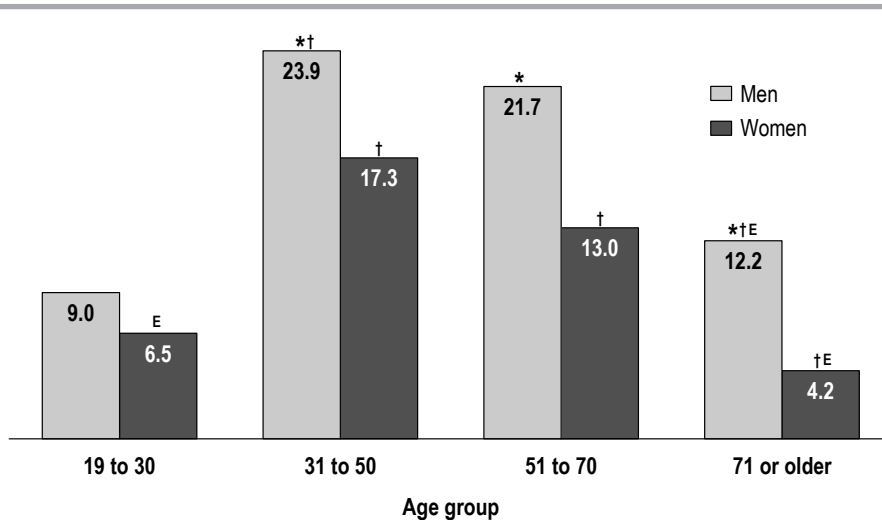
### Alcoholic beverages

Because alcohol consumption varies considerably depending on the occasion, it is difficult to determine a "usual"

level. As well, alcohol consumption is subject to under-reporting.<sup>6</sup> The Centre for Addiction and Mental Health has established guidelines for low-risk drinking: a maximum of 14 drinks a week for men and 9 drinks a week for women, and no more than two drinks per occasion.<sup>7</sup> While the proportions exceeding these weekly recommendations cannot be determined from the CCHS, it is possible to calculate daily alcohol intake. At ages 19 to 70, about 20% of men and 8% of women reported usually consuming more than two drinks per day (Figure 2).

For men, beer was, the alcoholic beverage consumed by the largest proportions and in the greatest quantities.

**Figure 1**  
**Percentage with usual daily caffeine intake greater than 400 milligrams, by gender and age group, household population aged 19 or older, Canada excluding territories, 2004**



\* significantly different from estimate for women of same age ( $p < 0.05$ )

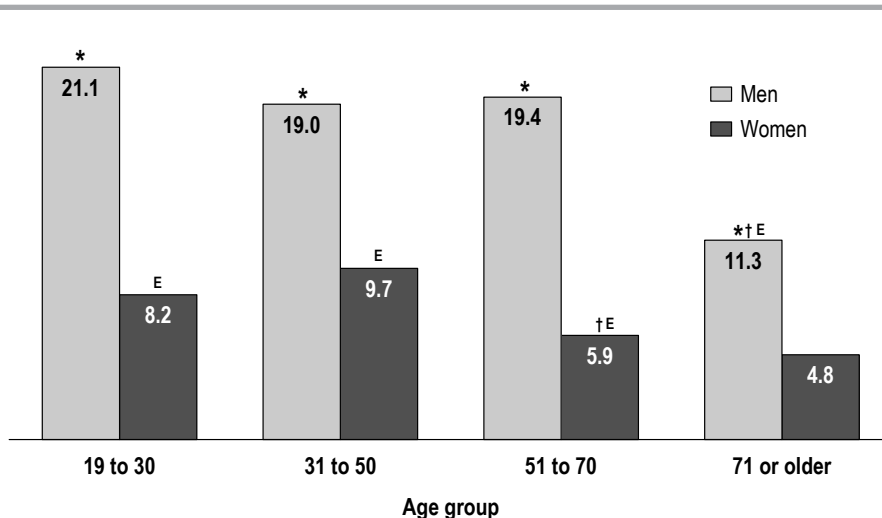
† significantly different from estimate for same sex in previous age group ( $p < 0.05$ )

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

**Note:** Excludes pregnant and breastfeeding women. Two outliers were excluded in 31-to-50 female category (intake greater than 5,000 mg). Estimated with the NCI method.<sup>8</sup> Probability of consuming and amount consumed were adjusted for weekend/weekday and smoking status.

**Source:** 2004 Canadian Community Health Survey – Nutrition.

**Figure 2**  
**Percentage with usual daily alcohol intake greater than 27.2 grams (two standard drinks), by gender and age group, household population aged 19 or older, Canada excluding territories, 2004**



\* significantly different from estimate for women of same age ( $p < 0.05$ )

† significantly different from estimate for same sex in preceding age group ( $p < 0.05$ )

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

**Note:** Excludes pregnant and breastfeeding women. Estimated with the NCI method.<sup>8</sup> Probability of consuming and amount consumed were adjusted for weekend/weekday and for frequency of drinking alcohol in past 12 months.

**Source:** 2004 Canadian Community Health Survey – Nutrition.

The people most likely to consume beer were men aged 19 to 50, 26% of whom reporting drinking beer the day before they were interviewed; at age 71 or older, the proportion was 12%. The quantity of beer that male consumers reported fell from an average of 1,159 grams (more than three bottles) at ages 19 to 30 to 567 grams (just over one bottle) at age 71 or older.

Much smaller proportions of women reported drinking beer. For example, 8% of women aged 19 to 30 drank beer the previous day, averaging 704 grams. At age 71 or older, 2% of women reported beer consumption.

For both sexes, the proportion consuming wine rose from around 5% at ages 19 to 30 to approximately 16% at ages 51 to 70. However, among wine drinkers, the average amount consumed was highest at ages 19 to 30 (402 grams for men; 291 grams for women). By age 71 or older, average consumption was 198 grams for men and 178 grams for women.

Fewer than 10% of adults reported drinking liquor or spirits the day before the interview. The average amount that they drank was around 160 grams at ages 19 to 30; by age 71 or older, the average was halved to about 75 grams.

### Milk and fruit juice

Beverages help in meeting recommendations from Canada's Food Guide<sup>3</sup> for the consumption of dairy products (for example, milk) and vegetables and fruit (for example, fruit juice).

The proportion of adults who reported drinking milk tended to rise with age, from about half of 19- to 30-year-olds to around two-thirds of seniors aged 71 or older. Nonetheless, the average amount of milk they consumed dropped with advancing age. At ages 19 to 30, amounts averaged 408 grams for men and 328 grams for women; by age 71 or older, the averages were 260 and 198 grams, respectively. As a result, overall daily milk intake by people age 71 or older (consumers and non-

## *The data*

This article is based on data from the 24-hour dietary recall component of the 2004 CCHS. Respondents were asked to list all foods and beverages consumed during the 24 hours before the day of their interview (midnight to midnight). Interviewers used the Automated Multi-pass Method,<sup>9,10</sup> with a five-step approach to help respondents remember what they had to eat and drink:

- a quick list (respondents reported all foods and beverages consumed in whatever order they wished);
- questions about specific food categories and frequently forgotten foods;
- questions about the time of consumption and type of meal (for example, lunch, dinner);
- questions seeking more detailed, precise descriptions of foods and beverages and quantities consumed; and
- a final review.

A subsample of the population responded to a second 24-hour recall a few days later to help assess day-to-day variations in food and beverage intake. The energy and nutrient content of the food and beverages was derived from Health Canada's Canadian Nutrient File 2001b, Supplement.<sup>11</sup>

A total of 35,107 people completed the initial 24-hour dietary recall, and a subsample of 10,786 completed the second recall. Response rates were 76.5% and 72.8%, respectively. Thirty-eight invalid or "null" recalls were excluded.

The first 24-hour recall for 20,159 adults aged 19 or older was used to estimate average beverage consumption. Usual intakes of caffeine and alcohol were based on both recalls, excluding 244 pregnant or breastfeeding women, and were estimated using the NCI method<sup>8</sup> in a two-part model: first, estimating the probability of consuming in a logistic regression model; second, estimating the amount consumed in a non-linear mix model. Both parts of the model were estimated simultaneously to account for the correlation between the probability of consuming and the amount consumed. As well, both parts of the caffeine model were adjusted by weekend/weekday and by *smoking status* (daily smoker, occasional smoker, non-smoker). Alcoholic beverages were listed in the 24-hour dietary recall of the CCHS, and in addition, a question in the general component of the survey asked about the frequency of alcohol consumption. Both parts of the alcohol model were adjusted by weekend/ weekday and by *frequency of drinking alcohol in the past 12 months* (never, less than once a month, once a month, 2 to 3 times a month, once a week, 2 to 3 times a week, 4 to 6 times a week, everyday).

The bootstrap method, which accounts for the complex survey design, was used to estimate standard errors, coefficients of variation, and confidence intervals.<sup>12,13</sup> The significance level was set at  $p < 0.05$ .

The beverage categories are based in groupings created by Health Canada's Bureau of Nutritional Sciences. Recipes and basic foods have separate categories. The categories were revised to eliminate double-counting. Beverages used in food recipes belonging to a non-beverage food category (milk in a cake recipe, for example) are excluded from the beverage categories.

The *water* category refers to municipal, bottled, well and distilled water consumed as such. It excludes water required to prepare another beverage (for instance, water in coffee is included in the coffee category).

The *milk* category includes all milk regardless of fat content, evaporated milk and milk added to tea or coffee. It also includes goat milk and infant formulas. Condensed milk and milk added to ready-to-eat or hot cooked cereals (on average, 45 grams a day) are excluded.

The *fruit juice* category refers to 100% pure juice, and includes the juice portion of alcoholic beverages and juice recipes (concentrate and water), whereas the *fruit drinks* category comprises beverages that contain less than 100% fruit juice.

The *tea* and *coffee* category excludes added items such as cream and sugar.

Alcoholic beverages are split into three categories: alcoholic *beer*, *wine* and *spirits and liquor*. In the last category, only the alcohol ingredient in a drink is included.

The methods used to gather information about food and beverage consumption are generally associated with some under-reporting. The 24-hour dietary recall is not exempt from this problem, even when the Automated Multiple-pass Method, which maximizes respondent recall, is used. Another report<sup>14</sup> has estimated calorie under-reporting at close to 10% for CCHS respondents aged 12 or older. Under-reporting of beverages strongly correlates with that of calories.

It is possible that some traces of a beverage category are found in another category in cases where it is impossible to separate certain ingredients in a mixture.



consumers) averaged 166 grams for men and 136 grams for women (Table 1).

For the total adult population, milk contributed approximately a half serving of dairy products to the daily diet. Adults' consumption of all dairy products, however, was relatively low, with more than two-thirds not exceeding two servings a day.<sup>15</sup>

The proportion of adults reporting fruit juice consumption varied little by age and sex—about one-third. However, similar to milk, quantities consumed dropped off sharply at older ages, from an average of 523 grams for men and 401 grams for women aged 19 to 30 to 221 grams for both sexes aged 71 or older.

For the total adult population (consumers and non-consumers), fruit juice consumption amounted to slightly more than one serving of vegetables and fruit at ages 19 to 30 and two-thirds of a serving at age 71 or older.

Around half of Canadian adults failed to meet the five daily servings of vegetables and fruit<sup>15</sup> recommended by the 1992 Food Guide, which was in effect when the 2004 CCHS was conducted (recommended levels were raised in 2007<sup>3</sup>). Even with the addition of vegetable juice, beverages generally made up less than one serving in this food group.

### Energy intake from beverages

Depending on age, beverages can account for a substantial share of daily calories. Most of these calories come from regular soft drinks, alcohol, milk, fruit juice and fruit drinks.

**Table 3**  
**Percentage of daily calories derived from beverages, by gender and age group, household population aged 19 or older, Canada excluding territories, 2004**

Age group	Men		Women	
	%			
19 to 30	20.4*	17.9		
31 to 50	16.0*†	14.3†		
51 to 70	14.7*†	12.2†		
71 or older	12.0†	11.3		

\* significantly different from estimate for women of same age (p < 0.05)

† significantly different from estimate for same sex in preceding age group (p < 0.05)

Note: Excludes pregnant and breastfeeding women.

Source: 2004 Canadian Community Health Survey – Nutrition.

At ages 19 to 30, beverages made up more than 20% of men's daily energy intake and about 18% of that of women (Table 3). The proportions fell with age, largely because of lower consumption of sweetened beverages (regular soft drinks and fruit drinks) and alcohol.

### Comparison with the United States

According to a similar study of beverage consumption, based on 1999-2002 National Health and Nutrition Examination Survey data,<sup>16</sup> young adults in the United States drank slightly less fruit juice, milk products and coffee than did their Canadian counterparts (aged 20 to 39). However, in this age range, Americans consumed more than twice the amount of soft drinks, compared with Canadians.

In fact, the pattern of greater soft drink intake in the United States applied to all age groups. Tea consumption was the only other major difference between Canada and the US, with middle-aged Canadians (aged 40 to 59) drinking less, and older ones (aged 60 or older) drinking more. The American study did not examine water and alcoholic beverages.

### Conclusion

What Canadian adults drank in 2004 depended on their age and sex. However, with one exception, the top three choices in 2004 were water, coffee and milk (though not necessarily in that order). The exception was men aged 19 to 30, among whom regular soft drinks ranked third in terms of the percentage reporting consumption.

How much of each beverage was consumed also depended on age and sex, with men typically drinking more than women, and amounts generally declining at older ages.

Some beverages tended to be consumed in greater quantities than others. Men and women of all ages who drank water reported drinking more of it than did consumers of any other beverage. Coffee, tea and diet soft drinks were also consumed in relatively large quantities.

These beverage consumption patterns were reflected in caffeine intake. At ages 31 to 70, around one in five adults exceeded Health Canada guidelines for caffeine consumption. ■

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