

Regional differences in obesity

by Margot Shields and Michael Tjepkema

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In 2004, nearly one-quarter (23%) of Canadians aged 18 or older were obese, and an additional 36% were overweight (data not shown). This means that close to 6 in 10 adults had excess body weight. Excess weight was also apparent among children and adolescents: 8% were obese and 18% were overweight, for a combined obesity/overweight prevalence of 26% among 2- to 17-year-olds.

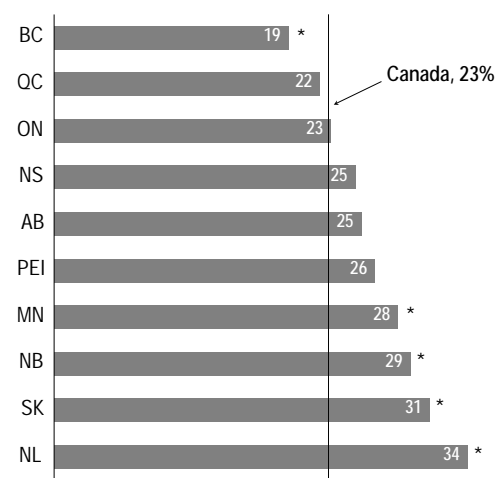
These estimates of obesity and overweight are based on data from the 2004 Canadian Community Health Survey: Nutrition, and were derived using body mass index (BMI) (see *Body mass index*). The 2004 CCHS was the first time in many years that interviewers measured the height and weight of a nationally representative sample of Canadians. Most previous surveys relied on respondents to report their height and weight, a practice that tends to underestimate the prevalence of obesity and overweight.¹⁻⁴

This article examines provincial and urban-rural differences in the percentage of Canadians who have excess weight. Comparisons for adults focus on obesity, the weight category associated with the greatest health risks.⁵ Because small sample sizes prevent a separate examination of obesity for children and adolescents, comparisons for 2- to 17-year olds reflect the obese and overweight categories combined.

Adults

In 2004, the prevalence of obesity among adults varied by province. Compared with the national average of 23%, percentages were relatively high among residents of Newfoundland and Labrador

Chart 1
Percentage obese, by province, household population aged 18 or older, Canada excluding territories, 2004



Data source: 2004 Canadian Community Health Survey: Nutrition
* Significantly different from estimate for Canada ($p < 0.05$)

(34%), Saskatchewan (31%), New Brunswick (29%) and Manitoba (28%) (Chart 1). On the other hand, at 19%, the prevalence of obesity was significantly low in British Columbia.

In general, adults living in cities (census metropolitan areas or CMAs – see *Definitions*) were less likely than those outside CMAs to be obese: 20% versus 29% (Chart 2, Table 1). The prevalence of obesity was significantly lower among CMA than non-CMA residents in Nova Scotia, Ontario, Manitoba, Alberta and British Columbia, and approached significance in Quebec ($p=0.08$). However, in Newfoundland and Labrador, New Brunswick and Saskatchewan, the prevalence of obesity among adults in CMAs and non-CMAs did not differ significantly.

Table 1

Percentage obese or obese/overweight, by selected geographical factors, household population aged 18 or older, Canada excluding territories, 2004

	Estimated population	Obese	Obese/ Overweight
	'000	%	%
Canada	23,985	23.1	59.1
CMA†	15,660	20.2	56.0
Non-CMA	8,325	28.5 ↑	65.1↑
Newfoundland and Labrador	405	33.9 ↑	71.0↑
CMA	159	36.4	70.0
Non-CMA	246	32.3	71.6
Prince Edward Island	104	26.3	66.5↑
Nova Scotia	719	24.7	59.7
CMA	284	18.4 ^E	47.8
Non-CMA	435	28.8 ↑	67.4↑
New Brunswick	570	29.2 ↑	64.4
CMA	124	34.7 ^E	68.9
Non-CMA	446	27.7	63.2
Quebec	5,820	21.8	56.3
CMA	3,706	19.5	53.3
Non-CMA	2,115	25.8	61.6↑
Ontario	9,304	22.7	58.6
CMA	6,772	20.8	57.0
Non-CMA	2,532	27.6 ↑	62.8
Manitoba	827	28.2 ↑	62.5
CMA	525	25.2	58.2
Non-CMA	301	33.5 ↑	70.0↑
Saskatchewan	703	30.8 ↑	68.1↑
CMA	298	29.4	61.3
Non-CMA	405	31.9	73.2↑
Alberta	2,346	25.2	60.9
CMA	1,711	22.6	58.4
Non-CMA	634	32.2 ↑	67.6
British Columbia	3,189	19.2 ↓	59.0
CMA	2,081	13.3	53.5
Non-CMA	1,108	30.2 ↑	69.4↑
Metropolitan Zone			
CMA (population 2+ million)	8,069	16.6 ↓	51.3↓
CMA (population 100,000 to <2 million)	7,592	24.2	60.9
CA‡ (population 10,000 to <100,000)	3,907	29.9 ↑	63.8↑
Strong MIZ§	1,111	23.9	62.6
Moderate MIZ§	1,710	26.5	68.3↑
Weak MIZ§	1,397	28.4 ↑	64.6↑
No MIZ§	199	43.5 ↑	80.6↑

Data source: 2004 Canadian Community Health Survey: Nutrition
Notes: Reference group for province and metropolitan zone is Canada; for non-CMA, reference group is CMA.

† Census metropolitan area

‡ Census agglomeration

§ Metropolitan influenced zone

↑ Significantly higher than estimate for reference group ($p < 0.05$)

↓ Significantly lower than estimate for reference group ($p < 0.05$)

E Coefficient of variation 16.6% to 33.3% (interpret with caution)

There was far less provincial variability in obesity prevalence when non-CMA residents were considered. The only province where the non-CMA obesity estimate differed significantly from the national estimate (29%) was Manitoba, at 34%.

The size of the CMA in which adults lived was also related to their likelihood of being obese (Chart 3). In CMAs with a population of at least

Body mass index

Body mass index (BMI), a measure of weight adjusted for height, is calculated as follows:

Metric: $BMI = \text{weight (kilograms)} / \text{height (metres)}^2$

Non-metric: $BMI = (\text{weight (pounds)} / \text{height (inches)}^2) \times 703$

Two BMI categories are identified in this article, according to standards adopted by Health Canada for classifying excess weight in adults:⁵

Overweight (BMI 25.0 to 29.9)

Obese (BMI 30.0 or more)

For example, the weight ranges that would place an individual whose height is 1.78m (5'10") in the overweight and obese categories are:

	kilograms	pounds
<i>Overweight</i>	79.1 - 94.8	174 - 208
<i>Obese</i>	94.9+	209+

The overweight category is associated with increased health risks; the obese category, with a high risk of developing health problems.

Recently, the International Obesity TaskForce (IOTF) agreed on an approach to measure overweight and obesity among children and adolescents.⁶ The group recommended extrapolating the adult cut-points of 25 and 30 to create sex- and age-specific values for children and adolescents. Based on data collected between 1963 and 1993 from the United States, Great Britain, the Netherlands, Brazil, Hong Kong and Singapore, BMI centile curves that passed through the points of 25 and 30 at age 18 were derived. The obesity/overweight estimates for 2- to 17-year-olds in this analysis are based on the IOTF criteria. (See *Calculating overweight and obesity in children and adolescents* in Shields in this issue for the cut-points.)

2 million, 17% were obese. The figure was 24% in CMAs with a population of 100,000 to 2 million, and 30% in census agglomerations (CAs), which are urban centres with a population of 10,000 to 100,000.

Small sample sizes make it difficult to examine the prevalence of obesity in specific CMAs; therefore, results should be interpreted with caution. The prevalence was relatively low among adults in the two largest CMAs—Toronto (16%) and Vancouver (12%)—while a high proportion of adults in St. John’s were obese (36%) (Table 2).

When the combined obesity/overweight estimates for specific CMAs were compared with the national figure (59%), other differences emerged. The estimate was high for adults in Hamilton (74%) and St. Catharine’s-Niagara (69%), and low for those in Montréal (52%). The

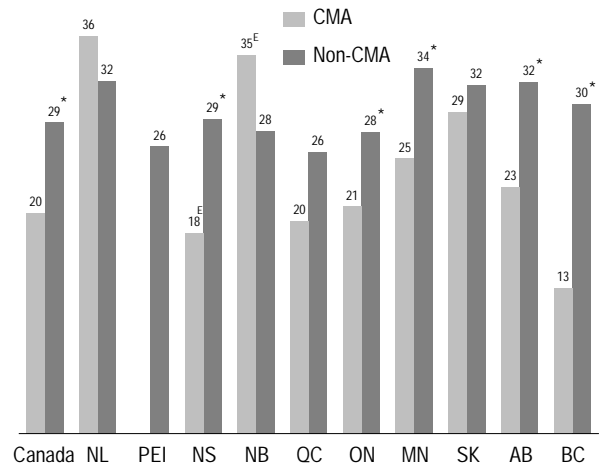
Definitions

Census metropolitan areas (CMAs) and census agglomerations (CAs) (<http://www12.statcan.ca/english/census01/Products/Reference/dict/geo009.htm>) consist of one or more adjacent municipalities situated around a major urban core. To form a CMA, the urban core must have a population of at least 100,000. To form a CA, the urban core must have a population of at least 10,000.

Census metropolitan area and census agglomeration influenced zones (MIZ) are used to classify municipalities not included in a CMA or CA (<http://www12.statcan.ca/english/census01/Products/Reference/dict/geo010.htm>). Municipalities are assigned to one of four categories depending on the percentage of residents who commute to work in the urban core of a CMA or CA:

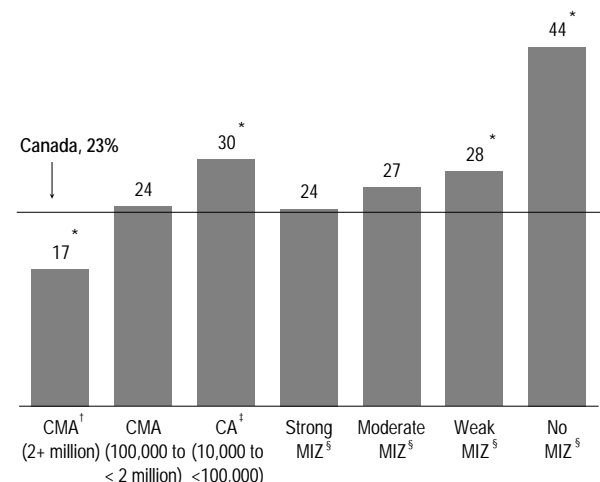
- Strong MIZ: more than 30% of residents commute to work in a CMA or CA.
- Moderate MIZ: 5% to 30% of residents commute to work in a CMA or CA.
- Weak MIZ: 0% to 5% of residents commute to work in a CMA or CA.
- No MIZ: fewer than 40 or no residents commute to work in a CMA or CA.

Chart 2
Percentage obese, by province and CMA[†]/non-CMA residence, household population aged 18 or older, Canada excluding territories, 2004



Data source: 2004 Canadian Community Health Survey: Nutrition
[†] Census metropolitan area
 * Significantly different from estimate for CMA ($p < 0.05$)
^E Coefficient of variation 16.6% to 33.3% (interpret with caution)

Chart 3
Percentage obese, by metropolitan zone, household population aged 18 or older, Canada excluding territories, 2004



Data source: 2004 Canadian Community Health Survey: Nutrition
[†] Census metropolitan area
[‡] Census agglomeration
[§] Metropolitan influenced zone
 * Significantly different from estimate for Canada ($p < 0.05$)

Table 2

Percentage obese or obese/overweight, by census metropolitan area, household population aged 18 or older, Canada excluding territories, 2004

	Estimated population '000	Obese		Overweight/Obese	
		%	Significantly different from:	%	Significantly different from:
Canada	23,985	23.1		59.1	
Newfoundland and Labrador					
St. John's	405 159	33.9 36.4	↑	71.0 70.0	↑
Nova Scotia					
Halifax	719 284	24.7 18.4 ^E	↓	59.7 47.8	↓
New Brunswick					
Saint John	570 124	29.2 34.7 ^E		64.4 68.9	
Quebec					
Saguenay	5,820 141	21.8 18.9 ^E		56.3 52.3	
Québec	552	17.3 ^E		56.8	
Sherbrooke	97	F		52.4	
Trois-Rivières	139	F		56.6 ^F	
Montréal	2,577	21.2		51.6	↓ ↓
Gatineau	199	F		63.6	
Ontario					
Ottawa	9,304 636	22.7 19.7 ^E		58.6 62.0	
Kingston	81	28.9 ^E		70.1	
Oshawa	208	29.6 ^E		63.5	
Toronto	3,772	15.6	↓ ↓	50.9	↓ ↓
Hamilton	452	34.6 ^E	↑	74.3	↑ ↑
St. Catherine's/ Niagara	346	23.1 ^E		69.3	↑ ↑
Kitchener	450	30.7		62.3	
London	470	26.6 ^E		61.6	
Windsor	99	33.2 ^E		56.5 ^F	
Greater Sudbury	72	26.1 ^E		62.1	
Thunder Bay	185	32.6 ^E		60.0	
Manitoba					
Winnipeg	827 525	28.2 25.2	↓	62.5 58.2	↓
Saskatchewan					
Regina	703 151	30.8 31.8 ^E		68.1 58.1	
Saskatoon	147	27.0 ^E		64.5	
Alberta					
Calgary	2,346 765	25.2 25.7		60.9 53.8	↓
Edmonton	946	20.1	↓	62.2	
British Columbia					
Vancouver	3,189 110	19.2 25.0 ^E	↓ ↓	59.0 58.3	↓
Victoria	1,720 251	11.7 ^E 19.0 ^E		51.8 62.6	

Data source: 2004 Canadian Community Health Survey: Nutrition
 ↑ Significantly higher than estimate for Canada/province ($p < 0.05$)
 ↓ Significantly lower than estimate for Canada/province ($p < 0.05$)
 E Coefficient of variation 16.6% to 33.3% (interpret with caution)
 F Coefficient of variation greater than 33.3% (suppressed because of extreme sampling variability)

prevalence of obesity/overweight was also low in Halifax (48%), but only approached statistical significance ($p=0.055$).

Commuting patterns

Municipalities outside CMAs and CAs are assigned to one of four categories depending on the percentage of residents who commute to a CMA or CA to work. This percentage, known as MIZ, determines whether a given municipality is considered to be a strongly influenced zone, a moderately influence zone, a weakly influenced zone, or a zone that is not influenced (see *Definitions*).

The prevalence estimates of obesity among adults living in strongly influenced or moderately influenced zones were similar to the national figure (23%): 24% and 27%, respectively (Table 1, Chart 3). Obesity was significantly more prevalent among adults in weakly influenced zones (28%).

Data source

Data from the 2004 Canadian Community Health Survey: Nutrition were used to estimate the prevalence of overweight and obesity among the population aged 2 or older. The 2004 CCHS was designed to gather information about the nutritional status of Canadians at the provincial level (<http://www.statcan.ca/english/concepts/hs/index.htm>). The survey does not include residents of the three territories, Indian reserves, institutions and some remote areas; full-time members of the regular Armed Forces; and civilian residents of military bases. The response rate was 76.5%.

Among those who responded to the CCHS, measurements of height and weight were obtained for 57.5% of adults aged 18 or older (12,428) and 65.5% of 2- to 17-year-olds (8,661), yielding overall response rates of 44% and 50%, respectively. (See *Limitations* in Tjepkema and Shields in this issue, for more information about non-response.)

To account for the multi-stage sample design of the CCHS, the bootstrap technique was used to calculate coefficients of variation and to test for statistical significance of differences between prevalence estimates.^{7,8}

And residents of non-influenced zones were almost twice as likely to be obese (44%), compared with the national average.

Urban sprawl, immigrants

Studies based on US data have found associations between obesity and urban sprawl, which is a pattern of development in metropolitan areas whereby large percentages of the population live in lower-density residential areas. Although a measure of urban sprawl is not available in the CCHS, the finding that residents of municipalities farthest from urban centres are the most likely to be obese is consistent with the American research. It has been suggested that the consequences of urban sprawl include increased reliance on automobiles, decreased motivation to walk to destinations, and reduced opportunities for exercise because of the time required to travel to recreational facilities.⁹

A possible explanation for the low obesity rates in the largest cities is the tendency for immigrants to settle in these areas. Immigrants, particularly recent arrivals, are less likely to be obese than are people born in Canada.¹⁰ Nonetheless, the relatively low prevalence of obesity among CMA residents persisted when examined in a multivariate model that controlled for immigrant status and number of years since immigrating (data not shown).

Fewer differences for children

The prevalence of obesity/overweight among children and adolescents tended to be high in the Atlantic provinces (Chart 4, Table 3). The proportion of 2- to 17-year olds who were obese/overweight was above the national level (26%) in Newfoundland and Labrador (36%), New Brunswick (34%) and Nova Scotia (32%), as well as in Manitoba (31%). Children and adolescents in Alberta (22%) and Quebec (23%) were less likely to be obese/overweight.

Excess weight among children and adolescents was generally not related to urban-rural residence

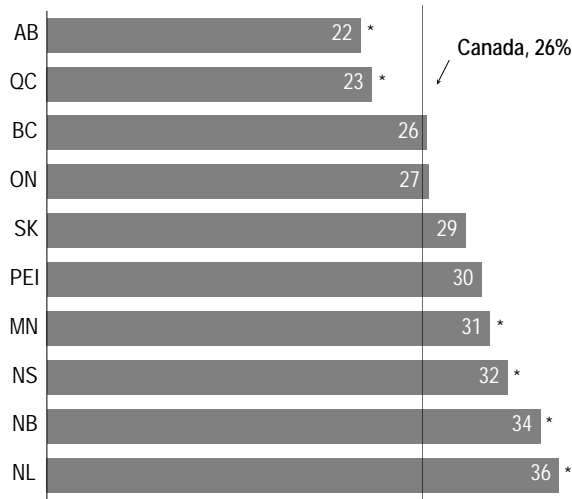
Table 3
Percentage obese/overweight, by selected geographical factors, household population aged 2 to 17, Canada excluding territories, 2004

	Estimated population '000	Obese/ Overweight %
Canada	6,184	26.2
CMA†	3,802	25.8
Non-CMA	2,382	27.0
Newfoundland and Labrador	93	35.6 ↑
CMA	31	31.5 ^E
Non-CMA	62	37.7
Prince Edward Island	29	30.2
Nova Scotia	172	32.0 ↑
CMA	51	32.0
Non-CMA	120	32.0
New Brunswick	138	34.3 ↑
CMA	37	38.6 ^E
Non-CMA	101	32.7
Quebec	1,368	22.6 ↓
CMA	829	23.0
Non-CMA	539	21.9
Ontario	2,513	27.5
CMA	1,775	27.3
Non-CMA	738	27.9
Manitoba	234	30.8 ↑
CMA	139	32.1
Non-CMA	95	29.0
Saskatchewan	197	29.1
CMA	68	29.8 ^E
Non-CMA	129	28.8
Alberta	669	21.8 ↓
CMA	406	18.6 ↓
Non-CMA	263	26.9
British Columbia	772	26.4
CMA	467	26.3
Non-CMA	305	26.5
Metropolitan Zone		
CMA (population 2+ million)	1,917	26.6
CMA (population 100,000 to <2 million)	1,886	24.9
CA‡ (population 10,000 to <100,000)	1,086	27.7
Strong MIZ§	361	29.8
Moderate MIZ	438	22.8
Weak MIZ	442	27.1
No MIZ	55	29.3 ^E

Data source: 2004 Canadian Community Health Survey: Nutrition
Notes: Reference group for province and metropolitan zone is Canada; for non-CMA, reference group is CMA.
 † Census metropolitan area
 ‡ Census agglomeration
 § Metropolitan influenced zone
 ↑ Significantly higher than estimate for reference group ($p < 0.05$)
 ↓ Significantly lower than estimate for reference group ($p < 0.05$)
 E Coefficient of variation 16.6% to 33.3% (interpret with caution)

Chart 4

Percentage obese/overweight, by province, household population aged 2 to 17, Canada excluding territories, 2004



Data source: 2004 Canadian Community Health Survey: Nutrition
* Significantly different from estimate for Canada ($p < 0.05$)

(Table 3). At the national level, the proportion who were obese/overweight was similar in large CMAs, smaller CMAs, CAs and the four MIZ groups. The only province with a significant difference was Alberta, where 2- to 17-year-old CMA residents were less likely to be obese/overweight than were those in non-CMAs.

In a small number of CMAs, the prevalence of obesity/overweight among children and adolescents differed significantly from the national level (26%). The proportion was high in Gatineau (48%), Kingston (46%) and Winnipeg (32%), and low in Québec City (15%), Ottawa (16%) and Calgary (16%) (Table 4). Again, these differences are based on small sample sizes.

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Table 4

Percentage obese/overweight, by census metropolitan area, household population aged 2 to 17, Canada excluding territories, 2004

	Estimated population '000	Obese/Overweight	
		%	Significantly different from: Canada Province
Canada	6,184	26.2	
Newfoundland and Labrador	93	35.6	
St. John's	31	31.5 ^E	
Nova Scotia	172	32.0	
Halifax	51	32.0	
New Brunswick	138	34.3	
Saint John	37	38.6 ^E	
Quebec	1,368	22.6	
Saguenay	50	24.3 ^E	
Québec	117	14.5 ^E	↓
Sherbrooke	37	F	
Trois-Rivières	26	F	
Montréal	552	23.0	
Gatineau	46	48.1 ^E	↑ ↑
Ontario	2,513	27.5	
Ottawa	176	16.3 ^E	↓ ↓
Kingston	18	46.4 ^E	↑ ↑
Oshawa	81	33.3 ^E	
Toronto	1,009	28.3	
Hamilton	124	24.5 ^E	
St. Catherine's/Niagara	76	31.8 ^E	
Kitchener	97	32.0 ^E	
London	82	28.3 ^E	
Windsor	39	21.1 ^E	
Greater Sudbury	28	22.4 ^E	
Thunder Bay	43	27.0 ^E	
Manitoba	234	30.8	
Winnipeg	139	32.1	↑
Saskatchewan	197	29.1	
Regina	29	22.0 ^E	
Saskatoon	39	35.7 ^E	
Alberta	669	21.8	
Calgary	214	16.0 ^E	↓ ↓
Edmonton	192	21.4 ^E	
British Columbia	772	26.4	
Abbotsford	65	19.4 ^E	
Vancouver	355	27.4	
Victoria	47	27.2 ^E	

Data source: 2004 Canadian Community Health Survey: Nutrition

↑ Significantly higher than estimate for Canada/province ($p < 0.05$)

↓ Significantly lower than estimate for Canada/province ($p < 0.05$)

E Coefficient of variation 16.6% to 33.3% (interpret with caution)

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

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