

# Updating the Canadian Obesity Maps: An Epidemic in Progress

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## ABSTRACT

**OBJECTIVES:** Obesity is a growing problem in Canada and worldwide. While obesity maps that convey changing rates over time and geography provide a useful way to convey such information, regional obesity surveillance maps for Canada have not been published since 1998. This research provides a summary of changing Canadian obesity rates since that time.

**METHODS:** We computed estimated obesity rates for provinces and territories across Canada from 2000 to 2011. Data were based on Canadian Community Health Survey and corrected for self-report bias. Data reporting the estimated percent of the adult population who are obese were mapped over time overall and by sex according to Canadian province and territory.

**RESULTS:** The data indicate that the estimated prevalence of obesity across Canada has continued to increase over the past 11 years. Current rates exceed 30% in the Maritime provinces (Newfoundland, New Brunswick, Nova Scotia, Prince Edward Island) and in two territories (Northwest Territory, Nunavut). Data for men and women are generally consistent. The major increase in obesity appears to have occurred in the first part of this period, with relatively stable rates found from 2008 to 2011. However, obesity rates are still climbing, warranting continued surveillance efforts.

**CONCLUSION:** Maps showing changing regional obesity rates provide a compelling pan-Canadian portrait that can lead to an impetus for action for the public, health care providers, and decision makers. Such colour-coded maps offer an efficient way to convey complex data that transcends language differences and personalizes the data for the viewer.

**KEY WORDS:** Canada/epidemiology; obesity/epidemiology; geography

La traduction du résumé se trouve à la fin de l'article.

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Although obesity is a preventable condition, rates worldwide have doubled since 1980.<sup>1</sup> Being overweight or obese is the fifth leading risk factor for global deaths,<sup>1</sup> and excess weight significantly increases the risk of chronic illnesses such as cardiovascular disease, stroke, diabetes, and some cancers.<sup>2,3</sup> While it is perceived as a problem predominantly in industrialized nations, obesity is now a growing concern in developing countries<sup>4</sup> and poses a financial burden in many regions. In Canada, the estimated cost of obesity to the economy was \$4.6 billion in 2008, up approximately 20% from the year 2000.<sup>5</sup>

While province-specific Canadian data have been collected on an ongoing basis, and the epidemic rise in obesity has been noted in reports such as the recent Public Health Agency of Canada report, *Obesity in Canada*,<sup>5</sup> provincial obesity surveillance maps have not been published since 2002, when data from the 1995 to 1998 period were presented.<sup>6</sup> Our approach to data presentation – using colour-coded depictions of changes in obesity rates over time – is a graphic way to communicate the changing prevalence of obesity that is appropriate for both public and professional audiences. The purpose of this paper is to update Canada's obesity maps with data collected between 2000 and 2011 to more accurately reflect estimated obesity rates across Canada.

## METHODS

Sources of data were extracted from the Canadian Community Health Survey (CCHS); data included self-reported height and weight for 2000, 2003, 2005, and 2007-11. The data were drawn

from annual health indicator profiles for each province as reported on the Statistics Canada website,<sup>7</sup> except for the year 2000, where data were provided in response to a request to Statistics Canada.<sup>8</sup>

Body mass index (BMI) was calculated for all eligible respondents aged 18 and older based on their self-reported heights and weights,

**Table 1.** Estimated Prevalence of Obesity in the Canadian Population From 2003-2011, Adjusted Self-reported Data

Year	CCHS % Self-reported Obesity Rate
2003	22.3
2005	22.8
2007	23.8
2008	24.2
2009	24.9
2010	25.1
2011	25.3

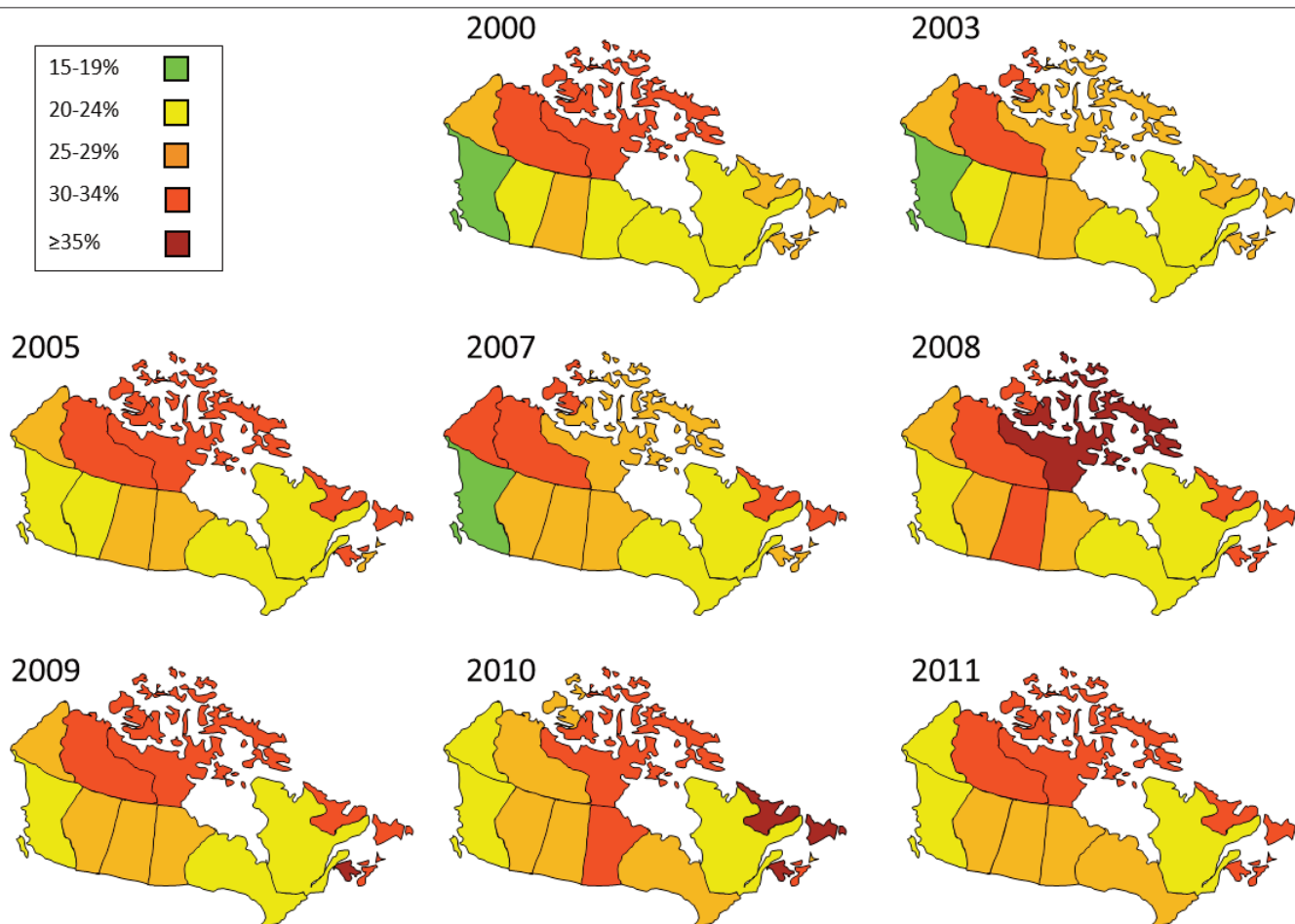
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**Conflict of Interest:** None to declare.

**Figure 1.** Estimated prevalence of obesity in Canadian adults by province (2000-2011)\*

\* Adults with BMI  $\geq 30$  kg/m<sup>2</sup> in each province as calculated from the self-reported height and weight surveys conducted by the CCHS and corrected to account for misreporting of height and weight.

and the dataset excluded all cases with missing information, as well as ineligible respondents such as pregnant women. It should be noted that the survey coverage excludes about 3% of the Canadian population, specifically: persons living on reserves and other Aboriginal settlements in the provinces; full-time members of the Canadian Forces; the institutionalized population; and persons living in the Quebec health regions of Région du Nunavik and Région des Terres-Cries-de-la-Baie-James. In Nunavut, the coverage is limited to the ten largest communities, which represents about 70% of the Nunavut population. "Obesity" was defined as a BMI of 30 kg/m<sup>2</sup> or greater.<sup>9</sup> Considerable research indicates that self-reports of height and weight result in large underestimates of true obesity rates.<sup>10</sup> Shields and colleagues analyzed the 2005 CCHS data and found that, on average, self-reported weight was 2.1 kg less than measured, and self-reported height was 0.7 cm more than measured, resulting in a lower prevalence of obesity using self-reported data.<sup>11</sup> These tendencies – to over-report height and under-report weight – were found in both sexes. Shields and colleagues recommend adjusting self-reported values (by 7%) or modifying BMI cut-off points for obese and overweight categories to avoid underestimating the prevalence of obesity.<sup>11</sup> We followed this suggestion and adjusted all self-reported data upward by 7%, retaining the widely-used BMI cutoff for obesity. Given that we are using a cor-

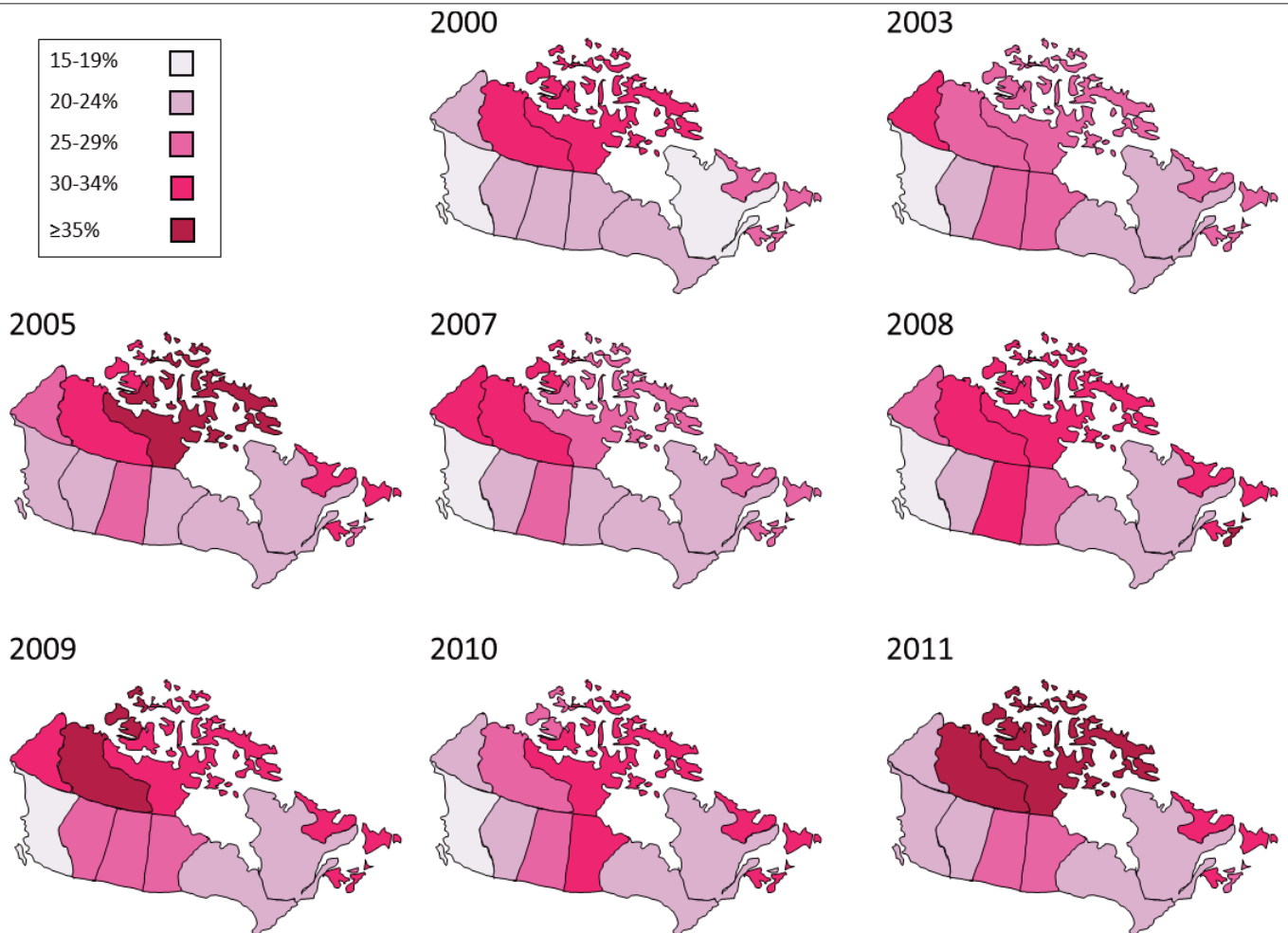
rection based on national data for provincial-level data, all figures should be regarded as estimates.

## RESULTS

Table 1 shows the estimated percentage of Canadians who are obese. Between 2000 and 2011, the percentage has increased by almost 18%. It should be noted that most of this increase occurred in the first part of this period, and prevalence was relatively stable, although still increasing, between 2008 and 2011.

Figure 1 shows updated provincial obesity surveillance maps, based on a model previously used by Katzmarzyk.<sup>6</sup> The figure includes data for the Northwest Territories (NWT), Nunavut (NU) and Yukon which were not available in the previous report.<sup>6</sup> The figure clearly demonstrates increasing and sustained high estimated obesity figures in some provinces and territories, particularly in NWT, NU, and the Maritimes (Newfoundland, New Brunswick, Nova Scotia, and Prince Edward Island). In fact, the 2011 prevalence exceeded 30% in all of these areas. In contrast, British Columbia (BC) is the only province in which fewer than one in five residents have been obese during any of the past 11 years, and both BC and Quebec have maintained prevalence below 25% over the period. Yukon showed fluctuations in the prevalence estimates over the years, with variation likely accounted for by the small sample sizes in this area, which can give rise

**Figure 2.** Estimated prevalence of obesity in Canadian adult women by province (2000-2011)\*



\* Adults with BMI  $\geq 30$  kg/m<sup>2</sup> in each province as calculated from the self-reported height and weight surveys conducted by the CCHS and corrected to account for misreporting of height and weight.

to wide confidence intervals, unrepresentative samples and response rates, and/or dynamic cohorts due to rapid population changes.<sup>5,6,10,12</sup>

Figures 2 and 3 show comparable maps for women and for men, respectively. The results are largely similar, with higher estimated rates in the Maritimes and lower rates in BC and Quebec (and for women, in Ontario as well). There is a suggestion that rates for women in the territories exceed those for men.

### CONCLUSIONS

The trends illustrated in this report clearly indicate that the estimated rates of obesity are on the rise in most Canadian provinces over the past 11 years. However, there are a number of limitations to these analyses and their generalizability. One is coverage: as noted previously, the CCHS does not include certain populations, such as Aboriginals who live on reserves or individuals in remote areas.

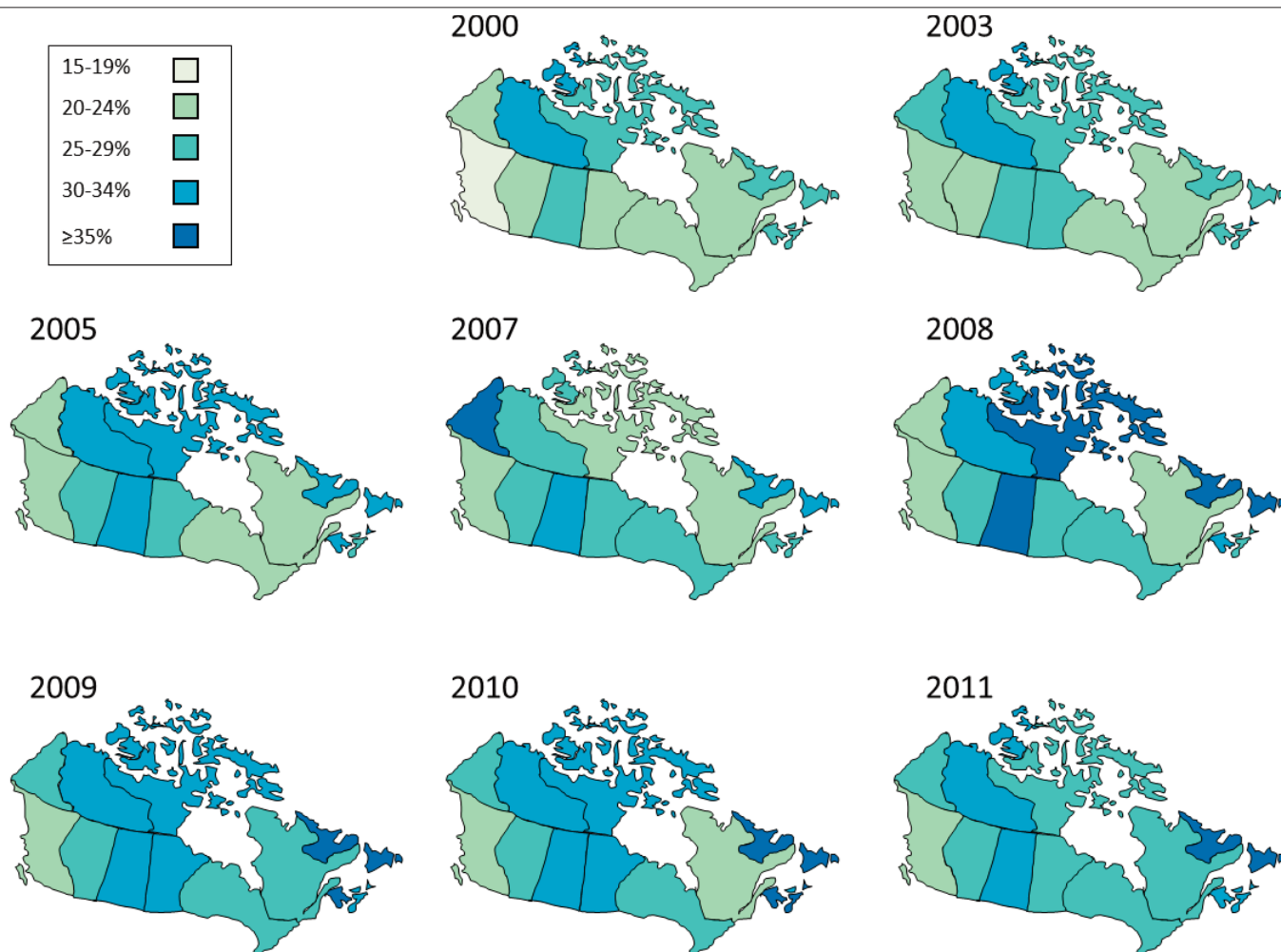
There are also limitations to the BMI classification system. According to Health Canada's Canadian Guidelines for Body Weight Classification in Adults, caution must be exercised when classifying very lean or very muscular people as well as certain ethnic groups and seniors.<sup>9,13</sup> Nonetheless, BMI provides a consistent, replicable metric that allows the observation of time trends.

In addition, the correction for self-report that we are using is based on national data which we have extrapolated to the provincial and territorial level. However, since we are presenting the maps in terms of a broad band of BMI levels rather than exact BMI values, this concern should not have a major impact on our results.

In conclusion, depending on region, between one in three and one in four Canadians can currently be estimated to be obese. This trend is seen in all provinces and territories. There is possibly a levelling of obesity rates: for the past four years, the percentage of Canadians estimated to be obese has varied only about one percentage point (from 24.2 to 25.3 percent), in contrast to earlier years in this period of observation when the percentage of obesity climbed more steadily upwards. It remains to be seen whether future rates remain stable, climb, or fall. Continued surveillance activities such as the Canadian Health Measures Survey<sup>14</sup> will further inform efforts to quantify obesity and its correlates. However, we have sufficient information today to know that obesity constitutes a considerable challenge to Canadians, both now and in the future. The impact of obesity on chronic disease incidence takes time to emerge, and even if rates level off, they are at historic highs.

These obesity maps make this point in a clear and immediately apparent way, to illustrate the need for change. Efforts will be needed at personal and societal levels – with the participation of health

**Figure 3.** Estimated prevalence of obesity in Canadian adult men by province (2000-2011)\*



\* Adults with BMI  $\geq 30$  kg/m<sup>2</sup> in each province as calculated from the self-reported height and weight surveys conducted by the CCHS and corrected to account for misreporting of height and weight.

care providers, social institutions, government, industry, and the public – to achieve a return to healthy weights in Canadians. At a recent Canadian Public Health Association annual meeting plenary address,<sup>15</sup> Dr. Richard Jackson remarked that the state-specific, year-by-year colour-coded obesity maps developed for the US by the Centers for Disease Control were the “single most” persuasive information he presented to policy-makers over the years. We are hopeful that our maps can similarly contribute to the Canadian scene. Visual images such as these use shapes and colours to provide a dramatic demonstration of complex statistics in a way that transcends language differences and creates a personalized connection to the data for the viewer.

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## RÉSUMÉ

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**OBJECTIFS :** L'obésité est un problème croissant au Canada et dans le monde. Les cartes de l'obésité qui montrent l'évolution des taux dans l'espace et le temps sont un moyen utile de transmettre ce genre d'information, mais on ne publie plus de cartes régionales de surveillance de l'obésité au Canada depuis 1998. Nous présentons un résumé de l'évolution des taux d'obésité au Canada depuis cette date.

**MÉTHODE :** Nous avons calculé les taux d'obésité estimatifs des provinces et des territoires du Canada entre 2000 et 2011. Nos données proviennent de l'Enquête sur la santé dans les collectivités canadiennes et sont corrigées en fonction du biais de déclaration. Les données rendant compte du pourcentage estimatif de la population adulte obèse ont été cartographiées dans le temps globalement, et par sexe selon la province ou le territoire du Canada.

**RÉSULTATS :** La prévalence estimative de l'obésité au Canada a continué d'augmenter au cours des 11 dernières années. Les taux actuels dépassent 30 % dans les provinces maritimes (Terre-Neuve, Nouveau-Brunswick, Nouvelle-Écosse, Île-du-Prince-Édouard) et dans deux territoires (Territoires du Nord-Ouest, Nunavut). Les données pour les hommes et les femmes sont semblables en général. La principale hausse de l'obésité semble s'être produite durant la première partie de la période, les taux s'étant relativement stabilisés entre 2008 et 2011. Cependant, ces taux augmentent encore, ce qui justifie la poursuite des efforts de surveillance.

**CONCLUSION :** Les cartes montrant l'évolution régionale des taux d'obésité présentent un portrait pancanadien éloquent qui pourrait pousser le public, le personnel soignant et les décideurs à réagir. Ces cartes à code de couleur sont un moyen efficace de transmettre des données complexes; elles transcendent les frontières linguistiques et personnalisent les données pour l'observateur.

**MOTS CLÉS :** Canada/épidémiologie; obésité/épidémiologie; géographie