

# Estimated Intakes of Added Sugars in Canada and Relationship to Trends in Body Weight

Consumption of added sugars in Canada is often reported to be higher than data suggest. Both popular and scientific articles often incorrectly report unadjusted national food supply (availability) data as actual consumption data. Additionally, when describing Canadian eating habits, US data is often cited. This does not provide an accurate reflection of Canadian consumption patterns, as Canadian intakes of many foods and beverages containing added sugars are substantially below US levels (1).

Misinformation about added sugars consumption may be linked to complications associated with their estimation. Such difficulties include estimating waste adjustment factors to determine apparent consumption from food availability data; missing availability data for some sources of added sugars (notably corn sweeteners); and the lack of a comprehensive database of added sugars content in foods.

In this article, the available literature and various reports are used to provide the best estimates of added sugars consumption in Canada. Estimates of added sugars intake from both Statistics Canada availability data and Canadian Community Health Survey (CCHS) nutrition survey data are explored in detail. Trends in added sugars consumption and body weight are also reviewed.

## Estimated added sugars consumption in Canada is:

- 10 - 13% of total energy
- Approximately 51 - 53 g/day
- Stable or modestly declining as a % of total energy
- Substantially below US consumption levels

## Terminology

<b>Food Available for Consumption</b> (Availability or Disappearance)	Data on the supply of food commodities, not accounting for losses in distribution, retail stores, households, private institutions or restaurants. Statistics Canada publishes this type of data. Availability = (beginning stocks + production + imports) minus (exports + ending stocks).
<b>Apparent Consumption</b> (Waste Adjusted Food Availability)	Estimates of food consumption derived by deducting retail, institutional and household losses including cooking, storage and plate losses from "food available for consumption" (above).
<b>Food Intake</b> (Dietary Surveys)	Self-reported estimates of food intakes derived from nutrition surveys (e.g. Canadian Community Health Survey).
<b>Sugar</b>	Sucrose (from sugar cane or sugar beets). Canadian food standards specify that sugar must have a minimum purity of 99.8% sucrose.
<b>Sugars</b>	All monosaccharides and disaccharides, naturally occurring and added: <ul style="list-style-type: none"> <li>• Monosaccharides - glucose, fructose, galactose.</li> <li>• Disaccharides - sucrose, lactose, maltose.</li> </ul>
<b>Sugars and Syrups</b> (Statistics Canada Category)	Sugar and sugar syrups (from sugar cane or sugar beets), maple sugars, honey. Does not include corn sweeteners.
<b>Added Sugars</b>	All sugars added to foods, including: <ul style="list-style-type: none"> <li>• Sugars and syrups (Statistics Canada category above).</li> <li>• Corn sweeteners: high fructose corn syrup ("glucose-fructose"), glucose syrup, and dextrose.</li> <li>• Fruit juice/concentrated fruit juice or other ingredients that act as a functional substitute for added sugars.</li> </ul>

## ADDED SUGARS AVAILABLE FOR CONSUMPTION IN CANADA

### Sugars and Syrups Availability

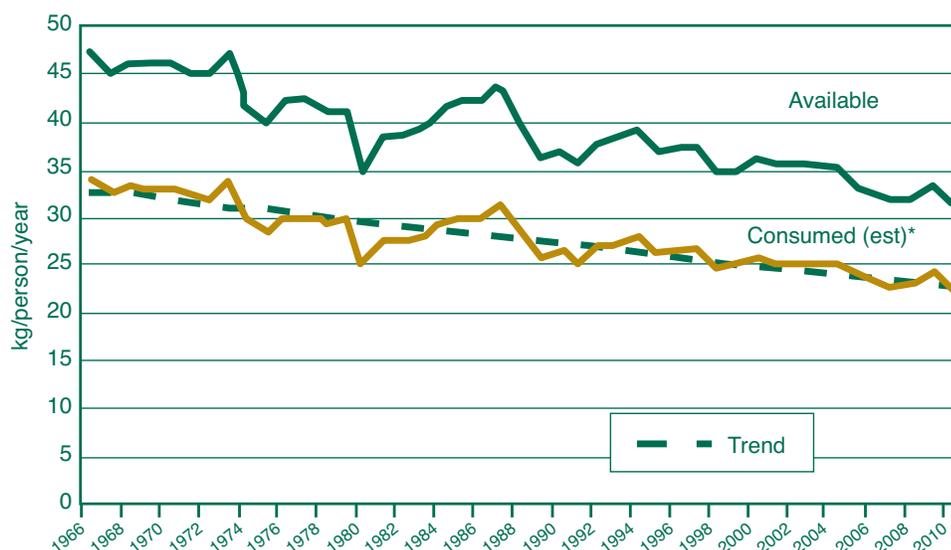
Availability data (also known as disappearance data) reflect the total amount of a food or commodity entering the market, regardless of its final use. This provides a basis for examining consumption trends over time. Statistics Canada publishes annual availability data on 'sugars and syrups'. The 'sugars and syrups' category includes data for refined sugar<sup>a</sup>, honey and maple sugars, but does not include corn sweeteners (2). Statistics Canada data show that the estimated availability and apparent consumption of 'sugars and syrups' has been decreasing over the past 4 decades (Figure 1).

a Includes all white, brown and specialty sugars and sugar syrups made from sugar cane or sugar beets.

### Apparent Consumption of 'Sugars and Syrups' (Waste Adjusted Food Availability)

Availability data is useful to report trends, but overestimates actual intakes because it does not account for sizable losses that occur during distribution, storage, preparation and consumption (e.g. food discarded or spoiled). To correct for these losses, Statistics Canada applies a waste adjustment factor of approximately 30% to estimate consumption (Figure 1). However, this adjustment is based on a static model developed by the United States Department of Agriculture (USDA) Economic Research Service in the 1970s and does not reflect the progressive increase in food waste over the past 40 years. Food waste is now estimated at approximately 40% (3). When the average 40% food loss estimate is deducted from Canadian availability data, added 'sugars and syrups' consumption is estimated to be 51 g/day (Table 1).

**Figure 1: Sugars and Syrups Available and Consumed (estimated)\* 1966 - 2010, Statistics Canada**



\* Statistics Canada: Experimental, use with caution. The data have been adjusted for retail, household, cooking and plate loss. Data excludes corn sweeteners (i.e. high fructose corn syrup / "glucose-fructose", glucose syrup, and dextrose). Abbreviations: est = estimated

**Table 1: Estimated Consumption of Sugars and Syrups in Canada from Availability Data**

Sugars and Syrups <sup>i</sup> Canada	1970	1975	1980	1985	1990	1995	2000	2005	2010
Total Available (kg/yr)	46.1	40.2	35.0	42.2	36.8	37.0	35.9	33.7	31.2
Total Available (g/day)	126	110	96	116	101	101	99	92	86
Loss Adjustment Factor 40% <sup>ii</sup>	-50	-44	-38	-46	-40	-41	-39	-37	-34
<b>Estimated Consumption (g/day)</b>	<b>76</b>	<b>66</b>	<b>58</b>	<b>69</b>	<b>61</b>	<b>61</b>	<b>59</b>	<b>55</b>	<b>51</b>

i Sugars and syrups as defined by Statistics Canada (includes sugar, honey and maple sugars, and excludes corn sweeteners), Food Statistics 2011.

ii Hall KD, Guo J, Dore M, Chow CC. The progressive increase of food waste in America and its environmental impact. PLoS One 2009;4:e7940.

## Soft Drinks Availability (Indirect estimate of corn sweetener consumption trends)

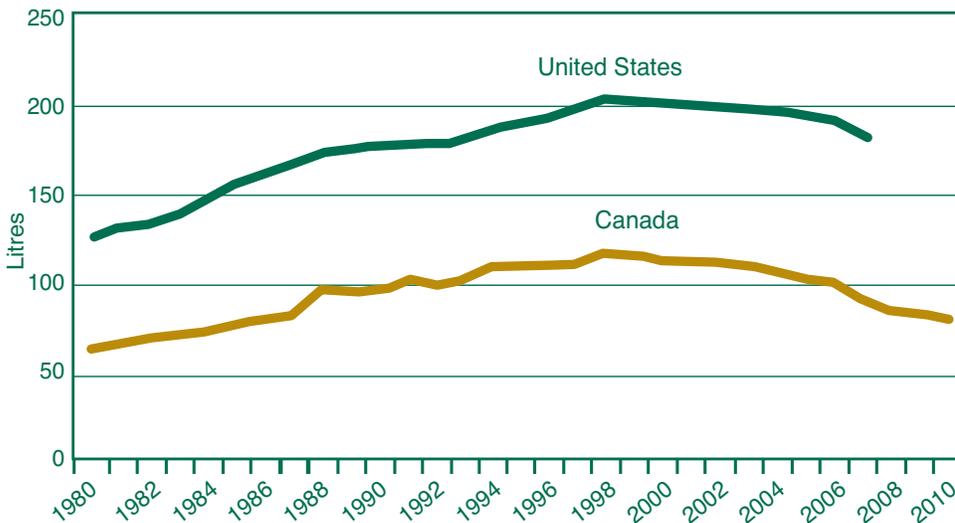
The overall decline in 'sugars and syrups' availability, in part reflects the replacement of liquid sugar by high fructose corn syrup (HFCS) in sweetened beverages. The transition from liquid sugar to HFCS, which started in the 1970s, was gradual and depended on the relative prices of the two sweetening agents. This caused annual variations in 'sugars and syrups' availability, which can be seen until the late 1990s. Sugar has now been fully replaced by HFCS in almost all sweetened beverages in Canada, so there is much less annual variability (Figure 1).

Availability data for corn sweeteners is not reported to Statistics Canada as this is proprietary information. Because the main use of HFCS is to sweeten caloric beverages, soft drink data provide an indirect estimate of HFCS availability and trends.

Soft drink availability in Canada increased from 1980 to 1998 but has declined over the past decade (2). The trend in the US is very similar; however soft drink consumption in the US is approximately double that in Canada (Figure 2).

Canadian availability data show that the contribution of soft drinks to total energy availability is relatively small (~3% total caloric intake) and is down from the peak of 3.9% in the mid-1990s (Table 2). As these data do not distinguish between diet and regular soft drinks, the current 3% caloric contribution from soft drinks is likely overestimated.

**Figure 2: Soft Drinks Available for Consumption, per Capita 1980 - 2010, Statistics Canada, USDA\***



**Table 2: Canada Soft Drinks: Energy Available from the Food Supply, per person, per day, Statistics Canada**

Year	Soft drinks energy (kcal)	Total energy (kcal)	% energy from soft drinks
1980	78	3047	2.6%
1985	91	3176	2.9%
1990	113	3166	3.6%
1995	128	3329	3.9%
2000	132	3552	3.7%
2005	120	3447	3.5%
2006	117	3404	3.4%
2007	105	3389	3.1%
2008	101	3372	3.0%

\* US carbonated soft drinks per capita figures were calculated by USDA using industry data. This data was discontinued after 2007. Source: USDA, Economic Research Service, Food Availability: Miscellaneous Beverages. 2007. Abbreviation: USDA = United States Department of Agriculture.

Food intake data from the Canadian Community Health Survey (CCHS) is very similar to the consumption estimates derived from food availability data. The CCHS reports that soft drink consumption by Canadian adults is 2% of daily Calories for females and 3% of daily Calories for males (4).

## Estimated Energy Available from 'Added Sugars'

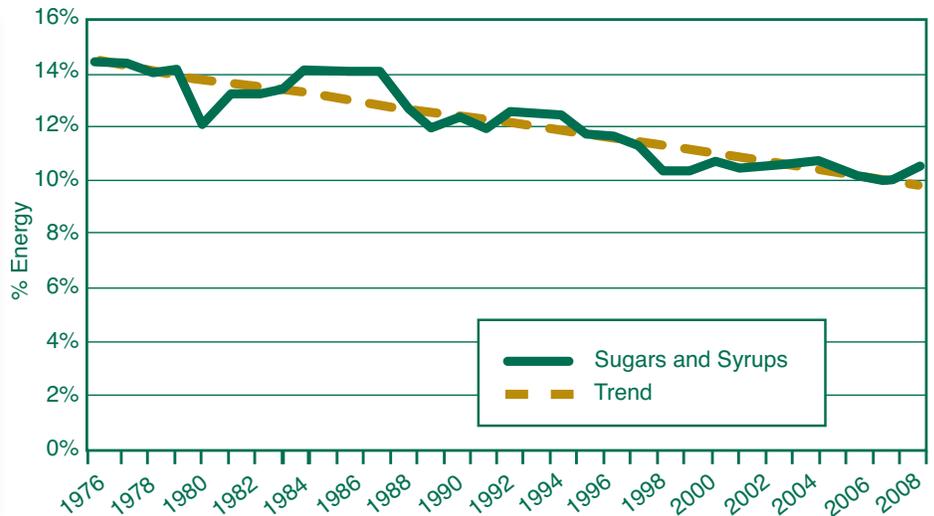
The energy available from total added sugars in Canada can be estimated by combining the energy available from both 'sugars and syrups' and soft drinks (recall soft drinks data provide an indirect measure of HFCS, and therefore corn sweetener availability). Since 1998, when HFCS became the main sweetener used in beverages, the contribution of 'sugars and syrups' to total energy intake has

remained relatively stable at around 10% (Figure 3). From these values, total added sugars can be calculated to contribute approximately 13% of total energy available in the food supply; i.e., 10% from 'sugars and syrups' and 3% from soft drinks (i.e., HFCS) (Table 3).

Availability data provide useful estimates of the average energy contributed by

added sugars to total energy intake, but do not provide insight into individual consumption patterns nor intakes of different genders and age groups. However, in Canada, no other trend data for estimates of added sugars intakes exist as the national nutrition survey (CCHS) has been completed only once (2004).

**Figure 3: Energy (%) Available from Sugars and Syrups 1976 - 2008, Statistics Canada**



**Table 3: Canada Estimated Energy Available from Total Added Sugars, 2008, Statistics Canada**

Sugars and syrups (kcal)	352
Soft drinks (HFCS) (kcal)	101*
Total added sugars (kcal)	453
Total energy availability (kcal)	3372
<b>% Energy total added sugars</b>	<b>13%</b>

\* Overestimate as does not correct for diet soft drinks (i.e., all soft drinks are considered caloric). Abbreviations: HFCS = high fructose corn syrup

## ADDED SUGARS – ESTIMATED INTAKES FROM SURVEY DATA

In 2004, the Canadian Community Health Survey (CCHS) collected 24 hour dietary recall data on 35,000 Canadians. The survey provides self-reported data on food intakes of carbohydrate and total sugars but not added sugars. This is because added sugars are not chemically distinct from naturally occurring sugars, so there is no laboratory test capable of measuring the added sugars content of foods.

Among Canadian adults<sup>b</sup>, the CCHS reported 49% of energy was derived from carbohydrates (5), which is within the Acceptable Macronutrient Distribution Range of 45-65% of total energy (6)

(Table 4). Total sugars contributed an average 102 g/day or approximately 20% of total energy intake.

Although dietary surveys cannot provide a direct measure of added sugars intakes, researchers have estimated added sugars based on total sugars intake. One such important study was conducted by the US Food and Drug Administration, Sugars Task Force, which reported added sugars to account for approximately 50% of total sugars intake (7). This is the only comprehensive analysis of naturally occurring and added sugars intakes undertaken in North America using nutrition

survey data. Added sugars intake among Canadian adults can then be estimated<sup>c</sup> using CCHS data to contribute an average of 10% of total energy (Table 4).

Unlike other nutrients, there is no quantitative recommendation for added sugars intake in Canada. Canadian and US Dietary Reference Intakes (DRIs) (6) suggest a maximum intake level of added sugars of 25% or less of total energy intake<sup>d</sup>. Both availability data and CCHS nutrition survey data, estimate added sugars intake to average approximately 10 – 13% of total daily Calories, well below the suggested maximum of 25%.

<sup>b</sup> Canadian children and adolescents (who are not the focus of this report) were also reported to be within recommended range, with 55% of their Calories derived from carbohydrates.

<sup>c</sup> According to the USDA report (7), Americans were estimated to consume 21% of energy from total sugars with added sugars accounting for an average 56% of total sugars intake. The percent energy from total sugars in this US 1986 report (i.e. 21%) is similar to current (2004) Canadian data (20%) (5). However, the proportion of added sugars as a percentage of total sugars in Canada would be lower than 56% given Canadian consumption of soft drinks is and has historically been half that of the US (Figure 2).

<sup>d</sup> DRI Report, page 323: "Based on the data available on dental caries, behavior, cancer, risk of obesity, and risk of hyperlipidemia, there is insufficient evidence to set a UL for total or added sugars. Although a UL is not set for sugars, a maximal intake level of 25 percent or less of energy from added sugars is suggested based on the decreased intake of some micronutrients of American subpopulations exceeding this level (see Chapter 11 and Appendix J)."

**Table 4: CCHS 2004 Self-Reported Intakes of Carbohydrates and Sugars for Canadian Adults (19+ yrs)**

	Energy (kcal/day)	Carbohydrates (% energy)	Total Sugars (g/day)	Total Sugars (kcal/day)	Total Sugars (% energy)	Added Sugars (% energy est*)	Added Sugars (g/day est*)
Female	1775	49.9	92	368	21	11	46
Male	2420	48.2	115	460	19	10	58
<b>Weighted Average</b>	<b>2065</b>	<b>49</b>	<b>102</b>	<b>409</b>	<b>20</b>	<b>10</b>	<b>53</b>

\*Based on estimation that added sugars comprise approximately half of total sugars (7). Abbreviations: est = estimate

## SUGARS INTAKES AND BODY WEIGHT

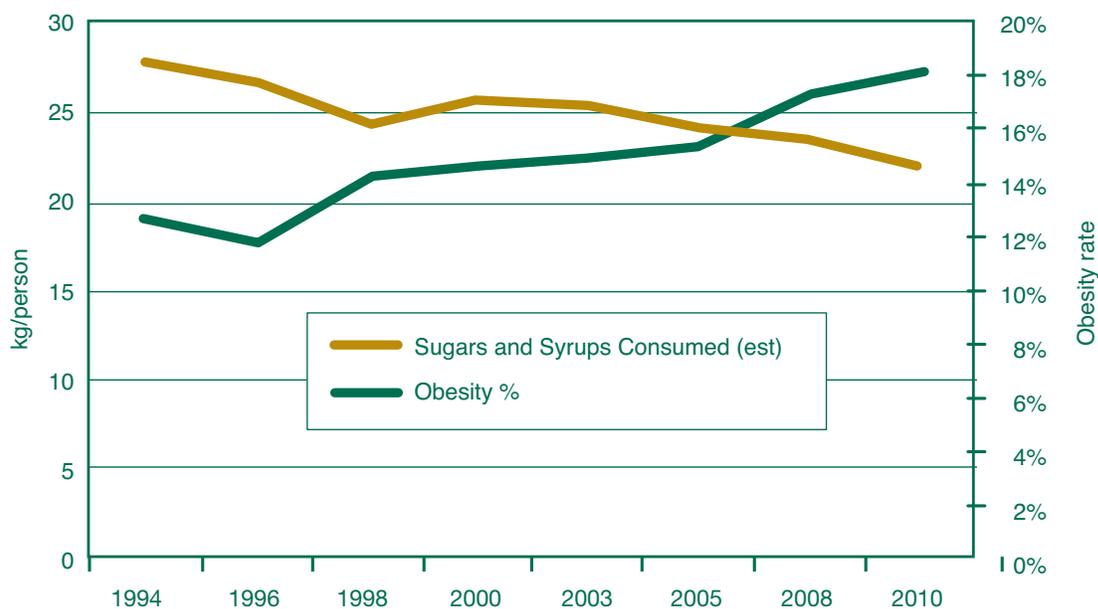
Current scientific literature does not support common media statements linking sugars consumption to obesity (8). After a thorough review of the scientific evidence, the Canada-US DRI report (6) found “no clear and consistent association between increased intake of added sugars and body mass index (BMI)” (page 313). In fact, higher intakes of sugars are associated with lower body weights (8). Trends in sugar consumption plotted against obesity rates

support this inverse correlation (Figure 4). Other countries, including Australia, the UK, and the US have shown similar trends (9;10).

Analysis of the CCHS data noted that total energy intake significantly increased the odds of obesity for men and women, but the composition of their diets, meaning the relative percentages of carbohydrates, protein and fats was not a factor (11). Only

fibre intake was negatively associated with obesity rates in males (11). These results are consistent with epidemiological and intervention studies, which also do not support a positive link between sugars intake and the development of obesity (8). Obesity is a complex issue, which involves a combination of factors including but not limited to overconsumption of total Calories and physical inactivity.

**Figure 4: Sugars and Syrups Consumption and Obesity Rates in Canada, 1994-2010**



Sources: Body mass index (BMI) - Statistics Canada, Canadian Community Health Survey (CCHS), 2000/2001, 2003, 2005, 2007 -2010; National Population Health Survey (NPHS), 1994/1995, 1996/1997 and 1998/1999, cross sectional sample, health file (household component); National Population Health Survey (NPHS), 1994/1995 and 1996/1997, cross sectional sample, health file (North component); Sugars and Syrups consumed (estimated) - Statistics Canada, food available adjusted for losses. Abbreviation: est = estimate.

## CONCLUSION

Added sugars consumption in Canada is not increasing, contrary to common perception. Trends based on food availability data indicate that consumption has been relatively stable or modestly declining for the past 3 decades. Actual intakes of added sugars cannot be measured with precision given difficulties in determining accurate waste adjustment factors and the inability to measure added sugars (as distinct from total sugars) content of foods. The contribution of added sugars to total energy intake can only be estimated from both availability data (2) and nutrition survey data (5). These sources provide similar estimates of added sugars intake, averaging approximately 10-13% of total daily Calories among Canadians.

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