



Trends in sugary drinks in Canada, 2004 to 2015: a comparison of market sales and dietary intake data

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Abstract

Objective: The current study aimed to examine the correspondence between sales data and dietary recall data for sugary drinks in Canada.

Design: Repeat cross-sectional analysis of sales data for sugary drinks sold in Canada from 2004 to 2015 from two sources: GlobalData (GD) and Euromonitor (EM). Sugary drinks included ten beverage categories containing free sugars. Analyses examined sales volumes over time, with adjustment for population growth. National intake estimates were drawn from the 2004 and 2015 Canadian Community Health Survey (CCHS) Nutrition.

Setting: Canada.

Participants: Not applicable.

Results: In 2015, daily per capita sugary drinks consumption was estimated as 356 ml (GD) and 443 ml (EM) from sales data sources, and as 277 ml from dietary recall data. Both sales data sources and dietary recall data indicated that per capita sugary drinks consumption decreased from 2004 to 2015, although the magnitude of this change differed: -23% (GD), -17% (EM) and -32% (CCHS Nutrition). Market sales data showed similar trends among categories of sugary drinks, with decreases in sales of traditional beverage categories (e.g. carbonated soft drinks) and increases in novel categories (e.g. sugar-sweetened coffee).

Conclusions: All data sources indicate a declining trend in sugary drinks consumption between 2004 and 2015, but with considerable differences in magnitude. Consumption estimates from sales data were substantially higher than estimates from dietary recall data, likely due to under-reporting of beverage intake through dietary recall and the inability of sales data to account for beverages sold but not consumed. Despite the observed decline, sugary drinks sales volumes remain high in Canada.

Keywords
Sugary drinks
Sugar-sweetened beverages
Free sugar
Population health

Consumption of sugary drinks contributes to weight gain^(1,2) and is a significant risk factor for chronic diseases, including type 2 diabetes, metabolic syndrome, CVD, cancer and dental caries⁽³⁻⁶⁾. Sugary drinks are beverages containing caloric sweeteners, specifically 'free sugars', and contribute 'empty calories' due to low nutrient levels⁽⁷⁾. The WHO defines free sugars as monosaccharides and disaccharides added to foods and beverages, plus sugars naturally present in honey, syrups, fruit juices and fruit juice concentrates⁽⁸⁾. Accordingly, sugary drinks include non-diet versions of caloric carbonated soft drinks, sweetened teas and coffees, energy drinks, sports drinks, flavoured

bottled water, flavoured milk, drinkable yoghurt, fruit drinks with less than 100% juice and 100% fruit juice. The consumption of free sugars is a determinant of body weight and further influences cardiometabolic factors independent of weight^(9,10).

Dietary recall data are often used by researchers to estimate beverage consumption and to evaluate policies⁽¹¹⁾. In Canada, national surveys with dietary recalls have been infrequent, with three conducted over the past 45 years^(12,13). Recent national dietary intake data collected in 2015 suggest that sugary drinks are a substantial source of the population's daily energy intake⁽¹⁴⁾, despite declines

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from 2004^(15,16). However, examination of any broader historic trends is limited. In particular, little is known about newer beverage categories, such as flavoured water, drinkable yoghurt and flavoured milk⁽¹⁷⁾. It is also unclear how sugary drink categories change relative to one other and whether these changes influence the spectrum of products consumed by populations. Additionally, previous sugary drink assessments have often excluded 100 % fruit juice (e.g. Slining *et al.*⁽¹⁸⁾), despite the known adverse metabolic effects of consuming the free sugars it contains⁽⁸⁾. Accounting for 100 % juice in total estimates remains novel⁽¹⁹⁾.

Commercial data on sugary drinks sales have the potential to provide more timely and cost-effective estimates of sugary drink intake. These data are collected through ties to key industry players across the value chain. They provide in-depth analysis on consumer goods and service industries, and are often used to inform industry marketing and business practices. Sales data also avoid limitations associated with self-reported recall data, which are known to underestimate actual intake^(20–22). However, the accuracy of sales estimates is often unclear given the proprietary nature of the data and the underlying methods used to generate estimates. In addition, the correspondence between sources of sales data, and between sales data and dietary recall data, is unexamined for most populations. Thus, the purpose of the present study was to examine trends in sugary drinks sales data using two well-established sources, with comparisons to national intake estimates between 2004 and 2015 in the Canadian context.

Methods

Data sources

Beverage sales data for Canada were purchased in August 2016 from Euromonitor International (years 2002–2015) and in October 2017 from GlobalData (years 1999–2015). Euromonitor (EM) provides market reports for food and beverage sales in Canada and globally using data obtained from a range of industry sources⁽²³⁾. GlobalData (GD) specializes in industry and consumer research for beverages, working with a network of professional researchers embedded in the commercial beverage industry and through industry partnerships across the value chain. Both GD and EM data reflect domestic beverage consumption and use methods such as dialogue with key industry players, global and local company analysis, store checks and surveys across the supply chain, all of which are proprietary and cannot be independently validated.

EM and GD beverage data each capture ‘on-trade’ sources where beverages are sold for immediate consumption at the place of purchase and ‘off-trade’ sources where beverages are sold for subsequent consumption away from the place of purchase. Collectively this includes bars, restaurants, cafés, other catering establishments, grocery

stores, supermarkets, convenience stores, non-grocery retailers, vending, Internet retailing, home shopping and direct selling. GD also includes warehouses, hotels and other accommodation places, and institutions, such as hospitals.

Beverage categories containing free sugars⁽⁸⁾ were identified using a calorie rating variable (GD) and category descriptions (EM and GD). For GD, these beverage categories included: carbonates (cola and non-cola), iced/ready-to-drink tea, iced/ready-to-drink coffee, energy drinks, sports drinks, flavoured water, enhanced water, flavoured milk drinks, drinking yoghurt, squashes/syrups (liquid fruit concentrates), fruit powders (powder fruit concentrates), still (juice) drinks (<24.9 % juice), nectars (25–99 % juice) and 100 % juice. For EM, these included: regular cola carbonates, non-cola carbonates (lemonade/lime, ginger ale, tonic water, other mixers, orange carbonates, other non-cola carbonates), ready-to-drink tea, ready-to-drink coffee, energy drinks, sports drinks, flavoured bottled water, functional bottled water, flavoured milk drinks, drinking yoghurt, concentrates (liquid and powder), juice drinks (<24 % juice), nectars (25–99 % juice) and 100 % juice^(23,24).

Most GD beverage categories used a calorie rating variable that defined ‘regular’ calorie as ≥ 209 kJ (≥ 50 kcal)/250 ml and ‘low’ calorie as < 209 kJ (< 50 kcal)/250 ml. Except for enhanced water, all beverages with a regular calorie rating were included in the analysis. GD reported 100 % of the enhanced water category as ‘low’ calorie. However, based upon consumption estimates of flavoured water from the 2015 Canadian Community Health Survey (CCHS) Nutrition, it was assumed that 25 % of all sales of enhanced water was ‘regular’ calorie. Calorie rating information was unavailable for some beverage categories, requiring the following assumptions. Using an online consumer product search, 50 % of fermented milk volume was considered to contain free sugars. The annual ratio of flavoured milk to total milk (total milk equals the sum of flavoured and plain milk) was applied to soya milk as well as grain, nut, rice and seed milk alternative drinks for each year to determine the estimated volume with free sugars. For EM data, no calorie rating variable was available; thus, any ratios determined from GD data were applied to the corresponding EM categories.

Sugary drink intake estimates were drawn from published analyses of beverage intake from the 2004 and 2015 CCHS Nutrition national cross-sectional surveys representative of the majority of Canadians living in the provinces (aged ≥ 1 year; final sample sizes: 2004, n 34 775; 2015, n 20 176)^(13,25). The full methodology is described elsewhere⁽²⁵⁾; briefly, standardized 24 h dietary recalls were used to elicit all foods and beverages consumed by respondents on the previous day. Data collection dates for CCHS 2004 and 2015 began in January 2004 and January 2015, respectively, and spanned the entire calendar year so as to avoid seasonal effects. All fluids consumed



as beverages and containing free sugars were identified from CCHS food codes. For each survey, these sugary drinks were grouped and reported intake was analysed by volume (millilitres). To permit calculation of per capita estimates for the Canadian population, non-consumers were assigned zero values for volume.

Analysis

For the secondary analysis of sales data, GD and EM data were organized into ten mutually exclusive sugary drink beverage categories: carbonated soft drinks (regular cola, non-cola carbonates); fruit drinks (liquid and powder concentrates, juice drinks, nectars); sports drinks; energy drinks; sugar-sweetened coffee; sugar-sweetened tea; flavoured water (flavoured water, enhanced/functional water); flavoured milk and alternatives; drinkable yoghurt; and 100% juice (see online supplementary material, Supplemental Table S1).

The sales data analysis examined drinkable volume, representing the final liquid volume that consumers drink. For most beverages sold pre-packaged in liquid form, drinkable volume is equal to the volume sold. For GD, all purchased sales data represented drinkable volumes. However, for EM, volumes for powder and liquid concentrates required conversion into drinkable volumes. Due to the fact that EM did not include specific dilution ratios for such beverages, EM concentrates were reconstituted using conservative dilution ratios drawn from GD: 39 864.5 litres of drink per tonne of concentrate for powder concentrates and 6.6 litres of drink per litre of concentrate for liquid concentrates. All reported volumes are drinkable volumes, unless otherwise noted.

Sales data analysis examined changes over time in sugary drink volume for all sugary drinks and for each beverage category, as well as changes in each beverage category's contribution to total sugary drink volume. Volumes were adjusted for annual population growth⁽²⁶⁾. For the national intake estimates, sugary drinks were first organized into mutually exclusive categories and then summed to obtain total sugary drink volume (Supplemental Table S1). With survey weights applied, independent-sample *t* tests compared 2004 and 2015 reported intakes using the statistical software package IBM SPSS Statistics version 25.0 (2017).

The dietary intake data were accessed through the South-Western Ontario Research Data Centre at the University of Waterloo. Ethics requirements were covered through the South-Western Ontario Research Data Centre's standard data access and vetting procedures⁽²⁷⁾. For the secondary analysis of publicly available market data, ethics approval was not required. Due to the standard data agreements of EM and GD, specific estimates of individual beverage categories for a given year cannot be reported. Therefore, data are presented showing changes in a single beverage category over time or showing aggregated beverage categories within a single year.

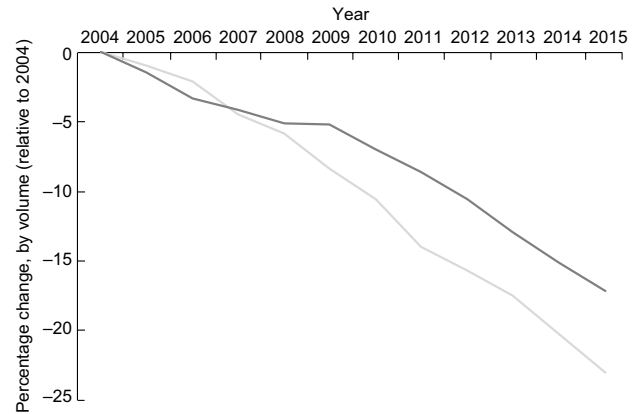


Fig. 1 Percentage change in per capita sales of sugary drink beverages in Canada, by volume, 2004 to 2015: —, GlobalData (GD); —, Euromonitor (EM). Note: sales data of sugary drinks (GD and EM) represent drinkable volumes sold, adjusted for population growth

Results

In 2015, Canadians purchased 356 ml (GD) and 443 ml (EM) of sugary drinks per person per day. Per capita sugary drinks sales volumes were highest in 2004, at 462 ml (GD) and 534 ml (EM) per person per day. Overall, from 2004 to 2015, sugary drinks sales volume decreased by 23% (GD) and 17% (EM), when adjusting for population growth (Fig. 1). Despite differences in magnitude, trends over time for sugary drinks sales across the two data sets were similar, with steadily increasing rates of decline from 2004 to 2015. National intake of sugary drinks was estimated as 392 and 266 ml per person per day in 2004 and 2015, respectively, as per the CCHS Nutrition data. Estimates of sugary drink intake measured using the CCHS Nutrition data showed a 32% decline from 2004 to 2015.

When examining changes in categories of sugary drinks, similar trends were seen in both sales data sets. As shown in Fig. 2, from 2004 to 2015, adjusted sales volume decreased for traditional categories of sugary drinks, such as carbonated soft drinks, fruit drinks and 100% juice. In contrast, adjusted sales volume increased for novel categories, including energy drinks, sugar-sweetened coffee, flavoured water, drinkable yoghurt, flavoured milk and alternatives, sports drinks and sugar-sweetened tea. Changes in dietary intake estimates for sugary drink beverage categories drawn from the CCHS Nutrition mirror those observed in the commercial data sources, with the exception of sports drinks (see Fig. 2). Although both sales data sets showed consistency in the direction of changes in sales by beverage category, the magnitude of these changes differed, particularly for several categories of sugary drinks, such as energy drinks, sugar-sweetened coffee, flavoured water and drinkable yoghurt.

Changes in sales volumes resulted in changes in the overall profile of sugary drinks volume over time.

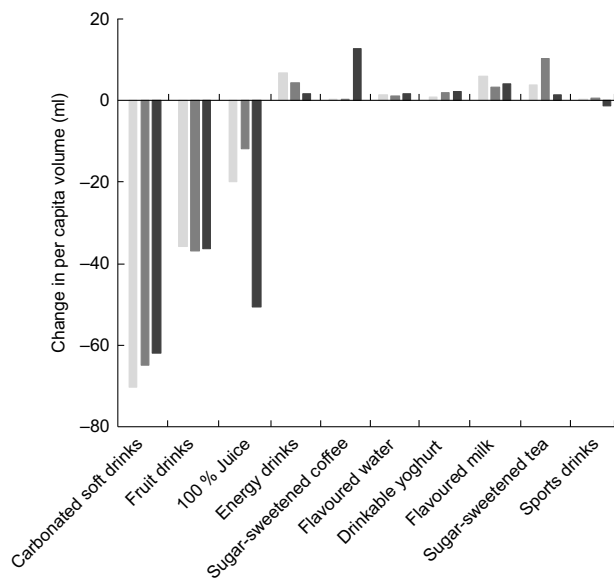


Fig. 2 Change in daily per capita sales and dietary intake of sugary drinks in Canada, by volume, 2004 to 2015: ■, GlobalData (GD); ■, Euromonitor (EM); ■, Canadian Community Health Survey (CCHS). Note: sales data of sugary drinks (GD and EM) represent drinkable volumes sold, adjusted for population growth. Dietary intake data are drawn from the CCHS Nutrition

In 2004, sales of sugar-sweetened tea, sugar-sweetened coffee, sports drinks, energy drinks, flavoured water, flavoured milk and alternatives, and drinkable yoghurt represented approximately 11.8% (GD) or 10.7% (EM) of sugary drink volume. By 2015, these ‘emergent’ categories accounted for approximately 20.8% (GD) and 18.0% (EM) of all sugary drink sales. At both time points, 100% juice contributed almost one-fifth of sugary drinks sales volume (21.0% in 2004, 21.8% in 2015, for GD; 21.4% in 2004, 23.1% in 2015, for EM) and was consistently the second largest contributor to total sugary drinks sales volume, after carbonated soft drinks. Compared with 2004, 2015 daily per capita sales of the three leading categories (carbonated soft drinks, fruit drinks and 100% fruit juice) was approximately 43.5 ml lower (46 ml for GD; 41 ml for EM). However, sales of the emergent beverage categories increased by approximately 7.5 ml per person per day (7 ml for GD; 8 ml for EM). If sales of these emergent categories had remained at 2004 per capita levels – rather than having increased steadily over time – per capita sugary drink volume in 2015 would have been approximately 23% less than in 2004 (26% for GD; 20% for EM), or approximately 15% lower than the observed 20% change.

Discussion

The study findings indicate a decline in per capita sugary drinks consumption between 2004 and 2015 in Canada. While this decline is reflected in both sources of proprietary

sales data (GD and EM) as well as in dietary intake data for the Canadian population (CCHS Nutrition), the volume and extent of decline reflected by these data differ considerably (–17% EM, –23% GD, –32% CCHS Nutrition). Estimates of sugary drinks consumption from market sales data sources were greater than estimates drawn from dietary intake data for the Canadian population, as reported for other jurisdictions⁽¹⁷⁾. Market sales data are not intended to estimate actual consumption, and do not account for beverages prepared at home nor for any ‘waste’ in terms of beverages sold but not consumed. Additionally, the difference in sales data estimates and dietary intake estimates may be due to under-reporting of energy intake, which is a common limitation of dietary recall tools⁽²⁰⁾. Dietary recalls have been noted to underestimate sugar-sweetened beverage consumption by as much as 30–40%⁽²¹⁾. Furthermore, evidence suggests that for some food and beverage categories, the under-reporting of energy intake increased in CCHS 2015 compared with CCHS 2004⁽²⁸⁾. The declining trend in consumption of sugary drinks among Canadians is consistent with findings from other high-income countries, such as the USA and the UK^(29–32). Further research is needed to determine whether changes in Canada are driven by an overall reduction in beverage purchases among consumers, or a shift in consumption from sugary drinks to other beverages such as low-calorie options, including plain water.

Differences between the two sources of sales data were also observed. Estimates of sales beverage volume between GD and EM differed in any given year. For instance, adjusted sugary drinks sales in 2015 estimated by EM were 24% greater than those of GD. Differences in sales volume estimates were also observed among specific beverage categories, with greater differences observed between the sales data sources for novel categories, including energy drinks, sugar-sweetened coffee, flavoured water and drinkable yoghurt. Differing estimates and rates of change between the sales data sources may be due to varying data scope, beverage category definitions and collection methodologies. While the proprietary nature of these data precludes a detailed comparative analysis, these discrepancies raise questions about the use of commercial data that have not been independently validated. Although sales data sources may be useful for identifying general market trends over time, the accuracy of these trends, as well as the estimates underlying them, remains open to question.

All three data sources are consistent in demonstrating changes across categories of sugary drinks. Sales increased for sugar-sweetened tea, sugar-sweetened coffee, sports drinks, energy drinks, flavoured water, flavoured milk and alternatives, and drinkable yoghurt. These categories have come to account for an increasing proportion of sugary drinks sales over this time period, from approximately 12% in 2004 to approximately 19% in 2015. These shifts may be due to consumers selecting products based on



misperceptions that these beverages may confer more health benefits compared with traditional sugary drinks⁽³³⁾.

Findings from the current study have several implications for research. The findings reinforce the importance of including novel categories of sugary drinks, such as flavoured milk and drinkable yoghurt, when measuring sugary drink intake in population-based surveys. The findings also highlight the importance of 100 % juice to sugary drink intake: 100 % juice was consistently the second largest contributor to total sugary drinks sales volume and comprised a generally consistent proportion of market share over time, in contrast to most other beverage categories. These findings support the inclusion of fruit juice along with sugar-sweetened beverages as a form of free sugar intake that should be limited⁽⁸⁾.

To our knowledge, the current study is one of the first to compare estimates of sugary drinks consumption from various data sources at the population level⁽³⁴⁾. However, the secondary nature of data analysis posed several limitations. First, beverage categories as defined by EM and GD may have failed to capture some beverages containing sugar. For example, GD's definition of juice drinks, nectars and 100 % juice beverages excluded those marketed as 'baby juices'. Additionally, both data sources excluded hot coffee and tea drinks prepared at home, to which sugar may be added. Finally, sales data sources excluded most protein drinks and meal replacement beverages. Second, while it was possible to align nearly all sugary drinks beverage categories across the data sources, some differences were noted. For example, although soya milk and milk alternatives were included in GD's definition of dairy beverages, these were excluded from the EM definition. Third, there was uncertainty in the conversion of concentrates to drinkable volumes. To reduce the likelihood of overestimating drinkable volumes, the most conservative conversion factors were used. Fourth, sales data of this nature cannot detect differences based on population characteristics, such as age. Fifth, sales trends prior to 2004 were not examined in the current study. Although the year 2004 was used as the basis for comparative analyses and happened to represent the highest annual sales volume for the examined time period, it is unknown whether 2004 sales volumes represent a historic peak or whether preceding sugary drinks sales volumes were higher still. Sixth, data on the caloric content of sales data beverages were unavailable and the dietary energy contribution of these products is unknown, including any changes over time. Based on CCHS data, sugary drink energy intake declined by 25 % from 2004 to 2015 (analysis unreported). The precise role of energy misreporting is unclear. Finally, the sales data were reflective of the entire Canadian population's consumption. In comparison, the CCHS sample excludes subsets of the Canadian population, such as individuals living in the three territories, reserves or other Aboriginal settlements, some remote locations or institutions (e.g. prisons), as well

as Canadians <1 year of age. It is unknown how these exclusions may have affected per capita estimates^(12,13).

Conclusions

The study findings demonstrate a declining trend over time in sugary drinks consumption in Canada, as shown in data drawn from commercial market sources and dietary intake surveys. Despite this consistent trend, the examined data sources reflected considerable differences in the volume and extent of decline. While it has been shown that dietary intake surveys underestimate consumption^(20,21), market sales data are likely to overestimate consumption, given that they do not account for wastage. Actual levels of consumption likely lie somewhere in between. Despite recent declines, sugary drink consumption remains high in Canada, in part due to the emergence of newer beverage categories.

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Supplementary material

To view supplementary material for this article, please visit <https://doi.org/10.1017/S1368980019001654>

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