

Added and free sugar content of foods and beverages reported in the 2015 Canadian Community Health Survey-Nutrition.

In Canada, the added and free sugar content of foods and beverages are not systematically documented. With funding from the Canadian Institutes of Health Research (grant number 384559), we took the effort to develop the methodology and to calculate the added and free sugar content of all foods and beverages reported in the 2015 Canadian Community Health Survey-Nutrition [1]. We published this in 2020 in Health Reports [2]. To facilitate further research in the area of added and free sugar, we provide the detailed methodology in this document below, and provide the estimate values of all ingredient-level foods and beverages reported in the 2015 Canadian Community Health Survey-Nutrition in the parallel document ‘Calculated values of added and free sugar.pdf’. Everyone is free to use this information for the purpose of their research and work. Please acknowledge our work by referencing the publication [2] along with this website.

Definitions:

Free sugar: “all monosaccharides and disaccharides added to foods by the manufacturer, cook or consumer, plus sugars naturally present in honey, syrups and fruit juice”. This is a definition by the World Health Organization. In 2015, they released recommendations to reduce the consumption of free sugars to less than 10% of the daily total energy intake, and ideally to less than 5% of daily total energy intake.

Added sugar: “refined sugars added during cooking or manufacturing, not including naturally occurring sugars and fruit juice. This is a definition by the US Department of Agriculture. They recommend the consumption of added sugar to be less than 10% of the daily total energy intake.

Total sugar is the summation of all naturally occurring and added sugars.

A recipe-level food is a food that consist of more than one ingredient. Examples are chicken noodle soup, beef stew, a sandwich, and Caesar salad.

An ingredient-level food refers to an uncombined food item. Examples are an apple, noodles, a steak and a piece of cheese.

Methodology:

We took a 9-steps approach adapted from Louie et al. [3] to estimate the added and free sugar content of foods and beverages. This approach is described elsewhere [2]. Further detail of each of these 9-steps is provided below.

Estimated values of added and free sugar content:

Following the description of the 9-steps approach, we provide a table with our estimates of the added and free sugar content of all 2,784 ingredient-level foods reported by the more than 20,000 Canadian residents participating in 2015 Canadian Community Health Survey-Nutrition [1, 2]. The 2,590 recipe-level foods reported in this survey [2]. Recipes and recipe-level foods are respondent specific and therefore, due to confidentiality, subject to restricted release, but can be calculated from the ingredient-

level foods.

The 9-steps approach:

STEP 1: Assign 0 g added and free sugar to ingredient-level foods that contain 0 g in total sugar.

If the total sugar of ingredient-level foods in the 2015 Canadian Community Health Survey-Nutrition (CCHS 2015) was 0 g, 0 g added sugar and 0 g free sugar were assigned.

STEP 2: Assign 0 g added and free sugar to ingredient-level foods that are unprocessed or processed without added or free sugar.

0 g added sugar was assigned to the following food types:

- (1) Non-sweetened fruit/vegetable juice (including concentrate).
- (2) Non-sweetened juice base, alcoholic beverages, soft drinks, and beverage mix, coffees and tea (including sweetened with artificial sweeteners only, without chocolate).
- (3) Non-sugar-sweetened milk, buttermilk and milkshake (including sweetened with artificial sweeteners only, without chocolate).
- (4) Non-sweetened dairy products (including plain yogurts and ice cream sweetened with artificial sweeteners only, without chocolate and fruits).
- (5) All fats and oils.
- (6) All spices and herbs.
- (7) All plain cereal grains, pastas, rice, flours and oats without added sugar.

- (8) Eggs and egg products (except egg-based desserts).
- (9) Fresh fruit, unsweetened dried fruits, fresh vegetables (including salads without dressing and syrup pack), fresh meat, fresh seafood and tofu.
- (10) Fruits, vegetables, vegetable products/fruit salad canned in water, 100% fruit juice or liquid sweetened with artificial sweeteners only.
- (11) Intensely sweetened jam and beverage base (without added sugar).
- (12) Legumes (fresh, dried and/or processed, except sweetened varieties).
- (13) Nuts (except sweetened varieties and nut bars), coconut (and products except for sweetened varieties) and seeds.
- (14) Plain breads, plain pastries, English muffin, bagels, pizza bases, naan, puff shell, Taco shell, croutons, French toast, phyllo dough, rolls, tortilla, bannock and rice cake without filling (such as chocolate, dried fruit and/or nuts).
- (15) Others: vinegar, soy sauce and vanilla extract.

0 g free sugar was assigned to the following food types:

- (1) 100% vegetable juice.
- (2) Non-sweetened alcoholic beverages, soft drinks, and beverage mix, coffees and tea (including sweetened with artificial sweeteners only, without chocolate and juice).
- (3) Non-sugar-sweetened milk, buttermilk and milkshake (including sweetened with artificial sweeteners only, without chocolate).
- (4) Non-sugar-sweetened dairy products (including plain yogurts and ice cream sweetened with artificial sweeteners only, without chocolate and fruits).

- (5) All fats and oils.
- (6) All spices and herbs.
- (7) All plain cereal grains, pastas, rice, flours and oats without added sugar.
- (8) Eggs and egg products (except egg-based desserts).
- (9) Fresh fruit, unsweetened dried fruits, fresh vegetables (including salads without dressing and syrup pack), fresh meat, fresh seafood and tofu.
- (10) Fruits, vegetables and vegetable/fruit salad canned in water or liquid sweetened with artificial sweeteners only.
- (11) Intensely sweetened jam and beverage base (without added sugar).
- (12) Legumes (fresh, dried and/or processed, except sweetened varieties).
- (13) Nuts (except sweetened varieties and nut bars), coconut (and products except for sweetened varieties) and seeds.
- (14) Plain breads, plain pastries, English muffin, bagels, pizza bases, naan, puff shell, Taco shell, croutons, French toast, phyllo dough, rolls, tortilla, bannock and rice cake without filling (such as chocolate, dried fruit and/or nuts).
- (15) Others: vinegar, soy sauce, vanilla extract, and infant formula.

STEP 3: Assign 100% of total sugars as added and free sugars to ingredient-level foods with very little naturally occurring sugars.

100% of total sugars was assigned as added sugar to the following food types:

- (1) Regular soft drinks, sport drinks, carbonated drinks, flavoured water and non-fruit-based energy drinks.

- (2) Coffee and beverage base with no milk solids or made up with water.
- (3) Soy beverages and soy yogurt without added fruits, chocolate and dairy products.
- (4) Savoury biscuits, sweet biscuits, crackers, cakes and buns, donuts and batter-based products that do not contain fruit, chocolate or dairy products.
- (5) Breakfast cereals and cereal bars without fruits, chocolate, dairy or milk solids.
- (6) Sweetened nuts, sweetened seeds, peanut butter and other nut spreads.
- (7) Crumbed/battered meat, seafood and processed meats.
- (8) All confectionery except those containing fruit, chocolate and dairy products.
- (9) Sugars, syrups, molasses, honey and sweetener without fruit and dairy products.
- (10) Energy bar and protein bar (without fruit and dairy products).

100% of total sugars was assigned as free sugar to the following food types:

- (1) 100% Fruit juice (including concentrate).
- (2) Regular soft drinks, sport drinks, carbonated drinks, flavoured water, energy drinks and fruit-based alcoholic beverages.
- (3) Coffee and beverage base with no milk solids, dry or made up with water.
- (4) Soy beverages and soy yogurt without added chocolate and dairy products.
- (5) Savoury biscuits, sweet biscuits, crackers, cakes and buns, donuts and batter-based products that do not contain fruit, chocolate or dairy products.
- (6) Breakfast cereals and cereal bars without fruits, chocolate, dairy or milk solids.
- (7) Sweetened nuts, sweetened seeds, peanut butter and other nut spreads.
- (8) Crumbed/battered meat, seafood and processed meats.

- (9) All confectionery except those containing fruit, chocolate and dairy products.
- (10) Sugars, syrups, molasses, nectar, honey and sweetener without dairy products.
- (11) Other: energy bar, protein bar and fruit-based sauce.

STEP 4: Calculate added and free sugar content by comparing the total sugar value with that of an unsweetened variety.

Added sugar and free sugar per 100 g were calculated using the formula:

$$AS_{100g} = \frac{100 \times (TS_{us} - TS_s)}{(TS_{us} - 100)} \quad FS_{100g} = \frac{100 \times (TS_{us} - TS_s)}{(TS_{us} - 100)}$$

Where, AS_{100g} and FS_{100g} are the added sugar and free sugar of the final product per 100g, TS_{us} is the total sugar content per 100g of the unsweetened product and TS_s is the total sugar content per 100g of the sweetened product.

STEP 5: Calculate added and free sugar content based on lactose and maltose content.

Where data for lactose was available in the Canadian Nutrient File (CNF) or the United State Department of Agriculture Food and Composition Database (USDA) and the food did not contain dried fruit or malted cereal, added sugar and free sugar content of ingredient-level foods was calculated using the formula: $AS = TS - \text{lactose}$ and $FS = TS - \text{lactose}$. If data for lactose and maltose was available in the CNF or the USDA and the ingredient-level food contained malted cereal and did not contain dried fruit, added sugar and free sugar was calculated using the formulae: $AS = TS - \text{lactose} - \text{maltose}$, and $FS = TS - \text{lactose} - \text{maltose}$.

STEP 6: Calculate added sugar and free sugar content using content values of similar foods of STEPs 1–5 or other nutrient databases.

For foods for which steps 1-5 had not provided estimates of added or free sugar content, similar foods for which steps 1-5 did provide these estimates or foods that were included in the Food Standards Australia and New Zealand Food Nutrient Database (AUSNUT) information on added sugar or free sugar content was used. Foods were considered to be similar if they only differed in water content, if they contained similar ingredients (such as similar vegetables in soup), or if they were calorie/energy reduced or fat reduced. Where a similar food was identified (matching), added sugar and free sugar content of the target food was estimated using the formulas: $AS_{\text{target}} = TS_{\text{target}} \times (AS_{\text{matching}}/TS_{\text{matching}})$, and $FS_{\text{target}} = TS_{\text{target}} \times (FS_{\text{matching}}/TS_{\text{matching}})$.

STEP 7: Estimate added sugar and free sugar content of ingredient-level foods subjectively based on common recipes and ingredient lists.

Where none of the ingredients of food items contain added sugar or free sugar, the added sugar and free sugar were assigned 0 g. Where there were some ingredients with added sugar or free sugar, the proportion of ingredients were estimated using common recipes. For example, the CFIA information on percentage of liquid in canned fruits or vegetables were used [4].

STEP 8: Assign 50% of total sugar as added sugar and free sugar content of all remaining ingredient-level foods.

For the ingredient-level foods for which the added sugar or free sugar content was not estimated in steps 1-7, the added sugar and free sugar content were assigned as 50% of total sugar.

STEP 9: Calculate added sugar and free sugar content of recipe-level foods using respondent specific recipes and the added and free sugars content of ingredient-level foods estimated in steps 1-8.

All recipe-level foods in the 2015 CCHS-Nutrition are made up of ingredient-level foods for which added sugar and free sugar was calculated in steps 1-8. Due to moisture changes caused by cooking, added sugar and free sugar content of recipe-level foods were calculate using the recipes, raw weights and proportion of ingredients. To calculate the added sugar and free sugar content of recipe-level foods, the following formulas were used:

$$AS_{100g} = \frac{\sum_{i=1}^j RW_i \times AS_i}{\sum_{i=1}^j W_i} \quad FS_{100g} = \frac{\sum_{i=1}^j RW_i \times FS_i}{\sum_{i=1}^j W_i}$$

Where, RW_i is the raw weight for the i th ingredient in the recipe, W_i is the weight of the i th ingredient after cooking in the recipe, AS_i is the added sugar content per 100g of the i th ingredient and FS_i is the free sugar content per 100g of the i th ingredient.

Note 1: Some food items reported in the 2015 CCHS-Nutrition had missing information on total sugar. For these food items the CNF, the USDA, common grocery stores in Canada, or the AUSNUT were searched for similar food items. Where a similar food item was identified, total sugar for the 2015 CCHS-Nutrition food item was calculated whereby considering the total sugar/ energy ratio. Where more than one similar food item was identified, the average was used in this calculation.

Note 2: The above described 9-steps approach was adapted from Louie et al. [3] who applied their 10 steps-approach to Australian data. One of their 10 steps (step #4) was omitted in the above described 9-steps approach because some recipe-level foods reported in the 2015 CCHS-Nutrition had more than one recipe.

Reference:

1. Health Canada. 2015 Canadian Community Health Survey—Nutrition User Guide. December 2018. Ottawa (ON), Canada: Health Canada; 2018.
2. Liu S, Munasinghe LL, Ohinmaa A, Veugelers PJ. Added, free and total sugar content and consumption of foods and beverages in Canada. *Health Reports* 2020
3. Louie JCY, Moshtaghian H, Boylan S, Flood VM, Rangan AM, Barclay AW, et al. A systematic methodology to estimate added sugar content of foods. *Eur J Clin Nutr.* 2015;69(2):154-61.
4. Canadian Food Inspection Agency, Minimum Drained Weights and Average Drained Weights for Processed Fruit or Vegetable Products in a Hermetically

Sealed Package. Available from: <http://www.inspection.gc.ca/about-the-cfia/acts-and-regulations/list-of-acts-and-regulations/documents-incorporated-by-reference/minimum-drained-weights-and-average-drained-weight/eng/1521842603695/1521842647177>.