

Technical Appendix to Working Paper 10-WP 518
Accounting for Product Substitution in the Analysis
of Food Taxes Targeting Obesity

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This Technical Appendix includes detailed information on definitions of categories and terms, and computations and related assumed values. The manuscript presents results on the use of the “average” measure for disaggregating foods within each food group. We use these values to indicate “H” (high) or “L” (low) fat and “H” (high) or “L” (low) sugar. The “average” measure, delineates high/low by comparing the calorie percentage from discretionary fat and added sugars of each individual food item to the average level of the composite food group. This appendix is supplemental material not intended for publication.

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Appendix A. Definition, Example, Health Effect, and Intake Guidelines for Saturated Fat, Unsaturated Fat, and Trans Fat

Fat Type		Definition	Presence in food	Health effects	Intake guidelines
Saturated fat		Saturated fats are typically solid at room temperature.	The majority of saturated fats come from animal sources, including meat and dairy products. Examples are fatty beef, lamb, pork, poultry with skin, beef fat (tallow), lard and cream, butter, cheese and other dairy products made from whole or reduced-fat (2%) milk. In addition, many baked goods and fried foods can contain high levels of saturated fats. Some plant foods, such as palm oil, palm kernel oil and coconut oil, also contain primarily saturated fats.	Saturated fats increase the cholesterol level in the blood. High level of blood cholesterol increases the risk of heart disease and stroke.	The American Heart Association recommends limiting saturated fats to less than 7% of total daily calories. That means no more than 140 calorie (16 grams) saturated fats for a 2000 calorie need per day.
Unsaturated fat	Monounsaturated fat	Monounsaturated fats are typically liquid at room temperature but start to turn solid when chilled.	Examples of foods high in monounsaturated fats include vegetable oils such as olive oil, canola oil, peanut oil, sunflower oil and sesame oil. Other sources include avocados, peanut butter, and many nuts and seeds.	Monounsaturated and/or polyunsaturated fats can help decrease bad cholesterol levels in the blood and decrease the risk of heart disease and stroke.	Limit the total fats to less than 25–35% of the calories intake per day. The majority of those fats should be monounsaturated or polyunsaturated. Have foods containing monounsaturated and/or polyunsaturated fats instead of foods that contain saturated and/or trans fats.
	Polyunsaturated fat	Polyunsaturated fats are typically liquid at room temperature and when chilled.	Foods high in polyunsaturated fat are vegetable oils including soybean oil, corn oil and safflower oil, as well as fatty fish such as salmon, mackerel, herring and trout. Other sources include some nuts and seeds such as walnuts and sunflower seeds.	Monounsaturated fats are also high in vitamin E. Polyunsaturated fats also include essential fats that the body needs such as omega-6 and omega-3.	
Trans fat		Trans fats (trans fatty acids or partially hydrogenated oils) are created in an industrial process that adds hydrogen to liquid vegetable oils to make them more solid.	Trans fats can be found in fried foods like French fries and doughnuts, and baked goods including pastries, pie crusts, biscuits, pizza dough, cookies, crackers, and stick margarines and shortenings	Trans fats increase the bad (LDL) cholesterol levels and decrease the good (HDL) cholesterol levels. Trans fats increase the risk of heart disease and stroke. It’s also associated with a higher risk of type 2 diabetes.	The American Heart Association recommends limiting trans fats to less than 1% of total daily calories. That means no more than 20 calories (2 grams) from trans fats for a 2000 calorie need per day. No more industrially manufactured trans fats given the naturally occurring trans fat that have been consumed.

Source: American Heart Association 2009.

Appendix B. Definition, Source and Examples of Discretionary Fats and Added Sugar

Source of discretionary calories	Definition	Subgroup	Definition	Example	Sources
Discretionary fat	The fat above the lowest available fat level	Discretionary liquid oil	Oils are fats that are liquid at room temperature. Foods that are mainly oil include mayonnaise, some salad dressing and soft tub or squeeze margarine.	Vegetable oils used in cooking	<p>Oils from a plant source and not described as “Hydrogenated” or “shortening”</p> <p>Fish</p> <p>Nuts and seeds</p> <p>Margarine described as “tub” or “liquid” types. If the type (stick/tub/liquid) of the margarine is not included in the description, it is classified as an oil if the recipe ingredient is an oil, or if it contains less than 80% total fat</p>
		Discretionary solid fat	Solid fats are fats that are solids at room temperature. Solid fats mainly come from animal sources or from vegetable oils that have been hydrogenated.	Butter, beef tallow, stick margarine, and shortenings	<p>From an animal source other than fish</p> <p>A blend of animal and plant sources (e.g., butter and margarine blend)</p> <p>Described as “hydrogenated”</p> <p>Described as “shortening”</p> <p>Cocoa fat/ fat in chocolate (not liquid)</p> <p>Derived from coconut or palm oil</p> <p>Margarine described as “stick”. If the type of margarine (stick/tub/liquid) is not included in the description, or if the recipe ingredient is classified as solid or if the fat content was 80% or greater, it is classified as a solid fat</p>
Added sugar	Added sugars are sugars consumed directly or added to foods at the table, or used as ingredients in processed and prepared foods such as breads, cakes, soft drinks, jams, chocolates, and ice cream. Added sugars do not include naturally occurring sugars such as lactose in milk or fructose in fruit.			White sugar, brown sugar, raw sugar, corn syrup, corn syrup solids, high fructose corn syrup, malt syrup, maple syrup, pancake syrup, fructose sweetener, liquid fructose, honey, molasses, anhydrous dextrose, crystal dextrose, and dextrin	

Source: Bowman, S.A., J.E. Friday, and A.J. Moshfegh 2008.

Appendix C. Calories, Nutrients, and Expenditures of Foods
Appendix C-1. Calories, Nutrients, and Expenditures of Foods by Cut-off Measure

Composite food groups	Sub-categories ^a	Calorie distribution within column ^b	Discretionary oil density ^c	Discretionary solid fat density ^d	Added sugars density ^e	Food expenditure (dollars)
11 Milks and milk drinks		4.67%	0.85%	26.38%	11.16%	0.22
	HH	1.09%	1.44%	19.88%	38.96%	0.05
	HL	2.73%	0.00%	36.96%	0.00%	0.11
	LH	0.23%	5.72%	1.22%	40.83%	0.01
	LL	0.61%	1.76%	0.16%	0.00%	0.06
12 Creams and cream substitutes		0.68%	6.49%	68.51%	14.48%	0.03
	HH	0.28%	0.01%	64.28%	34.42%	0.01
	HL	0.39%	11.27%	72.24%	0.12%	0.01
	LL	0.00%	0.00%	0.00%	0.00%	0.00
13 Milk desserts, sauces, gravies		2.12%	0.78%	42.88%	33.31%	0.07
	HH	1.92%	0.56%	43.45%	35.48%	0.07
	HL	0.14%	1.97%	51.55%	0.66%	0.00
	LH	0.06%	5.43%	3.20%	43.43%	0.00
	LL	0.00%	0.44%	0.19%	0.00%	0.00
14 Cheeses		2.74%	0.15%	65.93%	0.31%	0.14
	HH	0.01%	0.03%	25.84%	24.46%	0.00
	HL	2.72%	0.15%	66.31%	0.25%	0.14
	LL	0.01%	0.24%	3.43%	0.00%	0.00
20-24 Meats: Beef & Pork & Lamb, veal, game, other carcass meat & Poultry		7.90%	5.15%	20.98%	0.14%	0.58
	HH	0.07%	0.13%	44.26%	8.84%	0.01
	HL	5.22%	1.43%	30.58%	0.08%	0.34
	LL	2.61%	12.72%	1.16%	0.02%	0.24

25 Organ meats, sausages and lunchmeats, and meat spreads		2.68%	0.19%	43.27%	0.54%	0.16
	HL	1.99%	0.26%	58.26%	0.43%	0.09
	LH	0.04%	0.00%	0.00%	13.31%	0.01
	LL	0.65%	0.01%	0.10%	0.04%	0.07
26 Fish and shellfish		1.27%	9.50%	16.16%	0.56%	0.19
	HL	0.92%	8.37%	21.75%	0.70%	0.12
	LH	0.00%	37.10%	0.00%	11.61%	0.00
	LL	0.35%	12.34%	1.64%	0.18%	0.07
27+28+77 Meat Mixtures: Meat, poultry, fish with nonmeat items & Frozen and shelf-stable plate meals, soups, and gravies with meat, poultry, fish base; gelatin and gelatin-based drinks & Vegetables with meat, poultry, fish		7.37%	9.02%	20.60%	2.44%	0.43
	HH	0.17%	3.55%	17.92%	10.78%	0.01
	HL	5.91%	7.55%	24.95%	2.16%	0.31
	LH	0.08%	19.20%	0.46%	12.38%	0.01
	LL	1.21%	16.31%	0.97%	2.01%	0.11
31-35 Eggs		2.14%	5.68%	36.79%	0.42%	0.07
	HH	0.00%	0.01%	35.70%	12.39%	0.00
	HL	2.10%	5.09%	37.42%	0.36%	0.07
	LH	0.00%	0.00%	0.00%	89.76%	0.00
	LL	0.04%	38.16%	3.49%	0.00%	0.00
41-43 Dry beans, peas, other legumes, nuts, and seeds		3.37%	34.34%	3.92%	3.29%	0.12
	HH	0.16%	0.53%	11.42%	16.95%	0.01
	HL	0.52%	16.95%	18.17%	0.13%	0.01
	LH	0.27%	10.43%	1.38%	24.20%	0.03

	LL	2.42%	42.93%	0.65%	0.77%	0.07
51+52+54 Yeast breads, rolls & Quick breads & Crackers and salty snacks from grain products		12.00%	9.70%	10.63%	5.72%	0.24
	HH	1.49%	1.32%	26.79%	22.19%	0.04
	HL	3.88%	4.82%	20.94%	2.05%	0.08
	LH	1.73%	10.42%	0.16%	9.13%	0.01
	LL	4.90%	15.86%	1.24%	2.41%	0.11
53+55 Cakes, cookies, pies, pastries & Pancakes, waffles, French toast, other grain products		6.43%	3.78%	30.44%	28.45%	0.18
	HH	5.38%	2.07%	34.01%	31.01%	0.13
	HL	0.50%	1.99%	23.39%	1.56%	0.02
	LH	0.54%	22.04%	1.87%	28.25%	0.02
	LL	0.01%	36.35%	6.04%	0.00%	0.00
56-57 Pastas, cooked cereals, rice & Cereals, not cooked or ns as to cooked		4.44%	2.32%	3.20%	11.99%	0.12
	HH	0.17%	2.07%	13.19%	33.05%	0.01
	HL	0.17%	0.81%	29.17%	0.02%	0.00
	LH	1.93%	2.13%	1.28%	24.34%	0.07
	LL	2.17%	2.63%	2.06%	0.28%	0.03
58-59 Grain mixtures, frozen plate meals, soups & Meat substitutes, mainly cereal protein		11.18%	3.52%	28.19%	0.91%	0.53
	HH	0.08%	0.19%	27.04%	7.91%	0.00
	HL	10.01%	1.63%	31.09%	0.75%	0.48
	LH	0.05%	3.13%	0.00%	14.30%	0.00
	LL	1.04%	21.95%	1.76%	1.26%	0.05
61-67 (excluding 612+641+642+644)		2.27%	0.16%	0.06%	5.07%	0.23

Fruits, excluding juice						
	HH	0.00%	2.08%	32.37%	24.16%	0.00
	HL	0.00%	0.08%	29.07%	2.81%	0.00
	LH	0.21%	0.56%	0.01%	54.82%	0.01
	LL	2.05%	0.11%	0.00%	0.00%	0.21
612+641+642+644+92 Fruit juices & Nectars & Vinegar & Nonalcoholic beverages (excluding Coffee & Tea & Soft drinks, carbonated)		3.51%	0.04%	0.08%	41.41%	0.16
	HH	0.02%	0.42%	15.04%	57.78%	0.00
	LH	1.83%	0.07%	0.01%	78.86%	0.09
	LL	1.66%	0.00%	0.00%	0.00%	0.08
71 White potatoes and Puerto Rican starchy vegetables		4.70%	17.20%	24.79%	0.10%	0.12
	HH	0.00%	0.00%	57.91%	16.92%	0.00
	HL	2.78%	0.01%	41.62%	0.00%	0.07
	LL	1.92%	42.10%	0.39%	0.24%	0.05
72-76 Other vegetables		2.84%	8.87%	15.64%	6.06%	0.40
	HH	0.06%	8.30%	16.16%	31.64%	0.00
	HL	1.19%	4.83%	36.25%	0.29%	0.11
	LH	0.26%	5.25%	0.05%	51.52%	0.02
	LL	1.33%	13.23%	0.24%	0.98%	0.27
81 Fats		1.22%	34.46%	65.63%	0.26%	0.02
	HH	0.01%	0.00%	71.20%	25.40%	0.00
	HL	0.81%	2.18%	98.54%	0.00%	0.01
	LL	0.41%	99.15%	0.10%	0.39%	0.00
82-83 Oils & Salad dressings		2.06%	88.85%	2.39%	5.98%	0.04
	HH	0.01%	6.86%	28.14%	21.48%	0.00
	HL	0.15%	83.18%	9.13%	1.17%	0.00
	LH	0.55%	79.86%	0.48%	16.54%	0.02

	LL	1.34%	94.05%	2.15%	2.01%	0.02
91 Sugars and sweets		3.31%	11.23%	7.19%	60.30%	0.10
	HH	1.38%	23.69%	16.40%	39.94%	0.05
	HL	0.01%	16.81%	38.56%	4.10%	0.00
	LH	1.84%	2.34%	0.35%	78.43%	0.04
	LL	0.08%	0.00%	0.00%	0.05%	0.00
921-923 Coffee & Tea		1.01%	0.11%	6.57%	61.48%	0.12
	HH	0.13%	0.29%	23.30%	44.96%	0.01
	HL	0.08%	0.47%	40.93%	0.00%	0.01
	LH	0.57%	0.00%	0.00%	98.14%	0.02
	LL	0.22%	0.14%	0.00%	0.01%	0.08
924 Soft drinks, carbonated		5.91%	0.00%	0.00%	95.00%	0.30
	LH	5.80%	0.00%	0.00%	96.74%	0.21
	LL	0.11%	0.00%	0.00%	0.00%	0.09
93 Alcoholic beverages		4.21%	0.05%	0.19%	3.45%	0.68
	HH	0.02%	0.26%	38.65%	11.18%	0.00
	LH	0.60%	0.32%	0.05%	23.39%	0.14
	LL	3.59%	0.00%	0.00%	0.05%	0.53
94 Water		0.00%	0.00%	0.00%	0.00%	0.00
	LL	0.00%	0.00%	0.00%	0.00%	0.00

^a HH stands for High fat & High sugar; HL stands for High fat & Low sugar; LH stands for Low fat & High sugar; LL stands for Low fat & Low sugar.

^b Calorie distribution within this column sums to 100%.

^c Percentage contribution of discretionary oil to the total calories in the food. Each gram of discretionary oil provides 9 calories.

^d Percentage contribution of discretionary solid fat to the total calories in the food. Each gram of discretionary solid fat provides 9 calories.

^e Percentage contribution of discretionary added sugars to the total calories in the food. Each gram of added sugars provides 4 calories.

Appendix C-2. Calories, Nutrients, and Expenditures of Foods by Average Measure

Composite food groups	Sub-categories ^a	Calorie distribution within column ^b	Discretionary oil density ^c	Discretionary solid fat density ^d	Added sugars density ^e	Food expenditure (dollars)
11 Milks and milk drinks		4.67%	0.85%	26.38%	11.16%	0.22
	HH	0.17%	0.11%	33.53%	27.79%	0.01
	HL	2.40%	0.00%	39.50%	0.00%	0.10
	LH	1.15%	2.52%	14.09%	41.16%	0.05
	LL	0.94%	1.14%	6.57%	0.03%	0.07
12 Creams and cream substitutes		0.68%	6.49%	68.51%	14.48%	0.03
	HH	0.02%	0.10%	72.59%	27.75%	0.00
	HL	0.35%	0.00%	84.34%	0.68%	0.01
	LH	0.24%	0.00%	60.47%	38.67%	0.01
	LL	0.08%	57.57%	19.80%	0.44%	0.00
13 Milk desserts, sauces, gravies		2.12%	0.78%	42.88%	33.31%	0.07
	HH	1.09%	0.02%	48.73%	36.54%	0.03
	HL	0.37%	0.17%	58.97%	21.37%	0.01
	LH	0.36%	1.25%	21.74%	45.75%	0.02
	LL	0.30%	3.72%	27.30%	21.49%	0.01
14 Cheeses		2.74%	0.15%	65.93%	0.31%	0.14
	HH	0.00%	0.00%	87.06%	2.51%	0.00
	HL	1.87%	0.16%	71.47%	0.00%	0.08
	LH	0.23%	0.01%	59.98%	3.64%	0.01
	LL	0.64%	0.16%	51.80%	0.00%	0.04
20-24 Meats: Beef & Pork & Lamb, veal, game, other carcass meat & Poultry		7.90%	5.15%	20.98%	0.14%	0.58
	HH	0.28%	3.31%	38.58%	3.35%	0.02
	HL	3.88%	1.05%	35.20%	0.00%	0.23

	LH	0.11%	17.24%	9.28%	1.36%	0.01
	LL	3.63%	9.31%	4.78%	0.00%	0.33
25 Organ meats, sausages and lunchmeats, and meat spreads		2.68%	0.19%	43.27%	0.54%	0.16
	HH	0.65%	0.06%	59.98%	1.19%	0.02
	HL	1.29%	0.36%	58.48%	0.05%	0.07
	LH	0.06%	0.03%	4.44%	10.68%	0.01
	LL	0.67%	0.01%	0.97%	0.00%	0.07
26 Fish and shellfish		1.27%	9.50%	16.16%	0.56%	0.19
	HH	0.35%	5.92%	32.02%	1.41%	0.04
	HL	0.18%	9.23%	27.70%	0.00%	0.02
	LH	0.19%	22.78%	8.16%	1.16%	0.02
	LL	0.55%	7.33%	4.81%	0.00%	0.12
27+28+77 Meat mixtures: Meat, poultry, fish with nonmeat items & Frozen and shelf-stable plate meals, soups, and gravies with meat, poultry, fish base; gelatin and gelatin-based drinks & Vegetables with meat, poultry, fish		7.37%	9.02%	20.60%	2.44%	0.43
	HH	1.45%	7.14%	29.14%	4.66%	0.05
	HL	2.23%	2.86%	33.18%	0.53%	0.14
	LH	1.70%	21.15%	9.96%	5.16%	0.09
	LL	1.98%	6.89%	9.32%	0.63%	0.16
31-35 Eggs		2.14%	5.68%	36.79%	0.42%	0.07
	HH	0.26%	0.20%	48.03%	1.56%	0.01
	HL	0.57%	2.13%	45.67%	0.00%	0.02
	LH	0.16%	15.16%	23.24%	3.02%	0.01
	LL	1.15%	7.32%	31.80%	0.00%	0.04
41-43 Dry beans, peas, other		3.37%	34.34%	3.92%	3.29%	0.12

legumes, nuts, and seeds						
	HH	0.23%	0.38%	9.91%	17.24%	0.01
	HL	0.52%	17.05%	18.19%	0.07%	0.01
	LH	0.26%	16.61%	0.05%	21.34%	0.02
	LL	2.37%	43.26%	0.66%	0.72%	0.07
51+52+54 Yeast breads, rolls & Quick breads & Crackers and salty snacks from grain products		12.00%	9.70%	10.63%	5.72%	0.24
	HH	1.43%	1.31%	27.97%	22.32%	0.04
	HL	2.60%	7.11%	26.27%	0.82%	0.05
	LH	3.53%	9.82%	0.52%	7.87%	0.04
	LL	4.44%	13.82%	3.93%	1.52%	0.10
53+55 Cakes, cookies, pies, pastries & Pancakes, waffles, French toast, other grain products		6.43%	3.78%	30.44%	28.45%	0.18
	HH	1.43%	0.86%	35.49%	38.80%	0.03
	HL	2.04%	0.47%	44.83%	20.75%	0.05
	LH	1.50%	6.08%	18.80%	42.53%	0.04
	LL	1.45%	8.95%	17.25%	14.54%	0.05
56-57 Pastas, cooked cereals, rice & Cereals, not cooked or ns as to cooked		4.44%	2.32%	3.20%	11.99%	0.12
	HH	0.64%	1.65%	7.15%	27.50%	0.02
	HL	0.99%	2.92%	9.22%	0.00%	0.01
	LH	1.16%	2.59%	0.16%	27.59%	0.04
	LL	1.65%	2.02%	0.20%	2.15%	0.03
58-59 Grain mixtures, frozen plate meals, soups & Meat substitutes, mainly cereal protein		11.18%	3.52%	28.19%	0.91%	0.53
	HH	0.60%	0.28%	35.83%	4.62%	0.04

	HL	5.58%	0.54%	38.45%	0.35%	0.28
	LH	1.09%	11.22%	13.14%	3.76%	0.05
	LL	3.91%	6.14%	16.58%	0.33%	0.16
61-67 (excluding 612+641+642+644) Fruits, excluding juice		2.27%	0.16%	0.06%	5.07%	0.23
	HH	0.00%	3.02%	16.54%	20.51%	0.00
	HL	0.01%	43.61%	13.33%	0.56%	0.00
	LH	0.21%	0.52%	0.00%	54.89%	0.01
	LL	2.05%	0.01%	0.00%	0.00%	0.21
612+641+642+644+92 Fruit juices & Nectars & Vinegar & Nonalcoholic beverages (excluding Coffee & Tea & Soft drinks, carbonated)		3.51%	0.04%	0.08%	41.41%	0.16
	HH	0.02%	0.42%	15.04%	57.78%	0.00
	HL	0.00%	0.81%	3.79%	40.58%	0.00
	LH	1.70%	0.08%	0.00%	82.79%	0.08
	LL	1.79%	0.00%	0.00%	2.11%	0.08
71 White potatoes and Puerto Rican starchy vegetables		4.70%	17.20%	24.79%	0.10%	0.12
	HH	0.00%	0.00%	57.91%	16.92%	0.00
	HL	2.59%	0.01%	43.40%	0.00%	0.06
	LH	0.19%	33.46%	2.93%	2.35%	0.01
	LL	1.91%	38.76%	1.85%	0.00%	0.05
72-76 Other vegetables		2.84%	8.87%	15.64%	6.06%	0.40
	HH	0.05%	0.19%	19.81%	37.92%	0.00
	HL	1.08%	4.33%	38.35%	0.24%	0.10
	LH	0.45%	31.61%	0.85%	32.90%	0.02
	LL	1.26%	4.89%	1.25%	0.21%	0.28
81 Fats		1.22%	34.46%	65.63%	0.26%	0.02
	HH	0.00%	0.00%	77.32%	14.26%	0.00

	HL	0.78%	0.00%	101.35%	0.00%	0.01
	LH	0.06%	83.25%	3.26%	4.33%	0.00
	LL	0.38%	98.25%	1.61%	0.00%	0.01
82-83 Oils & Salad dressings		2.06%	88.85%	2.39%	5.98%	0.04
	HH	0.07%	72.50%	7.68%	10.21%	0.00
	HL	0.79%	91.08%	4.93%	2.87%	0.01
	LH	0.58%	78.33%	0.36%	16.01%	0.02
	LL	0.62%	97.54%	0.48%	0.17%	0.01
91 Sugars and sweets		3.31%	11.23%	7.19%	60.30%	0.10
	HH	0.11%	8.30%	13.43%	72.39%	0.01
	HL	1.26%	25.41%	17.09%	36.40%	0.04
	LH	1.44%	0.40%	0.09%	87.21%	0.03
	LL	0.50%	7.54%	1.37%	39.73%	0.02
921-923 Coffee & Tea		1.01%	0.11%	6.57%	61.48%	0.12
	HH	0.01%	0.00%	25.42%	68.31%	0.00
	HL	0.21%	0.38%	30.39%	25.14%	0.01
	LH	0.57%	0.00%	0.00%	98.14%	0.02
	LL	0.22%	0.14%	0.00%	0.01%	0.08
924 Soft drinks, carbonated		5.91%	0.00%	0.00%	95.00%	0.30
	LH	4.87%	0.00%	0.00%	98.03%	0.18
	LL	1.03%	0.00%	0.00%	80.68%	0.12
93 Alcoholic beverages		4.21%	0.05%	0.19%	3.45%	0.68
	HH	0.03%	0.29%	29.41%	14.88%	0.00
	LH	0.62%	0.31%	0.00%	22.61%	0.15
	LL	3.56%	0.00%	0.00%	0.00%	0.52
94 Water		0.00%	0.00%	0.00%	0.00%	0.00
	LL	0.00%	0.00%	0.00%	0.00%	0.00

^a HH is High fat & High sugar; HL is High fat & Low sugar; LH is Low fat & High sugar; LL is Low fat & Low sugar.

^b Calorie distribution within this column sums to 100%.

^c Percentage contribution of discretionary oil to the total calories in the food. 1 g discretionary oil = 9 calories

^d Percentage contribution of discretionary solid fat to the total calories in the food. 1 g discretionary solid fat = 9 calories.

^e Percentage contribution of discretionary added sugars to the total calories in the food. 1 g added sugars = 4 calories.

Appendix D. Cross-Price Elasticities of Composite Foods

Composite food groups	11	12	13	14	20-24	25	26	27+28+77	31-35	41-43	51+52+54	53+55	56-57	58-59	61-67 (excluding 612+641+642+644)	612+641+642+644+92	71	72-76	81	82-83	91	921-923	924	93	94
11 Milks and milk drinks		-9.E-03	1.E-01	1.E-02	-1.E-02	6.E-02	-2.E-02		4.E-02	-1.E-02			2.E-02		-1.E-02	-1.E-02	6.E-03	8.E-03	2.E-02		-6.E-03	1.E-02		3.E-02	
12 Creams and cream substitutes			6.E-02	7.E-02															-6.E-03						
13 Milk desserts, sauces, gravies				9.E-02															9.E-02						
14 Cheeses					-8.E-02	5.E-01	7.E-02		6.E-02	2.E-02			8.E-03		6.E-03	-3.E-02	-4.E-03	-7.E-03	-4.E-02		-3.E-02	2.E-02		-1.E-02	
20-24 Meats: Beef & Pork & Lamb, veal, game, other carcass meat & Poultry						-6.E-03	-7.E-02		-9.E-03	2.E-02	-7.E-02		-5.E-02		4.E-03	5.E-03	4.E-02	1.E-03	-2.E-03		-1.E-02	6.E-03		1.E-02	
25 Organ meats, sausages and lunchmeats, and meat spreads							-1.E-02		-1.E-02	3.E-02	-2.E-01		-8.E-02		1.E-02	-2.E-02	-3.E-03	3.E-02	-2.E-02		-5.E-03	-7.E-03		3.E-03	
26 Fish and shellfish									-6.E-02	-3.E-02	-1.E-01		-5.E-02		-3.E-02	7.E-03	4.E-02	-2.E-02	-7.E-02		-3.E-02	2.E-03		-3.E-03	
27+28+77 Meat mixtures: Meat, poultry, fish with nonmeat items & Frozen and shelf-stable plate meals, soups, and gravies with meat, poultry, fish base; gelatin and gelatin-based drinks & Vegetables with meat, poultry, fish																									
31-35 Eggs										-5.E-03	-2.E-01		-3.E-02		-2.E-02	3.E-02	-2.E-03	-1.E-03	-1.E-02		-2.E-02	8.E-03		9.E-03	
41-43 Dry beans, peas, other legumes, nuts, and seeds													3.E-02		6.E-03	-2.E-02	-6.E-02	-1.E-03	-1.E-02		2.E-02	-5.E-03		8.E-03	
51+52+54 Yeast breads, rolls & Quick breads & Crackers and salty snacks from grain products													2.E-02		-1.E-02	-6.E-03			-3.E-02						
53+55 Cakes, cookies, pies, pastries & Pancakes, waffles, French toast, other grain products																									
56-57 Pastas, cooked cereals, rice & Cereals, not cooked or ns as to cooked															5.E-04	7.E-03	2.E-02	2.E-02	-4.E-02		1.E-01	-4.E-02		1.E-02	
58-59 Grain mixtures, frozen plate meals, soups & Meat substitutes, mainly cereal protein																									
61-67 (excluding 612+641+642+644) Fruits																-1.E-02	1.E-02	-8.E-03	2.E-02		-1.E-02	-3.E-03		3.E-04	

Appendix E. Mashallian Elasticities of Composite Foods

Composite food groups	11	12	13	14	20-24	25	26	27+28+77	31-35	41-43	51+52+54	53+55	56-57	58-59	61-67 (excluding 612+641+642+644)	612+641+642+644+92	71	72-76	81	82-83	91	921-923	924	93	94
11 Milks and milk drinks	-7.E-01	-9.E-03	1.E-01	1.E-02	-1.E-02	6.E-02	-2.E-02	-1.E-04	4.E-02	-1.E-02	-2.E-04	-1.E-04	2.E-02	-2.E-04	-1.E-02	-1.E-02	6.E-03	8.E-03	2.E-02	-2.E-05	-6.E-03	1.E-02	-2.E-04	3.E-02	-1.E-06
12 Creams and cream substitutes	-7.E-02	-4.E-01	6.E-02	7.E-02	5.E-04	1.E-04	6.E-05	5.E-04	1.E-04	4.E-04	6.E-04	4.E-04	2.E-04	6.E-04	2.E-04	3.E-04	2.E-04	8.E-04	-6.E-03	5.E-05	3.E-04	4.E-04	7.E-04	2.E-03	5.E-06
13 Milk desserts, sauces, gravies	3.E-01	2.E-02	-7.E-01	9.E-02	7.E-04	2.E-04	9.E-05	7.E-04	2.E-04	5.E-04	8.E-04	5.E-04	3.E-04	9.E-04	4.E-04	4.E-04	3.E-04	1.E-03	9.E-02	8.E-05	4.E-04	5.E-04	1.E-03	3.E-03	7.E-06
14 Cheeses	2.E-02	1.E-02	5.E-02	-1.E+00	-8.E-02	5.E-01	7.E-02	3.E-04	6.E-02	2.E-02	4.E-04	2.E-04	8.E-03	4.E-04	6.E-03	-3.E-02	-4.E-03	-7.E-03	-4.E-02	3.E-05	-3.E-02	2.E-02	5.E-04	-1.E-02	3.E-06
20-24 Meats: Beef & Pork & Lamb, veal, game, other carcass meat & Poultry	-9.E-03	-4.E-04	-1.E-03	-2.E-02	-8.E-01	-7.E-03	-7.E-02	-3.E-03	-9.E-03	2.E-02	-7.E-02	-2.E-03	-5.E-02	-4.E-03	4.E-03	5.E-03	4.E-02	1.E-03	-1.E-03	-3.E-04	-1.E-02	6.E-03	-5.E-03	1.E-02	-3.E-05
25 Organ meats, sausages and lunchmeats, and meat spreads	8.E-02	-5.E-04	-1.E-03	4.E-01	-3.E-02	-8.E-01	-1.E-02	-3.E-03	-1.E-02	3.E-02	-2.E-01	-2.E-03	-8.E-02	-4.E-03	1.E-02	-2.E-02	-3.E-03	3.E-02	-2.E-02	-3.E-04	-5.E-03	7.E-03	-5.E-03	3.E-03	-3.E-05
26 Fish and shellfish	-2.E-02	-6.E-04	-2.E-03	5.E-02	-2.E-01	-1.E-02	-5.E-01	-4.E-03	-6.E-02	-3.E-02	-1.E-01	-3.E-03	-5.E-02	-5.E-03	-3.E-02	7.E-03	4.E-02	-2.E-02	-7.E-02	-4.E-04	-3.E-02	2.E-03	-6.E-03	-4.E-03	-3.E-05
27+28+77 Meat mixtures: Meat, poultry, fish with nonmeat items & Frozen and shelf-stable plate meals, soups, and gravies with meat, poultry, fish base; gelatin and gelatin-based drinks & Vegetables with meat, poultry, fish	-2.E-03	-3.E-04	-1.E-03	-2.E-03	-2.E-03	-5.E-04	-3.E-04	-2.E+00	-6.E-04	-2.E-03	-3.E-03	-2.E-03	-1.E-03	-3.E-03	-1.E-03	-1.E-03	-1.E-03	-4.E-03	-1.E-04	-2.E-04	-1.E-03	-2.E-03	-3.E-03	-1.E-02	-2.E-05
31-35 Eggs	1.E-01	-2.E-04	-6.E-04	1.E-01	-7.E-02	-2.E-02	-2.E-01	-1.E-03	-1.E-01	-5.E-03	-2.E-01	-1.E-03	-3.E-02	-2.E-03	-2.E-02	3.E-02	-2.E-03	-1.E-03	-1.E-02	-1.E-04	-2.E-02	8.E-03	-2.E-03	9.E-03	-1.E-05
41-43 Dry beans, peas, other legumes, nuts, and seeds	-2.E-02	2.E-04	6.E-04	2.E-02	1.E-01	4.E-02	-5.E-02	1.E-03	-2.E-03	-8.E-01	2.E-03	1.E-03	3.E-02	2.E-03	6.E-03	-2.E-02	-5.E-02	-1.E-03	-1.E-02	2.E-04	2.E-02	-5.E-03	2.E-03	8.E-03	1.E-05
51+52+54 Yeast breads, rolls & Quick breads & Crackers and salty snacks from grain products	1.E-05	2.E-06	5.E-06	9.E-06	-2.E-01	-1.E-01	-1.E-01	1.E-05	-7.E-02	1.E-05	-8.E-01	1.E-05	2.E-02	2.E-05	-1.E-02	-6.E-03	6.E-06	2.E-05	-3.E-02	1.E-06	8.E-06	9.E-06	2.E-05	6.E-05	1.E-07
53+55 Cakes, cookies, pies, pastries & Pancakes, waffles, French toast, other grain products	-5.E-04	-7.E-05	-2.E-04	-4.E-04	-4.E-04	-1.E-04	-6.E-05	-5.E-04	-1.E-04	-4.E-04	-6.E-04	-7.E-01	-2.E-04	-6.E-04	-2.E-04	-3.E-04	-2.E-04	-8.E-04	-2.E-05	-5.E-05	-3.E-04	-3.E-04	-7.E-04	-2.E-03	-4.E-06
56-57 Pastas, cooked cereals, rice & Cereals, not cooked or ns as to cooked	4.E-02	-1.E-04	-4.E-04	9.E-03	-2.E-01	-1.E-01	-8.E-02	-9.E-04	-2.E-02	3.E-02	4.E-02	-7.E-04	-6.E-01	-1.E-03	5.E-04	7.E-03	2.E-02	2.E-02	-4.E-02	-1.E-04	1.E-01	-4.E-02	-1.E-03	1.E-02	-8.E-06
58-59 Grain mixtures, frozen plate meals, soups & Meat substitutes, mainly cereal protein	-2.E-03	-3.E-04	-1.E-03	-2.E-03	-2.E-03	-5.E-04	-3.E-04	-2.E-03	-6.E-04	-2.E-03	-3.E-03	-2.E-03	-1.E-03	-2.E+00	-1.E-03	-1.E-03	-1.E-03	-4.E-03	-1.E-04	-2.E-04	-1.E-03	-2.E-03	-3.E-03	-1.E-02	-2.E-05
61-67 (excluding 612+641+642+644) Fruits, excluding juice	-2.E-02	-4.E-04	-1.E-03	2.E-03	1.E-02	9.E-03	-2.E-02	-2.E-03	-8.E-03	9.E-04	-1.E-02	-2.E-03	-7.E-04	-3.E-03	-6.E-01	-1.E-02	1.E-02	-8.E-03	2.E-02	-3.E-04	-1.E-02	-3.E-03	-4.E-03	-1.E-04	-2.E-05
612+641+642+644+92 Fruit juices & Nectars & Vinegar & Nonalcoholic beverages (excluding Coffee & Tea & Soft drinks, carbonated)	-2.E-02	-2.E-04	-6.E-04	-2.E-02	2.E-02	-1.E-02	1.E-02	-2.E-03	1.E-02	-1.E-02	-1.E-02	-1.E-03	5.E-03	-2.E-03	-2.E-02	-9.E-01	-2.E-02	8.E-04	-2.E-02	-2.E-04	7.E-02	-2.E-02	-2.E-03	1.E-02	-1.E-05
71 White potatoes and Puerto Rican starchy vegetables	1.E-02	-2.E-04	-5.E-04	-6.E-03	2.E-01	-3.E-03	7.E-02	-1.E-03	-1.E-03	-6.E-02	-1.E-03	-8.E-04	2.E-02	-1.E-03	2.E-02	-2.E-02	-2.E-01	-3.E-03	-3.E-02	-1.E-04	4.E-02	6.E-02	-2.E-03	-2.E-02	-1.E-05
72-76 Other vegetables	4.E-03	-1.E-04	-3.E-04	-3.E-03	8.E-03	1.E-02	-6.E-03	-8.E-04	1.E-05	-2.E-03	-9.E-04	-6.E-04	7.E-03	-9.E-04	-3.E-03	9.E-04	-7.E-04	-5.E-01	-5.E-02	-8.E-05	-3.E-02	1.E-03	-1.E-03	4.E-03	-7.E-06
81 Fats	2.E-01	-9.E-03	3.E-01	-3.E-01	-3.E-02	-1.E-01	-7.E-01	-2.E-03	-6.E-02	-8.E-02	-4.E-01	-2.E-03	-3.E-01	-3.E-03	2.E-01	-1.E-01	-2.E-01	-1.E+00	-4.E-01	6.E-03	2.E-02	4.E-03	-4.E-03	3.E-02	-2.E-05
82-83 Oils & Salad dressings	-2.E-03	-2.E-04	-7.E-04	-1.E-03	-2.E-03	-4.E-04	-2.E-04	-2.E-03	-4.E-04	-1.E-03	-2.E-03	-1.E-03	-8.E-04	-2.E-03	-8.E-04	-9.E-04	-8.E-04	-3.E-03	3.E-03	-8.E-01	-1.E-03	-1.E-03	-3.E-03	-8.E-03	-2.E-05
91 Sugars and sweets	-1.E-02	1.E-04	3.E-04	-4.E-02	-5.E-02	-5.E-03	-6.E-02	8.E-04	-1.E-02	2.E-02	9.E-04	6.E-04	1.E-01	1.E-03	-2.E-02	1.E-01	5.E-02	-1.E-01	4.E-03	8.E-05	-7.E-01	-4.E-02	1.E-03	-2.E-03	7.E-06
921-923 Coffee & Tea	3.E-02	2.E-04	4.E-04	3.E-02	4.E-02	-6.E-03	8.E-03	1.E-03	6.E-03	-5.E-03	1.E-03	8.E-04	-4.E-02	1.E-03	-2.E-03	-3.E-02	6.E-02	9.E-03	9.E-04	1.E-04	-4.E-02	-6.E-01	2.E-03	3.E-03	1.E-05
924 Soft drinks, carbonated	1.E-04	2.E-05	5.E-05	9.E-05	1.E-04	3.E-05	2.E-05	1.E-04	3.E-05	9.E-05	1.E-04	9.E-05	5.E-05	2.E-04	6.E-05	6.E-05	5.E-05	2.E-04	5.E-06	1.E-05	7.E-05	9.E-05	-1.E+00	6.E-04	1.E-06
93 Alcoholic beverages	1.E-02	3.E-04	8.E-04	-2.E-03	2.E-02	5.E-03	4.E-03	2.E-03	2.E-03	2.E-03	2.E-03	1.E-03	3.E-03	2.E-03	5.E-03	6.E-03	-1.E-03	8.E-03	1.E-03	2.E-04	2.E-04	1.E-03	3.E-03	-9.E-01	2.E-05
94 Water	8.E-04	1.E-04	3.E-04	6.E-04	7.E-04	2.E-04	1.E-04	8.E-04	2.E-04	6.E-04	9.E-04	6.E-04	4.E-04	1.E-03	4.E-04	4.E-04	3.E-04	1.E-03	3.E-05	9.E-05	5.E-04	6.E-04	1.E-03	4.E-03	-3.E-01

Note: Elasticities are from USDA/ERS 2008; Bhuyan and Lopez 1997; Reed, Levedahl, and Clark 2003; Reed, Levedahl, and Hallahan 2005; Chouinard et al. 2010.

Appendix F. Calorie and Nutrient Densities of Composite Food Groups
Appendix F-1. Calorie and Nutrient Densities of Composite Food Groups before Tax

Composite food groups	Calorie/Nutrient Density			
	Calorie (calorie/ unit)	Discretionary oil (g/unit)	Discretionary solid fat (g/unit)	Added sugars (g/unit)
11 Milks and milk drinks	453.60	0.43	13.29	12.66
12 Creams and cream substitutes	558.38	4.03	42.50	20.21
13 Milk desserts, sauces, gravies	626.99	0.55	29.87	52.22
14 Cheeses	431.13	0.07	31.58	0.34
20-24 Meats: Beef & Pork & Lamb, veal, game, other carcass meat & Poultry	295.77	1.69	6.90	0.10
25 Organ meats, sausages and lunchmeats, and meat spreads	355.25	0.08	17.08	0.48
26 Fish and shellfish	143.56	1.52	2.58	0.20
27+28+77 Meat mixtures Meat, poultry, fish with nonmeat items & Frozen and shelf-stable plate meals, soups, and gravies with meat, poultry, fish base; gelatin and gelatin-based drinks & Vegetables with meat, poultry, fish	377.55	3.78	8.64	2.30
31-35 Eggs	629.78	3.97	25.74	0.66
41-43 Dry beans, peas, other legumes, nuts, and seeds	626.27	23.90	2.73	5.15
51+52+54 Yeast breads, rolls & Quick breads & Crackers and salty snacks from grain products	1102.37	11.88	13.02	15.75
53+55 Cakes, cookies, pies, pastries & Pancakes, waffles, French toast, other grain products	801.62	3.37	27.11	57.01
56-57 Pastas, cooked cereals, rice & Cereals, not cooked or ns as to cooked	842.53	2.17	2.99	25.25
58-59 Grain mixtures, frozen plate meals, soups & Meat substitutes, mainly cereal protein	461.44	1.81	14.45	1.05
61-67 Fruits (excluding 612+641+642+644)	220.10	0.04	0.01	2.79
612+641+642+644+92 Fruit juices & Nectars & Vinegar & Nonalcoholic beverages (excluding Coffee & Tea & Soft drinks, carbonated)	466.92	0.02	0.04	48.33
71 White potatoes and Puerto Rican starchy vegetables	855.79	16.35	23.57	0.22
72-76 Other vegetables	153.86	1.52	2.67	2.33
81 Fats	1386.80	53.09	101.12	0.89
82-83 Oils & Salad dressings	1226.56	121.08	3.26	18.35
91 Sugars and sweets	708.08	8.84	5.66	106.74
921-923 Coffee & Tea	187.36	0.02	1.37	28.80
924 Soft drinks, carbonated	431.83	0.00	0.00	102.56
93 Alcoholic beverages	136.28	0.01	0.03	1.18
94 Water	38.88	0.00	0.00	0.00

**Appendix F-2. Calorie and Nutrient Densities of Composite Food Groups with Tax
on Calories from Added Sugars by Cut-off Measure**

Composite food groups	Calorie/Nutrient Density			
	Calorie	Discretionary oil (g/unit)	Discretionary solid fat (g/unit)	Added sugars (g/unit)
11 Milks and milk drinks	453.26	0.42	13.35	12.22
12 Creams and cream substitutes	558.84	4.10	42.58	19.78
13 Milk desserts, sauces, gravies	628.11	0.56	30.00	51.57
14 Cheeses	431.16	0.07	31.59	0.33
20-24 Meats: Beef & Pork & Lamb, veal, game, other carcass meat & Poultry	295.78	1.69	6.89	0.10
25 Organ meats, sausages and lunchmeats, and meat spreads	355.27	0.08	17.08	0.48
26 Fish and shellfish	143.56	1.52	2.58	0.20
27+28+77 Meat mixtures: Meat, poultry, fish with nonmeat items & Frozen and shelf-stable plate meals, soups, and gravies with meat, poultry, fish base; gelatin and gelatin-based drinks & Vegetables with meat, poultry, fish	377.44	3.78	8.64	2.29
31-35 Eggs	629.73	3.97	25.75	0.63
41-43 Dry beans, peas, other legumes, nuts, and seeds	627.55	24.00	2.73	5.09
51+52+54 Yeast breads, rolls & Quick breads & Crackers and salty snacks from grain products	1095.59	11.85	12.99	15.29
53+55 Cakes, cookies, pies, pastries & Pancakes, waffles, French toast, other grain products	797.58	3.40	26.83	56.32
56-57 Pastas, cooked cereals, rice & Cereals, not cooked or ns as to cooked	848.36	2.19	3.02	24.99
58-59 Grain mixtures, frozen plate meals, soups & Meat substitutes, mainly cereal protein	461.43	1.81	14.46	1.04
61-67 Fruits (excluding 612+641+642+644)	218.41	0.04	0.01	2.19
612+641+642+644+92 Fruit juices & Nectars & Vinegar & Nonalcoholic beverages (excluding Coffee & Tea & Soft drinks, carbonated)	468.42	0.02	0.04	45.18
71 White potatoes and Puerto Rican starchy vegetables	855.79	16.35	23.57	0.22
72-76 Other vegetables	153.42	1.51	2.68	2.24
81 Fats	1386.72	53.04	101.18	0.87
82-83 Oils & Salad dressings	1231.90	121.70	3.30	18.20
91 Sugars and sweets	696.32	9.23	5.99	102.17
921-923 Coffee & Tea	176.24	0.02	1.38	25.76
924 Soft drinks, carbonated	394.04	0.00	0.00	93.01
93 Alcoholic beverages	136.41	0.01	0.03	1.16
94 Water	38.88	0.00	0.00	0.00

**Appendix F-3. Calorie and Nutrient Densities of Composite Food Groups with Tax
on Calories from Added Sugars by Average Measure**

Composite food groups	Calorie/Nutrient Density			
	Calorie	Discretionary oil (g/unit)	Discretionary solid fat (g/unit)	Added sugars (g/unit)
11 Milks and milk drinks	453.29	0.42	13.35	12.23
12 Creams and cream substitutes	556.76	4.08	42.45	19.66
13 Milk desserts, sauces, gravies	625.35	0.55	29.76	51.93
14 Cheeses	431.16	0.07	31.59	0.33
20-24 Meats: Beef & Pork & Lamb, veal, game, other carcass meat & Poultry	295.77	1.69	6.89	0.10
25 Organ meats, sausages and lunchmeats, and meat spreads	355.22	0.08	17.08	0.48
26 Fish and shellfish	143.55	1.52	2.58	0.20
27+28+77 Meat mixtures: Meat, poultry, fish with nonmeat items & Frozen and shelf-stable plate meals, soups, and gravies with meat, poultry, fish base; gelatin and gelatin-based drinks & Vegetables with meat, poultry, fish	377.02	3.77	8.63	2.29
31-35 Eggs	629.79	3.97	25.74	0.66
41-43 Dry beans, peas, other legumes, nuts, and seeds	627.57	23.99	2.73	5.10
51+52+54 Yeast breads, rolls & Quick breads & Crackers and salty snacks from grain products	1100.10	11.91	13.01	15.42
53+55 Cakes, cookies, pies, pastries & Pancakes, waffles, French toast, other grain products	797.85	3.39	26.96	56.14
56-57 Pastas, cooked cereals, rice & Cereals, not cooked or ns as to cooked	846.75	2.18	3.02	25.02
58-59 Grain mixtures, frozen plate meals, soups & Meat substitutes, mainly cereal protein	461.51	1.80	14.46	1.04
61-67 Fruits (excluding 612+641+642+644)	218.43	0.04	0.01	2.20
612+641+642+644+92 Fruit juices & Nectars & Vinegar & Nonalcoholic beverages (excluding Coffee & Tea & Soft drinks, carbonated)	468.35	0.02	0.04	45.07
71 White potatoes and Puerto Rican starchy vegetables	855.79	16.35	23.57	0.22
72-76 Other vegetables	153.27	1.49	2.68	2.26
81 Fats	1386.72	53.05	101.18	0.88
82-83 Oils & Salad dressings	1230.31	121.57	3.27	18.19
91 Sugars and sweets	694.56	9.20	5.89	101.73
921-923 Coffee & Tea	174.74	0.02	1.37	25.37
924 Soft drinks, carbonated	412.40	0.00	0.00	97.41
93 Alcoholic beverages	136.41	0.01	0.03	1.16
94 Water	38.88	0.00	0.00	0.00

Appendix G. Added Sugars Densities of Composite Food Groups and Sub-Categories
Appendix G-1. Added Sugars Densities of Composite Food Groups and Sub-Categories by Cut-off Measure

Composite food groups	Added sugars per unit of food (g/unit)				
	Composite	HH	HL	LH	LL
11 Milks and milk drinks	12.66	48.04	0.00	47.79	0.00
12 Creams and cream substitutes	20.21	46.23	0.18	NA	0.00
13 Milk desserts, sauces, gravies	52.22	55.56	1.20	55.24	0.00
14 Cheeses	0.34	16.50	0.27	NA	0.00
20-24 Meats: Beef & Pork & Lamb, veal, game, other carcass meat & Poultry	0.10	4.48	0.07	NA	0.01
25 Organ meats, sausages and lunchmeats, and meat spreads	0.48	NA	0.51	4.42	0.02
26 Fish and shellfish	0.20	NA	0.29	12.20	0.05
27+28+77 Meat mixtures: Meat, poultry, fish with nonmeat items & Frozen and shelf-stable plate meals, soups, and gravies with meat, poultry, fish base; gelatin and gelatin-based drinks & Vegetables with meat, poultry, fish	2.30	11.06	2.28	9.10	1.24
31-35 Eggs	0.66	7.42	0.59	219.77	0.00
41-43 Dry beans, peas, other legumes, nuts, and seeds	5.15	28.55	0.25	14.03	1.40
51+52+54 Yeast breads, rolls & Quick breads & Crackers and salty snacks from grain products	15.75	46.41	5.37	81.82	6.00
53+55 Cakes, cookies, pies, pastries & Pancakes, waffles, French toast, other grain products	57.01	68.82	2.15	36.53	0.00
56-57 Pastas, cooked cereals, rice & Cereals, not cooked or ns as to cooked	25.25	53.68	0.05	35.23	0.99
58-59 Grain mixtures, frozen plate meals, soups & Meat substitutes, mainly cereal protein	1.05	9.14	0.86	17.88	1.54
61-67 Fruits (excluding 612+641+642+644)	2.79	14.03	4.41	48.34	0.00
612+641+642+644+92 Fruit juices & Nectars & Vinegar & Nonalcoholic beverages (excluding Coffee & Tea & Soft drinks, carbonated)	48.33	57.34	NA	90.08	0.00
71 White potatoes and Puerto Rican starchy vegetables	0.22	29.36	0.01	NA	0.49
72-76 Other vegetables	2.33	40.04	0.17	46.37	0.26
81 Fats	0.89	55.73	0.00	NA	2.03
82-83 Oils & Salad dressings	18.35	15.33	3.35	31.48	8.74
91 Sugars and sweets	106.74	57.70	2.77	175.90	0.05
921-923 Coffee & Tea	28.80	47.42	0.00	161.43	0.00
924 Soft drinks, carbonated	102.56	NA	NA	149.07	0.00
93 Alcoholic beverages	1.18	4.97	NA	5.37	0.02
94 Water	0.00	NA	NA	NA	0.00

Appendix G-2. Added Sugars Densities of Composite Food Groups and Sub-Categories by Average Measure

Composite food groups	Added sugars per unit of food (g/unit)				
	Composite	HH	HL	LH	LL
11 Milks and milk drinks	12.66	45.98	0.00	48.25	0.02
12 Creams and cream substitutes	20.21	11.32	0.88	71.19	0.72
13 Milk desserts, sauces, gravies	52.22	72.88	32.11	51.82	26.61
14 Cheeses	0.34	3.08	0.00	3.50	0.00
20-24 Meats: Beef & Pork & Lamb, veal, game, other carcass meat & Poultry	0.10	2.29	0.00	0.97	0.00
25 Organ meats, sausages and lunchmeats, and meat spreads	0.48	1.86	0.06	3.94	0.00
26 Fish and shellfish	0.20	0.71	0.00	0.73	0.00
27+28+77 Meat mixtures: Meat, poultry, fish with nonmeat items & Frozen and shelf-stable plate meals, soups, and gravies with meat, poultry, fish base; gelatin and gelatin-based drinks & Vegetables with meat, poultry, fish	2.30	7.59	0.48	5.50	0.44
31-35 Eggs	0.66	2.27	0.00	4.29	0.00
41-43 Dry beans, peas, other legumes, nuts, and seeds	5.15	17.22	0.14	15.80	1.29
51+52+54 Yeast breads, rolls & Quick breads & Crackers and salty snacks from grain products	15.75	46.54	2.15	35.95	3.56
53+55 Cakes, cookies, pies, pastries & Pancakes, waffles, French toast, other grain products	57.01	113.19	42.66	82.52	22.23
56-57 Pastas, cooked cereals, rice & Cereals, not cooked or ns as to cooked	25.25	42.42	0.01	39.25	5.54
58-59 Grain mixtures, frozen plate meals, soups & Meat substitutes, mainly cereal protein	1.05	3.47	0.39	4.47	0.45
61-67 Fruits (excluding 612+641+642+644)	2.79	18.11	0.78	48.37	0.00
612+641+642+644+92 Fruit juices & Nectars & Vinegar & Nonalcoholic beverages (excluding Coffee & Tea & Soft drinks, carbonated)	48.33	57.34	51.84	94.67	2.52
71 White potatoes and Puerto Rican starchy vegetables	0.22	29.36	0.01	4.85	0.00
72-76 Other vegetables	2.33	47.41	0.14	39.26	0.05
81 Fats	0.89	36.05	0.00	17.44	0.00
82-83 Oils & Salad dressings	18.35	18.57	14.80	31.45	0.56
91 Sugars and sweets	106.74	46.16	58.49	230.12	54.34
921-923 Coffee & Tea	28.80	168.24	21.28	161.43	0.00
924 Soft drinks, carbonated	102.56	NA	NA	149.15	36.70
93 Alcoholic beverages	1.18	6.26	NA	5.17	0.00
94 Water	0.00	NA	NA	NA	0.00

Appendix H. New Prices with Tax on Calories from Added Sugar
Appendix H-1. New Prices with Tax on Calories from Added Sugars by Cut-off Measure

Composite food groups	New Price with Tax					
	Without CES	With CES				
		Composite	HH	HL	LH	LL
11 Milks and milk drinks	1.0122	1.0119	1.0461	1.0000	1.0459	1.0000
12 Creams and cream substitutes	1.0194	1.0192	1.0444	1.0002	NA	1.0000
13 Milk desserts, sauces, gravies	1.0501	1.0498	1.0533	1.0012	1.0530	1.0000
14 Cheeses	1.0003	1.0003	1.0158	1.0003	NA	1.0000
20-24 Meats: Beef & Pork & Lamb, veal, game, other carcass meat & Poultry	1.0001	1.0001	1.0043	1.0001	NA	1.0000
25 Organ meats, sausages and lunchmeats, and meat spreads	1.0005	1.0005	NA	1.0005	1.0042	1.0000
26 Fish and shellfish	1.0002	1.0002	NA	1.0003	1.0117	1.0000
27+28+77 Meat mixtures: Meat, poultry, fish with nonmeat items & Frozen and shelf-stable plate meals, soups, and gravies with meat, poultry, fish base; gelatin and gelatin-based drinks & Vegetables with meat, poultry, fish	1.0022	1.0022	1.0106	1.0022	1.0087	1.0012
31-35 Eggs	1.0006	1.0006	1.0071	1.0006	1.2110	1.0000
41-43 Dry beans, peas, other legumes, nuts, and seeds	1.0049	1.0049	1.0274	1.0002	1.0135	1.0013
51+52+54 Yeast breads, rolls & Quick breads & Crackers and salty snacks from grain products	1.0151	1.0149	1.0446	1.0052	1.0786	1.0058
53+55 Cakes, cookies, pies, pastries & Pancakes, waffles, French toast, other grain products	1.0547	1.0544	1.0661	1.0021	1.0351	1.0000
56-57 Pastas, cooked cereals, rice & Cereals, not cooked or ns as to cooked	1.0242	1.0241	1.0515	1.0001	1.0338	1.0009
58-59 Grain mixtures, frozen plate meals, soups & Meat substitutes, mainly cereal protein	1.0010	1.0010	1.0088	1.0008	1.0172	1.0015
61-67 Fruits (excluding 612+641+642+644)	1.0027	1.0024	1.0135	1.0042	1.0464	1.0000
612+641+642+644+92 Fruit juices & Nectars & Vinegar & Nonalcoholic beverages (excluding Coffee & Tea & Soft drinks, carbonated)	1.0464	1.0449	1.0551	NA	1.0865	1.0000
71 White potatoes and Puerto Rican starchy vegetables	1.0002	1.0002	1.0282	1.0000	NA	1.0005
72-76 Other vegetables	1.0022	1.0022	1.0384	1.0002	1.0445	1.0002
81 Fats	1.0009	1.0008	1.0535	1.0000	NA	1.0019
82-83 Oils & Salad dressings	1.0176	1.0175	1.0147	1.0032	1.0302	1.0084
91 Sugars and sweets	1.1025	1.1002	1.0554	1.0027	1.1689	1.0001
921-923 Coffee & Tea	1.0276	1.0261	1.0455	1.0000	1.1550	1.0000
924 Soft drinks, carbonated	1.0985	1.0938	NA	NA	1.1431	1.0000
93 Alcoholic beverages	1.0011	1.0011	1.0048	NA	1.0052	1.0000
94 Water	1.0000	1.0000	NA	NA	NA	1.0000

Appendix H-2. New Prices with Tax on Calories from Added Sugars by Average Measure

Composite food groups	New Price with Tax					
	Without CES	With CES				
		Composite	HH	HL	LH	LL
11 Milks and milk drinks	1.0122	1.0119	1.0441	1.0000	1.0463	1.0000
12 Creams and cream substitutes	1.0194	1.0191	1.0109	1.0008	1.0684	1.0007
13 Milk desserts, sauces, gravies	1.0501	1.0500	1.0700	1.0308	1.0498	1.0255
14 Cheeses	1.0003	1.0003	1.0030	1.0000	1.0034	1.0000
20-24 Meats: Beef & Pork & Lamb, veal, game, other carcass meat & Poultry	1.0001	1.0001	1.0022	1.0000	1.0009	1.0000
25 Organ meats, sausages and lunchmeats, and meat spreads	1.0005	1.0005	1.0018	1.0001	1.0038	1.0000
26 Fish and shellfish	1.0002	1.0002	1.0007	1.0000	1.0007	1.0000
27+28+77 Meat mixtures: Meat, poultry, fish with nonmeat items & Frozen and shelf-stable plate meals, soups, and gravies with meat, poultry, fish base; gelatin and gelatin-based drinks & Vegetables with meat, poultry, fish	1.0022	1.0022	1.0073	1.0005	1.0053	1.0004
31-35 Eggs	1.0006	1.0006	1.0022	1.0000	1.0041	1.0000
41-43 Dry beans, peas, other legumes, nuts, and seeds	1.0049	1.0049	1.0165	1.0001	1.0152	1.0012
51+52+54 Yeast breads, rolls & Quick breads & Crackers and salty snacks from grain products	1.0151	1.0150	1.0447	1.0021	1.0345	1.0034
53+55 Cakes, cookies, pies, pastries & Pancakes, waffles, French toast, other grain products	1.0547	1.0543	1.1087	1.0410	1.0792	1.0213
56-57 Pastas, cooked cereals, rice & Cereals, not cooked or ns as to cooked	1.0242	1.0241	1.0407	1.0000	1.0377	1.0053
58-59 Grain mixtures, frozen plate meals, soups & Meat substitutes, mainly cereal protein	1.0010	1.0010	1.0033	1.0004	1.0043	1.0004
61-67 Fruits (excluding 612+641+642+644)	1.0027	1.0024	1.0174	1.0007	1.0464	1.0000
612+641+642+644+92 Fruit juices & Nectars & Vinegar & Nonalcoholic beverages (excluding Coffee & Tea & Soft drinks, carbonated)	1.0464	1.0448	1.0551	1.0498	1.0909	1.0024
71 White potatoes and Puerto Rican starchy vegetables	1.0002	1.0002	1.0282	1.0000	1.0047	1.0000
72-76 Other vegetables	1.0022	1.0022	1.0455	1.0001	1.0377	1.0000
81 Fats	1.0009	1.0009	1.0346	1.0000	1.0167	1.0000
82-83 Oils & Salad dressings	1.0176	1.0175	1.0178	1.0142	1.0302	1.0005
91 Sugars and sweets	1.1025	1.0999	1.0443	1.0562	1.2210	1.0522
921-923 Coffee & Tea	1.0276	1.0259	1.1615	1.0204	1.1550	1.0000
924 Soft drinks, carbonated	1.0985	1.0959	NA	NA	1.1432	1.0352
93 Alcoholic beverages	1.0011	1.0011	1.0060	NA	1.0050	1.0000
94 Water	1.0000	1.0000	NA	NA	NA	1.0000

Appendix I. Demand Change with Tax on Calories from Added Sugars by Average Measure

Composite food groups	Demand change rate					
	Without CES	With CES				
		Composite	HH	HL	LH	LL
11 Milks and milk drinks	-0.45%	-0.43%	-3.62%	0.80%	-3.83%	0.80%
12 Creams and cream substitutes	-0.63%	-0.62%	-0.09%	0.56%	-3.63%	0.57%
13 Milk desserts, sauces, gravies	-2.82%	-2.82%	-4.42%	-1.23%	-2.80%	-0.78%
14 Cheeses	-0.06%	-0.06%	-0.51%	0.00%	-0.58%	0.00%
20-24 Meats: Beef & Pork & Lamb, veal, game, other carcass meat & Poultry	-0.36%	-0.36%	-0.69%	-0.35%	-0.49%	-0.35%
25 Organ meats, sausages and lunchmeats, and meat spreads	-0.55%	-0.54%	-0.69%	-0.50%	-0.92%	-0.49%
26 Fish and shellfish	-0.80%	-0.79%	-0.82%	-0.77%	-0.82%	-0.77%
27+28+77 Meat mixtures: Meat, poultry, fish with nonmeat items & Frozen and shelf-stable plate meals, soups, and gravies with meat, poultry, fish base; gelatin and gelatin-based drinks & Vegetables with meat, poultry, fish	-0.42%	-0.41%	-1.44%	-0.06%	-1.04%	-0.05%
31-35 Eggs	-0.36%	-0.36%	-0.38%	-0.35%	-0.41%	-0.35%
41-43 Dry beans, peas, other legumes, nuts, and seeds	-0.17%	-0.17%	-1.48%	0.38%	-1.33%	0.26%
51+52+54 Yeast breads, rolls & Quick breads & Crackers and salty snacks from grain products	-1.20%	-1.19%	-4.25%	0.20%	-3.22%	0.05%
53+55 Cakes, cookies, pies, pastries & Pancakes, waffles, French toast, other grain products	-3.87%	-3.84%	-8.29%	-2.67%	-5.93%	-0.91%
56-57 Pastas, cooked cereals, rice & Cereals, not cooked or ns as to cooked	-0.13%	-0.15%	-1.37%	1.68%	-1.15%	1.27%
58-59 Grain mixtures, frozen plate meals, soups & Meat substitutes, mainly cereal protein	-0.23%	-0.23%	-0.73%	-0.10%	-0.94%	-0.11%
61-67 Fruits (excluding 612+641+642+644)	-0.46%	-0.44%	-8.32%	0.47%	-21.58%	0.89%
612+641+642+644+92 Fruit juices & Nectars & Vinegar & Nonalcoholic beverages (excluding Coffee & Tea & Soft drinks, carbonated)	-3.42%	-3.29%	-4.90%	-4.08%	-10.23%	3.87%
71 White potatoes and Puerto Rican starchy vegetables	0.48%	0.47%	-0.81%	0.48%	0.26%	0.48%
72-76 Other vegetables	-0.42%	-0.41%	-3.99%	-0.24%	-3.36%	-0.23%
81 Fats	0.04%	0.05%	-2.48%	0.12%	-1.16%	0.12%
82-83 Oils & Salad dressings	-1.39%	-1.39%	-1.42%	-1.05%	-2.65%	0.36%
91 Sugars and sweets	-6.85%	-6.67%	-1.64%	-2.76%	-16.04%	-2.38%
921-923 Coffee & Tea	-2.17%	-2.05%	-15.37%	-1.43%	-14.81%	0.95%
924 Soft drinks, carbonated	-9.36%	-9.12%	NA	NA	-16.34%	1.61%
93 Alcoholic beverages	0.00%	0.00%	-1.24%	NA	-0.97%	0.29%
94 Water	0.03%	0.03%	NA	NA	NA	0.03%

Appendix J. Elasticity of Substitution by Average Measure of Defining Sub-Categories

Composite food groups	Elasticity of substitution
	Average measure
11 Milks and milk drinks	1.04
12 Creams and cream substitutes	0.65
13 Milk desserts, sauces, gravies	0.88
14 Cheeses	1.71
20-24 Meats: Beef & Pork & Lamb....	1.56
25 Organ meats....	1.14
26 Fish and shellfish	0.70
27+28+77 Meat mixtures: Meat etc with nonmeat items	2.04
31-35 Eggs	0.15
41-43 Dry beans, ...	1.15
51+52+54 Yeast breads, ...	1.09
53+55 Cakes, cookies, pies, ...	0.94
56-57 Pastas, cooked cereals, ...	0.76
58-59 Grain mixtures, frozen plate ...	2.15
61-67 Fruits (excluding 612+641+642+644)	5.55
612+641+642+644+92 Fruit juices ...	1.72
71 White potatoes ...	0.46
72-76 Other vegetables	0.86
81 Fats	0.77
82-83 Oils & Salad dressings	1.04
91 Sugars and sweets	1.01
921-923 Coffee & Tea	1.18
924 Soft drinks, carbonated	1.96
93 Alcoholic beverages	2.55
94 Water	^a

^a All the products in this composite food group are defined as Low Fat & Low Sugar.

Appendix K. Percentage Change in Calories with Tax on Calories from Added Sugars by Average Measure

Composite food groups	Calories consumption		
	Initial consumption (calorie)	Consumption change (%)	
		Without CES	With CES by Average measure
11 Milks and milk drinks	102.05	-0.45%	-0.50%
12 Creams and cream substitutes	14.83	-0.63%	-0.91%
13 Milk desserts, sauces, gravies	46.39	-2.82%	-3.07%
14 Cheeses	59.98	-0.06%	-0.05%
20-24 Meats: Beef & Pork & Lamb....	172.88	-0.36%	-0.36%
25 Organ meats....	58.55	-0.55%	-0.55%
26 Fish and shellfish	27.75	-0.80%	-0.79%
27+28+77 Meat mixtures: Meat etc with nonmeat items	161.10	-0.42%	-0.55%
31-35 Eggs	46.78	-0.36%	-0.36%
41-43 Dry beans, ...	73.62	-0.17%	0.04%
51+52+54 Yeast breads, ...	262.36	-1.20%	-1.39%
53+55 Cakes, cookies, pies, ...	140.55	-3.87%	-4.29%
56-57 Pastas, cooked cereals, ...	97.14	-0.13%	0.35%
58-59 Grain mixtures, frozen plate ...	244.54	-0.23%	-0.22%
61-67 Fruits (excluding 612+641+642+644)	49.60	-0.46%	-1.19%
612+641+642+644+92 Fruit juices ...	76.79	-3.42%	-2.99%
71 White potatoes ...	102.70	0.48%	0.47%
72-76 Other vegetables	62.15	-0.42%	-0.79%
81 Fats	26.61	0.04%	0.05%
82-83 Oils & Salad dressings	44.98	-1.39%	-1.09%
91 Sugars and sweets	72.44	-6.85%	-8.46%
921-923 Coffee & Tea	22.02	-2.17%	-8.65%
924 Soft drinks, carbonated	129.16	-9.36%	-13.21%
93 Alcoholic beverages	92.05	0.00%	0.09%
94 Water	0.06	0.03%	0.03%
Total	2187.06	-1.56%	-1.95%

Appendix L. Percentage Change in Calories from Discretionary Solid Fat and Added Sugars with Tax on Calories from Added Sugars by Average Measure

Composite food groups	Discretionary solid fat consumption			Added sugars consumption		
	Initial consumption (g)	Consumption change rate		Initial consumption (g)	Consumption change rate	
		Without CES	Initial consumption (g)		Without CES	Without CES
11 Milks and milk drinks	2.99	-0.45%	-0.02%	2.85	-0.45%	-3.81%
12 Creams and cream substitutes	1.13	-0.63%	-0.74%	0.54	-0.63%	-3.35%
13 Milk desserts, sauces, gravies	2.21	-2.82%	-3.19%	3.86	-2.82%	-3.35%
14 Cheeses	4.39	-0.06%	-0.05%	0.05	-0.06%	-0.57%
20-24 Meat: Beef & Pork & Lamb....	4.03	-0.36%	-0.37%	0.06	-0.36%	-0.66%
25 Organ meats....	2.81	-0.55%	-0.56%	0.08	-0.55%	-0.78%
26 Fish and shellfish	0.50	-0.80%	-0.80%	0.04	-0.80%	-0.82%
27+28+77 Meat mixtures: Meat etc with nonmeat items	3.69	-0.42%	-0.55%	0.98	-0.42%	-1.05%
31-35 Eggs	1.91	-0.36%	-0.36%	0.05	-0.36%	-0.40%
41-43 Dry beans, ...	0.32	-0.17%	0.05%	0.61	-0.17%	-1.13%
51+52+54 Yeast breads, ...	3.10	-1.20%	-1.26%	3.75	-1.20%	-3.27%
53+55 Cakes, cookies, pies, ...	4.75	-3.87%	-4.38%	10.00	-3.87%	-5.32%
56-57 Pastas, cooked cereals, ...	0.34	-0.13%	0.65%	2.91	-0.13%	-1.06%
58-59 Grain mixtures, frozen plate ...	7.66	-0.23%	-0.18%	0.55	-0.23%	-0.61%
61-67 Fruits (excluding 612+641+642+644)	0.00	-0.46%	-3.72%	0.63	-0.46%	-21.49%
612+641+642+644+92 Fruit juices ...	0.01	-3.42%	-4.86%	7.95	-3.42%	-9.81%
71 White potatoes ...	2.83	0.48%	0.47%	0.03	0.48%	0.23%
72-76 Other vegetables	1.08	-0.42%	-0.34%	0.94	-0.42%	-3.33%
81 Fats	1.94	0.04%	0.11%	0.02	0.04%	-1.38%
82-83 Oils & Salad dressings	0.12	-1.39%	-1.07%	0.67	-1.39%	-2.26%
91 Sugars and sweets	0.58	-6.85%	-2.74%	10.92	-6.85%	-11.05%
921-923 Coffee & Tea	0.16	-2.17%	-2.10%	3.38	-2.17%	-13.69%
924 Soft drinks, carbonated	0.00	0.00%	0.00%	30.67	-9.36%	-13.68%
93 Alcoholic beverages	0.02	0.00%	-1.24%	0.79	0.00%	-0.98%
94 Water	0.00	0.00%	0.00%	0.00	0.00%	0.00%
Total	46.58	-0.90%	-0.88%	82.33	-5.53%	-9.47%

Appendix M. Calorie Sources with Tax on Calories from Added Sugars (Calories)

	Total calories	Calories from discretionary solid fat and added sugar ^a	Calories from discretionary oil ^b	Calories from discretionary solid fat ^b	Calories from Added sugars ^b
Initial consumption	2187.06 (100%)	748.55 (34.23%)	178.64 (8.17%)	419.24 (19.17%)	329.31 (15.06%)
After tax (Without CES)	2152.98 (100%)	726.59 (33.75%)	176.87 (8.22%)	415.48 (19.30%)	311.11 (14.45%)
After tax (With CES by Cut-off measure)	2139.70 (100%)	709.39 (33.15%)	177.54 (8.30%)	415.59 (19.42%)	293.80 (13.73%)
After tax (With CES by Average measure)	2144.51 (100%)	713.65 (33.28%)	177.38 (8.27%)	415.54 (19.38%)	298.11 (13.90%)

Note: Numbers in parentheses are the share of total calories in the row.

^a This column is the summation of the last two columns in the table.

^b Each gram of discretionary oil and discretionary solid fat is assumed to provide 9 calories, each gram of added sugars is assumed to provide 4 calories.

Appendix N. Welfare Loss per Unit of Nutrient Consumption Reduced with Tax on Calories from Added Sugars by Average Measure

	Without CES	With CES by Average measure
EV/Calorie reduction (\$/calorie)	0.0023	0.0018
EV/Discretionary oil reduction (\$/g)	0.3905	0.5360
EV/Discretionary solid fat reduction (\$/g)	0.1842	0.1827
EV/Added sugars reduction (\$/g)	0.0169	0.0096

Note: EV is equivalent variation.

References to Technical Appendix

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