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# Sweetener Consumption in the United States

## Distribution by Demographic and Product Characteristics

**Stephen Haley, Jane Reed, Biing-Hwan Lin,  
and Annetta Cook**

### Abstract

U.S. consumption of sugars added to food items increased by 23 percent between 1985 and 1999. Although U.S. Department of Agriculture (USDA) data have documented the overall growth trend, not much has been inferred from USDA survey data. This article helps fill a gap by reporting findings for sweetener consumption by income and demographic characteristics, using data from USDA's 1994-96, 1998 Continuing Survey of Food Intakes by Individuals. Among the conclusions: per capita sweetener consumption is highest in the Midwest and lowest in the Northeast; sweetener consumption tends to rise with increased income up to a certain level and then fall; sweetener consumption is highest in suburban areas, but only slightly lower in rural areas; sweetener consumption for non-Hispanic Whites and Blacks is about the same and is much higher than the level for Hispanics and other racial/ethnic groups; and men consume about 25 percent more sweeteners than women, although for carbonated beverages men outconsume women by over 50 percent.

**Keywords:** Continuing Survey of Food Intakes by Individuals (CSFII), Food Commodity Intake Database (FCID), sugar, corn sweeteners, U.S. sweetener consumption

**About the authors:** Haley is an agricultural economist in the Market and Trade Economics Division. Lin is an agricultural economist in the Food and Rural Economics Division (FRED) of the Economic Research Service, as was Reed, who has since left, at the time the report was written. Cook was a home economist in the Community Nutrition Research Group, Beltsville Human Nutrition Research Center, Agricultural Research Service until retiring in the fall of 2004. All authors were with the U.S. Department of Agriculture when this research was undertaken.

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## Introduction

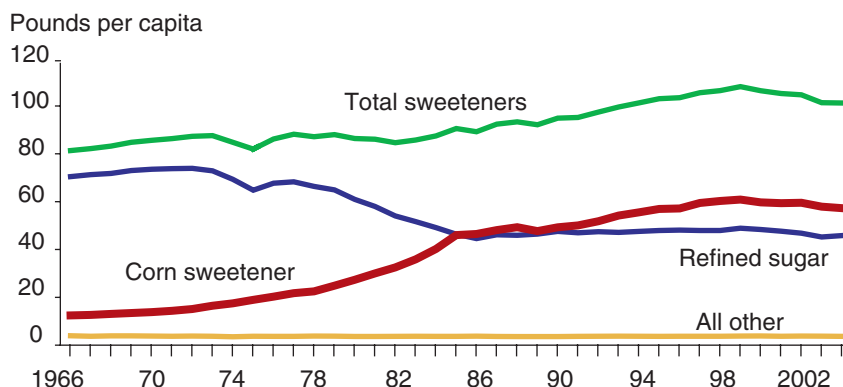
For several years there has been interest regarding the high and growing consumption of sweeteners in the United States. From 1970 to 1984, combined deliveries of refined sugar, corn sweeteners (high fructose corn syrup, glucose syrup, and dextrose), honey, maple syrup and other edible syrups averaged 120.0 pounds per capita. Starting around 1985, per capita sweetener deliveries began growing at a rapid rate. The average grew to 127.6 pounds between 1985 and 1989, representing a 6.3-percent increase over the preceding 5-year average. Between 1990 and 1994 the average increased by another 6.9 percent, to 136.4 pounds, and between 1995 and 1999 it increased by 8.1 percent to 147.4 pounds.<sup>1</sup>

Corn sweetener growth before 1985 was largely attributable to a one-to-one replacement of refined sugar used in products that had been using liquid sugar as a sweetening agent (fig. 1). Since 1985 the rise in sugar demand, although strong, has been moderate compared with the growth of corn sweeteners. For refined sugar, average per capita deliveries rose from 62.0 pounds in 1985-89 to 65.3 pounds in 1995-99, by 5.3 percent. The rise of deliveries of high fructose corn syrup (the largest corn sweetener) has been much higher, from an average 47.2 pounds in 1985-89 to 60.3 pounds in 1995-99, a growth of 27.7 percent. Other sweeteners (honey, dextrose, and other syrups) have not contributed greatly to the rise in overall sweetener deliveries.

The purpose of this article is to bring together data from two areas of research in the U.S. Department of Agriculture (USDA) to provide a foundation for understanding sweetener consumption patterns. The first set of data, from USDA's Agricultural Research Service (ARS), combines results from the USDA food consumption surveys and ARS FoodLink-generated databases that define ingredients and commodity amounts. These data allow examination of sweetener consumption patterns based on income and demographic characteristics of the survey respondents, including regions of the United States where they live; the type of community in which they live (metropolitan center, suburb, or rural area); their household income as a

<sup>1</sup>More recently, growth of the deliveries has slowed—it was estimated at 141.5 pounds in 2003, about the same level as in 1994. Not included in the data is the sugar contained in imported products. Prior to 1995, sugar in imports was offset by sugar contained in U.S. food exports, indicating only a minor positive adjustment to total deliveries. Beginning in the 1995-96 period, sugar-containing imports started increasing at a faster rate than U.S. sugar-containing exports. On a per capita basis, the sugar in net imported products added 3.7 pounds to total per capita sweetener availability in 2003, compared with only 0.8 pounds in 1994. See the May 2004 *Sugar and Sweetener Outlook* for more detailed analysis. (<http://www.ers.usda.gov/publications/so/view.asp?f=specialty/sss-bb/>)

Figure 1  
**Estimated per capita sweetener consumption, total and by type of sweetener, 1966-2004**



Source: USDA.

percentage of poverty; their race or ethnic origin; and gender and age factors.

The second set of data is U.S. sweetener supply and utilization information, collected by several USDA agencies and published by USDA's Economic Research Service (ERS). ERS also provides an estimate of losses of sweeteners from factory to final consumer, an important consideration in analyzing sweetener consumption.

Joining data from these research areas provides a static baseline estimate of how much sweetener product was consumed, in what product, by individuals in the various population arrays. Once consumer patterns are identified, they can be used as a starting point for analyzing changes in sweetener consumption patterns across time.

## Methodology and Data

USDA has conducted periodic surveys of household and individual food consumption in the United States since the 1930s. The 1994-96 Continuing Survey of Food Intakes by Individuals (CSFII), conducted by ARS, is one of the key sources for this article. Each year of this 3-year dataset comprises a nationally representative sample of noninstitutionalized people residing in 50 States and Washington, DC.

Between January 1994 and January 1997, the 1994-96 CSFII collected dietary intake for 2 nonconsecutive days for individuals of all ages through in-person interviews, 3 to 10 days apart and using 24-hour recall. The 3-year CSFII dataset includes information and nutrient intakes for 15,303 individuals who provided dietary data for both days. These data are supplemented by a child-oriented 1998 CSFII, which adds intake data for 5,559 children from birth through age 9 to the 1994-96 CSFII.

The respondents provided a list of foods consumed, as well as information on where, when, and how much of each food was eaten. Standardized probes were used to collect food descriptions and the amounts eaten. The location where the food was purchased was coded into several categories. For each respondent, an array of economic, social, and demographic characteristics were also collected. This database can be used to estimate the market and consumption distribution of a food by numerous category listings.

This study also uses the Food Commodity Intake Database (FCID), which was developed jointly by the U.S. Environmental Protection Agency and ARS (EPA and USDA/ARS 2000). FCID contains human food consumption data, expressed in terms of agricultural food commodities, on 5,831 foods and beverages that people of different ages reported eating in 1994-96 and 1998. The FCID provides estimates for the edible amount of agricultural food commodities in each food reported in the CSFII. Generic recipes were used to determine the nutrient content of each survey food; the default ingredients, including sweeteners, reflect what was in use for broad categories of foods during the time of the survey and may not always represent ingredients in the actual food eaten by a respondent. The FCID contains data on a variety of sweeteners—sugarcane sugar, beet sugar, corn syrup, honey, maple syrup, maple sugar, sorghum syrup, and several kinds of molasses. For this study, they are combined into sugar, corn sweetener, and others.

The CSFII data include a sample weight for each respondent, indicating the number of people the sample represents. The share of a sweetener product by location can be estimated by calculating the weighted sum of respondents consuming the product in each location. Similarly, the socioeconomic and demographic characteristics of the respondents can be used to estimate the consumption share of sweeteners by these characteristics.

## Sweetener Data: Adjustment for Loss

ERS estimates per capita sweetener deliveries (i.e., available supply) for domestic food and beverage use. These sweeteners include refined sugar, high fructose corn syrup, glucose syrup, dextrose, honey, and maple and other edible syrups. The data are published in the ERS *Sugar and Sweetener Situation and Outlook Yearbook*, and also on the ERS website.<sup>2</sup> The delivery data record sweeteners that are intended for human consumption as they leave the processor/manufacturer. To estimate sweetener intake, it is necessary to estimate the losses that occur between the processor and consumer. ERS calculates sweetener losses based on the work of Kantor (1998).

Sweetener losses are estimated at various levels in the distribution chain. Data for the sweeteners tracked by ERS are shown in table 1. The first column shows total estimated deliveries, and the second column shows calculated per capita deliveries. There are three potential sources of food loss in the chain: loss from primary to retail weight, estimated at zero for sweeteners; loss from retail/institutional level to consumer level, estimated at 11 percent for sweeteners; and loss at the consumer level, estimated at zero percent for a nonedible share and 20 percent for uneaten portions. Overall wastage is calculated at 29 percent, about 2 percentage points higher than the average across all food groups (i.e., 27 percent).

Kantor notes that estimating food losses is a difficult task because there are few empirical studies from which to derive estimates. Existing studies do not extend across the whole area where losses may occur. Consumer surveys on waste seem to suffer from inadequate recall, which may lead to underestimation of food wasted. Nonetheless, Kantor notes that the CSFII data imply daily per capita sweetener consumption of 20 teaspoons, which would imply that caloric sweetener losses are 55 percent of available sweetener supplies. This study uses the waste coefficients developed by Kantor for the 1998 study, while taking note that additional research is needed in this area.<sup>3</sup>

<sup>2</sup>See: <http://www.ers.usda.gov/briefing/sugar/data/data.htm>. For the sources of the sweetener data, see the appendix to this article.

<sup>3</sup>In 1986, Glinsmann et al. reported results of the Food and Drug Administration's Sugars Task Force on health aspects of sugars contained in carbohydrate sweeteners. The report included consumption data on sugars consumption based on an analysis of 14 age/gender groups. The consumption data was reported as a percentage of total calories consumed. Mean daily caloric intake of added sugars ranged between 5 to 14 percent with an overall population mean of 11 percent. This estimate, although dated, is at variance with that reported by ERS at 18.6 percent for 1996 (ERS, 2004). The ERS average for 1970-2004 is calculated at 18.0 percent, with no statistically significant growth over time. Therefore, there is significant difference of results between ERS and the FDA report, even taking into account the earlier time period in which the FDA study was conducted. If one were to use the FDA study's mean percentage of 11 percent applied against an assumed daily diet of 2,000 kcal, then average daily per capita caloric intake from added sugars would be 220 kcal, equivalent to the following: 13.75 teaspoons of sugar per day, 57.75 grams of sugar per day, 2.4 ounces per day, and 46.47 pounds per year. Assuming as in table 1 that 144.7 per capita pounds of sweetener were available for consumption in 1996, then the implied wastage percentage would be 68 percent. Although this wastage percentage seems high, the FDA study presents an alternative to the ERS methodology that suggests the need for additional research and that results like those in this report are subject to careful interpretation.

Table 1

### U.S. caloric sweeteners: estimated deliveries and consumption, 1996

Sweetener	Estimated deliveries <sup>1</sup>		Loss from primary to retail weight	Weight at retail level	Loss from retail/institutional level to consumer level	Weight at consumer level	Loss at consumer level		Per capita consumption (adjusted for loss)
	Total	Per capita <sup>2</sup>					Nonedible share	Other (uneaten food, etc.)	
	Tons (1,000)	Pounds	Percent	Pounds	Percent	Pounds	Percent		Pounds
Refined sugar	8,785	65.2	0.0	65.2	11.0	58.0	0.0	20.0	46.4
Corn sweeteners	10,541	78.2	0.0	78.2	11.0	69.6	0.0	20.0	55.7
Other sweeteners	186	1.4	0.0	1.4	11.0	1.2	0.0	20.0	1.0
Total	19,513	144.7	0.0	144.7	11.0	128.8	0.0	20.0	103.0

<sup>1</sup>Refined sugar equivalent, dry basis.

<sup>2</sup>U.S. population in 1996 = 269.7 million (U.S. Census Bureau).

Source: USDA.

## Sweetener Consumption by Income and Demographic Classification

Data in table 2 are derived from the study dataset containing results from both the FCID and CSFII. The data are distributive percent shares of sweetener consumption and U.S. population across five income and demographic classifications: U.S. Census region; household income as a percentage of poverty; metropolitan, suburban, or rural setting; race/ethnic origin; and gender and age.

To estimate per capita consumption in pounds for table 3, we first determined the ratio of the consumption shares for each item in table 2 to that item's share of the population (column 1). For instance, the Northeast region's consumption percentage (18.35) divided by its proportion of the U.S. population (19.6) is 93.6 percent of U.S. average per capita consumption.<sup>4</sup> Next, we went back to table 1 (righthand column) for 1996 average per capita consumption in pounds for the whole United States: 103.0 pounds for total sweeteners, 46.4 pounds for sugar, 55.7 pounds for corn sweeteners, and 1.0 pounds for other sweeteners. Multiplying these figures by each item's percentage of U.S. average consumption enabled us to estimate pounds consumed. For example, total per capita sweetener consumption by the Northeast is 93.6 percent of 103.0 pounds, or 96.5 pounds.

Table 3 shows that sweetener consumption differs markedly across census regions and gender and age groupings. The differences between household income levels and degree of urbanization are somewhat less pronounced, and the results by race/ethnic grouping are mixed. Among the Census regions, sweetener consumption is highest in the Midwest, at 114.2 pounds per capita, about 11 percent above the national average. The ratio holds steady for the individual sweeteners in the row. Sweetener consumption in the South is at about the national average, while the Northeast and West are both about 6 percent below the national average. Average sugar consumption in the Northeast is about 1.2 pounds higher than in the West, but corn sweetener consumption is 2.8 pounds higher in the West than in the Northeast. Consumption of other sweeteners (honey, maple and sugar syrups) is notably higher in the Northeast, at 2.3 pounds, than in the other regions.

The CSFII classifies households in three income brackets, using Federal poverty guidelines developed by the U.S. Department of Health and Human Services. Some Federal food programs, such as the Food Stamp Program, have used 130 percent or less of the poverty level to determine eligibility. That figure is used in this study as the top end of the low-income category. Income between 131 and 350 percent of the poverty level defines the middle-income group. Income over 350 percent defines high-income households.

The data reveal that low-income household sweetener consumption is 3.9 percent less than the national average. For this group, sugar consumption is 8.0 percent below the national average, while corn sweetener consumption is only 3.6 percent less. The middle-income households have the highest sweetener consumption, at 105.8 pounds, or 6.9 percent more than low-income households. For middle-income households, sugar consumption is 11.9 percent higher and corn sweetener consumption is 6.0 percent higher

<sup>4</sup>Note that the 1994-96 CSFII was based on 1990 Census results, so its population distribution may deviate from the recent Census results, such as the rise in the Hispanic share of the U.S. population.



Table 2

**U.S. sweetener consumption distribution, by share**

Category	Population <sup>1</sup>	Total sweeteners	Sugar	Corn sweeteners	Other sweeteners
<i>Distributive percent shares</i>					
<b>Census region:</b>					
Northeast	19.6	18.35	18.63	17.64	47.59
Midwest	23.5	26.05	26.28	26.22	5.86
South	34.9	34.95	34.74	35.25	29.27
West	22.0	20.66	20.35	20.89	23.38
<b>Household income as a percentage of poverty:</b>					
Under 130 percent	19.2	18.45	17.68	18.70	43.39
131-350 percent	41.8	42.91	43.05	43.15	24.27
Over 350 percent	39.0	38.64	39.27	38.16	38.55
<b>Degree of urbanization:</b>					
Metropolitan	32.0	31.08	30.85	30.84	58.29
Suburban	46.9	47.78	48.23	47.67	34.42
Rural	21.1	21.15	20.92	21.49	13.39
<b>Race/ethnic origin:</b>					
White, non-Hispanic	72.6	74.24	75.98	73.17	56.61
Black, non-Hispanic	12.6	13.00	12.22	13.18	42.52
Hispanic	10.5	9.59	8.64	10.47	4.93
Other	4.4	3.16	3.16	3.18	2.18
<b>Gender and age:</b>					
Male, all	49.0	56.97	54.67	58.49	84.33
Male, 2-11	9.0	8.68	9.80	7.88	1.22
Male, 12-19	5.9	9.15	8.36	9.86	6.73
Male, 20-39	16.0	21.32	17.49	23.90	60.44
Male, 40-59	11.6	12.44	12.57	12.28	16.60
Male, 60 and over	6.7	5.39	6.44	4.57	2.45
Female, all	51.0	43.03	45.33	41.51	21.84
Female, 2-11	8.5	7.68	8.58	7.03	2.18
Female, 12-19	5.7	6.32	6.08	6.61	1.33
Female, 20-39	15.9	14.62	14.17	15.10	9.38
Female, 40-59	12.1	9.11	9.93	8.51	4.74
Female, 60 and over	8.6	5.28	6.58	4.27	1.21

<sup>1</sup>Population shares are from the 1990 Census.

Source: USDA.

than the national average. High-income households consume 3.5 percent fewer sweeteners than the middle group, but 3.1 percent more than low income households. Compared with the middle-income group's sugar consumption, the high-income group's level is only 2.3 percent less, but its corn sweetener consumption is 5.2 percent less. In fact, the high-income group's level of corn sweetener consumption is only 0.5 percent higher than that of low-income group. These results are consistent with the notion that sugar consumption is more positively correlated to increasing levels of income than is corn sweetener consumption; that is, demand for sugar rises faster as income increases—and decreases less markedly beyond a certain income level—than corn sweetener demand.



Table 3

**U.S. sweetener consumption distribution, by pounds per capita**

Category	Total sweeteners	Sugar	Corn sweeteners	Other sweeteners
<i>Pounds per capita</i>				
<b>Census region:</b>				
Northeast	96.5	44.1	50.1	2.3
Midwest	114.2	51.9	62.1	0.2
South	103.2	46.2	56.2	0.8
West	96.8	42.9	52.9	1.0
<b>Household income as a percentage of poverty:</b>				
Under 130 percent	99.0	42.7	54.2	2.1
131-350 percent	105.8	47.8	57.5	0.5
Over 350 percent	102.1	46.7	54.5	0.9
<b>Degree of urbanization:</b>				
Metropolitan	100.1	44.7	53.6	1.7
Suburban	105.0	47.7	56.6	0.7
Rural	103.3	46.0	56.7	0.6
<b>Race/ethnic origin:</b>				
White, non-Hispanic	105.4	48.6	56.1	0.7
Black, non-Hispanic	106.3	45.0	58.2	3.1
Hispanic	94.1	38.2	55.5	0.4
Other	74.0	33.3	40.2	0.5
<b>Gender and age:</b>				
Male, all	119.8	51.8	66.4	1.6
Male, 2-11	99.4	50.5	48.7	0.1
Male, 12-19	159.8	65.7	93.0	1.0
Male, 20-39	137.3	50.7	83.1	3.4
Male, 40-59	110.5	50.3	58.9	1.3
Male, 60 and over	82.9	44.6	38.0	0.3
Female, all	86.9	41.2	45.3	0.4
Female, 2-11	93.1	46.8	46.0	0.2
Female, 12-19	114.2	49.5	64.6	0.2
Female, 20-39	94.7	41.3	52.9	0.5
Female, 40-59	77.6	38.1	39.1	0.4
Female, 60 and over	63.3	35.5	27.6	0.1

<sup>1</sup>Population shares are from the 1990 Census.

Source: USDA.

By size of community (represented by degree of urbanization), survey results indicate that sweetener consumption is highest in suburban locales and lowest in metropolitan areas. Of all the groupings, the ranges in this group between the highest and lowest rankings are the least (4.9 pounds for sweeteners; 2.9 pounds for sugar; 3.0 pounds for corn sweeteners), indicating that size of community may be a less important factor in sweetener demand than the other factors.

Sweetener consumption levels of non-Hispanic Whites and Blacks are fairly close, less than a pound difference. Whites consume 3.6 pounds more sugar than Blacks, but 2.1 pounds less of corn sweeteners. Hispanics as a group average over 10 pounds less sweetener use than either non-Hispanic Whites or Blacks. Most of the difference is in lower sugar consumption (38.2 pounds, compared with 48.6 pounds for Whites and 45.0 pounds for Blacks). In comparison, average consumption of corn sweeteners by Hispanics is only slightly less than for the other two groups (55.5 pounds, compared with 56.1 pounds for Whites and 58.2 pounds for Blacks).

Sweetener consumption varies markedly with age. The 12-19 year group has the highest per capita average, 137.4 pounds. Average sweetener consumption declines about 20 pounds from a younger age to the next highest age. Gender differences are important as well. Over all age groupings, men consume an average 37.9 percent more sweeteners than women. The average is much higher for corn sweeteners, 46.8 percent more, than for sugar: 25.4 percent more.

## Sweetener Consumption by Product

The CSFII data permit an examination of the products in which sugar and corn sweeteners are consumed. The top panel of table 4 shows the distributive percent shares of sugar and corn sweeteners consumed in the product groupings. Reported sweetener consumption is highest in three categories: milk and milk products; grain products; and sugar, sweets, and beverages. These shares sum to more than 90 percent for both sweeteners.

About 10 percent of sugar and corn sweeteners is consumed in milk and milk products. The remaining bulk of the sugar is split in roughly equal shares between grain products (42.3 percent) and sugar, sweets, and beverages (38.2 percent). Average yearly per capita consumption of sugar in grain products amounts to 19.6 pounds, in sugar, sweets, and beverages to 17.7 pounds, and in milk and milk products to 4.9 pounds (bottom panel, table 4).

Corn sweeteners are consumed primarily in the sugar, sweets, and beverages category (73.5 percent), with a far smaller share going to grain products (10.8 percent). Average yearly consumption of corn sweeteners amounts to 40.9 pounds in sugar, sweets, and beverages, 6.0 pounds in grain products; and 5.5 pounds in milk and milk products.

Table 4

### Refined sugar and corn sweeteners: Percent of consumption by food product

Food product	Sugar	Corn sweeteners
	<i>Percent</i>	
Milk and milk products	10.55	9.95
Meat, poultry, fish, and mixtures	2.38	2.46
Eggs	0.02	0.09
Dry beans, peas, other legumes	0.86	0.45
Grain products	42.27	10.83
Fruits	1.68	1.67
Vegetables	2.74	0.54
Fats	1.31	0.53
Sugar, sweets, and beverages	38.18	73.51
All products	100.0	100.0
	<i>Pounds per capita</i>	
Milk and milk products	4.9	5.5
Meat, poultry, fish, and mixtures	1.1	1.4
Eggs	0.0	0.1
Dry beans, peas, other legumes	0.4	0.3
Grain products	19.6	6.0
Fruits	0.8	0.9
Vegetables	1.3	0.3
Fats	0.6	0.3
Sugar, sweets, and beverages	17.7	40.9
All products	46.4	55.7

Source: USDA.

Table 5 breaks the grain products and sugar, sweets, and beverages categories down into constituent parts. In the grain category, sugar is mostly consumed in cakes (5.0 pounds yearly, per capita), ready-to-eat cereal (4.3 pounds), cookies (3.8 pounds), and breakfast-type pastries (1.6 pounds). In the sugar, sweets, and beverages category, sugar is consumed in candies (4.4 pounds per capita), sugar and blends (4.2 pounds), fruitades and drinks (3.7 pounds), iced tea mixes (3.0 pounds), and ices and popsicles (1.0 pound). In the same sugar, sweets, and beverages category, corn sweeteners are primarily consumed in carbonated soft drinks (25.4 pounds per year), fruitades and drinks (8.2 pounds), and syrup and sweet toppings (4.1 pounds). In all, 36.3 percent of sugar and corn sweeteners are consumed in carbonated soft drinks, fruitades, and other nonalcoholic drinks.

Table 5

**Refined sugar and corn sweeteners in grain products and sugar, sweets, and beverages**

Food product	Refined sugar	Corn sweeteners
	<i>Pounds per capita</i>	
<b>Grain products:</b>		
Yeast breads, rolls	0.9	3.0
Quick breads	0.7	0.3
Cakes	5.0	0.2
Cookies	3.8	0.6
Pies	1.2	0.2
Cobblers, eclairs, turnovers, other pastries	0.4	0.0
Danish, breakfast pastries, doughnuts, granola bars	1.6	0.7
Coffee cake (non-yeast)	0.1	0.0
Crackers and salty snacks from grain products	0.7	0.1
Pancakes	0.1	0.0
Waffles	0.1	0.0
French toast	0.1	0.1
Pastas, cooked cereal, rice	0.2	0.0
Cereal - ready to eat	4.3	0.3
Cereals, baby food	0.0	0.0
Grain mixtures, frozen plate meals, soups	0.6	0.5
Total	19.6	6.0
<b>Sugar, sweets, and beverages:</b>		
Sugars and sugar-substitute blends	4.2	0.0
Syrup, honey, molasses, sweet toppings	0.4	4.1
Jellies, jams, preserves	0.1	1.1
Gelatin desserts or salads	0.5	0.0
Ices or popsicles	1.0	0.2
Candies	4.4	1.3
Chewing gum	0.0	0.0
Coffee	0.1	0.1
Tea	3.0	0.2
Soft drinks, carbonated	0.0	25.4
Fruitades and drinks	3.7	8.2
Beverages, nonfruit	0.1	0.0
Beverage concentrates, dry, not reconstituted	0.0	0.0
Alcoholic beverages	0.1	0.2
Total	17.7	40.9

Source: USDA.

## Sweetener Distribution by Product

Tables 6 through 10 show some of the detail behind the data in table 3, specifically, they show the per capita consumption of products using sugar and corn sweetener across demographic categories. Although the distribution of products would be expected to follow general patterns, there are some exceptions. In the distribution by U.S. Census region (table 6), people in the Midwest consume proportionally more sugar in grain products (20.9 percent more than the average) than they consume of sugar in all products (11.9 percent above the average). Also, while people in the Northeast consume fewer corn sweeteners than the national average by 16.2 percent, they consume proportionally fewer—10.1 percent—in the sugar, sweets, and beverages category.

The distributions of sweeteners by the percent-of-poverty classification (table 7) does not necessarily follow the pattern of increased sweetener consumption as income rises from poverty and near-poverty levels, to be followed by decreased consumption as income reaches the highest category. Although that effect is strong in the sugar, sweets, and beverages category, per capita sweetener consumption rises with income levels in milk and milk products for both sugar and corn sweeteners. A similar effect is seen for grain products.

Distributions by size of community (table 8) follow the general patterns, except perhaps for the low consumption by rural residents of corn sweeteners in milk and milk products. In the classification by race/ethnic group (table 9), non-Hispanic Whites consumed the highest levels of sugar (48.6 pounds compared with the next highest, 45.0 pounds for non-Hispanic Blacks). The detailed distributions show that Whites consume 5.0 pounds more sugar than Blacks in grain products, but 2.5 pounds less sugar in the sugar, sweeteners, and beverage category. The table also shows that Hispanics have the highest level of corn sweetener consumption in the sugar, sweetener, and beverages category (44.4 pounds).

Table 10 gives the distributions by gender and age groupings. Data in the table show that, except for corn sweeteners consumed in the category of sugar, sweets, and beverages, men tend to outconsume women by about 25 percent (68.5 pounds to 54.1 pounds). For corn sweeteners in sugar, sweets, and beverages, men outconsume women by 53.7 percent.

Table 6

**Refined sugar and corn sweeteners: per capita consumption by food product, by Census region**

Food product	All people	Northeast	Midwest	South	West
<b>Refined sugar:</b>					
Milk and milk products	4.9	5.2	5.6	4.6	4.4
Meat, poultry, fish, and mixtures	1.1	1.1	1.2	1.1	1.0
Eggs	0.0	0.0	0.0	0.0	0.0
Dry beans, peas, other legumes	0.4	0.2	0.5	0.5	0.4
Grain products	19.6	19.9	23.7	18.1	17.5
Fruits	0.8	0.6	1.0	0.7	0.8
Vegetables	1.3	1.2	1.4	1.4	0.9
Fats	0.6	0.5	0.8	0.6	0.6
Sugar, sweets, and beverages	17.7	15.4	17.7	19.4	17.2
All products	46.4	44.1	51.9	46.2	42.9
<b>Corn sweeteners:</b>					
Milk and milk products	5.5	6.9	5.8	4.6	5.5
Meat, poultry, fish, and mixtures	1.4	1.4	1.4	1.5	1.2
Eggs	0.1	0.0	0.0	0.1	0.0
Dry beans, peas, other legumes	0.3	0.2	0.3	0.3	0.2
Grain products	6.0	5.8	7.0	6.2	4.8
Fruits	0.9	0.9	1.3	0.7	0.9
Vegetables	0.3	0.3	0.3	0.3	0.3
Fats	0.3	0.3	0.4	0.3	0.3
Sugar, sweets, and beverages	40.9	34.3	45.5	42.3	39.7
All products	55.7	50.1	62.1	56.2	52.9

Source: USDA.

Table 7

**Refined sugar and corn sweeteners: Per capita consumption by food product, by household income as a percentage of poverty**

Food product	All people	Percent of poverty		
		0 to 130 percent	131 to 350 percent	351 percent and over
<i>Pounds per capita</i>				
<b>Refined sugar:</b>				
Milk and milk products	4.9	4.1	4.8	5.4
Meat, poultry, fish, and mixtures	1.1	1.1	1.1	1.1
Eggs	0.0	0.0	0.0	0.0
Dry beans, peas, other legumes	0.4	0.4	0.4	0.4
Grain products	19.6	16.2	19.7	21.2
Fruits	0.8	0.7	0.9	0.7
Vegetables	1.3	1.2	1.3	1.3
Fats	0.6	0.5	0.6	0.7
Sugar, sweets, and beverages	17.7	18.4	19.1	15.9
All products	46.4	42.7	47.8	46.7
<b>Corn sweeteners:</b>				
Milk and milk products	5.5	5.4	5.2	5.9
Meat, poultry, fish, and mixtures	1.4	1.4	1.3	1.4
Eggs	0.1	0.0	0.1	0.0
Dry beans, peas, other legumes	0.3	0.2	0.3	0.2
Grain products	6.0	5.5	6.1	6.2
Fruits	0.9	1.0	1.0	0.9
Vegetables	0.3	0.2	0.3	0.4
Fats	0.3	0.2	0.3	0.4
Sugar, sweets, and beverages	40.9	40.2	43.0	39.1
All products	55.7	54.2	57.5	54.5

Source: USDA.

Table 8

**Refined sugar and corn sweeteners: Per capita consumption by food product, by size of community**

Food product	All people	Metropolitan	Suburban	Rural
<i>Pounds per capita</i>				
<b>Refined sugar:</b>				
Milk and milk products	4.9	4.1	5.5	4.8
Meat, poultry, fish, and mixtures	1.1	1.2	1.1	1.1
Eggs	0.0	0.0	0.0	0.0
Dry beans, peas, other legumes	0.4	0.4	0.3	0.5
Grain products	19.6	18.8	20.3	19.1
Fruits	0.8	0.7	0.8	0.9
Vegetables	1.3	1.3	1.2	1.3
Fats	0.6	0.6	0.6	0.7
Sugar, sweets, and beverages	17.7	17.6	17.9	17.6
All products	46.4	44.7	47.7	46.0
<b>Corn sweeteners:</b>				
Milk and milk products	5.5	5.8	5.7	4.9
Meat, poultry, fish, and mixtures	1.4	1.5	1.3	1.2
Eggs	0.1	0.0	0.1	0.1
Dry beans, peas, other legumes	0.3	0.2	0.2	0.3
Grain products	6.0	5.7	6.0	6.5
Fruits	0.9	0.9	0.9	1.0
Vegetables	0.3	0.3	0.3	0.3
Fats	0.3	0.3	0.3	0.3
Sugar, sweets, and beverages	40.9	39.0	41.8	42.1
All products	55.7	53.7	56.6	56.7

Source: USDA.

Table 9

**Refined sugar and corn sweeteners: Per capita consumption by food product, by race/ethnic group**

Food product	All people	White, non-Hispanic	Black, non-Hispanic	Hispanic	Other
<i>Pounds per capita</i>					
<b>Refined sugar:</b>					
Milk and milk products	4.9	5.4	3.8	3.3	3.0
Meat, poultry, fish, and mixtures	1.1	1.1	1.3	0.7	1.7
Eggs	0.0	0.0	0.0	0.0	0.0
Dry beans, peas, other legumes	0.4	0.4	0.6	0.3	0.2
Grain products	19.6	21.2	16.2	15.3	13.8
Fruits	0.8	0.8	0.7	0.7	0.6
Vegetables	1.3	1.3	1.7	0.9	0.9
Fats	0.6	0.7	0.6	0.4	0.3
Sugar, sweets, and beverages	17.7	17.7	20.2	16.6	12.8
All products	46.4	48.6	45.0	38.2	33.3
<b>Corn sweeteners:</b>					
Milk and milk products	5.5	5.6	6.4	4.5	4.3
Meat, poultry, fish, and mixtures	1.4	1.3	2.0	1.0	1.2
Eggs	0.1	0.1	0.1	0.0	0.0
Dry beans, peas, other legumes	0.3	0.2	0.4	0.2	0.1
Grain products	6.0	6.5	5.5	4.2	4.1
Fruits	0.9	1.0	0.8	0.7	0.7
Vegetables	0.3	0.3	0.4	0.3	0.1
Fats	0.3	0.3	0.1	0.2	0.1
Sugar, sweets, and beverages	40.9	40.8	42.5	44.4	29.6
All products	55.7	56.1	58.2	55.5	40.2

Source: USDA.



Table 10

**Refined sugar and corn sweeteners: Per capita consumption by food product, by age and gender**

Food product	Pounds per capita												
	All people	All males	Aged 11 and under	Aged 12 to 19	Aged 20 to 39	Aged 40 to 59	Aged 60 and over	All females	Aged 11 and under	Aged 12 to 19	Aged 20 to 39	Aged 40 to 59	Aged 60 and over
<b>Refined sugar:</b>													
Milk and milk products	4.9	5.3	6.3	7.4	4.1	5.4	5.1	4.5	6.0	5.5	3.6	4.1	4.3
Meat, poultry, fish, and mixtures	1.1	1.4	0.8	1.3	1.8	1.4	1.1	0.8	0.7	0.9	1.0	0.9	0.7
Eggs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dry beans, peas, other legumes	0.4	0.5	0.3	0.2	0.4	0.5	1.2	0.3	0.2	0.3	0.2	0.4	0.7
Grain products	19.6	21.8	22.8	26.9	19.9	21.3	20.8	17.5	20.3	20.1	17.1	15.6	16.8
Fruits	0.8	0.8	1.3	0.5	0.6	0.7	1.2	0.8	1.0	0.7	0.5	0.7	1.2
Vegetables	1.3	1.5	1.1	2.1	1.7	1.4	1.2	1.1	1.0	1.3	1.1	1.0	1.0
Fats	0.6	0.7	0.3	0.6	0.9	0.8	0.6	0.5	0.3	0.5	0.6	0.7	0.5
Sugar, sweets, and beverages	17.7	19.8	17.7	26.6	21.5	18.8	13.5	15.8	17.3	20.2	17.3	14.7	10.2
All products	46.4	51.8	50.5	65.7	50.7	50.3	44.6	41.2	46.8	49.5	41.4	38.1	35.5
<b>Corn sweeteners:</b>													
Milk and milk products	5.5	6.2	6.6	5.2	6.8	5.8	5.4	4.9	6.5	5.1	4.6	4.7	4.4
Meat, poultry, fish, and mixtures	1.4	1.7	0.8	1.8	2.5	1.6	1.1	1.0	0.8	1.2	1.2	1.0	0.8
Eggs	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Dry beans, peas, other legumes	0.3	0.3	0.2	0.2	0.1	0.2	0.9	0.2	0.1	0.2	0.1	0.3	0.4
Grain products	6.0	6.9	6.7	8.2	6.8	6.8	6.5	5.1	5.9	5.6	4.8	5.1	5.0
Fruits	0.9	0.9	1.5	0.5	0.5	0.8	1.7	0.9	1.2	0.8	0.4	0.8	1.8
Vegetables	0.3	0.3	0.1	0.2	0.4	0.5	0.3	0.3	0.1	0.2	0.3	0.3	0.5
Fats	0.3	0.3	0.1	0.2	0.3	0.4	0.4	0.3	0.1	0.2	0.4	0.4	0.3
Sugar, sweets, and beverages	40.9	49.8	32.8	76.7	65.7	42.6	21.6	32.4	31.3	51.3	41.1	26.6	14.4
All products	55.7	66.5	48.8	93.1	83.2	58.9	38.0	45.3	46.1	64.6	52.9	39.2	27.6

Source: USDA.

## Summary

Consumption of added sugars has increased substantially since 1985 and has leveled off only since 1999. Quantification of the rising consumption can be inferred from the increase in factory deliveries of refined sugar and corn sweeteners, documented by USDA and published in various *Sugar and Sweetener Outlook* reports and the *Sugar and Sweeteners Situation and Outlook Yearbook*. Recently USDA's Economic Research Service added estimates of losses from the factory level to the consumer. These data, although necessary for understanding national trends, provide no information on how segments of the U.S. public consume added sugars. This article helps fill the gap by reporting findings from USDA's Continuing Survey of Food Intake by Individuals for sweetener consumption, classified according to a set of demographic characteristics. These include sweetener consumption data, at the total and disaggregated product level, for U.S. Census regions, income levels, degree of urbanization, race/ethnic origins, and gender and age groupings. Principal findings are as follows:

- Sweetener consumption is highest in the Midwest, where consumption of sweeteners in grain products is also particularly high. It is lowest in the Northeast. Although sugar consumption there is higher than in the West, the Northeast's consumption of corn sweeteners is about one-sixth less than the national average.
- Sweetener consumption tends to rise with increased income up to a certain level and then to decrease. This trend is particularly strong for corn sweeteners, most of which are consumed in carbonated soft drinks and fruitades/other drinks. The trend is weaker for sugar, where consumption in grain products and milk and milk products keeps rising with income.
- Sweetener consumption is highest in suburban areas and is only slightly lower in rural areas. Sweetener consumption in metropolitan areas is below the national average for both sugar and corn sweeteners.
- Sweetener consumption by non-Hispanic Whites and Blacks is about the same, although Whites consume more sugar (3.6 pounds, especially in grain products) and Blacks consume more corn sweeteners (2.1 pounds, with more in sweets and beverages and in milk and milk products). Although Hispanics consume far less overall sweeteners (8.2 percent below the national average), their consumption of corn sweeteners, particularly in carbonated beverages, matches the national average.
- Sweetener consumption is highest for those 12 to 19 years old. Consumption levels decline with age. For most sweetener product groupings, men consume about 25 percent more than women. A big exception is corn sweeteners in the sweets and beverages category, where men outconsume women by over 50 percent.

These conclusions provide important benchmark information for researchers and the public alike. However, the survey data set is now at least 9 years old and needs to be updated. Although there have been many demographic changes in the United States, it is unlikely that these changes can fully account for changes in U.S. sweetener consumption, especially the leveling-off since 1999. Combinations of factors, and not just demographic factors, need to be considered. These might include growing public awareness of the health consequences of overconsumption of sweeteners and the emergence of low-calorie alternatives.

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## Appendix—USDA Sweetener Data Sources

**Sugar.** Delivery data come from *Sweetener Market Data*, published by USDA's Farm Service Agency (FSA). The data are reported to FSA by all sugarbeet processors, sugarcane millers, and cane sugar refiners located in the United States and Puerto Rico. The reporting is required by the Farm Security and Rural Investment Act of 2002. The FSA also includes estimates of imported direct-consumption sugar provided to them by USDA's Foreign Agricultural Service (FAS). All data are converted to refined sugar basis.

**Corn Sweeteners: high fructose corn syrup, glucose, and dextrose.** Delivery data are estimated by ERS based on information collected from various industry contacts and consulting firms. Import data come from the U.S. Census Bureau. The data are converted into dry weight equivalents. ERS estimates the nonfood component of each corn sweetener and excludes it from the reported total.

**Honey.** Estimates of deliveries are derived from estimates of production, stock changes, and trade. Honey production and stock holdings are estimated by USDA's National Agricultural Statistics Service (NASS) and reported the end of February in the NASS report *Honey*. Honey exports and imports are reported by the U.S. Census Bureau. Implied consumption is calculated from these series and then converted into its equivalent sugar solid content. (The conversion factor is from: USDA's *Weights, Measures, and Conversion Factors for Agricultural Commodities and Their Products*, Agricultural Handbook No. 697, <http://www.ers.usda.gov/publications/ah697/> ).

**Other Edible Syrups: sorgo, maple and sugarcane syrup, edible molasses, and edible refiners syrup.** Other than for maple syrup, there have been no reliable estimates for these syrups since the mid-1980s. In order to derive consumption estimates, it is assumed that total syrup consumption is proportional to the growth in maple syrup consumption. Production data for maple syrup are from NASS, and trade data are from the U.S. Census Bureau.

For all product categories except Other Edible Syrups, data are adjusted to exclude shipments to and from Puerto Rico. The source of these shipment data is the U.S. Census Bureau.