Trends in Calories and Nutrients of Beverages in U.S. Chain Restaurants, 2012−2017

Johannah M. Frelier, MPH,[1] Alyssa J. Moran, ScD,[2] Kelsey A. Vercammen, MSc,[3] Marian P. Jarlenski, PhD,[4] Sara N. Bleich, PhD[1]

Introduction: Although beverages comprise one third of all menu items at large chain restaurants, no prior research has examined trends in their calorie and nutrient content.

Methods: Beverages (n=13,879) on the menus of 63 U.S. chain restaurants were the final analytic sample obtained from a restaurant nutrition database (MenuStat, 2012−2017). For each beverage type, cluster-bootstrapped mixed-effects regressions estimated changes in mean calories, sugar, and saturated fat for beverages available on menus in all years and for newly introduced beverages. Data were analyzed in 2018.

Results: Traditional sugar-sweetened beverages, sweetened teas, and blended milk-based beverages (e.g., milkshakes) were significantly higher in calories from 2012 to 2017 for newly introduced beverages (p-value for trend <0.004). For all newly introduced sweetened beverages, sugar increased significantly (2015, +7.9 g; 2016, +8.2 g; p<0.004) whereas saturated fat declined (2016, −2.3 g; 2017, −1.6 g; p<0.004). For beverages on menus in all years, saturated fat declined significantly (p<0.001), whereas mean calories and sugar remained relatively constant. Significant declines were observed for sweetened coffees (−10 kcal, −0.5 g saturated fat, p<0.001), teas (−2.6 g sugar, p=0.001), and blended milk-based beverages (−28 kcal, −4.2 g sugar, −0.8 g saturated fat, p<0.001). From 2012 to 2017, the total number of beverage offerings increased by 155%, with 82% of this change driven by sweetened beverages.

Conclusions: Sweetened beverages available in large chain restaurants were consistently high in calories, sugar, and saturated fat and substantially increased in quantity and variety from 2012 to 2017.

INTRODUCTION

Monitoring the nutrient composition of restaurant menu items is important because Americans spend more than 50% of their food dollars away from home,[1] and more than one third of adults and children eat at a fast food restaurant each day.[2−4] Eating in fast food restaurants is associated with a poor diet[3,5] and higher average daily caloric intake,[6] with fast food restaurants frequently offering menu items high in calories, saturated fat, and sugar, with sugar-sweetened beverages (SSBs) among the largest contributors.[7] Moreover, some studies have found a relationship between fast food intake and negative health outcomes, such as weight gain and insulin resistance,[8,9] whereas others have found no effect.[10]

A growing body of research suggests that the calorie content of menu items at large chain restaurants in the U.S. has changed over time. Specifically, evidence has

From the [1]Department of Health Policy and Management, Harvard T.H. Chan School of Public Health, Boston, Massachusetts; [2]Department of Health Policy and Management, Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland; [3]Department of Epidemiology, Harvard T.H. Chan School of Public Health, Boston, Massachusetts; and [4]Department of Health Policy and Management, University of Pittsburgh Graduate School of Public Health, Pittsburgh, Pennsylvania

Address correspondence to: Johannah M. Frelier, MPH, Department of Health Policy and Management, Harvard T.H. Chan School of Public Health, 677 Huntington Ave., Kresge 429, Boston MA 02115. E-mail: jfrelier@hsph.harvard.edu.

shown that large chain restaurants decreased the calories of newly introduced menu items by about 60 kcal (or a 12% decline) from 2012 to 2015,[11,12] that restaurants voluntarily posting calorie information on their menus have lower calories per item than restaurants that do not,[13] and that items dropped from restaurant menus are significantly higher in calories than items that remain (relative to items on the menu in all years: *p*=0.02, relative to newly introduced items: *p*=0.04).[14] However, although beverages represent about one third of all menu items in large chain restaurants, and 80% of all children's menu beverage offerings are SSBs,[12,15] no prior research has looked at recent trends in the nutrient content of beverages in large chain restaurants. One previous study examined beverages on the children's menu of large chain restaurants and found a significant increase in average per-item beverage calories from 2012 to 2013 and 2014, but no change from 2012 to 2015.[15] This is particularly relevant for children who consume 35% of their empty calories, mainly from SSBs, at fast food restaurants where little to no improvement has been made to reduce the saturated fat and sugar content of menu offerings.[7,16] Examining trends in SSB offerings at restaurants is important because the consumption of these drinks is strongly linked to obesity, Type 2 diabetes, and many other adverse health conditions.[17−19]

This study examines trends in the calories, sugar, and saturated fat of beverages on the menus of large U.S. chain restaurants from 2012 to 2017. It also compares the nutrient content of newly introduced beverages with those present on the menu in all years.

METHODS

Beverage data were acquired from a national restaurant nutrition database (MenuStat; menustat.org) built and maintained by the New York City Department of Health and Mental Hygiene. Details on the data collection methods are published elsewhere.[20] In summary, MenuStat contains nutrition information compiled annually from the top grossing U.S. chain restaurants.[20] This study expands on previous studies using MenuStat[11−15,21,22] by focusing on beverages available on restaurant menus, examining trends by beverage type (e.g., sweetened coffees), expanding beyond calories to also analyze sugar and saturated fat, and including the most recent years of data.

Study Sample

The MenuStat database included 94 restaurants in 2017. Restaurants were excluded if they did not contribute data in all years (2012−2017; *n*=28) or did not include beverages in any years (*n*=2) (Appendix Figure 1, available online). A total of 19,471 beverages available on menus between 2012 and 2017 were assessed for inclusion from these 64 restaurants. A small number of beverages (1%) were excluded for the following reasons: intended for home preparation (*n*=34; e.g., bagged coffee), could not be categorized into a

beverage type because they lacked information about ingredients on the restaurant website (*n*=108), or were not single-serve (*n*=63; e.g., gallon-sized drinks). The sample of 19,266 beverages across 64 restaurants was used to describe the total number and proportion of beverage types available on menus from 2012 to 2017, regardless of complete nutritional information (Figure 1).

Next, restaurants were assessed for inclusion based on the presence of nutritional information; one restaurant was excluded for missing calorie information for all beverages (*n*=63). Where possible, missing nutritional information for individual beverages was entered by the research team for calories (*n*=104, 0.5%), sugar (*n*=182, 0.9%), and saturated fat (*n*=150, 0.8%) using a process detailed in Appendix Text 1 (available online). Beverages were then excluded (*n*=5,387, 28%) if they were

1. missing calorie information in the year they were newly introduced; or
2. available on the menu in all years but missing calorie information for ≥1 year.

The sample of 13,879 beverages available on menus in 63 restaurants (36 fast food, nine fast casual, 18 full service) was used for all analyses of calorie and nutrient trends over time from 2012 to 2017 (Tables 1 and 2, Figure 2, and Appendix Tables 1 and 2, available online).

Measures

Consistent with prior publications using MenuStat data,[11−13,15,22] restaurant-level covariates were: restaurant saturation (national or regional), restaurant type (full service, fast casual, or fast food), and restaurant classification by cuisine (15 mutually exclusive categories using InfoUSA[23]; e.g., Mexican). Appendix Text 1 (available online) provides details.

Based on item descriptions and nutritional information, beverages were classified as sweetened beverages, unsweetened beverages, or alcohol (Appendix A, available online). Sweetened beverages were further classified into one of four mutually exclusive types:

1. traditional SSBs (e.g., soda, fruit drinks, and sports and energy drinks);
2. sweetened coffees;
3. sweetened teas;
4. blended milk-based beverages (e.g., milkshakes, and smoothies with milk).

Unsweetened beverages were also classified into one of four mutually exclusive types:

1. diet drinks;
2. unsweetened coffees and teas;
3. water; or
4. other (included plain white milk, plant-based milks, and 100% juices).

Beverages on the children's menu were coded as any beverage with "kid," "child," or "children" appearing in the beverage name or description. Consistent with previous publications,[11,12,14,21,22] beverages available in all years were defined as those beverages with the same name and description within a given restaurant from 2012 to 2017. Beverages defined as newly introduced in 2013 −2017 did not have a matching name and description in the preceding year.
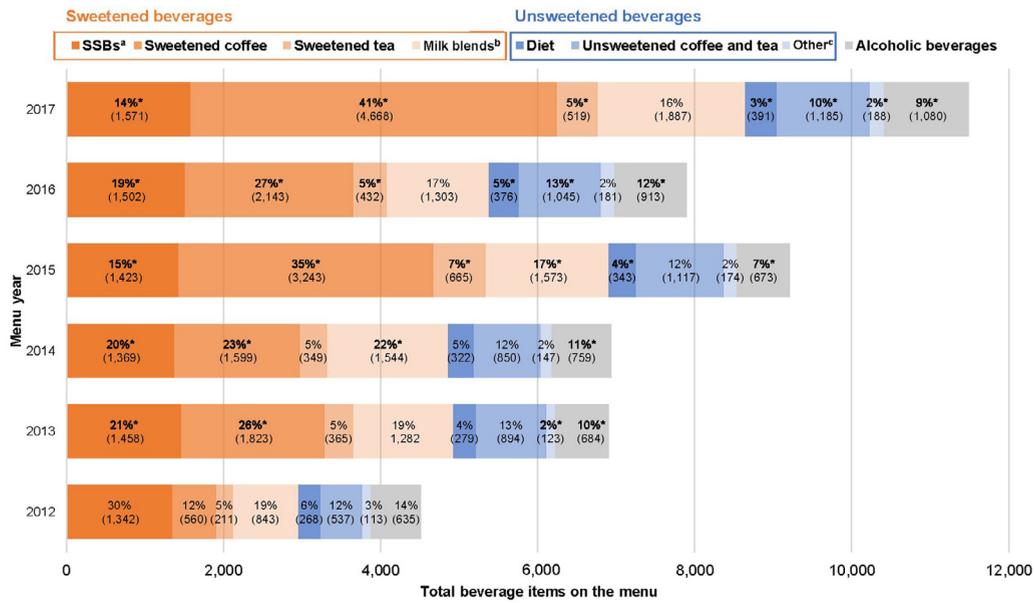
Figure 1. Number and proportion of beverage types available on menus in 64 U.S. restaurants from 2012 to 2017 (*n*=19,266).
Note: Boldface indicates statistically significant difference (*p<0.05) in the proportion of items in each beverage category for a given year compared with the previous year (e.g., 2017 vs 2016).
[a]SSBs included sweetened beverages that were not sweetened coffees, teas, or blended milk-based beverages (e.g., soda, fruit drinks, sports drinks, and energy drinks).
[b]Blended milk-based beverages included sweetened milk-based drinks (e.g., milkshakes, smoothies, and flavored milk).
[c]Other included plain white milk, 100% juices, and water (<1% of beverages in all years were categorized as water).
SSB, sugar-sweetened beverage.

The main outcomes for this analysis were calories (kcal), sugar (g), and saturated fat (g), examined for beverages available on menus in all years and for newly introduced beverages.

Statistical Analysis

To determine whether the types of beverages available on restaurant menus changed over time, binomial tests of proportions were conducted to compare the percentage of beverages in each type for a given year (2013−2017) with that for the preceding year.

For each beverage type, cluster-bootstrapped mixed-effects regressions with 100 repetitions and random intercepts for restaurants estimated the following:

1. predicted mean per-item changes in calories, sugar, saturated fat, and serving size from 2012 to 2017 among beverages on the menus in all years;
2. predicted mean calories, sugar, saturated fat, and serving size for beverages newly introduced in 2013, 2014, 2015, 2016, or 2017 compared with beverages available only in 2012.

Cluster bootstrapping (a nonparametric method that samples clustered observations) was selected because the same beverage item often appeared in multiple or all years. SEs were bootstrapped because the distribution of the error terms for beverage calories were not normally distributed owing to beverages with 0 kcal. Random intercepts for restaurant chains were included to account for correlated errors among beverages within restaurants. Covariates for all models included restaurant-level indicators for restaurant saturation, restaurant type, and restaurant classification

by cuisine, along with an item-level indicator for children's menu status (Appendix Text 1, available online).

Predicted mean calories, grams of sugar, grams of saturated fat, and serving size ounces for beverages on the menus in all years were estimated using Stata's post-regression margins command. Tests of linear trend were also conducted by specifying year as a continuous variable in the regression models. The Bonferroni correction was applied to minimize the risk of Type I error owing to multiple comparisons; statistical significance was assessed at *p*<0.002 for beverages on the menus in all years and *p*<0.004 for sweetened beverages only on the menu in 2012 and newly introduced in 2013−2017.[24] Analyses by beverage type excluded unsweetened beverages, which are predominantly calorie free, and alcoholic beverages. Data were analyzed in 2018 using Stata, version 14.

RESULTS

Figure 1 shows the number and proportion of beverages (*n*=19,266) available at large chain restaurants (*n*=64) by beverage type over time. From 2012 to 2017, the total number of beverage offerings increased by 155%, with 82% of this change driven by sweetened beverages. Across all years, sweetened beverages (traditional SSBs, sweetened coffees and teas, and blended milk-based beverages) made up the largest percentage of available beverages, ranging from 66% to 75% of total beverage offerings in each year. The proportion of blended milk-

Table 1. Characteristics of Beverages on Menus in 63 U.S. Restaurants From 2012 to 2017

Menu category	All beverages	Beverages offered all years	Beverages only in 2012	Beverages new in 2013	Beverages new in 2014	Beverages new in 2015	Beverages new in 2016	Beverages new in 2017	Fast food (n=36)	Fast casual (n=9)	Full service (n=18)	Children's menu
Overall beverages	13,879 (100)	1,746 (12.6)	423 (3.1)	2,078 (15.0)	1,528 (11.0)	1,532 (11.0)	1,265 (9.1)	3,246 (23.4)	7,169 (51.7)	4,768 (34.4)	1,942 (14.0)	830 (6.0)
Sweetened beverages	10,774 (77.6)	1,291 (73.9)	348 (82.3)	1,757 (84.6)	1,235 (80.8)	1,161 (75.8)	886 (70.0)	2,841 (87.5)	5,883 (82.1)	4,157 (87.2)	734 (37.8)	670 (80.7)
SSBs[a]	2,326 (16.7)	695 (39.8)	89 (21.0)	228 (11.0)	112 (7.3)	160 (10.4)	279 (22.1)	218 (6.7)	1,643 (22.9)	212 (4.5)	463 (23.8)	377 (45.4)
Sweetened coffees	4,202 (30.2)	183 (10.5)	56 (13.2)	768 (37.0)	501 (32.8)	460 (30.0)	278 (22.0)	1,671 (51.5)	1,829 (25.5)	2,336 (49.0)	37 (1.9)	0 (0.0)
Sweetened teas	1,026 (7.4)	89 (5.1)	30 (7.1)	155 (7.5)	125 (8.2)	239 (15.6)	99 (7.8)	175 (5.4)	390 (5.4)	547 (11.5)	63 (3.2)	41 (4.9)
Blended milk-based beverages[b]	3,254 (23.4)	324 (18.6)	173 (40.9)	606 (29.2)	497 (32.5)	302 (19.7)	230 (18.2)	777 (23.9)	2,021 (28.2)	1,062 (22.3)	171 (8.8)	252 (30.4)
Unsweetened beverages	2,168 (15.6)	395 (22.6)	50 (11.8)	248 (11.9)	210 (13.7)	322 (21.0)	251 (19.8)	286 (8.8)	1,280 (17.9)	608 (12.8)	258 (13.3)	160 (19.3)
Diet	536 (3.9)	161 (9.2)	10 (2.4)	32 (1.5)	66 (4.3)	44 (2.9)	81 (6.4)	39 (1.2)	396 (5.5)	45 (0.9)	89 (4.6)	82 (9.9)
Unsweetened coffees/teas	1,312 (9.4)	192 (11.0)	26 (6.2)	189 (9.1)	94 (6.2)	219 (14.3)	121 (9.6)	225 (6.9)	675 (9.4)	523 (11.0)	101 (5.2)	31 (3.7)
Water	77 (0.6)	11 (0.6)	4 (1.0)	5 (0.2)	8 (0.5)	9 (0.6)	18 (1.4)	10 (0.3)	33 (0.5)	9 (0.2)	35 (1.8)	4 (0.5)
Other[c]	240 (1.7)	31 (1.8)	10 (2.4)	22 (1.1)	42 (2.8)	50 (3.3)	31 (2.5)	12 (0.4)	176 (2.5)	31 (0.7)	33 (1.7)	43 (5.2)
Alcoholic beverages	959 (6.9)	60 (3.4)	25 (5.9)	73 (3.5)	83 (5.4)	49 (3.2)	128 (10.1)	119 (3.7)	6 (0.1)	3 (0.1)	950 (48.9)	0 (0.0)

Note: Values are *n* (%).
[a]SSBs included sweetened beverages that were not sweetened coffees, teas, or blended milk-based beverages (e.g., soda, fruit drinks, sports drinks, and energy drinks).
[b]Blended milk-based beverages included sweetened milk-based drinks (e.g., milkshakes, smoothies, and flavored milk).
[c]Other included plain white milk and 100% juice.
SSB, sugar-sweetened beverage.

Table 2. Predicted Mean Per-Item Calories, Sugar, and Saturated Fat of Beverages Available on Menus in 2012−2017

Menu category	n	Means						p-value for trend	Change, 2012−2017
		2012	2013	2014	2015	2016	2017		
Overall beverages									
Calories (kcal)	1,744	272	271	269	270	270	268	0.002	−4 kcal
Sugar (g)	1,714	48.0	48.0	47.6	47.6	48.2	48.1	0.553	+0.1 g
Saturated fat (g)	1,744	4.1	4.1	4.1	4.1	4.0	3.9	**<0.001**	−0.2 g
Sweetened beverages									
Calories (kcal)	1,288	343	342	339	340	341	339	0.013	−4 kcal
Sugar (g)	1,270	61.9	61.8	61.3	61.3	62.0	61.9	0.654	0.0 g
Saturated fat (g)	1,288	5.1	5.1	5.1	5.1	5.0	4.9	**<0.001**	−0.2 g
SSBs[a]									
Calories (kcal)	693	226	227	224	226	231	235	**<0.001**	+9 kcal
Sugar (g)	676	59.8	60.2	59.3	59.8	61.3	62.3	**<0.001**	+2.5 g
Saturated fat (g)	693	0.0	0.0	0.0	0.0	0.0	0.0	0.142	0.0 g
Sweetened coffees									
Calories (kcal)	180	340	343	348	343	336	330	**<0.001**	−10 kcal
Sugar (g)	176	49.1	50.1	51.0	50.2	49.9	49.1	0.672	0.0 g
Saturated fat (g)	180	6.6	6.8	6.8	6.6	6.2	6.1	**<0.001**	−0.5 g
Sweetened teas									
Calories (kcal)	81	168	168	165	164	164	159	0.003	−9 kcal
Sugar (g)	81	42.5	42.4	41.6	41.4	41.2	39.9	**0.001**	−2.6 g
Saturated fat (g)	81	0.1	0.1	0.1	0.1	0.1	0.1	0.003	0.0
Blended milk-based beverages[b]									
Calories (kcal)	319	598	591	584	588	584	570	**<0.001**	−28 kcal
Sugar (g)	317	76.3	75.0	74.3	74.0	73.8	72.1	**<0.001**	−4.2 g
Saturated fat (g)	319	14.8	14.7	14.6	14.7	14.4	14.0	**<0.001**	−0.8 g
Unsweetened beverages									
Calories (kcal)	392	23	23	23	23	24	24	0.019	+1 kcal
Diet									
Calories (kcal)	152	2	2	1	1	2	2	0.590	0 kcal
Unsweetened coffees/teas									
Calories (kcal)	188	25	25	26	26	27	27	0.013	+2 kcal

(continued on next page)

Table 2. Predicted Mean Per-Item Calories, Sugar, and Saturated Fat of Beverages Available on Menus in 2012−2017 (continued)

Menu category	n	Means						p-value for trend	Change, 2012−2017
		2012	2013	2014	2015	2016	2017		
Other[c]									
Calories (kcal)	14	117	115	115	115	118	117	0.671	0 kcal
Alcoholic beverages									
Calories (kcal)	59	273	273	273	274	246	247	0.016	−26 kcal

Note: Boldface indicates statistical significance at p<0.002 because of Bonferroni correction. The n indicates total number of beverages present on menu across all years for that beverage category.
[a]SSBs included sweetened beverages that were not sweetened coffees, teas, or blended milk-based beverages (e.g., soda, fruit drinks, sports drinks, and energy drinks).
[b]Blended milk-based beverages included sweetened milk-based drinks (e.g., milkshakes, smoothies, and flavored milk).
[c]Other included plain white milk and 100% juices.
SSB, sugar-sweetened beverage.

based beverages, unsweetened coffees and teas, sweetened teas, diet drinks, and other unsweetened beverages remained relatively unchanged despite increased absolute number of offerings.

Characteristics of the final beverage sample (n=13,879) from the 63 restaurants used for all analyses of beverage trends over time are reported in Table 1. Most beverage offerings at fast food and fast casual restaurants were sweetened beverages (82% and 87%, respectively), whereas about half of beverage offerings at full service restaurants were alcoholic beverages. About 6% of the total beverage offerings were from children's menus, of which 81% were sweetened beverages. Overall, 13% of beverages remained on the menu in all years, 3% were on the menu only in 2012, and 70% were newly introduced items (2013, 15%; 2014, 11%; 2015, 11%; 2016, 9%; 2017, 23%). About half of the beverages were offered at fast food restaurants (n=7,169), 35% at fast casual restaurants, and 14% at full service restaurants.

Table 2 displays the predicted mean per-item calories, sugar, and saturated fat for each year and by beverage type among items available on the menus in all 6 years. Over time, the mean calories, sugar, and saturated fat for overall beverages remained relatively constant, with a significant decline only observed for saturated fat (4.1 g vs 3.9 g, $p<0.001$). Traditional SSBs were the only beverage type with significant increases in calories (226 kcal vs 235 kcal, $p<0.001$), primarily driven by rises in sugar content (59.8 g vs 62.3 g, $p<0.001$). Significant declines were observed among sweetened coffees for both calories (340 kcal vs 330 kcal, $p<0.001$) and saturated fat (6.6 g vs 6.1 g, $p<0.001$). Similarly, a decrease in calories (598 kcal vs 570 kcal, $p<0.001$), sugar (76.3 g vs 72.1 g, $p<0.001$), and saturated fat (14.8 g vs 14.0 g, $p<0.001$) was found for blended milk-based beverages. Small but significant declines in sugar were also observed for sweetened teas (42.5 g vs 39.9 g, $p=0.001$).

Figure 2 shows the predicted mean per-item changes in calories, sugar, and saturated fat among sweetened beverages, comparing those on menus only in 2012 versus those newly introduced in 2013, 2014, 2015, 2016, or 2017. Newly introduced sweetened beverages showed a trend toward increasing calories and sugar but decreasing saturated fat, with statistically significant increases for sugar from 2012 (45.3 g) to 2015 (+7.9 g, $p<0.004$) and 2016 (+8.2 g, $p<0.004$), and significant decreases for saturated fat from 2012 (5.0 g) to 2016 (−2.3 g, $p<0.004$) and 2017 (−1.6 g, $p<0.004$). Traditional SSBs significantly increased in calories and sugar from 2012 (206 kcal, 49.2 g) to 2013 (+55 kcal, +15.7 g, $p<0.004$) and 2016 (+52 kcal, +14.0 g, $p<0.004$). Sweetened teas demonstrated substantial changes in nutrients from 2012 to 2016, with significant increases in calories (137
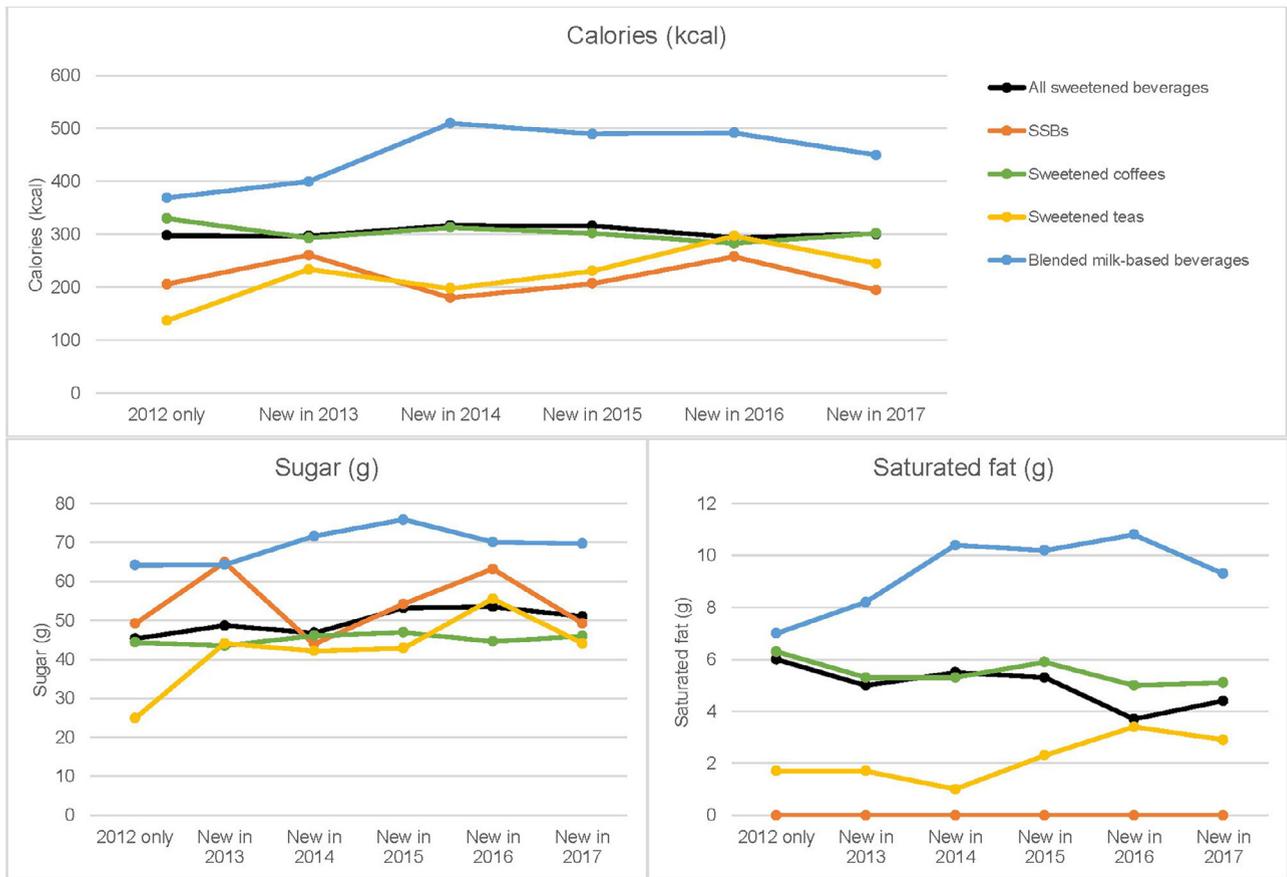
Figure 2. Predicted mean per-item changes in calories, sugar, and saturated fat of newly introduced sweetened beverages. SSB, sugar-sweetened beverage.

kcal vs 297 kcal, $p<0.004$), sugar (24.9 g vs 55.6 g, $p<0.004$), and saturated fat (1.7 g vs 3.4 g, $p<0.004$). Blended milk-based beverages newly introduced in 2014 had the highest calorie increase from 2012 (369 kcal vs 510 kcal, $p<0.004$) and remained significantly higher-calorie across all subsequent years of data compared with 2012. There were no significant changes in calories, sugar, and saturated fat at any time point for sweetened coffees.

The differences in mean per-item calories among beverages on the menus in all 6 years was compared with those only on the menu in 2012 or newly introduced in 2013, 2014, 2015, 2016, or 2017. Overall, newly introduced beverages were consistently lower in calories than beverages available on the menus in all study years, by an average difference of 23 calories.

Given that trends in the calorie and nutrient content of beverages may be driven by changes in serving size, an exploratory analysis was conducted examining serving size changes over time. However, many beverages were missing data on serving size (19% for common

beverages, 17% for newly introduced beverages). Common beverages available on the menu in all six years that had serving size information available showed a small, statistically significant decline in serving size across most beverage types (Appendix Table 1, available online). When comparing beverages on the menu only in 2012 with newly introduced beverages in 2013, 2014, 2015, 2016, or 2017 (Appendix Table 2, available online), there were few significant changes in serving size.

DISCUSSION

This study examined changes in calories, sugar, and saturated fat for beverages in 63 of the largest U.S. chain restaurants from 2012 to 2017. During this period, the total number of available beverages increased by 155%, with 82% of this change driven by sweetened beverages. Among beverages that remained on restaurant menus in all years, the calorie and sugar content of traditional SSBs (e.g., soda, fruit drinks, and sports and energy drinks) increased significantly, whereas a trend was

observed toward lower-calorie sweetened coffees, teas, and blended milk-based beverages. Overall, sweetened beverages on menus in all years significantly declined in saturated fat, driven by sweetened coffee and blended milk-based beverages. Newly introduced sweetened beverages had significantly higher sugar and lower saturated fat content. These observed trends are unlikely because of changes in beverage serving size, as exploratory analyses indicate only small declines in serving size over time across most beverage types. These calorie and nutrient changes in beverages available on menus in all years may be partially explained by reformulation in response to political pressure, consumer demand for greater transparency and healthier beverage offerings,[25] or self-regulation by restaurants in preparation for menu labeling implementation in 2018.[26] For example, annual retail sales data indicate a 62% sales growth in plant-based creamers (e.g., soy milk) in 2018[27]; reformulation using plant-based milks could partially explain these nutritional improvements as they are naturally lower in calories and saturated fat.

Though this study identified statistically significant decreases in calories, saturated fat, and sugar among common beverages for some beverage types, the observed changes were quite small. For example, although the mean calories for sweetened coffees declined significantly between 2012 and 2017, the magnitude of the change was only about 10 kcal.

Although small decreases in calories, saturated fat, and sugar may be more meaningful when applied at the population level, the public health impact of these findings should not be overstated. The Dietary Guidelines for Americans have a maximum daily limit of <10% of calories from added sugars and saturated fat, or 50 g of sugar and 22 g of saturated fat (using an average daily intake of 2,000 kcal).[28] In each year of this study, more than half (56%, on average) of the individual sweetened beverages meet or exceed this daily maximum for total sugar, although some of this total sugar may be naturally occurring from lactose (e.g., blended milk-based beverages and sweetened coffees). For example, the average sweetened beverage on the menus in 2017 was 12.4 ounces, with 298 kcal, 52 g of sugar, and 4 g of saturated fat, whereas the average blended milk-based beverage (e.g., milkshake or flavored milk) was 14.2 ounces, with 497 kcal, 70 g of sugar, and 11 g of saturated fat.

Among newly introduced sweetened beverages, there were observed increases in mean calories driven by sugar content consistent with previous research examining overall beverages on the children's menu from 2012 to 2015.[15] However, in previous studies that included unsweetened beverages (i.e., not restricting analyses to sweetened beverages only), decreases in calories were found for newly introduced beverages overall from 2012 to 2014.[11,12]

Despite increases in mean calories over time for newly introduced beverages, overall the mean calories were lower than beverages on menus in all study years.

The trend toward increasing the number and variety of newly introduced sweetened beverages that remain high in calories, sugar, and saturated fat by large chain restaurants is concerning. One third of Americans eat out at a fast food restaurant every day[2−4] where beverages represent one third of all menu items[12] and—based on this analysis—often consist of high-calorie specialty drinks that are high in sugar and saturated fat. Continued efforts to decrease unacceptably high levels of sweetened beverage consumption[29] should encourage restaurants to offer greater availability and variety of healthy options (low in calories, sugar, and saturated fat), a technique shown to influence purchases and consumption.[30,31]

These data suggest that there is considerable room for chain restaurants to make improvements in the nutritional quality and energy content of beverage offerings, perhaps encouraged through policy changes like menu labeling[32] and SSB warning labels,[33] portion size caps and reformulation,[34] SSB taxes,[35−37] healthy children's meal policies,[38−40] or restricting marketing to children.[41,42] This is especially important for children, as research found that children's specialty beverages were higher in calories, saturated fat, and carbohydrates than regular menu nonalcoholic beverages,[43] and little progress has been made to improve nutrition through the National Restaurant Association's Kids LiveWell program,[15] a voluntary industry initiative to offer more healthful items for children.

Future research should continue to track trends in the energy and nutrient content of beverages in large chain restaurants, especially in response to recent policy initiatives like the federal menu labeling mandate in 2018.[26] Additionally, future studies should expand on these findings and examine whether beverage serving sizes are changing by restaurant, and how beverage offerings and nutrient content may differ in regional and independent chains. It is also important to examine consumer purchasing and consumption behavior for specific types of beverages to better understand the role that chain restaurants play in the public's health.

Limitations

This study has some limitations. First, only beverages with complete nutrition information are assessed in the primary analyses, which may not be inclusive of all offerings at all store locations. These data are also limited to 63 large chain restaurants, which may not be generalizable to other types of food retail establishments (e.g., small chains). The aggregation of nutrition information by MenuStat to create this data set is also subject to human error, as is the

additional coding of beverages into specific categories by the authors. However, the MenuStat methods for recording data are rigorous[20] and the authors followed a detailed codebook for additional coding. Additionally, it was not possible to examine trends among children's beverages alone because of the small number of beverages available on children's menus; however, results were robust when excluding children's beverages in a sensitivity analysis (results not shown). Finally, the impact of these beverage trends on caloric intake, obesity, and other health outcomes is unknown, owing to the absence of sales and consumption data.

CONCLUSIONS

Sweetened beverages (traditional SSBs, coffees, teas, and blended milk-based beverages) available in large chain restaurants were consistently high in calories, sugar, and saturated fat, and substantially increased in quantity and variety from 2012 to 2017. Special attention should be paid to traditional SSBs (e.g., soda, fruit drinks, and sports and energy drinks), which are the only beverage type (on the menus in all years) to have a significant increase in calories, primarily driven by sugar. Large chain restaurants should be encouraged to offer and promote more healthful beverages, especially to children.

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SUPPLEMENTAL MATERIAL

Supplemental materials associated with this article can be found in the online version at https://doi.org/10.1016/j.amepre.2019.03.023.

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