

# Assessing the Availability of Healthier Children's Meals at Leading Quick-Service and Full-Service Restaurants

Sarah Sliwa, PhD<sup>1</sup>; Stephanie Anzman-Frasca, PhD<sup>2</sup>; Vanessa Lynskey, MPH<sup>3</sup>;  
Kyle Washburn, M Ed, MBA<sup>4</sup>; Christina Economos, PhD<sup>1,3</sup>

## ABSTRACT

**Objective:** To compare the calorie, fat, saturated fat, and sodium content of available children's meal combinations in leading restaurants with national recommendations.

**Design:** Cross-sectional.

**Setting:** Children's menu offerings and corresponding nutrition information were collected (May, 2014) from Web sites of the top 10 quick-service (QSR) and top 10 full-service (FSR) restaurant chains that offered a children's menu and provided nutrition information.

**Variables Measured:** Total calories (kcal), percent calories from fat and saturated fat, and total sodium (mg) were calculated for children's meal combinations (QSR N = 1,363; FSR N = 6,654). Combinations with  $\leq 600$  kcal,  $\leq 35\%$  kcal from fat,  $\leq 10\%$  kcal from saturated fat,  $\leq 770$  mg sodium, and those that met all 4 of these criteria were identified.

**Analysis:** Frequencies by restaurant segment.

**Results:** The majority of QSR (72%) and FSR (63%) meal combinations had  $\leq 600$  kcal. Only 31.9% of combinations at QSRs and 21.7% at FSRs met all 4 criteria. In both segments the calorie target was most frequently met, and the sodium target the least.

**Conclusions and Implications:** Children's meal combinations with  $\leq 600$  kcal are available at leading restaurant chains, but many meals fail to meet current national recommendations for fat, saturated fat, and sodium. Menu labeling legislation may address caloric content but implications for other nutrients remain unclear.

**Key Words:** children, diet quality, dietary guidelines, restaurants (*J Nutr Educ Behav.* 2016;48:242-249.)

Accepted January 26, 2016.

## INTRODUCTION

Most American children consume nutritionally poor diets that exceed recommendations for calories, solid fats, sodium, and added sugars, while falling short of recommended intakes of fruits, vegetables, and low-fat dairy.<sup>1-3</sup> Restaurant meals tend to be higher in calories and lower in nutritional quality than foods prepared at home.<sup>4-7</sup> Accordingly, consumption of foods

from quick-service restaurants (QSRs) and full-service restaurants (FSRs) has been associated with higher energy and sodium intake and lower diet quality.<sup>7,8</sup> An analysis of National Health and Nutrition Examination Survey dietary recall data suggested that QSRs contribute over a third (35%) of children's intake of solid fats and added sugars.<sup>9</sup> Because restaurants have become normative eating contexts for many children,<sup>10</sup> improving

the nutritional profile of foods available to children in restaurants is a strategy to improve children's overall diet quality. To this end, the 2015 Dietary Guidelines Advisory Committee encouraged restaurants to modify their offerings to improve their nutrient profiles and help Americans reduce intakes of calories, saturated fat, and sodium.<sup>11</sup>

Recent industry trends and research findings suggest that some restaurants are introducing healthier items to children's menus. For the past 6 years, healthier children's dishes have been among the top 10 food trends in the National Restaurant Association's annual survey of chefs.<sup>12-17</sup> The National Restaurant Association introduced the voluntary *Kids LiveWell* program in 2011, with the stated goal of helping parents and children make healthier choices when dining at restaurants.<sup>18</sup> The > 42,000 restaurant locations participating in this program offer at least 1 meal and 1 side dish that meet specific nutrition criteria; furthermore,

<sup>1</sup>Friedman School of Nutrition Science and Policy, Tufts University, Boston, MA

<sup>2</sup>Jacobs School of Medicine and Biomedical Sciences, University at Buffalo, Buffalo, NY

<sup>3</sup>ChildObesity180, Tufts University, Boston, MA

<sup>4</sup>Healthy Athletes, Special Olympics, Washington, DC

**Conflict of Interest Disclosure:** The authors' conflict of interest disclosures can be found online with this article on [www.jneb.org](http://www.jneb.org).

Address for correspondence: Sarah Sliwa, PhD, Division of Population Health, National Center for Chronic Disease Prevention and Health Promotion, US Centers for Disease Control and Prevention, 4770 Buford Hwy, NE, MS F-78, Atlanta, GA 30341; Phone: (770) 488-0946; Fax: (404) 488-5771; E-mail: [ssliwa@cdc.gov](mailto:ssliwa@cdc.gov)

©2016 Society for Nutrition Education and Behavior. Published by Elsevier, Inc. All rights reserved.

<http://dx.doi.org/10.1016/j.jneb.2016.01.004>

full meals must include at least 2 sources, and sides must include at least 1 of the following food groups: fruits, vegetables, lower-fat dairy, whole grains, and lean protein.<sup>18</sup> On the research side, a study comparing menu items at 66 of the 100 largest restaurant chains found that overall, new menu items introduced in 2013 and 2014 contained significantly fewer calories than did menu items available in 2012.<sup>19,20</sup> These shifts may represent voluntary changes in anticipation of federal menu-labeling legislation, which is scheduled to go into effect by December 1, 2016.<sup>21</sup> Improvements in single menu items are encouraging. Because many restaurants sell children's meals, the caloric content of the overall bundle also must be considered.

To expand upon existing research, this study describes the availability of healthier children's meals at leading QSRs and FSRs in 2014 by calculating children's meal combinations and determining the extent to which these meals align with national recommendations for calories, fat, saturated fat, and sodium.<sup>18,22,23</sup> This focus was selected because (1) all 4 are overconsumed, (2) nutrition information was widely available for these components across leading restaurants, and (3) clear national recommendations for their intake are available.<sup>3,22</sup> Understanding the availability of healthier children's meals in the format in which they are presented in many restaurants is a critical first step toward accelerating improvements in supply and increasing children's exposure to healthier foods in these settings.

## METHODS

### Data Collection

Using the 2014 Nation's Restaurant News Top 100 Report,<sup>24</sup> the 10 leading QSRs and FSRs by sales were identified that met the following inclusion criteria: (1) offer a distinct children's menu, (2) make nutrition information publicly available online for children's menu items, and (3) provide at minimum calorie information for all children's entrées. Children's meals were defined as entrées advertised in a child-focused section of the online menu, plus any sides, beverages, or desserts offered with those entrées as part of a combination. In May, 2014, screen-

shots were taken of all children's meal components on each restaurant's Web site. Corresponding nutrition information about portion size (grams or ounces), calories (kilocalories), fat (grams), saturated fat (grams), and sodium (milligrams) was downloaded for data entry and cleaning as described subsequently.

In 1 QSR and 8 FSRs, some of this information was not available online (eg, nutrition information was available upon request only; aspects of children's meals, such as items included or beverage sizes, were unclear). In these cases, researchers called the restaurant's customer service number, after which all questions at 5 of the 9 restaurants were resolved. In 2 cases, restaurant service staff stated that owing to variability, local franchises would need to be called to obtain answers to questions about children's beverage sizes and types offered. Calls with local franchisees were conducted in these cases by selecting 10 random locations from a numbered list of all outlets. For each restaurant chain contacted in this manner, a 100% response rate was obtained.

After completing these steps, some information remained unclear or unavailable for plain or standard foods (eg, 8 oz of 100% orange juice, a serving of raw carrot sticks) at 3 FSRs (FSRs 1, 3, and 4). The US Department of Agriculture Nutrient Database for Standard Reference (NDSR)<sup>25</sup> was used to estimate serving size and/or nutrition content in these cases. For example, if nutrition information was missing altogether for a cola product, corresponding values from NDSR for "14400, Carbonated beverage, cola, contains caffeine, fast-food cola" were entered. When children's beverage sizes could not be confirmed, the standard 12-oz size listed in the US Department of Agriculture database was used (ie, "1.0 cup child fast food, 12 fl. oz. capacity, weight of the drink only with no ice added"). The NDSR database was used to impute values across 2 FSRs (FSRs 1 and 4) for a total of 4 side dishes and 25 beverages, accounting for < 10% of all FSR menu items. At FSR 3, restaurant-provided nutrient values for the 20-oz adult cup were scaled to the 12-oz children's size.

At FSR 4, the beverage size (8 oz) was known but the restaurant provided a calorie range for all beverages rather than calories for individual bev-

erages. The upper limit of this range was compared with NDSR entries for specific nondiet beverages. Two beverages exceeded the 20% Food and Drug Administration margin of error (22% and 23%).<sup>26</sup> As described in the results, analyses were conducted with and without these beverages. At this same FSR, calorie information but not fat, saturated fat, or sodium was provided for sides. The NDSR entries for like items were matched on calories within  $\pm 10.3\%$  ( $n = 3$  sides,  $\pm 5.9\%$  to  $19.5\%$ ) and corresponding values for fat, saturated fat, and sodium were imputed.

At FSR 1, for which imputations were also needed, nutrition information was available for select children's meal combinations ( $n = 25$ ; 29.4% of children's meal combinations). Nutrition information for combinations constructed with imputed side and beverage values closely matched restaurant-provided data ( $\pm 3.0\%$  kcal,  $\pm 4.3\%$  fat [g],  $\pm 5.3\%$  sat fat [g], and  $\pm 2.8\%$  sodium [mg]).<sup>26</sup> Imputed values were used for all combinations at this FSR.

At FSR 5, saturated fat values could not be obtained for all menu items through these mechanisms. Analyses were run with and without FSR 5 and outcomes were compared, as described in the Results section. FSR 5 was excluded from analyses that addressed saturated fat and meals meeting all 4 criteria.

This study analyzed publicly available data and did not involve human subjects. Institutional review board approval was not needed for this research.<sup>27</sup>

### Data Entry and Coding

Using the menu screenshots, nutrition information, and supplemental information described earlier, all children's menu items and corresponding nutrition information were double-entered into Microsoft Excel by trained research assistants and coded as entrées, sides, beverages, or desserts. Coders specified how sides were paired with entrées (eg, choice of any side), because this information would influence the calculation of menu combinations. When a restaurant's children's meal did not include a particular category of menu item, a dummy item (eg, no dessert)

was entered with zeroes for its nutritional values. Items that could be consumed with a dipping sauce or dressing were entered as presented in the nutrition information. For example, if the nutrition information was listed for apple slices with caramel sauce, the information was entered for apples with the sauce. If information was presented separately for an entrée such as chicken nuggets and for a topping such as ketchup, the unadorned entrée was entered. If nutrition information offered multiple versions of the same entrée, varying only in a topping or sauce (eg, pancakes with blueberry, strawberry, or apple topping; chicken nuggets with barbeque sauce or honey mustard), the version pictured on the menu was entered ( $n = 5$  items across 4 FSRs). Double-entered data were compared, and the researchers who generated the coding protocol (SS and SAF) resolved any discrepancies.

## Data Analysis

Children's meal combinations and corresponding calorie, fat, saturated fat, and sodium content were developed in Microsoft Excel (version 14.0, Microsoft, Redmond, WA, 2011) using a macro. For each restaurant, the macro indexed through all offerings within each category of menu item to identify all unique combinations (QSR  $N = 1,363$ ; FSR  $N = 6,654$ ). For example, in a restaurant that offered a choice of 1 of 5 entrées, 1 of 3 sides, 1 of 3 beverages, and no dessert, dummy items would have been entered to reflect no side 2 and no dessert. This menu would yield  $5 \times 3 \times 1 \times 3 \times 1$  unique combinations ( $n = 5$ ). For each unique combination, the macro recorded the constituent items, including any dummy items, and then summed calorie, fat, saturated fat, and sodium content across the items comprising each combination. Two FSRs featured a build your own entrée option (eg, pick any 3 items from a list). An iterative process first generated all customizable entrée combinations and then included them among the entrées to be combined with beverages, sides, and desserts as described previously. Calories (kilocalories) and sodium (milligrams) are presented as whole numbers, and grams of fat and saturated fat are presented to 1 decimal place, as in the nutrition information.

To calculate the percentage of calories from fat and saturated fat, grams of fat and saturated fat were multiplied by 9 and then divided by the total kilocalories and multiplied by 100 for that combination. Indicators were created to identify meal combinations that met specific criteria for calories ( $\leq 600$  kcal), fat ( $\leq 35\%$  kcal from fat), saturated fat ( $\leq 10\%$  kcal from saturated fat), and sodium ( $\leq 770$  mg sodium), and met all 4 of these criteria. These benchmarks were selected based on interest in school-aged children dining in restaurants and the alignment of several sources of national expert recommendations for this age group and setting. These sources include the *2010 Dietary Guidelines for Americans*, in which the cutoffs for calories and sodium in a single meal correspond with approximately one third of the recommended daily intake for a sedentary or moderately active child aged 9–13 years,<sup>22</sup> criteria endorsed by the National Restaurant Association<sup>18</sup> and expert-generated standards.<sup>23</sup> Some researchers have applied a more stringent calorie criterion of  $\leq 430$  kcal in evaluating children's meals, which aligns with one third the calorie recommendation for sedentary children aged 4–8 years and the argument that the majority of children's meals are marketed for younger ages.<sup>6</sup> Because of this, supplementary analyses calculated the proportion of combinations meeting calorie, fat, saturated fat, and sodium, and all 4 criteria using the  $\leq 430$ -kcal cut point, by segment (QSR and FSR).

Because the number of available meal combinations varied by restaurant (4–297 in QSRs and 22–3168 in FSRs), restaurant-specific weights were developed to ensure that each restaurant contributed equally to summary statistics. Analyses are presented separately by segment. All summary statistics represent the weighted averages across restaurants (Tables 1 and 2).

## RESULTS

### QSRs: Segment Summary

At all 10 QSRs, children's meal combinations included an entrée, at least 1 side dish, and a beverage. Two QSRs offered 2 sides with each kids' meal and 1 included a dessert by default with all but 1 meal combination. The QSR children's menus featured an

average of  $17 \pm 10$  items (range, 6–42 items). Average children's meal combination across QSRs had  $506 \pm 107$  kcal (range, 200–1080 kcal) (Table 1), 30.9% calories from fat,  $17.4 \pm 6.2$  g of fat (range, 1.5–49.0 g), 9.1% of calories from saturated fat,  $5.1 \pm 1.9$  g saturated fat (range, 0.0–22.0 g), and  $863 \pm 229$  mg sodium (range, 285–1840 mg).

Table 3 shows the percentage of meals meeting the nutrition criteria at each QSR. On average, 72.4% of QSR combinations had  $\leq 600$  calories; 69.0% and 72.2% met criteria for percent calories from fat and saturated fat, respectively; 46.2% met the sodium criterion and 31.9% met all 4 criteria. At 6 of 10 QSRs, more than three quarters of combinations had  $\leq 600$  calories. One QSR had more than three quarters of combinations meeting all 4 criteria (100%); at 3 QSRs, more than half of combinations met this benchmark.

The QSR in which all of the meals met the calorie, fat, saturated fat, and sodium criteria had the fewest menu options. Children were offered a choice of 4 entrées, 1 side, and milk. By contrast, the 3 QSRs (QSRs 1–3) with the highest calorie meals offered more choices and therefore more potential combinations.

Analyses using the more stringent calorie criterion found that on average, 40.9% of combinations (range, 0% to 100%) had  $\leq 430$  kcal and 27.4% (range, 0% to 100%) met all 4 criteria when this benchmark was used.

### FSRs: Segment Summary

At 8 of 10 FSRs, children's meals included an entrée, a side, and a beverage. All 10 FSRs offered 1 side per kids' meal and none included dessert with the meal. The FSRs featured an average of  $27 \pm 10$  items on children's menus (range, 14–45 items). Across the 10 FSRs, combinations averaged  $565 \pm 168$  calories (range, 140–1,475 calories) (Table 2), in which the average meal had 36.4% of calories from fat,  $22.9 \pm 12.1$  g fat (range, 0.5–82.4 g), 10.0% calories from saturated fat,  $8.7 \pm 5.4$  g saturated fat (range, 0.0–32.5 g), and  $1,046 \pm 422$  mg sodium (range, 195–3,410 mg).

Analyses were conducted with and without missing and imputed data to

**Table 1.** Mean Calorie, Fat, Saturated Fat, and Sodium Content of Children's Meal Combinations Within and Across Quick-Service Restaurant Chains (n = 10)

Restaurant Chain	Meal Combinations, n	Calories (kcal) $\pm$ SD	Fat (g) $\pm$ SD	Saturated Fat (g) $\pm$ SD	Sodium (mg) $\pm$ SD
1 <sup>a</sup>	289	842 $\pm$ 135	29.8 $\pm$ 7.8	12.7 $\pm$ 4.1	1,257 $\pm$ 320
2	510	641 $\pm$ 108	24.3 $\pm$ 6.5	6.8 $\pm$ 2.2	1,020 $\pm$ 312
3	297	563 $\pm$ 135	18.9 $\pm$ 7.6	3.8 $\pm$ 2.1	1,025 $\pm$ 240
4	15	552 $\pm$ 124	22.2 $\pm$ 7.1	5.9 $\pm$ 2.6	780 $\pm$ 211
5	36	472 $\pm$ 112	17.5 $\pm$ 6.3	4.1 $\pm$ 1.2	1,035 $\pm$ 264
6	112	469 $\pm$ 115	17.8 $\pm$ 5.9	5.6 $\pm$ 2.0	748 $\pm$ 207
7	36	437 $\pm$ 123	13.6 $\pm$ 6.2	3.2 $\pm$ 1.2	1,069 $\pm$ 278
8	54	392 $\pm$ 139	13.2 $\pm$ 8.6	3.3 $\pm$ 1.5	640 $\pm$ 206
9	10	383 $\pm$ 59	11.7 $\pm$ 5.0	3.7 $\pm$ 1.5	588 $\pm$ 138
10	4	313 $\pm$ 21	4.8 $\pm$ 0.6	2.0 $\pm$ 0.4	473 $\pm$ 113
Overall	136	506 $\pm$ 107	17.4 $\pm$ 6.2	5.1 $\pm$ 1.9	863 $\pm$ 229

<sup>a</sup>Quick-service restaurant 1 includes dessert with all but 1 children's meal combination.

Note: The top 10 quick-service restaurant in sales meeting inclusion criteria were, in alphabetical order: Arby's, Burger King, Chik-Fil-A, Dairy Queen, Jack-in-the-Box, KFC, McDonald's, Sonic, Subway, and Wendy's. This order does not correspond to the sequence in which the results are presented here.

assess the influence of these points. When FSR 5 (missing saturated fat data) was excluded, resulting averages across the remaining 9 FSRs were similar (561  $\pm$  164 kcal, 23.1  $\pm$  12.4 g fat, 8.7  $\pm$  5.4 g saturated fat, and 1,046  $\pm$  431 mg sodium), so FSR 5 was retained in the final analyses

(Table 2). For FSR 4, the analysis was rerun excluding the 2 beverages with imputed values that exceeded the upper limit of the restaurant-provided calorie range by more than  $\pm 20\%$ . Results showed a slight narrowing of the SD for calories ( $-3$  kcal) and an increase in average sodium content

(+1 mg). The beverages were included in analyses to better reflect this restaurant's offerings.

Table 4 shows the prevalence of combinations meeting the 4 nutrition criteria at each FSR. Overall, 63% of combinations met the calorie criterion; 49.6% and 39.9% met the fat

**Table 2.** Mean Calorie, Fat, Saturated Fat, and Sodium Content of Children's Meal Combinations Within and Across Full-Service Restaurant Chains (n = 10)

Restaurant Chain	Meal Combinations, n	Calories (kcal) $\pm$ SD	Fat (g) $\pm$ SD	Saturated Fat (g) $\pm$ SD	Sodium (mg) $\pm$ SD
1	84	708 $\pm$ 238	37.2 $\pm$ 19.6	14.6 $\pm$ 7.7	1,848 $\pm$ 798
2	924	707 $\pm$ 166	25.5 $\pm$ 10.2	9.3 $\pm$ 4.8	1,210 $\pm$ 391
3	3,168	645 $\pm$ 225	32.5 $\pm$ 15.5	11.8 $\pm$ 6.5	1,391 $\pm$ 574
4	399	608 $\pm$ 203	23.3 $\pm$ 11.5	9 $\pm$ 4.6	787 $\pm$ 364
5	645	607 $\pm$ 207	20.6 $\pm$ 9.5	Missing	1,040 $\pm$ 339
6	219	592 $\pm$ 138	23.7 $\pm$ 13.6	7.8 $\pm$ 4.8	1,084 $\pm$ 532
7	203	588 $\pm$ 168	19.6 $\pm$ 15.5	10.2 $\pm$ 10.3	784 $\pm$ 391
8 <sup>a</sup>	21	440 $\pm$ 85	20.5 $\pm$ 9.3	8.6 $\pm$ 5.2	784 $\pm$ 213
9 <sup>a</sup>	160	399 $\pm$ 153	19.2 $\pm$ 9.5	6.2 $\pm$ 3.7	787 $\pm$ 335
10	56	358 $\pm$ 100	6.7 $\pm$ 6.5	1.2 $\pm$ 1.1	741 $\pm$ 281
Overall	665	565 $\pm$ 168	22.9 $\pm$ 12.1	8.7 $\pm$ 5.4	1,046 $\pm$ 422

<sup>a</sup>Full-service restaurants 8 and 9 do not include beverages with children's meal combinations.

Note: The top 10 full-service restaurants in sales meeting inclusion criteria were, in alphabetical order: Applebee's, Buffalo Wild Wings, Chili's, Denny's, IHOP, Olive Garden, Outback Steakhouse, Red Lobster, Red Robin, and TGI Friday's. This order does not correspond to the sequence in which the results are presented here.

**Table 3.** Proportion of Children's Meal Combinations at Individual Quick-Service Restaurants (QSRs) Meeting Criteria for Calories, Fat, Saturated Fat, and Sodium

QSR Chain	Meal Combinations, n	Combinations $\leq 600$ kcal (%)	Combinations With $\leq 35$ Fat Calories (%)	Combinations With $\leq 10$ Saturated Fat Calories (%)	Combinations With $\leq 770$ mg Sodium (%)	Combinations Meeting Kilocalories, Fat, Saturated Fat, and Sodium Criteria (%)
1	289	4.8	73.4	15.6	5.9	1.0
2	510	39.4	50.4	52.2	25.1	17.5
3	297	57.9	71.4	90.9	15.5	13.5
4	15	60.0	40.0	53.3	53.3	13.3
5	36	88.9	58.3	94.4	25.0	19.4
6	112	88.4	58.9	37.5	58.0	19.6
7	36	91.7	83.3	100.0	16.7	16.7
8	54	92.6	74.1	98.1	72.2	57.4
9	10	100.0	80.0	80.0	90.0	60.0
10	4	100.0	100.0	100.0	100.0	100.0
Overall	136	72.4	69.0	72.2	46.2	31.9

Note: Quick-service restaurant 1 includes dessert with all but 1 children's meal combination.

and saturated fat criteria, respectively; 37.9% met the sodium criterion; and 21.7% met all 4 criteria. At 3 of the 10 FSRs, more than three quarters of combinations met the calorie benchmark but only 1 of those FSRs included beverages as part of its children's meals. No FSRs had more than three quarters of combinations meeting all 4 criteria; at 1, more than half of combinations met this benchmark (57.1%). This FSR offered fewer options, which resulted in the smallest number of combinations among the 8 FSRs offering entrée, side, and beverage bundles.

Analyses using the more stringent criterion found that 31.3% (range, 5.5% to 75.0%) of meals had  $\leq 430$  kcal and 15% (12.3% to 17.8%) met all 4 criteria.

## DISCUSSION

Industry trends<sup>12-17</sup> and recent research<sup>19,20,28</sup> have illustrated the potential for healthier options to become more prevalent in restaurants. The current findings present encouraging information about the availability of lower-calorie kids' meals at QSRs and FSRs. However, the consistently low availability of meals meeting all 4 nutrition criteria of interest and varied availability of these meals across restaurant chains suggest that healthier

children's meals are not currently the norm.

Less than one third of children's meal combinations at QSRs and one quarter at FSRs met criteria for calories, fat, saturated fat, and sodium.

Of the nutrition criteria, the 600-cal target was most frequently met and sodium was least met across segments. Nevertheless, the average meal at 4 QSRs and 1 FSR met the sodium criterion. Furthermore, at 2 QSRs over 90% of meal combinations had  $\leq 770$  mg sodium, which demonstrates that large restaurant chains can meet this recommendation. Supplemental analyses found that meals with  $\leq 430$  kcal, which may be more appropriate for younger children, are less widely available.

A closer look at sources of variability may provide insights into strategies to increase the supply of healthier children's meal combinations. First, components included in children's meal combinations were not uniform across restaurants. Two FSRs did not include beverages with children's meals, and the results therefore likely underestimate the calories

available to children who add caloric beverages to their orders in these restaurants. One restaurant included desserts with their children's meal combinations. This QSR had the lowest proportion of meals meeting the calorie, saturated fat, and sodium criteria. Removing dessert from children's meals could improve the nutrition profile of available combinations without necessarily inviting compensatory orders. Analyses of sales data from an FSR that offered desserts on the children's menu à la carte, rather than within children's meal bundles, found that the majority of children's menu orders ( $> 75\%$ ) did not add dessert.<sup>28</sup> Greater consistency in what comprises a children's meal may make it easier for nutritionists and parents to make comparisons across chains. The number of items offered also varied widely across restaurants. Interestingly, the QSR that had the highest availability of healthier meals had the shortest menu.

Nevertheless, 1 analysis of children's and adult FSR entrées found that the majority of the variability in calories and nutrients was within restaurants rather than between them.<sup>29</sup> At the majority of QSRs (8 of 10) and FSRs (9 of 10), the SD for combinations exceeded 100 kcal. Moreover, 4 of the FSRs had both higher-calorie meals and higher variability in calories across meals, in which the average meal had



**Table 4.** Proportion of Children's Meal Combinations at Individual Full-Service Restaurants (FSRs) Meeting Criteria for Calories, Fat, Saturated Fat, and Sodium

FSR Chain	Meal Combinations, n	≤ 600 kcal (%)	Combinations With ≤ 35 Fat Calories (%)	Combinations With ≤ 10 Saturated Fat Calories (%)	Combinations With ≤ 770 mg Sodium (%)	Combinations Meeting Kilocalories, Fat, Saturated Fat, and Sodium Criteria (%)
1	84	38.1	19.0	10.7	14.3	0
2	924	26.1	59.3	39.4	16.2	7.5
3	3168	45.3	19.3	22.6	14.2	9.3
4	399	48.9	49.4	20.8	45.4	17.5
5	1092	59.1	55.8	Missing	12.9	Missing
6	390	56.2	50.0	42.6	33.3	21.0
7	342	59.4	73.7	51.2	56.1	38.0
8	22	95.5	27.3	27.3	54.5	18.2
9	177	90.4	36.2	36.7	61.0	16.9
10	56	100.0	96.4	100.0	57.1	57.1
Overall	665	63.0	49.6	39.9	37.9	21.7

Note: Full-service restaurants 8 and 9 do not include beverages with children's meal combinations.

> 600 kcal, with an SD > 200 kcal. Menu labeling will highlight differences in calorie content among similar items across chains and among choices within a given restaurant. To date, the body of research addressing the impact of menu labeling on children's meal orders is limited. Existing evidence suggests that menu labeling, as a stand-alone strategy, may be insufficient to shift children's meal purchases toward healthier options.<sup>30</sup>

Healthier menu items can affect children's diet quality only when ordered and eaten. Furthermore, if healthier options are not purchased, restaurants have little incentive to supply them. Making healthier options more prevalent, palatable, and automatic may influence selection and acceptance. New research describes how an FSR chain that increased the proportion of children's meals meeting *Kids LiveWell* criteria and removed less healthy options (eg, french fries, soft drinks) from children's menus increased their sales of *Kids LiveWell*-eligible items without losing revenue.<sup>28</sup> To build demand for healthier choices, menus can be designed to draw consumers' attention to these items, bolster taste expectations, and pair healthier sides and beverages with entrées by default.<sup>31</sup> Although a minority of FSR and QSR restaurants offer fruit or vegetable sides by default,<sup>32</sup> this approach has been linked with increased ordering of healthier sides in QSR<sup>33</sup> and FSR settings.<sup>28</sup>

Several limitations of the current study merit discussion. The analysis focused on descriptions of kids' meals found on official restaurants Web sites; additional items may be available as part of children's menus in stores but not promoted online. Franchisees may make decisions that contribute to additional variability across in-store offerings. The calorie, fat, saturated fat, and sodium content of meals may be underestimated when free beverage refills are available and when menu items can be customized at no cost through the addition of dressings, syrups, toppings, etc. Because restaurants that did not offer a distinct children's menu were excluded, the results do not address the availability of healthier meals in some settings that families frequent (eg, pizza restaurants). The calorie criterion used in this study is consistent with federal guidance<sup>22</sup> and with what is used for *Kids LiveWell*<sup>18</sup> and recommended by public health practitioners and researchers for restaurant meals.<sup>23</sup> However, because the average caloric contribution of snacks can exceed 500 kcal/d for children aged 7–12 years,<sup>34</sup> children consuming 3 meals that are about 600 kcal could exceed recommended calorie intakes.

Strengths of the current study include its focus on meal combinations rather than specific menu items, which reflects how foods are ordered for many children in restaurant settings. By considering the overall prevalence of

combinations meeting these nutrition criteria and their variability, this analysis describes children's meal landscape more comprehensively than would a focus on central tendencies.<sup>35</sup>

Across children's meal combinations, the calorie target ( $\leq 600$  kcal) was met most often and the sodium target ( $\leq 770$  mg) least often.

## IMPLICATIONS FOR RESEARCH AND PRACTICE

Overall, these results highlight the feasibility of offering healthier children's meals in restaurants,<sup>12–17,19</sup> as well as room for further improvement in overall nutritional quality in the average children's meal. Nutrition professionals can empower parents to use nutrition information to select restaurants that offer a larger proportion of healthier children's meals. In addition, characteristics of meals meeting nutritional criteria offer insights into ways to improve the supply of healthier children's meal options (eg, exclude dessert from combinations). The current findings offer a point of comparison for monitoring further shifts in the nutrition

profile of children's meal combinations, which is timely because the national implementation of menu labeling may lead to additional lower-calorie offerings. It is unclear whether requiring calorie information alone will spur needed improvements in the overall nutrition content of offerings. Given the ongoing obesity epidemic and evidence linking a greater supply of healthy children's meal options with healthier orders,<sup>27</sup> continued efforts to monitor and influence both supply and demand for healthier children's meal options in restaurants are warranted. Sales and plate waste data are needed to understand children's consumption better in restaurant contexts. Another area for research is menu length as it relates to orders, operational costs, and waste, because this information may help uncover feasible ways to increase the relative availability and selection of healthier meals. Research analyzing these measures is critical to identify promising ways to continue to increase the supply, selection, and consumption of healthier children's meals in restaurants.

## ACKNOWLEDGMENTS

This study was funded by the Robert Wood Johnson Foundation and The JPB Foundation. The authors thank Rachel Banner, Natalie Bishop, Clarissa Brown, and Grace Chan for attentive data entry and coding; Kathleen Smith for support with data cleaning; and Benjamin Barrington for providing Excel troubleshooting support. This article was written by Sarah Sliwa in her private capacity. No official support or endorsement by the Centers for Disease Control and Prevention, Department of Health and Human Services is intended or should be inferred.

## REFERENCES

1. Hiza HA, Casavale KO, Guenther PM, Davis CA. Diet quality of Americans differs by age, sex, race/ethnicity, income, and education level. *J Acad Nutr Diet*. 2013;113:297-306.
2. Kim SA, Moore LV, Galuska D, et al. Vital signs: fruit and vegetable intake among children—United States, 2003–2010. *MMWR Morb Mortal Wkly Rep*. 2014;63:671-676.
3. Reedy J, Krebs-Smith SM. Dietary sources of energy, solid fats, and added sugars among children and adolescents in the United States. *J Am Diet Assoc*. 2010;110:1477-1484.
4. French SA, Story M, Neumark-Sztainer D, Fulkerson JA, Hannan P. Fast food restaurant use among adolescents: associations with nutrient intake, food choices and behavioral and psychosocial variables. *Int J Obes Relat Metab Disord*. 2002;25:1823-1833.
5. Sebastian RS, Enns CW, Goldman JD. US adolescents and MyPyramid: associations between fast-food consumption and lower likelihood of meeting recommendations. *J Am Diet Assoc*. 2009;109:226-235.
6. Batada A, Bruening M, Marchlewicz EH, Story M, Wootan MG. Poor nutrition on the menu: children's meals at America's top chain restaurants. *Child Obes*. 2012;8:251-254.
7. Powell LM, Nguyen BT. Fast-food and full-service restaurant consumption among children and adolescents: effect on energy, beverage, and nutrient intake. *JAMA Pediatr*. 2013;167:14-20.
8. Cogswell ME, Yuan K, Gunn JP, et al. Vital signs: sodium intake among US school-aged children—2009–2010. *MMWR Morb Mortal Wkly Rep*. 2014;63:789-797.
9. Poti JM, Slining MM, Popkin BM. Where are kids getting their empty calories? Stores, schools, and fast-food restaurants each played an important role in empty calorie intake among US children during 2009–2010. *J Acad Nutr Diet*. 2014;114:908-917.
10. Powell LM, Nguyen BT, Han E. Energy intake from restaurants: demographics and socioeconomic, 2003–2008. *Am J Prev Med*. 2012;43:498-504.
11. *Scientific Report of the 2015 Dietary Guidelines Advisory Committee*. Washington, DC: US Dept of Agriculture, Dept of Health and Human Services; 2015.
12. National Restaurant Association. What's hot in 2015 culinary forecast. <http://www.restaurant.org/Downloads/PDFs/News-Research/WhatsHot2015-Results.pdf>. Accessed March 1, 2015.
13. National Restaurant Association. What's Hot in 2014 culinary forecast confirms sourcing, nutrition trends. <http://www.restaurant.org/News-Research/News/What-s-Hot-in-2014-culinary-forecast-confirms-sour>. Accessed March 1, 2015.
14. National Restaurant Association. NRA shows you what's hot for 2013. <http://www.qsrmagazine.com/news/nra-sho>ws-you-whats-hot-2013. Accessed March 1, 2015.
15. National Restaurant Association. What's hot in 2012 chef survey shows local sourcing, kids' nutrition as top menu trends. <http://www.restaurant.org/News-Research/News/What-s-Hot-in-2012-chef-survey-shows-local-sourcin>. Accessed March 1, 2015.
16. National Restaurant Association. Local sourcing, healthy kids' meals, sustainable seafood and gluten-free cuisine among hottest restaurant menu trends in 2011. <http://www.restaurant.org/Pressroom/Press-Releases/Local-Sourcing,-Healthy-Kids-Meals,-Sustainable-S>. Accessed March 1, 2015.
17. National Restaurant Association. Sustainability, local sourcing and nutrition top list of hottest menu trends for 2010, according to national restaurant association research. <http://www.restaurant.org/Pressroom/Press-Releases/Sustainability,-Local-Sourcing-and-Nutrition-Top-L>. Accessed March 1, 2015.
18. National Restaurant Association. Kids LiveWell Program [Internet]. <http://www.restaurant.org/Industry-Impact/Food-Healthy-Living/Kids-LiveWell-Program>. Accessed March 1, 2015.
19. Bleich SN, Wolfson JA, Jarlenski MP. Calorie changes in chain restaurant menu items: implications for obesity and evaluations of menu labeling. *Am J Prev Med*. 2015;48:70-75.
20. Bleich SN, Wolfson JA, Jarlenski MP. Calorie changes in large chain restaurants: declines in new menu items but room for improvement. *Am J Prev Med*. 2016;50:e1-e8.
21. Taylor M. *FDA Statement On Extension Of Menu Labeling Compliance Date*. <http://www.fda.gov/Food/NewsEvents/ConstituentUpdates/ucm453529.htm>. Accessed July 30, 2015.
22. US Department of Agriculture. US Department of Health and Human Services. *Dietary Guidelines for Americans, 2010*. 7th ed. Washington, DC: US Government Printing Office; 2010.
23. Cohen DA, Bhatia R, Story MT, et al. *Performance Standards for Restaurants: A New Approach to Addressing the Obesity Epidemic*. Santa Monica, CA: RAND Corporation; 2013.
24. National Restaurant Association. *Top 100 Report*. 2013.
25. US Department of Agriculture National Nutrient Database for Standard Reference. Release 27. <http://www.ars.usda.gov/Services/docs.htm?docid=25706>. Accessed February 17, 2016.

26. US Food and Drug Administration. Guidance for industry: nutrition labeling manual: a guide for developing and using data bases. <http://www.fda.gov/Food/GuidanceRegulation/GuidanceDocumentsRegulatoryInformation/LabelingNutrition/ucm063113.htm>. Accessed January 30, 2015.
27. Office of the Vice Provost for Research, Tufts University. What must be reviewed? <http://www.tufts.edu/central/research/IRB/ToBeReviewed.htm>. Accessed December 17, 2015.
28. Anzman-Frasca S, Mueller MP, Sliwa S, et al. Changes in children's meal orders following healthy menu modifications at a regional US restaurant chain. *Obesity (Silver Spring)*. 2015;23:1055-1062.
29. Auchincloss AH, Leonberg BL, Glanz K, Bellitz S, Ricchezza A, Jervis A. Nutritional value of meals at full-service restaurant chains. *J Nutr Educ Behav*. 2014;46:75-81.
30. Tandon PS, Zhou C, Chan NL, et al. The impact of menu labeling on fast-food purchases for children and parents. *Am J Prev Med*. 2011;41:434-438.
31. Wansink B, Love K. Slim by design: Menu strategies for promoting high-margin, healthy foods. *Int J Hosp Manag*. 2014;42:137-143.
32. Anzman-Frasca S, Dawes F, Sliwa S, et al. Healthier side dishes at restaurants: an analysis of children's perspectives, menu content, and energy impacts. *Int J Behav Nutr Phys Act*. 2014;11:81.
33. Wansink B, Hanks AS. Calorie reductions and within-meal calorie compensation in children's meal combos. *Obesity (Silver Spring)*. 2014;22:630-632.
34. Piernas C, Popkin BM. Trends in snacking among U.S. children. *Health Aff*. 2010;29:398-404.
35. Popkin BM. The public health implications of fast-food menu labeling. *Am J Prev Med*. 2012;43:569-570.

# Join our Webinar on Methods Papers

## Writing and Reviewing Research Methods papers for JNEB

Tuesday, April 26, 2016 at 1:00 pm EDT

### Speakers:

- Karen Chapman-Novakofski, PhD, RDN,  
Editor in Chief, *Journal of Nutrition Education and Behavior* (JNEB)
- Christopher Taylor, PhD, RDN
- Susan Johnson, PhD, Associate Editor, JNEB

Our presenters will describe the purpose of the Research Methods papers and how that has impact on how to write and review these unique types of papers. Research Methods are manuscripts that describe the objectives and methodologies for multi-year interventions whose aims are to change nutrition and/or physical activity behavior and/or related physiological outcomes, such as BMI or blood glucose.

JNEB webinars are free to everyone. Register here: <http://www.sneb.org/events/events.html>



## **CONFLICT OF INTEREST**

The authors have not stated any conflicts of interest.