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Energy Content of U.S. Fast-Food Restaurant Offerings 14-Year Trends

Katherine W. Bauer, PhD, MS,

Department of Public Health and Center for Obesity Research and Education, Temple University, Philadelphia, Pennsylvania

Mary O. Hearst, PhD, MPH,

Division of Epidemiology and Community Health, School of Public Health, University of Minnesota, Minneapolis, Minnesota

Alicia A. Earnest, BA,

Division of Epidemiology and Community Health, School of Public Health, University of Minnesota, Minneapolis, Minnesota

Simone A. French, PhD,

Division of Epidemiology and Community Health, School of Public Health, University of Minnesota, Minneapolis, Minnesota

J. Michael Oakes, PhD, and

Division of Epidemiology and Community Health, School of Public Health, University of Minnesota, Minneapolis, Minnesota

Lisa J. Harnack, DrPH, RD

Division of Epidemiology and Community Health, School of Public Health, University of Minnesota, Minneapolis, Minnesota

Abstract

Background—Within the past decade there has been increasing attention to the role of fast food in the American diet, including a rise in legislative and media-based efforts that address the healthfulness of fast food. However, no studies have been undertaken to evaluate changes in the energy content of fast-food chain restaurant menu items during this period.

Purpose—To examine changes in the energy content of lunch/dinner menu offerings at eight of the leading fast-food chain restaurants in the U.S. between 1997/1998 and 2009/2010.

Methods—Menu offerings and nutrient composition information were obtained from archival versions of the University of Minnesota Nutrition Coordinating Center Food and Nutrient Database. Nutrient composition information for items was updated biannually. Changes in median energy content of all lunch/dinner menu offerings and specific categories of menu items among all restaurants and for individual restaurants were examined. Data were collected between 1997 and 2010 and analysis was conducted in 2011.

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Address correspondence to: Katherine W. Bauer, PhD, MS, Center for Obesity Research and Education, Department of Public Health, Temple University, 1301 Cecil B. Moore Ave., Ritter Annex, 9th Floor, Philadelphia PA 19122. katherine.bauer@temple.edu..

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Results—Spanning 1997/1998 and 2009/2010, the number of lunch/dinner menu items offered by the restaurants in the study increased by 53%. Across all menu items, the median energy content remained relatively stable over the study period. Examining specific food categories, the median energy content of desserts and condiments increased, the energy content of side items decreased, and energy content of entrees and drinks remained level.

Conclusions—While large increases in the number of menu items were observed, there have been few changes in the energy content of menu offerings at the leading fast-food chain restaurants examined in this study.

Introduction

Over the past 3 decades, regular consumption of food purchased at fast-food chain restaurants, which provide convenience foods in self-service or carry-out eating venues,¹ has become the norm for many children and adults.^{2,3} In 2003/2004, fast food accounted for 15% of Americans' daily energy intake,⁴ a substantial increase from 1977/1978 when fast food accounted for 4% of daily energy intake.⁵ In 2010, sales among the top 50 fast-food chain restaurants exceeded \$141 billion in the U.S.⁶ A recent survey of adults found that 80% purchased fast food in the past month and 28% consumed fast food two or more times a week.⁷

Additionally, on a typical day nearly 40% of high school-aged adolescents consume fast food.⁸ Foods sold at fast-food chain restaurants are often of low nutritional quality,⁹ and frequent consumption of fast food has been associated with less-healthy dietary patterns among children,⁸ adolescents,¹⁰⁻¹² and adults.^{13,14} Studies have consistently found positive associations between fast-food intake and excess weight and weight gain among adults,¹⁵⁻¹⁸ while the relationship between fast food and weight among children is less clear.¹⁹

Over the past decade there has been an increase in public discourse about the role of fast food in the American diet. Most notably, several mainstream media efforts detailing the poor nutritional quality of fast food and the methods of food production used by fast-food chain restaurants have been released, including the book *Fast Food Nation: The Dark Side of the All-American Meal* by Eric Schlosser²⁰ and the movie *Super Size Me*.²¹ Many municipalities have also developed policy initiatives related to fast food. These initiatives include laws requiring the point-of-purchase publishing of nutritional data on restaurant menus.^{22,23} Signed into law in March of 2010, the Patient Protection and Affordable Care Act of 2010 preempts local menu-labeling initiatives and mandates that nationwide by 2012 restaurants and food vendors with more than 20 locations post calorie information for the food they sell.²⁴

Scientific evidence is mixed regarding the effectiveness of efforts such as menu labeling in changing consumer behavior.²⁵⁻²⁸ However, it has been suggested that an alternative mechanism through which legislation and media attention may lead to lower-calorie intake by consumers is via changes in the nutritional quality of fast food by the industry itself.^{25,29} Fast-food chain restaurants may be motivated to decrease the energy content of their offerings to avoid further legislative requirements for the industry, demonstrate a commitment to consumers' health, or attract new calorie-conscious consumers.

In recent years, specific restaurants, industry self-regulatory programs, and leading restaurant associations have announced several health-conscious changes to restaurants' offerings. These changes include elimination of "super size" portions,³⁰ the addition of healthier entrée and side items,³¹ and modifications to the default options in children's meals.³² Despite these changes, a recent evaluation by Kraak et al.³³ observed that

specifically in the area of children's meals, limited progress has been made by the fast-food industry in the expansion and promotion of healthier options.

Some fast-food chain restaurants have committed to improvements to the health profile of their menus.³⁰⁻³² Yet, to our knowledge, there have not been any quantitative examinations of changes in the energy content of fast food over time. This type of research has specifically been called for in order to understand how restaurants may be responding to legislation to improve the caloric and nutrient composition of their food.^{25,26}

In light of this knowledge gap, this paper aims to address the following research questions: (1) Has the energy content of menu offerings at eight of the leading fast-food chain restaurants changed in the past 14 years?; and (2) Are there differences between specific fast-food restaurant chains in the pattern of change in energy content of the menu items during the past 14 years? The answers to these questions can help objectively evaluate whether leading fast-food restaurants have modified the calorie profile of their menu offerings during a time period in which public scrutiny and legislative efforts related to this industry surged.

Methods

Data for the current study were acquired from current and archival versions of the University of Minnesota Nutrition Coordinating Center (NCC) Food and Nutrient Database. Currently this database includes menu items available at 22 U.S. fast-food restaurant chains. Fast-food restaurants are selected for inclusion in this database on the basis of both popularity and availability of company-provided ingredient listing and nutrient composition information for standard menu items. Consequently, most but not all leading fast-food restaurants are included in the database.

Of the 22 restaurants currently in the NCC Food and Nutrient Database, eight were selected for inclusion in this study on the basis of the following criteria: (1) included in the database since 1997; (2) restaurant has defined set of food offerings on the menu; and (3) all standard menu items are included in the database. The eight restaurants included in this study are among the top restaurants in the U.S. with regard to annual sales and number of locations (Table 1). The menu items available at each of the selected restaurants and their nutrient composition were updated in the database biannually; thus data included in the study were collected between 1997 and 2010, and trends were examined in seven 2-year time periods (1997-1998, 1999-2000, 2001-2002, 2003-2004, 2005-2006, 2007-2008, 2009-2010) to ensure that all eight restaurants are represented in each period.

University of Minnesota Nutrition Coordinating Center Food and Nutrient Database

The NCC Food and Nutrient Database is maintained using a standard set of well-defined and described procedures.³⁴⁻³⁷ When updating nutrient information for a restaurant, all foods and beverages on the restaurant's menus are obtained from the restaurant corporation. Ingredient and nutrient composition information is also sought from the corporation for all items. The ingredient information provided is generally a listing of ingredients in descending order of content in the menu item.

Most restaurants provide information for only a limited set of nutrients (e.g., kilocalories (kcal), macronutrients, saturated fat, sodium, and some vitamins and minerals) for their food items. Thus, NCC database nutritionists create formulations (recipes) for menu items using an NCC developed program³⁸ that estimates, via a linear optimization algorithm, the amount of each ingredient needed to produce a product with a nutrient profile close to that specified

by the restaurant corporation for the product. From this recipe, the composition data for nutrients beyond those provided by the restaurant corporation are calculated.

As a general rule, all portion sizes available for food items on restaurant menus are included in the database (e.g., small, medium, and large french fries) are included in the database. Exceptions to this rule include chicken nuggets and strips, which are included in the database in the unit of 'piece' or 'each' rather than by order size. With respect to foods that may be ordered with various topping options, separate entries are generally included in the database for the food and each topping. For example, salads and dressing choices are included as separate items in the database. One restaurant offered a salad bar during some years included in the study. Items offered at the salad bar only were excluded due to the inability to accurately identify the energy content of meals composed from the salad bar.

Creation of Data Set for Trends Analysis

For the present analysis, a data set was created that included all lunch/dinner menu items available at the eight restaurants during each time point. Each available serving size of a food was included as a unique menu item. Therefore, changes in portion size over time and the accompanying changes in energy content of the item would be detected.

In order to evaluate changes in the energy content of specific types of menu items (e.g., entrees, desserts) over time, the range of foods sold by the restaurants each year were reviewed, categories of menu items were developed, and the menu items were then sorted into categories (Table 2). These categories and the types of foods assigned to them were then reviewed and confirmed. There were a small number of items that did not easily fit into a single category (e.g., milkshakes could be considered either a beverage or dessert) and consensus of their classification was reached after discussion by the study team and review of the restaurant's classification scheme.

Statistical Analysis

In order to assess overall change over the 14 years of data across all eight restaurants, descriptive statistics including number of items on the menu and the mean, median, and interquartile range of energy content were calculated for all menu items, as well as specific food categories (e.g., desserts). To evaluate restaurant-specific changes in the energy content of foods offered between 1997/1998 and 2009/2010, the median and interquartile range for kcal/item during the first and last time periods were examined for each restaurant's overall menu and within specific food categories where there were an adequate number of menu items offered at all restaurants. Because the menu items included in the analysis represent the entire population of foods offered at each restaurant and restaurants were not selected randomly, statistical testing and related *p*-values are not appropriate. Data analysis was conducted in 2011.

Results

Trends in Number of Menu Items Offered

During the 14-year period the number of food items offered by the selected eight restaurants increased substantially, from 679 to 1036 (Table 3). Within each of the food subcategories, the number of food items also increased. For example, the number of lunch and dinner entrees offered nearly doubled, increasing from 211 to 380. Some of this increase can be attributable to the increase observed in number of entrée salads offered – from 11 in 1997/1998 to 51 in 2009/2010. While for most types of food the number of items available increased relatively gradually during the earlier years of data collection, between 2007/2008 and 2009/2010 substantial increases in the number of food items were observed within many

of the categories. For example, the number of drinks sold increased from 235 and 341 between these later time periods. This increase is attributable both to the addition of new types of drinks to the menus, such as sugar-sweetened teas, the number of which increased from 0 to 35 across the study period, and the addition of new portion sizes for existing drink types.

Trends in Energy Content of Menu Items

Across the entire menu and within the entrée and drinks categories, the median energy content of food items remained relatively stable during the study period. Meanwhile, among the condiments and desserts categories, the mean and median energy content of food items gradually increased. For example, the median kcal per dessert item increased from 334 kcal/item in 1997/1998 to 414 kcal/item in 2009/2010.

Examining the interquartile ranges, the upper end of the interquartile range for the entire menu, entrees, condiments, and desserts increased during the time period examined, while the lower end remained relatively stable. For example, in 1997/1998 the interquartile range for dessert items ranged between 238 and 530. This range shifted to span from 252 to 719 in 2009/2010, an increase of 189 kcal at the 75th percentile. Among side items there was a slight increase in the median kcal/item in 2001/2002; however, starting in 2003/2004 and continuing through 2009/2010 decreases were observed in the mean and median energy content of side items with an accompanying downward shift in the interquartile range.

Trends in Restaurant-Specific Offerings

When examining restaurant-specific changes in menu offerings between 1997/1998 and 2010/2011, the median energy content of menu offerings overall either increased or remained stable at six of the eight restaurants (Table 4). Within specific food categories, findings are mixed as to whether the median energy content of menu offerings increased, decreased, or held constant. For example, while the median energy content of menu offerings at McDonald's increased by 42 kcal/item overall, the median energy content among side items decreased by 225 kcal/item. In comparison, at Dairy Queen the median kcal/item for entrees increased by 137, while the median energy content of drinks decreased from 261 kcal/item to 158 kcal/item.

Discussion

Results from this study suggest that there have been few decreases in the energy content of menu offerings across the eight leading fast-food chain restaurants examined in this study, which account for a substantial share of fast food sold to Americans. Rather, it appears that the median energy content of restaurant menus has been stable for menus overall, entrees, and drinks, increasing for condiments and desserts, and decreasing for side items. Additionally, for the overall menu and for several of the food categories the upper end of the interquartile range increased, suggesting the addition of higher-calorie items either via increased portion sizes or new types of food being added to the menu. When looking at restaurants individually, for the majority, median energy content of overall menu offerings remained stable or increased, while among specific food categories, findings were largely mixed with both decreases and increases in median calories observed across food categories within restaurants.

One of the most salient findings of this study was a 53% increase in total number of foods sold over the 14 years examined. This may be a positive change in that restaurants are meeting customers' demand for new products; however, there is evidence to suggest that increasing the number of menu choices may increase the number of items purchased by

consumers. Several studies have demonstrated that when individuals are presented with greater numbers or variety of food items they will consume greater volumes.³⁹⁻⁴¹

However, this research has been primarily conducted by presenting subjects with actual food (e.g., a buffet meal) rather than a menu. Other studies have suggested that when presented with more than an optimal number of choices, individuals tend to become stressed and reduce the number of items they select.⁴² Because of these conflicting potential outcomes, further research is needed to understand how the increases in number of menu items, as well as the inclusion of additional information on menus such as kcal per item, may alter consumers' choices.

While little change was observed in the median energy content of fast-food offerings as a whole, among side items, a median decrease of 45 kcal/item over the study years was observed. This decrease in energy content may be attributable to an increase in number of side salads (from six to 12), decrease in median kcal for side salads (from 87 to 39), and some restaurants limiting the portion sizes of french fries.^{30,43} This change in median energy content observed among side items has the potential to have a positive impact on population-level energy intake due to the frequency with which side items are purchased. For example, "combo meals", which package together entrees, side items, and drinks, represent approximately one third of the fast-food orders, and nearly 12% of all fast-food purchases are side items only.⁴⁴

Modest decreases in the energy content of some types of menu items via either changes in types of foods sold or decreases in portion sizes may reflect an effort by the industry to meet the needs of health-conscious consumers. Efforts such as the modification of types and portions sizes of side items may also be used to alter public perception of the restaurants and/or invoke a "health halo," which leads consumers to believe that consuming food from the restaurant is a healthful decision.⁴⁵ Similarly, research suggests that the mere inclusion of healthful options on restaurant menus may prompt individuals to purchase higher-calorie food choices.⁴⁶ Therefore, while some consumers may benefit from efforts by the fast-food industry to limit the energy content of a select number of foods, evidence suggests that including a small number of lower-calorie options while maintaining or increasing the energy content of other foods may contribute to increased caloric consumption.

Use of the NCC Food and Nutrient Database for restaurant menu information is both a strength and limitation of this study. Use of the database is a strength because historical information about the menu items was available, and their nutrient composition could be readily ascertained from a database in which consistent and rigorous maintenance and update procedures are applied. Shortcomings relate to relying on a food and nutrient database developed for the purpose of evaluating food and nutrient intake of individuals as opposed to evaluating the nutritional quality of foods in the marketplace. As a result of this focus, some menu items, such as chicken nuggets, were included in the analysis data set as individual items as opposed to the order sizes available at restaurants. This shortcoming may have contributed to a small underestimation of the energy content of the menu, as well as limit the ability to identify changes in energy content that may have occurred due to changing portion sizes of these items.

Other limitations of relying on the NCC Food and Nutrient Database are that the trends are reflective of restaurant offerings and do not provide any sales information in order to better understand what foods consumers are choosing, and that the restaurant chains included in the analysis were not selected in a random manner. Consequently, the representativeness of the sample and generalizability of study findings are limited. However, the way in which the

data were analyzed and interpreted takes this limitation into account, with findings considered to be representative of only those restaurant chains included in the analysis.

Conclusion

Despite increasing pressure and legislation directed toward the fast-food industry to improve the healthfulness of their menus, as well as statements by the fast-food industry that indicate they are increasingly providing healthful food to consumers, overall the energy content of fast-food menu offerings has not decreased over the past 14 years at the leading fast-food chain restaurants examined in this study. While changes within some food categories and at some specific restaurants seem to be occurring, these changes may be offset by increases in the energy content of other items and increases in the total number of menu items offered, which may prompt increased purchasing by consumers. Substantial shifts in the healthfulness of food offered by fast-food chain restaurants may prove difficult to implement due to beliefs by the industry that there is not a large demand for more such food and that offering new or modified options may result in a loss of profit.⁴⁷

Consumers may benefit by being aware of the relatively limited changes in the energy content of fast-food offerings despite efforts by the industry to promote more-healthful choices. As results from the current study can serve as a baseline against which to benchmark changes in fast-food offerings after implementation of the national menu-labeling mandate, future analyses can provide greater understanding of whether initiatives that primarily aim to inform consumers can also change industry practices.

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Table 1

Fast-food restaurant sales information, 2010

Restaurant Name	Rank	U.S. Sales (millions \$)	Number of U.S. Locations
McDonald's	1	32,395.0	14,027
Burger King	3	8,600.0	7,253
Wendy's	4	8,340.0	6,576
Taco Bell	6	6,900.0	5,634
KFC	9	4,700.0	5,055
Arby's	14	3,010.0	3,649
Jack in the Box	15	2,934.8	2,206
Dairy Queen	16	2,660.0	4,514

QSR Magazine, Top 50, published August 2011, www.qsrmagazine.com⁴⁸

KFC, Kentucky Fried Chicken

Table 2

Fast-food Subcategory Coding Schema

1	Entire Menu: Includes all foods, drinks, desserts, and condiments on lunch/dinner menu
2	Entrées <ul style="list-style-type: none"> a. Meat/fish sandwich (includes hamburger, cheeseburger, chicken sandwich, fish sandwich, roast beef, "fresh" sandwich, pita sandwich, hot dog) b. Chicken (includes chicken nuggets, tenders, pieces) c. Entree salad (no dressing) d. "Mexican" entree (includes tacos, burrito, fajita)
3	Sides <ul style="list-style-type: none"> a. French fries/fried potatoes b. Other fried food (e.g., onion rings, egg rolls, mozzarella sticks) c. Side salad (e.g., lettuce salad, coleslaw, potato salad) d. Soup/chili e. Bread (e.g., biscuits, corn bread, cheese bread) f. Nonfried potato g. Other sides (e.g., nachos, baked beans, green beans)
4	Drinks <ul style="list-style-type: none"> a. Hot drinks (e.g., coffee, hot chocolate, "coffee drinks") b. Sugar-sweetened drinks (e.g., regular soft drinks, lemonade, sweetened iced tea, juice drinks) c. Diet soft drinks d. 100% juice e. Milk (e.g., low-fat milk, chocolate milk) f. Shakes or slush drink g. Unsweetened iced tea
5	Condiments <ul style="list-style-type: none"> a. Salad dressing b. Ketchup c. Other condiments (e.g., mustard, mayonnaise, jelly, salsa, tartar sauce, croutons)
6	Desserts <ul style="list-style-type: none"> a. Ice cream b. Pie c. Cookies d. Cake (single serving)

Table 3
Trends in energy content of fast-food restaurant lunch/dinner menu offerings between 1997/1998 and 2009/2010

	1997/1998	1999/2000	2001/2002	2003/2004	2005/2006	2007/2008	2009/2010
Entire Menu							
Items, <i>n</i>	679	670	672	729	807	825	1036
M (SD) kcal/item	300 (246)	303(246)	311 (249)	310 (265)	341(283)	335 (276)	329 (280)
Median kcal/item	265	267	284	264	291	288	269
Interquartile range, kcal/item	94-445	98-451	100-460	108-445	119-512	117-483	100-488
Entrees							
Items, <i>n</i>	211	212	221	230	297	315	380
M (SD) kcal/item	416 (196)	423 (201)	423 (187)	420 (192)	461 (212)	459 (222)	453 (224)
Median kcal/item	403	397	395	381	426	417	409
Interquartile range, kcal/item	285-533	279-538	309-539	300-531	317-599	312-577	300-574
Sides							
Items, <i>n</i>	71	72	77	78	94	93	105
M (SD) kcal/item	299 (178)	299(178)	347 (208)	295 (193)	288 (199)	266 (209)	263(196)
Median kcal/item	264	264	327	278	252	202	219
Interquartile range, kcal/item	164-424	164-424	198-485	130-421	109-455	89-395	91-372
Drinks							
Items, <i>n</i>	229	213	200	220	233	235	341
M (SD) kcal/item	226 (278)	220 (279)	214 (285)	235 (327)	265 (350)	246 (313)	231(290)
Median kcal/item	120	115	115	113	125	129	123
Interquartile range, kcal/item	2-350	0-306	0-270	0-280	0-359	0 - 345	6-344
Condiments							
Items, <i>n</i>	74	78	76	92	96	96	108
M (SD) kcal/item	84 (83)	97 (92)	90 (86)	104 (81)	113 (89)	111 (85)	103 (75)
Median kcal/item	54	58	55	77	84	87	82
Interquartile range, kcal/item	34-109	34-134	34-122	41-143	44-182	43-167	45-140
Desserts							
Items, <i>n</i>	94	95	98	109	87	86	102
M (SD) kcal/item	390 (219)	391 (216)	400 (221)	416 (243)	443 (275)	447 (279)	502 (322)
Median kcal/item	334	344	340	347	356	363	414
Interquartile range, kcal/item	238-530	238-530	243-550	243-603	248-620	250-619	252 - 719

Table 4
 Restaurant-specific median energy content of menu offerings in 1997/1998 and 2009/2010

	Median kcal/item (Interquartile Range)											
	Entire Menu		Entrees		Side Items		Drinks					
	1997/1998	2009/2010	1997/1998	2009/2010	1997/1998	2009/2010	1997/1998	2009/2010	1997/1998	2009/2010	1997/1998	2009/2010
McDonald's	217 (88-444)	259 (117-418)	458 (266-575)	394 (268-507)	430 (199-515)	205 (33-372)	131 (69-366)	159 (79-432)				
Burger King	263 (32-487)	242 (72-478)	565 (403-722)	458 (365-765)	389 (254-584)	263 (108-416)	127 (3-328)	145 (7-427)				
Wendy's	230 (92-395)	263 (91-468)	389 (311-451)	381 (274-547)	323 (204-488)	297 (234-451)	92 (0-123)	127 (9-390)				
Taco Bell	303 (177-394)	327 (184-452)	362 (285-425)	363 (319-532)	274 (177-497)	300 (171-428)	52 (2-153)	79 (4-148)				
KFC	164 (89-250)	166 (81-305)	204 (146-375)	305 (198-411)	173 (141-226)	91 (78-175)	51 (2-119)	59 (4-152)				
Arby's	260 (69-459)	240 (79-260)	507 (360-620)	501 (350-615)	196 (126-233)	267 (128-460)	123 (2-357)	79 (5-193)				
Jack in the Box	269 (46-566)	292 (91-540)	519 (328-643)	478 (334-660)	395 (130-594)	324 (82-427)	150 (2-725)	152 (9-362)				
Dairy Queen	356 (222-553)	446 (183-716)	426 (302-550)	563 (367-679)	338 (310-422)	298 (186-350)	261 (34-577)	158 (7-528)				

KFC, Kentucky Fried Chicken