

Predicted Impact of the Food and Drug Administration's Menu-Labeling Regulations on Restaurants in 4 New Jersey Cities

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Objectives. To determine the proportion of restaurants that will be required to post calorie information under the Food and Drug Administration's menu-labeling regulations in 4 New Jersey cities.

Methods. We classified geocoded 2014 data on 1753 restaurant outlets in accordance with the Food and Drug Administration's guidelines, which will require restaurants with 20 or more locations nationwide to post calorie information. We used multivariate logistic regression analyses to assess the association between menu-labeling requirements and census tract characteristics.

Results. Only 17.6% of restaurants will be affected by menu labeling; restaurants in higher-income tracts have higher odds than do restaurants in lower-income tracts (odds ratio [OR] = 1.55; $P = .02$). Restaurants in non-Hispanic Black (OR = 1.62; $P = .02$) and mixed race/ethnicity (OR = 1.44; $P = .05$) tracts have higher odds than do restaurants in non-Hispanic White tracts of being affected.

Conclusions. Additional strategies are needed to help consumers make healthy choices at restaurants not affected by the menu-labeling law. These findings have implications for designing implementation strategies for the law and for evaluating its impact. (*Am J Public Health.* 2018;108:234–240. doi:10.2105/AJPH.2017.304162)

 See also Kraak, p. 158.

The proportion of calories consumed from food sources outside the home, including restaurants, has increased significantly since the 1970s and now constitutes roughly a third of daily calories consumed by both children and adults.¹ Food purchased outside the home is typically larger in portion sizes, higher in fat and calories, and lower in fiber than is food prepared at home.^{1–4} Additionally, restaurant meals tend to be energy dense and nutrient poor and often exceed the typical calorie recommendations for single eating occasions.^{5–7}

Although fast-food restaurants have been shown to contribute the most calories to food consumed away from home⁸ and typically serve food of poor dietary quality,⁷ some evidence suggests that meals from small chain and independent restaurants are more energy dense than are those from large, national chain restaurants.⁶ Furthermore, meal consumption

away from home varies by sociodemographic characteristics. Higher-income individuals derive a greater proportion of calories from all sources away from home, but the contribution of calories from fast-food restaurants among lower-income individuals recently surpassed that for higher-income individuals.^{8,9} Non-Hispanic Black adults consume significantly more calories when dining out than do non-Hispanic Whites and Hispanics.¹⁰

Overconsumption of calories is a primary risk factor for weight gain and obesity¹¹; thus, it is not surprising that consumption of food

away from home is associated with higher body weight.¹² According to National Health and Nutrition Examination Survey data, 36% of adults and 17% of youths aged 2 to 19 years were obese (having a body mass index [defined as weight in kilograms divided by height in meters squared] ≥ 30.0) in 2011 through 2014.¹³ Because of the magnitude of the problem, finding strategies to prevent obesity is a public health priority.

Restaurants have been identified as possible venues to target obesity prevention efforts, because both adults and children frequently consume meals in restaurants.^{14,15} The US surgeon general's 2001 call to action to prevent obesity first proposed calorie menu labeling in restaurants as a strategy to prevent and decrease the burden of overweight and obesity.¹⁶ Soon after, the Food and Drug Administration (FDA) and the Institute of Medicine encouraged the restaurant industry to enact voluntary menu labeling.¹⁷ State and local governments also began trying to pass menu-labeling laws in 2003; however, these efforts encountered resistance from the restaurant industry. In 2006 New York City was the first local jurisdiction to pass menu labeling, and in 2008 California was the first state to successfully implement a statewide law.¹⁸ By 2010, 20 states and localities had passed varied menu-labeling policies,¹⁹ leading to different stakeholders coming together to negotiate uniform standards across all 50 states that would preempt more restrictive state or city policies.

Menu labeling was finally passed into law nationwide as part of the Patient Protection

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and Affordable Care Act in 2010.²⁰ The primary goal of menu labeling is to help consumers make informed dietary choices,¹ as studies show the average consumer and even nutrition professionals have trouble estimating the caloric content of meals eaten away from home.^{21,22} The FDA, tasked with creating guidelines for implementing menu labeling, released the final rules in December 2014, which require restaurants and similar food establishments with 20 or more locations nationwide to post calorie information on menus and menu boards.²³ The FDA's final guidance requires eligible restaurants to post calorie information by May 7, 2018.²⁴

Research shows that in restaurant settings, although the majority of customers notice menu labeling, only 15% to 33% of patrons use the information when determining food or beverage choices.^{25–30} Therefore, studies examining the overall impact of menu labeling find no significant reduction in calorie purchases or consumption.^{28,31–34} However, studies looking at those who actively use calorie information show that users purchase fewer calories than do nonusers.^{26,29,30,35,36} Furthermore, there are disparities in who uses menu labeling. Adults with higher-income levels,^{26,30,37,38} adults aged 25 to 44 years,²⁵ and adults who consume fast food more frequently³⁷ are more likely to use menu labeling.

The format for displaying menu labeling can also influence its effectiveness; for example, use of colors to identify healthier options has been shown to enhance comprehension and reduce caloric intake.³⁹ As part of the upcoming FDA regulations, restaurants will also be required to add contextual language to help consumers understand menu labeling with respect to daily calorie recommendations (e.g., “2,000 calories a day is used for general nutrition advice, but calorie needs vary” for adults and “1,200 to 1,400 calories a day is used for general advice for children ages 4 to 8 years, but calorie needs vary” for children).²³ Such statements have been shown to be beneficial in informing customers' purchases.⁴⁰

Systematic reviews examining the impact of menu labeling have reported mixed results.^{31,39,40} A 2015 meta-analysis concluded that menu labeling has the potential to reduce the number of calories purchased and consumed.³⁹ Other reviews conclude that menu labeling may work only in specific contexts⁴⁰

or may result in very small declines in calories purchased.³¹ Irrespective of differences in conclusions, all reviews support menu labeling as a relatively low-cost strategy that may encourage consumers to purchase fewer calories.

The FDA projections for the cost benefit attributed to menu labeling in terms of improved health and longevity, primarily related to predicted reductions in obesity prevalence, range from \$3.7 billion to \$10.4 billion.¹ These depend on the extent to which patrons shift their consumption behaviors toward healthier diets consistent with the Dietary Guidelines for Americans. The FDA and the National Restaurant Association, a long-time supporter of a uniform standard for displaying calorie information at chain restaurants, predict that menu labeling will affect 36% to 40% of US restaurants (approximately 298 600 establishments in 2130 chains).^{1,41}

Because less than half of all restaurants are projected to be affected, we asked whether all communities would be equally exposed to menu labeling. We sought to determine the proportion of restaurants that will be affected by the new menu-labeling regulations in 4 urban, high-minority, low-income cities in New Jersey. Although other factors may contribute to consumer response to labeling, exposure is a precondition to its use. We also investigated whether such exposure to menu labeling will vary by the income and race/ethnicity of census tracts within these cities. Considering that fast-food restaurants cluster in lower-income and racial/ethnic minority neighborhoods,^{42–45} we hypothesized that restaurants in lower-income census tracts and restaurants in census tracts with higher proportions of racial/ethnic minorities will be more likely to be affected by menu labeling.

METHODS

We obtained 2014 geocoded data on restaurant outlets in 4 New Jersey cities (Camden, New Brunswick, Newark, and Trenton) from InfoUSA and classified them using a standard protocol developed for a National Institutes of Health–funded study.⁴⁶ The final analysis included 1753 restaurant locations. Consistent with the literature, we defined chain restaurants as establishments with multiple locations doing business under the same name, regardless of

ownership type (e.g., individual franchise), that offer approximately the same menu items.⁴⁷

Chain restaurants can be full or limited service. Limited-service restaurants, often referred to as fast-food restaurants or quick service restaurants, are establishments where patrons order and pay before eating. In full-service restaurants, patrons order and are served while seated and pay after eating.⁴⁸ Because the menu-labeling law will be applied to all types of outlets with 20 or more locations nationwide, including full- and limited-service restaurants, we did not separate out the different restaurant types. We distinguished between restaurants that will (i.e., any restaurant with 20 or more locations nationwide) and those that will not (i.e., restaurants with fewer than 20 locations nationwide) be affected by menu-labeling regulations.

Outcome Variable

We first classified restaurants located in the 4 cities using a list of the top 100 chain restaurants from a published Technomic, Inc. report⁴⁹; all restaurants on this list had 20 or more locations nationwide. For restaurants that were not on the Technomic list, we used store locator features available on restaurant web pages to determine whether the restaurant had 20 or more locations. In accordance with the FDA's guidelines,²³ we identified restaurants that are part of a chain with 20 or more locations doing business under the same name as establishments likely to be affected by menu-labeling regulations, which we coded as 1 (vs 0 for others).

Explanatory Variables

We obtained census tract characteristics using data from the 2011 through 2015 American Community Survey.⁵⁰ We included only tracts with restaurants in the analysis (n = 267). Of the 312 census tracts across the 4 New Jersey cities, 45 did not have a restaurant located in the tract; we excluded these from our analysis. Explanatory variables included median household income and racial/ethnic characteristics of census tracts where restaurants were located. We used these variables in categorical formats to allow our examination of differences between the groups that are furthest apart (e.g., lowest vs highest income), as is often done in similar studies examining neighborhood context.^{9,44,45,51,52} We categorized the median

household income for each tract on the basis of tertiles to create lower-, middle- and higher-income categories. We used the proportions of non-Hispanic Whites, non-Hispanic Blacks, and Hispanics to calculate a majority race variable, coding tracts with predominately non-Hispanic Whites (> 50% of the population) as 1, tracts with predominately non-Hispanic Blacks as 2, tracts with predominately Hispanics as 3, and tracts with no predominate race/ethnicity category as 4.

Analysis

We used multivariate logistic regression analyses to assess the association between being subject to menu-labeling requirements and census tract characteristics. We ran multivariate and descriptive analyses using SPSS version 23 (IBM-SPSS Statistics, Inc., Somers, NY). We set the α -level of significance at .05 for all analyses.

RESULTS

A summary of the restaurants in the 4 New Jersey cities that meet the criteria for being subject to menu labeling is presented in Table 1. Of the 1753 restaurants located in the study area, 308 (17.6%) belonged to chains with 20 or more locations and will therefore be required to post calorie information. Of the restaurants to be affected by menu labeling, 245 locations belonged to chains with a top 100 ranking on the basis of sales,⁴⁹ and 63 locations were part of local or unranked chains with at least 20 locations. Chains most frequently represented in the study sample that will be required to post menu labels included Dunkin Donuts, Subway, McDonald’s, Burger King, Domino’s Pizza, Wendy’s, Kentucky Fried Chicken, and Popeyes Louisiana Kitchen. Conversely, 1445 restaurants (approximately 82% of all restaurants in New Jersey), which were independent or chains with fewer than 20 locations nationwide, will not be affected by the FDA’s menu-labeling regulations.

Table 2 shows the characteristics, including race/ethnicity, population density, and land mass, of census tracts in which restaurants were located. Median household income across all tracts was \$47 426. We

TABLE 1—Number of Restaurants in Cities Projected to Be Affected by Menu-Labeling Regulations: 4 New Jersey Cities, 2014

Restaurant Chain	No. Locations ^a (n = 1753)	Rank on Technomic Top 100 ^b (n = 245)
McDonald’s	17	1
Starbucks	4	2
Subway	36	3
Burger King	15	4
Wendy’s	11	5
Taco Bell	6	6
Dunkin’ Donuts	63	7
Pizza Hut	6	9
Applebee’s	3	10
Panera Bread	1	11
KFC	10	12
Domino’s Pizza	11	13
Chipotle Mexican Grill	2	15
Chili’s Bar and Grill	1	17
Little Caesars	6	19
Dairy Queen	3	20
Arby’s	1	22
IHOP	3	23
Papa John’s	9	24
Popeyes Louisiana Kitchen	10	27
Texas Roadhouse	1	32
Jimmy John’s	1	36
TGI Fridays	1	37
Five Guys Burgers & Fries	2	43
Church’s Chicken	1	50
Hooters	1	51
Boston Market	3	68
Baskin-Robbins	2	73
White Castle	5	74
Jamba Juice	1	78
Famous Dave’s	1	82
Quiznos	1	84
Checkers/Rally’s	4	86
On the Border Mexican Grill and Cantina	1	94
Cold Stone Creamery	2	98
Other chain restaurants (identified through store locator web searches)	63	Not ranked

Note. IHOP = International House of Pancakes; KFC = Kentucky Fried Chicken. Of the total number of restaurant locations, 1445 (82.4%) will not be affected by the menu labeling and 308 (17.6%) will be affected.

^aIncluded restaurant locations in Camden, New Brunswick, Newark, and Trenton.

^b2015 Technomic Inc., *Top 100 Chain Restaurant Report*. All restaurants included in the list had > 20 locations nationwide and so are eligible for menu labeling.

TABLE 2—Characteristics of Census Tracts Where Restaurants Were Located: 4 New Jersey Cities, 2014

Characteristic	Total	Population Density, People/km ² , Mean ±SD	Land Area, km ² , Mean ±SD
Mean land area, km ² (SD)	1.51 (3.06)		
Mean population density, people/km ² (SD)	5 788 (3 829)		
Mean median household income, \$ (SD)	47 426 (20 563)		
Lower tertile, \$	< 36 997	6 186 ±3 001	0.73 ±0.51
Middle tertile, \$	36 997–52 557	7 249 ±4 215	1.03 ±1.71
Higher tertile, \$	> 52 557	3 977 ±3 414	2.60 ±4.55
Race/ethnicity proportions ^a			
Majority non-Hispanic White, %	18.0	4 047 ±4 078	2.38 ±3.03
Majority non-Hispanic Black, %	36.8	6 128 ±2 843	0.85 ±1.66
Majority Hispanic, %	20.8	8 227 ±4 232	0.92 ±1.91
No majority, %	24.4	4 498 ±3 449	2.35 ±4.74

Note. Number of census tracts was n = 267. The cities were Camden, New Brunswick, Newark, and Trenton.

^aMajority categories defined as census tracts with >50% of residents of the specified race/ethnicity.

categorized approximately 37% of census tracts as majority non-Hispanic Black, 24.4% as mixed race/ethnicity tracts, approximately 21% as majority Hispanic, and 18% as non-Hispanic White. Mean population density and mean land area across all tracts and across income and racial/ethnic categories are also presented.

Table 3 shows, for all census tracts having at least 1 restaurant, the number of restaurants and the proportion required to post menu labels, by income and race/ethnicity of the tracts. Middle-income tracts had the largest number of restaurants, followed by high-income tracts. Higher-income tracts had the greatest proportion of restaurants (20.7%) projected to

be affected by menu labeling, followed by middle-income tracts (16.5%). Lower-income tracts had the smallest proportion of restaurants that met the criteria for menu labeling at 15.4%. Tracts with no racial/ethnic majority had the most restaurants, followed by majority non-Hispanic Black tracts, majority Hispanic tracts, and majority non-Hispanic White tracts. Tracts with no racial/ethnic majority had the largest proportion of restaurants projected to be affected by menu labeling, at 20.7%; followed by majority non-Hispanic Black neighborhoods, at 20.5%; and majority non-Hispanic White neighborhoods, at 16.5%. Majority Hispanic tracts had the smallest proportion of restaurants likely to be subject to menu labeling, at 10.9%.

Results from logistic regression assessing the independent association between the potential for being affected by menu labeling and restaurant census tract characteristics are also presented in Table 3. Restaurants located in the highest-income tracts have 55% higher odds of being affected by menu labeling than do restaurants in lowest-income tracts (odds ratio [OR] = 1.55; confidence interval [CI] = 1.08, 2.23; *P* = .02). Restaurants located in majority non-Hispanic Black tracts have 62% greater odds of being affected by menu labeling than do restaurants located in majority non-Hispanic White tracts (OR = 1.62; CI = 1.08, 2.43; *P* = .02). Restaurants located in census tracts with no majority racial/ethnic group have 44% greater odds of being affected by menu labeling than do restaurants in majority non-Hispanic White tracts (OR = 1.44; CI = 1.01, 2.07; *P* = .048). We also ran regression models with continuous variables (data not shown), and we observed similar results for racial/ethnic characteristics; restaurants in neighborhoods with higher proportions of non-Hispanic Black residents were more likely to be eligible for menu labeling. However, when we used income as a continuous variable, the incremental association was not significant.

TABLE 3—Total Restaurants and Proportion of Restaurants Required to Post Menu Labels by Census Tract, and Adjusted Associations Between Menu-Labeling Status and Census Tract Characteristics: 4 New Jersey Cities, 2014

Characteristic	No. Restaurants	No. Required to Post Menu Labels (%)	OR ^a (95% CI)
Total	1753	308 (17.6)	
Income categories, ^b tertile, \$			
Lower, < 36 997	506	78 (15.4)	1 (Ref)
Middle, 36 997–52 557	689	114 (16.5)	1.25 (0.90, 1.73)
Higher, > 52 557	552	114 (20.7)	1.55 (1.08, 2.23)
Race/ethnicity ^c			
Majority non-Hispanic White	339	56 (16.5)	1 (Ref)
Majority non-Hispanic Black	487	100 (20.5)	1.62 (1.08, 2.43)
Majority Hispanic	405	44 (10.9)	0.74 (0.47, 1.17)
No majority	521	108 (20.7)	1.44 (1.01, 2.07)

Note. CI = confidence interval; OR = odds ratio. Cities were Camden, New Brunswick, Newark, and Trenton.

^aFrom multivariate logistic regression analysis used to assess associations between menu-labeling status and census tract characteristics, adjusting for income and race/ethnicity.

^bIncome information missing for 6 census tracts; regression models adjusted for race/ethnicity.

^cRace/ethnicity information missing for 1 census tract; majority categories defined as tracts with >50% of residents of the specified race/ethnicity; regression models adjusted for income.

DISCUSSION

Less than a fifth (17.6%) of restaurants in 4 New Jersey cities (Camden, New Brunswick, Newark, and Trenton) will be required to comply with the mandated US menu-labeling law, set to take effect on May 7, 2018.

The proportion of restaurants subject to menu-labeling regulations in this sample is less than half of what the FDA and the National Restaurant Association project nationally (36%–40%).^{1,41}

We found the most restaurants overall in middle-income tracts and tracts with no racial/ethnic majority. Low-income tracts and majority non-Hispanic White tracts had the fewest restaurants. Previous research on restaurant density and neighborhood characteristics produced mixed results. Although most studies found that both full- and limited-service restaurants are more likely to be located in low- and middle-income neighborhoods,^{43–45,53} as well as in predominately Black or mixed race/ethnicity neighborhoods,^{42–44} this is not always the case. Wang et al.,⁵² using a sample from 4 cities in California, found that residents of middle socioeconomic status tracts lived closer to fast-food restaurants than did residents of low and high socioeconomic status. In a nationally representative sample, Powell et al.,⁴⁵ found that minority communities were less likely to have fast-food or sit-down restaurants than were White neighborhoods. Finally, Mazidi and Speakman found that full-service restaurants and fast-food restaurants were more likely to be located in wealthier, more educated neighborhoods.⁵⁴

We found that anticipated exposure to menu labeling varies by neighborhood income and race/ethnicity. Restaurants located in the highest-income tracts (median income above \$52 557) are more likely to be affected by menu labeling than are those located in the lowest-income tracts (median income below \$36 997), and restaurants located in majority non-Hispanic Black or majority mixed race/ethnicity tracts are also more likely to be affected by the menu-labeling mandate. These findings are consistent with the research of Austin et al.,⁵¹ who found that fast-food chain restaurants in Chicago, Illinois, were more likely to be located in high-income areas and that few restaurants were located in low-income neighborhoods (neighborhoods with median household incomes below \$30 300).

Currently, only chain restaurants (those with 20 or more locations nationwide) are required to post calorie information and provide additional nutrition information to customers on request. Austin et al. argue that chain restaurants may be hesitant to locate in

impoverished areas.⁵¹ Similar results have been observed with grocery stores, with low-income neighborhoods having fewer supermarkets than do high-income areas.⁵⁵ Market demand and land availability may explain location decisions for both restaurants and grocery stores.⁵⁵ Notably, a relatively high proportion of restaurants in non-Hispanic Black neighborhoods, the population among whom obesity prevalence is the highest,⁹ will be subject to menu labeling. A similar prevalence was not observed in majority Hispanic tracts, however.

These findings raise multiple concerns with regard to the impending implementation of the national menu-labeling law. First, less than a fifth of all restaurants in low-income communities are projected to be required to display calorie menu labels. Furthermore, the odds of having restaurants with calorie menu labeling are lower in the lowest-income neighborhoods and in Hispanic neighborhoods—communities with higher rates of obesity. The consequences in terms of health equity of this differential exposure to menu labeling for obesity prevention may be further exacerbated by the fact that adults with lower-income levels are less likely to notice and use menu labeling.^{26,30,37,38} Therefore, additional interventions are needed in low-income areas to help consumers make healthier choices when dining out to prevent further health disparities among at-risk populations.

Strengths and Limitations

To our knowledge, we are the first to assess the extent to which restaurants located in low-income and high-minority communities will be affected by menu-labeling regulations. We are also the first to investigate differences in menu-labeling exposure on the basis of variations in neighborhood demographics, including income and race/ethnicity. A distinguishing strength of our study is that we categorized restaurants using a standardized process, with commercially available sources and web searches.

A study limitation was the inclusion of only 4 low-income urban cities in the sample. Additionally, we confined food outlets to restaurants; other eating establishments, including movie theaters, corner stores, grocery stores, and vending machines, will also be

subject to the menu-labeling mandate. The FDA estimates that an additional 20% of other food establishments will be affected by the final menu-labeling rule, including 18% of grocery stores, 30% of convenience stores, and 54% of movie theaters.¹ Exposure to menu labeling will be increased in communities with these venues.

Public Health Implications

Previous research indicates that individuals who use menu labeling purchase fewer calories than do those who do not. Because only 15% to 33% of patrons report using menu labeling in restaurants that display the information, educational and promotional campaigns have the potential to increase menu label use among those exposed to it. However, because less than a fifth of the restaurants we studied are projected to be required to comply with menu-labeling requirements, low exposure—particularly in low-income communities and in Hispanic and non-Hispanic White communities—may limit the impact of the policy on population health and health inequities.

Additional strategies are needed to help consumers make healthier choices when eating in restaurants that will not be affected by menu labeling under the current law. One strategy would be to increase menu-labeling exposure at restaurants not currently covered by the law. Expanding menu labeling may require technical assistance and financial incentives if smaller chains and independent restaurants, which have been shown to serve energy-dense meals,⁶ are to offer nutrition information to consumers. The FDA estimates the cost of nutrition analysis to be between \$32 800 and \$120 500 per chain.¹ Although this cost is likely to be affordable for larger chains, economic incentive may be critical for others. Consumer demand may also promote expansion of menu labeling; results from previous studies suggest that the majority of customers want to see calorie information posted in restaurants.^{56,57}

Effective communication strategies are needed to raise consumer awareness, understanding, and use of menu labeling. Other strategies for helping consumers make healthier choices when eating out include reformulating restaurant meals to lower-calorie options, adding healthier sides and

entrée options, modifying and standardizing portion sizes, and promoting options that meet specific nutritional guidelines.^{39,58–60}

Such efforts should target low-income communities, which already carry a disproportionate burden of poor diet quality and health outcomes, to address diet-related health inequities. **AJPH**

CONTRIBUTORS

J. Gruner collected data, conducted the analysis, and wrote the first draft of the article. R. S. DeWeese created the database. R. S. DeWeese, C. Lorts, and M. J. Yedidia revised the article. C. Lorts collected the data. M. J. Yedidia interpreted the findings. M. J. Yedidia and P. Ohri-Vachaspati procured grant funding. P. Ohri-Vachaspati conceptualized the study, analyzed the data, and developed the article.

HUMAN PARTICIPANT PROTECTION

The Arizona State University and Rutgers University institutional review boards approved this study.

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