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Calorie Labeling And Food Choices: A First Look At The Effects On Low-Income People In New York City

Calorie information on menus appears to increase awareness of calorie content, but not necessarily the number of calories people purchase.

by **Brian Elbel, Rogan Kersh, Victoria L. Brescoll, and L. Beth Dixon**

ABSTRACT: We examined the influence of menu calorie labels on fast food choices in the wake of New York City's labeling mandate. Receipts and survey responses were collected from 1,156 adults at fast-food restaurants in low-income, minority New York communities. These were compared to a sample in Newark, New Jersey, a city that had not introduced menu labeling. We found that 27.7 percent who saw calorie labeling in New York said the information influenced their choices. However, we did not detect a change in calories purchased after the introduction of calorie labeling. We encourage more research on menu labeling and greater attention to evaluating and implementing other obesity-related policies. [Health Aff (Millwood). 2009;28(6):w1110-21 (published online 6 October 2009; 10.1377/hlthaff.28.6.w1110)]

SEVERAL YEARS AFTER THE U.S. SURGEON GENERAL'S public warning of an "obesity epidemic," public policy responses have been patchwork and partial.¹ Although more than 100 bills have been introduced since 2002, no major legislation to address the problem has passed the U.S. Congress to date.² States and metropolitan areas vary widely in the degree and nature of their legislative and regulatory activity.³ Experts in the science and politics of nutrition have reached some consensus around feasible policy options that could have an impact on rising obesity rates.⁴ However, few of these options have been implemented on a scale that would permit systematic evaluation.

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■ **Calorie labeling.** One recently emergent and rapidly expanding policy to address obesity rates is calorie labeling (also referred to as menu labeling). New York City became the first U.S. jurisdiction to implement this legislation, on 19 July 2008. Although the proposed regulatory details differ across localities, the statutes typically require restaurants with a certain number of locations in a city or state (ranging from at least five to twenty; the number in New York City is fifteen) to visibly post the caloric content of all regular menu items. In general, fast-food outlets must post calorie labels on their menu boards; sit-down establishments are required to list calories on the printed menu. In some cases, additional nutritional information is required. NYC restaurants must list calories for all regularly available menu options, using a typeface and format similar to the price or name of the item.⁵

Nutrition advocates view labeling as an important public policy tool to influence obesity at a population level, largely because of the strong link between fast-food consumption and obesity.⁶ More than thirty U.S. cities and states, including the nation's most populous city (New York) and state (California), have introduced legislation to mandate menu labeling; thirteen bills had become law as of this writing. At the federal level, consensus around a labeling bill seems to have emerged in the Senate. This bill, which at the time of this writing has been rolled into the larger set of bills addressing health reform, is very similar to the NYC legislation.⁷

■ **Previous studies.** Little scientific evidence exists evaluating the influence of menu labeling on fast-food choices.⁸⁻¹⁰ One study by the NYC Department of Health and Mental Hygiene examined food purchases at Subway restaurants that voluntarily posted calorie information in advance of mandatory labeling.¹¹ They found that Subway customers who saw the information (32 percent of respondents) consumed fifty-two fewer calories, on average. The study could not account for health-conscious consumers who might have been more likely to notice calorie information and therefore purchased fewer calories because of their underlying preferences. A recent experiment using random assignment of consumers in a nonrestaurant setting found that menu labeling did not decrease calories ordered or consumed, even among those who reported noticing the calorie information. In fact, that study found some evidence that males ordered more calories when labels were present.¹² A second experiment examining calorie labeling on a printed menu found that labeling was effective in altering food consumed, but only when coupled with information indicating that 2,000 was the recommended daily allowance of calories.¹³ Finally, a few studies have examined menu labeling in a cafeteria setting¹⁴⁻¹⁷ or via hypothetical-choice experiments.^{18, 19} These studies found inconsistent and generally weak results from menu labeling.

■ **Our study.** Using data collected before and after labeling was introduced in New York City and a comparison location (Newark, New Jersey), we examined the influence of calorie labeling on food choices. Given the increased risk of obesity and related health problems associated with low-income and racially/ethnically diverse

populations, we focused our attention on these groups.^{20, 21} In addition to analyzing calories purchased at fast-food restaurants, we also examined the percentage of consumers who reported noticing and responding to calorie information.

Given the severe nature of this public health problem, careful scientific evaluations of policy solutions are incredibly important. There are many policy proposals ranging from educational interventions to attempts to change the built environment to make physical activity the “default” behavior in cities and states. However, almost none of these policy interventions has actually been implemented.⁴ Calorie-labeling policies are among the first obesity policies to be widely embraced. Yet we have virtually no data outside of the laboratory to examine whether these policies are effective and, in particular, whether they are effective among the most vulnerable populations.²² The study reported in this paper is the first to evaluate the effectiveness of this policy since its introduction.

Study Data And Methods

■ **Choice of cities.** We chose New York City because it is the first site in the country to have introduced calorie labeling. We selected Newark as the control city because (1) it has not introduced calorie labeling; (2) its urban characteristics and demographics are similar to those of New York City; and (3) it does not have a vast number of daily commuters to New York City but is close enough to permit a reasonably consistent comparison.

■ **Choice of neighborhoods and restaurants.** We began by narrowing restaurants to those representing four of the largest fast-food chains located in New York City and Newark: McDonald’s, Burger King, Wendy’s, and KFC. We targeted restaurants within lower-income demographic areas that largely consist of minority groups, mostly African American and Latino. We used six sets of population-level characteristics to match two restaurants from the same chain in NYC neighborhoods with one restaurant of the same chain in the Newark city limits: population size, age, race/ethnicity, poverty level, obesity rates, and diabetes rates. We also attempted to match key structural or geographic characteristics in our restaurant pairings (for example, location relative to public transportation; proximity to large apartment complexes, hospitals, or other institutions; and location in a downtown area). After minimal restaurant substitutions, we were left with five restaurants in Newark and fourteen in New York (five Wendy’s, eight McDonald’s, three Burger King, and three KFC). In New York City, our data collection locations included four of the five boroughs: the Bronx (specifically, the South Bronx), Brooklyn (central Brooklyn), Manhattan (Harlem and Washington Heights), and Queens (the Rockaways).²³

■ **Data collection.** All restaurants were visited during lunch (generally 12:30–3:00 p.m.) or dinner hours (generally 4:30–7:00 p.m.) for approximately 2.5 hours by a research team of three to four people. Restaurants were visited on a Tuesday, Wednesday, or Thursday (thereby avoiding days most likely to consist of “special” or

“treat” meals) over a two-week period beginning 8 July 2008—before calorie labeling was implemented in New York City.

We used a methodology similar to a “street-intercept” survey.²⁴ Every customer possible was approached as he or she entered the restaurant during our designated survey periods. Customers were asked to bring their receipts back and to answer a set of questions for compensation of \$2. Subjects were not told why the receipts were being collected. It is difficult to assess cooperation rates with street-intercept surveys, and we did not directly collect participation data. However, another NYC study using the same method tracked the total number of customers entering a fast-food restaurant during data collection (regardless of whether customers were approached to take the survey) and found that 55 percent answered a survey.¹¹ This was consistent with our data collection.

Approximately four weeks after labeling was introduced in New York City, data were again collected from the same restaurants, headed by the same research staff, using the same methodology, on the same days of the week and during the same time periods. To the extent that restaurants differ from each other in ways we cannot observe, these differences should be minimized by collecting data from the same locations both before and after labeling. Here we report on the results for respondents age eighteen and older. Because food choices that parents make for their children and that adolescents make for themselves are especially complex, we examined these groups in other work.^{25, 26} We also limited our analysis to the food that adults purchased for their own consumption, given the difficulty in allocating calories from food items consumed by multiple people.

■ **Measures.** *Nutritional value of food purchased.* To gather valid nutrition data, study staff obtained receipts indicating food items purchased for each participant’s own consumption. Food items purchased, along with any modifications or additions (for example, added cheese, regular or diet soda), were confirmed by study staff with oral review. We then used the nutrition data provided on each fast-food establishment’s corporate Web site to manually calculate for each item purchased and for the order as a whole the following nutritional information: calories, saturated fat, sodium, and sugar. We chose these nutrients based on their associations with obesity, chronic disease, and overall health. All menu items and respective nutrition information were entered into a spreadsheet; all items were then verified by a second group of research assistants.

Additional data collected. After the food purchase details were confirmed, a short survey was conducted that included respondent’s age, sex, race (African American/black, Latino, other race/white), education (high school or less, some college or an associate degree, a bachelor’s degree or above—these data were not collected at baseline), and whether the food was consumed in the restaurant or taken “to go.” We also asked respondents (1) whether they noticed any calorie information posted in the establishment; (2) if so, whether the information influenced their

food choices; and (3) whether this calorie information caused them to purchase more or fewer calories.

■ **Statistical analysis.** First, we examined mean differences for all nutrition variables across the pre- and postlabeling period for New York City and Newark. We present those values adjusted for age, sex, race/ethnicity, and whether the food was eaten in the restaurant or taken “to go.”²³

Second, we also focused on the proportion of our sample who viewed calorie labels and the proportion who indicated that the information influenced their choice. We present the results separately for males versus females, respondents younger and older than age thirty-five, and respondents who were black and those who were Latino.

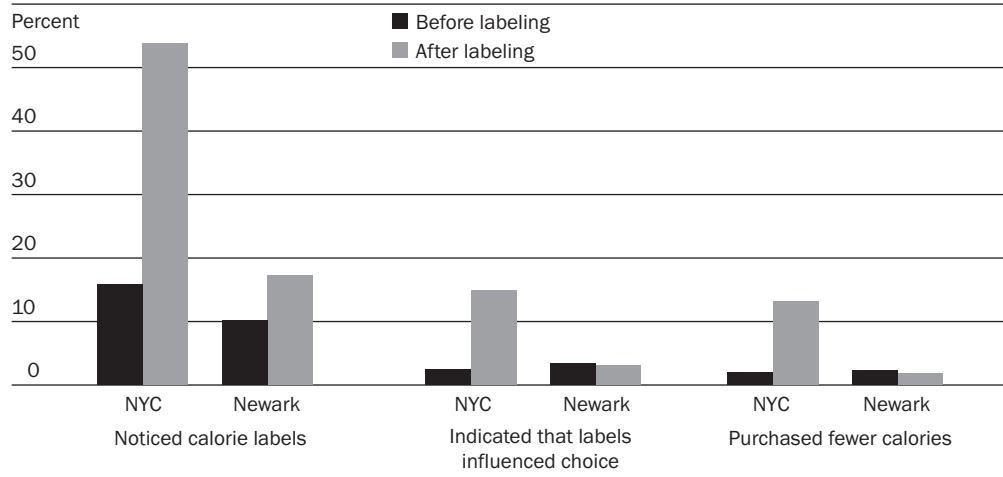
Finally, we examined the influence of noticing calorie information and whether respondents were influenced by calorie labels for the post-labeling sample in New York City (examined as a set of dummy variables and presented as regression-adjusted results). The study was reviewed by the institutional review board at the NYU School of Medicine. All analyses were done with SAS version 9.1. Standard errors were clustered at the restaurant level.

Study Findings

After excluding twenty-one receipts for which specific food items could not be confirmed, we analyzed data from 1,156 receipts collected from adults for food they purchased for themselves. As per our design, 71 percent of our sample was surveyed in New York City (47 percent of these before calorie labeling and the rest after) with the remainder in Newark. Approximately 38 percent of our sample was male, with a mean age of thirty-eight. Those identifying themselves as black made up 65.7 percent of the sample; Latinos made up 19.9 percent; and the remaining 14.4 percent consisted of other races, including those identifying themselves as mixed race or white. Almost half of our postlabeling sample had only a high school diploma or less. Within cities, our sample stayed consistent, with the exception of a statistically significant increase in the proportion of black respondents in Newark (increasing from 74 percent prelabeling to 81 percent postlabeling). Our Newark sample was also slightly more likely to be black and less likely to be Hispanic than our NYC sample.²³

■ **Notice of and response to calorie labels.** At baseline, the percentage of people who saw calorie information available on posters, pamphlets, or food wrappers did not differ between New York City and Newark (Exhibit 1). However, after calorie labeling was instituted in New York City, the percentage of respondents who reported noticing calorie information increased sharply in New York City—to 54 percent—but not in Newark.

New York City also saw an increase in the percentage of people who reported using this information and deciding as a result to purchase fewer calories. Newark saw no such increases. Put differently, 27.7 percent of our post-labeling NYC sam-

EXHIBIT 1**Study Respondents Who Indicated Noticing And Responding To Calorie Labels In New York City And Newark, New Jersey, Fast-Food Restaurants, 2008**

SOURCE: Authors' data.

NOTES: New York City was the study site; Newark was the comparison site. For all three questions, the NYC prelabeling period was different from the NYC postlabeling period ($p < 0.05$), and the NYC postlabeling period was different from the Newark postlabeling period ($p < 0.05$). No other differences were statistically significant. A version of this exhibit showing 95 percent confidence intervals is available online at <http://content.healthaffairs.org/cgi/content/full/hlthaff.28.6.1110/DC2>.

ple who saw the calorie labeling indicated that the information influenced their choices. Of these, approximately 88 percent indicated that they purchased fewer calories in response to labeling.²³

■ **Influence of labeling on the nutrient content of purchased food.** People in New York City purchased a mean number of 825 calories before menu labeling was introduced and 846 calories after labeling was introduced (Exhibit 2). The number of calories purchased in Newark before and after labeling also did not appreciably change (823 calories before labeling and 826 calories after). Similar results were

EXHIBIT 2**Regression-Adjusted Nutrient Content For Food Purchases In New York City And Newark, New Jersey, Before And After Calorie Labeling In Restaurants, 2008**

	New York City		Newark	
	Before labeling	After labeling	Before labeling	After labeling
Number of calories	825	846	823	826
Saturated fat (grams)	11.7	10.9	11.9	11.9
Sodium (milligrams)	1,414	1,450	1,369	1,502
Sugar (grams)	42	41	41	33

SOURCE: Authors' data.

NOTES: There were no statistically significant differences. A version of this exhibit showing 95 percent confidence intervals is available online at <http://content.healthaffairs.org/cgi/content/full/hlthaff.28.6.w1110/DC2>.

found for saturated fat, sodium, and sugar, with no appreciable or significant differences before or after labeling was instituted.²³

■ **Calories purchased by various population groups.** Exhibit 3 presents only the results for calories and whether these results differ by sex, race, or age. We found no evidence that any of these groups differed in their responses to labeling, compared to the sample as a whole. In each case, we saw neither a difference between the NYC and Newark samples nor a difference before or after labeling.²³

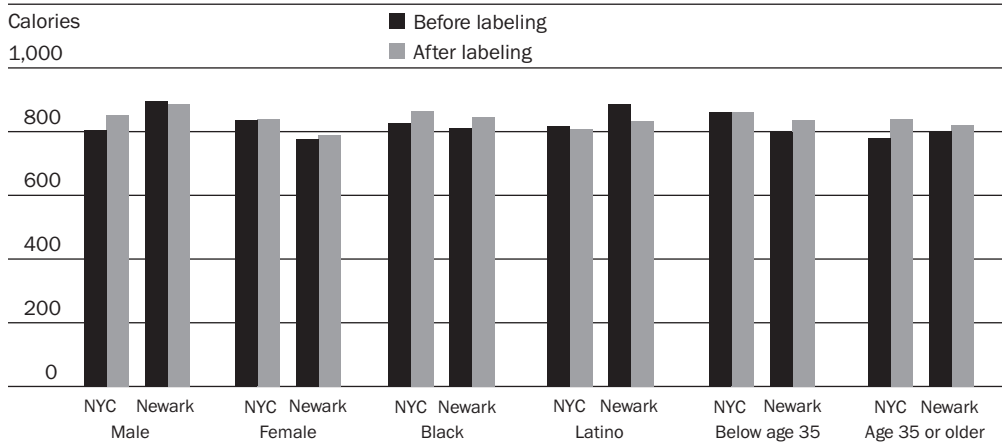
■ **Postlabeling findings.** We analyzed the number of calories purchased by (1) those who did not notice the posted calorie labels; (2) those who did notice the labels but indicated that they were not inclined to purchase fewer calories as a result; and (3) those who noticed the labels and indicated that as a result, they purchased fewer calories (Exhibit 4).

We first note that these relationships are not causal, given that seeing the labels (or not) could be correlated with other factors that induce people to purchase more or fewer calories. We found nonsignificant decreases in calories purchased for groups who indicated that the labels mattered to them (blacks and people under age thirty-five), while for other groups (older than age thirty-five) we found nonsignificant increases.²³

Discussion

In our study of consumers from low-income, minority communities, calorie labeling increased the percentage of consumers who reported seeing calorie labels, and thereby the number of people who reported that the information influenced

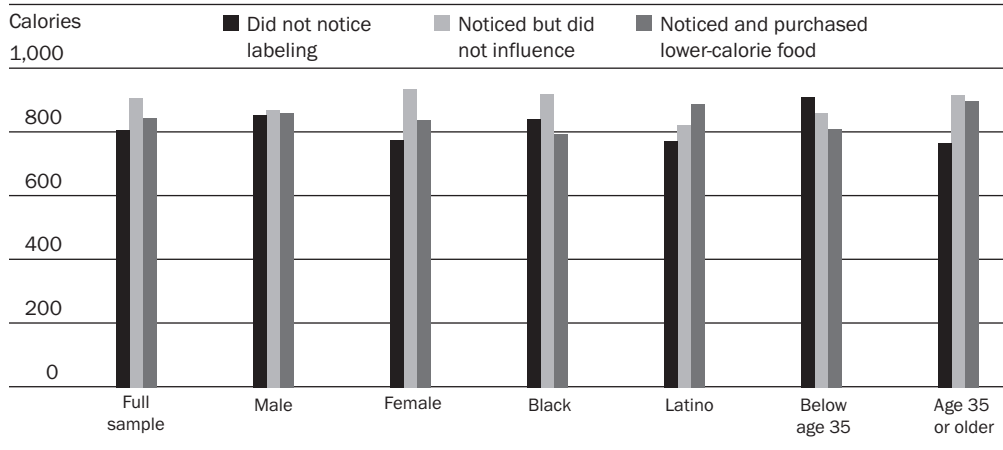
EXHIBIT 3
Calories Purchased By Various Subgroups In New York City And Newark, New Jersey, Fast-Food Restaurants, Before And After Calorie Labeling Began, 2008



SOURCE: Authors' data.

NOTES: New York City was the study site; Newark was the comparison site. Regression adjusted for age, race/ethnicity, and whether or not food was purchased "to go." A version of this exhibit showing 95 percent confidence intervals is available online at <http://content.healthaffairs.org/cgi/content/full/hlthaff.28.6.w1110/DC2>.

EXHIBIT 4
Number Of Calories Purchased In The New York City Sample After Calorie Labeling Began, In Response To Calorie Labeling, 2008



SOURCE: Authors' data.

NOTES: Regression adjusted for age, race/ethnicity, and whether or not food was purchased "to go." A version of this exhibit showing 95 percent confidence intervals is available online at <http://content.healthaffairs.org/cgi/content/full/hlthaff.28.6.w1110/DC2>.

their food choices. This meaningful change as a result of labeling could "set the stage" for a larger influence of calorie labeling as time and public policy progress.

However, we did not find evidence in our sample that menu labeling influenced the total number of calories purchased at the population level. About half of the NYC respondents in our postlabeling sample reported noticing calorie information, and only a quarter of these reported that the information influenced their food choices. Even those who indicated that the calorie information influenced their food choices did not actually purchase fewer calories according to our data collection. We note again that our study sample consisted primarily of racial and ethnic minorities residing in relatively low-income areas; other groups may respond differently to labeling.

In an ideal world, calorie labeling on menus and menu boards would have an immediate and direct impact on everyone's food choices. However, as has been seen in previous attempts to change the behavior of vulnerable populations (for example, smoking cigarettes), greater attention to the root causes of behavior or multifaceted interventions, or both, will be necessary if obesity is to be greatly reduced in the overall U.S. population.²⁷⁻²⁹ Future policy development must consider this broader perspective.

■ **Strengths of our study.** Our study had several advantages over the limited prior research on calorie labeling. First, we studied labeling as it was rolled out in the "real world," as opposed to a hypothetical or laboratory setting. Second, we were able to verify food—and therefore calories—purchased by examining respondents' food receipts instead of obtaining retrospective reports. Third, we sampled the same

restaurants both before and after the introduction of labeling, thereby limiting the effects of differences across restaurants. Fourth, the time period under study was relatively narrow. Given the many factors that could influence people's food choices,^{30,31} a short study period allowed us to better attribute any change in calories purchased to the introduction of labeling (although we also note that our time period was a potential problem, as described below). Fifth and finally, we included data from not only New York City but also a comparison group—a critical study design to control for possible trends in food choice unrelated to the calorie labeling.

■ **Study limitations.** Our study also had several limitations that point to the need for future research—and that also may contribute to why we found low consumer responsiveness to labeling.

First, although our short study period (approximately four weeks) was also a strength of our design, the effect of labeling might have been different had we collected our postlabeling data later. To the extent that repeated exposure is necessary for behavior change, our short-term study does not reflect the longer-run impact of labeling. However, consumers in our sample reported frequenting fast-food restaurants approximately five times per week, which indicates that they likely had repeated experiences with calorie labels before our follow-up data collection. It is not clear whether continued extensive exposure beyond a month would have made consumers more or less likely to respond to labels.

The timing of our postlabeling data collection also meant that the exact formatting of some labels was in flux. Although all of the locations we studied posted calorie labels, New York City levied fines on restaurants that were not in full compliance with regulations requiring a specific typeface and placement of the calorie labels.³² Labeling that was in full compliance with the regulation could have altered our findings.

Second, menu labels might need to be coupled with greater education regarding caloric content. Although education alone has not been successful in altering obesity in the past, it is possible that an appropriately funded educational campaign surrounding calorie labeling might improve the efficacy of calorie labeling.³³ New York City initiated an educational campaign (after our data collection) that informed residents that “2,000 calories a day is all most adults should eat.”³⁴

Third, we were not able to observe whether some consumers were avoiding outlets that posted calorie labels, because we sampled only customers who entered a fast-food location with labeling. If consumers are avoiding restaurants with labels, attention must be paid to where they are going instead—whether to restaurants with less- or more-healthy food—and what they are consuming at these locations. It is important to note that numerous restaurants and food service establishments are not chains; as a result, only 10 percent of NYC restaurants are subject to the labeling legislation.⁵

Fourth, it is possible that with a larger sample we might have observed a reduction in the number of calories purchased. Even a reduction of fifty calories (equiva-

lent to one Oreo cookie) per restaurant visit, sustained over time, could translate to weight loss and potential health benefits for some people.

Fifth, future work must focus on whether labeling might be more effective at altering the food choices of other subgroups (for example, those who eat fast food more or less often or come from other demographic groups). Attention should be paid to both structural reasons (for example, consumers not seeing or understanding calorie information) as well as reasons related to behavioral economics and the psychology of food decision making.³⁵⁻³⁸

■ **Need for additional interventions.** Eating behavior is notoriously resistant to change.³⁹ A large body of research has shown that weight-loss interventions designed to educate people about healthful food choices are generally ineffective. Thus, simply displaying information about the caloric value of various food options may fail to translate into attitudinal, motivational, or—most importantly—behavioral changes in line with choosing healthier food options. Menu labels may need to be coupled with additional policy approaches.

At the same time, our study does not necessarily imply that labeling is an ineffective policy. On the contrary, we found that some subset of consumers used the information to eat more healthfully. Calorie labeling could result in changes that do not rely primarily on alterations in consumers' food choices. Menu labeling regulations may encourage chain restaurants to offer more nutritious or otherwise improved menu offerings, which could be profoundly influential. Public health experts have shown that creating “default” incentives to improve well-being is essential to improving public health. By indirectly influencing restaurants to offer more lower-calorie items, menu labeling regulations could help encourage such default options for consumers.^{40,41} That said, one study has found that simply adding healthier options to a menu can counterintuitively increase the proportion of consumers who purchase less-healthful menu items.⁴²

MENU LABELING IS AN IMPORTANT FIRST ATTEMPT to alter food environments on a large scale and could ultimately prove both beneficial to health and cost-effective. However, we simultaneously encourage further research on menu labeling and much greater attention to implementing and evaluating other obesity-related policies. Given the scale, scope, and difficulty in combating the problem of obesity, greater attention must be given to the overall range of policy options and to ways of making nascent policies, such as menu labeling, optimally effective.

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