

Original Research Article

Calorie labelling on the menu: extent and disparities in use at sit down restaurants in the United States

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ABSTRACT

Background: Obesity remains a major health concern all over the world. The Food and Drug Administration in 2018 enacted a policy that required all food chain restaurants with more than 20 establishments to include calorie information on their menus. Very few studies have assessed the effects of this policy since its enactment.

Methods: A secondary data analysis was conducted using the Health Information National Trends Survey (HINTS-5 Cycle 3), a nationally-representative survey administered by the National Cancer Institute (NCI). Data were collected using telephone interviews between January and May 2019. Regression models were used to determine the relationships between demographic and health related variables and the use of calorie information on the menu.

Results: Forty six percent of the participants (n=5438) stated that they noticed calorie information on the menu. Among those who noticed the information, 65%, 37% and 44% reported that they ordered fewer calories, fewer items, or smaller sizes respectively, while 4%, 2%, and 2% reported that they ordered more calories, more items or larger sizes. Men were less likely to report seeing calorie information on the menu as compared to women (OR 0.70; CI: 0.56-0.89). Similarly, when compared to those between 18-45 years old, those 75 years and older were 33% less likely to report seeing this information (OR: 0.67 CI: 0.46-0.98). The odds of noticing calorie information on the menu increased with increase in education and income.

Conclusions: Gender, age education, and income disparities exist in the use of calorie information among restaurant goers in the US. More targeted education is needed to ensure that the policy attains its intended goal.

Keywords: Obesity, Calories information, Menu labels, Food chain restaurants

INTRODUCTION

Obesity continues to be a major public health concern all over the world as it is associated with increased risk of chronic diseases such as type 2 diabetes mellitus, cardiovascular diseases, respiratory disorders, infertility, some forms of cancers, psychological and social problems, and functional limitations, which can have a substantial, negative impact on quality of life.¹ Currently, obesity and its comorbidities are considered the main driving risk factors in mortality and morbidity from COVID-19.^{2,3} Furthermore, obesity and its comorbidities pose a large economic burden to individuals' families and nations in healthcare expenditure as well as decreased economic growth associated with fewer work days, low productivity,

and permanent disability of the working population.⁴ With such burdens on individual health and the economy, policy interventions are necessary to mitigate the obesity pandemic.

In the US, the federal government, state, and local authorities have developed numerous policies to help decrease obesity prevalence in the population. Examples of such policies include, formation of Dietary Guidelines for Americans; these guidelines are expected to increase the public awareness of their nutrition needs as well as facilitate nutrition education among different sub groups in the society.⁵ Another policy is the requirement by the FDA for manufacturers to include a nutrition facts panel on all packaged foods.⁶ Specifically, the facts panel emphasizes

the number of calories and serving sizes in the packaged foods. Taxation of foods especially sugar sweetened beverages has also been explored; researchers and policy makers believe that taxing unhealthy food while subsidizing healthy food could promote healthy eating by the public.^{7,8}

One of the most recent policies to be implemented by the FDA is requiring restaurants to include calorie information on the menu.⁹ The policy to include calorie information on the menu was introduced in 2010 when the Affordable Care Act was passed. This policy required that all fast food restaurants operating more than 20 outlets indicate the number of calories on the menu by May 2018. This was necessitated by the fact that away from home meals account for more than 50% of all food consumed in the US and research has shown that people tend to consume more calories when they consumed food outside their home.¹⁰ However, some states already had legislature that required inclusion of calorie information on menu items in their food establishments.¹¹

Several studies have investigated the use of calorie information on restaurant menu; a few at national level and most at local or state levels. Using data from Behavioral Risk Factor Surveillance System (BRFSS), two studies found that about half of the respondents indicated using calorie information on the menu to inform their meal choices. Those that used menu labeling were more likely to be female, have an annual household income of \$50,000 or more, non-white, more educated, overweight or obese, physically active, former- or never-smokers, with no or lower (<1 time/day) sugar-sweetened beverage intake and living in states where menu labeling legislation was enacted or proposed.^{11,12} A similar study conducted in Minnesota found that among 1300 participants, only half of them noticed calorie information on the menu and among those who noticed the information, 38% did not use it to inform their menu order.¹³ This was despite the fact that Minnesota was one of the states that required calorie information to be included in the menu well before the federal requirement. All previous studies used data collected before the policy was enacted all over the country and in some cases, data was only available for only a few states.

The aim of the study was to use nationally representative data to determine the use of calorie information on the menu post enactment of the menu labelling policy. In addition, this study sought to identify demographic disparities associated with noticing and using calorie information provided on the menu.

METHODS

This study was a secondary data analysis of the Health Information National Trends Survey (HINTS) 5 cycle 3, a nationally representative survey administered by the National Cancer Institute. Data were collected among non-institutionalized adults 18 years and older from January to

April 2019. Participants were selected through a stratified random sampling method from the national list of mailing addresses. Respondents from high minority areas were oversampled. Data were collected through either a paper based or web-based survey. The average response rate was about 30%.

Measures

Demographic characteristics of interest for this study were, race/ethnicity, age, gender (male/female), household income and education level. Body mass index was also computed from weight and height measurements provided and participants were grouped into either underweight, normal weight, overweight, or obese categories.

Use of calorie information was determined using the following questions, 'Think about the last time you ordered food in a fast food or sit-down restaurant, did you notice calorie information listed next to the food on the menu or menu board? (Yes/No). Those who answered yes were asked follow-up question: Thinking about the last time you noticed calorie information on the menu or menu board, how did the calorie information change what you were thinking of ordering? (1) ordered something with fewer calories (Yes/No); (2) I ordered something with more calories (Yes/No); (3) I ordered fewer items (Yes/No) (4) I ordered smaller sizes (Yes/No); (5) I ordered more items (Yes/No); (6) I ordered larger sizes (Yes/No)'.

Data analysis

Data were analyzed using IBM SPSS statistics 27. Demographic characteristics were summarized in frequencies and percentages. Multilinear logistic regression was used to determine the relationship between demographic characteristics of the participants and use of calorie information. Significance was considered at $p < 0.05$.

RESULTS

Demographic characteristics

Majority of the participants were non-Hispanic white (56%), female (51%) and aged 50 years and older (67%). Thirty four percent were classified as overweight while 34% of all the participants were classified as obese according to the reported weight and height. All demographic characteristics are presented on Table 1.

Almost half (46%) of the participants reported that they noticed calorie label on the menu when they visited a sit-down restaurant. When asked how they used this information, 65% stated that they ordered items with fewer calories, 37% stated they ordered fewer items while 44% stated that they ordered smaller sizes.

Very few participants stated that they ordered larger sizes or more items as shown on Figure 1.

Table 1: Demographic characteristics (n=5438).

Characteristics	N	Percentage (%)
Race/ethnicity		
Non-Hispanic white	3054	63.0
Non-Hispanic Black or African American	677	14.0
Hispanic	730	15.1
Non-hispanic asian	224	4.6
Non-hispanic other	165	3.4
Gender		
Male	2108	38.8
Female	2824	51.0
Age group (years)		
18-34	687	12.6
35-49	968	17.8
50-64	1668	30.7
65-74	1171	21.5
75+	790	14.5
Education level		
Less than high school	334	6.3
High school graduate	946	17.9
Some college	1591	30.1
Bachelor's degree	1402	26.5
Post-baccalaureate degree	1008	19.1
Income status		
Less than \$20,000	904	18.8
\$20,000 to < \$35,000	614	11.3
\$35,000 to < \$50,000	630	12.8
\$50,000 to < \$75,000	848	17.7
\$75,000 or more	1802	37.6
Body mass index (BMI)		
Underweight (BMI <18.5)	75	1.4
Normal (BMI 18.5-24.9)	1583	30.1
Overweight (BMI 25-29.9)	1826	34.8
Obesity class 1 (BMI 30-34.9)	1017	19.4
Obesity class 2 (BMI 35-39.9)	451	8.6
Obesity class 3 (BMI >40)	302	5.7

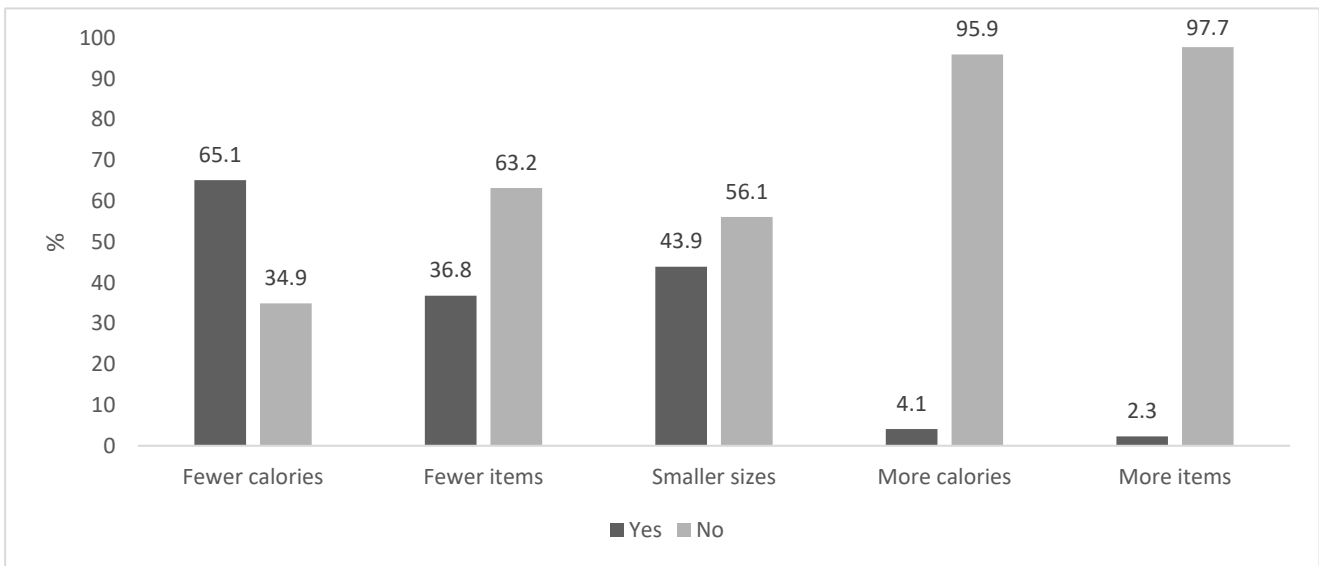


Figure 1: The influence of noticing calorie information on ordering from the menu (n=2447).

Participants who answered yes to “Think about the last time you ordered food in a fast food or sit-down restaurant, did you notice calorie information listed next to the food on the menu or menu board?” were further asked “Thinking about the last time you noticed calorie information on the menu or menu board, how did the calorie information change what you were thinking of ordering?”

Factors associated with use of calorie information on menu labels

Men had 30% decreased odds compared to females of noticing calorie information on the menu (OR 0.70; CI: 0.56-0.89). Similarly, compared to those between 18-34, those over 75 years old had decreased odds (33% decline) noticing the information (OR: 0.67 CI: 0.46-0.98). High school graduates, those with some college, college graduates, or have a post-graduate degree had increased odds of noticing calorie information (odds increasing 1.5 (CI: 1.07-2.06), 1.8 (1.35-2.51), and 2.4 (1.71-3.37) times,

respectively). Those with higher incomes had increased odds compared to those with the least household income of noticing this information (odds increasing 1.6 (CI: 1.04-2.51), 2.1 (1.31-3.38), 2.0 (CI:1.32-2.89), 2.6 (CI:1.74-3.85), respectively, as the income brackets increase). Race/ethnicity and weight status did not show any significant relationship to noticing calorie information on the menu as shown on Table 2.

Among those who noticed the calorie information, about 65% stated that they ordered something with fewer calories. Those who were underweight and male had decreased odds compared to those of normal weight or female of choosing something with fewer calories (OR:0.2 (CI: 0.05-0.95); OR: 0.58 (CI: 0.42-0.79). Those with higher incomes have increased odds compare to those with the least household income (odds increasing 2.5 (CI: 1.22-4.98) and 2.4 (CI: 1.41-4.12) for \$35k-\$50k and over \$75k household income, respectively). There were no differences in the age, education level and race/ethnicity categories as shown on Table 3.

Table 2: Relationship between demographic and health characteristics and noticing calorie information on the menu.

Variables	Odds ratio	95% Confidence interval		P value
		Lower	Upper	
Intercept	0.38*	0.22*	0.65*	0.001*
Ages 18-34 vs 35-49	0.89	0.61	1.28	0.523
Ages 18-34 vs 50-64	0.85	0.61	1.20	0.359
Ages 18-34 vs 65-74	0.96	0.68	1.35	0.813
Ages 18-34 vs 75+	0.67*	0.46*	0.98*	0.038*
Normal vs Underweight	1.73	0.62	4.84	0.296
Normal vs Overweight	1.08	0.83	1.42	0.556
Normal vs Obese	1.12	0.85	1.48	0.407
HS vs <HS	1.06	0.62	1.82	0.829
HS vs Some college	1.49*	1.07*	2.06*	0.018*
HS vs College graduate	1.84*	1.35*	2.51*	0.000*
HS vs College postgraduate	2.40*	1.71*	3.37*	0.000*
NonHisp White vs NonHisp Black	0.82	0.57	1.18	0.278
NonHisp White vs Hispanic	0.86	0.61	1.21	0.374
NonHisp White vs NonHisp Asian	0.76	0.47	1.23	0.257
NonHisp White vs NonHisp Other	1.19	0.58	2.47	0.633
Self-reported gender	0.70*	0.56*	0.89*	0.003*
<\$20k vs \$20k to \$35k income	1.62*	1.04*	2.51*	0.033*
<\$20k vs \$35k to \$50k income	2.10*	1.31*	3.38*	0.002*
<\$20k vs \$50k to \$75k income	1.95*	1.32*	2.89*	0.001*
<\$20k vs >\$75k income	2.59*	1.74*	3.85*	0.000*

*Significant at p<0.05.

Table 3: Relationship between demographic and health characteristics and ordering fewer calories.

Variables	Odds ratio	95% Confidence interval		P value
		Lower	Upper	
Intercept	0.71	0.35	1.43	0.334
Ages 18-34 vs 35-49	1.22	0.76	1.96	0.412
Ages 18-34 vs 50-64	1.45	0.87	2.40	0.150
Ages 18-34 vs 65-74	1.41	0.87	2.28	0.160
Ages 18-34 vs 75+	1.36	0.73	2.53	0.337

Continued.

Variables	Odds ratio	95% Confidence interval		
		Lower	Upper	P value
Normal vs Underweight	0.22*	0.05*	0.95*	0.043*
Normal vs Overweight	0.93	0.62	1.38	0.702
Normal vs Obese	0.96	0.62	1.49	0.859
HS vs <HS	1.51	0.64	3.57	0.351
HS vs Some college	1.05	0.63	1.77	0.845
HS vs College graduate	1.54	0.91	2.61	0.110
HS vs College postgraduate	1.56	0.91	2.69	0.105
NonHispanic White vs NonHispanic Black	1.49	0.89	2.52	0.131
NonHispanic White vs Hispanic	1.27	0.78	2.07	0.342
NonHispanic White vs NonHispanic Asian	1.40	0.67	2.92	0.365
NonHispanic White vs NonHispanic Other	0.58	0.18	1.87	0.359
Self-reported gender	0.58*	0.42*	0.79*	0.001*
<\$20k vs \$20k to \$35k income	1.56	0.84	2.92	0.159
<\$20k vs \$35k to \$50k income	2.47*	1.22*	4.98*	0.012*
<\$20k vs \$50k to \$75k income	1.18	0.66	2.11	0.577
<\$20k vs >\$75k income	2.41*	1.41*	4.12*	0.001*

*Significant at $p < 0.05$.

About 37% who noticed calorie information stated that they ordered fewer items. Those who were underweight had 84% (OR: 0.16 CI: 0.03-0.74) decreased odds compared to those of normal weight of ordering fewer items. Compared to non-Hispanic Whites, non-Hispanic Blacks, Hispanics, and Asians increased their odds of ordering few items [ORs increases of 1.6 (1.05-2.56), 1.7 (1.03-2.64), and 2.3 (1.13-4.55), respectively]. There were no observed significant differences in gender, age, education level or income categories as shown on Table 4.

About 43% of those sampled stated that they ordered smaller sizes after noticing calorie information. Those who were underweight had 89% (OR: 0.1 CI: 0.02-0.48) decreased odds compared to those of normal weight of ordering smaller sizes. Similarly, compared to females, males had a 29% (OR: 0.71 CI: 0.51-0.99) decrease in their odds of ordering a smaller size. No significant differences in ordering smaller sizes were observed among the age, education level, race/ethnicity or income level categories as shown on Table 5.

Table 4: Relationship between demographic and health characteristics and ordering fewer items.

Variables	Odds ratio	95% Confidence interval		
		Lower	Upper	P value
Intercept	0.60	0.28	1.26	0.178
Ages 18-34 vs 35-49	0.90	0.56	1.45	0.671
Ages 18-34 vs 50-64	0.79	0.49	1.29	0.352
Ages 18-34 vs 65-74	0.87	0.53	1.42	0.571
Ages 18-34 vs 75+	0.85	0.39	1.81	0.668
Normal vs Underweight	0.16	0.03	0.74	0.019
Normal vs Overweight	1.06	0.70	1.60	0.781
Normal vs Obese	1.31	0.88	1.95	0.184
HS vs <HS	0.93	0.35	2.45	0.884
HS vs Some college	0.79	0.47	1.34	0.384
HS vs College graduate	1.01	0.61	1.68	0.957
HS vs College postgraduate	0.88	0.51	1.51	0.647
NonHispanic White vs NonHispanic Black	1.64*	1.05*	2.56*	0.031*
NonHispanic White vs Hispanic	1.65*	1.03*	2.64*	0.038*
NonHispanic White vs NonHispanic Asian	2.26*	1.13*	4.55*	0.022*
NonHispanic White vs NonHispanic Other	1.03	0.34	3.09	0.964
Self-reported gender	0.74	0.52	1.05	0.088
<\$20k vs \$20k to \$35k income	0.73	0.40	1.33	0.305
<\$20k vs \$35k to \$50k income	1.40	0.76	2.59	0.281
<\$20k vs \$50k to \$75k income	0.99	0.56	1.75	0.978
<\$20k vs >\$75k income	1.02	0.61	1.69	0.953

*Significant at $p < 0.05$.

Table 5: Relationship between demographic and health characteristics and ordering smaller sizes.

Variables	Odds ratio	95% Confidence interval		
		Lower	Upper	P value
Intercept	1.08	0.53	2.20	0.835
Ages 18-34 vs 35-49	1.13	0.72	1.79	0.592
Ages 18-34 vs 50-64	0.78	0.50	1.21	0.262
Ages 18-34 vs 65-74	0.62	0.38	1.02	0.058
Ages 18-34 vs 75+	0.69	0.36	1.35	0.279
Normal vs Underweight	0.11*	0.02*	0.48*	0.004*
Normal vs Overweight	1.01	0.67	1.53	0.946
Normal vs Obese	1.36	0.90	2.05	0.138
HS vs <HS	0.72	0.30	1.76	0.474
HS vs Some college	0.82	0.51	1.32	0.420
HS vs College graduate	0.92	0.59	1.45	0.732
HS vs College postgraduate	0.76	0.47	1.20	0.238
NonHispanic White vs NonHispanic Black	1.20	0.75	1.91	0.443
NonHispanic White vs Hispanic	1.38	0.89	2.14	0.147
NonHispanic White vs NonHispanic Asian	1.33	0.69	2.59	0.395
NonHispanic White vs NonHispanic Other	1.06	0.36	3.10	0.912
Self-reported gender	0.71*	0.51*	0.99*	0.043*
<\$20k vs \$20k to \$35k income	0.71	0.39	1.27	0.248
<\$20k vs \$35k to \$50k income	1.56	0.83	2.95	0.168
<\$20k vs \$50k to \$75k income	1.00	0.56	1.80	0.996
<\$20k vs >\$75k income	0.90	0.52	1.56	0.707

*Significant at $p < 0.05$.

DISCUSSION

This study explored the use of calorie information on the menu in sit down restaurants in the US. Slightly less than half of those sampled stated that they noticed calorie information on the menu with the majority who noticed the information stating that they ordered fewer calories. Men and those over 75 years old were less likely to state that they noticed calorie information as compared to women and younger adults respectively. The likelihood of noticing this information increased with education level and income status. Similar findings were reported by Bowers and Suzuki (2014) using the 2011 Behavioral Risk Factor Surveillance System (BRFSS) data. They found that 52% of the sampled population from Hawaii, Minnesota and Wisconsin stated that they used menu labels in sit down restaurants with the majority being women and those of income greater than \$50,000.¹² Other studies found smaller estimates (10-36%) of the number of people who reported noticing calorie information on the menu.¹⁴⁻¹⁹ These previous studies had smaller sample sizes and covered fewer states while this current study is representative of the US population. In addition, previous studies were done before the mandatory requirement by the government to include calorie information on the menu all across the country.

The ultimate goal of including nutrition information on menu labels, especially calorie information, is to reduce calorie consumption and improve diet quality. Although a majority of those who reported noticing calorie information also reported that they ordered less calories,

there were still more than a third who did not reduce their calorie intake after looking at the menu. It is important to note that this question was only asked to those who stated that they had noticed calorie information. There have been mixed findings on the influence of calorie labelling on consumer restaurant behaviors related to calorie intake.^{17,18,20} A systematic review by Bleich et al (2017) found limited evidence that having calories labelled on the menu in fact reduced the number of calories consumed.²¹ Similarly, in another systematic review, calorie labelling was found not to be effective in promoting healthier food choices in real life settings.²² A comparative study conducted in New York immediately after state-wide requirements of food labelling took effect in 2008 and five years later in 2013-2014 did not find any reductions in calorie consumption and recommended that other policy intervention in addition to menu labelling may be necessary to decrease energy intake in the population.²³ Ellison, Lusk and Davi (2013), in a study conducted among 153 patrons in a university setting, found that a symbolic calorie label (one with the number of calories and a traffic light warning) led to fewer calorie consumption than a plain numeric label or no label at all.²⁴ Findings from the current study cannot determine whether seeing calorie information led to decreased caloric intake because only those who reported seeing calorie information were asked whether they changed their order.

Disparities exist in noticing and using calorie information. This study found that those with higher income and education level had increased likelihood of noticing and using calorie information on menu labels to specifically

order items with less calories. This finding is consistent with many previous studies.²⁵⁻²⁷ It is evident that those with higher education status are more likely to have a higher income which may place them at an advantage when making dietary choices. Researchers have cautioned that obesity reduction interventions such as including nutrient information on menu labels may actually compound health inequalities as these messages may only reach and have an impact on those that have more information such as those of higher social economic status and higher education status.²⁸

This study did not find any significant differences among race and ethnicities in noticing calorie information on the menu which has also been observed elsewhere; this is despite the clear racial ethnic disparities in obesity that have been reported in the United States.²⁵ A recent study looked at disparities in adult obesity in the United States using BRFSS combined data for 2015 to 2017 and found the highest prevalence of obesity to be among non-Hispanic black (38.4%) followed by Hispanics (32.6%) with non-Hispanic white at 28.6%.²⁹ Racial ethnic disparities in obesity are said to be reflective of the social and economic differences found in the US.³⁰ It is unfortunate, though not unexpected, that those who are at a greater risk for obesity and other chronic diseases did not show a higher percentage of noticing and using calorie information on the menu. Therefore, education strategies are needed to reach this section of the population for this policy to benefit its intended audience.

Another unfortunate observation was that those who were in overweight or obese categories were not different from the rest of the population in terms of noticing calorie information or even using that information to reduce their calorie intake. This section of the population is especially vulnerable to excessive calorie intake since studies have shown they are more likely to eat away from home and more energy dense food.³¹ In order to reach this population, we need to understand some of the factors that influence individuals' dietary choices. This may be explained by the framework presented by Berry et al (2019) that proposes taste value orientation, quantity value orientation and health value orientation as the main concepts that influence individuals' dietary choices, where taste and value are bigger influencers of calories ordered than the value health value of the food. Consumers are likely to associate low calorie foods with tastelessness and lower quantity.³² Nutrition education can be used to clear such a misconception in the society.

Nutrition education interventions are definitely needed in order to reach more people who were targeted by this policy especially those at risk for overweight and obesity. Such interventions may need to use tested and proven theories that have been shown to influence behavior change. For example, Jeong and Ham (2018) conducted a study to test whether customers use of calorie information on the menu could be explained by the health belief model. They found that perceived threats and perceived benefits

had a positive effect on menu label use whereas perceived barriers had a negative effect.³³ More people used the information on the menu label if they perceived the information to be of benefit to their health but cited several barriers as the reason that they do not necessarily use this information. Nutrition educators and health promotion experts could use this model as they try to encourage more people to use the menu labels. Education could target ways of overcoming the barriers and encouraging the population to focus on potential immediate and future benefits of referring to calorie information when ordering food at a restaurant

The findings of this study should be interpreted in the light of some limitations. First, data was collected using self-report, which may have been influenced by social desirability bias. Participants may have overreported behaviors that were viewed as positive, such as ordering fewer items or choosing items with fewer calories. Second, the types of restaurants frequented was not assessed. It is unknown whether consumer behaviors were influenced by dining experience, such as upscale dining vs fast food style restaurants. Third, the findings may be subject to nonresponse bias due to a high nonresponse rate of 70%. However, a major strength of this study was that the sample was large and nationally representative.

CONCLUSION

The use of calorie information posted on restaurant menus was primarily influenced by age, gender, and education level but relatively unaffected by ethnicity and weight status. Men and older adults were less likely to notice calorie information compared to women and younger adults, and the odds of noticing calorie information was positively associated with household income and education level. The findings of this study support the need for health literacy interventions focused on adults with lower household income and educational level. More studies are warranted to evaluate the effects of restaurant calorie labeling on measured caloric intake and/or diet quality.

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