BODY MASS INDEX AND THE INFLUENCE OF CALORIC LABELING

By:

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A Thesis Submitted in Partial Fulfillment
of the Requirements for the Degree of
Master of Science in Health

Middle Tennessee State University
Department of Health and Human Performance
December 2014

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Dedicated to those I love.

ACKNOWLEDGEMENTS

I want to thank God for allowing me this opportunity beyond my wildest dreams. Your plans have always been greater than mine. I am grateful.

Words cannot express my gratitude to my fiancé, Miller, and family. You all have been supportive of my passion for health and education, unconditionally loving, and patient. This is because of you, and for you. You are loved.

A special "thank you" goes to faculty members who dramatically changed my life. To my team, Dr. Winborn and Dr. Bates, who have provided guidance that has been overwhelmingly helpful. And to Shannon Josey, who made my entire graduate career possible.

ABSTRACT

The purpose of this study was to identify a relationship between BMI (body mass index) and using calorie labels on menu boards. This study is a quantitative study in which the researcher analyzed data from an annual, cross-sectional study known as the Behavioral Risk Factor Surveillance System. A total of 475,865 random participants were included. Data from the Behavioral Risk Factor Surveillance System were initially analyzed with cross tabulations and descriptive statistics. Hypothesis testing was completed by logistic regression with SPSS. This was used to determine a positive relationship between BMI and using calorie labels. Participants who are obese were more likely to use calorie labels to make a decision on food than non-obese participants. With new legislation being enacted, more extensive research is necessary to facilitate public health efforts.

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CHAPTER I

INTRODUCTION

Americans are some of the unhealthiest people of the world. From 2007 to 2009, there was an increase in obesity (defined by body mass index greater than 30) by 1.1%, or 2.4 million, American adults according to the 2009 Behavioral Risk Factor Surveillance System (BRFSS) by the Centers for Disease Control (Sherry, Blanck, Galuska, Pan, & Dietz, 2010, p. 953). The primary risk factor contributing to obesity is overconsumption of calories and physical inactivity (FDA, 2011, p. 7).

The CDC announced Nutrition, Physical Activity, Obesity, and Food Safety as a "winnable battle" for 2015. "Winnable battles" are determined by the as specific areas to focus on for future interventions (Winnable Battles). These often align to the World Health Organization's Healthy People 2020 goals. Obesity and overweight are priority health concerns and leading indicators addressed by the Healthy People 2020 goals (FDA, 2011, p. 6). The Healthy People 2020 baseline data showed that 16.2% of U.S. children and adolescents aged 2-19 are obese. The target is a 5% reduction at 15.4%. The following Healthy People 2020 objectives are relevant to this study (Winnable Battles):

- NWS 8 Increase the proportion of adults who are at a healthy weight to 33.9% from a baseline of 30.8%.
- NWS 9 Reduce the proportion of adults who are obese to 30.6% from a baseline of 34.0%.
- NWS 10.4 Reduce the proportion of children aged 2-19 years who are considered obese to 14.6% from a baseline of 16.2%.

- NWS 17.2 Reduce consumption of calories from added sugars to 10.8% from a baseline of 15.7%.
- NWS 19 Reduce consumption of sodium in the population aged 2 years and older to 2,300 mg from a baseline of 3,641 mg.

Obesity is linked to several health complications like heart disease, the lead killer of all Americans (Kamberg, 1990, p. 4). This, in turn, is costing Americans millions of dollars. "For 2006, medical costs associated with obesity were estimated at as much as $147 billion (2008 dollars); among all payers, obese persons had estimated medical costs that were $1,429 higher than persons of normal weight" (Finkelstein, Trogdon, Cohen, & Dietz, 2009, p. 826). Fortunately, obesity can be reversed by modification of food choices and integrating regular exercise. Kamberg (1990) reports, "Go easy on the hamburgers, french fries, whole milk, and eggs" to prevent heart disease (p.4).

"Studies suggest that one problem involves the fact that because food decisions are made so often, and the marginal effect of any one meal on future obesity is small, the cumulative costs of a large number of relevant decisions may be neglected" (FDA, 2011, p. 5). Because of this, consumers may not demand calorie information or show a desire for it, but they may show regret at a later time. For instance, a person may become obese in the future and regret making so many choices to eat unhealthy in the past. Currently, however, a person is not necessarily informed about the health risks associated with the product because calorie labels are not in place (FDA, 2011, p.5).

Sherry et al. (2010) identifies "change individual behaviors as well as the environments and policies that affect those behaviors" as one key to decreasing the prevalence of obesity. In

2008, New York City was the first to regulate menu labeling of calorie content after many disputes with the restaurant association. Soon after, in 2013, The Patient Protection and Affordable Care Act, more commonly referred to as "Obamacare" followed. Having caloric information readily available may influence the consumer to make a healthier choice than originally planned (Farley et al., 2009, p. 1098-1099). These recent regulations sparked interest in investigating whether or not healthier changes are being made.

Statement of the Problem

Until now, calorie information has only been provided upon request. With new legislation, restaurants will be required to post nutritional information on menu boards. Most Americans underestimate the caloric content in a food item unless it is posted at the point-of-sale (Burton, Creyer, Kees, & Huggins, 2006, p. 1669). Fast-food goers now have the ability to make a healthier food choice based on the calories posted, but some people may be more likely to avoid the healthier choice than others (Lansky & Brownell, 1982, p.728)

Purpose

The purpose of this study was to understand if a person's body mass index (BMI) is directly related to his or her food choices when nutritional information is provided on menu boards. This research identifies the demographics of people who use caloric labeling and what factors may have contributed to a healthier decision. Therefore, further efforts to combat poor nutrition can be directed to more specific populations.

Significance

Healthy People 2010's objective to reduce prevalence of obesity to 15% was not met by any state in 2007. Data from the 2007 BRFSS showed an increase of obesity of 1.7% from 2005 to 2007 (CDC, 2008).

Albright, Flora, and Fortmann (1990) stated, "Most diet change studies have focused on individuals or small clinical populations; effective methods of achieving large-scale dietary changes are needed (p. 158). "Priority should be given to interventions that move beyond increasing individual awareness and provide the environmental and policy changes that support behavior change, particularly among those with the greatest need" (CDC, 2008). Caloric labeling on menu boards is a national attempt to trigger behavior change. Research is necessary to determine which factors may influence the individual to make a healthier food choice based on menu labels (CDC, 2008). "Researchers should investigate which characteristics of patrons (e.g. age, gender, weight concerns and nutrition attitudes) impact whether or not menu labeling is utilized when ordering away-from-home" (Larson & Story, 2009, p. 8).

Hypothesis

When controlling for age, gender, family income and educational level, participants who are obese, as determined by body mass index, are less likely to choose more healthily based on the calorie information than participants who have body mass indexes rated below the level of "obesity".

Theoretical Framework

Albert Bandura's Social Cognitive Theory may help explain why some people, regardless of calories being posted, still choose the unhealthier choice in food. The Social Cognitive Theory is based on three determinants: behavior, internal/personal factors, and the environment. All three factors influence each other. Behavior includes skills, practice, and self-efficacy. The personal factors include the knowledge of the behavior, expectations of outcome, and attitudes about the behavior. Environmental factors are determined by the social norms, access in the community, and influence on others (Pajares, 2002).

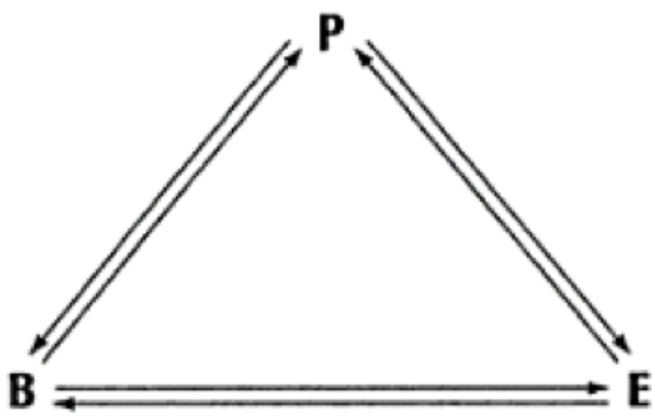

Figure 1. Social Cognitive Theory Triad. B represents behavior; P is the personal factors in the form of cognitive, affective, and biological events; and E the external environment (Pajares, 2002).

Definition of Terms

The following terms have been defined for the purpose of this study.

1) A calorie is a measurement of how much energy a food produces based upon it's content of carbohydrates, fat, protein, and alcohol (WHO, 2014).

2) Body Mass Index is a number that represents a person's weight in kilo grams divided by the square of his or her height in meters (WHO, 2014).

3) Obesity is defined as a body mass index greater than or equal to 30 (WHO, 2014).

Limitations

It is assumed that participants answered truthfully on the Behavioral Risk Factor Surveillance System survey. All of the answers for the BRFSS were self-reported, which allows for more error in the integrity of results.

Although this survey is very comprehensive, it is lengthy. This has the ability to negatively affect answers. Both of these are threats to the internal validity of this study.

CHAPTER II

LITERATURE REVIEW

Restaurants offer a quick and convenient way to satiate hunger. This is probably why half of Americans food budget is spent on food outside of the home (Hensley & Stensson, 2008). In a 15-year prospective study by Pererira (2005), consumers of fast food visited on average twice a week. The lowest of users still averaged 1.3 times a week (p. 38). People who eat at restaurants are associated with a higher weight and less healthy eating habits. Working away from home, being a parent, and living within a close proximity to restaurants contributed to frequency of eating out in a study by Jeffrey, Baxter, McGuire, and Linde. The restaurants' proximity affected the frequency of eating out, but not necessarily only at fast-food restaurants. "Number of restaurants near people's homes was not associated with BMI." However, there was a positive relationship between frequency of visits at fast food restaurants and BMI (Jeffrey et al., 2006).

Unfortunately, there are health-related consequences associated with the decision to eat at a restaurant. In a study by Satia, Galanko and Siega-Riz (2004), it was found that people who eat at fast-food restaurants have higher fat intake and lower vegetable intake than people who do not eat at fast-food restaurants. The average intake for people who eat at fast food regularly was 39.0 grams, as opposed to people who do not eat there regularly, at a 28.3g daily intake. The study also found a relationship between BMI and frequency of eating at fast-food restaurants. Frequent goers had an average BMI of 31.3 as opposed to people who rarely/never go at 28.6 (Satia et al., 2004, p. 1092).

One study by Roberto, Larsen, Agnew, Baik, and Brownell (2010), showed comparison between calories ordered, calories consumed, and total calories consumed during and after the meal. This was a randomized study that included both men and women from different races and a range of BMIs (BMIs were self-reported) (p.317). The information was crossed with when a calorie label was provided, when a calorie label alone was provided, and when a calorie label plus information was provided. The authors identify the largest influence on behavior when a calorie label plus information was available. There was a decline in each category when the consumer was given extra information along with the calorie content. The extra information included a statement that read the average caloric consumption daily is 2,000 calories (Roberto et al., 2010, p. 312).

When regarding only the calories consumed, as opposed to ordered, there was a significant difference. Total calories consumed for the participants in the calorie label plus information was 1289+/-656. The total calories consumed by participants in the no calorie labels was 1466+/-724; t285=2.07; P=.04; d=0.26 (Roberto et al., 2010, p. 315). Calories consumed decreased by 124 and 203 with the calorie labels group and the calorie labels plus information group, respectively (Roberto et al., 2010, p.316). According to figure 2, the calorie labels plus information group ordered less calories, consumed less calories during the meal, and consumed less calories during and after the meal in every menu type group (Roberto et al., 2010, p. 316).

Research included variables such as age, BMI, hunger level before meal, fullness after meal, degree of liking meal, and frequency of visiting fast food restaurants. No significant differences occurred between any of the menu type conditions (Roberto et al., 2010, p.314).

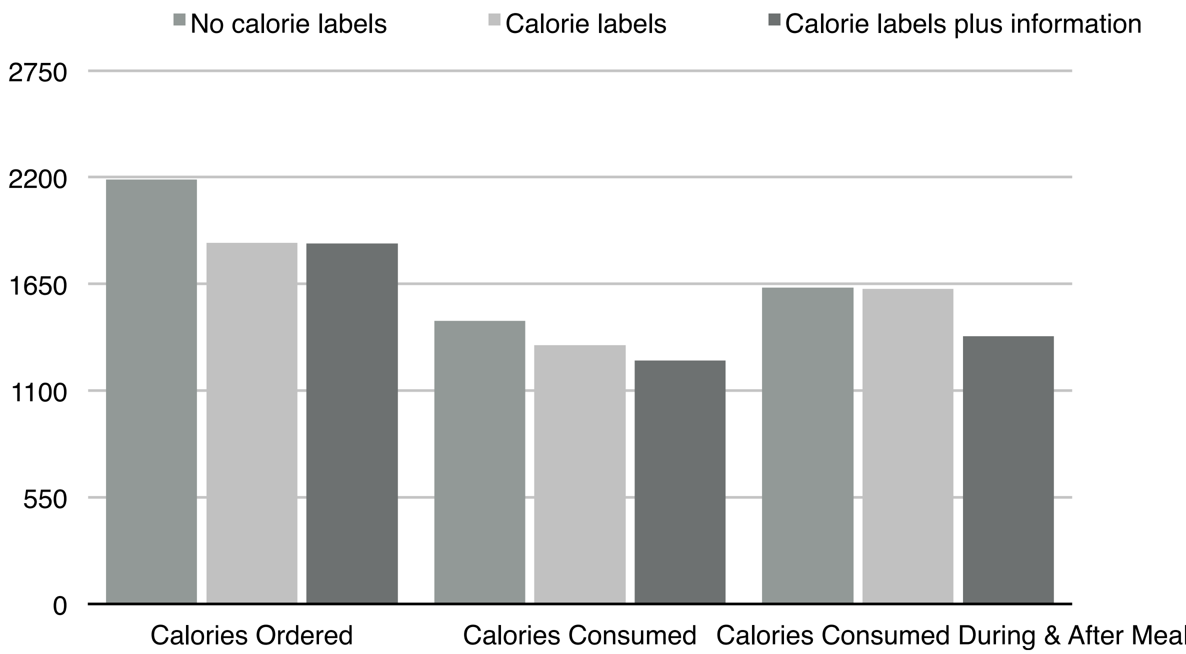

Figure 2. Calories Ordered and Consumed, by Menu Type (Roberto et al., 2010, p. 316).

Consumers' Comprehension

For some, even reading the nutrition labels correctly can prove to be a challenge. In a study by Pelletier, Chang, Delzell, and McCall (2004), 90% of participants knew where to locate the nutrition label on snacks and could read the calories on the label, but 63% of all of the participants confused calories per serving with the total calories (p. 321).

According to Sherry et al. (2010), "The prevalence of obesity is highest among people who did not graduate from high school, and lowest among those with a college education" (p.

952). When correctly estimating calories in a study by Sinclair, Hammond, and Goodman (2013), the greatest difference occurred when those with some college or completion of college were compared to those with some elementary school, some high school, or completion of high school. The study shows evidence that a person with a lower education level is more likely to incorrectly estimate calorie content of a food item (pp. 768, 770-771).

For most people it is nearly impossible to estimate calories. Currently, most restaurants, including fast food, do not provide point-of-purchase nutritional information. This can prove to be a public health challenge for consumers to make a healthful choice (Burton et al., 2006, p. 1669).

Sinclair et al. (2013) examined comprehension of calories and percent daily values (according to a food label) across different demographics. The researchers found the largest odds ratio to be 4.58 representing participants 65 years old and older. This is when participants 65 and older were compared to ages 25-34 in correctly estimating calorie amounts. Older participants are more likely to incorrectly guess the calorie content than other age groups (Sinclair et al., 2013, p. 770).

The largest difference regarding income was when participants making over $80,000 per year was compared to participants making less than $39,999 per year. The study by Sinclair et al. (2013) also found that minority groups and persons with lower health literacy are likely to incorrectly answer the calorie and percent daily value questions. Body mass index "was not significantly associated with health literacy in the current study", but the researchers do suggest additional research is needed in that area (p. 771). The most significant values occurred in the age, education, and income variables (p. 772).

Lansky and Brownell (1982) examined underestimating calories in contrast to aforementioned Pelletier et al. (2004) study of miscomprehension. Underestimating calories was common in this study.

> Obese persons made large errors in estimating food quantity and calories. The mean error in calories of 63.9% would mean that a day's intake of 2000 calories would be estimated at 3280 calories. Such a subject would err 1 lb. worth of calories every three days (Lansky & Brownell, 1982, p. 729).

In a study by Burton et al. (2006), 99 percent of people underestimated the calorie count in cheese fries with ranch dressing (3010 calories). The mean guess was 869, which is an underestimate by 2,141 calories. A hamburger and fries (1240 calories) was also underestimated by 88%. The mean answer was 777 calories, which is an underestimate of 463 calories. The chef salad (930 calories) that was underestimated to be 452 calories by 90% of people. That is a 478 calorie difference (p.1670). Burton et al. (2006) states, "If diners consumed 600 more calories than they realized for just one restaurant meal per week, an extra 30,000 calories a year would be added to their diets (p.1674). That is equal to about a 9 pound increase in weight per year, which could be substantial over a period of time (p.1674).

When consumers see the nutritional information, they are more likely to choose an item lower in calories, especially when a discrepancy exists between the actual and estimated calories. When the consumer thinks that the item is already low in calories (and it actually is), he or she is less likely to order that item (Burton et al., 2006, pp. 1673-4).

However, another study demonstrated that knowledge of nutrition was not necessarily a predictor of choosing the healthier option. The study by Rodolfo Nayga, Jr. showed significant results that men are less likely to use labels than women. When another variable, knowledge, was added, there was no difference between the men and women who have the same nutrition knowledge. Mostly, men had less knowledge about nutrition than women (Nayga, 2000, p.105-107).

In the same study, ethnicity and income affected the knowledge of nutrition, but not whether they used labels or not. "Non-Caucasians and lower income consumers have lower levels of nutrition knowledge than their counterparts". There was no significance of ethnicity and income in regards to whether or not they used the labels (Nayga, 2000, p.107). In opposition to previous hypotheses, age and education also provided no significant data to knowledge of nutrition or label use (Nayga, 2000, p. 108).

Restaurants can be clever in their marketing attempts, but it may also have consequences on Americans' waistlines. In 1955, McDonald's fries had only one serving size, which is the equivalent to todays small. Portion options range from small, or one serving size, to triple that size (Brownell, 2004). With larger serving sizes now available, restaurants have the opportunity to play with pricing. For instance, the large fries have 157% more calories than the small, but only cost 62% more ("From Wallet to Waistline," 2002).

Noticing and Using the Labels

A Philadelphia study in 2009 compared results from a telephonic versus point-of-purchase survey for people noticing and using calorie labels. The researchers examined data after calorie labeling was mandatory for four months (Breck, Cantor, Martinez, and Elbel, 2014, p.31). Potential outcomes were either the respondent saw the calorie label, respondent was influenced by calorie label, or the respondent made a more healthful choice as a result of the label.

The telephonic survey that recorded 702 total people reports that more women (N=490), blacks (N=348), people over the age of 50 (N=307), people with a high school degree or less (N=313), people making between $20,000-$40,000 annually (N=175), and overweight people (N=245) saw the labels in the last three months more often to their counterparts. When surveying 235 total participants in the point-of-purchase survey, the only categorical difference was that more 31-50 year olds and individuals who are underweight or normal weight noticed the labels more. This measure was recorded at the point-of-purchase and therefore not answered according to any visit in the last three months (Breck et al., 2014, p. 33).

The survey also recorded people who saw and were influenced by the calorie labels, but the direction of more healthful or less healthful decision was uncertain. Out of 461 in the telephonic survey, females (N=345) and blacks (N=225) noticed and were influenced by the labels. Also people over 50 (N=192), with a high school degree or less (N=176), people who earn between $40,000 and $60,000 annually (N=112), and individuals who dentify as obese (N=167) noticed and were influenced by the labels. In the point-of-purchase survey, out of 79 participants, women (N=42), blacks (N=44), individuals between the ages of 31 and 50 (N=38), people with a high school degree or less (N=43), and people who are underweight or normal weight (N=34) saw and were influenced by the labels (Breck et al., 2014, p. 33).

According to the telephonic survey, out of 293 people who saw the label and made a healthier decision because of the label had the following demographics: women (N=94), blacks (N=53), over age 50 (N=53), people with a high school degree or less (N=43), people with an income greater than 60,000 per year (N=37), and people identified as obese (N=49). The point-of-purchase survey results vary (Breck et al., 2014, p. 33). “Only obese individuals are at statistically significant increased odds", as opposed to overweight (Breck et al., 2014, p. 34). Out of 56 participants in the point-of-purchase survey, 31 females reported using the labels to influence their decision. Blacks (N=30), ages 31-50 (N=31), individuals with a high school degree or less (N=43), and people identified as normal or underweight (N=27) also used the labels to influence their decision to eat more healthfully (Breck et al., 2014, p. 33). There is a large difference between the telephonic survey and the point-of-purchase survey in weight status. In the point-of-purchase survey, overweight people are less likely to use the calorie labels (Breck et al., 2014, p. 34).

The researchers found the greatest significance in females, people with a high school degree or less, and a household income less than $20,000 annually in each category in the telephonic survey. The only significant differences in the point-of-purchase results were whites who saw and were influenced in some way by the labels and people with a high school degree or less in the "saw labels" and "saw and were influenced" groups (Breck et al., 2014, p. 33).

Nutrition Label Formatting

Borgmeier and Westenhoefer (2009) conducted an interesting, randomized study about different formatting for nutrition labels. In their study, 420 Hamburg/German adults were examined under the following five formats: (1) a simple "healthy choice" tick, (2) a multiple traffic light label, (3) a monochrome Guideline Daily Amount (GDA) label, (4) a colored GDA label, and (5) a "no label". Guideline Daily Amounts in Germany is the similar to American's food label in that in shows amounts and percent daily values, but it is usually packed on the front, as opposed to the back or side (Borgmeier & Westenhoefer, 2009, p. 184).

A simple approach is the healthy choice tick. This is a symbol that is only allowed on approved foods low in total fat, saturated fat, added sugar, and sodium. This is the equivalent to American's "smart choice" label. The monochrome label is a solid color, with the facts, but no symbolization as to which facts are of danger to an individual's health. A multiple traffic light label is labeled by red, amber, or green (i.e. high, moderate, or low) on the product. More specifically, the colored GDA label would have the corresponding traffic light symbol beside the corresponding fact. For example, a product high in calories would have a red traffic light beside it used to symbolize the dangers associated (Borgmeier & Westenhoefer, 2009, p. 184).

In the pair wise comparison of foods, the traffic light had the highest average of correct answers at 24.8 out of 28 pairs. The "no label" condition had the least correct (20.2 out of 28 pairs). Gender did not produce significant results against any of the formats, although women did produce more correct results. Also, educational level did not produce any significant results. Although "overweight subjects had a slightly lower number of correct decisions compared to normal weight subjects", the weight variable showed no significance either (Borgmeier & Westenhoefer, 2009, p. 184).

In a second analysis, individuals were compared for making healthier food choices, as opposed to the aforementioned identification of healthier choices. "In all experimental groups the average daily intake for fat, saturated fat, sugar, and sodium was above the recommendations for daily consumption." Gender did not produce significant results for each label format, regardless of men choosing less healthy items. In the educational level variable, "higher sodium was associated with higher education in the traffic light and colored GDA condition, but with lower educational level in the simple tick condition." Higher education had an inverse relationship to envisaged protein in the simple tick condition. However, higher education was positively related in the traffic light condition. Individuals with a normal weight have higher energy percentages from carbohydrates than overweight people. "The energy percent from carbohydrates was lowest in the colored GDA-condition and highest in the "no label" condition (Borgmeier & Westenhoefer, 2009, p. 184).

Overall, having labels was associated with healthier choices. More than any other category, the multiple traffic light symbols produced the best choices. Women and normal weight subjects had the most correct answers, but education did not present any significant results (Borgmeier & Westenhoefer, 2009, p. 184).

Potential Impact

Researchers Kuo, Jarosz, Simon, and Fielding (2009) conducted an assessment of Los Angeles adults to hypothesize the potential impact of menu labeling. They used the Los Angeles County Health Survey to estimate obesity prevalence. Height and weight of participants were self-reported in the survey. The percentage of obese adults in the county parallels the average weight gain from 1997 to 2005. The average weight in 1997 was subtracted from the average weight of an adult in 2005. That result was multiplied by the number of adults in the county population of 2005. Average population weight gain was determined by dividing that estimate by 8 (number of years in the time interval) (Kuo et al., 2009, p. 1681).

Estimates of total annual revenue, market share, and average meal price were used to determine the approximate number of meals served. Other research was used to determine the percentage of patrons who would use the menu labeling and order reduced calorie meals. The average stated that about 10% of people would use the menu to find a lower calorie meal. It is assumed that consumers would not increase their beverage intake or consecutive meal calories. Another assumption was that the activity level would stay consistent so their resting metabolic rate would not change. If 10% of consumers reduced their caloric intake (at an average of 100 calories per meal), "a total of 40.6% of the 6.75 million pound weight gain in the county would be averted." If that were doubled to 20%, 81.2% of the weight gain would be erased, even if the caloric reduction were still at 100 calories. Even more significant would be a reduction of 125 calories by 20% of patrons. Weight gain would be leveled, maybe even reversed, by reaching 101.5%. Furthermore, if the percentages increased, the weight loss would increase and the obesity epidemic could be eliminated (Kuo et al., 2009, p.1682-3). In terms of costs, however, the FDA estimates that six percent of people would have to achieve the benchmark of a 100-calorie reduction per week to break even on the mean annualized cost of this new ruling (FDA, 2011, p. 12).

Other Research

Jeffery et al. (2009) researched the food choices in older women in relation to BMI. The sample averages were an age of 52.4 and a BMI of 33.4. Most of the participants were white and the highest education completed was high school or some college. Findings report that BMI was positively associated with a lower intake of low calorie foods. Body mass index was positively associated with intake of high-calorie and non-sweet foods, but negatively associated with high-calorie sweet foods (p. 238).

In an article by Feedstuffs, Rod Smith wrote about the study conducted by HealthFocus. The survey reported 60% of shoppers agreed that FOP (front-of-package) labels would "help them eat more healthfully, 36% of obese shoppers indicated that they do not read labels as much as non-obese shoppers (35%)." The researchers claimed it is likely that this could be applied in the restaurant industries as the law begins to mandate calorie labels (2011, p. 9).

It has been found that people, especially women, who read food labels are slimmer than people who do not read labels. A study by Loureiro, Yen, and Rodolfo revealed that people living in cities, who were white and educated, pay more attention to labels than anyone else. "Seventy-four percent of women took time to read the labels, compared with 58% of men." The people who read the labels have a lower BMI. The discrepancy is 1.48 points lower for women and 0.12 points lower for men. Loureiro et al. (2012) said, "We know that this information can be used as a mechanism to prevent obesity." Women who avoided reading the labels were upwards of nine pounds heavier than the women who do read the labels. Yen added that the labels provide good information so shoppers have the ability to make a more informed decision. "These findings imply health education campaigns can employ nutrition labels as one of the instruments for reducing obesity" (Yen, 2012, p. 333).

Nutrition Labeling Education Act of 1989

In order to inform the public of the nutritional value of food, the Nutrition Labeling Education Act (NLEA) was mandated (21 U.S.C. 343) (Moorman, 1998, p. 83). This "required food manufacturers to provide nutrition information about their products in a truthful and complete manner by May 1994. This would help interested people make more educated decisions on their food intake (p. 85). The NLEA leaves the large responsibility of regulating "nutrient content claims" to the Food and Drug Administration (FDA). It is not specified whether that includes restaurants, or if it just applies to packaged foods (Farley et al., 2009, p. 1104).

NYSRA vs. New York Department of Health

Following the Nutrition Labeling Education Act (NLEA) of 1989, the New York City Health Department presented the idea of restaurants posting caloric information on menus. The NYC Board of Health embraced the Health Department's proposal and set it into motion. Farley et al. (2009) showed a chart for "Implementation Issues, Decisions, and Rationale for the New York City Restaurant Calorie Labeling Rule". Included in this chart was the issue of which restaurants will be required to comply. They included high-traffic restaurants with more than 15 locations. All food that has a name and a price must be included along with all beverages, including alcohol. Calorie content was ruled as the only information necessary to display because it "generally correlates with carbohydrates, fats, and sodium". Adding other information may cause consumers to focus their attention away from the calories. The calorie content location must be on menu boards, written at the same or larger font size as the menu item, and close to the actual item. If it is a combination meal, a calorie range should be provided to represent all choices (Farley et al., 2009, p. 1100).

Restaurant owners were outraged with this ruling claiming it would be too difficult and costly to implement and that it imposed on their First Amendment Rights. This eventually led to the New York State Restaurant Association, or NYSRA, filing a lawsuit in 2007. "The lawsuit was based on two grounds: federal preempting by the NLEA and violation of the First Amendment's guarantee of freedom of speech" (p. 1104). Judge Richard J. Holwell denied the ruling because the first proposal only applied to restaurants that already voluntarily supplied the information based on preemption. Once the Board of Health made changes to the proposal to apply to restaurants with 15 or more locations, the NYSRA fired back again. This time the Board of

Health prevailed and passed the law of caloric labeling in New York City (Farley et al., 2009, pp. 1104-1105).

Restaurant Adoption of Labeling

In a 2004 study, 96 percent of the 300 largest chain restaurants nationwide were found to have nutrition information (Wootan & Osborn, 2006, p. 267). The chain restaurants chosen were representative of 39% of total restaurant sales in 2001. These businesses' sales ranged anywhere from $55 million up to $39.6 billion (Hume, 2002). Eighty-six percent of the largest chain restaurants had information on their website, but it does not designate if that was the only source of the information. A major complication is the information is not readily available at point-of-purchase and may require the consumer to seek information prior to ordering (Wootan & Osborn, 2006, p. 267).

While the legislation for providing calories on menus is new, the concept of trying to inform the consumer is not. Restaurants have made attempts by providing information online, in brochures, and on the bags. The problem with that is most customers are not informed until after the food item has already been purchased. There is evidence proving people make significantly lower caloric choices when labels are provided (Krieger & Saelens, 2013, pp. 3-4).

One study by Albright et al. (1990) addressed the issue of food sales in particular restaurants once labeling has been displayed. They found a sales increase in two restaurants with 150-200 items labeled items by 18-40%. The authors add that one of the restaurants was located within a FCP (Five City Project) group in Stanford and one was located in the county, but not within the FCP (p. 161). The FCP was an educational community-based cardiovascular risk study (p. 158-159). In restaurant #1 the sales of chicken and fish increased about the same, but restaurant #3 had double the fish sales than of chicken sales. On the other hand, the remaining two restaurants (one within the FCP and one in another county) showed no increase in sales from labeling on the menus (Albright et al., 1990, p. 161). The FDA did admit the direction of revenue and profitability is uncertain, which is why most people have chosen to not display this information up until this point (FDA, 2011, p.5-6).

Affordable Care Act Legislation

Affordable Care Act, Section 4205 added amendments to the Federal Food, Drug, and Cosmetic Act. These amendments make restaurants with 20 or more locations operating under the same name, regardless of ownership, that offer the same menu items applicable to mandatory menu labeling of calories (i).

The legislation demands calorie content being posted on menu boards in a "clear and conspicuous manner" beside the respective menu item as not to be confused with other items. The calorie content should be reflective of how the menu item is normally prepared and sold (I)(aa) and (II)(aa). In addition to the calories per item being on the menu board, the daily-recommended caloric intake (regulated by the Secretary) should be listed as well. This allows for public understanding of the caloric significance of each meal item listed (I)(bb) and (II)(bb). (II)(aa) and (II)(bb) includes "drive-thrus" in this legislation. The same rules apply for "drive-thru" menus as they do for inside menus (Patient Protection and Affordable Care Act, 2010).

> In Subclause (iii) food on display or self-service food, "food sold at a salad bar, buffet line, cafeteria line, or similar self-service facility" should have the caloric content per serving placed adjacent to the item. This also includes self-service beverages. Oftentimes, self-service food is not listed on a menu board, hence why the calories should be listed alongside the food item (Patient Protection and Affordable Care Act, 2010).

> Subclause (iv) establishes reasonable basis "for its nutrient content disclosures, including nutrient databases, cookbooks, laboratory analyses, and other reasonable means, as described in section 101.10 of title 21, Code of Federal Regulations (or any successor regulation) or in a related guidance of the Food and Drug Administration" (Patient Protection and Affordable Care Act, 2010).
>
> In Subclause (v), the Secretary is responsible for the nutrient disclosure regarding combinations that are listed as a single menu item. The caloric information may contain averages or ranges including every available option for the combination meal, including flavors or varieties (Patient Protection and Affordable Care Act, 2010).
>
> Subclause (vii) excludes some foods from the caloric labeling. This includes (aa) condiments or items not on the menu, (bb) specials or temporary items that are on the menu for less than 60 days, (cc) market test food that is on the menu less than 90 days (Patient Protection and Affordable Care Act, 2010).

The public most likely understands that food from restaurants tends to generally be unhealthier than other foods and can yield to higher obesity risks. However, there is a large disconnect between knowing a particular food is bad, but deciding to consume it anyway.

Americans' Views

Large-scale national health reform has been debated for many years. The Affordable Care Act, as a whole, has many Americans concerned about governmental health policy. These conflicting views will probably always exist. One study found that Americans reported dissatisfaction with the current system. "A majority of Americans indicate general support for a national health plan financed by taxpayers, as well as increased national health spending." Battling with the reported results are the actual survey results that state the following about the policies:

"A public that is satisfied with their current medical arrangements, in many years does not see health care as a top priority for government action, does not trust the

> federal government to do what is right, sees their federal taxes as already too high, and does not favor a single-payer (government) type of national health plan." (Blendon & Benson, 2001, p. 43).

Americans may not show a desire or understand the need for calorie labels, but that viewpoint will likely change in the future (FDA, 2011, p.5). Blendon and Benson (2001) suggests carefulness when interpreting health policies to the general public (p. 44).

Potential Challenges

Restaurant owners in particular have major concerns about the new laws forthcoming. The following represent potential problematic circumstances when menu labeling becomes mandated (Larson & Story, 2009, p. 8):

1. Chefs do not necessarily cook with the exact proportions every time and could allow for unintentional inaccuracy of caloric listings.
2. Changing the menu items would be difficult and limit flexibility in changing options.
3. Variations of menu items could be complex in displaying the accurate calories.
4. It is not cost-effective to provide nutrition information on menu boards.
5. Profitable menu items may become less desirable and consumers may switch restaurants.
6. Training employees such as servers in nutritional information could be difficult.

Some benefits restaurants owners may consider is that there could be reduced portion sizes. Half the size does not necessarily have to mean half of the price. Hwang and Lorenzen (2008) found that most people are willing to pay more for a food item if they believe the food provides healthy benefits. Consumers may want to buy a higher calorie item and split it accompanied by two side salads, which still may be more healthful than each person having an entree (Gilbert, 2009). The FDA states "This increased attention to the number of calories in food offered for sale by covered establishments may then result in an increased availability of lower calorie options, and an increased demand for these options" (2011, p.6).

Social Cognitive Theory

Bandura describes self-regulation as a concept that can be challenged when choosing food (Bandura, 1997, p. 304). Self-regulation means that we can control our own behavior by incentives and changing the environment for ourselves (Bandura, 1997, p. 303). The Social Cognitive Theory explains that self-regulation can be achieved by careful management of one's intentions, but is not controlled by desires. Much like influencing others behavior, we can manage our own behavior by rewards and environmental changes (Bandura, 1997, p. 16). In this study, we will be researching the lack of self-regulation and what variables play a role for making healthy food choices. Bandura describes food as a "powerful primary reinforcer that produces instant gratification." From the way food is advertised to it's relaxing effects causes people to overeat and disregard self-regulation. Self-regulation is key for those who desire to lose weight or monitor their dietary habits (Bandura, 1997, p. 304).

Self-monitoring, goal setting, and self-reward are all divisions of self-regulation (Bandura, 1997, p. 303). Self-monitoring can be used to determine behavior and the conditions in which the particular behavior occurs. "Self-monitoring also provides the information needed for setting realistic sub goals, evaluating one's progress, and increasing one's sense of self-regulatory efficacy." Feedback is particularly effective in this division. Journaling is often recommended for people as a tool for self-monitoring. Goal-setting is another type of self-regulation. In this theory, it is important for the individual to make small, attainable goals to build on self-efficacy. Once small goals are achieved, the individual's confidence will boost in achieving subsequent, more complex goals. It is also proven that self-reward fosters behavior change. Allowing oneself to become rewarded for a desired behavior encourages change. Immediate, small rewards are more effective than rewards that may be in the future. However, some reward should be saved for longer-term allowing for sustainability of the desired behavior change (Glanz, Rimer, & Viswanath, 2008, p. 179).

Self-efficacy is another construct of the Social Cognitive Theory that is related to food choice. Self-efficacy describes the person's confidence level that he or she can perform the desired behavior. The best method to increase self-efficacy is mastery experience. This allows the individual to succeed at a task that increases in difficulty at small increments. Other methods include social modeling, improving physical and emotional states, and verbal persuasion. A social modeling example, in terms of food choice, would be showing the individual that he or she can make better choices because another person like them was challenged with the same process, but overcame it. Improving physical and emotional states is simply ensuring that an individual is in his or her quintessential state, meaning low stress and well-rested. Verbal persuasion includes encouragement and feedback from others to facilitate change through confidence (Bandura, 1997). In a study by Schwarzer and Renner (2000), it was found that the more self-efficacious a person, on average, the better his or her nutrition behaviors (p. 493).

Moral disengagement is when a person becomes morally disconnected from themselves therefore making decisions that the person otherwise probably would not make. Bandura (1999) explains moral disengagement as a secondary practice to when self-regulation is diminished.

Once a person repeats the act enough times, guiltlessness can occur causing the person to become disengaged to his or her moral standards (p. 203). If a consumer continually chooses the hamburger over a salad, he or she is more likely to make it acceptable to order the hamburger over time. One of Bandura's (1999) mechanisms is particularly applicable here. He mentions "the diffusion and displacement of responsibility" which means that responsibility of a person's harmful choices can be blamed on others (p. 193). For example, a person ordering at a restaurant may blame the restaurant for not providing the nutrition information for his or her food choices. With prior research, people are likely to inaccurately guess the caloric content in food, therefore, without labels, it is easy to displace responsibility upon the restaurant (Lansky & Brownell, 1982, p. 729).

CHAPTER III

METHODS

In this study, data were investigated from the 2012 Behavioral Risk Factor Surveillance System (BRFSS) sponsored by the Centers for Disease Control and Prevention (CDC, 2013). The BRFSS began in 1984 surveying people from 15 states. It began because scientists realized that personal behaviors were the greatest factor in determining mortality and morbidity. Today, the BRFSS is the largest telephonic health survey being conducted (CDC, 2013).

Data Source- Behavioral Risk Factor Surveillance System

The BRFSS is a survey designed around the leading causes of premature mortality and morbidity of adults. Those include the following: 1) smoking, 2) alcohol use, 3) physical activity, 4) diet, 5) hypertension, 6) safety belt use. The questions are constructed to target those specific areas. The BRFSS has a set of standard core questions that must be asked. However, individual states have an opportunity to integrate their own questions and optional modules. By gathering this data, health educators can effectively construct programs to decrease rates of mortality and morbidity (CDC, 2013).

The survey is conducted through Random Digit Dialing (RDD). It began only on landlines, but in 2011 cell phones were incorporated. In 2008, BRFSS did conduct a pilot test before using cell phone technologies (CDC, 2013). Interviewers who work for the state health departments may conduct the survey. They may also contract with telephone call centers or universities. The survey is conducted throughout the whole year. The participants are not compensated for completing the survey, but are encouraged to give data to improve the lives of Americans (CDC, 2013).

For this study, data were examined from the 2012 BRFSS. Relevant questions were examined to determine the effect of body mass index on if calorie labels help determine what the consumer orders.

Reliability and Validity

The CDC identifies six studies that examined the reliability and validity of the BRFSS (CDC, 2008). Hu, Pierannunzi, and Balluz (2011) states that "BRFSS is a valuable system for public health, and maintaining and ensuring its high quality is a priority for CDC and state health departments." The authors found the use of landlines and cell phones provides lower non coverage rates, more responses, lengthens the field period, and offers comparability for varying modes. Incorporating the cell phone mode may help reach a higher percentage of young adults, males, minors, and working groups who are all often underreported. The author suggested that the web may be a new mode for participants to respond, but suggests that would need additional research (Hu et al., 2011, p. 4). As different modes become available, the reliability of survey data will be more accurate.

Research by Fahimi, Link, Schwartz, Levy, and Mokdad (2008) compared the BRFSS with National Health and Nutrition Examination Survey (NHANES) and the National Health Interview Survey (NHIS). They did find some variation in responses among the three surveys. The authors did note that the difference could be a result of wording or weighting adjustments. Regular examination of the three tools is important because they are "critical components of the U.S. public health system, with each providing essential data for policy makers, researchers, and the public alike" (pp. 5-6).

Similar to that study, Nelson, Powell-Griner, Town, and Kovar (2003) evaluated the reliability and validity of the NHIS and BRFSS. These authors similarly found variability in answers, and added that the percentage difference in responses ranges from 0.4 to 3.0 (p. 1337).

Participants

There were a total of 475,687 participants included in the 2012 BRFSS survey including participants from all 50 states, District of Columbia, Puerto Rico, and Guam. The decision to participate relied upon the individual person.

The participants' average age was 54.67(18.103); M(SD) and had a large range from 7 to 99 years of age. Males represented 191,737 (40.3%) while females represented 283,950 (59.7%) of the respondents. The education level of participants ranged from never attended school or only kindergarten to college 4 years or more. Of these participants, 4,916 (48.03%) were white, 1,065 (10.41%) were Black or African American, 726 (7.09%) were Asian, 1,101 (10.76%) were Native Hawaiian or Other Pacific Islander, and 819 (8.00%) were American Indian. Excluded were the participants who answered "Other", "Multiracial", or refused to answer or missing.

Variables

Independent Variable

The independent variable for this study was body mass index from the 2012 BRFSS. In the BRFSS, BMI was a calculated variable using the reported height and weight. The participants' body mass indexes were calculated by weight in kilograms divided by height in meters squared. The CDC states that a BMI less than 18.5 represents "underweight", 18.5-24.9 represents "normal weight", 25.0-29.9 is "overweight", and above 30.0 is "obese" (CDC, 2012).

The weight question is 7.11 and reads, "About how much do you weigh without shoes?" The respondent was able to enter his or her weight accordingly. "777" was coded as "do not know/not sure" and "999" was entered when the respondent refused. The height question follows at 7.12 and reads, "About how tall are you without shoes?" Again, the respondent entered his or her weight while "77" represented "don't know/not sure" and "99" was used for participants who refused. For both, if the respondent already answered in kilograms or metrics, respectively, "9" was entered in column 118. All fractions were rounded up. After recoding, which was essential for hypothesis testing, if the answer was calculated as "1= underweight", "2= normal weight", or "3= overweight", the participant was recoded as "not obese". If the participant answered 4= "obese", it was recoded to "1=obese". After recoding, 28.4% were listed as obese, while 71.6% are not obese (CDC, 2012).

Dependent Variable

The dependent variable for this study was categorical and was assessed by question 3 in Module 5. It reads, "The next question is about eating out at fast food and chain restaurants. When calorie information is available in the restaurant, how often does this information help you decide what to order?" Answers were coded as 1= "Always" 2= "Most of the time," 3= "About half the time," 4= "Sometimes," 5= "Never", 6= "Never noticed or never looked for calorie information", 8= "Usually cannot find calorie information", 55= "Do not eat at fast food or chain restaurants", 77= "Don't Know/Not Sure", and 99= "Refused". The researchers decided to recode these to identify whether or not the labels were used. Recoding was used to determine if the participant did or did not use the label. If the respondent answered "Always", "Most of the time", "About half of the time", or "Sometimes", the variable was recoded 1= "Yes". If the respondent answered “Never”, the variable was recoded to 0= “No”. All other values were not necessary to evaluate since the researchers only wanted to know if he or she did or did not use the label. After recoding this variable, 56.7% of the participants did use the calorie information to make a choice on food (CDC, 2012).

Control Variables

The control variables included gender, age, annual household income, and education level. All of these were categorical variables, some which were recoded for multiple purposes.

Gender was recoded for the purpose of having meaningful descriptive statistics. In statistics, when using dichotomous variables, it is better to code them as “0” and “1”. Value labels were set at 1= Male, 2= Female. However, after recoding, they were changed to 0= Male, 1=Female. Males represented 40.3% of the participants and females represented 59.4%.

The categorical variable age was included to investigate which age groups are more likely to use labels. The question asked, “What is your age?”. In the codebook, the answers to that question were categorized into the following six categories: 18-24 years, 25-34 years, 35-44 years, 45-54 years, and 65 and older. This variable was not recoded.

To analyze income, the BRFSS writes, “Is your annual household income from all sources…” Answers were coded as 1= Less than $10,000; 2= Less than $15,000; 3= Less than $20,000; 4= Less than $25,000; 5= Less than $35,000; 6= Less than $50,000; 7= Less than $75,000; 8= $75,000 or more; 77= Don’t Know/Not Sure, and 99= Refused. Recoding into four categories was necessary because we only wanted to analyze poverty, middle class, upper class, and not answered. Therefore, the variables became 1= Less than $25,000; 2= $25,000-49,999; 3= $50,000 or more, and 9 represented missing values. Most participants (36.9%) earned a family income greater than $50,000. People who had a family income between $25,000 and $49,999 made up 22.5%, and only 26.5% earned less than $25,000 (CDC, 2012).

Education level was also recoded for purpose of if the participant could understand the menu label. When asked "What is the highest grade or year of school you completed?", the participants could choose 1= Never attended school or only kindergarten, 2= Grades 1 through 8, 3= Grades 9 through 11, 4= Grade 12 or GED, 5= College 1 year to 3 years, 6= College 4 years or more, and 9= Refused. Of all the participants, 34.4% are college graduates, 27.0% had some college, 29.3% are high school graduates, and only 8.9% did not complete high school (CDC, 2012).

Research Design

Cross-sectional studies are recommended when analyzing data from a survey. They are used when looking at data from one point in time, as opposed to over a period of time. In this case, the BRFSS is a survey that is conducted at a single period of time. Cross-sectional studies are of great benefit because they are relatively inexpensive; take little time to complete; can estimate prevalence of outcome of interest because sample is usually taken from the whole population; and many risk factors can be measured. Another great benefit to cross-sectional studies is that they can be very informative for future public health planning.

The BRFSS was used because it is nationally representative. The BRFSS, conducted by the CDC, is a reputable source that provides some of the most useful national data available. Because it is nationwide, this data is easily generalizable to other populations (CDC, 2008).

Ethics

Consent was obtained from the participant prior to beginning the BRFSS. The participants' identity is protected to achieve anonymity. The survey is voluntary and has no major risks associated with taking the survey. Because of these and because BRFSS data is publicly available, the researcher is exempt from Institutional Review Board (IRB) approval.

Data Analysis

Descriptive statistics were used to provide information about the participants' demographic data. Chi-Square was used to detect differences among the demographics in each variable. This allowed significance to be shown if there were differences among the groups.

Hypothesis testing was later conducted. Logistic Regression Analysis was used to determine the relationship between the dependent variable (whether the participant used calorie labels) and independent variable (body mass index) while controlling for age, gender, race, education level, and income level.

The association between body mass index and if the participant used calorie labels to help him or her order was estimated using odds ratio (OR) with the p value set at the .05 level, derived from logistic regression models. Statistical analyses were done using IBM SPSS Version 22.0 for Windows.

CHAPTER IV

RESULTS

Introduction

The research question for this study asks what the relationship is between an individual's BMI and whether or not he or she uses calorie labels when controlling for age, gender, income level, and highest educational level completed. Research was derived from the 2012 BRFSS, which is supported by the Centers for Disease Control. The following section shows the descriptive statistics and regression analysis results.

Recoding of Variables

Some variables were recoded for the purpose of analysis. Body mass index was recoded into "non-obese" and obese categories from "underweight", "normal weight", "overweight", and "obese". The question that assessed calorie label usage was recoded. The original question asked, "How often does this information help you order?" Instead of measuring how often a person uses the label when ordering, researchers changed it to whether or not the individual used the labels. Annual household income was recoded to reflect socioeconomic status. The original answers were recoded to "Less than $25,000", "$25,000-$49,999", and "More than $50,000". Educational level was recoded into the following four variables: "Did not complete high school", "High school graduate", "Some college", and "College graduate".

Demographic Data

Table 1 presents the demographic data of the participants involved in the 2012 BRFSS. There were a total of 475,685 participants, mostly comprised of non-obese females, over the age of 65 that are college graduates, and earn an annual household income of $50,000 or more. Below are the descriptive characteristics of all participants.

Table 1: BRFSS Participant Characteristics

Characteristic	n	%
Demographics		
Anatomical Sex		
Male	191,737	40.3
Female	283,950	59.7
Age		
18-24	24,894	13.0
25-34	47,771	10.0
35-44	59,708	12.5
45-54	83,400	17.5
55-64	102,793	21.6
65+	152,541	32.0
Ethnicity		
White	4,916	48.0
Black	1,065	10.4
Asian	726	7.0
Pacific Islander	1,101	10.8
American Indian	819	8.0
Education		
Did Not Complete High School	42,351	8.9
High School Graduate	139,501	29.3
Some College	128,404	27.0
College Graduate	163,510	34.4
Income		
Less than $25,000	126,108	26.5
$25,000-$49,999	107,229	22.5
Above $50,000	175,605	36.9
BMI		
Not Obese	322,556	67.8
Obese	127,656	26.8
Used Calorie Labels		
Yes	57,882	56.7
No	44,291	43.3

Abbreviations: n= number, BMI=body mass index

Table 1 shows descriptive characteristics of participants and the variables of interest. Women accounted for 59.7% of the sample, while males comprised 40.3%. Most participants were aged 65 or older (32.0%). A substantial discrepancy occurred in race with whites representing 48.0% of the sample, blacks representing 10.4%, and Asian and American Indian representing less than 10% each. Most participants (34.4%) were college graduates, but 27.0% had some college education. Nearly 37% of participants had an annual household income of $50,000 or more. Only 22.5% earned between $25,000 and $49,999 while even more (26.5%) made less than $25,000 annually. Non-obese individuals (67.8%) comprised most of the sample and 56.7% of participants reporting using the labels at least once.

Table 2. Cross Tabulations of Participants' Age with Other Variables

		Age						
		18-24	25-34	35-44	45-54	55-64	65+	Total
Anatomical Sex	Male	12,208	20,826	25,351	34,796	43,072	55,484	191,737
		(49.0%)	(43.6%)	(42.1%)	(41.5%)	(40.5%)	(36.4%)	(40.3%)
	Female	12,689	26,993	34,925	49,058	63,194	97,091	283,950
		(51.0 %)	(56.4%)	(57.9%)	(58.5%)	(59.5%)	(63.6%)	(59.7%)
Ethnicity	White	422	595	570	877	1,120	1,332	4,916
		(35.5%)	(36.6%)	(37.5%)	(49.4%)	(56.6%)	(62.1%)	(48.0%)
	Black	162	212	172	187	156	176	1,065
		(13.6%)	(13.0%)	(11.3%)	(10.5%)	(7.9%)	(8.2%)	(10.4%)
	Asian	160	156	139	114	82	75	726
		(13.5%)	(9.6%)	(9.1%)	(6.4%)	(4.1%)	(3.5%)	(7.1%)
	Pacific Islander	167	249	211	183	152	139	1,101
		(14.1%)	(15.3%)	(13.9%)	(10.3%)	(7.7%)	(6.5%)	(10.8%)
	American Indian	73	112	141	142	192	159	819
		(6.1%)	(6.9%)	(9.3%)	(8.0%)	(9.7%)	(7.4%)	(8.0%)
Education	Did Not Complete High	2,394	3,798	4,274	6,216	7,308	18,361	42,351
	School	(9.6%)	(8.0%)	(7.1%)	(7.4%)	(6.9%)	(12.1%)	(8.9%)
	High School Graduate	9,083	11,241	13,734	24,020	29,515	51,908	139,501
		(36.6%)	(23.6%)	(22.9%)	(28.7%)	(27.9%)	(34.2%)	(29.4%)
	Some College	9,345	13,358	15,854	22,571	29,638	37,638	128,404
		(37.6%)	(28.0%)	(26.4%)	(27.0%)	(28.0%)	(24.8%)	(27.1%)
	College Graduate	3,999	19,264	26,179	30,765	39,280	44,023	163,510
		(16.1%)	(40.4%)	(43.6%)	(36.8%)	(37.1%)	(29.0%)	(34.5%)
Income	<$25K	9,193	13,031	12,282	18,528	24,768	48,306	126,108
		(48.5%)	(29.9%)	(22.2%)	(24.5%)	(26.7%)	(39.4%)	(30.8%)
	$25K-$49,999	4,781	12,000	11,682	16,116	23,171	39,479	107,229
		(25.2%)	(27.5%)	(21.1%)	(21.3%)	(25.0%)	(32.2%)	(26.2%)
	>$50K	4,971	18,554	31,277	41,124	44,820	34,859	175,605
		(26.2%)	(42.6%)	(56.6%)	(54.3%)	(48.3%)	(28.4%)	(42.9%)
BMI	Not Obese	19,579	32,726	39,437	54,088	67,395	109,331	322,556
		(83.9%)	(74.1%)	(69.4%)	(67.9%)	(67.4%)	(74.7%)	(71.6%)
	Obese	3,767	11,412	17,376	25,590	32,569	36,942	127,656
		(16.1%)	(25.9%)	(30.6%)	(32.1%)	(32.6%)	(25.3%)	(28.4%)
Used Labels	No	2,421	4,374	5,223	7,872	9,566	14,835	44,291
		(44.6%)	(41.2%)	(39.1%)	(41.7%)	(41.7%)	(47.9%)	(43.3%)
	Yes	3,006	6,255	8,131	11,004	13,377	16,109	57,882
		(55.4%)	(58.8%)	(60.9%)	(58.3%)	(58.3%)	(52.1%)	(56.7%)

Abbreviations: BMI= body mass index

Table 2 above reveals the age of participants in each of the other variables. Most of the males and females were over the age of 65. Most whites were over the age of 65, but most blacks were between the ages of 25 and 34. In each of the education and income categories, most people were over the age of 65. In the 65 and older category, 109,331 people were not obese, while only 36,942 were obese. More people used labels to help them make a choice than did not use labels in each of the age categories.

Table 3. Cross Tabulations of Participants' Ethnicity with Other Variables

		Ethnicity					
		White	Black	Asian	Pacific Islander	American Indian	Total
Anatomical Sex	Male	2,214 (45.0%)	399 (37.5%)	334 (46.0%)	475 (43.1%)	391 (47.7%)	3,338 (44.4%)
	Female	2,702 (55.0%)	666 (62.5%)	392 (54.0%)	626 (56.9%)	428 (52.3%)	4,188 (55.6%)
Education	Did Not Complete High School	483 (9.8%)	103 (9.7%)	29 (4.0%)	63 (5.7%)	126 (15.4%)	741 (9.9%)
	High School Graduate	1,521 (31.0%)	274 (25.8%)	195 (27.0%)	518 (47.0%)	222 (27.1%)	2,212 (29.4%)
	Some College	1,652 (33.6%)	385 (36.3%)	231 (32.0%)	287 (26.1%)	305 (37.2%)	2,573 (34.2%)
	College Graduate	1,255 (25.6%)	300 (28.2%)	268 (37.1%)	233 (21.2%)	166 (20.3%)	1,989 (26.5%)
Income	<$25K	1,715 (39.6%)	417 (45.6%)	171 (26.5%)	360 (36.1%)	375 (51.9%)	2,678 (40.5%)
	$25K-$49,999	1,166 (26.9%)	241 (26.3%)	170 (26.3%)	294 (29.5%)	154 (21.3%)	1,731 (26.2%)
	>$50K	1,446 (33.4%)	257 (28.1%)	305 (47.2%)	344 (34.5%)	194 (26.8%)	2,202 (33.3%)
BMI	Not Obese	3,264 (68.8%)	624 (62.2%)	546 (77.9%)	648 (60.7%)	509 (64.7%)	4,943 (68.3%)
	Obese	1,480 (31.2%)	380 (37.8%)	155 (22.1%)	419 (39.3%)	278 (35.3%)	2,293 (31.7%)
Used Labels	No	585 (45.7%)	87 (37.2%)	159 (40.4%)	249 (35.0%)	104 (49.8%)	935 (44.1%)
	Yes	696 (54.3%)	147 (62.8%)	235 (59.6%)	462 (65.0%)	105 (50.2%)	1,183 (55.9%)

Abbreviations: BMI= body mass index

Table 3 exhibits the numerical differences of participants' ethnicities in each of the variables. Ethnicity and age are shown in table 2. In every ethnicity, more people used the labels than did not use the labels. Most whites, blacks, and American Indians were female, had some college education, made less than $25,000 and were not obese. Most Asians were females, college graduates, made more than $50,000 annually and were not obese.

Table 4. Cross Tabulations of Participants' Highest Level of Completed Education with Other Variables

		Education				
		Did Not Complete High School	High School Graduate	Some College	College Graduate	Total
Anatomical Sex	Male	16,907 (39.9%)	55,873 (40.1%)	48,170 (37.5%)	70,033 (42.8%)	190,983 (40.3%)
	Female	25,444 (60.1%)	83,628 (59.9%)	80,234 (62.5%)	93,477 (57.2%)	282,783 (59.7%)
Income	<$25K	24,555 (73.3%)	50,915 (43.7%)	33,851 (30.3%)	16,575 (11.3%)	125,896 (30.8%)
	$25K-$49,999	6,429 (19.2%)	36,383 (31.2%)	34,023 (30.4%)	30,280 (20.7%)	107,115 (26.2%)
	>$50K	2,516 (7.5%)	29,345 (25.2%)	43,980 (39.3%)	99,680 (68.0%)	175,521 (43.0%)
BMI	No	25,517 (65.1%)	90,759 (68.6%)	84,843 (69.6%)	120,860 (77.4%)	321,979 (71.6%)
	Yes	13,671 (34.9%)	41,520 (31.4%)	37,029 (30.4%)	35,272 (22.6%)	127,492 (28.4%)
Used Labels	No	3,891 (52.5%)	14,701 (49.6%)	12,730 (43.9%)	12,878 (35.8%)	44,200 (43.3%)
	Yes	3,515 (47.5%)	14,913 (50.4%)	16,257 (56.1%)	23,102 (64.2%)	57,787 (56.7%)

Abbreviations: BMI= body mass index

Table 4 displays cross tabulations of education with the other variables. Age and ethnicity are excluded in this table because they are shown in tables 2 and 3, respectively. Most participants in each variable were female. Participants who did not complete high school made less than $25,000 annually, were not obese, and did not use labels. High school graduates made less than $25,000 annually, were not obese, but did use labels. Participants with some college education made greater than $50,000 annually, were not obese, and did use labels. Most college graduates made over $50,000 annually, were not obese, and did use labels to make a decision on food.

Table 5. Cross Tabulations of Participants' Annual Household Income with Other Variables

		Income <$25K	$25K-$49,999	>$50K	Total
Anatomical Sex	Male	44,201 (35.1%)	44,665 (41.7%)	82,188 (46.8%)	171,054 (41.8%)
	Female	81,907 (64.9%)	62,564 (58.3%)	93,417 (53.2%)	237,888 (58.2%)
BMI	Not obese	79,956 (66.5%)	72,547 (70.3%)	126,451 (74.5%)	278,954 (71.0%)
	Obese	40,231 (33.5%)	30,611 (29.7%)	43,206 (25.5%)	114,048 (29.0%)
Used Labels	No	11,809 (47.8%)	11,049 (45.7%)	15,625 (38.3%)	38,483 (42.9%)
	Yes	12,904 (52.2%)	13,112 (54.3%)	25,223 (61.7%)	51,239 (57.1%)

Abbreviations: BMI= body mass index

Table 5 shows the cross tabulations of income in the following categories: sex, BMI, and whether a person used labels. Age, ethnicity, and education are in tables 2, 3, and 4, respectively. Most females and males made over $50,000 annually. People who were not obese was nearly triple the people who were obese. Most of the people who used labels to make a decision on food made more than $50,000 annually.

Table 6. Cross Tabulations of Participants' BMI with Other Variables

		BMI		
		Not Obese	Obese	Total
Anatomical Sex	Male	134,055 (41.6%)	54,151 (42.4%)	188,206 (41.8%)
	Female	188,501 (58.4%)	73,505 (57.6%)	262,006 (58.2%)
Used Labels	No	30,701 (44.2%)	11,854 (42.4%)	42,555 (43.7%)
	Yes	38,769 (55.8%)	16,121 (57.6%)	54,890 (56.3%)

Abbreviations: BMI= body mass index

Table 6 conveys cross tabulations of BMI with sex and whether a person used labels to make a decision on food. Age, ethnicity, education, and income cross tabulations with BMI are in tables 2, 3, 4, and 5, respectively. Non-obese females accounted for 188,501 of the sample, while males accounted for 134,055 of the sample. Most people who used labels were not obese (38,769).

Table 7. Cross Tabulations of Participants' Label Usage with Other Variables

		Used Labels		
		No	Yes	Total
Anatomical Sex	Male	22,928 (51.8%)	18,561 (32.1%)	41,489 (40.6%)
	Female	21,363 (48.2%)	39,321 (67.9%)	60,684 (59.4%)

Abbreviations: BMI= body mass index

Table 7 shows the cross tabulation of whether a person used labels and their gender. Age, ethnicity, education, income, and obese are shown in tables 2, 3, 4, 5, and 6, respectively. Most females used labels (39,321), while most males did not (22,928). Over double the amount of females used labels (39, 321) compared to males (18,561).

Table 8. Demographics for Percent of Population Characteristics[a]

Variable Name	Did not use calorie labels	Did use calorie labels	Total	Rao-Scott X^2	P Value
Gender				4037.48	< .01*
Male	51.8	32.1	40.6		
Female	48.2	67.9	59.4		
Age Category				434.17	< .01*
18-24	5.5	5.2	5.3		
25-34	9.9	10.8	10.4		
35-44	11.8	14.0	13.1		
45-54	17.8	19.0	18.5		
55-64	21.6	23.1	22.5		
65+	33.5	27.8	30.3		
Education				1572.80	< .01*
Did not complete high school	8.8	6.1	7.3		
High school graduate	33.3	25.8	29.0		
Some College	28.8	28.1	28.4		
College graduate	29.1	40.0	35.3		
Income				680.92	< .01*
Less than $25K	30.7	25.2	27.5		
$25K-$49,999	28.7	25.6	26.9		
Above $50K	40.6	49.2	45.5		
BMI				26.84	< .01*
Not Obese	44.2	55.8	71.3		
Obese	42.4	57.6	28.7		

[a]The above values represent the percentage of population characteristics. Percentages were rounded to the hundredth place.
Total population percentages for did not use calorie labels and did use calorie labels were 43.7% and 56.3%, respectively.
Abbreviations: BMI, body mass index
*Indicates statistical significance at the $p < 0.05$ level.

Table 8 reveals that 67.9% of females used calorie labels, as opposed to only 32.1% of males. Individuals over the age of 65 reported using the calorie labels more than any other age group. Forty percent of college graduates used the labels, as opposed to those who did not graduate high school at 6.1%. A difference in income exist between those who earn an annual income of 49.2% using labels and those making less than $25,000 (25.2%). Out of those who are obese, 57.6% reported using the labels while only 42.4% did not use the labels.

Table 9. Adjusted Odds Ratios for Used Calorie Labels

Variable Name	Did use calorie labels
Gender	
Male	[Reference]
Female	2.482 (2.413 - 2.554)*
Age Category	
18-24	[Reference]
25-34	0.901 (0.833 - 0.974)*
35-44	0.906 (0.840 - 0.978)*
45-54	0.832 (0.774 – 0.895)*
55-64	0.833 (0.776 – 0.895)*
65+	0.717 (0.668 – 0.768)*
Education	
Did not complete high school	[Reference]
High school graduate	1.021 (0.962 - 1.083)
Some College	1.223 (1.151 - 1.299)*
College graduate	1.683 (1.582 - 1.790)*
Income	
Less than $25K	[Reference]
$25K-$49,999	1.073 (1.033 - 1.115)*
Above $50K	1.337 (1.288 - 1.388)*
BMI	
Not obese	[Reference]
Obese	1.160 (1.125 - 1.196)*

The above Odds Ratios were calculated using logistic regression with “Did Not Use Calorie Labels” selected as the reference group.
Abbreviations: CI, Confidence Interval; BMI, Body Mass Index.
*Indicates statistical significance $p < 0.05$.

The odds ratio of females to males that did use calorie labels was 2.482 (CI= 2.413, 2.554). Twice as many females used the labels as males. Participants aged 18-24 were used as a reference label. All other age categories showed significance. Participants aged 25-34 had an odds ratio of 0.901 (CI= 0.833, 0.974). Participants aged 35-44 had an odds ratio of 0.906 (CI= 0.840, 0.978). Participants aged 45-54 had an odds ratio of 0.832 (CI= 0.774, 0.895). Participants aged 55-64 had an odds ratio of 0.833 (CI= 0.776, 0.895). Participants aged 65 and older had an odds ratio of 0.717 (CI= 0.668, 0.768). In the education variable, people who did not complete high school and used labels were used as the reference category. High school graduates did not show significance in using labels (OR= 1.021, CI=0.962, 1.083). Participants with some college education, however, did show significance (OR=1.223, CI= 1.151, 1.299). College graduates also showed significance (OR= 1.683, CI=1.582, 1.790). Participants making less than $25,000 and that used labels were used as a reference category. Participants with an annual household income making between $25,000 and $49,999 had an odds ratio of 1.073 (CI= 1.033, 1.115). Participants who made over $50,000 was also significant (OR= 1.337, CI= 1.288,1.338). Participants who were not obese and used calorie labels were used as a reference category for BMI. People who were obese showed significance (OR=1.160, CI= 1.125, 1.196).

CHAPTER V

DISCUSSION

This study examined the effect of an individual's body mass index on whether he or she uses calorie labels. The purpose arises from new legislation mandating restaurants to post calorie labels beside its respective food. This study isolated key demographics of the people who participated in the BRFSS and who use calorie labels, therefore directing further interventions towards specific populations.

Cross Tabulations

Participants were made up of mostly women (59.4%) and people over the age of 65 (40.3%). The participants were mostly college graduates (35.3%) who have a household income of $50,000 or more (45.5%). Non-obese individuals comprised 71.3% of the sample. Most of the participants (56.7%) reported using calorie information on menu boards.

Logistic Regression

Results from the logistic regression showed that the null hypothesis can be rejected. There was a statistically significant difference between non-obese and obese individuals who use calorie labels. Results from this study showed that individuals who are obese are more likely to use calorie labels than non-obese individuals (OR=1.16, CI=1.125,1.196). This is antagonistic to the current hypothesis, but coincides with the previous literature by Breck et al. (2014). Breck et al. (2014) stated that obese individuals were more likely to use the calorie labels at the point-of-purchase in their telephonic survey. Body mass index did not have any significance with health literacy (Sinclair et al., 2013, p.771). However, body mass index was associated with a high intake of high calorie foods (Jeffrey et al., 2009, p. 238). People who avoided reading the labels in the study by Loureiro et al. (2012) were often more obese than those who did read the labels (p. 333).

Income

Individuals with an annual household income of $50k or more used labels were more likely to use labels than those who made $25k-$49,999 (OR=1.337, CI=1.288,1.388). Also, individuals making $25k-$49,999 were more likely to use the labels than people with an annual household income of less than $25k (OR=1.073, CI=1.033,1.115). In the study by Breck at al (2014), people with a household income of $60k were influenced by the labels more than individuals making between $40k-$60k, or less (p. 33-34). In the study by Sinclair et al. (2013) where comprehension was examined, income was significant when individuals making over $80,000 were compared to those who make less than $40,000 (p. 772). Nayga (2000) proved that income affected the knowledge of nutrition, but not whether the individual makes the choice to use the label or not (p. 107). In the study by Breck et. al (2014), individuals making over $60,000 annually made a healthier decision than all other income categories (p. 33).

Education

Education displayed significant results showing that individuals who graduated college were more likely to use the labels than individuals in the "some college" category (OR=1.683, CI=1.582,1.790). The "some college" category was more likely to use the labels than high school graduates and individuals who did not complete high school (OR=1.223, CI=1.151,1.299). There is no significance between high school graduates and individuals who did not complete high school. This data shows the noteworthiness of going to college (OR=1.021, CI=0.962,1.083). Loureiro et al. (2012) reported that educated people are more likely to use labels than less educated people (p. 333). However, these results are in opposition to the previous literature by Breck et al. (2014) results that showed people with a high school degree or less are more likely to use the labels than any other education category (p. 33-34). Sherry (2010) stated that people with a lower education level are more likely to incorrectly guess the number of calories (p.768, 770-771). Education had no relationship to nutrition knowledge in the study by Nayga (2000). In the formatting study by Borgmeier and Westenhoefer (2009), education was not significant in any of the formats of labels. Although, education and sodium had a positive relationship in the traffic color GDA and the colored GDA formats. Higher education was significantly related to higher protein intake in those formats, as well (p. 184).

Gender

According to table 2, females were more likely than males to use the calorie information (OR=2.482, CI=2.413, 2.554). Previous research from Breck et al. (2014) agreed with this reporting females used calorie labels more than males at the point-of-purchase. Females also used labels more than men in that study's other categories: "saw labels, but unsure if it helped make a more healthful choice" and "saw and were influenced by the labels" (p. 33-34). Loureiro et al. (2012) reported a 16% discrepancy of women reading the labels more than men (p. 333). Also consistent is Nayga (2000) where results showed males are less likely to use labels than females. In the formatting label study by Borgmeier and Westenhoefer (2009), gender did not produce any significant results in any of the formats, but women did have more correct answers when knowing which label was a healthier item (Borgmeier & Westenhoefer, 2009 p.184).

Age

In this study, age showed to be significant in each of the six categories. Participants 65 and older used labels more than participants in all other categories. In previous literature (Breck et al., 2014), older individuals were more likely to use the calorie labels than younger people. Nayga (2000), however, shows that there were no significant differences for label use with age.

Future Research

Using the Nagelkerke R^2, it is implied that the model only accounted for 8.6% of the variance in whether or not someone chooses to use labels. Future research should be aimed at identifying other variables that have an impact on using calorie labels.

Research should also be conducted to examine a causal relationship between BMI and using calorie labels. With this information, we know obese individuals use calorie labels more, but it is unclear if it is because of an effort to decrease their weight. There is currently limited literature on why people use calorie labels.

Clear, concise presentation of nutrition facts is necessary because of frequent miscomprehension of nutritional labels (Pelletier et al., 2004, p. 321). While the Food and Drug Administration is proposing changes to the nutrition facts label, consumers still may be confused while eating outside of the home (FDA, 2014; Pelletier et al., 2004, p.321). The multiple traffic light labels on grocery store items was a useful tool for consumers to make healthier decisions in the study by Borgmeier and Westenhoefer (2009, p.184). Perhaps this tool could produce similar results in restaurants, where most of the Americans food budget is spent (Hensley & Stensson, 2008).

Future analyses should include race. Because of race being asked in multiple questions in the BRFSS, analysis among different labels was difficult. Prior research shows race could be valuable in research (Nayga, 2000, p. 107; Breck et al., 2012, p. 33).

Limitations

This study has known limitations. All data is reliant upon the respondent's honesty while completing the survey. The participant is also likely to have mortality because of the length of the survey. Both of these can be threats to the validity of the study.

Race was omitted from analysis in this research. While we intended to analyze race as a covariate, it was found that data was improperly collected, making it difficult to draw definite conclusions.

Implications

Without consideration of the limitations, this study provides essential information to predict what demographics are more likely to use calorie labels. Labels were found to have a significant impact on a consumer's ability to make a healthier choice (Borgmeier & Westernhoefer, 2009, p. 184). Regardless of desirability, the option of an informed choice will be available.

With new health policies being implemented in 2015, it is crucial that health educators serve as a resource person and advocate for advances in research. This particular study enlightens educators about specific populations that could be targeted in nutrition education. Young males, lower income individuals, and high school graduates are of particular concern.

Another implication of this study is directed at restaurant owners. This study shows information that could be vital in sustaining a business. For instance, now that we know women are more likely to use the labels, females will likely purchase an item with a lower calorie content. A restaurant whose consumers are predominantly female should focus on lower calorie options. On the other hand, a sports bar, or mainly male dominated restaurant, may not have to take as many precautions. Customers may naturally become more interested in healthy option and have increased concern for nutrition in general. Because of this, healthful alternatives should be plentiful in the restaurants to avoid any loss of revenue. This may even attract customers who would not have normally visited the restaurant. Careful marketing should be implemented during this time of change.

Conclusion

This study concludes that there is a positive relationship between BMI and using calorie labels. Soon, people will be able to make more informed decisions on food choice, a fundamental aspect of life. It is hoped that the obesity epidemic will decline as a result of menu labeling and more extensive research.

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APPENDIX A: 2012 BRFSS QUESTIONS

2012 BRFSS SURVEY QUESTIONS

7.1 What is your age?

_ _ Code age in years

0 7 Don't Know/Not Sure

0 9 Refused

7.4 Which one of these groups would you say best represents your race?

(Check all that apply)

Please read:

1 White
2 Black or African American
3 Asian
4 Native Hawaiian or Other Pacific Islander
5 American Indian or Alaska Native

Or

6 Other [specify]_______________

Do not read:

7 Don't know/Not sure
9 Refused

7.8 What is the highest grade of year of school you completed?

Read only if necessary:

1 Never attended school or only attended kindergarten
2 Grades 1 through 8 (Elementary)
3 Grades 9 through 11 (Some high school)
4 Grade 12 or GED (High school graduate)
5 College 1 year to 3 years (Some college or technical school)
6 College 4 years or more (College graduate)

Do not read:

9 Refused

7.10 Is your annual household income from all sources---

If respondent refuses at ANY income level, code '99' (Refused)

Read only if necessary:

0 4 Less than $25,000 **If "no," ask 05; if "yes." ask 03**
($20,000 to less than $25,000)

0 3 Less than $20,000 **If "no," code 04; if "yes." ask 02**
($15,000 to less than $20,000)

0 2 Less than $15,000 **If "no," code 03; if "yes." ask 03**
($10,000 to less than $15,000)

0 1 Less than $10,000 **If "no," code 02**

0 5 Less than $35,000 **If "no," ask 06**
($25,000 to less than $35,000)

0 6 Less than $50,000 **If "no," ask 07**
($35,000 to less than $50,000)

0 7 Less than $75,000 **If "no," code 08**
($50,000 to less than $75,000)

0 8 $75,000 or more

Do not read:

7 7 Don't know/Not sure
9 9 Refused

7.11 About how much do you weight without shoes?

NOTE: If respondent answers in metrics, put "9" in column 118.

Round fractions up

_ _ _ _ Weight (*pounds/kilograms)*
7 7 7 7 Don't know/ Not sure
9 9 9 9 Refused

7.12 About how tall are you without shoes?

NOTE: If respondent answers in metrics, put "9" in column 122.

Round fractions down

_ _ / _ _ Height (f t / inches/meters/centimeters)
7 7 / 7 7 Don't know/Not sure
9 9 / 9 9 Refused

7.20 Indicate sex of respondent. **Ask only if necessary.**

1 Male
2 Female

3. The next question is about eating out at fast food and chain restaurants. When calorie information is available in the restaurant, how often does this information help you decide what to order?

Please read:

01 Always
02 Most of the time
03 About half the time
04 Sometimes
05 Never

Do not read:

06 Never noticed or never looked for calorie information
08 Usually cannot find calorie information
55 Do not eat at fast food or chain restaurants
77 Don't know/Not sure
99 Refused