

Association Between Socio-demographic Characteristics and Fast Food Calorie
Menu Labeling Use and Awareness among Adults Living in the Southwest

by

Jessie Green

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Graduate Supervisory Committee:

Punam Ohri-Vachaspati, Chair
Meg Bruening
Christopher Wharton

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ABSTRACT

As part of the recently passed Patient Protection and Affordable Care Act, chain restaurants with 20 or more locations nationwide are required to post calorie information on menus and menu boards in order to help consumers make healthier decisions when dining out. Previous studies that have evaluated menu-labeling policies show mixed results and the majority have been conducted in urban cities along the east coast. This study was the first to look at the effectiveness of menu labeling in a southwest population. The primary objective of this cross-sectional study was to determine if noticing or using calorie menu labels in a fast food restaurant was associated with purchasing fewer calories. A second aim of this study was to evaluate the relationship between socio-demographic characteristics and the likelihood of noticing and using menu labeling. Customer receipts and survey data were collected from 329 participants using street-intercept survey methodology at 29 McDonald's locations in low- and high-income neighborhoods throughout the Phoenix metropolitan area. The study population was 63.5% male, 53.8% non-Hispanic white, and 50.8% low-income. Results showed that almost 60% of the study sample noticed calorie menu labeling and only 16% of participants reported using the information for food or beverage purchases. Income was the only socio-demographic characteristic that was associated with noticing menu labeling, with higher-income individuals being more likely to notice the information ($p=0.029$). Income was also found to be associated with using menu labels, with higher income individuals being more likely to use the information ($p=0.04$). Additionally, individuals with a bachelors degree or higher were more likely to use the information ($p=0.023$) and individuals aged 36 to 49 were least likely to use the information

($p=0.046$). There were no significant differences in average calories purchased among those who noticed menu labeling; however, those who reported using calorie information purchased 146 fewer calories than those who did not use the information ($p=0.001$).

Based on these findings it is concluded that calorie menu labeling is an effective public policy and that nutrition education campaigns should accompany national menu labeling implementation in order to make the policy more effective across all socio-demographic groups.

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CHAPTER 1

INTRODUCTION

Expenditure on away-from-home food reached an all-time high in the United States in 2011 at 641 billion dollars.¹ Based on data from 2005-2008, the percent of food eaten at home has decreased from 82% in 1977-1978 to 68.5%.² Of food purchased away from home in 2011, 80% percent was purchased at full-service restaurants and limited-service eating-places, such as fast food restaurants.¹ It is currently estimated that one in four Americans visit a fast food or full-service restaurant at least once per day, in which an average of 1,032 calories, or half of the daily recommendation, are consumed.³⁻⁶ In general, frequently eating out, especially at fast food restaurants, is associated with greater weight gain and obesity, greater body fat, higher LDL cholesterol levels, and greater insulin resistance.⁷⁻¹² Additionally, due to the rapid increase in obesity rates over the past three decades and the health outcomes associated with obesity, for the first time in modern history, today's youth may live shorter lives than their parents,¹³ making obesity a public health priority.¹⁴

During the 2009-2010 state legislative sessions, only 13% of over 500 proposed bills designed to combat the obesity epidemic were enacted.¹⁵ Furthermore, calorie menu labeling has been one of the only public policies that has passed into federal law since the Surgeon General's Call to Action to Prevent and Decrease Overweight and Obesity in 2001.¹⁶ As part of the Patient Protection and Affordable Care Act, which was approved in March of 2010, chain restaurants and food vendors with 20 or more locations nationwide are required to post calorie information on menus and menu boards.¹⁷ The goal of menu labeling is to help consumers make healthier decisions when consuming

food away from home.^{18, 19} Studies show that both the average consumer and nutrition experts have trouble estimating the caloric and nutrient content of an average meal,²⁰⁻²³ and that the majority of the general public want restaurants and eating establishments to have menu labeling.^{18, 19, 24-25}

While there is substantial support demonstrating the need and potential benefits of calorie menu labeling, there is a lack of evidence showing that it is an effective strategy in reducing obesity rates. Weight gain is a result of high-energy intake and low-energy expenditure. Using calorie menu labeling as a solution for obesity is based on the assumption that if consumers are provided calorie information, they will choose lower-calorie options.^{26, 27} Whether this assumption plays out in the real world is still up for debate as few studies have evaluated menu labeling as an effective public policy, and of those that have, results are mixed.^{18-19, 24-25, 28-44} Some studies show that menu labeling leads to a reduction in the total number of calories ordered or purchased,^{18, 25, 31, 33-36} and consumed,¹⁸ while others show that menu labeling has no impact on purchase or consumption behavior.^{24, 28-29, 32, 37-39} Furthermore, of the studies that have been conducted, only a few^{23, 25, 28-29, 30-31, 34, 37, 41} look at “real world” calorie purchase behaviors in which individual purchases are observed and analyzed in an actual restaurant setting. Studies that are conducted in a natural food environment utilizing pre-post and/or a comparison group are particularly important because they provide a more realistic picture of the factors that influence the decision-making process.¹⁹ Additionally, these types of studies have the greatest ability to capture the impact of calorie menu labeling in real time. Most studies have been conducted in a laboratory setting using a simulated restaurant experience,^{18, 24, 32-33} or look retrospectively at purchasing history of an entire

restaurant chain.^{24, 35-38, 42} While studies that are conducted in a laboratory setting are beneficial because they can show actual casual relationships, they are not always able to capture naturalistic behaviors. Additionally, the majority of the research on this topic has been conducted in urban cities along the east coast.^{18, 23-24, 28-31, 34, 37, 40-41, 43-44} Results from these studies can only be extrapolated to the population from which the study sample was drawn from and they cannot be generalized to the entire U.S. population.

In terms of demographic discrepancies, only a few studies have looked at differences among individuals who report noticing or using calorie information, and these results are also mixed.^{25, 30-32, 39, 42} Some studies show that females are more likely than males to use calorie information,^{25, 31, 39, 42} while others show that males are more likely to use the information.³⁰ Some studies show that higher income patrons are more likely to use calorie information,³¹ while others fail to show this relationship.^{25, 32, 39, 42} There seems to be a consensus that individuals with a higher education level are more likely to notice or use menu labels; however, only a few studies have demonstrated this phenomenon.^{32, 39} Results are also mixed among different age groups. Some studies show that individuals between the ages of 18 to 24 are more likely to notice the information but individuals between the ages of 25 to 44 are more likely to use the information.^{30, 32, 35} Other studies have found that adults over the age of 54 are more likely to use the information.³⁹

To the best of our knowledge, there have been no studies that have examined the effectiveness of menu labeling in a southwest population. One reason for this could be that prior to the McDonald's franchise announcing its plan to post calorie information on menus nation-wide in the fall of 2012,⁴⁵ few restaurant chains in the southwest region of

the United States voluntarily provided calorie information to customers at the point-of-purchase. Currently, Arizona does not have a mandatory menu labeling law,¹⁵ and the Food and Drug Administration has not yet released nation-wide calorie menu labeling guidelines as part of the Patient Protection and Affordable Care Act. This study is the first to look at the effectiveness of menu labeling in a southwest population using McDonald's menu labels. Additionally, this study is one of the first to look at how menu labeling is associated with socio-demographic characteristics, such as age, gender, race, ethnicity, income, education level, number of children, and frequency of fast food visits in a mixed income and diverse population. While the rates of obesity have increased across all demographics, specific groups are more affected by obesity rates than others,⁴⁶⁻⁴⁸ creating health disparities between demographic groups. In the same context, if certain groups are more likely to notice and use calorie menu labeling to make healthier choices than other groups, then calorie menu labeling as a public policy may lead to larger health disparities between different demographic groups. Additionally, this study has the potential to identify future interventions for groups that are less likely to benefit from calorie menu labeling as it is currently implemented.

Study Purpose

The primary objective of this cross-sectional study was to determine if noticing or using calorie menu labels in a fast food restaurant was associated with purchasing fewer calories. A second aim of this study was to evaluate the relationship between socio-demographic characteristics of adult restaurant patrons (such as age, gender, income, education level, race, ethnicity, number of children, and frequency of fast food visits) and

the likelihood of noticing and using calorie menu labeling in the Phoenix metropolitan area.

Aims and Hypotheses

The study addressed the following research questions. Individual hypotheses are provided for each research question.

1. *Do patrons who notice or use calorie menu labeling order fewer calories compared to patrons who do not notice or use calorie menu labeling?* (Survey questions Q6, Q6b, Q6bi, Q6c, Q6ci, see Appendix A).

Hypothesis:

A. Patrons who notice or use calorie menu labeling will order fewer calories compared to patrons who do not notice or use calorie menu labeling.

2. *Are socio-demographic characteristics of adult fast-food restaurant patrons associated with the likelihood of their noticing calorie menu labeling?* (Survey question Q6, see Appendix A).

Hypotheses:

A. Higher-income individuals are more likely to notice calorie menu labeling than lower-income individuals.

B. Women are more likely to notice calorie menu labeling than men.

C. Individuals with higher education levels are more likely to notice calorie menu labeling than individuals with lower education levels.

- D. Non-Hispanic whites are more likely to notice calorie menu labeling than other racial or ethnic groups.
- E. Individuals between the ages of 26 and 35 are more likely to notice calorie menu labeling than younger or older age groups.
- F. Individuals who have children are more likely to notice calorie menu labeling than individuals who do not have children.
- G. Individuals who frequent fast food restaurants more than once per week are more likely to notice calorie menu labeling than individuals who frequent fast food restaurants once per week or less.

3. Are socio-demographic characteristics of adult fast-food restaurant patrons associated with the likelihood of their using calorie menu label information to purchase food and/or beverage items. (Survey questions Q6b and Q6c, see Appendix A).

Hypotheses:

- A. Higher-income individuals are more likely to use calorie menu labeling to purchase food and/or beverage items than lower-income individuals.
- B. Women are more likely to use calorie menu labeling to purchase food and/or beverage items than men.
- C. Individuals with higher education levels are more likely to use calorie menu labeling to purchase food and/or beverage items than individuals with lower education levels.
- D. Non-Hispanic whites are more likely to use calorie menu labeling to purchase food and/or beverage items than other racial or ethnic groups.

E. Individuals between the ages of 36 and 49 are more likely to use calorie menu labeling to purchase food and/or beverage items than younger or older age groups.

F. Individuals who have children are more likely to use calorie menu labeling to purchase food and/or beverage items than individuals who do not have children.

G. Individuals who frequent fast food restaurants more than once per week are more likely to use calorie menu labeling to purchase food and/or beverage items than individuals who frequent fast food restaurants once per week or less.

Definition of Terms

- Body Mass Index (BMI): a calculated number based on a person's weight and height that is used to assess body fatness and screen for health problems. [BMI = Weight (kg) / Height² (m²)]
- Overweight: an individual who has a BMI between 25 and 29.9.
- Obesity: an individual who has a BMI above 30.
- Calorie menu labeling: the practice of clearly posting the calorie content of a particular food or beverage item, as it is usually prepared or offered for sale, adjacent to the name of the standard menu item so that it can be clearly associated with the menu item at the point of purchase. Menu labels can appear on menu boards, food tags, or printed menus.
- Away-from-home food: food or beverage items that are purchased from sources outside of the home such food and/or beverage items purchased at restaurants, food vendors, and convenient stores.
- Point-of-purchase: the location or time where sales are made or there is an exchange of money for goods.

Limitations and Delimitations

- Only McDonald's locations in the Phoenix metropolitan area that were practicing calorie menu labeling were used for this study.
- This study recruited adults, at least 18 years of age who live in Phoenix or the surrounding metropolitan area.
- Participants had to be able to speak, read and understand English.
- Participants were customers at one of 29 randomly-selected McDonald's locations in the Phoenix metropolitan area.
- Participants had to be purchasing food or beverage items for individual consumption.
- If participants were purchasing food and/or beverage items for themselves as well as other individuals, they had to be able to provide a separate receipt showing only the items they intended to consume.
- Entire groups of individuals entering an establishment together were not included in the study but single individuals within a group, who met the specified criteria, were selected for inclusion on a voluntary basis.
- This study is limited in that it only measured calories purchased and not calories consumed.
- This study is limited in that hunger and total daily calories consumed were not controlled for.
- This study is limited in that it did not assess changes before and after calorie menu labeling was put into place.

- This study is limited in that it only analyzed calorie information from one daily meal and total daily calorie intakes were not evaluated or considered.
- This study is limited in that it consisted of individuals living in the Phoenix metropolitan area and, therefore, it may not be generalizable to the rest of the United States.

CHAPTER 2

REVIEW OF LITERATURE

Health disparities in the US

As defined by the Centers for Disease Control (CDC), health disparities are differences in health outcomes between groups, such as gender, race and ethnicity, education, income, disability, geographic location, or sexual orientation groups that reflect social inequalities.⁴⁹ When a health outcome is seen in a greater or lesser extent between two or more populations, it is known as a disparity.⁵⁰ These disparities in health are the result of the interaction between biology, genetics, individual behavior, socioeconomic status, the physical environment, discrimination, racism, literacy levels, and legislative policies. In addition, health is also influenced by access to education, healthy foods, safe and affordable housing, reliable public transportation, health insurance, and health care providers.⁵⁰ The ultimate goal of public health research and practice in the United States is to eliminate health disparities, ensuring that all individuals have an equal opportunity to achieve adequate and optimal health.⁵¹

Disparities in mortality and chronic disease

According to a 2011 report prepared by the National Center for Health Statistics, between 2000 and 2009, the average life expectancy for males and females increased by 1.9 and 1.6 years respectively; however, females still have an average life expectancy at birth that is 4.9 years longer than males. In terms of race and ethnicity, in 2009 life expectancy for non-Hispanic blacks was 4.3 years less than non-Hispanic whites.⁴⁸

The average life expectancy for a 25-year old male without a high school diploma was 9.3 years less than males who had at least a Bachelor's degree (based on data from 2006). Similarly, women without a high school diploma had a life expectancy that was 8.6 years less than those who had a Bachelor's degree or higher.⁴⁸

A cross-sectional study conducted by Braveman et al.,⁵² found that life expectancy was highest among adults with the highest income level across all races. Additionally, adults with the highest education level had the highest percent of excellent or very good health scores, regardless of race or ethnicity.⁵² Based on these statistics, income and education level are likely to have the greatest impact on health in terms of socio-demographic characteristics.

Overall, in the United States the rates of obesity have continued to rise in all ages, all races, all education levels, all smoking levels, and both sexes over the past three decades; although these rates of increase have slowed slightly since around year 2000.^{47, 53-54} However, while the rates of obesity have increased across all demographics, specific groups are more affected by obesity than others. According to the CDC, Non-Hispanic blacks have the highest age-adjusted rates of obesity at 49.5%, followed by Mexican Americans at 40.4%, Hispanics at 39.1%, and non-Hispanic whites at 34.3%.⁴⁶ According to the CDC's National Center for Health Statistics 2010 Data Brief,⁴⁷ obesity prevalence is mostly similar in men across all income levels with the exception of non-Hispanic black and Mexican-American men. Non-Hispanic black and Mexican-American men with higher income levels are more likely to be obese than those with lower income levels. Women of high-income levels are less likely than low-income women to be obese across all ethnicities. Of those who are obese, 41% have incomes at

or above 350% of the poverty level, 39% have incomes between 130% and 350% of the poverty level, and 20% have incomes below 130% of the poverty level, meaning that most obese adults are not low income. In terms of education, women with college degrees are less likely to be obese compared to women with lower education levels. There is no significant difference in the rates of obesity among men of certain education levels.⁴⁷⁻⁴⁸

In terms of diabetes, rates are highest among those with a less than a high school education, non-Hispanic blacks, and adults aged 65 years or older.⁵⁵ In terms of heart disease, it is the leading cause of death among men, women, non-Hispanic blacks, Hispanics, and non-Hispanic whites. It is the second leading cause of death after cancer for American Indians, Alaska Natives, and Asians or Pacific Islanders.⁵⁶ Additionally, heart disease death rates are highest in the southern and lowest in the western regions of the United States. Among race and gender, non-Hispanic white men are more likely to have coronary heart disease than non-Hispanic blacks and Mexican American men. For women, non-Hispanic black women are more likely to have coronary heart disease than non-Hispanic white and Mexican American Women.⁵⁶

Obesity rates and health disparities in Phoenix

Based on data from 2010, the city of Phoenix is home to almost 1.5 million people, made up of roughly 46.5% non-Hispanic white, 41% Hispanic or Latino, 6.5% non-Hispanic black, 2% American Indian and Alaska Native, and 3% Asian.⁵⁷ According to data from 2007-2011, the median household income of Phoenix residents is \$48,596. Compared to 14% nationally and 16% in the state of Arizona, approximately

20% of Phoenix residents live below the poverty level. It is estimated that only 25% of the population has a Bachelor's degree or higher.⁵⁷

According to a 2012 report released by Trust for America's Health and the Robert Wood Johnson Foundation entitled *F as in Fat: How Obesity Threatens America's Future*,⁵⁸ Arizona currently has one of the lowest obesity rates in the country among adults at 24.7%, ranked 40th out of the 50 states. In terms of diabetes, Arizona ranks 25th with a 9.5% prevalence among the adult population. Rates of obesity among adult men and women in Arizona are similar at 24.2% and 25.1% respectively; however, rates of obesity differ greatly among races, with 20.6% of non-Hispanic whites being obese, 27.1% of non-Hispanic blacks being obese, at 33.6% of Hispanics being obese. While Arizona currently has one of the lowest obesity percentages in the country, 40th out of 50, it has one of the greatest increasing trends of obesity. If obesity rates continue on their current track, it is projected that by 2030, the obesity rate among adults in Arizona will be at 58.8%, moving the state to a ranking of 16th in the nation. Furthermore, according to projections, even if the average adult BMI were to decrease by 5%, over half of the population would still be obese in 24 states, including Arizona, by 2030.⁵⁸

Consequences of obesity

Obesity rates in the United States continue to rise and currently more than one-third of U.S. adults (35.7%) are obese.⁴⁶ Obesity is associated with increased morbidity and mortality.⁵⁹ Obese individuals have a 50 to 100 percent increased risk of premature all-cause mortality compared to individuals who have BMIs within a normal range of 20 to 25. Obesity is associated with an increased risk for hypertension; type 2 diabetes

mellitus; hypercholesterolemia; cardiovascular disease; gallbladder disease; endometrial, colon, postmenopausal breast and other types of cancers; dyslipidemia; stroke; asthma; sleep apnea; and certain musculoskeletal disorders such as osteoarthritis.^{14, 53, 60-61}

Additionally, the medical and economic impacts of obesity are astronomical, including roughly 300,000 excess deaths per year, 36 percent higher health care costs, and 77 higher medication costs compared to being within a normal weight range.⁶²⁻⁶³ For obese adults, the expected lifetime medical care cost of obesity-related diseases (coronary heart disease, stroke, type 2 diabetes, hypertension, and hypercholesterolemia) is nearly double the cost of an adult with a BMI within a normal range.⁶⁰ Additionally, due to the rapid increase in obesity rates over the last decade and the health outcomes associated with obesity, for the first time in modern history, today's youth may live shorter lives than their parents.¹³ Due to the association between overweight and obesity and the increased risk factors for morbidity and mortality, reversing the obesity epidemic in the United States is crucial.¹⁴

Impact of the food environment on health

In general, it has been found that individuals who live near grocery stores are less likely to become obese or to develop type 2 diabetes.⁶⁴⁻⁶⁶ The Retail Food Environment Index (RFEI) is a ratio of the availability of fast food restaurants and convenience stores compared to grocery stores and produce vendors, relative to an individual's home.^{67,68} A higher RFEI score indicates that a person's residence is surrounded by a higher number of fast food and convenience stores than grocery stores and produce vendors. Research has found that as RFEI score increases so does obesity prevalence, regardless of SES,⁶⁷⁻⁶⁹

meaning this phenomenon is seen in all areas in which there are more fast food restaurants than grocery stores. However, most low-income areas have higher RFEI scores than high-income areas because low-income neighborhoods, neighborhoods of ethnic minorities, and rural neighborhoods have fewer grocery stores and more fast food restaurants and convenience stores compared to higher-income, predominantly Caucasian neighborhoods.^{66, 68, 70} Low-income neighborhoods are also ones in which obesity rates tend to be the highest.⁶⁸

While a higher RFEI score and living in a low-income area are independently associated with higher rates of obesity, the highest rates of both obesity and diabetes are seen among individuals who have both variables, meaning they live in a low-income area that also has a high RFEI score.⁶⁸ The association between number of fast food restaurants compared to grocery stores and obesity is not only seen in the United States,⁷¹⁻⁷² but it has been recently seen in Canada as well.⁶⁷ A study conducted by Jeffery et al.,⁹ failed to find this association; however, it was mainly due to the fact that there were major limitations in their study, specifically in the way the researchers defined “fast food” and “proximity.”

Research has shown that individuals who live closer to full-service restaurants are more likely to eat at those restaurants and are, therefore, more likely to consume more nutrient-dense foods compared to foods offered at fast-food restaurants.⁹ While greater access to grocery stores is associated with lower rates of obesity, similarly greater access to full-service restaurants is associated with lower rates of obesity, higher fruit and vegetable consumption and greater likelihood to meet dietary recommendations for total and saturated fat.^{12, 69, 73} One reason for this could be that full-service restaurants are

more capable of preparing and storing healthier food options compared to fast food restaurants, which have limited space and tighter time constraints for meal preparation. Since access to full-service restaurants is related to better health outcomes, disparities in access to full-service restaurants could potentially be associated to disparities in health. Results from a study conducted by Larson et al.,¹² showed that roughly 40% of young adults from high SES backgrounds reported eating at a full-service restaurant at least once per week compared to 25% of young adults from low SES backgrounds. These results suggest that the type of food consumed while eating out may depend on an individual's demographic characteristics. These findings also support the fact that lower-income areas have a greater exposure to environments that are not supportive of positive health behaviors.

Social-Ecological Framework

Individuals must make choices about what they eat, what they drink, and how physically active they will be within the context of their environment.⁷⁴ Depending on where someone lives, environments can promote overconsumption of calories and discourage physical activity, or just the opposite. Unfortunately, today, the latter scenario is often the exception rather than the standard. However, just because an individual lives in an environment that is conducive to healthy behaviors does not necessarily mean that he or she will be a healthy individual. Individual behavior change cannot be explained without considering an individual's multiple levels of influence.⁷⁵⁻⁷⁶ A social ecological framework explains how all elements of society combine to shape an individual's food and physical activity choices, which ultimately impact an individual's overall health.⁷⁴

These elements include intrapersonal factors, such as demographic characteristics, psychosocial factors, knowledge, and genes; interpersonal factors, such as an individual's face-to-face contact with friends, family members, and coworkers; institutional and community factors, such as an individual's access to healthy food, neighborhood safety, and workplace or school policies; industry and governmental factors, such as rules, regulations, and marketing; and society factors, such as cultural norms, belief systems, and economy.

Meeting the Dietary Guidelines for Americans

Since research has shown that there are disparities in the types of food environments among income and racial groups, it is not surprising that there are disparities among demographic groups in terms of meeting dietary guidelines. In a study conducted by Kirkpatrick et al., researchers used NHANES data to assess the dietary quality among groups of varying incomes and races and ethnicities.⁷⁷ Results from the study showed that a greater percentage of adults in higher income categories were more likely to meet the minimum recommendation for total fruits, whole fruits, total vegetables, dark green vegetables, other vegetables, whole grains, meats and beans, milk, and oils. Higher income adults were also less likely to exceed the standards for solid fat, added sugar and alcoholic beverages compared to lower income adults. Among racial and ethnic groups, non-Hispanic blacks were the least likely to meet the minimum recommendations for whole fruits, total vegetables, other vegetables, total grains, and milk. Mexican-American adults were the most likely to meet the minimum recommendations for dry beans and peas and total grains; however they were also the

least likely to meet the minimum recommendations for dark green vegetables, starchy vegetables, and oils. Results from this study suggest that higher income groups and non-Hispanic whites are more likely to adhere to the dietary recommendations for most food groups. Non-Hispanic blacks have particularly poor dietary quality compared to non-Hispanic whites and Mexican-Americans.⁷⁷

Current consumption and expenditure of away-from-home foods

Consumer expenditure on food away from home reached an all-time high in the United States in 2011 at 641 billion dollars.⁴ According to U.S. Census Bureau data, sales at eating and drinking places reached 45.9 billion dollars in April of 2013, a 200 million dollar increase since 2012.⁷⁸ Based on data from 2005-2008, the percent of food eaten at home has decreased from 82% in 1977-1978 to 68.5%.² Of food purchased away from home in 2011, 76.9 percent was purchased at full-service restaurants and limited-service eating-places, such as fast food restaurants.⁴ It is currently estimated that one in four Americans visits a fast food or full-service restaurant at least once per day, in which an average of 1,032 calories, roughly half of the daily recommendation, are consumed.³⁻⁵ Males and females over the age of 2, consume approximately one-third of their total daily energy expenditure away from home, compared to 18% in the late 1970s.^{2, 79} A study conducted by Drenowski and Rehm,⁸⁰ found that adolescents between the ages of 12-19 consumed 17.5% of their daily energy expenditure from quick-service restaurants, or fast-food restaurants. Adults between the ages of 20-50 and 51 and above consumed 15.9% and 8.6% respectively from quick-service restaurants.⁸⁰

Demographics of fast food eaters

In a study of fast food consumption conducted by Paeratakul et al.,⁸¹ researchers found that men compared to women, individuals with higher income levels compared to lower income levels, households with more than four members compared to household with less than four members, individuals between the ages of 10 to 39 years of age compared to other age groups, and individuals with high school and some college education were more likely to consume fast food.⁸¹ These results are consistent with a study conducted by Powell et al.,⁵ published in 2012, where the authors reported that men compared to women, younger adults compared to older adults, non-Hispanic black adults compared to non-Hispanic white adults, larger households compared to smaller households, high school-educated adults compared to less than high-school educated adults, and adults with middle and higher-incomes compared to lower income adults were more likely to consume fast food.⁵ Results from a study conducted by Pereira et al.,¹⁰ show that fast food frequency is lowest in white women, compared to other racial and gender groups. Unlike results from Paeratakul et al.,⁸¹ Pereira at colleagues found that fast food consumption was highest among those who had fewer years of education.¹⁰ Finally, results from a study conducted by Jeffery et al. (2006), found that individuals who have children and individuals who work outside of the home are more likely to consume fast food.⁹

Quality of away-from-home food

Today, juggling a full-time job, a family life, a personal life and a social life is a common task for most people. Therefore, it is not surprising that quick and tasty food at

an affordable price is appealing to most Americans. The fast food industry is an expert in meeting consumer demands, appealing to our innate taste preferences by offering foods that are sweet, salty and flavorful.^{82, 83} In addition, fast food restaurants typically offer items that are, by weight, cheaper, lower in nutrient density, and higher in energy density than healthier food items such as fruits and vegetables.⁸⁴⁻⁸⁵ According to data analyzed by the USDA's Economic Research Service¹, foods prepared at home are nutritionally superior to foods that are eaten away from home in that they are typically prepared in healthier ways and have smaller portion sizes.² The fat content in away from home foods is on average 37.2 percent of calories compared to 30.5 percent of calories for foods prepared at home. Additionally, away-from-home foods are generally higher in saturated fat and sodium and lower in dietary fiber.² A recent study conducted by Hearst et al.,⁸⁶ in which researchers assessed the nutritional quality of menu offerings at eight fast-food restaurant chains over a 14 year period, found that while the nutritional quality of restaurants has improved in terms of saturated fat, solid fats and added sugars, the scores for fruit, whole fruit, total vegetables, dark-green and orange vegetables, legumes, whole grains, and oils did not change. The authors concluded that overall, the nutritional quality of menu offerings is poor.⁸⁶ Furthermore, although national chains have been criticized for highly caloric entrees, a study conducted by Urban et al.,⁸⁷ found that independent and small-chain restaurants, which typically do not make caloric information readily available to consumers, had entrees that matched and sometimes exceeded the energy content and nutritional profile of popular chain restaurant items.⁸⁷ Results from a study conducted by Scourboutakos et al.,⁶ found that the average breakfast, lunch and dinner meal from 19 chain-restaurants contained 1,228 calories, 2,269 milligrams of

sodium (151% of the recommendation), and 16 grams of saturated fat (83% of the daily recommendation).

Children and adolescents who consume fast food have been shown to have lower intakes of fruits, juices, milk, legumes, dark green vegetables and other vegetables compared to children and adolescents who do not consume fast food.⁸¹ Furthermore, children who consume fast food are shown to have higher intakes of fried potatoes, meat, and carbonated soft drinks. In terms of nutrient profiles, children who eat fast food have higher intakes of total energy and fat and lower intakes of protein, vitamin A and beta carotene, compared to children who do not eat fast food.⁸¹

Adults who consume fast food have been shown to have lower intakes of milk, legumes, fruits, and vegetables compared to adults who do not consume fast food.^{9, 12, 81} Adults who consume fast food have been shown to have more than double the intake of fried potatoes and carbonated soft drinks compared to adults who do not consume fast food.^{10, 81} In terms of nutrient profiles, adults who eat fast food have higher intakes of total energy, fat, cholesterol, sodium, and calcium and lower intakes of carbohydrates, protein, dietary fiber, vitamin A, vitamin C, and beta carotene compared to adults who do not eat fast food.^{5, 8, 10, 12, 81}

In terms of demographics, a study conducted by Powell et al.,⁵ found that men and adolescent boys consumed more calories than women at fast food restaurants. There were no statistical differences in caloric intake among other demographic characteristics

Health impacts of consuming food away from home

Since the majority of the research that looks at the health impact of fast food consumption consists of cross-sectional studies, it is difficult to determine the body's exact physiological responses to away-from-home food consumption. However there are many studies that show strong associations between away-from-home food consumption and poor health outcomes. In general, frequently eating out, especially at fast food restaurants, is associated with greater weight gain and obesity, greater body fat, higher HDL cholesterol levels, and greater insulin resistance.⁷⁻¹² These results have been found across all gender and racial groups. In a study conducted by Pereira et al.,¹⁰ individuals who consumed fast food more than twice a week gained 4.5 kilograms more than individuals who consumed fast food less than once per week over a period of 15 years. Compared to individuals who consumed fast food less than weekly, frequent fast food eaters were also found to have a two-fold increase in insulin resistance by the end of the study period.¹⁰ In a study conducted by Fulkerson et al.,¹¹ researchers found that adolescents who had picked up a family meal at or dined in a restaurant, including fast food restaurants, at least once per week were twice as likely to be overweight or obese than adolescents who did not have family meals out at least once per week. These findings indicate that fast food consumption potentially has both direct and indirect health consequences.

Reasons for consuming away-from-home food

In a study conducted by Ayala et al.,⁸⁸ that looked at the eating preferences of Latino women between the ages of 18 and 67, researchers found that individuals within

this demographic group who were younger, employed, with lower incomes, and who lived in the United States for a greater number of years preferred fast-food restaurants over other types of restaurants. Fast food restaurants were preferred due to the lower cost of food, the proximity to home or work, and the perceived better menu options and play areas for their children. These results suggest that young, Latino women may be at a greater risk for poor health outcomes than other demographic groups.⁸⁸ A study conducted by Schindler et al.,⁴⁴ also listed time and convenience as reasons for choosing fast food restaurants for daily meals.

In a study conducted by Rydel et al.,⁸⁹ researchers wanted to determine individual reasons for frequenting fast food restaurants and to see if reasoning differed by demographic factors such as age, sex and education level. Reasons such as: they are quick (92%), easy to get to (80%), the food tastes good (69%) and the food is inexpensive (63%), were more frequently reported by participants compared to reasons such as: they are a way to socialize with friends and family (33%), the restaurants offer nutritious food (21%), and they are fun and entertaining (12%), which were less frequently reported. In terms of demographic findings, results from the study indicated that certain demographic groups have different motivations for eating at fast food restaurants. For example, participants who had an education level of a Bachelor's degree or higher were more likely to agree that they eat fast food because they are too busy to cook food at home. Individuals who did not have a full-time job were more likely to agree that they frequent fast food restaurants because they are fun and entertaining and a way to socialize with friends and family. Participants between the ages of 16 to 24 were less likely to agree that they eat at fast food restaurants because they have nutritious offerings. Furthermore,

due to the fact that fast food restaurants appeal to the majority of Americans for their ability to produce good-tasting food at a cheap price in a relatively short amount of time, the authors suggest that interventions to reduce fast food consumption must focus on these characteristics and develop similar alternatives.⁸⁹

Menu labeling as a solution to the obesity epidemic

Due to the fact that national obesity statistics have failed to decline over the past three decades,⁴⁶ in order to slow the rates and reduce the health and economic burdens of obesity and obesity-related diseases, a shift from focusing on individual prevention efforts to public policy interventions has been made.⁹⁰ As stated in an article written by Brownell and colleagues,⁹¹ “default conditions now contribute to obesity, a reality that no amount of education or imploring of individuals can reverse.” We know that obesity is the results of a complex interaction between personal, biological, social, and environmental conditions; therefore, solutions must be designed to target the multiple factors that influence obesity.⁹¹ The Surgeon General’s Call to Action to Prevent and Decrease Overweight and Obesity,¹⁴ released in 2001, influenced the development of a number of public policies intended to combat the obesity epidemic, including: controlling advertising to consumers, increasing public information and social marketing campaigns, increasing nutrition education, increasing physical activity in schools, creating more reliable and accessible transportation systems, creating new tax and subsidy policies, increasing food availability in schools and workplaces, creating front-of-package food labels, and lastly, a policy that has gotten the most attention recently, offering nutrition information on menus and menu boards in quick service and sit-down restaurants.^{14,19,90-92}

There is substantial evidence that demonstrates that consumption of away-from-home food is associated with poor nutrient intake and undesirable health outcomes. Since it is currently estimated that one in four Americans visit a fast food or full-service restaurant at least once per day,³⁻⁵ restaurants and food industries are easy and logical venues for policy interventions. Menu labeling involves making caloric information and selected nutrient data readily available to consumers at the point of purchase by posting such information on restaurant menus and menu boards.^{19, 26, 93} Currently, many foodservice venues do not voluntarily provide caloric and nutrition information for all menu items at the point of purchase.^{18, 94, 95} Some information may be provided by means of websites, brochures, or kiosks; however, formatting is rarely consistent, with some venues offering numerical values and some offering symbolic characters to describe the nutrient content of menu items.⁹

The goal of menu labeling legislation is to increase awareness and to help consumers make healthier decision when eating out.¹⁹ The expectation is that if consumers are provided with caloric information, they will change their purchasing intentions to lower caloric items, creating an overall reduction in caloric intake.²⁶⁻²⁷ Findings from a health impact assessment on calorie menu labeling conducted by Kuo et al.,⁹⁶ predict that a mandated calorie menu labeling policy could be effective in reducing national weight gain, even with modest changes in consumer behavior. Though their findings are based on estimated projections, the authors forecast that if 10% of restaurant patrons were to order reduced-calorie meals and if the average reduction amount was 100 calories per meal, the result could be as significant as 41% reduction in average annual weight gain. An even greater reduction would be probable if 20% of patrons used calorie

menu labeling or if those who used menu labeling decreased the caloric content of their order by 125 calories. Furthermore, if 20% of the population were to decrease the caloric content of their away-from-home meals by 125 calories, 101.5% of average annual weight gain would be averted and a potential leveling off or reduction in obesity could be possible.⁹⁶

Additionally, as a result of menu labeling, restaurants may become more motivated to reformulate menu items, which could also aid in reducing the number of calories consumed by patrons, leading to an overall reduction in weight gain and obesity.^{19, 26} Results from a study conducted by Bruemmer et al.,⁹⁷ showed that eighteen months after menu labeling regulation was introduced in a Washington county, there were modest reductions in energy, saturated fat, and the sodium content of menu items compared to six months post policy implementation. However, the majority of restaurant entrees after the 18-month study periods were still high in energy, saturated fat and sodium content compared to the 2005 Dietary Guidelines for Americas.⁹⁷

While consumers are overall in favor of knowing the nutritional and caloric content of their food,^{18, 24, 98-101} sellers are discouraged from providing information to consumers because generally the ingredients that have poor nutritional value and contribute to an overall negative nutrient profile, are the same ingredients that make the food taste better, drawing in more business for the seller. Reformulation of higher calorie options could lead to a decrease in food quality, which would lead to an overall decrease in business.^{92, 102} However, in a study conducted by the Hudson Institute's Obesity Solutions Initiative, results showed that between 2006 and 2011,¹⁰³ restaurant chains that increased their servings of lower-calorie food and beverages had superior same-store

sales growth, increases in customer traffic, and overall gains in restaurant servings. A review article published by Krieger et al.,¹⁹ suggests that calorie menu labeling does not impact revenue. Results from a study conducted by Burton et al.,²⁰ showed that when calorie information was provided to participants, purchasing intention for less-healthy items decreased, where as purchasing intention for healthier items stayed the same or slightly increased.

In a study conducted by Bleich et al.,¹⁰¹ phone survey results showed that 51% of randomly sampled adults would be more likely to eat at a chain restaurant that listed caloric information along side the price information on the menu. Furthermore, 60% of participants said that calorie posting would encourage them to select a lower calorie food items. These results differed by demographic characteristics with women, Black and Hispanics, older adults, and more educated adults being significantly more likely to state that the calorie posing would affect their purchasing behavior.¹⁰¹ Results from Krukowski et al.,¹⁰⁴ also showed that women and individuals who frequented fast-food restaurants once or less per week were more likely to report that they would use calorie menu labeling in restaurants when ordering food items. However, results from this study also revealed that overall, 44% to 57% of participants stated that they were not likely to use caloric information in restaurants.¹⁰⁴ Results from other studies show that there is overall support for calorie menu labeling regulations among consumers.^{18, 24}

Other concerns regarding calorie menu labeling include costly implementation for restaurant proprietors, low accuracy and consistency of energy and nutrient content of menu items, and low nutrition literacy among consumers.^{27, 105-106} A study conducted by Urban et al.,¹⁰⁶ found that the measured energy values of restaurant meals were on

average 18% higher than stated values. Although this percentage was not found to be statistically significant, some restaurant items contained up to 200% of the stated value.¹⁰⁶ Furthermore, if consumers do not know their daily energy and nutrient requirements, calorie information might not be useful.^{26, 104-105}

Consumer knowledge regarding nutrient content of meals and recommended intake

Studies show that both the average consumer and nutrition experts have trouble estimating the calorie and nutrient content of an average meal.²⁰⁻²³ When shown photographs of food items, Registered Dietitians (nutrition experts) underestimated the energy content of each meal by 220 to 680 calories and by 18 to 57 grams of fat.²¹ In a study conducted by Burton et al.,²⁰ participants were asked to estimate the number of calories, grams of total fat and saturated fat, and grams of sodium for each food item listed on a typical restaurant menu. Results from the study showed that individuals underestimated the calorie content of high-caloric foods by 642 calories. Often times, calories were twice as high as consumer estimates. Furthermore, consumers underestimated calories for both healthy and non-healthy items. Consumers also underestimate the total fat, saturated fat and sodium levels for the majority of food items. This study indicates that consumers lack the ability to self-monitor calorie intake.²⁰ These findings were consistent in a more recent study conducted by Block et al.,²² in which researchers examined the ability of adults and adolescents to estimate the caloric content from six popular fast food chains using street-intercept survey methodology. Results from this study showed that more than two-thirds of participants underestimated the caloric content of their meals with 25% of participants underestimating by at least 500

calories. On average, adults underestimated by 175 calories, and adolescents underestimated by 259 calories. Furthermore, researchers found that noticing caloric information in the restaurant did not impact the accuracy of calorie estimations for menu items.²² However, these findings were not consistent with other studies in which results suggest that calorie menu labeling may impact consumer's ability to accurately estimate the caloric content of a meal.^{18, 23-24}

In terms of nutritional knowledge, a study conducted by Bleich et al.,¹⁰¹ showed that 78% of participants correctly identified the recommended energy requirements for moderately active men and 69% of participants correctly identified the recommended energy requirements for moderately active women. These results were similar to a study conducted by Krukowski et al.;¹⁰⁴ however, only 35% of participants correctly identified the recommended caloric intake for inactive adults.

Results from these studies suggest that since on average consumers overestimate the caloric and fat content of away-from-home foods, calorie menu labeling could be affective in promoting energy balance and reducing national weight gain.^{20, 22, 101} Results from these studies also support the notion that in order to be an effective public policy, consumer knowledge regarding daily energy and nutrient requirements needs to increase in order for the information to be useful for consumers and to achieve policy goals.¹⁰⁴

Food label use among consumers

According to the 2008 Health and Diet Survey conducted by the Center for Food Safety and Applied Nutrition,¹⁰⁷ 27% of the US population often use food labels when choosing what to eat, compared to 25% who sometimes use labels, 22% who rarely use

labels and 26% who never use labels. Of individuals who use labels, 66% use them to see how high or low a food item is in calories, salt, vitamins and/or fat. Additionally, 49% of label users reported changing their decision to buy or use a product when they read the nutrition label and 46% said they often use the calorie information to base their decision on what items to purchase.¹⁰⁷ Similarly, in a study conducted by Kreuter et al.,¹⁰⁸ results showed that of those who reported using food labels, 84% said they looked for information about fat, 68% said they looked for information about calories, 48% said they looked at information on saturated fat, 45% looked for information on cholesterol and sodium, and 21% said they looked for information on fiber. Results from the study also showed that label readers were more likely to have accurate perceptions of the amount of fat in their diets compared to non-label readers.¹⁰⁸ These results are consistent with a study conducted by Graham et al.,¹⁰⁹ in which results showed that college students who frequently read fast food labels were more likely to know their daily energy and fruit and vegetable requirements.

Additionally, individuals with diet-related health conditions, such as hypertension or hypercholesterolemia, have been shown to be more likely to use food labels to manage their condition and were also more likely to report that food labels influenced their food purchases.¹⁰⁸ These results are similar to a more recent study conducted by Post et al.,¹¹⁰ which suggested that individuals with type 2 diabetes, hypertension, hyperlipidemia, or a combination of these obesity-related diseases were more likely to read food labels compared to patients without these conditions.

In general these findings suggest that calorie menu labeling may be an effective strategy in reducing obesity and obesity-related disease since the target population (those

with chronic diseases) is currently using food labels to make food choices. Research has also shown that those who read food labels are more likely to consume less energy, total fat, saturated fat, total sugar and sodium; fewer carbohydrates; less fast food; and more fruits, vegetables and fiber compared to those who do not.¹⁰⁸⁻¹¹¹

In terms of demographic characteristics, research has shown that women are more likely than men to read and use nutrition labels,^{104, 108, 111-112} as are those with more years of education,^{108, 110-111} higher incomes,¹¹¹ and older adults between the ages of 51 and 70.¹¹² Women are also more likely than men to have food labels influence their purchasing decisions, as are older adults.¹⁰⁸ Additionally, women are more likely than men to look at the calorie and total fat content of food labels. Higher educated individuals are more likely to look for calorie, total fat and saturated fat content of food labels.¹⁰⁸ Regarding race/ethnicity and food label usage, results are mixed. In the Stran et al. study,¹¹² results showed that Mexican-American and Hispanic men were more likely to use food labels compared to non-Hispanic white men; however, the Ollberding et al. study,¹¹¹ found that non-Hispanic whites reported more frequent food label usage.

History of labeling legislation

The Nutrition Labeling and Education Act of 1990 provided consumers with nutrition information at the point-of-purchase for packaged food items.¹¹³ The goals of this policy were to clear up consumer confusion about food labels, to aid consumers in making healthy food choices, and to encourage product manufacturers to improve the food quality and to make more healthy food choices available to consumers.

While the Nutrition Labeling and Education Act of 1990 increased the availability of nutrition information on packaged foods, ready-made foods like the ones purchased in restaurants and movie theatres were exempt from this policy.^{20, 113} Currently, menu labeling regulations for chain restaurants have been adopted in over 20 states and have been implemented in 11 states and counties.¹⁹ In 2006, New York City was the first jurisdiction to pass a menu-labeling ordinance, which required restaurants with standard menu items to post calorie information on menus and menu boards.^{93, 114} Following New York, San Francisco, California; Multnomah County, Oregon; and King County, Washington passed similar city ordinances.⁹⁶ In 2008, California became the first state to pass statewide menu labeling legislation. In 2009, Main, Massachusetts and Oregon enacted menu labeling legislation, and New Jersey and Tennessee followed in 2010.¹¹⁴ These state and citywide ordinances inspired a national calorie menu labeling policy, Section 4205 in the Patient Protection and Affordable Care Act of 2010, which was passed into law on March 23, 2010.¹¹⁵

Specification and current status of menu labeling legislature

Section 4205 of the recently passed Patient Protection and Affordable Care Act of 2010 requires restaurants and similar food establishments (including fast food restaurants) with 20 or more locations nation-wide, regardless of ownership of said locations, to list calorie information for standard menu items on restaurant menus and menu boards.¹⁷ Labels can appear on menu boards, food tags or printed menus.¹⁹ A statement regarding the suggested daily caloric intake is also required to be on restaurant menus. This requirement was designed to help consumers make calorie information for

food and beverage items more meaningful.¹⁷ Additionally, this act also states that other nutrient information such as fat, sodium, total carbohydrates, sugar and protein content needs to be made available in writing to consumers upon request. Calorie information is not required for non-menu items such as condiments, daily specials, and items appearing on the menu for less than 60 days.¹⁷ Chain vending machines are also required to list calories for food articles under this act.¹¹⁶

In 2011, the FDA released proposed rules for the national policy.¹¹⁷ Under these rules, “restaurants or similar retail food establishments” are defined as establishments that present themselves as restaurants or that devote greater than 50 percent of their total floor area for the sale of food. Establishments whose primary purpose is not selling food, including movie theaters, airplanes, and bowling alleys, will be exempt from the policy. The following statement regarding daily caloric requirements is proposed: “A 2,000 calorie diet is used as the basis for general nutrition advice; however, individual calorie needs may vary.”¹¹⁷ Since the release of the proposed labeling requirements, major lobbying by non-restaurant establishments requesting exemption has delayed the release of the FDA’s final rules.¹¹⁸ To date, the FDA has not released specific requirements for restaurants regarding menu labeling and only a few states, cities, and counties currently have local policies implemented regarding menu labeling.^{19, 119} In an interview with the Associated Press in March of 2013, FDA Commissioner Margaret Hamburg stated that menu labeling has turned out to be one of the FDA’s most challenging issues and that implementation is going to be very hard.¹¹⁸ Hamburg told the Associated Press that they are in the final stages of the rule writing process and final guidelines will be released in

the “relative near term.” The FDA stated that an optimistic deadline would be by spring of 2013.¹¹⁸

While the majority of restaurant chains affected by the federal mandate are holding off on posting calorie labels until specific guidance is provided by the FDA,¹²⁰ in September of 2012, McDonalds announced that they would be posting calorie counts on all menus nation-wide, ahead of FDA guidelines.⁴⁵ With over 14,000 locations nation-wide, McDonalds is the largest chain to post calorie counts. Shortly after McDonalds announced they would be posting calorie information, in October of 2012, the American Beverage Association announced their plan to start a new program entitled Calories Counts, in which beverage makers, including Pepsico and Coca-Cola, are redesigning vending machines to include caloric information for vending items. The program is scheduled to start in Chicago and San Antonio in 2013, with plans to go nation-wide after assessing the success of the program.¹²¹ In June of 2013, Starbucks also announced that they would be posting calorie information for coffee and snack items at all locations within the United States by July of 2013.¹²²

Associations and effects of menu labeling

In a study conducted by Elbel et al.,²⁸ researchers evaluated the effectiveness of calorie menu labels at fast-food restaurants (McDonalds, Burger King, Wendy’s and KFC) located in low-income and racially/ethnically diverse populations in New York City and Newark, New Jersey. Newark was chosen as a control city due to the fact that it has similar urban and demographic characteristics to New York City, and it was an area in which calorie menu labeling had yet to be introduced. In both cities, researchers

examined difference in mean calories ordered before and after New York City's menu labeling mandate. Researchers used receipt and survey data from 1,156 adults, ages 18 and older. Data was collected from five restaurants in Newark and 14 in New York City over a two-week period before calorie labeling was implemented and over a four-week period after menu labeling was introduced. Researchers approached every possible customer as he or she was entering each restaurant location selection for the study. Each participant was asked to submit his or her receipt to the research team and to complete a short questionnaire in exchange for \$2 compensation. Receipts were analyzed using calorie, saturated fat, sodium and sugar counts provided on each restaurant's corporate Web site. Researchers found that the percentage of respondents who noticed menu labels increased in New York City from roughly 16% of patrons before legislature to 54% after legislature. The number of respondents who noticed menu labels in Newark remained unchanged. Additionally, 27.7% of those who saw calorie labeling in New York City said that it influenced their choices and 80% of these individuals said that they purchased fewer calories as a result; however, upon receipt analysis, it was shown that there was no difference in the mean number of calories purchased between patrons who noticed calorie menu labels and those who did not. In New York City, a mean of 823 calories was purchased prior to menu labeling and a mean of 846 calories were purchased after calorie menu labeling. Researchers found that there was no difference in responses to labeling among sex, race or age groups. Results from this study suggest that calorie menu labels may increase the number of patrons who notice calorie information but it is not effective in reducing the number of calories purchased. This study was limited in that it looked

primarily at low SES individuals and individuals of ethnic minorities. Additionally, researchers only collected data on weekdays, excluding weekends.²⁸

In 2011 a sister study was published by Ebel et al.,²⁹ which utilized the same data set as the Elbel 2009 study,²⁸ but this research team looked at the influence of calorie menu labeling in children and adolescents. Results showed that there were no significant differences in the number of calories purchased before and after calorie menu labeling among adolescents. However, after menu labeling enforcement, the number of adolescents who stated that they noticed calorie information posted in restaurants increased by 57% in New York City and 18% in Newark (control city). Of the adolescents who noticed, 16% stated that the information affected their food choices. These results demonstrate that children are less responsive than adults in terms of being influenced by menu labeling and that children and adolescents may need more nutrition education to benefit from menu labeling legislature.²⁹

Researchers Vadiveloo et al.,⁴¹ used the data collected by Elbel et al.,²⁸ to determine if point-of-purchase calorie labels affected food-purchasing patterns in New York City. Results showed that a greater number of adults in the intervention city (New York City) ordered caloric beverages and regular versus low-fat salad dressing after mandatory menu labeling compared to the control city (Newark). However, results also showed adults who reported noticing and or using calorie information to make their food or beverage choices ordered more salads, ate at fast food restaurants less often, and were less likely to order caloric beverages than adults who did not notice labels. The authors note that while these results support the use of calorie menu labeling, due to the quasi-experimental design, it is impossible to attribute the differences to calorie labels alone

and that adults who report noticing and using menu labeling might be healthier individuals in general.⁴¹

A final study published by Brian Elbel in 2011,²³ which also used the data set from his 2009 study,²⁸ looked at how menu labeling affects (1) the percentage of people who know how many calories they should eat in a day to maintain a healthy weight and (2) the population's ability to estimate the number of calories that are in a meal they purchase for themselves. Results showed that only one-third of participants, which consisted of low-income minority individuals, knew the recommended daily calorie allowance prior to menu labeling. This proportion did not change as a result to menu labeling. In terms of participant's ability to estimate the number of calories in a meal they purchased for themselves, Elbel found that 60% of participant underestimated the number of calories in their meal before menu labeling and that this proportion dropped to 50% after menu labeling. Furthermore, only 15% of patrons accurately estimated (within 100 calories) the number of calories in their meal prior to menu labeling. This proportion increased to 24% after menu labeling. Results from this study suggest that more nutrition education is needed in order to make menu labeling an effective public policy.²³

Krieger et al.,²⁵ examined the effect of menu labeling on the total number of calories purchased as well as the awareness and use of calorie menu labels in King County Washington. In January of 2009, chain restaurants with 15 or more locations nation-wide were required to post calorie information in King County. Researchers designed a pre-post-post cross-sectional study in which data was collected one to three months before regulation, four to six months after regulation, and again 18 months after regulation. Researchers recruited English-speaking participants, who were at least

fourteen years of age, and who were dining at one of the ten most commonly regulated restaurant chains in the country (including Subway, McDonald's, Taco del Mar, Taco Time, Starbuck's, Quizno's, Tully's, Jack in the Box, Burger King, and Taco Bell) to be included in the study. The sampling selection consisted of 25 restaurants located in low-income/high-diversity areas and 25 restaurants that were located in low-income/high-diversity areas. The low-income/high-diversity criteria was based on census data and included neighborhoods in which 35% of the population was below 200% of the federal poverty level and contained 30% people of color. Researchers collected customer receipts and survey data, which consisted of questions that addressed menu labeling usage and awareness, demographic characteristics, calorie needs, and details of menu items purchased. The response rate for the study was 57% of all eligible customers participated for a total of 6,125 participants from food chains and 1,200 participants from coffee chains. Results from the study showed that no significant changes in mean calories purchased four to six months post labeling were observed. Researchers found a 38-calorie reduction in food chains and a 22-calorie reduction in coffee chains 18 months after regulation. These calorie decreases were only observed in taco and coffee chains. Awareness of labels increased from 18.8% to 61.7% in food chains and from 4.4% to 30% in coffee chains at the 18-month period. There was no increase in menu labeling usage at 18-months post-implementation. Additionally, it was found that more women than men reported both seeing and using the information but no differences in race/ethnicity were found. A significant decrease in the number of calories purchased was observed in women but not men in both food and coffee establishments post-implementation. As stated by the researchers, this study was limited in that it did not

have a comparison group and researchers did not look at the total daily caloric intake of study participants. Additionally, the study survey did not evaluate participant hunger levels prior to purchasing their meal.²⁵

Wethington et al.,⁴² investigated the use of calorie menu labeling among youths. Researchers used results from the YouthStyles mail in survey to determine the percentage of U.S. youths between the ages of 9 and 18 who were using calorie information in restaurants and whether this percentage differs by socio-demographic characteristics. Results from this study showed that 19% of youths reported never seeing the calorie information before. Of those who noticed the information, 42.4% reported using the calorie information when it was available and 57.6% reported never using the information. Females were 80% more likely than males to report using the information, as were obese youths (70% more likely than non-obese), and youths living in homes within annual household incomes between \$40,000 - \$60,000 (70% more likely) compared to those living above \$60,000. Youths who ate at fast food or chain restaurants more than twice per week were 50% less likely to use calorie information compared to those who ate at restaurants once a week or less. The major limitation of this study is that due to the study design it cannot be confirmed whether youths who report using the calorie information actually order lower-calorie items.⁴²

A randomized, controlled experiment conducted by Tandon et al.,³³ sought to determine if calorie menu labeling would result in lower-calorie meal choices by parents for their children. Participants were recruited from a pediatric primary care clinic in Seattle, Washington. Participants were shown a picture of the McDonald's menu and asked which items they would select for themselves and for their children if they were to

eat McDonald's for their next meal. Participants in the treatment group were shown a menu that had calorie labels next to the price of each item on the menu. Participants in the control group were given menus that had only the price next to each menu item. Results from this study showed that participants in the intervention group ordered on average 102 fewer calories for their children than participants in the control group. The average number of calories that parents ordered for themselves did not differ between the two groups. These results show that calorie menu labeling may have a positive impact on decreasing childhood obesity as it can help parents choose healthier options for their children when eating out.³³

Results from the Tandon et al. study,³³ conflict results from an experimental study conducted by Holmes et al.,³⁷ in which researchers examined the effects of menu labeling in a real restaurant situation, a setting in which both parents and children are involved in the meal decision-making process. The experiment involved placing four different types of menus in the restaurant of a family-oriented private club, for a period of two weeks each. The four menus consisted of a control menu, a menu with nutrition labeling (calories and fat), a menu with nutrition symbols indicating healthier (lower calorie and or lower fat) options, and a menu with nutrition bargain pricing in which the healthier items were also the cheapest. Researchers reviewed sales data to determine differences in the number of calories ordered during each menu period. Results showed that there were no statistically significant differences in the number of calories ordered between each menu period. While total calories did not differ between menu types, researchers found that during the menu labeling periods, participants ordered lower calorie and lower fat entrée items but ordered higher calorie, higher fat a la carte items. These results indicate

that calories were displaced and not reduced during periods of menu labeling. Results from this study indicate that calorie menu labeling did not have a positive net effect on the total number of calories purchased by families.³⁷

Bassett et al.,³⁴ conducted a study prior to menu labeling legislature in New York City in 2007, which was one of the first to use the street-intercept survey methodology described in the Elbel et al. study.²⁸ A total of 167 locations, which represented 11 different fast food chains, were used for data collection. Subway was the only fast food chain that displayed calorie information at the time the study was conducted. Results from this study showed that Subway participants who noticed the calorie information ordered 52 fewer calories than those who did not notice the information. Of those who noticed the information at Subway, 37% reported that the information affected their purchase. Those who reported consciously using the information to make their meal selections ordered an average of 99 fewer calories than those who did not report seeing the information. Subway was the only restaurant chain that showed these results. In other fast food restaurants, only 4% of patrons noticed the calorie information. The authors noted that Subway patrons were a limiting factor in the study as they were most likely a slightly different population compared to participants who were surveyed at other fast food restaurants. The authors concluded that calorie information should be displayed at the point of purchase in order to help patrons make healthier purchases when eating out.³⁴

A 2010 study conducted by Dumanovsky et al.,³⁰ looked at the impact of a menu labeling policy on restaurant patrons' awareness and use of menu labels among different 15 different fast food chains in New York City. Data was collected from 45 restaurant

locations three months before labeling enforcement and three months after labeling enforcement. To collect data, three-person teams surveyed patrons exiting restaurant establishments. Surveyors asked customers if they noticed calorie information posted in the restaurant, where they noticed the information, and if the information impacted their purchase. The survey response rate for the pre-enforcement period was 48% compared to a 42% response rate for the post-enforcement period. A total of 1,370 pre-enforcement participants and 1,451 post-enforcement participants completed the study. Results showed that customer awareness of calorie menu labeling post-enforcement increased from 25% to 64%. Prior to enforcement roughly half of the locations had calorie information available to customers in some form. Customers were more likely to report seeing calorie information at McDonalds (87%), Subway (77%), and Starbucks (70%). The percentage of individuals who noticed and reported using calorie information in making their food or beverage selections doubled from 10 to 20 percent. Results also showed that after the enforcement period, younger customers (aged 18 to 24) were more likely to report noticing the information but adults aged 25 to 44 were more likely to report that the information affected their purchase. Income was not shown to be associated with seeing or using calorie information. Similarly, there were no gender differences reported in seeing menu labels but men were shown to be more likely than women to report using the calorie information and that the calorie information affected their purchase. Researchers concluded that calorie menu labeling increases the number of individuals who notice and use the information to make meal selections. Results from this study support the use of calorie menu labeling. Limitations of the study included reliance on self-reported data to evaluate whether or not menu labeling affected

purchasing behaviors. Researchers did not collect receipt data to verify the extent to which patrons used the calorie information.³⁰

Dumanovsky et al.,³¹ conducted a second study in 2011 to determine if there was a change in mean calories purchased before and after menu labeling implementation in New York City. Researchers sought to evaluate if there was a difference in mean calories ordered between individuals who noticed calorie labels and those who did not. The research team used surveys and register receipts to measure outcome variables. Data collection took place at 275 free-standing restaurant locations, which consisted of 13 different restaurant chains. Data was collected during the weekdays from 12:00 pm to 2:00 p.m. at food chains and from 2:00 pm to 4:00 pm at coffee chains. Prior to entering each establishment, English-speaking adult customers were asked to participate in the study. Participation included providing an itemized receipt and filling out a survey upon exiting the restaurant in exchange for a \$2 public transport pass. Researchers verified food purchases and meal substitutions with each participant when receipts were turned in. In the survey, participants were asked if they saw calorie information in the restaurant and, if so, whether the information affected their purchase. The response rate for the study was 60%. Calorie counts were determined using restaurant websites and if certain details were missing from the receipt such as a dressing choice, researchers defaulted to the lowest calorie option. Results from the study showed that 15% of customers reported using the calorie labels to determine their purchases. There was no significant difference in the number of calories purchased before and after menu labeling. In fact, there was actually an increase in the number of calories purchased after menu labeling at the Subway restaurant chain. This was thought to be due to the “\$5 dollar foot-long”

promotion, which started between collection periods. While there was not a reduction in the number of calories purchased before and after labeling in the overall sample, significant reductions were seen in individual chains, including McDonald's, Au Bon Pain, and KFC. Additionally, customers who reported using the calorie information purchased an average of 106 fewer calories than customers who did not see or use the information, which was statistically significant. Women were more likely to report using calorie information, as were higher income individuals. Individuals between the ages of 18 to 24 years old were the least likely to report using calorie information. The conclusion of the study was that calorie menu labeling could have a positive effect on energy intake as using calorie information was shown to be associated with lower calorie purchases. Some study limitations included the location of the study and the time of data collection. The study only included participants eating New York City during lunch. Furthermore, like most studies that look at menu labeling, these results are based on calories ordered and not calories consumed. Additionally there was no control group for this study.³¹

The purpose of a study conducted by Downs et al.,⁴⁰ was to investigate the impact that calorie recommendation statements had on menu labeling utilization. Researchers looked at two recommendation models; one that had the number of calories recommended per meal and the other had the number of calories recommended per day. Researches collected data from two McDonald's restaurants in New York City using similar street-intercept survey methodology outlined in previous studies (Elbel 2009, Elbel 2010, Dumanovsky 2011). Participants approaching the restaurant were randomly assigned to receive a strip of paper that contained either daily calorie recommendations or

per-meal calorie recommendations. A third control group did not receive any recommendation information. Researchers analyzed survey responses and customer receipts. Results showed that providing calorie recommendations did not alter the number of calories purchased and, therefore, did not influence the use of calorie menu labels. On the contrary, it was found that using recommendation information was associated with a greater number of calories purchased. However, researchers noted that this might have been due to confusion regarding per-meal recommendations and per-entrée recommendations. Most entrée items fell below the 500-calorie per-meal recommendation, which may have given participants a false sense of security, encouraging them to order more items to achieve the recommended amount. A major limitation of this study was that participants were handed slips of paper that listed calorie recommendations, which could have a greater influence on behavior than posting the information on the menu board.⁴⁰

In a study conducted by Finkelstein et al.,³⁸ researchers used a Mexican fast-food chain to determine the impact of menu labeling in King County, which includes Seattle and several outlying cities. Outcome variables were measured using transaction data provided by the restaurant. Monthly sales for each menu item were converted into monthly calories sold based on nutrition information listed on the company website. Data from 21 locations was used for the study, which included locations that were in King County (where menu labeling was mandated) and outside of King County (where menu labeling was never implemented). Data was analyzed at three time periods. The baseline time period was one year prior to menu labeling legislature. The second time period was after menu labeling legislature was passed but before calorie counts were

actually posted on menu boards. The final time period was after calories were posted on drive-through menus. Results from the study revealed that non-King County locations had an average of 180 more calories per transaction than King County locations, both before and after the law was implemented, indicating that King County customers were ordering fewer calories both prior to and after the menu labeling mandate. The percent of customers ordering “healthy entrees” was 11.7% in King County locations compared to 9.4% in non-King County locations. Additionally, King County locations showed a mild increase in overall calories from food and a mild decrease in calories from beverages between the baseline period and each post-period. Overall, there was not a significant difference in the number of calories per transaction between baseline data and each of the post-periods. Researchers concluded that there was no significant impact of mandatory menu labeling on the total number of transactions or the number of calories sold per transaction. This study was limited in that researchers only looked at purchasing data, which cannot capture individual behaviors. This limitation confines the conclusions that can be made because this type of design does not take into account whether customers actually noticed calorie information. Furthermore, differences in subgroups cannot be determined with this type of study design.³⁸

A similar study conducted by Pulos et al.,³⁵ used sales records and patron surveys to evaluate the effectiveness of calorie menu labeling (calories, fat, sodium and carbohydrates) at local restaurants in Seattle, Washington. Sales data was collected 30-days prior to menu labeling and 30-days after menu labeling. Survey questions asked participants if they noticed and understood the menu labels and if the labels influenced their purchasing decisions. Results from the study showed that in four of the six

restaurant sites entrees sold after labeling had significantly fewer calories than entrees sold before labeling. Roughly 70% of participants noticed the nutrition information. Of those who noticed the calorie information, 20% chose lower-calorie entrées. Researchers calculated that those who used the calorie information to order lower-calorie options decreased the caloric content of their meal by 75 calories; however this information could not be confirmed due the design of the study, meaning individual participant receipts were not collected or analyzed. Age was the only demographic characteristic that influenced likelihood to notice the nutrition information, with 83% of participants 45 years old and younger noticing the information and only 60% of participant 46 years old and older noticing the information. Results from this study suggest that menu labeling has the potential to be an effective public policy.³⁵

In a quasi-experimental study conducted at Ohio State University by Chu et al.,³⁶ researchers sought to determine if displaying nutrition information at the point of purchase for entrees served in an on-campus food-service operation would change purchasing behaviors. Treatment consisted of providing the following nutrition information above each entrée in the university dining hall: serving size, total calories, and grams of fat, protein and carbohydrates. Sales data was compared between three treatment periods: the pre-posing period, the posing or treatment period, and the post-posing period. Results showed that the average energy content of meals purchased by participants decreased immediately once nutrition information was displayed. When nutrition information was removed, the average number of calories per entrée increased gradually. Results from this study show that providing calorie information at the point of purchase reduces the number of calories purchased by university students.³⁶

In a field experiment conducted by Ellison et al.,³⁹ researchers wanted to determine which groups were most responsive to menu labeling by looking at calorie intake, health consciousness, and demographic characteristics and menu labeling format. For the study, participants were randomly assigned into one of three treatment groups at a campus restaurant at Oklahoma State University. The three treatment groups consisted of a control group in which no caloric information was displayed on restaurant menus; a calorie information group, which had the calorie counts listed next to menu items; and a calorie information plus traffic light symbols group, which had calorie counts and green, yellow, or red traffic light symbols indicating specific calorie ranges (green represented 400 or fewer calories, yellow represented 401 to 800 calories, and red represented greater than 800 calories). When finished with their meal, participants were asked to complete a survey, which asked questions about demographic characteristics, levels of health consciousness, frequency of eating out, food items that were purchased, and menu labeling preferences. Results from the study showed that patrons in the calorie information plus traffic light group ordered 114 fewer entrée calories than the calories only group and 129 fewer entrée calories than the control group. There were no significant differences in side calories ordered across treatment groups. In terms of total calories ordered, there were not significant differences between the labeling groups and the control group. Furthermore, participants in the labels only group ordered more calories on average than participants in the other groups. While participants in the control group ordered more entrée calories, they ordered fewer extra or side calories than participants in the treatment groups. In terms of demographic and health behavior characteristics, women ordered significantly fewer calories than men; however,

researchers were unable to determine if this was done for health reasons or because women require fewer calories in general compared to men. Individuals who were considered to be more health conscious ordered more low-calorie dinners than individuals who were less health conscious. Older patrons (ages 55 and older) were more likely to order low-calorie entrees than younger patrons. Participants who had at least a bachelor's degree were also more likely to order low-calorie meals. One of the main limitations of this study was that researchers did not ask patrons in the labeling groups if the information impacted their meal selections.³⁹

In a study conducted by Harnack et al.,³² researchers sought to determine how providing calorie information at the point-of-purchase affects food purchases. Researchers also looked at the influence of value size pricing on meal selection and consumption. To determine these effects, researchers used a 2 x 2 factorial experiment involving adolescents and adults who regularly consumed fast food. Participants from St. Paul Minnesota were randomly selected to receive one of four study menus: a calorie menu, a price menu, a calorie plus price menu, or a control menu. Each menu included lunch and dinner items that are available at McDonald's. To blind participants to the food being used in the study, well-known items were given a generic name (for example the Big Mac™ was called a 'double cheeseburger'). Calorie counts for each item were calculated using the McDonald's website. The calorie menu included calories for each menu item as well as a statement on the menu that listed the suggested daily calories for men and women. Calories were listed directly next to the price. The price menu was designed to eliminate value size pricing. Prices were based on the number of ounces in each product portion. Calorie counts were not included on the price menu. The calorie

plus price menu consisted of calorie information plus price modifications, which again, eliminated value pricing. The prices on this menu matched the prices on the 'price menu' and the calories on this menu matched the calories on the 'calorie menu.' The control menu listed prices according to McDonald's prices (which included value pricing) and did not include calorie counts. A total of 594 participants were used for the study. Study participants had to be at least 16 years old, eat at fast food restaurants at least once per week, and read and speak English. Participation involved completing a two-hour evening study session in which participants were required to purchase and consume their meal and complete several questionnaires. Participants were given a \$25 gift certificate as an incentive. Study sites consisted of hotel conference rooms and a church basement. Once each participant purchased their food, a member of the research team would drive to McDonald's to place the order and bring the food back to the participant on a generic tray so that individuals were unaware of the food brand. While subjects waited for their food they completed survey questions about fast food frequency, opinions about fast food, and food shopping and preparation practices. Once participants were done eating they completed a final survey, which included questions about nutrition knowledge and beliefs and anthropometrics. Researchers collected participant trays and weighed the leftover food using a food scale. Results from the study revealed that there were no statistically significant differences in the average number of calories consumed by each group (average calories were 805 for the calorie group, 813 for the price group, 761 for the calorie plus price group, and 739 for the control group). Additionally there was no significant difference in the selection of food categories (such as sugar-sweetened soft drinks, diet soft drinks, French fries, salads, etc.), meaning that one group was not more

likely than another group to order a particular type of food category. Additionally, 54% of those in the calorie condition reported noticing the calorie information. Specifically, white participants, participants with a higher education, and participants between the ages of 15 and 25 were more likely to notice calorie information. It was also found that value pricing had little effect on meal selection and consumption. Furthermore, the study found that there was no statistical difference in energy intake between those who reported noticing label information and those who did not. Those who noticed label information consumed an average of 690 calories compared to 671 calories in those who did not. Although these results were not significant, this data shows that those who noticed calorie labels ordered roughly 20 calories more than those who did not notice calorie labels. Based on these results, researchers concluded that providing calorie information on a fast food menu at the point-of-purchase had no effect on food selection and consumption. One of the major limitations of this study was that treatment was carried out in a conference room rather than an actual restaurant. Because participants were not in a typical fast food environment, their food choices and behaviors might have been slightly different. Furthermore, the study did not indicate how many items each menu had. If participants had a more limited selection of options compared to an actual fast food restaurant, it also may have impacted their meal selections.³²

In a study conducted by Roberto et al.,¹⁸ researchers wanted to see if menu labeling influenced total calories ordered and consumed during a meal as well as food consumed later in the day. An experimental design was used for data collection, in which participants were randomly assigned into three menu labeling conditions: a menu without any calorie labels, a menu with calorie labels, and a menu with calorie labels and

a statement about the daily calorie recommendation for an average American. Study outcomes included the total number of calories ordered, the total number of calories consumed during the study period, and the total number of calories consumed the evening after the study period. Results revealed statistically significant differences between the no menu labels group and both of the calorie label conditions. There was not a significant difference in the number of calories ordered among label conditions. In terms of the total number of calories consumed, when combining labeling condition groups, the labeling group consumed significantly fewer calories than the no labeling group. Results also showed that 70% of participants in the calorie labels condition group, 57% of participants in the no labels group, and 46% of participants in the labels and information group consumed an evening snack. Participants in the no calorie group consumed an average of 1,630 calories, compared to 1,625 calories consumed by the label group, and 1,380 calories by the labels and information group. Overall, results from this study suggest that menu labeling was effective in reducing the total number of calories ordered and consumed during a meal as well as calories consumed later in the day.¹⁸

In a similar online-survey study conducted by Liu et al.,²⁴ participants were randomly assigned into four menu groups. The control group received a menu with no calorie labels. The three menu labeling groups received either a menu with calorie labels and a statement of suggested caloric intake, a menu with items sorted from low to high calories and a statement of suggested caloric intake, or a menu with items sorted from low to high calories, a statement of suggested caloric intake, and green or red circles indicating higher and lower calorie choices. Participants were asked to select a meal based on what they would typically order when eating out and to estimate the number of

calories in their selected meal. Results from the study showed that individuals in both the rank order calorie menu group and then rank order and color-coded calorie menu group ordered significantly fewer calories than the no calories group. The calories only group did not order fewer calories than the control group. However, individuals from all three calorie label groups were more likely to accurately estimate the caloric content of their meal compared to the control group. Furthermore, 35.3% of participants in calorie menu labeling groups indicated that the calorie information impacted their food choices. Results from this study indicate that calorie menu labeling alone is not effective in reducing the number of calories ordered in an virtual-simulated restaurant experience.²⁴

A qualitative research study conducted by Schindler et al.,⁴⁴ evaluated calorie menu labeling utilization in a group of individuals from primarily ethnic minorities who had children and an average annual household income below \$25,000. Participant focus groups revealed that the majority of participants had heard about or noticed calorie menu labeling in restaurants but most did not report using the information to guide their food purchases. Some of the reasons for not using menu labels included preferring the taste of a particular menu item regardless of caloric content, ordering out of habit, and degree of hunger. Some participants indicated that they did not understand that calorie information or the role that calories play in health outcomes, and some felt that the information was often unclear and confusing due to wide caloric ranges (some combo meals ranged from 500-900 calories). The placement of the information on the menus also was a cause for some confusion. Finally, some individuals reported that the higher cost of the healthier items was a deciding factor in choosing lower cost, higher calorie items. The authors conclude that calorie menu labeling faces many barriers in being an effective public

policy strategy to combat the obesity epidemic. Altering the presentation of the information on menus to include symbols, color-coded healthier items, or separate low-calorie menus might increase the efficacy of the policy.⁴⁴ These results have been confirmed by a similar study conducted by Auchincloss et al.,⁴³ which took place in Philadelphia, Pennsylvania. In this study, barriers to menu labeling usage were shown to be high-literacy requirements in order to understand calorie information, lack of knowledge regarding daily calorie requirements, and low expectations of the nutritional quality of the food served in restaurants and fast food establishments.⁶⁴

Transtheoretical Model for Behavior Change

As described in her textbook, *Nutrition Education Linking Research, Theory, and Practice*, Isobel Contento describes the transtheoretical model as a behavior change theory that is based on the idea that individual behavior change is a continuous and dynamic process, which occurs through a five-stages based on an individual's readiness to change.¹²³ These five stages include precontemplation, contemplation, preparation, action, and maintenance.¹²³ Precontemplation is defined as the stage in which an individual is not aware of or is not interested in a behavior practice that might enhance their health. Contemplation is the stage in which an individual is considering making a behavior change in the near future (within the next six months); however, the cons of the behavior change slightly outweigh the pros and self-efficacy is low. Preparation is the stage in which an individual intends to make a behavior change in the immediate future (within one month). Action is the stage in which an individual has started the new practice or behavior on at least a small scale. Maintenance is the state in which an

individual has performed a new behavior or practice for a long enough period of time (at least six months) and they are comfortable incorporating the behavior into their everyday routine.¹²³ Based on this theoretical model, behavior change interventions and nutrition education programs can be developed to target individual stages with the goal of moving an individual along the continuum, towards action and maintenance stages.

Implications for further research

There is substantial support demonstrating the need for calorie menu labeling; however, based on results from previous menu labeling studies, the effectiveness of menu labeling remains unclear. One reason for mixed results in the current body of literature is due to the utilization of varying methodologies to evaluate the policy. Of the studies that have been conducted, some^{23, 25, 28-29, 30-31, 34, 37, 41} look at “real world” calorie purchase behaviors in which individual purchases are observed and analyzed in an actual restaurant setting, while other studies have been conducted in a laboratory setting using a simulated restaurant experience,^{18, 24, 32-33} or looking retrospectively at purchasing history of an entire restaurant chain.^{24, 35-38, 42} Additionally, the majority of the research on this topic has been conducted in urban cities along the east coast.^{18, 23-24, 28-31, 34, 37, 40-41, 43-44} In terms of socio-demographic characteristics, only a few studies have looked at differences among individuals who report noticing or using calorie information, and these results are also mixed.^{25, 30-32, 39, 42} Therefore, further research is needed to evaluate calorie menu labeling in other regions of the United States, including the Southwest. Additionally, more research is needed to evaluate the effectiveness of the policy among individuals from varying socio-demographic groups.

CHAPTER 3

METHODS

Setting

Restaurant locations were chosen using census data and the McDonald's store locator feature available through the McDonald's web site.¹²⁴ Only freestanding restaurant locations were used. Restaurants within a shopping mall or airport were excluded from the study. A list of every zip code within a 20-mile radius of downtown Phoenix was generated (see Appendix B for sampling diagram). From this list, low- and high-income zip codes were identified and used as the sampling frame. High-income neighborhoods were defined as those zip codes where the median household income was at least \$80,000. Low-income neighborhoods were defined as zip codes that had a median household income below 185% of the Federal poverty line for a family of four, which was below \$42,600 per year. Two lists were created for McDonald's restaurants located within a 20-mile radius of Phoenix—one contained restaurants that were located in low-income zip codes and the other contained restaurants located in high-income zip codes. Every McDonald's location within each income category was assigned a number (one through 22 for low-income locations and one through nine for high income locations). Eight locations from each income pool were selected using a random number generator, for a total of 16 locations.

The research design called for conducting surveys to cover lunch and dinner meal times as well as getting a representation of weekdays vs. weekends. Each McDonalds location was randomly assigned a specific data collection period. To do this, the 16 locations that were selected for the study were sorted into their income categories and

placed in two separate bins, one for each income level. Each pre-selected location was then randomly redrawn and assigned a new number between one and eight for low-income locations, and between nine and 16 for high-income locations. The first drawn number from the low-income bin was assigned #1, the second was assigned #2, and so on. The first number drawn from the high-income bin was assigned #9, the second was assigned #10 and so on. These numbers designated the time and day of the week that data would be collected (see Table 1).

Table 1: Data Collection Assignments by Location, Time and Day

	Low-Income				High-Income			
	Weekday		Weekend		Weekday		Weekend	
Lunch	#1	#2	#3	#4	#9	#10	#11	#14
Dinner	#5	#6	#7	#8	#13	#12	#15	#16

During the data collection process, the research team was asked to leave three lunch locations and one dinner location, which would have potentially limited the sample pool. In order to ensure adequate sample size based on our power analysis, new locations were added as study sites. The selection process for adding the locations followed the same method as the original sites; however, due to the low number of high-income locations, the threshold for defining high-income zip codes was lowered to a median household income of \$70,000 and above. As a result, twelve additional high-income locations were included in the sampling frame. Six additional locations, each from high- and low-income zip codes were selected using the same process described earlier. Days and times for data collection for these newly added locations were also determined using a similar procedure that was used for the initial study locations. However, due to the low

response rate on the weekend, more locations were assigned for weekend data collection than weekday data collection.

Sample Size

Because published data necessary to calculate sample size was limited and extremely varied, standard deviations from three previous studies^{18, 28, 32} were used to calculate three separate sample sizes, and an average of these three sample sizes was used. Setting the statistical power at 0.80 (80%) and the significance level at 0.05 for each sample size, it was determined that 312 participants were needed to detect a 100-point difference in calories between groups. A 100-point difference in calories was used based on results from a Health Impact Assessment conducted by Kuo et al.,⁹⁶ which projected a 100-point calorie reduction per meal could reduce annual weight gain in the United States by 40.6%. A total of 330 individuals participated in the study. One participant was eliminated because they later disclosed to the research team that they did not physically enter the restaurant establishment meaning they were not eligible for noticing calorie information. Another participant failed to complete the survey so only the information they provided was used for analysis. Therefore, the final sample size for the study consisted of 329 individuals or 328 individuals depending on the variable being analyzed.

Participants

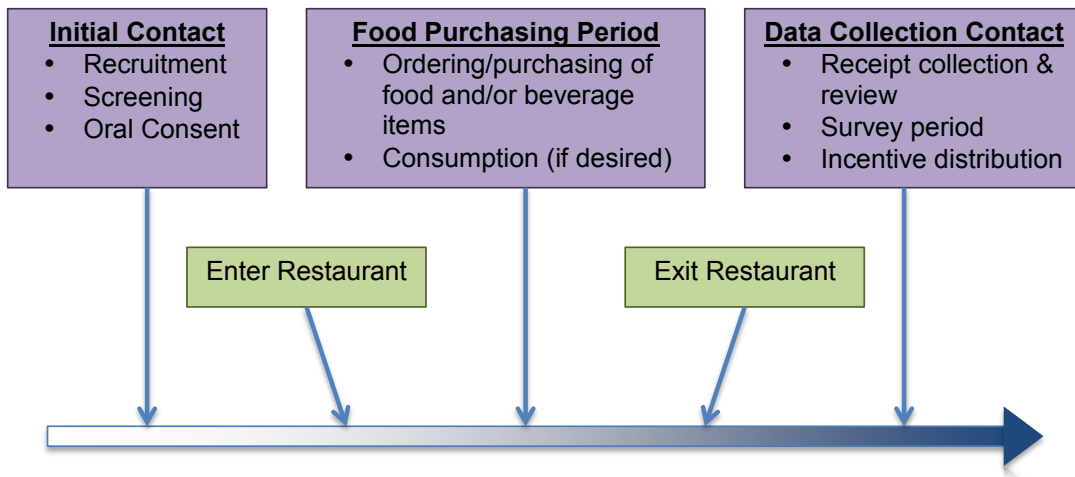
Participants were recruited outside individual restaurant locations at the front entrance. The participant sampling frame consisted of adults who were at least 18 years

old, who could read, speak and understand English, who were entering the restaurant. Only individuals purchasing food for personal consumption were used for the study. Individuals purchasing food for others were asked to provide a separate receipt showing only the food they purchased for self-consumption. Entire groups of individuals entering an establishment together were not included in the study but single individuals within a group, who met the specified criteria, were included. Groups were asked to elect one individual to participate in the study on either a voluntary basis or by selecting the group member with the closest birthday. Based on the design of this study, the Institutional Review Board at Arizona State University classified this study as exempt (see Appendix C).

Data Collection

Based on the random assignment of days and time, data collection at each location took place either on a weekday (Monday-Thursday) or on the weekend (Saturday). Lunchtime data collection took place between 11:00 a.m. and 2:00 p.m. and dinnertime data collection took place between 5:00 p.m. and 8:00 p.m. Data was collected from a maximum of 20 participants at each study location. Street-intercept survey methodology, as described by Elbel et al.,²⁸ and Dumanovsky et al.,³¹ was used during each collection period. Briefly, upon entry into each establishment, every possible customer was approached and asked to participate in the study (see Figure 1). Participants were told that the study was being conducted as part of a school research project exploring fast food restaurant use in the Phoenix area.

Figure 1: Study Design Diagram



During initial contact customers were briefly screened for inclusion criteria (see Participants section and Appendix D for further details). Oral consent was obtained and the participants were informed of their rights as a research subject. Once an individual agreed to participate, they were instructed to purchase food and beverage items as they usually would and to obtain a receipt, which would be collected prior to completing the survey. Individuals who were purchasing food and/or beverage items for multiple people were asked to make a separate order consisting of only items that they intended to consume. In order to participate, individuals were instructed to request a separate receipt. Customers who were purchasing items for dine-in were asked to seek out the research team upon completion of their meal.

When an individual who had agreed to participate in the study exited the restaurant, a research study data collector approached them. The data collector collected the participants itemized receipt and conducted an oral review of the order to verify the

food and/or beverage items that were purchased, checking for any additions or substitutions that were not listed on the receipt.

Cases in which participants who were dining with groups did not obtain a separate receipt showing their purchases, data collectors circled the items the participant ordered for their own consumption in the receipt. Once the receipt was verified and collected, participants were asked to complete the survey (Appendix A). Survey questions, obtained and modified from previous research studies,^{28, 31} were verbally administered and responses were recorded using a tablet device. For sensitive questions, such as age and income, participants were shown the tablet screen displaying the question and answer choices, and they were instructed to make their selection and advance the survey to the next question, keeping their answers confidential. Once the survey was complete participants were given \$5 compensation for their participation.

Measures

Explanatory variables. The explanatory variables of this study consisted of socio-demographic characteristics including age, gender, race, ethnicity, education level, income level, number of children, and frequency of fast food visits.

- Age was categorized using the following ranges: 18-25 years old, 26-35 years old, 36-49 years old, 50-64 years old, and 65 years and over (see Appendix A, Q18).
- Race and ethnicity were assessed using two questions. The first question asked participants which race they most closely identified with given the following options: Black / African American; white; American Indian / Native American,

Aleutian or Eskimo; Asian / Pacific Islander; Hispanic, Multiple race. The second question asked participants if they were of Spanish, Hispanic or Latino origin of descent (see Appendix A, Q23 and Q24). For descriptive analysis, race was reclassified into five categories: non-Hispanic white, non-Hispanic black, Hispanic, Asian, and other. Participants who stated they were of Spanish, Hispanic or Latino origin were categorized as Hispanic. Due to the small sample size of participants categorized as ‘other’ or ‘Asian’, for correlative analysis, these groups were set to ‘missing’ and statistical tests were run using three categories for race/ethnicity: non-Hispanic white, non-Hispanic black, and Hispanic.

- Education was assessed as the highest level completed. Options were as follows: some high school; 12th grade, GED or high school diploma; some college / no degree; associate’s degree; bachelor’s degree; some graduate/professional school / no degree; graduate / professional degree (see Appendix A, Q20). For statistical analysis, three categories were created: high school or less, some college, and college plus. Earning a bachelor’s degree classified an individual as ‘college plus’ and completing college classes or a trade school equivalent classified an individual as ‘some college.’
- Income was assessed using both a range and a zip code. Ranges were as follows: under \$20,000; \$20,000 to \$49,999; \$50,000 to \$74,999; \$75,000 to \$99,999; and \$100,000 and above (see Appendix A, Q21 & Q25). In cases in which a participant did not provide their income (n=11), median annual household income was inferred using census data on the provided zip code (if applicable). For

statistical analysis, these ranges were reclassified into three categories: income below \$50,000, income between \$50,000 and \$99,999 and an income of \$100,000 and above.

- Frequency of fast food consumption was assessed as frequency per week (see Appendix A, Q5). Participants were categorized dichotomously as consuming fast food more than once per week or once per week or less.
- Gender was observed by the research team (see Appendix A, Q29). Analysis was performed using the dichotomous variable.
- Number of children was assessed by first asking if the participant had children and then followed up with the age of each child (see Appendix A, Q19 and Q19a). Analysis was done using a dichotomous variable of having children or not having children.

Dependent variables. The three dependent variables being evaluated in this study were calorie menu labeling awareness, calorie menu labeling usage, and total number of calories purchased.

Calorie menu labeling awareness

Calorie menu labeling awareness was assessed using survey questions.

Participants were asked, “Did you noticed any calorie information listed for menu items at the restaurant today?” If participants stated that they noticed the calorie information, they were prompted with, “Did you see the calorie information before or after you placed your order?” For analysis, this variable was recoded as dichotomous, with only participants who noticed menu labeling prior to placing their order being classified as

noticing calorie menu labeling. Those who did not notice calorie menu labeling or who noticed menu labeling after placing their order were classified as not noticing calorie menu labeling (see Appendix A, Q6).

Calorie menu labeling usage

Participants who noticed calorie menu labeling prior to ordering were asked a follow up question, “Did the calorie information affect your beverage purchases today?” Response options consisted of, ‘yes’, ‘no’, ‘don’t know’, ‘did not purchase beverage items’, ‘refused’, or ‘other’. A parallel question was asked for food purchased and coded in the same manner. (See Appendix A, Q6b, Q6c). From these survey questions, three dichotomous variables were generated for analysis. Those who stated that the information affected their beverage purchase were classified as using menu labeling for beverage items. Those who stated the information affected their food purchases were classified as using menu labeling for food items. A combined variable was created for those who stated that they used menu labeling for food and/or beverage purchases, and were classified as general menu labeling users. This variables was termed “used menu labels.” All other responses were classified as non-users, or “did not use”.

Total number of calories purchased

The total number of calories purchased was assessed using customer itemized receipts and nutrition information provided by the McDonald’s web site. Calorie counts were established for each individual food or beverage item that was ordered and an overall total was calculated. In cases in which a patron bought an item with the intention

of sharing it, the calories for the food or beverage item were divided by the number of sharers. Sharing was defined as the intent of consuming a food or beverage item before the item was purchased. For example, if a husband stated that he bought a large fry to share with his wife, the number of calories for the large fry was divided by two. On the other hand, if a husband stated that he ate some of his wife's fries then that item was not counted as a shared item and it was excluded from the analysis as it was initially purchased for another individual. Similarly, if during an interview a participant disclosed that they only consumed half of the calories of a certain food or beverage item, the number of calories the individual purchased was used, not how many calories the individual consumed. Ketchup and other condiments that were not specifically ordered or included on the receipt were not included in calorie calculations. A second member of the research team verified all calorie calculations. All food items were entered into a spreadsheet individually in order to assess meal components independently and collectively. The following outcome variables were generated using receipt data: total side calories, total entrée calories, total food calories (combined side and entrée calories), beverage calories, and total calories (combined food and beverage calories).

Statistical Analyses

Statistical tests were conducted using SPSS version 21 software. Frequency distributions were examined for all variables used in the analysis to check for outliers. Individuals more than three standard deviations away from the mean number of total calories purchased were excluded from the analysis (n=1). Bivariate analyses were used to determine differences between groups. Chi square tests were used to analyze

categorical data such as associations between gender and likelihood of noticing calorie menu labels. Differences in mean calories purchased between groups were detected using independent t-tests (two groups) and ANOVA (three or more groups). Finally, multivariate analyses were used to control for cofounders. Logistic regression was used for dichotomous outcome variables, such as whether participants reported using menu labeling, and Ordinary Least Square (OLS) regression was used for continuous outcome variables, such as the amount of calories purchased. Odds ratios and 95% confidence intervals are provided for logistic regression and beta coefficients and 95% confidence intervals are provided for OLS. Significance was defined as a p-value of 0.05 or lower.

CHAPTER 4

RESULTS

Table 2 summarizes the socio-demographic characteristics of the study sample. Of the 329 participants who were included in the analysis, the majority were males (63.5%). The ages of the study sample were distributed fairly equally; 25.5% were 18-25 years old, 20.4% were 26-35 years old, 19.1% were 36-49 years old, 23.4% were 50-64 years old, and 11.6% were 65 years old or older. A little over half of study participants were non-Hispanic white (53.8%), 11.6% were non-Hispanic black, 26.4% were Hispanic, 2.7% were Asian, and 4.3% were other races/ethnicities. Slightly over half of the study participants reported a median annual household income below \$50,000, with 21.3% reporting an annual income less than \$20,000. Over one-third of participants (35.0%) had a high school diploma or less and 25% had a bachelor's degree or higher. Two-thirds of the sample had children and about an equal number frequented fast food restaurants more than once per week (62.6% and 66.3% respectively).

Table 2: Socio-demographic Characteristics of Study Sample (N=329)

Explanatory Variable	n^a	%^b
Gender		
Male	209	63.5
Female	120	36.5
Age		
18-25 years old	84	25.5
26-35 years old	67	20.4
36-49 years old	63	19.1
50-64 years old	77	23.4
65 and over	38	11.6
Race / Ethnicity		
Non-Hispanic white	177	53.8
Non-Hispanic black	38	11.6
Hispanic	87	26.4
Asian	9	2.7
Other	14	4.3
Income^c		
Under \$20,000	70	21.3
\$20,000 to \$49,999	97	29.5
\$50,000 to \$74,999	65	19.8
\$75,000 to \$99,999	42	12.8
\$100,000 and above	52	15.8
Education Level		
HS or less	115	35.0
Some college	129	39.2
Bachelor's degree or higher	82	24.9
Has Children		
Yes	206	62.6
No	122	37.1
Frequency of Fast Food Consumption		
Once per week or less	111	33.7
More than once per week	218	66.3
^a Sample size may not add to 329 due to missing cases.		
^b Some percentages may not equal 100 due to rounding error.		
^c For missing cases, income was inferred based median household income from reported zip code.		

Table 3 shows that approximately 57.4% of study participants reported noticing calorie menu labels prior to placing their order. Almost 13% of participants reported that

calorie menu labels affected their food purchase and 7% of participants reported that the labels affected their beverage purchase, for a total of 16% of participants who reported using calorie information for food or beverage purchases.

Table 3: Frequency of noticing and using menu labeling information among study participants (N=329)

Notice and Use of Menu Labeling	n^a	%^b
Noticed menu labels before placing order		
Yes	189	57.4
No ^c	140	42.6
Used menu labels for food purchases		
Yes	42	12.8
No ^d	287	87.2
Used menu labels for beverage purchases^e		
Yes	23	7.0
No ^d	306	93.0
Used menu labels for food or beverage purchases		
Yes	53	16.1
No ^d	276	83.9
^a Sample size may not add to 329 due to missing cases.		
^b Percentages may not equal 100 due to rounding error.		
^c Included those who did not notice menu labels and those who noticed labels after order was placed.		
^d Included those who did not use menu labels for food or beverage items and those who did not notice menu labeling.		

Table 4 shows how noticing calorie menu labels differed among socio-demographic groups. In bivariate analysis, significant associations were found across income categories and levels of education ($p < 0.001$ and $p < 0.05$ respectively). As income increased, so did the likelihood of noticing calorie menu labels, with 75% of participants with median annual household incomes of \$100,000 or higher noticing labels compared to 47.3% of participants with incomes below \$50,000 noticing labels. The same gradient

effect was observed among education levels, with 69.5% of individuals with at least a bachelor's degree noticing compared to only 53.9% of participants with a high school diploma or less noticing. There was a marginal association between participant race/ethnicity and whether they noticed calorie menu labels, with non-Hispanic whites being most likely to notice at 61.0%; however, this was found to be only marginally statically significant ($p=0.092$).

Table 4: Socio-demographic characteristics of participants who noticed calorie menu labeling information compared to those who did not **notice** calorie menu labeling information prior to placing their order (N=329)

Explanatory Variables	Noticed menu labels	Did not notice menu labels	<i>p</i> value ^d
	n ^b (% ^c)	n ^b (% ^c)	
Sample	189 (57.4)	140 (42.6%)	
Gender			0.805
Male	119 (56.9%)	90 (43.1%)	
Female	70 (58.3%)	50 (41.7%)	
Age			0.414
18-25 years old	46 (54.8%)	38 (45.2%)	
26-35 years old	37 (55.2%)	30 (44.8%)	
36-49 years old	38 (60.3%)	25 (39.7%)	
50-64 years old	50 (64.9%)	27 (35.1%)	
65 and over	18 (47.4%)	20 (52.6%)	
Race / Ethnicity			0.092
Non-Hispanic white	108 (61.0%)	69 (39.0%)	
Non-Hispanic black	20 (52.6%)	18 (47.4%)	
Hispanic	41 (47.1%)	46 (52.9%)	
Income			<0.001
Below \$50,000	79 (47.3%)	88 (52.7%)	
\$50,000 - \$99,999	69 (64.5%)	38 (35.5%)	
\$100,000 and above	39 (75.0%)	13 (25.0%)	
Education level			0.043
HS or less	62 (53.9%)	53 (46.1%)	
Some college	69 (53.5%)	60 (46.5%)	
Bachelor's degree or higher	57 (69.5%)	25 (30.5%)	
Has Children			0.830
Yes	119 (57.8%)	87 (42.2%)	
No	69 (56.6%)	53 (43.4%)	
Frequency of fast food consumption			0.318
Once per week or less	68 (61.3%)	43 (38.7%)	
More than once per week	121 (55.5%)	97 (44.5%)	
^a Included those who did not notice menu labels and those who noticed labels after order was placed. ^b Sample size may not add to 329 due to missing cases. ^c Percentages may not equal 100 due to rounding error. ^d Significance is determined at the 0.05 level (2-tailed).			

The bivariate analysis between socio-demographic characteristics and respondents' report of using calorie menu labels for food or beverage purchases is summarized in Table 5. A significant difference was observed between reported use of calorie menu labels and participant education level, in a similar pattern that was observed for noticing calorie menu labels. As participant education increased, so did the use of calorie menu labels—increasing from 9.6% among those with a high school diploma or less to 30.5% among those with a bachelor's degree or higher. Significant associations were also observed between income and reported use of menu labeling. Those with median household incomes between \$50,000 to \$99,999 reported using calorie menu labels at 26.2% compared to 7.8% for individuals with household incomes below \$50,000 and 21.2% for individuals with household incomes of \$100,000 or higher.

Associations were also seen among age groups, with adults 65 years old or older being more likely to report using menu labels for food or beverage purchases (28.9%); however, this relationship was only marginally significant ($p=0.086$). Additionally, a marginal relationship ($p=0.056$) was also found between race/ethnicity and reported use of calorie menu labels, with non-Hispanic whites being more likely to report using labels (19.2% compared to 13.2% for non-Hispanic blacks and 8.0% for Hispanics).

Table 5: Socio-demographic characteristics of participants who **used** calorie menu labeling information for **food OR beverage purchases** compared to those who did not use calorie menu labeling information (n=329)

Explanatory Variables	Used labeling for food OR beverage purchases	Did not use labeling ^a	<i>p</i> value ^d
	n ^b (% ^c)	n ^b (% ^c)	
Sample	53 (16.1%)	276 (83.9%)	
Gender			0.146
Male	29 (13.9%)	180 (86.1%)	
Female	24 (20.0%)	96 (80.0%)	
Age			0.086
18-25 years old	10 (11.9%)	74 (88.1%)	
26-35 years old	12 (17.9%)	55 (82.1%)	
36-49 years old	6 (9.5%)	57 (90.5%)	
50-64 years old	14 (18.2%)	63 (81.8%)	
65 and over	11 (28.9%)	27 (71.1%)	
Race / Ethnicity			0.056
Non-Hispanic white	34 (19.2%)	143 (80.8%)	
Non-Hispanic black	5 (13.2%)	33 (86.8%)	
Hispanic	7 (8.0%)	80 (92.0%)	
Income			<0.001
Below \$50,000	13 (7.8%)	154 (92.2%)	
\$50,000 - \$99,999	28 (26.2%)	79 (73.8%)	
\$100,000 and above	11 (21.2%)	41 (78.8%)	
Education level			<0.001
HS or less	11 (9.6%)	104 (90.4%)	
Some college	16 (12.4%)	113 (87.6%)	
Bachelor's degree or higher	25 (30.5%)	57 (69.5%)	
Has Children			0.604
Yes	31 (15.0%)	175 (85.0%)	
No	21 (17.2%)	101 (82.8%)	
Frequency of fast food consumption			0.723
Once per week or less	19 (17.1%)	92 (82.9%)	
More than once per week	34 (15.6%)	184 (84.4%)	
^a Included those who did not use menu labels for food items, those who did not use menu labels for beverage items, and those who did not notice menu labeling. ^b Sample size may not add to 329 due to missing cases. ^c Percentages may not equal 100 due to rounding error. ^d Significance is determined at the 0.05 level (2-tailed).			

Table 6 summarizes the mean, maximum and minimum calories purchased by participants for total calories, which consisted of all food and beverage calories; total food calories, which consisted of combined entrée and side calories; and total beverage calories. On average, participants purchased 783 total calories, 720 total food calories, 565 entrée calories, 360 side calories, and 219 beverage calories. The maximum number of calories purchased by a study participant was 2,240 calories and the minimum number of calories was zero.

Table 6: Average number of calories purchased by food or beverage category (n=329)

Outcome Variable	n	Mean	SD	Max	Min
Total food and beverage calories	329	783	453	2,240	0
Total food calories	290	720	21	1,930	30
Total entrée calories	248	565	258	1,930	190
Total side calories	191	360	136	810	30
Total beverage calories	222	219	159	870	0

The differences in mean calories purchased among socio-demographic groups are described in Table 7. The bivariate analysis showed that significant differences were found in total calories purchased among all socio-demographic groups with the exception of income categories and frequency of fast food consumption. Between gender categories, males were found to purchase 160 more calories than females ($p=0.002$). Additionally, multiple relationships were found among age categories. Tukey Post Hoc tests showed that individuals between the ages of 18 to 25 ordered 218 more calories than individuals between the ages of 36 to 49 ($p=0.022$). Additionally, 18 to 25 year olds ordered 238 more calories than individuals between the ages of 50 to 64, and 413 more calories than those aged 65 and older ($p=0.005$, $p<0.001$, respectively). Individuals

between the ages of 26 to 35 were found to purchase 241 more calories than those aged 65 and older, although this relationship was only marginally significant ($p=0.051$). In terms of race and ethnicity, Hispanics were found to purchase 175 more calories than non-Hispanic whites ($p=0.006$). Among education levels, individuals with a high school diploma or less were found to purchase 219 more calories than those with a bachelor's degree or higher ($p=0.002$). Finally, those without children were found to purchase 125 more calories than individuals with children ($p=0.014$).

Table 7: Differences in mean calories purchased by socio-demographic characteristics

Explanatory Variable	n	Mean calories Purchased^a	SD	SE	p value^b
Gender					0.002
Male	208	837	449	31	
Female	120	677	427	39	
Age^c					<0.001
18-25 years old	84	958 ^{A, B, C}	472	51	
26-35 years old	66	786 ^D	437	54	
36-49 years old	63	740 ^A	410	52	
50-64 years old	77	720 ^B	443	50	
65 and over	38	545 ^{C, D}	327	53	
Race / Ethnicity^c					0.006
Non-Hispanic white	177	726 ^A	420	32	
Non-Hispanic black	38	719	358	58	
Hispanic	86	901 ^A	483	52	
Income					0.494
Below \$50,000	166	752	431	33	
\$50,000 - \$99,999	107	789	469	45	
\$100,000 and above	52	832	455	63	
Education level					0.003
HS or less	114	882 ^A	449	42	
Some college	129	769	444	39	
Bachelor's degree or higher	82	663 ^A	422	47	
Has Children					0.014
Yes	206	733	426	30	
No	121	858	472	43	
Frequency of fast food consumption					0.154
Once per week or less	111	729	447	42	
More than once per week	217	803	445	30	
^a Participants with more than 3 SDs away from mean calories were excluded from analyses. ^b Significance is determined at the 0.05 level (2-tailed). ^c Equal variance not assumed. Homogeneity of variances not achieved. ^{A, B, C} Same superscript denotes significant differences in mean calories purchased between demographic groups (Tukey HSD test, p< 0.05). ^D Same superscript denotes significant differences in mean calories purchased between demographic groups (Tukey HSD test, p< 0.06).					

Table 8 summarizes the group average differences in total food and beverage calories, total food calories, entrée calories, side calories and beverage calories between those who noticed and did not notice calorie menu labeling as well as between those who used and did not use calorie menu labeling. No significant differences were found in average calories purchased between those who notice the calorie menu labels and those who did not notice among any of the food and beverage categories. However, significant differences were observed in mean calories purchased for food and/or beverage categories among those who reported using calorie menu labeling and those who did not. Those who reported using the calorie menu labels for either food or beverages ordered 177 fewer total food and beverage calories ($p=0.009$), 135 fewer food calories ($p=0.001$), 226 fewer entrée calories ($p<0.001$), and 95 fewer beverage calories ($p=0.014$), than those who did not report using or noticing the calorie information.

Table 8: Association between **noticing** and **using** calorie menu labeling before placing order and the number of food and/or beverage calories purchased

Food / Beverage Classification	Noticed Calorie Information			Used Calorie Information		
	Noticed	n	Mean (SD; SEM)	Used	n	Mean (SD; SEM)
Total food and beverage calories	Yes	189	779 (442;32)	Yes ^d	53	634* (432;59)
	No ^b	139	777 (455;39)	No ^b	276	811 (453;27)
Total food calories	Yes	166	695 (356;28)	Yes ^e	29	446* (190;35)
	No ^b	122	736 (345;31)	No ^b	219	581 (263;18)
Entrée calories	Yes	136	544 (224;19)	Yes ^e	37	523** (289;23)
	No ^b	108	550 (206;20)	No ^b	253	749 (366;47)
Side calories	Yes	137	213 (153;13)	Yes ^f	20	321 (144;32)
	No ^b	83	213 (144;16)	No ^b	171	365 (135;10)
Beverage calories	Yes	111	360 (135;13)	Yes ^e	18	131* (140;33)
	No ^b	79	356 (130;15)	No ^b	204	226 (158;11)

^a Participants with more than 3 SDs away from mean calories were excluded from the analysis
^b Included those who did not notice menu labels and those who noticed labels after order was placed.
^c Equal variances not assumed for using calorie information.
^d Used menu labels for food or beverage purchases.
^e Used menu labels for food purchases.
^f Used menu labels for beverage purchases.
* Significance is determined at the 0.05 level (2-tailed). Equal variances assumed.
** Significance is determined at the <0.001 level (2-tailed). Equal variances assumed.

The results from logistic regression analysis assessing the associations between noticing and using calorie label information and various explanatory variables are outlined in Table 8. In terms of noticing calorie menu labels, income was the only explanatory variable that remained significant after controlling for cofounders. The gradient effect of income seen in the bivariate analysis is also seen in the regression analysis, with individuals with annual household incomes between \$50,000 and \$99,999 having 78% higher odds of noticing calorie information than individuals with incomes less than \$50,000 (p=0.043), and individuals with annual household incomes of \$100,000 or higher having more than two times greater odds of notice the calorie information than individuals with incomes less than \$50,000 (p=0.029). Education level, which was found

to be statistically significant in bivariate analysis with noticing calorie menu labels, was no longer found to be significant in the multivariate analysis.

As shown in Table 9, in multivariate analysis a number of socio-demographic characteristics were found to be significantly associated with the use of calorie menu labels. Among age categories, individuals between the ages of 36 to 49 had 82% lower odds of using calorie menu labels than individuals between the ages of 18 and 25 ($p=0.046$). Whereas income was found to have a gradient effect with noticing menu labels (as income increased, so did the odds of noticing calorie menu labels), this effect was not observed with use of calorie menu labels; however, statistically significant relationships were still found. Individuals with annual household incomes between \$50,000 and \$99,999 had 3.5 times greater odds of using calorie menu labels compared to individuals with household incomes below \$50,000 ($p=0.04$), whereas individuals with household incomes of \$100,000 or higher had 2.72 times greater odds of using calorie menu labels than individuals with household incomes below \$50,000; however this relationship was only marginally significant ($p=0.056$). Finally, those with a bachelors degree had more than three times the odds to report using calorie menu labels and those with a high school diploma or less ($p=0.023$).

Table 9: Results from logistic regression assessing the association between noticing and using calorie menu labels and explanatory variables

Explanatory Variables	Noticing Menu Labels (n=300)		Using Menu Labels (n=300)	
	OR (95% CI)	p value ^a	OR (95% CI)	p value ^a
Gender				
Male (Ref)				
Female	1.18 (0.71 to 1.97)	0.517	1.87 (0.90 to 3.86)	0.091
Age				
18-25 years old (Ref)				
26-35 years old	1.02 (0.47 to 2.19)	0.969	1.08 (0.33 to 3.50)	0.900
36-49 years old	0.92 (0.39 to 2.17)	0.855	0.18 (0.04 to 0.97)	0.046
50-64 years old	1.04 (0.45 to 2.43)	0.921	0.78 (0.22 to 2.79)	0.704
65 and over	0.55 (0.20 to 1.52)	0.246	1.30 (0.32 to 5.26)	0.712
Race / Ethnicity				
Non-Hispanic white (Ref)				
Non-Hispanic black	0.89 (0.42 to 1.92)	0.773	0.92 (0.29 to 2.91)	0.892
Hispanic	0.69 (0.37 to 1.29)	0.246	0.49 (0.17 to 1.38)	0.178
Income				
Below \$50,000 (Ref)				
\$50,000 - \$99,999	1.78 (1.02 to 3.10)	0.043	3.43 (1.48 to 7.97)	0.004
\$100,000 and above	2.38 (1.09 to 5.16)	0.029	2.72 (0.97 to 7.60)	0.056
Education level				
HS or less (Ref)				
Some college	1.02 (0.59 to 1.78)	0.941	1.00 (0.40 to 2.60)	0.991
Bachelor's degree or higher	1.40 (0.68 to 2.91)	0.362	3.25 (1.18 to 8.97)	0.023
Has Children				
Yes (Ref)				
No	1.17 (0.64 to 2.15)	0.602	1.58 (0.65 to 3.83)	0.314
Frequency of fast food consumption				
Once per week or less (Ref)				
More than once per week	0.90 (0.53 to 1.54)	0.700	1.17 (0.54 to 2.60)	0.670
^a Significance is determined at the 0.05 level (2-tailed).				

Results from a multivariate ordinary least squares regression analysis assessing the association between total calories purchased and noticing calorie menu labeling after adjusting for other covariates, are outlined in Table 10. In multivariate analysis, noticing menu labels was not shown to be associated with the number of calories purchased ($p=0.171$). Gender and age were the only explanatory variables that remained statistically significant in this model. Being female was associated with 85 fewer calories

purchased compared to males ($p=0.009$). Being between the ages of 50 and 65 was associated with approximately 115 fewer calories purchased ($p=0.033$) compared to 18-25 year olds, and being 65 years old or older was associated with 275 fewer calories purchased ($p<0.001$) than 18-25 year olds. Total price was found to be significantly associated with the number of calories purchased ($p<0.001$). Every dollar increment in total price paid was associated with an increase of 140 total calories purchased.

Table 10: Results of multivariate ordinary least squares regression assessing the association between total calories and explanatory variables, with **noticing** menu labeling as main explanatory variable (N = 298)

Explanatory Variables	Total Calories Purchased ^a	
	B Coefficient (95% CI)	<i>p</i> value ^b
Notice Menu Labels		
No (Ref)		
Yes	-42.15 (-102.66 to 18.37)	0.171
Gender		
Male (Ref)		
Female	-84.92 (-148.75 to -21.10)	0.009
Age		
18-25 years old (Ref)		
26-35 years old	-73.96 (-171.28 to 23.35)	0.136
36-49 years old	-95.11 (-202.04 to 11.82)	0.081
50-64 years old	-114.66 (-219.85 to -9.46)	0.033
65 and over	-275.04 (-402.76 to -147.31)	<0.001
Race / Ethnicity		
Non-Hispanic white (Ref)		
Non-Hispanic black	22.58 (-73.08 to 118.25)	0.643
Hispanic	5.20 (-74.50 to 84.89)	0.898
Income		
Below \$50,000 (Ref)		
\$50,000 - \$99,999	-29.62 (-100.89 to 41.65)	0.414
\$100,000 and above	-83.45 (-178.31 to 11.41)	0.084
Education level		
HS or less (Ref)		
Some college	17.28 (-52.96 to 87.53)	0.629
Bachelor's degree or higher	-66.78 (-156.02 to 22.46)	0.142
Has Children		
Yes (Ref)		
No	-33.75 (-108.84 to 41.34)	0.377
Frequency of fast food consumption		
Once per week or less (Ref)		
More than once per week	-3.79 (-70.04 to 62.46)	0.911
Total Price Paid	140.41 (127.66 to 153.17)	<0.001

^a Participants with more than 3 SDs away from mean calories were excluded from analyses.

^b Significance is determined at the 0.05 level (2-tailed).

Results from a multivariate ordinary least squares regression analysis assessing the association between total calories and use of menu labeling, after adjusting for covariates, are outlined in Table 11. In the multivariate analysis, the relationship between the total number of calories purchased and using menu labels was found to be statistically significant ($p=0.001$). Using menu labels was associated with a decrease in total calories purchased by 146 calories. Gender and age remained statistically significant as well. In this model, being female was associated with 74 fewer total calories purchased compared to males ($p=0.021$). Being between the ages of 35 to 49 was associated with a decrease in 112 total calories purchased ($p=0.037$). Being between the ages of 50 and 65 was associated with approximately 116 fewer calories purchased ($p=0.028$), and being 65 years old or older was associated with 257 fewer calories purchased ($p<0.001$) compared to 18-25 year olds. Total price was again found to be significantly associated with the number of calories purchased ($p<0.001$). Every dollar increment in total price paid was associated with an increase of 141 total calories purchased.

Table 11: Results of multivariate ordinary least squares regression assessing the association between total calories and explanatory variables, with **using** menu labeling as main explanatory variable (n = 298)

Explanatory Variables	Total Calories Purchased ^a	
	B Coefficient (95% CI)	<i>p</i> value ^b
Using Menu Labels		
No (Ref)		
Yes	-146.29 (-231.98 to -60.59)	0.001
Gender		
Male (Ref)		
Female	-74.21 (-137.39 to -11.04)	0.021
Age		
18-25 years old (Ref)		
26-35 years old	-71.98 (-167.74 to 23.77)	0.140
36-49 years old	-112.59 (-218.32 to -6.86)	0.037
50-64 years old	-115.77 (-219.27 to -12.28)	0.028
65 and over	-257.36 (-383.00 to -131.73)	<0.001
Race / Ethnicity		
Non-Hispanic white (Ref)		
Non-Hispanic black	22.31 (-71.81 to 116.43)	0.641
Hispanic	0.31 (-78.07 to 78.70)	0.994
Income		
Below \$50,000 (Ref)		
\$50,000 - \$99,999	-16.71 (-87.24 to 53.82)	0.641
\$100,000 and above	-80.66 (-173.53 to 12.22)	0.088
Education level		
HS or less (Ref)		
Some college	17.19 (-51.92 to 86.31)	0.625
Bachelor's degree or higher	-45.84 (-134.66 to 42.98)	0.311
Has Children		
Yes (Ref)		
No	-27.70 (-101.68 to 46.28)	0.462
Frequency of fast food consumption		
Once per week or less (Ref)		
More than once per week	1.09 (-64.114 to 66.30)	0.974
Total Price Paid	141.21 (128.65 to 153.76)	<0.001
^a Participants with more than 3 SDs away from mean calories were excluded from analyses.		
^b Significance is determined at the 0.05 level (2-tailed).		

CHAPTER 5

DISCUSSION

The purpose of this study was to determine if noticing or using calorie menu labels in a fast food restaurant was associated with purchasing fewer calories among adult fast food patrons in the Phoenix metropolitan area. A secondary objective of this study was to explore the relationship between socio-demographic characteristics of adult restaurant patrons, including, gender, income, education level, race, ethnicity, number of children, and frequency of fast food visits, and the likelihood of noticing and using calorie menu labeling.

Noticing or using the calorie information

Results from this study showed that almost 60% of the study sample noticed menu labeling information, which is a similar proportion to what was found in previous studies.^{25, 28-29, 30, 32, 35, 42} In terms of menu labeling usage, only 16% of participants reported using the information for food or beverage purchases, with more individuals reporting using the information for food purchases than for beverage purchases (13% compared to 7%). The proportion of participants who reported using the information was also similar to what Dumanovsky³¹ and colleagues found. Pulous et al.,³⁵ found that 20.4% of patrons reported ordering an entrée lower in calories as a result of menu labeling. Both Elbel et al.,²⁸ and Dumanovsky et al.,³⁰ found that roughly 27% of participants who noticed the labeling information said that the information impacted their food or beverage choices Bassett et al.,³⁴ found that 37% of patrons who noticed the menu labels stated that the information affected their purchases. This large discrepancy

between the proportion of patrons who noticed label information and the proportion of patrons who reported using the information suggests that there might be a lack of knowledge on how to use calorie menu labeling, meaning patrons are seeing the information but it is not meaningful to them.^{28, 31-32, 35} Since McDonald's posted calorie information prior to the release of FDA guidance, the current menus do not include a statement regarding the daily recommendation for caloric intake. Therefore, patrons might not be able to translate the meaning of the calorie labels. Putting these results into context in terms of the transtheoretical model of behavior change, these results suggest that currently the majority of patrons may be in the precontemplation or contemplation stages of behavior change and future interventions should target these stages in order to move individuals along the behavior change continuum, towards action and maintenance stages. For example, launching a nutrition education campaign that is designed to increase consumer awareness of and knowledge of how to use calorie menu labeling could ultimately lead consumers to use calorie menu labels to order lower-calorie meals at restaurant establishments. Another explanation for the lack of utilization could be that fast food frequenters are not concerned about the calories they are consuming at these types of restaurants; given the reputation of these establishments, it is expected that their caloric intake will be high.^{44,62,89}

Examining the association between socio-demographic characteristics and noticing calorie menu labeling, we found that income was the only characteristic in multivariate analysis that was associated with noticing calorie menu labeling, suggesting that income had an independent effect on noticing calorie menu labels. As income increased, so did the odds of noticing calorie menu labels. This association was not seen

in previous studies most likely due to the fact that previous study samples did not contain participants of varying income levels. Harnack et al.,³² found that more educated individuals were more likely to notice calorie labels, but we did not find this association in our study. Additionally, some studies have shown mixed results with associations between age and likelihood of noticing label information. Some studies found individuals under 25 were more likely to notice,^{30, 32} and some showed that adults over the age of 45 were more likely to notice.³⁵ In either case, we did not find an association between age and the likelihood of noticing calorie menu labels.

In terms of using menu labels, again income was found to have a significant association, with higher income individuals being more likely to use the information, which has been shown in previous studies as well.^{31, 42} Other socio-demographic characteristics that were associated with using menu labels were age and education. This is not surprising as more educated individuals are more likely to have better health behaviors such being less likely to smoke, more likely to exercise, more likely to get health check-ups, and more likely to utilize books, newspapers or magazines for health information.^{125, 126} Additionally, more educated individuals, in general, have better health outcomes, including lower BMIs and a lower risk of diabetes.^{14, 47, 52} Higher income individuals were more likely to report using the information, which was also seen by Ellison et al.³⁹ Individuals between the ages of 26-35 were least likely to use the information, which was the opposite of what was found by Dumanovsky et al.³⁰ Wethington et al.,⁴² found that those who ate fast food more than twice per week were less likely to use the information; however, our results failed to confirm this relationship. One reason for this could be that in other studies, posting menu labels was part of a

citywide or countywide policy so patrons had a greater exposure to the policy in general. At the time of our study, there was not a state-, county-, or city-wide calorie menu labeling policy being enforced in Phoenix or Arizona so our study participants had limited exposure. Wethington et al.,⁴² also found that females were more likely to use the information than males, which was not supported by either our bivariate or our multivariate analysis.

Socio-demographic characteristics and purchasing behaviors

While we did not find that females were more likely to use calorie information than males, our results showed that women purchased roughly 75 fewer average calories than men, which is supported by Wethington et al.,⁴² and Powell et al.⁵ Additionally, we found an inverse relationship between age and the number of calories purchased. As age increased, the number of calories purchased decreased. This could be due to the fact that older adults have lower calorie needs or that appetite decreases with age. Ellison et al.,³⁹ also found this relationship. Bivariate analysis revealed that non-Hispanic whites ordered significantly fewer calories than Hispanics; individuals with a bachelor's degree or higher ordered fewer calories than those with a high school education; and those with children ordered fewer calories than those who did not have children. However, after controlling for cofounders, these associations were no longer found to be statistically significant, suggesting that these variables were not independently associated with the number of calories purchased.

Relationship between noticing and using calorie labels and purchasing behaviors

The study examined if patrons who noticed or used calorie information would purchase fewer calories than those who did not notice or use the information. Upon both bivariate and multivariate analysis, we found that there were no significant differences in average calories purchased among those who noticed and did not notice menu labeling. However, there were significant differences in total calories, total food calories, total entrée calories, and total beverage calories among those who reported using calorie information and those who did not. After controlling for confounding variables such as gender, age, race/ethnicity, income, education, having children, and frequency of fast food consumption, using menu labels was found to be associated with a decrease in 146 total calories purchased. These results are significant when applied to the health impact assessment on calorie menu labeling conducted by Kuo et al.⁹⁶ The authors of the assessment forecasted that if 10% of restaurant patrons were to order reduced-calorie meals and if the average reduction was 100 calories per meal, the result could be as significant as a 41% reduction in average annual weight gain, assuming those who order lower calorie meals would not have done so without calorie menu labeling. Furthermore, if 20% of patrons used calorie labeling or if those who used labeling decreased their order by 125 calories, 101.5% of annual weight gain could be averted.⁹⁶ Since roughly 16% of our sample reported using the information, and using the information was associated with a 150 fewer calories purchased, this could have a significant impact on slowing the rates of weight gain in the United States.

Strengths

This study has some notable strengths. As it was the first to examine calorie menu labeling in a southwest population, the sample used for this study closely represented our target population of Phoenix residents. Additionally, due to our diverse sample, we were able to investigate the relationship between calorie menu labeling and socio-demographic characteristics, which has been a limiting factor in most previous studies on this topic. Furthermore, the setting for this study was an actual fast food restaurant that was participating in calorie menu labeling, allowing us to observe the use of menu labeling in a real world environment. Additionally, the same fast food restaurant chain was used for all participants, eliminating the potential effects of differences among restaurant chains. Finally, this study analyzed individual customer receipt data rather than retrospective data, providing a more accurate evaluation of patron behavior.

Limitations

While this study has a number of strengths, it also has a number of limitations. First, it is a cross-sectional study, so we are not able to determine a cause-and-effect relationship between noticing or using calorie menu labels and the number of calories purchased. We cannot conclude that using calorie menu labels resulted in a reduction in the number of calories purchased, but can only point to an inverse significant association between these two variables. Next, similar to previous research, a major limitation of this study was that we were only assessing purchasing behavior and not consumption behavior. It is unknown whether those who used calorie information and ordered fewer calories compensated for the decrease later in the day. Also, it is unknown whether

participants actually consumed everything they purchased as we did not measure consumption behavior. Results from this study are based on the assumption that participants consumed everything that they purchased, which may not be the case. Another limitation to our study is that we only looked at one restaurant chain. It is possible that results may have varied among chains.

CHAPTER 6

CONCLUSION AND IMPLICATIONS

In general, our study supports menu labeling as an effective public policy that can potentially slow obesity rates because it is associated with fewer calories purchased by those who use calorie menu labels. As in other studies, less than one fifth of our sample indicated that calorie menu labels impacted their food or beverage purchases; however, those who reported using it purchased roughly 150 fewer calories than those who did not report using the information. From a public health perspective, this difference can result in a significant population-level impact. Furthermore, while only a small portion of the population might be using calorie menu labels, a substantial number of people are noticing the information. The nation-wide menu labeling policy has yet to be enforced so there is potential to see greater impacts on usage when the policy is implemented on a national scale. In terms of the socio-demographic characteristics of menu label users, result from this study suggest that specific groups, mainly higher-income and higher-educated individuals, are more likely to benefit from calorie menu labeling as these groups were more likely to notice and or use menu labels. The implications of these findings are that a nation wide policy has the potential to further widen health disparities among socio-demographic groups, as higher-income and higher-educated individuals are known to have better health outcomes compared to those who have lower incomes and education levels. Therefore, a menu labeling policy may not be targeting socio-demographic groups who could benefit the most from this policy.

Based on these results, it is recommended that the FDA finalize menu labeling guidelines and that the policy be accompanied by nutrition education campaigns designed

to help prepare consumers for using calorie menu labels to make healthier choices when eating at restaurants and food establishments. Furthermore, nutritional campaigns should be tailored to specific socio-demographic populations and stages of behavior change in order to make the policy as effective as possible and to ensure that all individuals have an equal opportunity to make healthy decisions when dining out.

Additionally, there are secondary effects of a menu labeling policy that need to be considered, such as changes to the food environment. Individuals must make choices about what they eat, what they drink, and how physically active they will be within the context of their environment. The current study evaluated the impact of menu labeling at the individual level. However, as a result of raised public awareness of the high caloric content of foods consumed away from home, food manufacturers might reconsider and reformulate the products they are putting in the market. Restaurants might not want the reputation of offering the highest calorie entrée items or side dishes if it will have a negative impact on their business. Future studies should include consideration of the potential impact calorie menu labeling policies can have on restaurant offerings and the overall food environment.

Finally, it is important to consider that measurable changes in obesity rates, as a result of a public policy, are going to take what the majority of public policy studies lack: time. Future studies should include exploration of the use of calorie menu labeling longitudinally, over greater periods of time and after a national policy has been enforced.

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APPENDIX A
SURVEY TOOL

***McDonald's Survey THE REAL DEAL - UPDATED 2/22/13**

Q1 What is the name of the primary researcher who collected this survey? (Do not read, for research team only)

- Jessie
- Alan

Q2 What is the PARTICIPANT's identification number? (Do not read, for research team only)

Q3 Did the participant order food items, beverage items or both? (Do not read, for research team only)

- Food Items ONLY
- Beverage Items ONLY
- BOTH food and beverage items

Q4 Were the food and / or beverage items ordered and purchased from the drive thru or from inside the restaurant? (Do not read, for research team only)

- Inside the restaurant
- Drive thru

Now I will now ask you a several questions about yourself, your health and about the food and/or beverage items you purchased today. If at any time you would rather answer a question confidentially, let me know and I can show you the question on the tablet device and you can select from the options yourself. This survey should take about 5 minutes.

Q5 In an average week, how many times do you go to fast food restaurants? (Do not read options, if they answer zero or monthly verify by asking "so less than weekly?")

- number of times per week _____
- less than weekly
- don't know
- refused

Q6 Did you notice any calorie information listed for menu items at the restaurant today? (Do not read options, if they answer "YES"; probe with "did you see the calorie information before or after you placed your order?")

- yes, prior to placing my order today
- yes, after placing my order today
- I saw it during a previous visit
- no, I did not notice calorie information

- don't know
- refused
- other (specify) _____

Q6a Where did you notice calorie information (choose all that apply)? (Do not read options, after response prompt with “anywhere else?”)

- posted on the menu board (behind / above the register)
- on a counter mat display at the register
- in a brochure at the register
- in an advertisement at the register
- in an advertisement in a location other than the register (ex: window advertisement)
- printed on the food / beverage packaging
- printed on menu liners
- remember from a previous visit
- remember from website
- did not notice calorie information
- don't know
- refused
- other (specify) _____

Q6b Did the calorie information affect your beverage purchases today? (Do not read options)

- yes
- no
- don't know
- refused
- did not purchase beverage items
- other (specify) _____

Q6bi How did the calorie information affect your beverage purchases? (Do not read options unless necessary)

- purchased items with fewer calories
- purchased items with more calories
- purchased items with smaller portion size
- purchased items with larger portion size
- Substituted beverage item
- Decided not to order beverage
- no difference
- don't know
- refused
- other (specify) _____

Q6c Did the calorie information affect your food purchases today? (Do not read options)

- yes
- no
- don't know
- refused
- did not purchase food items
- other (specify) _____

Q6ci How did the calorie information affect your food purchases? (Do not read options unless necessary)

- purchased items with fewer calories
- purchased items with more calories
- purchased items with smaller portion size
- purchased items with larger portion size
- Substituted entree item
- Substituted side item
- Decided not to order food item
- no difference
- don't know
- refused
- other (specify) _____

Q7 How tall are you without shoes?

- feet _____
- inches _____
- don't know
- refused

Q8 How much do you weigh? (may need to prompt with, “if you would like to answer the question confidentially let me know and I can show you the tablet device and you can make your own selection.”)

- pounds _____
- don't know
- refused

Q9 Would you say your health is: (Read options)

- excellent
- very good
- good
- fair
- poor
- don't know
- refused

Q10 Do you agree or disagree with the following statement: In general, I eat healthy. (Do not read options, after response prompt with “do you strongly agree/disagree or somewhat agree/disagree?”)

- strongly agree
- somewhat agree
- somewhat disagree
- strongly disagree
- don't know
- refused

Q11 Compared to what you would like to be, would you say you are underweight, at about the right weight, or overweight? (Do not read options, after response prompt with “do you feel you are slightly or very overweight/underweight?”)

- very underweight
- slightly underweight
- about the right weight
- slightly overweight
- very overweight
- don't know
- refused

Q12 Are you currently trying to eat differently for health or weight reasons? (Do not read options)

- yes
- no
- don't know
- refused

Q13 How many servings of fruits and vegetables do you eat each day? (If needed, provide the following information: 1 serving of vegetables is 1/2 cup cooked or 1 cup uncooked and 1 serving of fruit is one medium sized piece of fruit)

- servings _____
- don't know
- refused

Q14 What do you think is the recommended daily calorie intake for an average American? (If they say “don’t know” prompt with “what is your best estimate?”)

- calories _____
- don't know
- refused

Q15 Do you think you need the same, more, or less calories than an average American? (Do not read options unless necessary)

- need the same
- need less
- need more
- don't know
- refused

Q16 Do you currently smoke or chew tobacco? (Do not read options)

- yes
- no
- refused

Q17 In the last 7 days how many days were you physically active at work and at home for a total of at least 30 minutes doing activities that made you breathe hard?

- days _____
- don't know
- refused

Q18 How old are you? (Do not read options, might need to prompt with “are you between...”)

- 18-25 years old
- 26-35 years old
- 36-49 years old
- 50-64 years old
- 65 years and over
- refused

Q19 Do you have children?

- yes
- no
- refused

Q19a Do you have children who are: (read options)

- under 5 years of age
- between 5-12 years of age
- between 13-18 years of age
- older than 18 years of age
- don't know
- refused

Q20 What is the highest grade or level of school that you have completed? (read options)

- some high school
- 12th grade, GED or high school diploma
- some college / no degree
- associate's degree
- bachelor's degree
- some graduate / professional school / no degree
- graduate / professional degree
- don't know
- refused

Q21 What is the zip code of your residence? (Enter name of city of residence if respondent does not know zip code)

- zip code _____
- city _____

Q22 What is the primary language spoken in your home? (Do not read options)

- English
- Spanish
- other (specify) _____
- don't know
- refused

Q23 Are you of Spanish, Hispanic, or Latino origin of descent? (Do not read options)

- yes
- no
- don't know
- refused

Q24 What race would you most closely identify yourself as? (Do not read options)

- Black / African American
- White
- American Indian / Native American / Aleutian or Eskimo
- Asian / Pacific Islander
- Hispanic
- Multiple race
- don't know
- refused
- other (specify) _____

Q25 What is your average household income before taxes? (may need to prompt with “if you would like to answer the question confidentially let me know and I can show you the tablet device and you can make your own selection”; or “is your income between...”

- under \$20,000
- \$20,000 to \$49,999
- \$50,000 to \$74,999
- \$75,000 to \$99,999
- \$100,000 and above
- don't know
- refused

Q26 Did the beverage items you purchased today represent a typical purchase for you at this type of restaurant? (Read options)

- yes
- somewhat
- no
- don't know
- refused
- other (specify) _____

Q27 Did the food items you purchased today represent a typical purchase for you at this type of restaurant? (Read options)

- yes
- somewhat
- no
- don't know
- refused
- other (specify) _____

Q28 Please tell me if you agree or disagree with the following statement: Calorie menu labeling helps me make healthy choices at McDonald’s restaurants. (Do not read options, after response prompt with “do you strongly agree/disagree or somewhat agree/disagree?”)

- strongly agree
- somewhat agree
- somewhat disagree
- strongly disagree
- don't know
- refused

Q29 What is the participant's gender? (Do not read, for research team only)

- Male
- Female
- don't know

Q30 Verbal review of receipt? (Do not read, for research team only)

- yes
- no

Q31 Receipt collected? (Do not read, for research team only)

- yes
- no

Q32 Money Exchange? (Do not read, for research team only)

- yes
- no

Q33 Was the patron dining alone or as part of a group?

- Alone
- Group (enter number of members in group if applicable) _____
- Do not know

Q33a How was participant selected?

- Volunteer
- Randomly by date of birth
- Other (specify) _____

Q34 Was it easy for the participant to understand the survey language? (Do not read, for research team only)

- yes
- no

Q35 Time survey was collected?

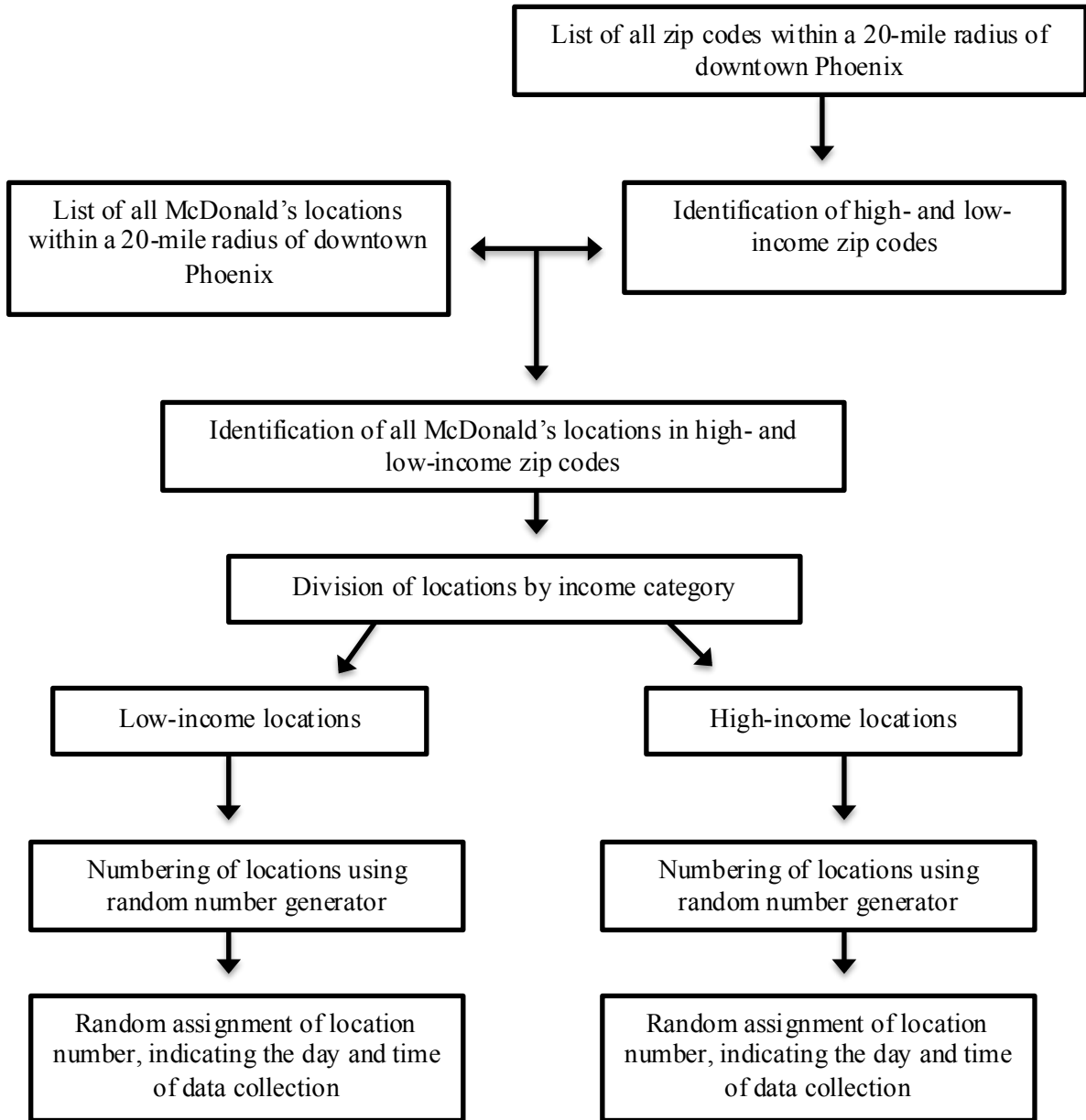
- Lunch
- Dinner

Q36 Day of week survey was collected?

- Weekday
- Weekend

APPENDIX B

SAMPLING DIAGRAM FOR STUDY LOCATIONS



APPENDIX C
ASU IRB CLASSIFICATION

To: Punam Ohri-Vachaspati

From: Mark Roosa, Chair
Soc Beh IRB

Date: 01/22/2013

Committee Action: **Exemption Granted**

IRB Action Date: 01/22/2013

IRB Protocol #: 1301008705

Study Title: Awareness and Use of Fast Food Menu Labeling

The above-referenced protocol is considered exempt after review by the Institutional Review Board pursuant to Federal regulations, 45 CFR Part 46.101(b)(2) .

This part of the federal regulations requires that the information be recorded by investigators in such a manner that subjects cannot be identified, directly or through identifiers linked to the subjects. It is necessary that the information obtained not be such that if disclosed outside the research, it could reasonably place the subjects at risk of criminal or civil liability, or be damaging to the subjects' financial standing, employability, or reputation.

You should retain a copy of this letter for your records.

APPENDIX D
PARTICIPATION CRITERIA AND INSTRUCTIONS

PARTICIPATION CRITERIA AND INSTRUCTIONS

Screening Questions

Would you like to participate in a research study about fast food restaurants in the Phoenix metropolitan area and surrounding suburbs? Participation includes completing a brief 5-minute-survey and donating your itemized receipt of today's purchases in exchange for \$5.00 compensation.

If yes:

Are you at least 18 years old?

Are you purchasing food or beverages for yourself at this restaurant today?

Do you speak English? (if needed)

Participation instructions

- Participants must be 18 years of age
- Order food items as you normally would
- Please ask for/keep your itemized receipt that lists today's purchases
- If ordering for others, please place your order separately so that we can have a copy of the receipt with only the food items you purchased for yourself
- After you purchase your food and/or beverage items we will have a brief survey (5 minutes) for you to complete along with a \$5 compensation
- Participation is completely voluntary
- All survey responses will be kept anonymous
- You may withdraw from the study at any time
- Your agreeing to answer the survey will be considered your consent to participate