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## Impact of Healthy Food Labels on Consumer Choice and Valuation

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IMPACT OF HEALTHY FOOD LABELS ON CONSUMER CHOICE AND  
VALUATION

by

Mattingly Perlinger

A THESIS

Presented to the Faculty of  
The Graduate College at the University of Nebraska  
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IMPACT OF HEALTHY FOOD LABELS ON CONSUMER CHOICE AND  
VALUATION

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University of Nebraska, 2016

Advisor: Christopher Gustafson

The obesity epidemic is prevalent across the entire United States, but minority communities are affected most of all. The Rosebud Indian Reservation in South Dakota is a minority community that has been particularly affected by the obesity epidemic, exhibiting higher rates of obesity and lower life expectancy than the rest of the country.

In this study we conducted a hypothetical choice experiment to test the effectiveness of three healthy food labels in increasing the likelihood of consumers choosing to purchase healthy products. We also calculated the consumer willingness to pay for each of these labels and examined differences in label effectiveness between different demographic characteristics. We found that a culturally relevant label was effective across all demographic groups, but only when accompanied by information that it was produced with input from the local population. We also found that overweight and non-overweight consumers respond differently to different labels. Finally, we found that consumers are willing to pay a premium for products containing the most effective healthy food labels.

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## CHAPTER 1: INTRODUCTION

### 1.1 Statement of the Problem

The American obesity epidemic is an important topic both for research and for public policy. Approximately 69% of U.S. adults (Flegal et al. 2012) and 32% of children and adolescents (Ogden et al. 2012) are overweight or obese. Overweight and obesity are well known to be associated with health problems such as heart disease, stroke, and type-2 diabetes (Frazao 1995). Additionally, obesity and overweight in certain age groups has been associated with functional limitation, depression, low self-esteem, and poor school and social functioning (Swallen et al. 2005).

In addition to the negative health consequences of overweight and obesity, there are high economic costs as well. Cawley et al. (2015) found that the direct medical cost of obesity in U.S. adults alone was \$315.8 billion in 2010. Wang et al. (2006) estimated that every one-unit increase in an individual's body mass index (BMI) results in an average \$202.30 increase in annual health costs. A review of literature by Cawley (2015) also found that obesity is associated with lower wages and lower probability of being employed.

Studies have shown that while the general public exhibits a high prevalence of overweight and obesity (Ward et al. 2016), certain groups may be at greater risk than others. For example, Mexican-American and black youth tend to have higher than average consumption levels of sugar-sweetened beverages (Wang, Bleich, and Gortmaker 2008), which are considered to be among the biggest contributors to childhood obesity (Ludwig, Peterson, and Gortmaker, 2001). Flegal et al. (2012) and Ogden et al. (2012) found black and Hispanic individuals to have significantly higher rates of obesity than



white individuals of the same age groups. Similarly, Story et al. (2003) found American Indians to be among the most at-risk groups for obesity at all ages.

The problem of obesity on American Indian reservations has not gone unnoticed by other researchers. Gittelsohn et al. (2013) conducted a multifaceted intervention on the Navajo Nation with hopes of gaining information about how to best tackle obesity-related problems among Native Americans. Gittelsohn and collaborators had previously conducted successful interventions in other minority communities (a summary of which can be found in Gittelsohn and Lee 2013). Both of the successful interventions in minority neighborhoods of Baltimore involved researchers working with storeowners to increase the stocking of healthy foods. One of these interventions also included the dissemination of educational materials throughout the neighborhood. Both resulted in significant increases in the purchase of healthy food. The Navajo intervention reported in Gittelsohn et al. (2013), however, proved to be less successful than the other interventions, despite the fact that it was more elaborate. Researchers conducted interactive sessions on healthy cooking, gave away samples of healthy foods, set up educational displays in stores, and made radio announcements in both Navajo and English. Healthy food labels were placed on store shelves, an aspect especially pertinent to our own research in this study, which focused on testing the effectiveness of healthy food labels<sup>1</sup>. While the subset of the population that received the most exposure to the intervention exhibited a significant decrease in BMI, the target population as a whole did not. A possible explanation for the limited success of the intervention was the fact that

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<sup>1</sup> Gittelsohn et al 2013 did not provide a description of the healthy food labels used in their study, so there is no way to definitively compare or contrast them to our own. However, they made no reference to any of their labels being locally designed or culturally relevant.

the food labels were not specifically tailored to the target population. Verbeke (2005 p. 361) stated, “The implications for information provision, e.g. through generic advertising or labelling, are that the recipient population needs to be well understood, segmented, identified, and targeted.” Thus, the results of both Gittelsohn et al. (2013) and Verbeke (2005) provide motivation for a detailed examination of the effects of healthy food labeling, and particularly the examination of culturally relevant labels.

One American Indian tribe that has been particularly affected by obesity-related health problems is the Rosebud Sioux tribe in south-central South Dakota. Gordon and Oddo (2009) found that over 20% of 2-4 year old children on the Rosebud Reservation had body mass indexes in the 95<sup>th</sup> percentile, the criterion used to define obesity. This is more than double the national average for children ages 2-5 (Ogden et al. 2014). Additionally, a study by Biolsi et al. (2002) reported that Todd County, the county in which the Rosebud Reservation is located, had the lowest life expectancy for both males and females in the entire United States. These characteristics provide the motivation to make the Rosebud Reservation the focus of our healthy food labeling research.

## **1.2 Objectives**

The first objective of this thesis is to examine the effectiveness of three healthy food labels on the Rosebud Indian Reservation. We wish to determine whether food-labeling systems for minority populations are more effective when they are culturally relevant. As will be shown in the literature review section, the literature on food labeling up to this point has primarily focused on label effectiveness among the general population. To our knowledge, there have not been any previous studies using labels specifically tailored to be culturally relevant to a particular minority community. We

further wish to determine whether culturally relevant labels are more effective when they are developed with local input. If local input in the development of the label is found to increase label effectiveness, this could have important policy implications for the actual implementation of such a labeling system in the future. Additionally, we wish to examine any demographic differences in label effectiveness, focusing especially on individuals who are overweight or obese and individuals who have diet-related health problems.

The second objective is to estimate consumer willingness to pay (WTP) for foods containing each of the labels. Although hypothetical product valuations have been found to be different than binding ones (Cummings, Harrison, and Rutstrom 1995), the information gained from this hypothetical choice experiment will still provide insights into relative consumer valuations for one product versus another. This information will be useful in determining whether consumers value products with certain attributes (such as the presence of a label) more than products with other attributes, providing an additional and quantifiable measure of the effectiveness of the labels we are testing.

The final objective of this research is to identify potential policy implications and provide insights for future research on this topic. This particular research is part of a larger research and health improvement project on the Rosebud Reservation called Healthy Food, Healthy Choice. Collaborators from the University of Nebraska-Lincoln, South Dakota State University Extension, Sinte Gleska University, which is the tribal university of the Rosebud Reservation, and the Rosebud Economic Development Corporation (REDCO), have conducted this project.

## CHAPTER 2: LITERATURE REVIEW

There is a significant literature on strategies to reduce obesity, especially when it comes to investigating how to provide information to consumers. Kim, Nayga, and Capps (2000) found that the information provided in the nutrition labels required by the Nutritional Labeling and Education Act of 1994 could be effective in improving diets, but only among consumers that chose to use them. Given this potential, subsequent research has looked into how to increase the chances of consumers using nutrition information. Bleich et al. (2012) found that providing plain text information on calories did not significantly reduce the purchase of sugar-sweetened beverages among low-income or minority adolescents. However, when the calorie information was shown as a percentage of daily-recommended calories, purchases of sugary beverages decreased by 40%. Showing calories as an exercise equivalent had an even greater effect, reducing the purchases of sugary beverages by 50% relative to the control condition. Likewise, Roberto et al. (2016) found that warning labels indicating the health dangers of sugary beverages significantly decreased parents' selection of these beverages versus both a no label condition and a calories only condition. These findings show the importance of providing information in a way that is salient, easy to interpret, and in a useful context.

Hare, Malmaud, and Rangel (2011), in studying food information from the perspective of neuroscience, found that people naturally take taste into account when deciding what foods to purchase, but in order for them to take health into account they need to explicitly have their attention drawn to the healthiness of the food. This is likely due to the fact that the brain can process taste information more quickly than it can process health information (Sullivan et al. 2015). This led the researchers to speculate

that the reason graphic images are found to be more effective than text in inducing smoking cessation (Borland et al. 2009) is because these labels are more salient and more likely to explicitly draw people's attention to the health-related consequences of their actions. This suggests that a culturally relevant and locally designed food labeling system could be effective tool in obesity prevention, as it has the potential to make the label more salient to the specific population, and thus more quickly draw people's attention to the healthiness of the food.

The research of Heike and Wilczynski (2011) provides empirical evidence to strengthen both the findings of Bleich et al. (2012) and the hypothesis of Hare, Malmaud, and Rangel (2011). Their work showed that although participants self-reported calories to be among the characteristics most important to them in making food choices, when calories were presented as plain text, they were not nearly as effective as a traffic light system rating various nutrients. This is consistent with the hypothesis that graphics are more effective at conveying information than text due to their salience, as well as the finding that calorie information alone is not very effective in impacting consumers' food choices, because it is both low in salience and difficult for consumers to interpret without context.

Feunekes et al. (2010) provide one of the most comprehensive studies in determining what types of healthy food labels are most effective. In this paper the researchers compared the comprehensibility, credibility, and effectiveness of several types of front-of-pack nutrition labels designed to help people identify healthier products. They also sought to determine whether these front-of-pack labels were generally any different in effectiveness than the standard back-of-pack nutrition panels. The results

showed that all front-of-pack labels were more effective than back-of-pack labels in helping participants identify the healthier products. Additionally, they found that the simplest labels – stars and smiley faces – were most effective. Participants found all of the labels to be more credible when their claims were backed up by a national or international food regulatory body, and they seemed to understand labels better as a comparison within a product group than a comparison between product groups. All of these findings were instrumental in helping design the labels to be tested in this study.

Cowburn and Stockley (2005), in a review of the various studies on food labeling, found that several demographic differences have been observed in the use of food labels. For example, women and people of higher education were more likely to look at food labels. We will examine these and other demographic factors in our results. They also found that consumers were generally able to use labels to compare food products to one another, but as the complexity of the task increased, their ability to effectively compare the products decreased. This lends credence to the findings of Feunekes et al. (2010) that simpler labels are the most effective. Likewise, Berning, Chouinard, and McCluskey (2008) found that although many experienced and health-conscious shoppers reported that they preferred more detailed labels, simpler labels with summary information may be more effective in helping the population at large. Kiesel and Villas-Boas (2013) suggest that the increased information costs of complex labels can also play a role in making them less effective than simpler labels.

Although many studies on food labeling have found positive results, there are also limitations to the use of food labeling alone. Grunert, Wills, and Fernandez-Celemin (2010), suggested that for healthy food labeling to be effective in the long-term, retailers

need to be willing to reformulate their products to make them healthier; otherwise, consumers will always see a tradeoff between taste and health. Liu et al. (2014) argued that information-based obesity interventions should be part of a comprehensive and multifaceted effort. Additionally, Wisdom, Downs, and Loewenstein (2010) found that while nutritional information can be useful in helping people choose healthier products, people often tend to reward themselves for this decision by concurrently purchasing other, less-healthy products. These studies reinforce the importance of the context in which our study must be viewed: it is not a stand-alone intervention, but rather one step in a multifaceted project.

### CHAPTER 3: EXPERIMENTAL METHODOLOGY

In order to compare the effectiveness and salience of generic versus culturally relevant labels in a community with a high prevalence of overweight and obesity-related health problems, we conducted a hypothetical choice experiment at a grocery store on the Rosebud Indian Reservation. Balcome, Fraser, and Falco (2010) and Berning, Chouinard, and McCluskey (2008) provide precedents for the use of hypothetical choice experiments in analyzing food labels. Berning, Chouinard, and McCluskey (2008) similarly conducted their choice experiment in a grocery store. The products used in the choice experiment were four types of cereal including two healthy varieties – corn flakes and shredded wheat – and two unhealthy varieties – frosted corn flakes and frosted shredded wheat. These cereal types were chosen based upon conversations with local residents indicating their popularity, as well as the fact that the frosted versus unfrosted variations allowed for a clear distinction between the healthy and unhealthy products.

The participants in our study were 139 shoppers at Turtle Creek Crossing Super Foods, a grocery store in Mission, South Dakota owned by the Rosebud tribe. Participants were recruited from October to December of 2015, and all participants received a \$10 gift card to the store, the same compensation method used in Berning, Chouinard, and McCluskey (2008).

The choice experiment featured both within-subjects and between-subjects elements to study the way consumer choice was affected by price per 40-ounce bag of cereal (\$4.99, \$5.99), healthiness (frosted, unfrosted), and the presence of a label indicating that one product was healthier than the other.



The within-subjects aspects of the experiment were that all participants were presented with choices between the healthy and unhealthy versions of each cereal type (frosted corn flakes versus corn flakes and frosted shredded wheat versus shredded wheat) at each of the price levels, including the cases in which both products were the same price. Each participant also saw both labeled and unlabeled products.

The first between-subjects element of the experiment was that any given participant only saw the healthy food label applied to one type of cereal. In other words, some participants saw the healthy food label applied to the corn flakes, but not to the shredded wheat, while others saw the label applied to the shredded wheat, but not to the corn flakes. We only included healthy labels in half of each participant's scenarios in order to examine participants' choices between the healthier and less healthy options both in scenarios in which the label was present and in scenarios in which it was not. We chose the between-subjects approach rather than an approach in which the label was applied to each cereal type half the time because we wanted to make sure the labels were easy to interpret and that consumers were not confused or skeptical about their meaning. The other between-subjects aspect of the experiment was that any given participant only saw one version of the healthy food label (the internationally-used smiley face label, the culturally relevant bison label, or the locally produced and culturally relevant bison label, which was identical to the other bison label except that it included the information that the label was designed with local input and designed by a local artist).

Each survey contained eight choice scenarios. Every scenario contained the options of choosing the healthier (unfrosted) product, the less healthy (frosted) product, or neither, similar to the design used in Loureiro and Umberger (2007). We randomized

the order in which the choice sets and label types were presented to participants. As in Balcome, Fraser, and Falco (2010), participants were instructed to think about the choice scenarios as if they were real. Participants also filled out a demographic survey after the completion of the choice experiment, including questions about age, gender, household size, self-reported weight status, health problems, education, and household income. An example of a full set of choice scenarios and instructions can be found in Appendix A, and a full demographic survey can be found in Appendix B.

The smiley face label used in our experiment (hereafter referred to as SMILEY) was a simple black and white smiley face, and it was chosen in large part because Feunekes et al. (2010) indicated that smiley faces were among the most effective of all labels across several countries in helping consumers to accurately identify healthier products. The culturally relevant label was designed after researchers conducted “talking circles” (focus groups) with local residents in order to get a sense of what kind of symbol tribal members saw as representative of health and vitality. The ultimate result was the choice of a bison. An artist who is a faculty member at Sinte Gleska University, the tribal university on the Rosebud Indian Reservation, designed the culturally relevant label. The label was a simple black and white outline of the body of a bison. This label treatment is hereafter referred to as BISON. The other variation of this label, which included information specifying that it was designed with input from the local community and drawn by a local artist, was simply the same outline of a bison accompanied by the description, “Healthy choice label created with input from Rosebud members and designed by a local artist.” This label treatment is hereafter referred to as BISON\_LOCAL.

## CHAPTER 4: DATA, MODELING, AND RESULTS

### 4.1 Participant Demographics

All participants for this study were shoppers at Turtle Creek Crossing Super Foods, a tribally owned grocery store on the Rosebud Indian Reservation. At the conclusion of the choice experiment, we asked participants several demographic questions, which allowed us to gain insights into the composition of our sample. A full summary of demographic questions and responses can be found in Table 1.

The previously observed overweight and obesity trends that served to motivate this research held true among participants in our study, with 57% of participants reporting being overweight or obese. Ward et al. (2016) suggest that self-reported levels of obesity tend to be lower than actual rates, pointing to the likelihood that the actual overweight and obesity levels among participants are even higher. Another indication that the levels of overweight and obesity may be higher than the self-reported numbers is that only 19% of the study participants reported having a bachelor's degree or higher, and 75% reported making less than \$20,000 per year. Drewnowski and Specter (2004) pointed to both low education and low income as factors associated with obesity.

Drichoutis, Lazaridis, and Nayga (2006) conducted a review of literature aimed at identifying the demographic characteristics associated (positively or negatively) with the use of food labels. The first set of variables they looked at were personal characteristics, including age, education, and gender. They found education level and being female to be positively associated with food label use, while the effects of age on label use were mixed. Among participants in our study, 71% were female. While we only asked participants for age ranges, rather than exact ages, we used the midpoint of each range to

calculate the average age of participants, which was approximately 37 years old. The education level of our participants was generally low, with 81% of participants having less than a bachelor's degree, including 9% who did not graduate high school.

The second set of factors that Drichoutis, Lazaridis, and Nayga (2006) examined was a group of “situational, behavioral, and attitudinal factors.” Among these characteristics were income, special dietary needs, household size, and whether or not one was the primary grocery shopper for his or her household. They found that special dietary needs and being the primary household grocery shopper were positively correlated with food label use, while the effects of income were mixed. In terms of household size, they found that overall household size is negatively associated with label use, but the presence of preschool children was positively associated with label use. Among participants in our study 90% reported being the primary grocery shopper for their households. While we did not specifically ask about special dietary needs, 35% of participants reported having health problems related to food intake, and 64% reported attempting to control calories. Information on income, like age, was collected in ranges. Using the midpoint for each range, we calculated the average household income of participants to be approximately \$10,000 per year, and 60% of participants reported receiving SNAP benefits (formerly known as food stamps). The average household size among participants was 4.8, while the average number of children under 18 in each household was 2.3.

In addition to the demographic characteristics examined by Drichoutis, Lazaridis, and Nayga (2006), we also asked participants other demographic questions relevant to our study, including tribal membership and trust in food experts. Ninety-two percent of

participants reported being members of the Rosebud Sioux Tribe. When asked whom they would trust most among a local nutritionist, a national expert, and a governmental agency (a question inspired by the findings of Feunekes et al. 2010, which stated that the organization providing information for labels was important to consumers), 30% reported trusting a national expert most, 17% trusted a local nutritionist most, and only 6% trusted a governmental agency most. However, nearly half (47%) reported trusting all of these organizations equally.

## **4.2 Model**

A multinomial nested logistic regression (logit) model with individual fixed effects was used to analyze the results of the choice experiment data. This is similar to the conditional multinomial logit model used in Loureiro and Umberger (2007) but accounts for both observable and unobservable individual characteristics. The interpretation of the model, however, is unchanged.

Loureiro and Umberger (2007) explained that consumer utility for a good can be decomposed into the utilities for each of the good's attributes. Consumers, who wish to maximize their utility, become more likely to choose a product as the utility provided by that product's attributes increases. Thus, "the coefficients [in the multinomial logit model] cannot be directly interpreted as the direct effects of the respective explanatory variables on the probability of choosing," a particular item. "Rather, they represent the direct effects associated with each of the explanatory variables on the (unobservable) utility function," (Loureiro and Umberger 2007, p. 507).

Consequently, the consumer utility function can be expressed as:

$$(1) U_{ij} = \beta_0 + \beta_1 Price_{ij} + \beta_2 Healthier_{ij} + \beta_3 BISON_{ij} + \beta_4 BISON\_LOCAL_{ij} + \beta_5 SMILEY_{ij} + \varepsilon_{ij}$$

where  $U_{ij}$  represents the utility of participant  $i$  making choice  $j$ ;  $Price$  represents the price, in dollars, of the product;  $Healthier$  is a binary dummy variable equal to 1 if the product is the healthier product in the choice set and equal to 0 if it is not<sup>2</sup>;  $BISON$ ,  $BISON\_LOCAL$ , and  $SMILEY$  are dummy variables representing the presence of each respective version of the healthy choice label; and  $\varepsilon_{ij}$  is a random error term.

While the coefficients  $\beta_1 - \beta_5$  cannot be interpreted directly as effects on participant choices (like coefficients in an OLS regression might be interpreted, for example), a less direct mathematical relationship does exist between the coefficients and participant choices. First off, the sign of the coefficient (positive or negative) indicates the direction of the effect of the explanatory variable on the probability of that product being chosen (i.e. a negative coefficient means that variable makes the product less likely to be chosen, and a positive coefficient means that variable makes the product more likely to be chosen). Furthermore, the coefficients represent estimates of the log odds ratios of the explanatory variables. By exponentiating each coefficient we can obtain the odds ratio of the corresponding explanatory variable. Subtracting 1 from this value gives us the change in odds of the product being chosen as a result of the explanatory variable.

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<sup>2</sup> Since the products containing each of the three labels are always healthier products, the coefficients for each of the labels indicate the marginal effect of the label on the likelihood of choosing the healthy product.

Thus, the change in the odds of the product being chosen as a result of each explanatory variable can be expressed as:

$$(2) \Delta odds = e^{\beta} - 1$$

Finally, willingness to pay (WTP) for each explanatory variable (*Healthier*, *SMILEY*, *BISON*, and *BISON\_LOCAL*) can be calculated by taking the coefficient on that explanatory variable divided by the coefficient on *Price* (Loureiro and Umberger 2007), such that:

$$(3) WTP_n = \beta_n / \beta_1$$

### 4.3 Effects of Explanatory Variables on Consumer Choice

Table 2 shows the coefficients for each of the explanatory variables in our choice experiment. We found that in all scenarios, participants were more likely to choose the healthier product than the less healthy product or the “neither alternative” option. As was expected, the coefficient on *Price* was negative (-0.06415) and significant at the 1% level, indicating that as a product’s price increased, participants became less likely to choose that product. Additionally, we found that both the *BISON\_LOCAL* (0.583) and *SMILEY* (0.702) labels had positive coefficients significant at the 1% level, indicating that the presence of each of these labels increased the odds of the healthy product being

chosen. The BISON label with no information on local input did not have any significant effect.

One of our stated objectives was to examine differences in label effectiveness between different demographic groups, particularly between people with diet-related problems and people without diet-related health problems and between overweight/obese people and normal/underweight people. We conducted additional multinomial nested logistic regression (logit) analyses (without fixed effects) to examine the behavior of participants with diet-related health problems and participants who were overweight or obese, the results of which are summarized in Table 3 and Table 4, respectively.

When taking into account differences between those with diet-related health problems and those without, we found that while both the SMILEY label and the BISON\_LOCAL label had significant effects (at the 5% level) on those who did not report diet-related health problems, the SMILEY label had a significantly greater effect on those who reported having diet-related health problems than on those who did not report having diet-related health problems.

The differences between those who report being overweight/obese and those who do not<sup>3</sup> are more pronounced than the differences between those with and without diet-related health problems. We found that among those who did not report being overweight, only the BISON\_LOCAL label had a significant effect. However, those who did report being overweight were significantly more likely to use the SMILEY label than

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<sup>3</sup> Information on weight levels was originally collected in 5 ranges: underweight, average, slightly overweight, overweight, and obese. When examining the differences between those who were overweight/obese and those who were not, we combined these 5 categories into 2, with underweight and average being classified as “not overweight” and slightly overweight, overweight, and obese being classified as “overweight.”



those who did not report being overweight, indicating that the SMILEY label's significance among the whole population was largely due to its significance among people who reported being overweight.

#### **4.4 Willingness to Pay**

The willingness to pay (WTP) for each of the product attributes, including the healthiness of the product and each of the labels, is reported in Table 2. We found that participants were willing to pay an average of \$0.86 more for the healthier product than the less healthy product. Participants had the highest WTP for the SMILEY label, followed closely by the BISON\_LOCAL label. Participants were, on average, willing to pay \$1.09 more for products with the SMILEY label than products without and \$0.91 more for products with the BISON\_LOCAL label than those without. The average WTP for the BISON label was only \$0.04.

## CHAPTER 5: DISCUSSION AND CONCLUSION

### 5.1 Discussion of Results

Some of the findings of this study are in line with those of the previous literature. The success of the SMILEY label was no surprise, given the fact that Feunekes et al. (2010) tested the smiley face healthy food label on an international scale and found it to be one of the most preferred and effective healthy food labels across the board.

The finding that participants who were overweight were less likely (although not significantly less likely) to purchase healthy products than those who were not overweight was not surprising, as eating unhealthy products in the past may have contributed to the fact that they had become overweight. A more surprising finding, however, was the fact that overweight people and non-overweight people seemed to respond differently to different labels. While the BISON\_LOCAL label was equally effective among overweight and non-overweight individuals, the SMILEY label was significantly more effective among those who were overweight than among those who were not.

Perhaps the most interesting finding of our research was the fact that the BISON\_LOCAL label had a significant effect on consumer choice, but the BISON label did not. Social norms offer a possible explanation for the greater effectiveness of the BISON\_LOCAL label versus the BISON label. Cialdini, Reno, and Kallgren (1990) found that when people perceive a certain behavior to be the norm, they are more likely to follow that behavior. Smith-McLallen and Fishbein (2008) found this to be the case in the context of food purchases, specifically. The fact that participants in the BISON\_LOCAL treatment were given information indicating that their peers viewed the

bison as a symbol of health may have made them perceive this to be a norm, and thus made them more responsive to it. It is also possible that participants were simply more amenable to the use of a cultural symbol when they knew that members of their own culture had input in its use.

## **5.2 Limitations**

As alluded to at the beginning of this article, hypothetical choice scenarios do not always elicit the same valuations as choices requiring binding economic decisions (Cummings, Harrison, and Rutstrom 1995). Although Lusk (2003) found that telling participants to act as if choices were real (“cheap talk”) was effective in making hypothetical valuations closer to binding ones, this effect did not hold over all consumers. Future research in this area should be geared towards either observational data in stores with labels implemented or experiments requiring binding economic decisions.

## **5.3 Implications for Future Research and Policy**

Even though our experiment did not use binding decisions, the findings of our study are still quite useful. The finding that consumers were willing to pay a premium for products containing both of the significant labels could prove useful in getting stores to agree to implement these labels.

The fact that overweight/obese people and non-overweight people respond differently to different labels is a finding that warrants consideration in future studies. Future research in the field of obesity interventions should take into account the fact that even among simple labels that contain summary information, the label designs that are

effective among the general population may not be the same label designs that are effective among high priority target populations.

Finally, the finding that the BISON\_LOCAL label had a significant effect across more demographic groups than any other label (and, in fact, among all demographic groups we tested) has significant implications for both research and policy. Since this was the first study specifically examining the differences in effectiveness between internationally recognized labels and culturally relevant labels in minority communities, the results should serve to motivate consideration of cultural factors in future food-labeling research. The fact that a culturally relevant label was more widely effective than the internationally recognized SMILEY label indicates that policies on healthy food labeling should take culture-specific factors into consideration. The minority communities that are already most affected by the obesity epidemic may be better served by labeling policies tailored specifically for them than by labeling policies directed to the whole population. Furthermore, local involvement in the development of such labels is vital to their ultimate effectiveness.

#### **5.4 Summary and Concluding Remarks**

Our results show that the inclusion of healthy food labels can significantly increase the likelihood of consumers choosing healthy products. We find that a culturally relevant label can be effective across a wider array of individuals in a minority community than an internationally recognized label. We also only find evidence that the culturally relevant label is effective if it is accompanied by information explaining that it was developed by a local artist and with local input.

We find, further, that overweight and non-overweight individuals respond differently to different types of healthy food labels. While overweight and non-overweight individuals were equally responsive to the culturally relevant label (BISON\_LOCAL), overweight people were significantly more receptive to the internationally recognized label (SMILEY).

This research is by no means the final word on healthy food labeling. It is meant to begin a conversation on how to tailor healthy food labels for minority communities, so as to make them as effective as possible. By using a combination of culturally relevant and generally recognized labels, combined with information, it may be possible to start making a dent in the obesity epidemic that plagues minority communities at such a uniquely high rate.

## CHAPTER 6: TABLES

Table 1: Summary statistics of demographic variables

Variable Name	Description	Mean	Standard Deviation	n
Age	Age in Years	2.7	1.4	137
	1=20-29			
	2=30-39			
	3=40-49			
	4=50-59			
	5=60-69			
	6=70-79			
	7=80+			
Gender	Female	0.71		133
	Male	0.29		
Household Size		4.8	2.5	133
Children <18		2.3	1.8	136
Income Level		2.0	1.4	135
	1=Under 10K			
	2=10-20K			
	3=20-30K			
	4=30-40K			
	5=40-50K			
	6=Over 50K			
Education Level		2.7	1.0	138
	1=Some High School			
	2=High School			
	3=Some College/Associate's Degree			
	4=Bachelor's Degree			
	5=Graduate/Professional Degree			
Primary Household Shopper	Yes	0.9		138
	No	0.1		
Control Calories	Yes	0.64		129
	No	0.36		

				24
Diet-related health problems	Yes	0.35		12
	No	0.65		9
Weight Level		2.8	1.0	13
				6
	1=Below Average			
	2=Average			
	3=Slightly Overweight			
	4=Overweight			
	5=Obese			
Receive SNAP benefits	Yes	0.6		12
	No	0.4		9
Rosebud Tribe Member	Yes	0.92		13
	No	0.08		0
Who do you trust most?	Local Nutritionist	0.17		12
	National Expert	0.30		5
	Government Agency	0.06		
	All Equally	0.47		

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Table 2: Variable estimates for fixed effects nested multinomial logistic regression model

Variable	Estimate	Standard Error	P-value	Odds Ratio	Willingness to Pay
Intercept	2.8407	0.4977	<.0001	17.13	
HEALTHIER	0.5504	0.1088	<.0001	1.73	\$0.86
PRICE	-0.6415	0.09072	<.0001	0.53	
BISON label	0.02834	0.1918	0.8825	1.03	\$0.04
BISON_LOCAL label	0.5829	0.1892	0.0021		
SMILEY label	0.7015	0.1663	<.0001	1.79	\$0.91
AIC	2834.67				
BIC	2855.21				



Table 3: Parameter estimates controlling for diet-related health problems

Variable	Estimate	Standard Error	P-value
Intercept	3.0541	0.6041	<.0001
Healthier	0.3635	0.1325	0.0061
Price	-0.645	0.1098	<.0001
BISON label	0.01018	0.2258	0.9641
BISON_LOCAL label	0.7211	0.2484	0.0037
SMILEY label	0.4012	0.1992	0.0442
Diet-related problems	-0.5703	1.079	0.598
Healthier*diet problems	0.5905	0.2338	0.0116
Price*diet problems	-0.00752	0.197	0.9696
BISON*diet problems	0.07268	0.4289	0.8655
BISON_LOCAL*health problems	-0.3281	0.3842	0.3932
SMILEY*health problems	1.0114	0.3773	0.0074
AIC	2818.02		
BIC	2856.17		

Table 4: Parameter estimates controlling for overweight/obesity

Variable	Estimate	Standard Error	P-value
Intercept	2.1469	0.7439	0.0045
Healthier	0.6910	0.1625	<.0001
Price	-0.5015	0.1351	0.0002
BISON label	0.2189	0.3258	0.5018
BISON_LOCAL label	0.5740	0.2670	0.0317
SMILEY label	0.1836	0.2430	0.4500
Overweight	1.3010	1.0026	0.1966
Healthier*Overweight	-0.2522	0.2192	0.2499
Price*Overweight	-0.2619	0.1825	0.1515
BISON*Overweight	0.4322	0.4054	0.2865
BISON_LOCAL*Overweight	-0.04835	0.3786	0.8984
SMILEY*Overweight	0.9641	0.3365	0.0042
AIC	2833.56		
BIC	2871.70		

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## APPENDIX A: CHOICE EXPERIMENT AND INSTRUCTIONS

### **Healthy Food, Healthy Choice Food Labeling Research**

Thank you for agreeing to participate in this survey. All of your responses today will be anonymous—we will not collect any information that could be used to identify you—and kept strictly confidential. No one, including the researchers, will know the answers you give to these questions.

Today, we are interested in asking you some questions about food choices. You will be presented with eight hypothetical choices between two food products. After the eight hypothetical choices, we will ask you to complete a short survey.

Again, we would like to emphasize that no one will be able to connect your answers to you, and that your responses will be completely anonymous. On the next page, you will receive additional information about the food choice questions.

## Instructions

- You will view details about two cereals at a time.
- Examine the details of the cereal—such as the variety of cereal or price—that you normally use to make a decision.
- Indicate which of the two cereals you would choose. You can also indicate that you would not choose either cereal in that particular pair.
- Please think carefully about each decision as though your choices were real.
- Below is an example choice scenario:

	Alternative A	Alternative B	Alternative C
Brand	Malt-O-Meal	Malt-O-Meal	Neither alternative A nor alternative B
Variety	Corn Flakes	Frosted Flakes	
Price (\$/bag)	\$5.99	\$4.99	
Healthier Option			
I would choose:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>


- Please check the box of the option that you would choose.
- **Brand:** All of the cereals presented are produced by Malt-O-Meal.
- **Variety:** Indicates the variety of cereal.
- **Price:** Price is expressed in dollars per large (40-ounce) bag. It is the price you would pay for the bag of cereal you select.

**Healthy Choice Label:** A healthy choice label will accompany certain healthier cereals. This label will accurately reflect that the cereal is a significantly healthier option than the other cereal offered. The label was created based on conversations and input from Rosebud members and was designed by a local artist. Here is a picture of the label:



Again, after you review each pair of items presented in the following scenarios, please indicate which cereal you would choose, or if you would choose not to purchase either cereal, by checking the box below the option.



	Alternative A	Alternative B	Alternative C
Brand	Malt-O-Meal	Malt-O-Meal	Neither alternative A nor alternative B
Type	Frosted Flakes	Corn Flakes	
Price (\$/bag)	\$4.99	\$5.99	
Healthier Option			
I would choose:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>




Healthy choice label created with input from Rosebud members and designed by a local artist

	Alternative A	Alternative B	Alternative C
Brand	Malt-O-Meal	Malt-O-Meal	Neither alternative A nor alternative B
Type	Frosted Shredded Wheat	Shredded Wheat	
Price (\$/bag)	\$4.99	\$5.99	
Healthier Option			
I would choose:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



Healthy choice label created with input from Rosebud members and designed by a local artist

	Alternative A	Alternative B	Alternative C
Brand	Malt-O-Meal	Malt-O-Meal	Neither alternative A nor alternative B
Type	Corn Flakes	Frosted Flakes	
Price (\$/bag)	\$4.99	\$5.99	
Healthier Option			
I would choose:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>




Healthy choice label created with input from Rosebud members and designed by a local artist

	Alternative A	Alternative B	Alternative C
Brand	Malt-O-Meal	Malt-O-Meal	Neither alternative A nor alternative B
Type	Shredded Wheat	Frosted Shredded Wheat	
Price (\$/bag)	\$4.99	\$5.99	
Healthier Option			
I would choose:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



Healthy choice label created with input from Rosebud members and designed by a local artist

	Alternative A	Alternative B	Alternative C
Brand	Malt-O-Meal	Malt-O-Meal	Neither alternative A nor alternative B
Type	Frosted Flakes	Corn Flakes	
Price (\$/bag)	\$4.99	\$4.99	
Healthier Option			
I would choose:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>




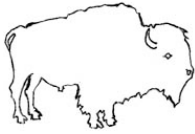
Healthy choice label created with input from Rosebud members and designed by a local artist

	Alternative A	Alternative B	Alternative C
Brand	Malt-O-Meal	Malt-O-Meal	Neither alternative A nor alternative B
Type	Frosted Shredded Wheat	Shredded Wheat	
Price (\$/bag)	\$4.99	\$4.99	
Healthier Option			
I would choose:	<input type="checkbox"/>	<input type="checkbox"/>	



Healthy choice label created with input from Rosebud members and designed by a local artist

	Alternative A	Alternative B	Alternative C
Brand	Malt-O-Meal	Malt-O-Meal	Neither alternative A nor alternative B
Type	Corn Flakes	Frosted Flakes	
Price (\$/bag)	\$5.99	\$5.99	
Healthier Option			
I would choose:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



Healthy choice label created with input from Rosebud members and designed by a local artist

	Alternative A	Alternative B	Alternative C
Brand	Malt-O-Meal	Malt-O-Meal	Neither alternative A nor alternative B
Type	Shredded Wheat	Frosted Shredded Wheat	
Price (\$/bag)	\$5.99	\$5.99	
Healthier Option			
I would choose:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



Healthy choice label created with input from Rosebud members and designed by a local artist



### APPENDIX B: DEMOGRAPHIC SURVEY

1. How many people live in your household? \_\_\_\_\_
2. How many children (18 years or younger) live in your household? \_\_\_\_\_
3. What is your gender? \_\_\_\_\_
4. What is your age? (Please circle the age range in which your age falls): 20-29 / 30-39 / 40-49 / 50-59 / 60-69 / 70-79 / 80 years or older
5. Do you do most of the food shopping for your family? Yes No
6. Are you a registered member of the Rosebud or any other tribe? Yes No
7. What is your highest level of education? *Some high school* / *High school* / *Some college/Associate's degree* | *Bachelor's Degree* | *Graduate/Professional School*
8. Who do you trust more to provide accurate nutritional information? *A local nutritionist* / *A national nutritional expert* / *A government agency* / *All equally*
9. What was your approximate household income last year? *Under \$10K (\$10,000)* / *\$10-20K* / *\$20-30K* / *\$30-40K* / *\$40-50K* / *Over \$50K*
10. Do you receive SNAP, WIC, or other benefits to help purchase food? Yes No
11. Do you try to control your daily caloric intake? Yes No
12. Do you think that you or others living in your household suffer from health problems related to diet/food intake? Yes No
13. What do you perceive your weight to be? *Below average weight for height and age* / *Average weight* / *Slightly overweight* / *Overweight* / *Obese*

