Impact of the proposed changes to nutrition fact panel on consumer perception

by

Erin Marie Smieja

B.S., Minnesota State University Mankato, 2004

A REPORT

submitted in partial fulfillment of the requirements for the degree

MASTER OF SCIENCE

Food Science

KANSAS STATE UNIVERSITY
Manhattan, Kansas

2018

Approved by:

Major Professor
Dr. Delores Chambers

Copyright

Abstract

Background: The US Food and Drug Administration proposed various updates to the nutrition fact panel, which included change to font, type size, addition of nutrients, and declaring absolute values. The rational was the new panel will provide consumers with more accurate and clear information, which may result in better food choices.

Objective: This study examines whether participants perception of nutrient information and/or sensory properties will change based on proposed nutrition panel display format.

Design: An online questionnaire was developed, and participants were randomized and selected to view the current nutrition label or the proposed nutrition label. The questionnaire was divided into three parts; (1) demographic information, (2) questions related to specific items of interest on the nutrition panel, (3) responses to questions after viewing each of five different food labels.

Subjects/Setting: US food shoppers over 18 years of age who read food labels (n=1221) completed the online questionnaire.

Statistical Analysis: Descriptive statistics were used for the analysis of participants demographic information. A Chi-square test were applied to test for significant differences between the current and proposed nutrition panels.

Results: The study reveals that the top items of interest and importance viewed on both the proposed and current nutrition panel were similar. More than 30 percent of participants selected added sugar, sugar, and sodium, may affect sensory characteristic. The nutrition panels showed distinct differences in descriptive attributes across the five food categories, and significant differences between the current and proposed labels included "too sweet," "nutritious," "healthy," "nutrient dense," "balanced nutrition" and "artificial".

Conclusion: Consumers' perceptions are impacted with the proposed nutrition panel. This study emphasized that consumers may be unclear about the labeling of added sugar. Government agencies, industry and those who impact health care will need to provide additional education to make sure consumers are clear about the labeling of added sugar.

Keywords: Nutrition labeling, Nutrition policy, Consumer behavior, Food consumption, Food label use.

Table of Contents

List of Figures

List of Tables

Acknowledgements

I would like to thank my major professor, Dr. Delores Chambers you have been instrumental in my college career over the last four years. I would also like to thank Dr. Edgar Chamber, for helping the development of the questionnaire and providing valuable feedback on my report. I want to acknowledge and thank the Sensory Center at Kansas State University for funding the research. I also want to thank Dr. Koppel for being a part of my committee and a wonderful Professor. Lastly, I want to thank my colleague Nort Holschuh for his contributions in the data analysis of this report.

Chapter 1 - Introduction

In 2014, the US Food and Drug Administration (FDA) proposed various updates to the nutrition facts panel.[1,2] This update will be the first mandated update since the Nutrition Labeling Education Act (NLEA) of 1990.[3] The NLEA provides FDA with the authority to require food labels on packaged food products and ensure that food labels are standardized and include specific label elements including serving size, number of servings, calories, fats, cholesterol, sodium, carbohydrate, sugar, dietary fiber, protein, vitamins and minerals.[3,4] Over the last 20 years, nutrition science has continued to evolve in the following areas: dietary recommendations, scientific research and consumer behavior; therefore, FDA proposed an update to the nutrition facts panel.[2] The new panel will provide consumers with more accurate information and help make better food choices.[1,2] The nutrition panel changes fall into three categories: the format of the label, nutritional content, and serving size. Formatting changes include increasing the type size for calories, servings per container, and serving size. The nutritional content changes will provide absolute values for vitamins and minerals; the addition of new nutrients such as added sugar, vitamin D, potassium; the removal of vitamin A, vitamin C, calories from fat; and updating the daily values for the following nutrients: sodium, dietary fiber, and vitamin D. Serving sizes have been updated for various food categories.[1,2]

In the United States, research indicates the general population uses the nutrition panel 75% of the time on food products;[5] however, this number may be inflated as self-reporting is shown to be higher.[6] The four most common uses for a food product label include, reviewing specific nutrients, assessing the nutritional content, avoiding an ingredient, and comparing food products to each other.[7] How the consumer uses the nutrition panel and makes informed decisions varies based on an individual's make-up and beliefs.[8] Many studies have looked at

demographics of an individual to determine who is most likely to use the information on the

nutrition panel. Studies have reported label use increases for women, the highly educated, those

with a higher income, and younger to middle age adults.[5,9,10] Other studies have found that older

adults pay more attention to nutrition labels.[11]

The food label package contains many package elements including brand name, claims,

product vignettes, and nutritional information, which impact the consumers perception. The

nutritional fact panel is a key element and the main source of nutrition content for many

consumers.[5] In a study conducted by Graham and Roberto using simulated shopping on

computers for individual products, results showed that consumers spend on average about 3.2

seconds before making an informed decision about the nutrition label. Typically, a consumer

reads the label from top to bottom;[12] however, a non-typical consumer may look at specific

nutrients related for health conditions and/or benefits.[7] Most consumers review at least one

component on the nutrition facts panel, over half review at least the top five listed items on a

panel, but most do not read the entire nutrition panel.[13] Nutrition labels are complex, which

makes the information displayed on the panel more difficult to interpret.[5] Due to the complexity

and the limited amount of time a consumer spend reviewing the nutrition label it is not

uncommon for consumers to categorize nutrients to make quick inferences about the nutritional

content of a product.[8] Nutrition content contributes to how a consumer perceives a food product,

but other sensory attributes play a key role in consumer perception. Consumers continue to want

a simplistic nutrition label that provides them the information they need to make informed

choices.[5]

The proposed nutrition facts panel made several updates adding additional items to the

nutrition panel, and it is uncertain if these changes will affect how the consumer perceives a food

product. Although a few studies have been conducted on the proposed panel, little information is available on consumer's perception of information and to what extent that information may impact the consumer's beliefs about the product. This study examines whether participants perception of nutrient information and/or sensory properties will change based on proposed nutrition panel display format.

Chapter 2 - Materials and Methods

Questionnaire Procedure

This questionnaire was conducted anonymously online using a computer or mobile device. The Kansas State University Human Subjects Review Board reviewed and approved the study protocol. Informed consent was obtained from participants at the time of the study. The questionnaire was completed by participants during October 2017.

Participants

Participants (n=1250) were recruited from an on-line survey company database comprised of more than 7 million consumers nationwide, with proportions divided to represent the four demographic regions of the U.S (Northeast, South, Midwest, West) as defined by the U.S. Census bureau. Participants were invited to participate and were screened and excluded from the study if they did not meet the following: must have lived in US for the last five years, at least 18 years of age, purchase 41% or more of the household's groceries, and read the nutrition facts panel "sometimes," "most of the time" or "always." During the screening participants were informed that they would be participating in a study related to food, if they met the screening criteria and that the questionnaire would take approximately 15 minutes and data would be kept confidential. The participants did not receive financial incentive for taking the questionnaire as Qualtrics has a reward program to compensate participants.

Nutrition Facts Panel Information

The nutrition facts panel used the Food and Drug Administration standard display format (figure1).

Figure 1 Illustration of Nutrition Fact Panel Current (left side) vs. Proposed (right side)
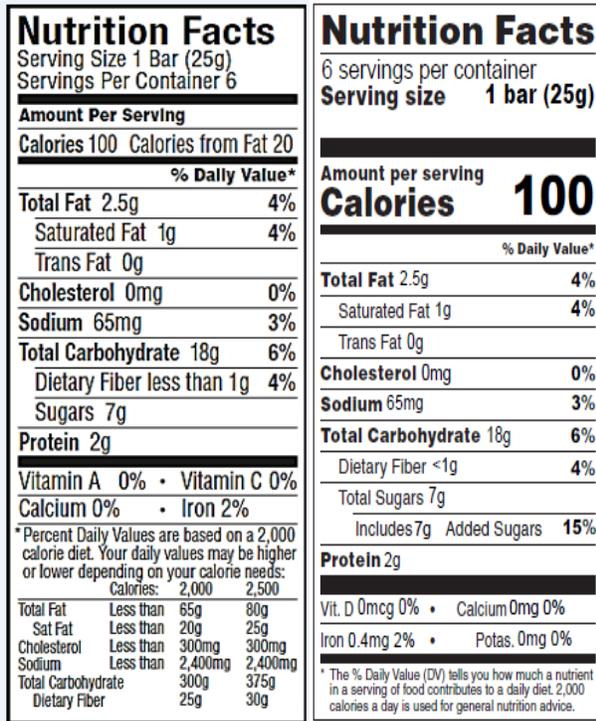
All nutrition labels declared the required nutrients defined by the FDA, some of the panels included additional voluntary nutrients, which are commonly declared when a product has been fortified with vitamins and minerals. The food categories included in the study were selected based on five major categories in the food market, which included yogurt, cereal, snack bar, beverage, and a meal product.

Questionnaire

A questionnaire was developed to assess whether consumer perception changes based on the current vs proposed label. Participants were randomly selected to review the nutrition panels with the current panel information or the proposed information, but not both. The questionnaire was divided into three parts; (1) demographic information, (2) questions related to specific items of interest on the nutrition panel, (3) responses to questions after viewing each of five different

food labels. The first part of the study included demographic information on gender, age, race/ethnicity, education, household size, income, health concerns, food assistance, and groceries bills (table 1). In the second part, participants were randomized and shown a current or proposed nutrition facts panel. Respondents were provided a list of required items that appear on the nutrition facts panel and were asked five questions regarding label use, items of interest, importance, avoidance, nutrients consumed as part of a healthy diet, and items that may change sensory characteristics. In the third part participants randomly reviewed five different food category nutrition facts panels and were asked to "check all that apply" from a list of 38 predetermined attributes. Respondent also had an option to select "other" and provide open ended comments. The questionnaire was examined for content validity by three experts in questionnaire design for food products, all with experience in packaging information. The questionnaire also was tested by five individuals for readability and ease of use.

Analyses

Analyses were conducted in Statistical Analysis Software (SAS) version 9.3. Descriptive statistics were used for the analysis of participants demographic information. Check all that apply questions were coded to quantify responses. A Chi-square test were applied to test for significant differences between the current and proposed nutrition panels. Approximately 600 respondents per label were used, which gives greater than an 80% power for detecting an 8-percentage point difference in the two labels at the 95% confidence level.

Chapter 3 - Results

Respondent Profile

The final sample size included 1221 qualified participants who fully completed the questionnaire on either the current or proposed panel. The percentages for the demographic information for participants who reviewed the current versus proposed nutrition label are in table 1. In general, the participants' demographics were similar between the two groups. There were approximately double the number of women as men, probably reflecting the larger number of women who do most of the household grocery shopping. [14,9]

Use of Proposed vs. Current Nutrition Panel

When participants were asked which items on the nutrition panel are of most interest, they indicated calories most often, followed by sugar, sodium, total fat, protein, serving size, added sugar and total carbohydrate (figure 2).

Figure 2 Items of interest selected on the current vs. proposed nutrition facts panel
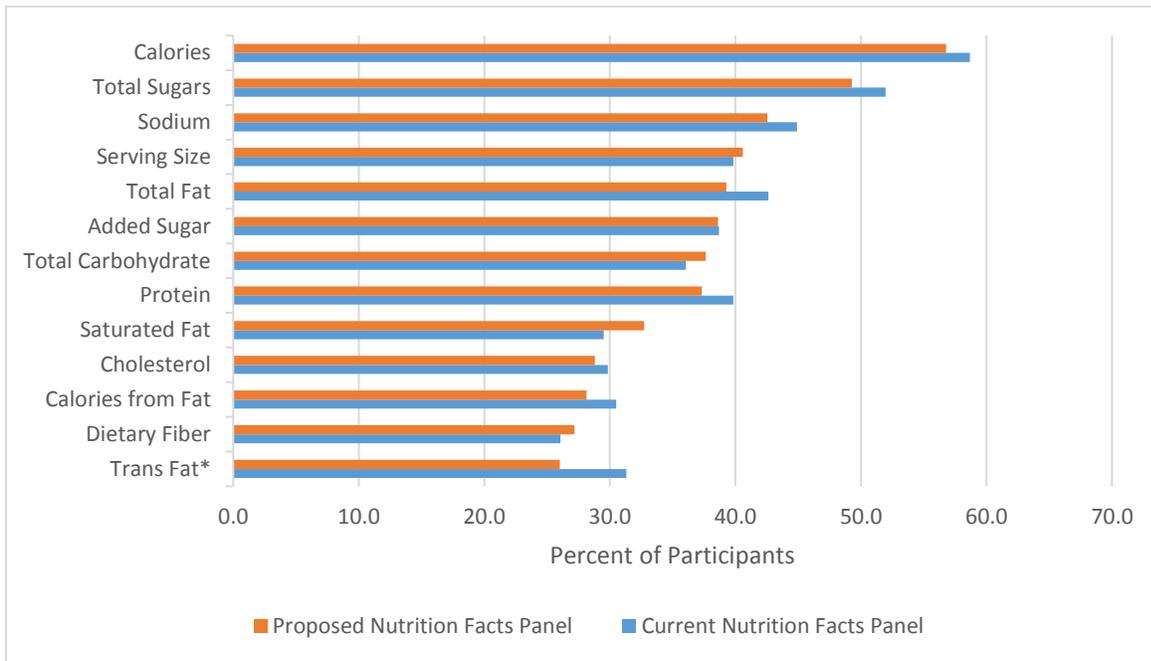
┤Graph represents only items selected by greater than 20 percent of the participants.

* Significant difference noted between current and proposed panel

This was true with both the current and proposed nutrition labels. Participants also were asked which items were of most importance; results were consistent with items of interest. Interestingly, it appears consumers do not pay attention to the details on a nutrition facts panel, participants selected nutrients they found to be important and of interest on the questionnaire even when that nutrient was not declared on the displayed nutrition panel they were asked to review. This may indicate that consumers are only reviewing specific information when they consume the product or have a specific need. Another consideration, specifically for added sugar, is consumers may have selected added sugar because they are aware that 'sugar' on the current panel includes both sugars and added sugar.

Demographic information was further analyzed to determine if differences occurred between the proposed and current label for items of interest. Participants in the sub-group age

45-60 showed significant differences between the two labels on multiple items including, trans fat, vitamin A, vitamin C, calcium, iron and serving size. This could indicate that this age group is more attentive to the nutrition label. Other population sub-groups showed minimal differences between the existing and proposed nutrition facts panel. Differences that do not seem particularly logical and may be random occurrences based on the many comparisons that were made. It also is possible that some effects, such as those for trans fat or vitamin A that showed an impact in several demographic sub-groups may the result of a combination of demographic factors. Such combinations were not studied here because of the small samples sizes that would result from parsing demographics into such multi-factor sub-groups. Unfortunately, "number of servings" was not analyzed in either question because of an inadvertent error in the questionnaire.

More than 20 percent of participants selected added sugar, sugar, sodium, saturated fat, trans fat, cholesterol, total fat, calories, total carbohydrate as items they tried to avoid. The current label had a significantly higher percentage selected for sugar (to avoid) than the proposed label 47.4 and 37.5 (P=0.001). This may indicate that participants may be paying less attention to total sugars with the addition of added sugars to the proposed nutrition label.

Participants were asked which nutrients they try to consume as part of a healthy diet, and no significant differences were noted between the current and proposed label.

Participants were asked which items on the nutrition facts panel they thought could impact appearance, flavor, texture, and smell, or taste; more than 20 percent of participants selected sugar, added sugar, sodium, and fats. The proposed label had a significantly lower percent selected for sugars than the current label 42.4 and 49.7 (P=0.015). Less than ten percent

of participants selected calories as an item that may change sensory attributes, the proposed label had a significantly higher percent selected for calorie ($p<0.05$) (figure 3).

Figure 3 Items selected that may impact appearance, flavor, texture, smell or taste on the current vs proposed panel
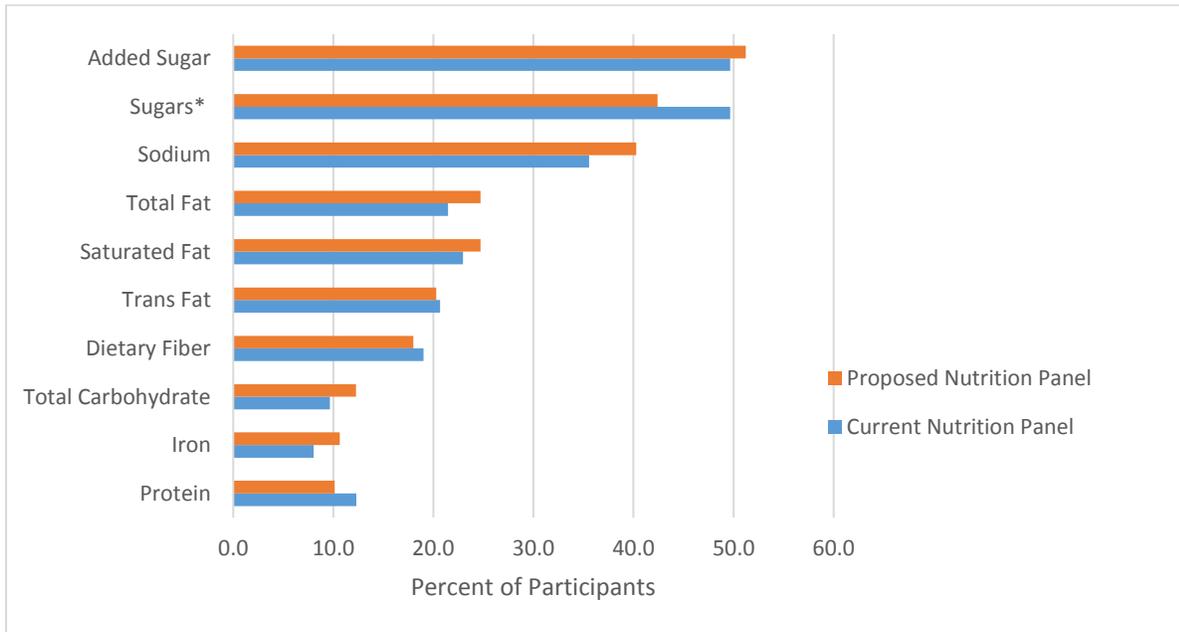
Graph represents only items selected by greater than 10 percent of the participants.

* Significant difference noted between current and proposed panel.

Perception of Food Category Labels

Data from the descriptors used for food labels is shown in Table 2. Attributes such as too salty or too sweet were rated by almost no respondents to as high as 50+% of respondents depending on the food product evaluated. 15% or more of the respondents selected the attributes flavorful, nutritious, and healthy for two or more products. 10-14% of respondents selected natural, light, balanced nutrition, delicious, and unhealthy for several products. Attributes such as fatty, rich, creamy, greasy, artificial, meaty, hearty, indulgent, and refreshing were found for only one of the foods. For example, only hamburger macaroni was noted by more than 10% of the population to be greasy, artificial, meaty, hearty, or indulgent. Conversely, attributes selected by less 5% of respondents included not salty enough, gritty, not sweet enough, too sour,

not sour enough, tangy, chalky, bold, mild, and premium. This is likely because these attributes are not relatable to the nutrition content for the chosen food categories.

Honey toasted oat cereal

Results showed that the proposed label had a significantly ($P<0.01$) higher percent selected for the attribute" too sweet" and "nutrient dense" than the current label. The proposed label had a significantly lower percent selected for the attribute "healthy" and "nutritious" than the current label ($P<0.01$)). Less than ten percent of participants noted a practical difference in the attribute "refreshing" and "dry" ($p<0.05$).

Strawberry lowfat yogurt

Results showed the proposed label had a significantly higher percent selected for the attribute" too sweet" than the current label ($P<0.01$). The proposed label had a significantly lower percent selected for the attribute" Nutritious" and "balanced nutrition" than the current label ($P=0.03$). A small percentage of participants noted a significant difference in the attribute greasy ($p<0.05$).

Chocolate chip granola bar

Results showed the proposed label had a significantly higher percent selected for the attribute" too sweet" than the current label ($P<0.001$). Participants also noted a meaningful difference in the attribute too salty ($p<0.02$), however participants also noted a difference in the attribute not salty enough (<0.03).

100% fruit punch juice

Results showed the proposed label had a significantly higher percent selected for the attribute "too sweet," "artificial," and "unhealthy" than the current label ($P<0.05$). The proposed

label had a significantly lower percent selected for the attribute "healthy" and "nutritious" than the current label (P<0.001).

Cheeseburger macaroni

Results showed no significant differences in attributes between the proposed and current label.

Table 1 Characteristics of respondents who viewed the current vs. proposed nutrition labels

Characteristics	Current Nutrition Panel (n = 610)	Proposed Nutrition Panel (n = 611)
Gender (%)	%	%
Male	33	32.6
Female	67	67.4
Age (%)		
18-22	5.1	5.7
23-44	45.1	42.2
45-60	29.2	30.6
61-74	19.2	20
75 or older	1.5	1.5
Education (%)		
High school or less	19.2	18.8
Some college or technical school	35.2	34.4
Completed B.S./B.A. or 4-year degree	30.5	31.3
Masters/PhD	14.9	14.9
Prefer not to answer	0.2	0.7
Income (%)		
< $25,000	17.4	16.4
$25,001-$49,999	27.7	28
$50,000-$99,999	34.4	33.9
$100,000-$200,000	13.3	15.7
$200,000+	2.3	2.5
Prefer not to answer	4.9	3.6
Health Concern (%)		
Yes	30	30.9
No	70	69.1
Food Assistance Program (%)		
Yes	18.9	17.2
No	81.1	82.8
Children Over 18 in Household (%)		
0	0.2	1
1	27.5	24.2
2	55.2	55.5
3	10.3	12.3
4	5.4	5.6
5 or more	1.1	1.5
Children Under 18 in Household (%)		
0	66.7	66.9
1	16.4	14.2
2	11.8	12.6
3	3.6	4.6
4	1.3	1.5
5 or more	0.2	0.2
Average Spent on groceries per/wk. (%)		
$0-$25	3.8	3.3
$26-$50	14.8	16
$51-$75	20.5	18.8
$76-$100	23.3	22.7
$101-$150	23.8	23.4
$151-$200	10	11.1
$200+	3.4	4.1
I do not know	0.5	0.5

Table 2 Significant differences in percent of participants viewing the proposed versus the current label across different food categories

Attributes	Honey Toasted Oat			Strawberry Lowfat Yogurt			Chocolate Chip Granola Bar			100% Fruit Punch Juice			Cheeseburger Macaroni		
	Current Percentages	Proposed Percentages	P-Value	Current Percentages	Proposed Percentages	P-Value	Current Percentages	Proposed Percentages	P-Value	Current Percentages	Proposed Percentages	P-Value	Current Percentages	Proposed Percentages	P-Value
Too Salty	10.8	13.1	0.221	8.2	6.1	0.146	10.5	6.9	0.0248*	4.3	3.3	0.364	55.9	57.6	0.547
Not Salty Enough	1.0	0.7	0.524	0.7	0.0	0.045	1.5	0.3	0.0338*	0.2	0.3	0.564	1.0	1.1	0.783
Too Sweet	8.5	23.7	<.0001*	27.4	35.0	0.0039*	10.3	22.3	<.0001*	39.5	53.2	<.0001*	1.0	0.8	0.760
Not Sweet Enough	3.9	2.5	0.142	1.5	2.1	0.392	2.8	2.1	0.457	1.3	1.3	0.997	0.7	0.2	0.178
Too Sour	0.3	0.2	0.562	0.5	0.3	0.653	0.3	0.2	0.562	0.7	0.5	0.703	0.2	0.7	0.179
Not Sour Enough	0.5	0.0	0.083	0.2	0.3	0.564	0.2	0.3	0.564	0.5	1.0	0.317	0.0	0.2	0.318
Tangy	0.5	0.8	0.480	2.0	1.1	0.246	0.3	0.5	0.655	3.8	3.3	0.638	0.3	0.2	0.562
Rich	4.1	4.9	0.494	12.0	11.3	0.713	7.9	7.0	0.580	3.1	3.8	0.534	9.2	11.1	0.260
Gritty	3.0	2.9	0.996	1.1	0.7	0.362	3.3	4.3	0.370	1.1	1.0	0.778	2.3	2.5	0.854
Smooth	3.0	3.3	0.746	21.6	18.2	0.129	3.8	4.1	0.773	7.0	6.4	0.642	3.1	3.1	0.996
Fatty	1.8	2.1	0.683	2.8	3.9	0.268	4.6	4.3	0.776	2.3	1.5	0.291	24.3	23.2	0.675
Chalky	2.1	1.3	0.269	0.5	1.3	0.131	1.1	1.6	0.466	0.3	0.8	0.256	0.8	1.8	0.132
Creamy	0.8	1.1	0.564	18.2	15.5	0.217	1.5	1.0	0.434	0.5	1.1	0.205	7.2	7.2	0.994
Thick	1.0	1.3	0.593	4.1	5.2	0.346	2.5	1.8	0.425	0.8	0.5	0.477	5.6	5.9	0.811
Dry	13.8	9.7	0.0254*	1.0	1.3	0.593	11.6	9.8	0.304	0.5	0.7	0.706	2.8	2.9	0.868
Greasy	1.6	1.6	0.997	2.0	0.5	0.0192*	1.6	1.6	0.997	1.0	1.1	0.783	16.7	20.0	0.143
Flavorful	18.2	15.9	0.281	23.9	20.5	0.144	22.6	18.2	0.053	24.3	20.1	0.082	15.9	14.9	0.626
Natural	14.1	13.1	0.608	12.6	11.3	0.474	11.6	11.3	0.849	13.1	10.5	0.153	4.4	3.1	0.227
Artificial	5.6	8.2	0.072	7.7	8.3	0.680	8.0	9.8	0.274	9.0	13.1	0.0231*	16.2	15.1	0.573
Meaty	0.3	0.2	0.562	0.5	0.5	0.998	1.1	0.7	0.362	0.2	0.2	0.999	10.3	10.1	0.917
Juicy	1.3	1.8	0.490	2.6	3.3	0.502	1.6	2.8	0.175	30.0	26.0	0.122	1.8	3.1	0.140
Nutritious	37.9	30.0	0.0035*	26.6	21.1	0.0256*	19.0	19.1	0.953	16.6	11.6	0.0132*	5.6	3.4	0.072
Bold	4.6	4.3	0.776	3.0	3.1	0.871	3.1	3.9	0.441	4.3	4.7	0.684	4.1	4.4	0.782
Healthy	42.8	32.2	0.0001*	30.7	26.0	0.073	24.4	22.4	0.408	21.6	14.2	0.0008*	5.1	5.2	0.902
Hearty	10.3	10.5	0.933	6.6	4.6	0.133	8.5	6.9	0.279	3.1	2.8	0.731	10.8	10.0	0.632
Nutrient-dense	8.5	13.7	0.0037*	3.0	2.8	0.860	3.8	3.1	0.526	2.3	3.9	0.100	2.5	2.1	0.699
Light	9.0	7.5	0.345	15.9	18.0	0.328	10.2	10.5	0.858	6.9	5.7	0.406	1.8	1.0	0.221
Fresh	6.6	6.2	0.809	10.0	8.0	0.227	3.9	4.1	0.889	10.7	8.3	0.169	2.3	2.5	0.854
Indulgent	4.6	4.7	0.897	7.9	9.0	0.476	15.2	11.8	0.077	6.9	6.2	0.638	11.5	10.5	0.576
Clean	6.9	4.9	0.143	5.4	4.9	0.693	4.6	3.3	0.237	4.8	4.3	0.674	1.3	2.3	0.198
Balanced Nutrition	23.8	21.3	0.297	13.4	9.3	0.0236*	10.3	10.1	0.917	6.4	5.6	0.541	2.8	3.8	0.337
Refreshing	2.0	3.9	0.0429*	7.2	7.2	0.994	2.8	4.1	0.211	11.1	11.8	0.727	1.1	1.8	0.344
Mild	3.0	4.4	0.173	3.1	3.9	0.441	4.4	3.8	0.560	2.1	2.1	0.997	2.6	2.3	0.708
Premium	3.0	3.4	0.629	4.1	3.1	0.354	3.0	3.1	0.871	3.0	2.3	0.471	1.6	1.3	0.632
None of these	4.8	3.9	0.479	4.1	5.6	0.232	7.0	7.5	0.747	4.1	2.9	0.275	3.1	2.9	0.863
Delicious	14.9	12.4	0.207	13.0	12.3	0.722	15.9	13.9	0.329	11.1	10.1	0.571	9.2	6.4	0.068
Unhealthy	4.8	7.0	0.090	7.7	9.2	0.359	9.8	12.1	0.204	12.8	17.7	0.0175*	35.7	35.5	0.935
Other	0.5	1.5	0.082	1.1	1.1	0.998	0.8	0.5	0.477	0.5	1.6	0.051	1.5	0.8	0.281

*Indicates significant difference (P<0.05) in an attribute between current and proposed nutrition panel

Chapter 4 - Discussion

This study examined the impact of the proposed nutrition panel changes on consumer perception. Among the participants reviewing the proposed versus the current label, we observed differences in nutrients they considered important and various attributes within the five food category labels.

It must be remembered that this study evaluated self-reported information on use of nutrition labeling and likely is higher than actual use.[6] Regardless, it is clear that consumers do not pay attention to the details on a nutrition facts panel because participants selected nutrients they found to be important on their label even when that nutrient was not declared on the nutrition panel they were asked to review. However, one must also consider that a consumer may not differentiate between sugar and added sugar on the current panel and could potentially be checking both boxes because they see it as the same nutrient/information. Therefore, it is not surprising, that the general population showed no significant difference in items of interest on the current versus the proposed nutrition panel. This study showed that similar results are found in terms of what people declare they pay attention to with calories reviewed most often and consumers placing emphasis on items near the top of the panel.[6] However, when consumers want information about a nutrient they become attentive to the nutrition panel. Studies have reported that consumer tend to spend more time focusing on negative nutrients.[15,9] Negative nutrients are nutrients that consumers want to reduce or to limit daily intake. This study showed that consumers are focused on limiting sugars, added sugars, sodium, saturated and trans fat. Sugars and added sugar were both top nutrients that participants want to limit, however participants selected sugars less on the proposed panel. It appears likely that the consumer may be more focused on the added sugars, which also was observed in a study conducted by Graham &

Roberto. It's not surprising added sugar is the top nutrients consumers want to limit, sugars in general continues to be a nutrient of debate. The dietary guideline recommends reducing intake of calories from added sugars.[16] Research has stated that the body cannot differentiate between sugar and added sugar as all sugars are carbohydrates and metabolized the same way;[16] however, many consumers have different beliefs. Today many definitions are used for the term added sugar, which continues to cause confusion amongst consumers. FDA definition states, "added sugar includes sugars that are either added during the processing of the foods, or are packaged as such, and include sugars (mono- and disaccharides), sugars from syrup and honey, and sugars from concentrated fruit or vegetable juices that are in excess of what would be expected from the same volume of 100 percent fruit or vegetable juice of the same type."[2]

Consumers appear to not only focus on the nutritional value of a food, but also make inferences regarding sensory attributes, specifically taste attributes such as sweetness and saltiness and general sensory properties such as flavorful and delicious. Over thirty percent of the participants thought added sugar, sugar and sodium could potentially change sensory attributes of product. More participants selected added sugars as a nutrient more likely to change sensory attributes. Many consumers understand that table sugar, also known as sucrose, is a source of added sugar. Sugar is added to food products for various functional reasons to increase sweetness, to act as a preservative, fermentation, for color, provide texture, and enhance flavor.[16] It becomes more evident in the review of the food category labels that the proposed panel has impacted consumer perception. Attributes that showed significant differences between the current and proposed labels included "too sweet," "nutritious," "healthy," "nutrient dense," "balanced nutrition" and "artificial".

All five proposed nutrition panels showed that the attribute "too sweet" was selected more versus the current panel. In fact, a significantly higher percent selected "too sweet" for cereal, yogurt, granola bar and juice label. The nutrition facts panel denotation of "sugar" is made up of naturally occurring sugar and added sugar.[17] FDA proposed placing 'added sugar' below sugars on the nutrition fact panel to provide consumers with additional information when making food choices.[1,2] Many consumers thought the addition of added sugars to the nutrition panel would be beneficial. [18]

However, it is unclear if consumers understood the term 'added sugar' on the label. In a recent study done by IFIC many consumers had difficulty interpreting the additional added sugars line, label readers thought that it meant more sugar was added to the product than was there before.[19,20] Consumers may be double counting sugar, which means that education is needed. Dietitians are a perfect source of such information and can provide correct information both to consumers, but also to other health care workers, such as physicians and nurses, who are less versed in nutrition labeling. We know that participants in this study stated that added sugar is most likely to change sensory attributes and consumers are aware that sugar is added to increase sweetness. Based on that information it is not surprising that the attribute "too sweet" was selected more often when added sugar was noted by the respondents.

Some of the proposed food category labels showed a significantly lower percent selected for the attribute "healthy" and "nutritious" and "balanced nutrition." These terms are commonly used to describe food and the terms may be used interchangeably by consumers. However, FDA has defined the term healthy, but not nutritious or balanced nutrition.[21] In a study conducted by Vlieger and colleagues et al., young adults stated, to be nutritious, the product must be low in sugar and/or contain vitamins, minerals, protein, and be good for you. Consumers also stated to

maintain their health it is important to limit the amount of specific nutrients such as sugar, saturated fat and total fat. [22] Consumers in our study seemed to focus on sugar and more importantly, added sugar as an important nutrient to assess overall nutritional content of a product.

The proposed cereal panel indicated that the attribute nutritious was selected more often for the current panel, but that nutrient-dense was selected more for the new panel. The proposed cereal nutrition facts panel, included ten vitamins and minerals, which included the addition of absolute values. Many studies have shown that consumer have a difficult time interpreting absolute values.[5] Although vitamins and minerals are not a top nutrient of interest it is important to note that consumers may be using grouping methods to quickly assess a products nutritional content. In a study conduct by Worsley, he stated that consumers "rather than consider all the nutrients listed on the breakfast cereal they may measure the nutritiousness of the cereal by the length in centimeters of the list, the longer the list the more nutritious the cereal." With the addition of absolute values, which adds more content and complexity to the label, grouping may become more popular to quickly assess nutritional content. It is important to note, one other cereal study was conducted and found that that cereal products showed only slight differences on the current vs proposed nutrition fact panel.[23]

The 100% fruit juice panel indicated that the attribute artificial is selected more on the proposed panel. The definition of artificial in the Webster dictionary means "not natural or real: made, produced, or done to seem like something natural."[24] The juice label declared values for both sugar and added sugar. In a study done by IFIC consumer were asked what does added sugar mean, respondents stated "sugars that are not found naturally within the ingredients." With the addition of added sugars, it may cause more consumers to think that added ingredients, such

as sugar, means that the product is not natural, concluding that it is artificial.   Again, further education by dietitians and others will be needed to make sure consumer fully understand the difference between total sugars and added sugar on the nutrition facts panel.

This study has several limitations that must be acknowledged. First, this study only examined the nutrition facts panel on selected products. We know that consumers typically do not only look only at the nutrition facts panel to make inferences about a product's attributes. It is known that consumers place emphasis on various package elements to determine characteristics of a product. Thus, it is possible that the impact of the nutrition facts panel may be overstated. However, it also is possible that front panel graphics and claims may lead consumers to look more specifically at the nutrition facts panel. Second, participants reviewed the nutrition panels online or via phone; this has two limitations. First, the size of the nutrition facts panel may appear differently than on the products and differently from device to device. That can influence the readability and impact of the panel. Because only a few consumers chose to stop completing the questionnaire before it was completely finished we believe that the nutrition facts panels and surveys must have been easily read and completed by most consumers. Second, the use on an on-line system could limit access to some individuals with lower education and income. It should be noted however that our demographics do not appear to have excluded those with lower education, lower income, or those on food assistance programs. Lastly, the cereal nutrition facts panel was the only panel that had an updated serving size. Further research should be done to determine if serving size has an impact to the perception of labels. In addition, further research, also should be conducted on additional food categories to determine if other food products have similar results as we concluded in our study.

Chapter 5 - Conclusion

These findings indicated that consumers' perceptions are impacted with the proposed nutrition panel. Consumers placed more emphasis on "added sugar", for example added sugar is considered a negative nutrient in the eye of the consumer and has the potential to change how the consumer perceives the overall health profile and the sensory properties of various products. This study continued to emphasize that consumers may be unclear about the labeling of added sugar. Government agencies and those who impact health care, such as dietitians, will need to provide additional education to make sure consumers are clear on the definition and labeling of added sugar. Industry will need to consider reformulations for product with higher amount of added sugar and will also need to help educate the consumers to avoid negative perception.

References

1. Food Labeling: Revision of the Nutrition and Supplement Facts Labels. Final rule. Federal Register. 2016;81(103):33741-999.

2. U.S. Food and Drug Administration. (2014). Proposed changes to the nutrition facts label. Retrieved from https://www.fda.gov/Food/GuidanceRegulation/GuidanceDocumentsRegulatoryInformation/LabelingNutrition/ucm385663.html. Accessed September 7,2017

3. Nutrition Labeling and Education Act of 1990. 21 U.S.C. §343(q) and (r): Pub L. No. 101-535, 104 Stat 2353.

4. Taylor CL, Wilkening VL. How the Nutrition Food Label Was Developed, Part 1: The Nutrition Facts Panel. J Am Diet Assoc. 2008;108(3):437-42.

5. Campos S, Doxey J, Hammond D. Nutrition labels on pre-packaged foods: a systematic review. Public Health Nutr. 2011 AUG;14(8):1496-506.

6. Graham DJ, Jeffery RW. Location, Location, Location: Eye- Tracking Evidence that Consumers Preferentially View Prominently Positioned Nutrition Information. J Am Diet Assoc. 2011;111(11):1704-11

7. U.S. Food & Drug Administration. "Food label use," 2008 Health and Diet Survey: Topline Frequency Report. Accessed September 7, 2017

8. Worsley A. Nutrition knowledge and food consumption: can nutrition knowledge change food behaviour? Asia Pac J Clin Nutr. 2002;11 Suppl 3:S579.

9. Cannoosamy K, Pugo-Gunsam P, Jeewon R. Consumer Knowledge and Attitudes Toward Nutritional Labels. Journal of Nutrition Education and Behavior. 2014;46(5):334-40.

10. Ollberding NJ, Wolf RL, Contento I. Food Label Use and Its Relation to Dietary Intake among US Adults. J Am Diet Assoc. 2011;111(5):S47-51.

11. Stran KA, Knol LL. Determinants of Food Label Use Differ by Sex. Journal of the Academy of Nutrition and Dietetics. 2013 May 2013;113(5):673-9.

12. Graham DJ, Roberto CA. Evaluating the Impact of U.S. Food and Drug Administration–Proposed Nutrition Facts Label Changes on Young Adults' Visual Attention and Purchase Intentions. Health Educ Behav. 2016;43(4):389-98.

14. Graham DJ, Heidrick C, Hodgin K. Nutrition Label Viewing during a Food- Selection Task: Front-of- Package Labels vs Nutrition Facts Labels. Journal of the Academy of Nutrition and Dietetics. 2015;115(10):1636-46.

15. De Vlieger NM, Collins C, Bucher T. What is a nutritious snack? Level of processing and macronutrient content influences young adults' perceptions. Appetite. 2017;114:55-63.

16. Goldfein KR, Slavin JL. Why Sugar Is Added to Food: Food Science 101. Comprehensive Reviews in Food Science and Food Safety. 2015;14(5):644-56.

17. Bowman SA. Added sugars: Definition and estimation in the USDA Food Patterns Equivalents Databases. J Food Compos Anal. 2017.

18. Kyle TK, Thomas DM. Consumers believe nutrition facts labeling for added sugar will be more helpful than confusing. Obesity. 2014;22(12):2481-4.

19. Intl. Food Information Council [IFIC]. 2014. Consumer investigation into nutrition facts panels and sugars labeling. Available fromhttp://www.food insight.org/sites/default/files/IFIC Foundation Preliminar y NFP Survey. Accessed November 27, 2017

20. Laquatra I, Sollid K, Smith Edge M, Pelzel J, Turner J. Including "Added Sugars" on the Nutrition Facts Panel: How Consumers Perceive the Proposed Change. Journal of the Academy of Nutrition and Dietetics. 2015 November 2015;115(11):1758-63.

21. US Food and Drug Administration 21C.F.R 101.13 (2017).

22. Tierney M, Gallagher AM, Giotis ES, Pentieva K. An online survey on consumer knowledge and understanding of added sugars. Nutrients. 2017;9(1).

23. González-Vallejo C, Lavins BD. Evaluation of breakfast cereals with the current nutrition facts panel (NFP) and the Food and Drug Administration's NFP proposal. Public Health Nutr. 2016;19(6):1047-58.

24. Merriam-Webster, 2010. Learner Dictionary Website. http://www.learnersdictionary.com/definition/artificial Accessed October 7, 2017.

Appendix A - Screener

Q1. This survey is being conducted by Kansas State University and is about food. It is a voluntary survey, and, if you qualify, should take less than 15 minutes. It has been approved by the Human Subject's Review Board of Kansas State University. Your data is confidential and will not be associated with your name. We appreciate your time and effort. Thank you!

Q2. Which of the following best describes your age?
- o   younger than 18
- o   18+

Q3. How long have you lived in the United States?
- o   Less than 1 year
- o   More than 1 year but less than 3
- o   More than 3 years but less than 5
- o   More than 5 years

Q4. What percentage of the household grocery shopping do you personally do?
- o   0%-20%
- o   21%- 40%
- o   41%-60%
- o   61%-80%
- o   More than 80%

Q5. How frequently do you read nutrition labels for food products?
- o   Always
- o   Most of the time
- o   Occasionally (for example, new products)
- o   Rarely
- o   Never

Q6. Which products have you purchased in the last month (check all that apply)
- •   Yoplait Yogurt
- •   Cheerios Cereal
- •   Hamburger Helper
- •   2% Milk
- •   Ms. D's Maple Syrup
- •   Oreo Cookies
- •   Ground Beef
- •   None

Thank you for participating. Based on your responses you have not qualified to take the survey. If you have questions, please contact: sensory@ksu.edu

Appendix B - Questionnaire Current Label

Q1. What is your gender

- o Male
- o Female

Q2. Which of the following best decribes your age (check one)

- o 18-22
- o 23-44
- o 45-60
- o 61-74
- o 75 or older

Q3. What is your race/ethnicity? (choose all that apply)

- o Hispanic/Latino
- o White/Caucasian
- o Black/African American
- o Native Hawaiian / Pacific Islander
- o Asian
- o American Indian / Alaska Native
- o Indian
- o Prefer not to answer

Q4. Which of the following best describes your highest education level? (Check one)

- o High school or less
- o Some college or technical school
- o Completed B.S/B.A or other 4 year degree
- o Masters/PhD
- o Prefer not to answer

Q5. Which of the following best describes your total household income during the past 12 months? (Check one)

- o < $25,000
- o $25,001-$49,999
- o $50,001-$99,999
- o $100,000-$200,000
- o 200,001 +
- o Prefer not to answer

Q6. Do you or anyone in your household have specific health concerns that impact diet?

- o Yes
- o No

Q7. Are you or anyone in your household on any sort of food assistance program? (Ex: SNAP, WIC, EFNEP, Free/Reduced Priced School Lunch, Food Bank, Local Food Kitchen, etc.)

- o Yes
- o No

Q8. How many adults 18 and over live in your household?

Q9. How many children 0-17 live in your household?

Q10. On average how much do you spend per week on groceries (not including eating out)?

- o $0-$25
- o $26-$50
- o $51-$75
- o $76-$100
- o $101-150
- o $151-200
- o 200+
- o I do not know

Q11. What items are of interest to you on the nutrition facts panel? (Check all that apply)

☐ Calories	☐ Total Carbohydrate	☐ Vitamins C	☐ Serving Size
☐ Total Fat	☐ Dietary Fiber	☐ Vitamin D	☐ Calories from Fat
☐ Saturated Fat	☐ Total Sugars	☐ Calcium	☐ Number of Servings
☐ Trans Fat	☐ Added Sugar	☐ Iron	☐ None of these
☐ Cholesterol	☐ Protein	☐ Potassium	☐ Other
☐ Sodium	☐ Vitamin A		

Q12. Choose up to 3 items on the nutrition facts panel that are most important to you? (Check 1-3 items)

☐ Calories	☐ Total Carbohydrate	☐ Vitamins C	☐ Serving Size
☐ Total Fat	☐ Dietary Fiber	☐ Vitamin D	☐ Calories from Fat
☐ Saturated Fat	☐ Sugars	☐ Calcium	☐ Number of Servings
☐ Trans Fat	☐ Added Sugar	☐ Iron	☐ None of these
☐ Cholesterol	☐ Protein	☐ Potassium	☐ Other
☐ Sodium	☐ Vitamin A		

Q13. What items on the nutrition facts panel do you try to avoid too much of in the diet? (Check all that apply)

☐ Calories	☐ Sodium	☐ Protein	☐ Iron
☐ Total Fat	☐ Total Carbohydrate	☐ Vitamin A	☐ Potassium
☐ Saturated Fat	☐ Dietary Fiber	☐ Vitamins C	☐ None of these
☐ Trans Fat	☐ Sugars	☐ Vitamin D	☐ Other
☐ Cholesterol	☐ Added Sugar	☐ Calcium	

Q14. What items on the nutrition facts panel do you try to consume as part of a healthy diet? (Check all that apply)

☐ Calories	☐ Sodium	☐ Protein	☐ Iron
☐ Total Fat	☐ Total Carbohydrate	☐ Vitamin A	☐ Potassium
☐ Saturated Fat	☐ Dietary Fiber	☐ Vitamins C	☐ None of these
☐ Trans Fat	☐ Sugars	☐ Vitamin D	☐ Other
☐ Cholesterol	☐ Added Sugar	☐ Calcium	

Q15. What items on the nutrition facts panel do you think could impact appearance, flavor, texture, smell or taste of the product? (Check all that apply)

☐ Calories	☐ Sodium	☐ Protein	☐ Iron
☐ Total Fat	☐ Total Carbohydrate	☐ Vitamin A	☐ Potassium
☐ Saturated Fat	☐ Dietary Fiber	☐ Vitamins C	☐ None of these
☐ Trans Fat	☐ Sugars	☐ Vitamin D	☐ Other
☐ Cholesterol	☐ Added Sugar	☐ Calcium	

Q16. This honey toasted oat cereal nutrition facts panel makes me think this product would be: (Check all that apply)

Honey Toasted Oat Cereal

Nutrition Facts
Serving Size ¾ cup (28g)
Servings Per Container about 12

Amount Per Serving	Oat Cereal	with ¾ cup skim milk
Calories	110	150
Calories from Fat	15	15
	% Daily Value**	
Total Fat 1.5g*	2%	2%
Saturated Fat 0g	0%	0%
Trans Fat 0g		
Polyunsaturated Fat 0.5g		
Monounsaturated Fat 0.5g		
Cholesterol 0mg	0%	1%
Sodium 160mg	7%	9%
Potassium 115mg	3%	9%
Total Carbohydrate 22g	7%	9%
Dietary Fiber 2g	8%	8%
Soluble Fiber less than 1g		
Sugars 9g		
Other Carbohydrate 11g		
Protein 2g		
Vitamin A	10%	15%
Vitamin C	10%	10%
Calcium	10%	25%
Iron	25%	25%
Vitamin D	10%	25%
Thiamin	25%	30%
Riboflavin	25%	35%
Niacin	25%	25%
Vitamin B6	25%	25%
Folic Acid	50%	50%
Vitamin B12	25%	35%
Phosphorus	8%	20%
Magnesium	6%	10%
Zinc	25%	30%

* Amount in cereal. A serving of cereal plus skim milk provides 1.5g total fat, less than 5mg cholesterol, 220mg sodium, 320mg potassium, 28g total carbohydrate (15g sugars, 12g other carbohydrate), and 7g protein.

- [ ] Too Salty
- [ ] Rich
- [ ] Dry
- [ ] Juicy
- [ ] Light
- [ ] Mild
- [ ] Not Salty Enough
- [ ] Gritty
- [ ] Greasy
- [ ] Nutritious
- [ ] Fresh
- [ ] Premium
- [ ] Too Sweet
- [ ] Smooth
- [ ] Flavorful
- [ ] Bold
- [ ] Indulgent
- [ ] Delicious
- [ ] Not Sweet Enough
- [ ] Fatty
- [ ] Natural
- [ ] Healthy
- [ ] Clean
- [ ] Unhealthy
- [ ] Too Sour
- [ ] Chalky
- [ ] Artificial
- [ ] Hearty
- [ ] Balanced Nutrition
- [ ] None of these
- [ ] Not Sour Enough
- [ ] Creamy
- [ ] Meaty
- [ ] Nutrient-dense
- [ ] Refreshing
- [ ] Other _____
- [ ] Tangy
- [ ] Thick

Q17. This strawberry lowfat yogurt nutrition facts panel makes me think this product would be:
(Check all that apply)

Strawberry Lowfat Yogurt

Nutrition Facts
Serving Size 1 container

Amount Per Serving

Calories 150   Calories from Fat 15

	% Daily Value*
Total Fat 2g	**3%**
Saturated Fat 1g	**5%**
Trans Fat 0g	
Cholesterol 10mg	**3%**
Sodium 95mg	**4%**
Total Carbohydrate 25g	**8%**
Sugars 18g	
Protein 6g	**12%**

Vitamin A 15% • Calcium 20%
Vitamin D 20% • Phosphorus 15%

Not a significant source of dietary fiber, vitamin C and iron.
* Percent Daily Values are based on a 2,000 calorie diet.

☐ Too Salty	☐ Rich	☐ Dry	☐ Juicy	☐ Light	☐ Mild
☐ Not Salty Enough	☐ Gritty	☐ Greasy	☐ Nutritious	☐ Fresh	☐ Premium
☐ Too Sweet	☐ Smooth	☐ Flavorful	☐ Bold	☐ Indulgent	☐ Delicious
☐ Not Sweet Enough	☐ Fatty	☐ Natural	☐ Healthy	☐ Clean	☐ Unhealthy
☐ Too Sour	☐ Chalky	☐ Artificial	☐ Hearty	☐ Balanced Nutrition	☐ None of these
☐ Not Sour Enough	☐ Creamy	☐ Meaty	☐ Nutrient-dense	☐ Refreshing	☐ Other
☐ Tangy	☐ Thick				

Q18. This chocolate chip granola nutrition facts panel makes me think this product would be: (Check all that apply)

Chocolate Chip Granola Bar

Nutrition Facts
Serving Size 1 Bar (25g)
Servings Per Container 6

Amount Per Serving

Calories 100   Calories from Fat 20

	% Daily Value*
Total Fat 2.5g	4%
Saturated Fat 1g	4%
Trans Fat 0g	
Cholesterol 0mg	0%
Sodium 65mg	3%
Total Carbohydrate 18g	6%
Dietary Fiber less than 1g	4%
Sugars 7g	
Protein 2g	

Vitamin A 0% · Vitamin C 0%
Calcium 0%   ·   Iron 2%

*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

		Calories:	2,000	2,500
Total Fat	Less than		65g	80g
Sat Fat	Less than		20g	25g
Cholesterol	Less than		300mg	300mg
Sodium	Less than		2,400mg	2,400mg
Total Carbohydrate			300g	375g
Dietary Fiber			25g	30g

- [ ] Too Salty
- [ ] Rich
- [ ] Dry
- [ ] Juicy
- [ ] Light
- [ ] Mild
- [ ] Not Salty Enough
- [ ] Gritty
- [ ] Greasy
- [ ] Nutritious
- [ ] Fresh
- [ ] Premium
- [ ] Too Sweet
- [ ] Smooth
- [ ] Flavorful
- [ ] Bold
- [ ] Indulgent
- [ ] Delicious
- [ ] Not Sweet Enough
- [ ] Fatty
- [ ] Natural
- [ ] Healthy
- [ ] Clean
- [ ] Unhealthy
- [ ] Too Sour
- [ ] Chalky
- [ ] Artificial
- [ ] Hearty
- [ ] Balanced Nutrition
- [ ] None of these
- [ ] Not Sour Enough
- [ ] Creamy
- [ ] Meaty
- [ ] Nutrient-dense
- [ ] Refreshing
- [ ] Other
- [ ] Tangy
- [ ] Thick

Q19. This 100% fruit punch juice nutrition facts panel makes me think this product would be: (Check all that apply)

100% Fruit Punch

Nutrition Facts

Serving Size 1 Cup (8oz)
Serving Per Container 6

Amount Per Serving	
Calories	100
Calories from Fat	0

	% Daily Value*
Total Fat 0g	0%
Saturated Fat 0g	0%
Trans Fat 0g	
Cholesterol less than 0mg	0%
Sodium 70mg	3%
Total Carbohydrate 25g	9%
Dietary Fiber 0g	0%
Sugars 22g	
Protein 0g	

Vitamin A	20%	Calcium	2%
Vitamin C	20%	Iron	2%

*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

	Calories	2,000	2,500
Total Fat	Less Than	65g	80g
Sat Fat	Less Than	20g	25g
Cholesterol	Less Than	300mg	300mg
Sodium	Less Than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

- ☐ Too Salty
- ☐ Rich
- ☐ Dry
- ☐ Juicy
- ☐ Light
- ☐ Mild
- ☐ Not Salty Enough
- ☐ Gritty
- ☐ Greasy
- ☐ Nutritious
- ☐ Fresh
- ☐ Premium
- ☐ Too Sweet
- ☐ Smooth
- ☐ Flavorful
- ☐ Bold
- ☐ Indulgent
- ☐ Delicious
- ☐ Not Sweet Enough
- ☐ Fatty
- ☐ Natural
- ☐ Healthy
- ☐ Clean
- ☐ Unhealthy
- ☐ Too Sour
- ☐ Chalky
- ☐ Artificial
- ☐ Hearty
- ☐ Balanced Nutrition
- ☐ None of these
- ☐ Not Sour Enough
- ☐ Creamy
- ☐ Meaty
- ☐ Nutrient-dense
- ☐ Refreshing
- ☐ Other
- ☐ Tangy
- ☐ Thick

Q20. This cheeseburger macaroni nutrition facts panel makes me think this product would be: (Check all that apply)

Cheeseburger Macaroni

Nutrition Facts
Serving Size 1/3 cup as pkgd (34g)
1 cup prepared
Servings Per Container 5

Amount Per Serving		As Pkgd	Prepared
Calories		120	310
Calories from Fat		5	110

	% Daily Value**	
Total Fat 0.5g*	1%	18%
Saturated Fat 0g	0%	24%
Trans Fat 0g		
Cholesterol 0mg	0%	18%
Sodium 620mg	26%	30%
Total Carb 25g	8%	10%
Dietary Fiber < 1g	3%	3%
Sugars 2g		
Protein 3g		

Vitamin A	0%	2%
Calcium	0%	10%
Iron	4%	10%

Not a significant source of vitamin C.

* Amount as packaged. As prepared, one serving provides 12g total fat (5g saturated fat, 0.5g trans fat), 55mg cholesterol, 720mg sodium, 29g total carbohydrate (6g sugars), and 21g protein.

- [ ] Too Salty
- [ ] Rich
- [ ] Dry
- [ ] Juicy
- [ ] Light
- [ ] Mild
- [ ] Not Salty Enough
- [ ] Gritty
- [ ] Greasy
- [ ] Nutritious
- [ ] Fresh
- [ ] Premium
- [ ] Too Sweet
- [ ] Smooth
- [ ] Flavorful
- [ ] Bold
- [ ] Indulgent
- [ ] Delicious
- [ ] Not Sweet Enough
- [ ] Fatty
- [ ] Natural
- [ ] Healthy
- [ ] Clean
- [ ] Unhealthy
- [ ] Too Sour
- [ ] Chalky
- [ ] Artificial
- [ ] Hearty
- [ ] Balanced Nutrition
- [ ] None of these
- [ ] Not Sour Enough
- [ ] Creamy
- [ ] Meaty
- [ ] Nutrient-dense
- [ ] Refreshing
- [ ] Other
- [ ] Tangy
- [ ] Thick

Appendix C - Questionnaire Proposed Label

Q1. What is your gender

- o Male
- o Female

Q2. Which of the following best decribes your age (check one)

- o 18-22
- o 23-44
- o 45-60
- o 61-74
- o 75 or older

Q3. What is your race/ethnicity? (choose all that apply)

- o Hispanic/Latino
- o White/Caucasian
- o Black/African American
- o Native Hawaiian / Pacific Islander
- o Asian
- o American Indian / Alaska Native
- o Indian
- o Prefer not to answer

Q4. Which of the following best describes your highest education level? (Check one)

- o High school or less
- o Some college or technical school
- o Completed B.S/B.A or other 4 year degree
- o Masters/PhD
- o Prefer not to answer

Q5. Which of the following best describes your total household income during the past 12 months? (Check one)

- o < $25,000
- o $25,001-$49,999
- o $50,001-$99,999

- o $100,000-$200,000
- o 200,001 +
- o Prefer not to answer

Q6. Do you or anyone in your household have specific health concerns that impact diet?

- o Yes
- o No

Q7. Are you or anyone in your household on any sort of food assistance program? (Ex: SNAP, WIC, EFNEP, Free/Reduced Priced School Lunch, Food Bank, Local Food Kitchen, etc.)

- o Yes
- o No

Q8. How many adults 18 and over live in your household?

Q9. How many children 0-17 live in your household?

Q10. On average how much do you spend per week on groceries (not including eating out)?

- o $0-$25
- o $26-$50
- o $51-$75
- o $76-$100
- o $101-150
- o $151-200
- o 200+
- o I do not know

Q11. What items are of interest to you on the nutrition facts panel? (Check all that apply)

Nutrition Facts
6 servings per container
Serving size   1 bar (25g)

Amount per serving
Calories   **100**

% Daily Value*

Total Fat 2.5g	4%
Saturated Fat 1g	4%
Trans Fat 0g	
Cholesterol 0mg	0%
Sodium 65mg	3%
Total Carbohydrate 18g	6%
Dietary Fiber <1g	4%
Total Sugars 7g	
Includes 7g Added Sugars	15%
Protein 2g	

Vit. D 0mcg 0% • Calcium 0mg 0%
Iron 0.4mg 2% • Potas. 0mg 0%

* The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

☐ Calories   ☐ Total Carbohydrate   ☐ Vitamins C   ☐ Serving Size

☐ Total Fat   ☐ Dietary Fiber   ☐ Vitamin D   ☐ Calories from Fat

☐ Saturated Fat   ☐ Total Sugars   ☐ Calcium   ☐ Number of Servings

☐ Trans Fat   ☐ Added Sugar   ☐ Iron   ☐ None of these

☐ Cholesterol   ☐ Protein   ☐ Potassium   ☐ Other
                                                                  _____

☐ Sodium   ☐ Vitamin A

Q12. Choose up to 3 items on the nutrition facts panel that are most important to you? (Check 1-3 items)

☐ Calories   ☐ Total Carbohydrate   ☐ Vitamins C   ☐ Serving Size

☐ Total Fat   ☐ Dietary Fiber   ☐ Vitamin D   ☐ Calories from Fat

☐ Saturated Fat   ☐ Sugars   ☐ Calcium   ☐ Number of Servings

☐ Trans Fat   ☐ Added Sugar   ☐ Iron   ☐ None of these

☐ Cholesterol   ☐ Protein   ☐ Potassium   ☐ Other
                                                                  _____

☐ Sodium   ☐ Vitamin A

Q13. What items on the nutrition facts panel do you try to avoid too much of in the diet? (Check all that apply)

☐ Calories   ☐ Sodium   ☐ Protein   ☐ Iron

☐ Total Fat   ☐ Total   ☐ Vitamin A   ☐ Potassium
                    Carbohydrate

☐ Saturated Fat   ☐ Dietary Fiber   ☐ Vitamins C   ☐ None of these

☐ Trans Fat   ☐ Sugars   ☐ Vitamin D   ☐ Other

☐ Cholesterol   ☐ Added Sugar   ☐ Calcium

Q14. What items on the nutrition facts panel do you try to consume as part of a healthy diet? (Check all that apply)

☐ Calories   ☐ Sodium   ☐ Protein   ☐ Iron

☐ Total Fat   ☐ Total   ☐ Vitamin A   ☐ Potassium
                    Carbohydrate

☐ Saturated Fat   ☐ Dietary Fiber   ☐ Vitamins C   ☐ None of these

☐ Trans Fat   ☐ Sugars   ☐ Vitamin D   ☐ Other

☐ Cholesterol   ☐ Added Sugar   ☐ Calcium

Q15. What items on the nutrition facts panel do you think could impact appearance, flavor, texture, smell or taste of the product? (Check all that apply)

☐ Calories   ☐ Sodium   ☐ Protein   ☐ Iron

☐ Total Fat   ☐ Total   ☐ Vitamin A   ☐ Potassium
                    Carbohydrate

☐ Saturated Fat   ☐ Dietary Fiber   ☐ Vitamins C   ☐ None of these

☐ Trans Fat   ☐ Sugars   ☐ Vitamin D   ☐ Other

☐ Cholesterol   ☐ Added Sugar   ☐ Calcium

Q16. This honey toasted oat cereal nutrition facts panel makes me think this product would be: (Check all that apply)

Honey Toasted Oat Cereal

Nutrition Facts				
9 servings per container				
Serving size			1 cup (37g)	
		Oat Cereal	with 1/2 c skim milk	
Calories		140	180	
		% DV*		% DV*
Total Fat		2g 2%	2g	3%
Saturated Fat		0.5g 2%	0.5g	3%
Trans Fat		0g	0g	
Polyunsaturated Fat		0.5g	0.5g	
Monounsaturated Fat		0.5g	0.5g	
Cholesterol		0mg 0%	<5mg	1%
Sodium		210mg 9%	270mg	12%
Total Carb.		30g 11%	35g	13%
Dietary Fiber		3g 10%	3g	10%
Total Sugars		12g	18g	
Incl. Added Sugars		12g 24%	12g	24%
Protein		3g	8g	
Vitamin D		1.2mcg 6%	2mcg	10%
Calcium		156mg 12%	260mg	20%
Iron		6.3mg 35%	6.3mg	35%
Potassium		94mg 2%	282mg	6%
Vitamin A		72mcg 8%	90mcg	10%
Vitamin C		7.2mg 8%	7.2mg	8%
Thiamin		0.5mg 45%	0.6mg	50%
Riboflavin		0.6mg 45%	0.7mg	55%
Niacin		6.4mg 40%	6.4mg	40%
Vitamin B$_6$		0.7mg 40%	0.7mg	40%
Folate Folic Acid		400mcg 100% (270mcg)	400mcg (270mcg)	100%
Vitamin B$_{12}$		1.9mcg 80%	2.2mcg	90%
Phosphorus		100mg 8%	188mg	15%
Magnesium		34mg 8%	42mg	10%
Zinc		4.9mg 45%	5.5mg	50%
* The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for				

- [ ] Too Salty
- [ ] Rich
- [ ] Dry
- [ ] Juicy
- [ ] Light
- [ ] Mild

- [ ] Not Salty Enough
- [ ] Gritty
- [ ] Greasy
- [ ] Nutritious
- [ ] Fresh
- [ ] Premium

- [ ] Too Sweet
- [ ] Smooth
- [ ] Flavorful
- [ ] Bold
- [ ] Indulgent
- [ ] Delicious

- [ ] Not Sweet Enough
- [ ] Fatty
- [ ] Natural
- [ ] Healthy
- [ ] Clean
- [ ] Unhealthy

- [ ] Too Sour
- [ ] Chalky
- [ ] Artificial
- [ ] Hearty
- [ ] Balanced Nutrition
- [ ] None of these

- [ ] Not Sour Enough
- [ ] Creamy
- [ ] Meaty
- [ ] Nutrient-dense
- [ ] Refreshing
- [ ] Other _____

- [ ] Tangy
- [ ] Thick

Q17. This strawberry lowfat yogurt nutrition facts panel makes me think this product would be: (Check all that apply)

Strawberry Lowfat Yogurt

Nutrition Facts

Serving size   1 container

Amount per serving
Calories   **150**

	% Daily Value*
Total Fat 2g	2%
Saturated Fat 1g	6%
Trans Fat 0g	
Cholesterol 10mg	4%
Sodium 95mg	4%
Total Carbohydrate 26g	10%
Dietary Fiber 0g	0%
Total Sugars 18g	
Includes 12g Added Sugars	24%
Protein 6g	12%
Vitamin D 2mcg	10%
Calcium 195mg	15%
Iron 0mg	0%
Potassium 282m	6%
Phosphorus 187mg	15%
Vitamin A 90mcg	10%

* The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

- ☐ Too Salty
- ☐ Rich
- ☐ Dry
- ☐ Juicy
- ☐ Light
- ☐ Mild
- ☐ Not Salty Enough
- ☐ Gritty
- ☐ Greasy
- ☐ Nutritious
- ☐ Fresh
- ☐ Premium
- ☐ Too Sweet
- ☐ Smooth
- ☐ Flavorful
- ☐ Bold
- ☐ Indulgent
- ☐ Delicious
- ☐ Not Sweet Enough
- ☐ Fatty
- ☐ Natural
- ☐ Healthy
- ☐ Clean
- ☐ Unhealthy
- ☐ Too Sour
- ☐ Chalky
- ☐ Artificial
- ☐ Hearty
- ☐ Balanced Nutrition
- ☐ None of these
- ☐ Not Sour Enough
- ☐ Creamy
- ☐ Meaty
- ☐ Nutrient-dense
- ☐ Refreshing
- ☐ Other _____
- ☐ Tangy
- ☐ Thick

39

Q18. This chocolate chip granola nutrition facts panel makes me think this product would be: (Check all that apply)

Chocolate Chip Granola Bar

Nutrition Facts

6 servings per container
Serving size   1 bar (25g)

Amount per serving
Calories   **100**

	% Daily Value*
Total Fat 2.5g	4%
Saturated Fat 1g	4%
Trans Fat 0g	
Cholesterol 0mg	0%
Sodium 65mg	3%
Total Carbohydrate 18g	6%
Dietary Fiber <1g	4%
Total Sugars 7g	
Includes 7g Added Sugars	15%
Protein 2g	

Vit. D 0mcg 0% • Calcium 0mg 0%
Iron 0.4mg 2% • Potas. 0mg 0%

* The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

☐ Too Salty	☐ Rich	☐ Dry	☐ Juicy	☐ Light	☐ Mild
☐ Not Salty Enough	☐ Gritty	☐ Greasy	☐ Nutritious	☐ Fresh	☐ Premium
☐ Too Sweet	☐ Smooth	☐ Flavorful	☐ Bold	☐ Indulgent	☐ Delicious
☐ Not Sweet Enough	☐ Fatty	☐ Natural	☐ Healthy	☐ Clean	☐ Unhealthy
☐ Too Sour	☐ Chalky	☐ Artificial	☐ Hearty	☐ Balanced Nutrition	☐ None of these
☐ Not Sour Enough	☐ Creamy	☐ Meaty	☐ Nutrient-dense	☐ Refreshing	☐ Other
☐ Tangy	☐ Thick				

Q19. This 100% fruit punch juice nutrition facts panel makes me think this product would be: (Check all that apply)

100% Fruit Punch

Nutrition Facts

About 6 Serv. Per Container
Serving size 1 Cup (8 OZ.)

Amount per serving
Calories 100

	% Daily Value*
Total Fat 0g	0%
Saturated Fat 0g	0%
Trans Fat 0g	
Cholesterol 0mg	0%
Sodium 70mg	3%
Total Carbohydrate 25g	9%
Dietary Fiber 0g	0%
Total Sugars 22g	
Includes 14g Added Sugars	28%
Protein 6g	12%
Vitamin D 0mcg	10%
Calcium 30mg	2%
Iron 0.5mg	2%
Potassium 300mg	6%
Vitamin A 190mg	20%
Vitamin C 20mcg	20%

* The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

- ☐ Too Salty
- ☐ Rich
- ☐ Dry
- ☐ Juicy
- ☐ Light
- ☐ Mild

- ☐ Not Salty Enough
- ☐ Gritty
- ☐ Greasy
- ☐ Nutritious
- ☐ Fresh
- ☐ Premium

- ☐ Too Sweet
- ☐ Smooth
- ☐ Flavorful
- ☐ Bold
- ☐ Indulgent
- ☐ Delicious

- ☐ Not Sweet Enough
- ☐ Fatty
- ☐ Natural
- ☐ Healthy
- ☐ Clean
- ☐ Unhealthy

- ☐ Too Sour
- ☐ Chalky
- ☐ Artificial
- ☐ Hearty
- ☐ Balanced Nutrition
- ☐ None of these

- ☐ Not Sour Enough
- ☐ Creamy
- ☐ Meaty
- ☐ Nutrient-dense
- ☐ Refreshing
- ☐ Other _____

- ☐ Tangy
- ☐ Thick

Q20. This cheeseburger macaroni nutrition facts panel makes me think this product would be: (Check all that apply)

Cheeseburger Macaroni

Nutrition Facts

5 servings per container
Serving size   1/3 c pckgd (34g)

	1/3 cup as packaged		1 cup as prepared	
Calories	**120**		**310**	
		% DV*		% DV*
Total Fat	0.5g	1%	12g	15%
Saturated Fat	0g	0%	5g	24%
Trans Fat	0g		0.5g	
Cholesterol	0mg	0%	55mg	18%
Sodium	620mg	27%	720mg	31%
Total Carb.	25g	9%	29g	11%
Dietary Fiber	<1g	2%	<1g	2%
Total Sugars	2g		6g	
Incl. Added Sugars	1g	2%	1g	2%
Protein	3g		21g	
Vitamin D	0mcg	0%	0.8mcg	4%
Calcium	0mg	0%	130mg	10%
Iron	0.7mg	4%	2.5mg	14%
Potassium	0mg	0%	282mg	6%

* The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

☐ Too Salty   ☐ Rich   ☐ Dry   ☐ Juicy   ☐ Light   ☐ Mild

☐ Not Salty Enough   ☐ Gritty   ☐ Greasy   ☐ Nutritious   ☐ Fresh   ☐ Premium

☐ Too Sweet   ☐ Smooth   ☐ Flavorful   ☐ Bold   ☐ Indulgent   ☐ Delicious

☐ Not Sweet Enough   ☐ Fatty   ☐ Natural   ☐ Healthy   ☐ Clean   ☐ Unhealthy

☐ Too Sour   ☐ Chalky   ☐ Artificial   ☐ Hearty   ☐ Balanced Nutrition   ☐ None of these

☐ Not Sour Enough   ☐ Creamy   ☐ Meaty   ☐ Nutrient-dense   ☐ Refreshing   ☐ Other

☐ Tangy   ☐ Thick

Appendix D - SAS Code

```
options formchar="|----|+|---+=|-/\<>*";
options symbolgen serror merror mlogic mprint ;
options nodate pageno=1 ps=50 ls=150 ;


title1 'Nutrition Labeling Survey' ;
title3 ' ' ;


libname sasdata "\\mgofrd2\redirect09\G3991NH\My Documents\ErinS\Masters Project" ;


proc format ;
  value $survF  'c'='Current'  'p'='Proposed' ;
  value s1F  1 = '0%-20%'  2='21%-40%'  3='41%-60%' 4='61%-80%' 5='More than 80%' ;
  value s2F  1 = 'Always'  2='Most of the time'  3='Occasionally (for example, for new products)'
4='Rarely' 5='Never' ;
  value genF  1='Male'  2='Female' ;
  value ageF  1='18-22'  2='23-44'  3='45-60'  4='61-74'  5='75 or older' ;
  value schF  1='High school or less'  2='Some college or technical school'  3='Completed
B.S./B.A. or other 4 year degree'
         4='Masters/PhD'  5='Prefer not to answer' ;
  value incF  1='< $25,000'  2='$25,001-$49,999'  3='$50,000-$99,999'  4='$100,000-$200,000'
5='$200,000+'
         6='Prefer not to answer' ;
  value ynF  1='Yes'  2='No' ;
  value grocF  1='$0-$25'  2='$26-$50'  3='$51-$75'  4='$76-$100'  5='$101-$150'  6='$151-$200'
7='$200+'
          8='I do not know' ;


*  Read the data from a text file which was exported from Excel. ;
```

```
/*

data sasdata.survey ;
  length Survey $ 1 Q11_20_TEXT Q12_20_TEXT Q13_18_TEXT Q14_18_TEXT
Q15_18_TEXT Q16_39_TEXT Q17_39_TEXT Q18_39_TEXT Q19_39_TEXT Q20_39_TEXT
$ 200 ;
  format Survey $survF. S1 s1F. S2 s2F. Q1 genF. Q2 ageF. Q4 schF. Q5 incF. Q6 Q7 ynF. Q10
grocF. ;
    infile "\\mgofrd2\redirect09\G3991NH\My Documents\ErinS\Masters Project\Final Data
Master Project -11 -14-17.txt"
      dlm='09'x dsd stopover firstobs=2 lrecl=1000 ;
  input Respondent Survey S1 S2 Q1 Q2 Q3_1 Q3_2 Q3_3 Q3_4 Q3_5 Q3_6 Q3_7 Q3_8
      Q4 Q5 Q6 Q7 Q8 Q9 Q10
      Q11_1 Q11_2 Q11_3 Q11_4 Q11_5 Q11_6 Q11_7 Q11_8 Q11_9 Q11_10 Q11_11
Q11_12 Q11_13 Q11_14 Q11_15 Q11_16 Q11_17 Q11_18 Q11_19 Q11_20 Q11_20_TEXT
Q11_21 Q11_22
      Q12_1 Q12_2 Q12_3 Q12_4 Q12_5 Q12_6 Q12_7 Q12_8 Q12_9 Q12_10 Q12_11
Q12_12 Q12_13 Q12_14 Q12_15 Q12_16 Q12_17 Q12_18 Q12_19 Q12_20 Q12_20_TEXT
Q12_21 Q12_22
      Q13_1 Q13_2 Q13_3 Q13_4 Q13_5 Q13_6 Q13_7 Q13_8 Q13_9 Q13_10 Q13_11
Q13_12 Q13_13 Q13_14 Q13_15 Q13_16 Q13_17 Q13_18 Q13_18_TEXT Q13_19
      Q14_1 Q14_2 Q14_3 Q14_4 Q14_5 Q14_6 Q14_7 Q14_8 Q14_9 Q14_10 Q14_11
Q14_12 Q14_13 Q14_14 Q14_15 Q14_16 Q14_17 Q14_18 Q14_18_TEXT Q14_19
      Q15_1 Q15_2 Q15_3 Q15_4 Q15_5 Q15_6 Q15_7 Q15_8 Q15_9 Q15_10 Q15_11
Q15_12 Q15_13 Q15_14 Q15_15 Q15_16 Q15_17 Q15_18 Q15_18_TEXT Q15_19
      Q16_1   Q16_2   Q16_3   Q16_4   Q16_5   Q16_6   Q16_7   Q16_8   Q16_9   Q16_10
Q16_11  Q16_12  Q16_13  Q16_14  Q16_15  Q16_16  Q16_17  Q16_18  Q16_19
      Q16_20  Q16_21  Q16_22  Q16_23  Q16_24  Q16_25  Q16_26  Q16_27  Q16_28
Q16_29  Q16_30  Q16_31  Q16_32  Q16_33  Q16_34  Q16_35  Q16_36  Q16_37  Q16_38
Q16_39_TEXT
      Q17_1  Q17_2  Q17_3  Q17_4  Q17_5  Q17_6  Q17_7  Q17_8  Q17_9  Q17_10
Q17_11  Q17_12  Q17_13  Q17_14  Q17_15  Q17_16  Q17_17  Q17_18  Q17_19  Q17_20
```

```
        Q17_21  Q17_22  Q17_23  Q17_24  Q17_25  Q17_26  Q17_27  Q17_28  Q17_29
Q17_30  Q17_31  Q17_32  Q17_33  Q17_34  Q17_35  Q17_36  Q17_37  Q17_38
Q17_39_TEXT

        Q18_1  Q18_2  Q18_3  Q18_4  Q18_5  Q18_6  Q18_7  Q18_8  Q18_9  Q18_10
Q18_11  Q18_12  Q18_13  Q18_14  Q18_15  Q18_16  Q18_17  Q18_18  Q18_19  Q18_20
        Q18_21  Q18_22  Q18_23  Q18_24  Q18_25  Q18_26  Q18_27  Q18_28  Q18_29
Q18_30  Q18_31  Q18_32  Q18_33  Q18_34  Q18_35  Q18_36  Q18_37  Q18_38
Q18_39_TEXT

        Q19_1  Q19_2  Q19_3  Q19_4  Q19_5  Q19_6  Q19_7  Q19_8  Q19_9  Q19_10
Q19_11  Q19_12  Q19_13  Q19_14  Q19_15  Q19_16  Q19_17  Q19_18  Q19_19  Q19_20
        Q19_21  Q19_22  Q19_23  Q19_24  Q19_25  Q19_26  Q19_27  Q19_28  Q19_29
Q19_30  Q19_31  Q19_32  Q19_33  Q19_34  Q19_35  Q19_36  Q19_37  Q19_38
Q19_39_TEXT

        Q20_1  Q20_2  Q20_3  Q20_4  Q20_5  Q20_6  Q20_7  Q20_8  Q20_9  Q20_10
Q20_11  Q20_12  Q20_13  Q20_14  Q20_15  Q20_16  Q20_17  Q20_18  Q20_19  Q20_20
        Q20_21  Q20_22  Q20_23  Q20_24  Q20_25  Q20_26  Q20_27  Q20_28  Q20_29
Q20_30  Q20_31  Q20_32  Q20_33  Q20_34  Q20_35  Q20_36  Q20_37  Q20_38
Q20_39_TEXT ;
*/


* Export demographic percentages. ;

/*
proc tabulate data=sasdata.survey ;
*  where q16_26 eq 1 ;
 class survey s1 s2 Q1 Q2 Q4 Q5 Q6 Q7 Q8 Q9 Q10 q16_26 ;
*   table q16_26 , (survey all)*(colpctn*f=12.1 n*f=12.0) ;
*   table s1 , (survey all)*colpctn*f=12.1 ;
*   table s2 , (survey all)*colpctn*f=12.1 ;
*   table Q1 , (survey all)*colpctn*f=12.1 ;
*   table Q2 , (survey all)*colpctn*f=12.1 ;
```

```
*   table Q4 , (survey all)*colpctn*f=12.1 ;

*   table Q5 , (survey all)*colpctn*f=12.1 ;

*   table Q6 , (survey all)*colpctn*f=12.1 ;

*   table Q7 , (survey all)*colpctn*f=12.1 ;

*   table Q8 , (survey all)*colpctn*f=12.1 ;

*   table Q9 , (survey all)*colpctn*f=12.1 ;

*   table Q10 , (survey all)*colpctn*f=12.1 ;

*   table survey all , (n*f=12.0 pctn*f=12.1) ;
    ods output 'Table 1'=pctData(drop=_type_ _page_ _table_) ;


proc export data=pctData
        outfile="\\mgofrd2\redirect09\G3991NH\My Documents\ErinS\Masters
Project\demoPcts.txt"
        dbms=dlm replace ;
    delimiter='09'x ;


*/


*  Convert all values from 0 or 1 to 0 or 100, respectively.  Mean values then are the percent of
1's in the original data. ;


data all ;
 drop i ;
 array zero_one[*] Q3_1 Q3_2 Q3_3 Q3_4 Q3_5 Q3_6 Q3_7 Q3_8
        Q11_1 Q11_2 Q11_3 Q11_4 Q11_5 Q11_6 Q11_7 Q11_8 Q11_9 Q11_10 Q11_11
Q11_12 Q11_13 Q11_14 Q11_15 Q11_16 Q11_17 Q11_18 Q11_19 Q11_20  Q11_21 Q11_22
        Q12_1 Q12_2 Q12_3 Q12_4 Q12_5 Q12_6 Q12_7 Q12_8 Q12_9 Q12_10 Q12_11
Q12_12 Q12_13 Q12_14 Q12_15 Q12_16 Q12_17 Q12_18 Q12_19 Q12_20  Q12_21 Q12_22
        Q13_1 Q13_2 Q13_3 Q13_4 Q13_5 Q13_6 Q13_7 Q13_8 Q13_9 Q13_10 Q13_11
Q13_12 Q13_13 Q13_14 Q13_15 Q13_16 Q13_17 Q13_18  Q13_19
```

Q14_1 Q14_2 Q14_3 Q14_4 Q14_5 Q14_6 Q14_7 Q14_8 Q14_9 Q14_10 Q14_11
Q14_12 Q14_13 Q14_14 Q14_15 Q14_16 Q14_17 Q14_18 Q14_19

Q15_1 Q15_2 Q15_3 Q15_4 Q15_5 Q15_6 Q15_7 Q15_8 Q15_9 Q15_10 Q15_11
Q15_12 Q15_13 Q15_14 Q15_15 Q15_16 Q15_17 Q15_18 Q15_19

Q16_1 Q16_2 Q16_3 Q16_4 Q16_5 Q16_6 Q16_7 Q16_8 Q16_9 Q16_10
Q16_11 Q16_12 Q16_13 Q16_14 Q16_15 Q16_16 Q16_17 Q16_18 Q16_19

Q16_20 Q16_21 Q16_22 Q16_23 Q16_24 Q16_25 Q16_26 Q16_27 Q16_28
Q16_29 Q16_30 Q16_31 Q16_32 Q16_33 Q16_34 Q16_35 Q16_36 Q16_37 Q16_38

Q17_1 Q17_2 Q17_3 Q17_4 Q17_5 Q17_6 Q17_7 Q17_8 Q17_9 Q17_10
Q17_11 Q17_12 Q17_13 Q17_14 Q17_15 Q17_16 Q17_17 Q17_18 Q17_19 Q17_20

Q17_21 Q17_22 Q17_23 Q17_24 Q17_25 Q17_26 Q17_27 Q17_28 Q17_29
Q17_30 Q17_31 Q17_32 Q17_33 Q17_34 Q17_35 Q17_36 Q17_37 Q17_38

Q18_1 Q18_2 Q18_3 Q18_4 Q18_5 Q18_6 Q18_7 Q18_8 Q18_9 Q18_10
Q18_11 Q18_12 Q18_13 Q18_14 Q18_15 Q18_16 Q18_17 Q18_18 Q18_19 Q18_20

Q18_21 Q18_22 Q18_23 Q18_24 Q18_25 Q18_26 Q18_27 Q18_28 Q18_29
Q18_30 Q18_31 Q18_32 Q18_33 Q18_34 Q18_35 Q18_36 Q18_37 Q18_38

Q19_1 Q19_2 Q19_3 Q19_4 Q19_5 Q19_6 Q19_7 Q19_8 Q19_9 Q19_10
Q19_11 Q19_12 Q19_13 Q19_14 Q19_15 Q19_16 Q19_17 Q19_18 Q19_19 Q19_20

Q19_21 Q19_22 Q19_23 Q19_24 Q19_25 Q19_26 Q19_27 Q19_28 Q19_29
Q19_30 Q19_31 Q19_32 Q19_33 Q19_34 Q19_35 Q19_36 Q19_37 Q19_38

Q20_1 Q20_2 Q20_3 Q20_4 Q20_5 Q20_6 Q20_7 Q20_8 Q20_9 Q20_10
Q20_11 Q20_12 Q20_13 Q20_14 Q20_15 Q20_16 Q20_17 Q20_18 Q20_19 Q20_20

Q20_21 Q20_22 Q20_23 Q20_24 Q20_25 Q20_26 Q20_27 Q20_28 Q20_29
Q20_30 Q20_31 Q20_32 Q20_33 Q20_34 Q20_35 Q20_36 Q20_37 Q20_38 ;
 set sasdata.survey ;
  do i = 1 to dim(zero_one) ;
   zero_one[i] = 100*zero_one[i] ;
  end ;

* Create macro variable lists of labels and numeric suffixes for use with groups of questions. ;

* list0 applies to Q3 ;
%LET var_list0 = _1   _2   _3   _4   _5   _6   _7   _8 ;

%Let label_list0 = 'Hispanic_Latino' 'White_Caucasian' 'Black_African_American'
'Native_Hawaiian_Pacific_Islander'
            'Asian' 'American_Indian_Alaska_Native' 'Indian' 'Prefer_not_to_answer' ;

* list1 applies to Q11 and Q12 ;
%LET var_list1 = _1   _2   _3   _4   _5   _6   _7   _8   _9   _10 _11 _12 _13 _14 _15
        _16 _17 _18 _19 _20 _21 _22 ;

%Let label_list1 = 'Calories' 'Total_Fat' 'Saturated_Fat' 'Trans_Fat' 'Cholesterol' 'Sodium'
'Total_Carbohydrate'
            'Dietary_Fiber' 'Total_Sugars' 'Added_Sugar' 'Protein' 'Vitamin_A' 'Vitamin_C'
            'Vitamin_D' 'Calcium' 'Iron' 'Potassium' 'Serving_Size' 'Calories_from_Fat'
            'Other' 'Number_of_Servings' 'None_of_these' ;

* list2 applies to Q13, Q14, and Q15 ;
%LET var_list2 = _1   _2   _3   _4   _5   _6   _7   _8   _9   _10 _11 _12 _13 _14 _15
        _16 _17 _18 _19 ;

%Let label_list2 = 'Calories' 'Total_Fat' 'Saturated_Fat' 'Trans_Fat' 'Cholesterol' 'Sodium'
'Total_Carbohydrate'
            'Dietary_Fiber' 'Sugars' 'Added_Sugar' 'Protein' 'Vitamin_A' 'Vitamin_C' 'Vitamin_D'
            'Calcium' 'Iron' 'Potassium' 'Other' 'None_of_these' ;

* list3 applies to Q16, Q17, Q18, Q19, and Q20 ;
%LET var_list3 = _1   _2   _3   _4   _5   _6   _7   _8   _9   _10 _11 _12 _13 _14 _15
        _16 _17 _18 _19 _20 _21 _22 _23 _24 _25 _26 _27 _28 _29 _30
        _31 _32 _33 _34 _35 _36 _37 _38 ;

%LET label_list3 = 'Too_Salty' 'Not_Salty_Enough' 'Too_Sweet' 'Not_Sweet_Enough'
'Too_Sour' 'Not_Sour_Enough' 'Tangy' 'Rich'

   'Gritty' 'Smooth' 'Fatty' 'Chalky' 'Creamy' 'Thick' 'Dry' 'Greasy' 'Flavorful' 'Natural'
'Artificial'

   'Meaty' 'Juicy' 'Nutritious' 'Bold' 'Healthy' 'Hearty' 'Nutrient_dense' 'Light' 'Fresh'
'Indulgent'

   'Clean' 'Balanced_Nutrition' 'Refreshing' 'Mild' 'Premium' 'None_of_these' 'Delicious'
'Unhealthy' 'Other' ;

* Set which question and its associated list number for a single run of the analysis. ;

%LET which_quest = Q11 ;
%LET which_list = 1 ;

* Set the appropriate variable and label list for the analysis ;

%LET var_list = &&var_list&which_list ;
%LET label_list = &&label_list&which_list ;

/*
* A particular 2-way cross tabulation for each survey. ;

proc sort data=all ;
 by survey ;

proc freq data=all ;
 label q16_26='Nutrient Dense (N=0, Y=100)' q16_24='Healthy (N=0, Y=100)' ;
 by survey ;
  tables q16_26*q16_24 ;

```
    ods output CrossTabFreqs=two_way_tab(where=(_type_ eq '11') keep=Survey _type_ q16_26
q16_24 frequency percent) ;  ;


proc print data=two_way_tab ;


proc export data=two_way_tab
        outfile="\\mgofrd2\redirect09\G3991NH\My Documents\ErinS\Masters
Project\two_way_table.txt"
        dbms=dlm replace ;
   delimiter='09'x ;
*/


/* Define utility macro for counting the number of variables in a list.  */


%MACRO countvr(varlist) ;
  %LOCAL nvars nullvar testvar ;
  %LET nullvar=;
  %LET nvars = 0 ;
  %LET testvar = %SCAN(&varlist,1) ;
    %DO %WHILE (&testvar NE &nullvar) ;
      %LET nvars = %EVAL(&nvars + 1)  ;
      %LET testvar = %SCAN(&varlist,%EVAL(&nvars + 1)) ;
    %END ;
  &nvars
%MEND countvr ;


%LET n_vars = %COUNTVR(&var_list) ;


/*
  Macro "add_pref" adds a prefix to each variable in a variable list and returns the new list.
  Used below to create a list.
```

```
*/

%MACRO add_pref(varlist, nvars, prefix) ;
 %LOCAL VARLIST2 next_var ;
   %LET VARLIST2 = ;
   %DO i = 1 %TO &nvars ;
     %LET next_var = %SCAN(&varlist, &i) ;
     %LET VARLIST2 = &VARLIST2  &prefix&next_var ;
   %END ;
&VARLIST2
%MEND add_pref ;

/*
   Macros "add_middle1" and "add_middle2" put a integer value into a character string
sequentially
   (1 to &nvars) to create lists below.
*/

%MACRO add_middle1(nvars) ;
 %LOCAL OUTLIST ;
   %LET OUTLIST = ;
   %DO i = 1 %TO &nvars ;
     %LET OUTLIST = &OUTLIST  freq.table&i..chisq = t&i._chisq(where=(Statistic eq 'Chi-
Square')) ;
   %END ;
&OUTLIST
%MEND add_middle1 ;

%MACRO add_middle2(nvars) ;
 %LOCAL OUTLIST ;
   %LET OUTLIST = ;
```

```
  %DO i = 1 %TO &nvars ;
    %LET OUTLIST = &OUTLIST  t&i._chisq ;
  %END ;
&OUTLIST
%MEND add_middle2 ;


%LET var_list = %add_pref(&var_list, &n_vars, &which_quest) ;


/*
   Macro "label_vars" creates a list of "variable names = variable labels" for use in proc tabulate
to get descriptive
   labels.
*/


%MACRO label_vars(varlist, labellist, nvars) ;
 %LOCAL VARS_WITH_LABELS next_var next_label ;
   %LET VARS_WITH_LABELS = ;
   %DO i = 1 %TO &nvars ;
     %LET next_var = %SCAN(&varlist, &i) ;
     %LET next_label = %SCAN(&labellist, &i) ;
     %LET VARS_WITH_LABELS = &VARS_WITH_LABELS  &next_var = &next_label ;
   %END ;
&VARS_WITH_LABELS
%MEND label_vars ;


/*
   Use the output display system (ods) with proc tabulate, proc transpose, and
   and proc freq and the macro created lists to get percentages and other output
   which are exported to tab-delimited text files.  The text files are
   ultimately imported into Excel.
*/
```

```
proc tabulate data=all ;
  label %label_vars(&var_list, &label_list, &n_vars) ;
  class survey ;
  var &var_list ;
  keylabel mean='Percent' ;
    table &var_list , survey*mean*f=12.3 ;
*    table &var_list , survey*n*f=12.0 ;
    ods output 'Table 1'=t_&which_quest(drop=_type_ _page_ _table_) ;


proc print data=t_&which_quest ;


proc transpose data=t_&which_quest out=t_&which_quest._tran name=Question ;
  id Survey ;


proc freq data=all ;
  tables survey*(&var_list) / chisq ;
  ods output %add_middle1(&n_vars) ;


data all_pvalues ;
  set %add_middle2(&n_vars) ;


data t_&which_quest._tran ;
*  keep Question Current Proposed Prob ;
  keep Current Proposed Prob ;
  merge t_&which_quest._tran all_pvalues ;


proc print data=t_&which_quest._tran ;


proc export data=t_&which_quest._tran
```

```
        outfile="\\mgofrd2\redirect09\G3991NH\My Documents\ErinS\Masters
Project\&which_quest._sub.txt"
        dbms=dlm replace ;
    delimiter='09'x ;


run ;
quit ;
```