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UNIVERSITY OF CONNECTICUT SCHOOL OF BUSINESS

# Nutritional Labeling

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## INTRODUCTION

The Nutrition Labeling and Education Act of 1990 (NLEA) is a United States Federal Law which gives the Food and Drug Administration the authority to require nutritional labeling on foods. The regulations of the NLEA, which became effective in 1993 and 1994, were aimed at “[altering] nutrition label information such that the usefulness of the information for consumers is increased”, with implications for consumer welfare (Burton et al. 36). After a decade since the introduction of the NLEA, what are consumers’ actual attitudes toward nutrition and nutrition labels?

This study aims to research consumers’ food purchasing behavior, including consumers’ perceptions of nutrition labels on food packages and the effects of such nutrition labels on consumers’ food purchasing decisions. The objective is to better understand consumers’ attitudes toward food purchases in relation to their understanding of food labels.

## METHOD

### Research Design

This present study was conducted as an extension of a similar study (unpublished) conducted by Dr. Han Srinivasan in the 1990s following the introduction of the NLEA. The primary instrument for the present Nutritional Labeling study (an online “Grocery Shopping Study” survey) was modified and updated from a survey developed for that original study and originally administered in 1992. The original instrument was an eight-page, five-section survey followed by a single-page “Nutritional Quiz”, all conducted by pen and paper. In order to ease both the distribution of the survey and the collection of the results, the previous survey was adapted into an online format with the use of tools provided by Google Documents. While most

of the survey questions were maintained from the original instrument, a few changes were made to facilitate the new online format. For example, the Nutritional Quiz was removed, along with one section of the original survey in which participants were presented with nutritional labels and asked to answer certain questions about them.

The updated questionnaire used in this current Nutritional Labeling study consisted of three sections (A, B, and C) following an introductory page (see Appendix, page 43-61, for a copy of the complete online questionnaire). Sections A and B concerned shopping behavior, nutrition knowledge, nutrition attitudes, and attitudes about nutrition labels. Section C primarily asked questions concerning participants' demographic characteristics: age, marital status, employment status, household, race, education, and income.

### **Procedure**

The present study employed a convenience sample of members of the University of Connecticut School of Business community, primarily undergraduate Business students. There were no specifications regarding demographic characteristics such as age, race, or occupation. Individuals were invited to complete the questionnaire, the "Grocery Shopping Study" survey, and then provided with the web link to access the questionnaire online. The survey yielded a total of 185 usable responses, which were compiled online through the services of Google Documents.

Data analysis of the survey results was conducted using Microsoft Excel 2007.

## **RESULTS**

The Grocery Shopping Study survey received 185 responses. In terms of demographic characteristics, a higher proportion of respondents were male (61%), and the majority of

respondents were in the 18-24 age category (69%). 23% of respondents were in the next age category of 25-34, while only 8% of respondents described themselves as 35 or older.

Correspondingly, the large majority of respondents were single (81% compared to only 18% married) and students (64% compared to only 23% full-time and 9% part-time workers). As appropriate for a survey given to members of a university community, 98% of respondents were found to have at least some college education: 63% of respondents had some college education, 19% were college graduates, and 16% received a graduate education. Additionally, the majority of respondents were Caucasian White (77%). Only 11% of respondents were Asian, 4% Hispanic, and 3% Black. The last demographic characteristics concern the respondents' households. Results were more evenly distributed regarding the number of people in a household: 31% reported 4 people, 22% reported 2 people, 18% reported 3 people, and 18% reported 5 or more people. For household income in 2009, the largest proportion (41%) reported themselves to be in the category of at least \$100,000, with 19% reporting an income of \$80,000-99,000 and 10% reporting an income of \$60,000-79,000. Overall, these results indicate that the typical respondent for the Grocery Shopping study was a young white male undergraduate student from an upper middle class family with multiple children.

Participants were asked several questions concerning their shopping habits. 97% of respondents do major grocery shopping fewer than five times per month: almost half (46%) do of the respondents do their major food shopping only 1-2 times per month, 30% do it 3-4 times per month, and 21% don't grocery shop. As for "filler shopping" (described as shopping trips between major grocery trips to buy small items), 45% of respondents do filler shopping 1-2 times per month, and 29% do it 3-4 times per month.

Shopping frequency (how many times consumers do their major food shopping and filler food shopping per month) is examined in relation to several other consumer characteristics. Segmenting shopping frequency by race reveals that 45.45% of Caucasian Whites do major food shopping 1-2 times per month and 44.76% of whites do filler shopping 1-2 times per month. 42.86% of Asian consumers do major food shopping 3-4 times per month, 38.10% do major food shopping 1-2 times per month, one-third do filler shopping 1-2 times per month, and 28.57% do filler shopping 5 or more times per month. 80% of black consumers do major food shopping 1-2 times per month, and 60% do filler shopping 1-2 times per month. 37.5% of Hispanic consumers do major shopping 1-2 times per month, 37.5% do major shopping 3-4 times per month, and 75% do filler shopping 1-2 times per month.

Segmenting shopping frequency by age reveals that 50% of consumers ages 18-24 do major food shopping 1-2 times per month, and 43.75% do filler shopping 1-2 times per month. Of consumers aged 25-34, 44.19% do major food shopping 3-4 times per month, 41.86% do major food shopping 1-2 times per month, and 46.51% do filler shopping 1-2 times per month. Of consumers aged 35-44, 50% do major shopping 3-4 times per month, 37.5% do filler shopping 1-2 times per month, and 37.5% do filler shopping 5 or more times per month. Of consumers ages 45-54, 80% do major shopping 3-4 times per month, and 60% do filler shopping 1-2 times per month. The one respondent in the 55-64 age range does major shopping 1-2 times per month and filler shopping 1-2 times per month. A correlation analysis between age and shopping frequency produced a correlation coefficient of  $r = 0.20$  between age and number of major shopping trips, and a correlation coefficient of  $r = 0.03$  between age and number of filler shopping trips.

Segmenting shopping frequency by household size reveals that for segments of consumers belonging to households with 3 or more people, a large proportion of these consumers do all shopping 1-2 times per month: of consumers in households with 3 people, 39.39% do major shopping 1-2 times per month and 45.45% do filler shopping 1-2 times per month; of consumers in households with 4 people, 51.72% do major shopping 1-2 times per month and 50% do filler shopping 1-2 times per month; of consumers in households with 5 or more people, 60.61% do major shopping 1-2 times per month, 36.36% do filler shopping 3-4 times per month, and 30.3% do filler shopping 1-2 times per month. For consumers belonging to households with one or two people, the largest proportion do major shopping 3-4 times per month (42.86% and 47.5%, respectively) and filler shopping 1-2 times per month (57.14% and 42.5%, respectively). A correlation analysis between household size and shopping frequency produced a correlation coefficient of  $r = -0.26$  between household size and number of major shopping trips per month, and a correlation coefficient of  $r = 0.02$  between household size and number of filler shopping trips per month.

Regarding employment status and shopping frequency, the majority of consumers who don't work or who are students (57.14% and 53.78%, respectively) do major shopping 1-2 times per month. Of consumers who work full time, the majority (53.49%) do major shopping 3-4 times per month. And a large proportion of consumers who work part time (43.75%) do not do major food shopping. As for filler shopping, 42.86% of those who don't work do filler shopping 3-4 times per month, 46.22% of students do filler shopping 1-2 times per month, 44.19% of those who work full time do filler shopping 44.19% per month, and 43.75% of those who work part time do filler shopping 1-2 times per month.

Regarding education and shopping frequency, a large proportion of college graduates or consumers with a graduate education (40% and 53.33%, respectively) do major shopping 3-4 times per month. 75% of those with a high school education do major shopping 1-2 times per month, and 52.59% of consumers with “some college” education also do major shopping 1-2 times per month. A large proportion of each consumer segment (42.86% of college graduates, 40% of those with a graduate education, 50% of those with a high school education, and 46.55% of those with some college education) does filler shopping 1-2 times per month.

Finally, regarding the relationship between income and shopping frequency, a large proportion of consumers of each income segment does their major shopping 1-2 times per month: 44.44% of those in the \$0-19,999 segment, 58.33% of the \$20,000-39,999 segment, 31.25% of the \$40,000-59,999 segment, 61.11% of the \$60,000-79,000 segment, 50% of the \$80,000-99,000 segment, and 43.42% of the over \$100,000 segment. A large proportion of each consumer segment also does their filler shopping 1-2 times per month: 51.85%, 41.67%, 37.5%, 61.11%, 47.22%, and 39.47%, by order of increasing income.

When asked about the amount of money their household spends each month on groceries, participants gave an incredibly wide distribution of responses, ranging from no money to up to \$1600. The average of the 184 usable responses was \$392.15, and the most frequently given response was \$500 (given by 25 respondents). An analysis of the correlation between the amount of money spent by a household on groceries each month and household size yielded a correlation coefficient of  $r = 0.24$ . A final finding about households is that it was found that in 76% of respondents' households, no member of the household was on any form of restrictive diet.

The amount of money spent each month on groceries can also be examined with respect to consumers' race. Participants in the Caucasian White segment provided a range from \$0 to \$1600, the median amount spent being \$400 per month. Asian respondents provided a range from \$40 to \$1200, with a median amount of \$250. Black respondents provided a range from \$100 to \$300, with a median of \$200. Hispanic respondents provided a range from \$300 to \$800, with a median of \$475.

Section A of the Grocery Shopping Study questionnaire asked participants specific questions on the subject of the labels found on food packages. Only 16% of participants responded that they rarely or never read the labels on packages; 32% responded that they often read the labels, 30% responded that they sometimes read the labels, and 22% responded that they always read the labels. The majority (59%) of respondents said that they find the information on food packages "somewhat easy to understand". The next largest proportion (28%) said that they find the information "very easy to understand", while only a combined 13% of respondents said that they find the information somewhat or very hard to understand.

Participants in the Grocery Shopping Study survey were asked how label information influences their buying decision, and most respondents said that the information has at least some influence: only 15% said that it had little or no influence, while 26% said that it had some influence, 37% said that it had a fair amount of influence, and 22% said that it had a great deal of influence.

Examining the relationship between age and the perceived understandability of nutritional labels reveals that for each age segment, the majority of respondents chose that nutritional labels were somewhat easy to understand. 57.81% of respondents aged 18-24 said that labels were somewhat easy to understand, and 28.91% said that they were very easy to

understand. Of respondents aged 25-34, 60.47% said that labels were somewhat easy to understand, and 25.58% said that they were very easy to understand. Of respondents aged 35-44, 75% said that labels were somewhat easy to understand. Of respondents aged 45-54, 60% said that labels were somewhat easy to understand, and 40% said that they were very easy to understand. The one respondent aged 55-64 chose that labels were somewhat easy to understand. A correlation analysis between age and understandability produced a correlation coefficient of  $r = 0.007$ .

The relationship between consumers' use of nutritional labels and consumer characteristics such as gender, race, household size, education, and familiarity with/knowledge of nutrition was analyzed. Regarding gender and label use, 23.94% of female respondents said that they always read the labels on packages, compared to 20.35% of male respondents. 33.8% of female respondents said that they often read the labels, compared to 30.09% of male respondents. 30.97% of male respondents said that they sometimes read labels, compared to 29.58% of female respondents. And 15.93% of male respondents said that they rarely read labels, compared to 8.45% of female respondents. Finally, 4.23% of female respondents said that they never read labels, compared to 2.65% of male respondents.

26.76% of female respondents said that these nutritional labels have a "great deal of influence" on their buying decisions, compared to 18.58% of male respondents. 29.20% of male respondents said that labels have "some influence", compared to 21.13% of female respondents. 42.25% of female respondents said that labels have "a fair amount of influence", compared to 33.63% of male respondents. 15.04% of male respondents said that labels have "little influence", compared to 5.63% of female respondents. And finally, 4.23% of female respondents said that labels have "no influence", compared to 3.54% of male respondents.

Regarding race, the largest proportion of Caucasian respondents (34.27%) said that they often read the labels on food packages. Another 34.27% of Caucasian respondents said that they sometimes read the labels, and 21.68% said that they always read the labels. Of Asian respondents, the largest proportion (28.57%) said that they always read the labels on food packages. 23.81% said that they sometimes read the labels, 23.81% said that they often read the labels, and 19.05% said that they rarely read the labels. Of black respondents, 40% said that they sometimes read the labels on food packages and another 40% said that they never read the labels. The other 20% of black respondents said that they always read the labels. Half the Hispanic respondents said that they sometimes read the labels, and the other half of Hispanic respondents said that they often read the labels.

The largest proportion of Caucasian respondents (39.86%) said that labels have a fair amount of influence over their buying decisions. 25.17% of Caucasian respondents said that they have some influence, and 20.98% said that they have a great deal of influence. One-third of Asian respondents said that labels have a great deal of influence, 23.81% said that they have some influence, and 23.81% said that they have a fair amount of influence. The largest proportion of black respondents (40%) said that labels have some influence, 20% of black respondents said that they have a great deal of influence, 20% said that they have a fair amount of influence, and 20% said that they have no influence. Of Hispanic respondents, 37.5% said that labels have some influence, 25% said that they have a great deal of influence, and 25% said that they have a fair amount of influence.

Next, a correlation analysis between household size and use of nutritional labels produced a correlation coefficient of  $r = 0.14$ . Analyzing by segments of household size reveals that a significant portion of respondents in single-person households (38.1%) said that they

always read the labels on food packages. 40% of respondents in two-person households often read food labels. Of respondents in three-person households, one-third often read food labels, 30.3% sometimes read food labels, and 27.27% always read food labels. Of respondents in four-person households, 32.76% often read food labels, 31.03% sometimes read food labels, and 15.52% always read food labels. Finally, of respondents in households of five people or more, 36.36% sometimes read food labels, 24.24% often read food labels, 18.18% always read food labels, and 18.18% rarely read food labels.

Analyzing the relationship between household size and the influence of such food labels produces a correlation coefficient of  $r = 0.19$ . One-third of consumers in single-person households said that labels have a great deal of influence, and 28.57% said that they have a fair amount of influence. Of two-person households, 47.5% said that labels have a fair amount of influence, and 30% said that they have a great deal of influence. Of three-person households, one-third said that they have a great deal of influence, 27.27% said that they have a fair amount of influence, and 24.24% said that they have some influence. Of four-person households, 39.66% said that they have a fair amount of influence, 32.76% said that they have some influence, and 15.52% said that they have a great deal of influence. Finally, of respondents of households of five or more people, 36.36% said that labels have some influence, one-third said that they have a fair amount of influence, and only 6.06% said that they have a great deal of influence.

Analyzing the relationship between degree of education and label use reveals that 34.29% of college graduates often look at nutritional labels, 28.57% always look at labels, and 25.71% sometimes do. Of respondents with a graduate education, 43.33% often look at labels, 26.67% always do, and 20% sometimes do. Of those with a high school education, 50% sometimes look

at labels, 25% often do, and 25% rarely do. And of those with some college education, 33.62% sometimes look at labels, 28.45% often do, 18.97% always do, and 15.52% rarely do.

Regarding the influence of nutritional labels on buying decision, a large portion of college graduates (34.29%) said that labels have a great deal of influence. 43.33% of respondents with a graduate education said that they have a fair amount of influence, while 50% of those with a high school education said that they have little influence. Of those with some college education, 37.93% said that they have a fair amount of influence, and 27.59% said that they have some influence.

The relationship between respondents' nutrition knowledge and their use of nutritional labels was examined. A correlation analysis between participants' agreement with the statement "I know a lot about nutrition" and how often they read labels on food packages produced a correlation coefficient of  $r = 0.41$ . Of those who responded to the statement with 1 (strongly agree), 90% said that they always read food labels. Of those who responded 2, 45.95% said that they often read labels, and 29.73% said that they always do. Of those who responded 3, 38.71% said that they often do, 33.87% said that they sometimes do, and 19.35% said that they always do. Of those who responded 4, 30% said that they sometimes do, 27.5% said that they often do, and 22.5% said that they rarely do. Of those who responded 5, 59.09% said that they sometimes read the labels. Of those who responded 6, 58.33% said that they sometimes do. And the respondent who responded 7 (strongly disagree) said that she never reads food labels.

A correlation analysis between consumers' agreement with that statement and how labels influence their buying decisions produced a correlation coefficient of  $r = 0.44$ . Of those who responded 1 (strongly agree to "I know a lot about nutrition"), 90% said that labels have a great deal of influence. Of those who responded 2, 40.54% said that they have a great deal of

influence, 13.51% said that they have some influence, and 35.14% said that they have a fair amount of influence. Of those who responded 3, 56.45% said that labels have a fair amount of influence. Of those who responded 4, 30% said that they have a fair amount of influence, 25% said that they have some influence, and 20% said that they have a great deal of influence. Of those who responded 5, 31.82% said that they have little influence, 27.27% said that they have some influence, and 27.27% said that they have a fair amount of influence. Of those who responded 6, 75% said that they have some influence. And of those who responded 7 (strongly disagree), 50% said that they have some influence and 50% said that they have no influence at all.

Most respondents (61%) felt that the “right amount” of information is present on nutrition labels. Both the median and mean response was also that the labels contained the right amount of information. 28% of respondents said that not enough information is on the labels, and only 5% felt that there is too much information on labels. A segmentation analysis was performed to examine the relationship between consumers’ attitudes about the amount of information on food labels and the understandability of such labels. Logically, of the consumers who thought labels have the right amount of information, 94.64% thought labels were somewhat or very easy to understand (62.5% and 32.14%, respectively). 17.65% of consumers who thought labels don’t have enough information thought labels were somewhat hard to understand. Of consumers who thought labels had too much information, one third of these respondents thought labels were somewhat hard to understand and 44.44% thought labels were somewhat easy to understand. Of consumers who had no opinion about the amount of information on labels, the majority thought labels were somewhat or very easy to understand (53.85% and 15.38%, respectively).

Participants were asked several times about their familiarity with or knowledge of nutrition. When asked about their familiarity with nutrition issues on a scale of 1 (not at all familiar) to 7 (extremely familiar), 35% of participants chose 5, 32% chose 6, and 16% chose 4. The mean of all responses was 5.24. Thus, most respondents considered themselves more familiar than unfamiliar with nutrition issues. Respondents also considered themselves more knowledgeable about nutrition than the average buyer. In Question 12 of Section A, on a scale from 1 (least knowledgeable) to 7 (most knowledgeable) about their “knowledge of nutrition compared to the average buyer”, 36% of respondents chose 5, 27% chose 6, and 17% chose 4. Only 12% of respondents considered themselves the most knowledgeable. The mean of responses to this question was a 5.17. In Question 9 of Section B, participants were again asked to compare themselves to the average person in regards to knowledge about nutrition, and participants again considered themselves more knowledgeable: on a scale from 1 (one of the most knowledgeable) to 7 (one of the least knowledgeable), 90% of respondents chose a 4 or lower, including 41% choosing 3. The mean of responses to this question was a 3.08. Finally, in when participants were asked to agree or disagree with the statement “I know a lot about nutrition” on a scale from 1-7 (1 being strongly agree and 7 being strongly disagree), the mean response was 3.38.

It is also worth examining the relationship between respondents’ knowledge of nutrition and their perceived understandability of nutrition labels. Analyzing the correlation between participants’ agreement with the statement “I know a lot about nutrition” and understandability of labels produced a correlation coefficient of  $r = 0.26$ . Of those who responded with 1 (strongly agree), 50% said that labels are very easy to understand, and the other 50% said that labels are somewhat easy to understand. Of those who responded with 2, 43.24% said that labels are very

easy to understand, and 48.65% said that they're somewhat easy to understand. Of those who responded with 3, 72.58% said that labels are somewhat easy to understand. Of those that responded with 4, 37.50% said that they're very easy to understand, and 50% said that they're somewhat easy to understand. Of those that responded 5, 72.73% said that they're somewhat easy to understand. Of those that responded with 6, 41.67% said they're somewhat easy, 33.33% said they're somewhat hard, and 25% said they're very easy. Of those that responded 7, 50% said they're somewhat, and the other 50% said they're very hard to understand.

The relationship between respondents' income and whether or not they read food labels was examined. Of respondents in the \$0-19,999 segment, one-third often read labels, 29.63% sometimes read labels, and 22.22% always read labels. Of respondents in the \$20,000-39,999 income segment, 41.67% sometimes read labels and one-third often do. Of respondents in the \$40,000-59,999 segment, 50% often read labels. Of respondents in the \$60,000-79,999 segment, 44.44% sometimes read labels, and 27.78% rarely do. Of respondents in the \$80,000-99,000 income segment, 30.56% always read labels, 25% often do, and 30.56% sometimes do. Of respondents in the \$100,000 and above segment, 36.84% often read food labels, and 28.95% sometimes do.

Table 1, below, summarizes the responses to how important consumers consider convenience, nutrition, taste, and price. On a scale of 1 (most important) to 5 (least important), the mean response for convenience was 2.58, the mean response for nutrition was 2.16, the mean response for taste was 2.02, and the mean response for price was 2.36.

**Table 1: With regard to the foods you purchase, how important is:  
(1 = Most important, 5 = Least important)**

	1	2	3	4	5
Convenience	10%	43%	30%	14%	4%
Nutrition	28%	45%	14%	10%	4%
Taste	37%	42%	9%	7%	5%
Price	22%	38%	22%	16%	1%

Table 2, below, shows the summary of what nutritional information consumers look for while food shopping. 131 respondents, or 71% of respondents, watch for calorie information; 102 respondents (55%) watch for information about sugar content. The nutrition information chosen the fewest times was information about Vitamin A, chosen by just 25 respondents (14%).

**Table 2: Which do you watch out for while grocery shopping?**

Calories	71%
Unsaturated Fat	24%
Sodium or Salt	41%
Sugars	55%
Fat	61%
Saturated Fat	50%
Carbohydrates	35%
Protein	50%
Cholesterol	28%
Iron	16%
Dietary Fiber	28%
Vitamin A	14%
Calcium	25%
Vitamin C	25%

Table 3a, below, summarizes participants' responses to their perceived importance of various nutritional information. These responses were also analyzed in relation to respondents' ages. The table also shows the mean response for each age segment.

**Table 3a: How important is the following nutritional information to you?  
(1 = Very Important, 5 = Not Important)**

	1	2	3	4	5	Mean response	Mean 18-24	Mean 25-34	Mean 35-44	Mean 45-54	Mean 55-64
Total Calories	39%	34%	14%	9%	4%	2.05	2.09	1.98	1.75	2.20	1.00
Calories from Fat	34%	32%	17%	13%	4%	2.23	2.27	2.23	1.75	2.20	1.00
Total Fat	38%	29%	18%	10%	4%	2.12	2.18	2.09	1.63	2.00	1.00
Saturated Fat	40%	27%	21%	8%	4%	2.10	2.17	2.05	1.63	1.60	1.00
Cholesterol	27%	28%	26%	11%	7%	2.43	2.57	2.30	1.63	1.60	1.00
Sodium	25%	28%	29%	12%	5%	2.45	2.55	2.33	2.00	1.60	2.00
Total Carbohydrates	17%	30%	32%	15%	7%	2.65	2.72	2.58	2.13	2.60	2.00
Dietary Fiber	18%	30%	31%	15%	6%	2.61	2.68	2.53	2.13	2.20	2.00
Sugars	25%	31%	27%	11%	6%	2.41	2.52	2.21	2.00	2.20	2.00
Protein	33%	32%	21%	9%	4%	2.19	2.23	2.26	1.88	1.60	1.00
Vitamin A	13%	18%	41%	21%	8%	2.93	2.90	3.19	2.38	2.60	2.00
Vitamin C	14%	23%	36%	19%	8%	2.84	2.84	3.02	2.38	2.00	2.00
Calcium	17%	26%	34%	15%	8%	2.71	2.68	3.05	2.13	1.80	2.00
Iron	14%	23%	37%	17%	9%	2.85	2.81	3.14	2.38	2.20	2.00

Table 3b, below, then segments respondents' feelings about the importance of this nutritional information by respondents' level of education. The mean response for each education segment is found below.

**Table 3b: How important is the following nutritional information to you?  
(1 = Very Important, 5 = Not Important)**

	Mean response	Mean College grad	Mean Grad education	Mean High school	Mean Some college
Total Calories	2.05	1.86	1.97	2.75	2.10
Calories from Fat	2.23	1.86	2.20	2.75	2.33

Total Fat	2.12	1.57	2.07	2.50	2.29
Saturated Fat	2.10	1.60	2.00	2.50	2.26
Cholesterol	2.43	2.06	2.13	3.25	2.59
Sodium	2.45	2.00	2.17	3.25	2.63
Total Carbohydrates	2.65	2.37	2.60	3.00	2.74
Dietary Fiber	2.61	2.31	2.30	3.25	2.75
Sugars	2.41	1.89	2.23	2.50	2.61
Protein	2.19	1.91	2.20	1.75	2.29
Vitamin A	2.93	2.74	2.97	3.25	2.97
Vitamin C	2.84	2.49	3.03	3.25	2.88
Calcium	2.71	2.51	2.83	3.50	2.72
Iron	2.85	2.69	3.00	3.50	2.84

The summary of participants' responses to several more questions can be found in Tables 4-10 below. These questions asked survey participants how they use nutrition information, how adequate consumers find nutritional information, how important certain nutritional information is to consumers, how consumers use sources of information, and how consumers are affected by health claims made on food packages.

**Table 4: How often do you use the nutrition information on food packages to do the following:**

	Always	Sometimes	Rarely	Never
Decide which brand to buy	20%	64%	12%	4%
Compare types of foods	34%	52%	9%	5%
Check advertising claims	12%	35%	35%	18%
Check fat content	38%	40%	16%	6%
Check calorie content	42%	35%	17%	6%
Determine suitability for family consumption	15%	39%	26%	19%
Help in meal planning	17%	40%	30%	14%
Determine serving size	22%	42%	25%	11%
Get storage instructions	21%	37%	25%	16%
Get cooking instructions	25%	49%	16%	10%

**Table 5: How adequate do you find the nutritional information on food packages in doing the following:**

	Very Adequate	Somewhat Adequate	Somewhat Inadequate	Very Inadequate
Deciding which brand to buy	21%	68%	10%	2%
Comparing types of foods	26%	61%	11%	2%
Checking advertising claims	13%	45%	34%	8%
Checking fat content	51%	42%	6%	1%
Checking calorie content	55%	36%	9%	1%
Determining suitability for family consumption	19%	55%	21%	5%
Helping in meal planning	20%	50%	22%	8%
Determining serving size	39%	42%	15%	4%
Finding storage instructions	30%	41%	27%	2%
Finding cooking instructions	32%	39%	25%	3%

**Table 6: Indicate your degree of agreement with the following statements: (1 = Strongly Agree, 7 = Strongly Disagree)**

	1	2	3	4	5	6	7	Mean response
I am interested in nutrition.	24%	32%	23%	8%	8%	4%	2%	2.59
It seems that anyone can say anything they want on food labels about nutrition.	5%	11%	21%	25%	15%	16%	6%	4.09
I know a lot about nutrition.	5%	20%	34%	22%	12%	6%	1%	3.38
Knowing what is good or bad is useful because I can change what I eat.	33%	32%	22%	8%	3%	2%	1%	2.23
It is good to know a lot about nutrition even though I may not use it to change my eating habits.	23%	28%	25%	13%	6%	2%	3%	2.67
Grocery shopping is boring.	8%	10%	16%	17%	22%	20%	8%	4.25
It is good that our government is watching the nutritional content of the foods I buy.	22%	24%	20%	14%	7%	6%	6%	3.03
I am confident about the quality of nutrition information on labels.	5%	21%	34%	22%	7%	8%	3%	3.39
I exercise regularly.	29%	22%	21%	8%	9%	6%	5%	2.89
I don't pay much attention to the food products I buy or eat.	3%	5%	9%	10%	19%	27%	26%	5.24
We should take good care of ourselves to be healthy.	60%	22%	8%	5%	2%	2%	1%	1.76

I am certain about the accuracy of the nutrition information on food labels.	2%	16%	32%	23%	12%	11%	3%	3.72
We need more government control over food labels to improve our eating habits.	8%	16%	22%	21%	14%	10%	10%	3.88
It is only necessary for some people to pay attention to food labels so that everyone may gain.	1%	8%	14%	18%	19%	23%	17%	4.83
Stricter labeling laws will force manufacturers to provide us better quality food products.	10%	24%	21%	19%	6%	14%	5%	3.53
Storage instructions are more important than nutrition information on food products.	2%	4%	10%	27%	24%	16%	17%	4.81
Information on health keeps changing so much that it is hard to know what foods are good for us.	6%	15%	30%	21%	15%	9%	4%	3.66
Despite all the information on food labels, I will still buy foods which may not be healthy.	15%	28%	28%	13%	9%	4%	4%	3.02
I get most of my nutritional information from TV.	0%	2%	13%	17%	16%	28%	24%	5.28
I get most of my nutritional information from newspapers.	1%	3%	9%	11%	16%	26%	36%	5.59
I get most of my nutritional information from radio.	0%	1%	6%	10%	18%	21%	45%	5.88
I get most of my nutritional information from other people.	7%	23%	29%	19%	10%	7%	5%	3.45

**Table 7: Degree of use**  
(1 = Always, 5 = Never)

	1	2	3	4	5
Newspapers	6%	19%	21%	28%	26%
Television	18%	34%	25%	17%	6%
Radio	2%	18%	27%	31%	22%
Magazines	11%	32%	28%	21%	8%
Other people	30%	47%	14%	7%	2%

**Table 8: Degree of importance**  
(1 = A lot, 5 = None)

	1	2	3	4	5
Newspapers	13%	24%	20%	24%	19%
Television	15%	27%	28%	23%	8%
Radio	4%	16%	29%	31%	19%
Magazines	14%	29%	34%	16%	7%
Other people	32%	38%	23%	5%	2%

**Table 9: Degree of adequacy**  
(1 = Total, 5 = None)

	1	2	3	4	5
Newspapers	12%	30%	29%	19%	10%
Television	8%	23%	37%	23%	10%
Radio	3%	16%	35%	30%	16%
Magazines	11%	31%	38%	16%	4%
Other people	11%	44%	31%	12%	2%

**Table 10: Indicate whether you are more likely, less likely, or not affected by health claims if you believed the following about whatever you buy:**

	More Likely	Less Likely	No Effect
Low in Calories	59%	13%	28%
High in Fat	37%	47%	16%
High in Saturated Fat	30%	40%	30%
Low in Saturated Fat	51%	21%	28%
Low in Cholesterol	51%	21%	29%
High in Sodium or Salt	27%	48%	25%
Low in Carbohydrates	37%	23%	40%
High in Dietary Fiber	45%	21%	34%
Low in Sugars	46%	28%	26%
High in Protein	62%	15%	23%
Low in Vitamin A	11%	37%	52%
High in Vitamin C	49%	16%	35%
High in Calcium	49%	19%	31%
Low in Iron	11%	38%	51%

## DISCUSSION

In order to better understand consumers' behavior regarding food purchases, participants in the Grocery Shopping Study were asked, "How many times a month do you do major grocery shopping?" and "How many times a month do you go "filler" shopping?" This distinction between major and filler shopping trips corresponds to the distinction between major and fill-in trips described by Kim and Park: "Fill-in trips are found to occur in more random fashion, while the major trips are regularly planned shopping trips" (Kim and Park 504). Kim and Park also further classified consumers into being either random shoppers, who tend to visit grocery stores at irregular intervals, or routine shoppers, who tend to visit grocery stores in relatively fixed intervals. They conducted a study of "the time of the grocery shopping trips made by... 1,443 households over two-year periods" as well as certain demographic characteristics of the participants (Kim and Park 506). The data collected in this study pertains to both the shopping frequency (as in, how many times the households went grocery shopping over a total of 103 weeks) and shopping interval. The mean shopping frequency was 184 times in 103 weeks, and the mean "intershopping interval for a typical household is 4.1 days" (Kim and Park 507). Moreover, they found that "70 percent of shoppers visit grocery stores with random intervals and 30 percent with relatively fixed intervals" (Kim and Park 501).

Additionally, important information regarding shopping frequency can be found in the results of a study described in J.R. Blaylock's influential 1989 article "An economic model of grocery shopping frequency": "The NCFSS data is a nationally representative survey of about 14000 households. The estimation sample was limited to about 7000 observations... Approximately 71% of the households in the sample reported that major grocery shopping occurred once a week or more often and 29% shopped less than once a week" (Blaylock 848).

The findings from the Grocery Shopping Study do not completely support Blaylock's finding. The fact that 97% of our study's respondents do their major shopping at most four times per month implies that they may not do major shopping more than one time per week. And the fact that nearly half of the respondents do major food shopping only one or two times per month implies that many respondents do not do major shopping every week. Our respondents seem to fit into the 29% from Blaylock's findings who shopped less than once a week.

Naturally, there is a certain amount of variability in shoppers' grocery buying behavior, particularly due to the aforementioned fact that shoppers can be either random or routine. Their analysis of shopping trip data allowed Kim and Park to make certain conclusions about the nature of shoppers' behavior. They found that, compared to random shoppers, routine shoppers have higher opportunity and search costs. Consequently, it is more difficult for these routine shoppers to visit stores frequently; they may plan their shopping in advance, visit stores less frequently, have stronger store loyalty, and spend more money during each given shopping trip (Kim and Park 501).

Spending is logically an important aspect of grocery shopping behavior. According to a 1997 report from the *Family Economics & Nutrition Review*, grocery spending depends in large part upon the size of the household: "larger households usually spend more in total dollars, but less per person than smaller households... Larger households tend to have lower per person food expenditures because they buy more economical packages, have younger children who tend to eat less, and spend more on food at home than on food away from home" ("Share of income"). Spending also depends on the make-up of the household: "Single mothers with children spent about half as much per person as single-person households" ("Share of income"). This study also found that urban households spend more on food than rural households ("Share of income").

In terms of numbers, in 1992, annual spending on food per person ranged from \$1,249 per person for households in the lowest income quintile to \$1,997 per person for households in the highest income quintile (“Share of income”).

As described in his 2009 article “Spend Less, but Eat Just as Well”, Mark Dolliver highlights changes in consumer food purchasing behavior due to the United States’ economic recession. Polling for the Yankelovich Dollars & Consumer Sense 2009 Grocery Syndicate Study reveals that consumers intend to spend less money on their groceries, but they do not intend to buy lower-quality foods. 61% of grocery shoppers plan to clip or download grocery coupons, 59% of shoppers plan to take advantage of store loyalty programs, and even 49% of shoppers plan to delay buying until the item is on sale (Dolliver). However, only 32 percent of those polled plan to “move down a level of quality on at least some of the food products you purchase for yourself” (Dolliver).

Throughout the survey of our Grocery Shopping Study, we asked specific questions pertaining to participants’ demographic characteristics, including gender, race, age, marital status, employment status, size of household, education, and income. Such demographic characteristics have been shown to be quite related both to consumers’ grocery purchasing behavior and to consumers’ use of the nutritional information found on food packages. Engel analysis is the term given to the “influence of economic and demographic variables on household food purchases” (Blaylock 843). Let us first consider gender. As aforementioned, the make-up of households affects grocery shopping. Blaylock found, for instance, that “[h]ouseholds headed by a female (no male present) are considerably less likely to shop once a week or more often than households with two adults... probably due to increased time constraints imposed on

female-headed households because of no spouse to share general household responsibilities, child care, and income-producing activities” (Blaylock 850-1).

Furthermore, gender has appeared to affect nutritional label use, as described in the comprehensive paper “Consumers’ Use of Nutritional Labels: A Review of Research Studies and Issues.” In their review of important literature published on nutritional labels, Drichoutis, Lazaridis, and Nayga found that being female positively affects label use (Drichoutis et al.). Citing four different studies, they describe that “females are, in general, more likely than men to use nutritional labels... many males do not agree that nutritional information is useful, that the information can help in food choice, or that health is a matter of importance to them” (Drichoutis et al.). While “males are less likely to use all nine types of nutrient information... [and] are more likely to use the ingredients lists... females pay attention to information about calories, vitamins, and minerals and they tend to use both nutrition labels and ingredient lists” (Drichoutis et al.).

Based on the analysis of the relationship between gender and use of nutritional labels, the results from the Grocery Shopping Study tend to support the idea that females are more likely to use labels. The percentages of female respondents who said that they sometimes, often, or always read labels were higher than the percentages of male respondents who said that they do. And a higher percentage of male respondents said that they rarely read the labels. In addition, a significantly higher percentage of female respondents than male respondents said that these labels have a great deal of influence on their food buying decisions, and a higher percentage of male respondents than female respondents said that such labels have little influence. Thus, there exists an apparent trend of females having more significant label use.

Shopping behavior and preferences seem to differ not only between genders but also between races. First of all, data indicates that female African-American shoppers and female

Hispanic-American shoppers spend more money on their groceries than do Caucasian-American women: the average African-American shopper spends \$108.04 on groceries per week, the average Hispanic-American shopper spends \$102.60 per week, and the average Caucasian-American shopper spends only \$82.79 per week (“Learn Ethnic/Racial Groups”). However, Hispanic-Americans are the most likely to be bargain shoppers (77%) (“Learn Ethnic/Racial Groups”). Results from the Grocery Shopping Study also support the conclusion that Hispanic shoppers spend more on groceries: of this study’s respondents, the median amount spent on groceries per month was higher for Hispanic respondents than for Caucasian White, black, or Asian respondents.

Regarding nutritional labels, Hispanic-Americans are also much more likely to read information on labels: 63 percent of Hispanic-American shoppers polled strongly agreed that they “usually read the information on product labels”, while only 32 percent of non-Hispanic shoppers strongly agreed with that statement (“Learn Ethnic/Racial Groups”). The Grocery Shopping Study found that a large percentage of Hispanic respondents (50%) do in fact read labels sometimes, and this percentage is higher than the percentage of Asian, black, and white respondents who sometimes use labels. However, the fact that no Hispanic respondents said they always read labels (while large portions of Asian, black, and white respondents said they always do) indicates that the Grocery Shopping Study did not find any significant differences in label use by race.

Blaylock’s article “An economic model” also addresses the effects of race in his discussion of the variables affecting shopping behavior. In fact, he even sites the race of the household head as one of the “most influential variables in the model in terms of statistical significance and largest net impact on shopping frequency... Race of the household head is the

most statistically significant variable in the model” (Blaylock 849-50). He speaks specifically of the differences between African-American households and households of other races. For example, Blaylock finds:

Households headed by a black are 20 percentage points less likely to shop as often as non-black households... First, black households spend less on perishable items such as dairy products, thus reducing the need for more frequent shopping. Second, black households, on the average, have lower levels of assets and wealth than non-black households. This may affect the ownership of vehicles (reducing mobility) and residential location (inner cities), and thus reduce shopping frequency. (Blaylock 850)

In fact, 80% of black respondents in the Grocery Shopping Study do their major shopping only one or two times per month, and the other 20% do major shopping 3-4 times per month. This is a lower percentage than the percentages of Asian, white, and Hispanic respondents who do major shopping 3-4 times per month. What’s more, the majority of black respondents also do filler shopping only one or two times per month. Results indicate that African-American consumers may not do their grocery shopping as often as consumers of other races.

Blaylock also cites age of the shopper as an influential variable affecting shopping frequency. Overall, he determines that there is a difference in the shopping patterns of those over the age of 50 versus those under the age of 50: “Age of the shopper positively influence the odds of more frequent shopping” (Blaylock 850). Specifically, “households with a 50-year-old shopper are over 19 percentage points more likely to shop at least once a week than a similar household with a 20-year-old shopper” (Blaylock 850). While Blaylock found a relationship between age and shopping frequency, the Grocery Shopping Study unfortunately did not provide

evidence to support his findings, given that the correlation between age and shopping frequency from the study's results was found to be only 0.20 for major shopping and 0.03 for filler shopping.

Age has been found to not only affect shopping patterns and shopping frequency, but it has also been found to have a significant effect on consumers' use of nutritional labels and their consequent perception of food products. In their review of nutritional label literature, Drichoutis, Lazaridis and Nayga describe the findings of several studies related to age and nutritional labels. One 1996 study determined that "older people perceive the [nutritional] labels as less understandable" (Drichoutis et al.). Drichoutis, Lazaridis and Nayga say that there have been conflicting findings about whether there is a significant relationship between age and the probability of using nutritional labels. Even so, they also do cite several studies which have found that "as age increases so is the likelihood of using the information about fat content, cholesterol content, and health benefits" (Drichoutis et al.).

In Question 6 of Section B of the Grocery Shopping Study, participants were asked to rate the importance of fourteen different kinds of nutritional information on a scale of 1 (very important) to 5 (not important). The overall average responses for each nutrition information ranged between 2 and 3. When these responses were broken down by age segment, the mean responses did not change very significantly. Some slight trends, however, were found. For total fat, for example, the mean response for the 18-24 segment was 2.18 while the mean response for every older age segment was slightly lower (and thus "more important" on the scale). For cholesterol, the mean response did decrease slightly as age increased, from 2.57 for respondents aged 18-24 to 1.60 for respondents aged 45-54 and 1.0 for the respondent aged 55-64. In this way, it is found that older respondents think cholesterol content is more important than do

younger respondents. A similar, but not exact, trend was also found for dietary fiber, sugars and protein.

Burton and Andrews' article "Age, Product Nutrition, and Label Format Effects on Consumer Perceptions and Product Evaluations" directly addresses the connection between shoppers' age and their behavior and perceptions regarding nutrition labels. Like Drichoutis, Lazaridis and Nayga, Burton and Andrews' study of the "effects associated with the nutritional labels mandated by the FDA across levels of nutrition and groups of older and younger consumers" also found that age affects the perceived understandability of food labels: "Older consumers also perceive all labels as more difficult to understand" (Burton and Andrews 81, 68). While the objective of the Nutrition Labeling and Education Act (NLEA) was to "educate consumers to make more informed decisions in the selection of food products", the nutrition labels now found on all food packages in accordance with the stipulations of the NLEA "contain much information that is new and unfamiliar, and for many consumers it may not be clear how this information can be best utilized" (Burton and Andrews 71). This may be especially true for older consumers, given that "performance on new and unfamiliar cognitive tasks diminishes for elderly consumers" (Burton and Andrews 70-1). Thus, Burton and Andrews' study found that "the older group of subjects, who averaged 70 years of age, generally perceived [nutrition] labels as less understandable than the younger subjects" (Burton and Andrews 81). Unfortunately, the results from the Grocery Shopping Study were not able to confirm this logical finding. Correlation analysis between age and the perceived understandability of the information about food content produced a correlation coefficient of only 0.007, so there was no correlation found between these variables according to the results from this study.

Of course, gender, race and age are not the only significant demographic variables of grocery shoppers; as previously stated, participants in the Grocery Shopping Study were also asked questions about their marital status, household, employment, education, and income. The 1997 article “Share of Income Spent on Food” finds that marital status and household composition are determinants of grocery spending: “Married couples without children spent about the same amount per person as did single-person households... Expenditures increased for married couples with children as their children got older, but their spending per person still tended to be less than that of married couples without children” (“Share of income”). As previously stated, the size of a household has a significant effect on its food spending. For instance, “Larger households usually spend more in total dollars but less per person than smaller households” (“Share of income”).

Along with race and age, J. R. Blaylock also includes household size in his list of the most influential variables affecting shopping frequency. Of course, it is logically predictable that “household size is positively related [to shopping frequency] because larger households require larger inventories” (Blaylock 846). Beyond that, Blaylock goes on to describe other effects of household size on grocery shopping behavior. Most importantly, he finds, “The demand for perishable commodities (e.g. milk) is likely to rise as household size increases because children are present. Hence, household size may have a positive effect on shopping frequency” (Blalock 846). Unfortunately, in the Grocery Shopping Study, a slight negative correlation (-0.26) was found between household size and major shopping trip frequency (although very little correlation was found between household size and filler shopping trip frequency). The findings from this study therefore do not support the positive relationship between household size and shopping frequency.

For the purposes of our study on nutritional labeling, however, the important question regarding household size is whether and how this variable affects how consumers use or perceive food labels. Overall, Drichoutis, Lazaridis and Nayga find that “smaller households and households with young children are more likely to engage in nutrition information search behaviors” (Drichoutis et al.). Their findings therefore suggest that household size and nutritional label use are negatively related (Drichoutis et al.). However, other studies have found exactly the opposite (Drichoutis et al.). Thus, the existing literature on nutritional labels actually does not offer any conclusive theories about the relationship between household size and use of the nutritional labels found on food packages. Nor do the results from the Grocery Shopping Study offer much help in this debate. Household size and whether consumers read labels on food packages was found to have a correlation of only 0.136, while the correlation between household size and influence of labels on buying decisions was found to only be 0.19. This indicates a slight positive relationship between household size and label use, but according to the Grocery Shopping Study this relationship is not particularly significant.

Previous studies and research have found that employment status also affects grocery shopping behavior. Kim and Park use the variable of employment as one of the demographic and purchase behavioral differences between “random” shoppers and “routine” shoppers. For example, households employed full-time may be under more time constraints. Accordingly, so-called “routine” shoppers are likely to be employed full-time (Kim and Park 509). And so while households employed full-time may not be able to shop as frequently and therefore then to be routine shoppers, the reverse also appears to be true: “Bawa and Ghosh (1994) found that households with... fewer employed members were more frequent grocery shoppers” (Kim and Park 502). Blaylock came to the same conclusions regarding employment, citing “whether the

usual shopper participates in the labour force” as another variable for measuring shopping. Specifically, he describes, “Employed shoppers and/or households without a male present probably shop less frequently than households with full-time homemakers or with a male present because of more stringent time constraints” (Blaylock 846). Do employed consumers really tend to shop less frequently? Not necessarily, according to the Grocery Shopping Study. The majority of respondents who don’t work (57.14%) said they do major shopping 1-2 times per month, while the majority of respondents who work full time (53.49%) said they do major shopping 3-4 times per month. Thus, for the participants in the Grocery Shopping Study, being employed actually increases shopping frequency!

In addition, J.R. Blaylock finds an interesting relationship between shopping frequency and education: “The positive and statistically significant relationship between education and shopping frequency implies the hypothesis that more formal education increases shopping efficiency is offset by the higher demand for fresh foods by more educated shoppers” (Blaylock 851). Consumers’ education is furthermore related to consumers’ use of nutritional labels. In their literature review, Drichoutis, Lazaridis and Nayga summarize past studies on the issue of education, nutrition information search, and nutrition labels. They find “that more education leads to higher levels of information search” (Drichoutis et al.). The findings of Drichoutis et al. do not stop there. For instance, they explain that “several studies have confirmed the hypothesis that higher educated individuals are more likely to use nutritional labels. Specifically, higher educated consumers were found to be more likely to use the sugar and ingredient information in one study and all nine types of nutrient information used in another study” (Drichoutis et al.). In summary, there has been found to be a positive relationship between education and nutrition information search.

Based on the results from the Grocery Shopping Study, it does indeed seem possible that education affects label use. Half of the respondents with a high school education said that they only sometimes read food labels, while another full quarter of this education segment said that they rarely do. Of those respondents with a graduate education, only 20% said that they only sometimes read labels, while 43.33% of this segment often does. Also, for certain but not all kinds of nutrition information, there was found to be a positive relationship between education and the perceived importance of this information; for cholesterol, total carbohydrates, and protein, more educated respondents tended to rate the nutrition information as more important.

Income is the final demographic characteristic to be examined. As expected, income affects shoppers' constraints or opportunity costs. Kim and Park find that "'routine' shoppers have higher income, which leads to fewer budget constraints" (Kim and Park 510). Their finding corresponds to earlier findings by Blaylock: "Income is inversely related to shopping frequency" (Blaylock 847). As for the use of nutritional labels, Drichoutis et al. find contradictory results regarding whether income has a positive or negative effect on nutrition information search:

higher income consumers were more likely to agree with statements a) on the usefulness of nutrition information, b) on the ease of choosing foods based on the nutritional information, c) that it is better to rely on the nutritional label information than on one's own knowledge, and d) on the fact that nutritional labels can be a motive to try a new food product... however, higher income respondents are more likely to use calories, sodium, fiber and fat information, while the effect of income on cholesterol information use remains ambiguous. (Drichoutis et al.)

The results from the Grocery Shopping Study are not able to corroborate this trend. The largest proportion of respondents (46.49%) does their major grocery shopping one or two times per month, and this remained true for almost all income segments. And furthermore, approximately the same percentage of respondents in the \$0-19,999 income segment as in the \$100,000 and above segment do their shopping one to two times per week (44.44% and 43.42%, respectively). A similar result was found in relation to consumers' information search about nutrition. For example, approximately the same percentage of respondents in the \$0-19,999 income segment as in the \$100,000 and above income segment always read food labels (22.22% and 19.74%, respectively). And approximately the same percentage of respondents in these two income segments often read food labels (33.33% and 36.84%, respectively). As such, the results from this study do not indicate a trend between increased income and increased shopping frequency or nutrition information search.

While it is not a demographic characteristic of consumers or grocery shoppers, consumers' familiarity with and knowledge of nutrition is an important issue to be considered when discussing nutritional labels. Drichoutis et al. found that "nutrition knowledge has a significant impact on nutritional label use" (Drichoutis et al.). Specifically, they describe, "Nutrition knowledge may facilitate label use by increasing its perceived benefits and by increasing the efficiency of label use, thereby decreasing the cost of using labels" (Drichoutis et al.). This conclusion supports the general idea that consumers' use of nutritional labels depends largely on consumers' opportunity costs: "consumers will search for nutrition-related information as long as the costs (mainly viewed as time spent reading labels) do not outweigh the benefits (healthful food choices)" (Drichoutis et al.). Furthermore, consumers' nutrition knowledge appears to affect the attitude towards nutrition information and labels: "Moorman

(1998) also found that consumers with more knowledge were less skeptical toward nutritional information. In addition, Levy and Fein (1998) revealed the positive effect of knowledge on consumer's ability to perform nutrition label use tasks" (Drichoutis et al.).

Thus, with the importance of consumers' nutrition knowledge in mind, we asked our participants in the Grocery Shopping Study to rate their familiarity with nutrition issues, to rate their knowledge of nutrition compared to the average buyer, and to compare their own nutrition knowledge to that of the average buyer. Given that the mean response to the question "How would you rate your familiarity with nutrition issues?" was 5.24, most consumers seem to consider themselves fairly knowledgeable about nutrition. How does this knowledge translate into use of nutritional labels? Results from the Grocery Shopping Study indicate that there is some positive relationship between respondents' disagreement with the statement "I know a lot about nutrition" and whether they do not read food labels (correlation coefficient of 0.41). There is also some positive relationship between respondents' disagreement with that statement and the lack of influence of labels on buying decisions. It seems as though respondents who feel they do not have much knowledge about nutrition do not tend to read nutrition labels, and thus these labels do not tend to influence their food purchasing behavior.

Of course, a central component to the study of nutrition information is whether or not consumers actually read the information. To approach this issue, we asked our study participants, "When you buy food products for the first time, how often do you read the labels on the packages?" 83.78% of respondents at least sometimes read food labels. But why don't the other 16.21% of respondents read nutritional labels? As Burton, Biswas, and Netemeyer state, "not all consumers are motivated to read labels" (Burton et al. 45). Aboulnasr and Sivaraman also establish that consumers' use of nutrition information depends largely on their motivation.

In their article “Food for thought”, they furthermore investigate how to increase their motivation: “In three experiments, we examine the efficacy of counterfactual thinking (CFT) as a strategy to enhance consumers’ motivation to process and use nutrition information on food packages” (Aboulnasr and Sivaraman 191). They define counterfactual thinking, or CFT, as “the practice of looking back at past events and mentally imagining how these events could have turned out differently” (Aboulnasr and Sivaraman 192). And motivation is defined as “consumers’ goal-directed arousal to process nutrition information” (Aboulnasr and Sivaraman 192). The idea here is that “consumers who engage in CFT in response to a negative diet-related health condition will identify ways in which that negative outcome could have been avoided. This process... will increase consumers’ motivation to avoid similar negative outcomes in the future” (Aboulnasr and Sivaraman 193).

The concept of counterfactual thinking is an interesting element in the understanding of how consumers’ use nutritional information. As Aboulnasr and Sivaraman conclude in their paper “Food for thought”, this concept also has important public policy implications. The main objective of the NLEA was to increase consumers’ use and comprehension of nutrition information. Aboulnasr and Sivaraman opine:

The present research suggests that using CFT in effectively designed public service announcements may have significant consequences on consumers’ motivation. The benefits of such motivation are mirrored in the greater usage and utilization of nutrition information on food packages for product evaluation as well as the significant difference in product attitudes based on their nutritional value. (Aboulnasr and Sivaraman 203)

One way to ensure that the objectives of the Nutrition Labeling and Education Act are reached is to take advantage of counterfactual thinking.

But how understandable are nutritional labels? The amount of literature published on this issue is, in fact, quite extensive. In their study of the “effects of basic label format, inclusion of nutrition reference values, perceived nutritiousness of the product, and nutrition knowledge”, Burton, Biswas, and Netemeyer also address the effects of consumers’ nutrition knowledge on the understandability of nutritional information found on food labels (Burton et al. 36). First of all, the understandability of nutrition labels logically depends on characteristics of the consumer. For instance, Burton et al. explain, “[B]ecause greater familiarity leads to more well-defined cognitive structures for nutrition terms and their meaning, consumers with high nutrition knowledge should perceive nutrition labels as easier to understand than consumers with low knowledge” (Burton et al. 39). Nutrition knowledge, however, is not the principal concern of Burton, Biswas, and Netemeyer. Rather, they examine how the format of nutrition labels affects the perceived understandability of nutrition labels, and they consequently found that “perceived understandability varied across label formats” (Burton et al. 42). Specifically, this study found that “increases in information quantity may lead to decreases in perceived understandability and raise the perceived complexity of decision making... Thus, perceived understandability will be higher for label formats that contain a lesser amount of information” (Burton et al. 38).

Burton and Andrews also address the relationship between label format and the understandability of nutrition information. As aforementioned, “Older consumers also perceive all labels as more difficult to understand” (Burton and Andrews 68). The researchers studied three different label formats. They concluded that the amount of information present on new, post-NLEA labels may diminish perceived understandability. The results of their study found, “For three of the four age by nutrition level conditions, the full NLEA format is viewed as less understandable than the pre-NLEA label format” (Burton and Andrews 80). In the Grocery

Shopping Study, 44.44% of the respondents who feel that nutritional labels have too much information find labels somewhat or very hard to understand, whereas 94.64% of respondents who feel labels have the right amount of information find labels to be somewhat or very easy to understand. There does, therefore, appear to be some link between how consumers perceive the information on labels and how they perceive the understandability of such labels.

Burton and Andrews describe how, contrary to the objectives of the NLEA, “The new nutrition labels contain much information that is new and unfamiliar, and for many consumers it may not be clear how this information can be best utilized to determine the most nutritious food choices” (Burton and Andrews 71). And, as previously found, this may be especially true for older segments of consumers. Burton and Andrews summarize the consequences of these findings: “Taken in sum, these results suggest some potential negative consequences of attempting to provide too much detailed information on a nutrition label” (Burton and Andrews 44).

Expanding on the idea that nutritional labels may not be perceived as incredibly understandable, we next examine whether consumers understand the specific language and terms found on such labels. For example, Burton and Andrews point out that “the new labels present information on ‘Daily Values’ and ‘% Daily Values,’ but it is not clear that all consumers know what the term ‘daily value’ means or how best to use this information in making healthy dietary choices” (Burton and Andrews 71). Burton, Biswas, and Netemeyer also specifically address this concern in their paper on the effects of nutrient reference information on consumer comprehension: “Inclusion of reference values also increases the amount of information on a label. Because of this increase in information, consumer perceptions of label understandability may decrease” (Burton et al. 38). They then later find that, in fact, “as predicted, including

reference values had a negative effect on the perceived understandability of the label... reference values did not aid in determining whether nutrient levels were high or low” (Burton et al. 44).

Given the important implications of the above findings, we also asked our own study participants to describe the meaning of RDI (Reference Daily Intake) and DRV (Daily Reference Value). These questions received many responses (37 for RDI and 77 for DRV) in some form indicating that participants did not know the meaning of these terms, such as “I don’t know”, “Nothing”, “I’m not familiar with this term”, “No guess”, or simply leaving the questions blank. Out of 185 total responses, 77 represents a full 41.6% of the study’s respondents who do not understand Daily Reference Value! In support of the aforementioned findings of Burton and Andrews, it is quite clear that not all consumers understand the information presented to them by nutritional labels.

## **CONCLUSIONS AND LIMITATIONS**

The human is an infinitely complex being, and a thorough review of studies on consumers’ grocery shopping behavior and their attitudes toward nutrition and nutritional labels reveals just how complex the human consumer, and specifically the human shopper, is! In terms of how our demographic characteristics influence our shopping behavior, it appears that the most significant overall influence on shopping frequency is opportunity cost. Opportunity cost separates routine shoppers from random shoppers, as shoppers with higher opportunity costs such time constraints (affected by employment and marital status) and lower income and levels of assets may not be able to shop as frequently. In fact, the use of nutritional labels is also affected by opportunity cost. It becomes a cost-benefit situation, in which consumers weigh the

time and energy costs of reading nutritional labels with the potential benefits on their health from doing so.

Opportunity cost is, of course, just the tip of the iceberg. As shown by the numerous studies done on this subject, there are an endless number of consumer characteristics that affect behavior and attitudes. Race, gender, employment, and education are some of the most significant of these characteristics. Interestingly, it has been found that females are more likely than men to use nutritional labels. In terms of race, Hispanic-Americans are also more likely to use nutritional labels. And in terms of education, higher educated consumers have been found to be more likely to do so. Older consumers, it seems, have a more complicated relationship with nutritional labels. For these consumers, the use of nutritional labels is hindered by their lack of understandability; older consumers perceive such labels as more difficult to understand. Logically, the opposite is true for consumers with nutrition knowledge; for these consumers, nutritional labels are more easily understandable. Of course, statements like these tend to reduce consumers to their most generalized components. These trends cannot be applied to every consumer because all humans are unique and complex. But these trends are nevertheless significant, especially because they demonstrate just how complicated our motivations are as shoppers, consumers, and readers of nutritional labels.

But then why are so many of the results of the Grocery Shopping Study unable to support the interesting conclusions drawn by, and trends observed by, past researchers? In the above Discussion section, there are a number of instances in which the data from this study either do not follow any trend or do not support the trends found by these other researchers: the relationship between age and understandability of nutrition information, between age and shopping frequency, between household size and shopping frequency, and between income and

shopping frequency, to name a few examples. The most plausible reason for this uncooperative data is the participant sample. It is fairly obvious that the respondents to the Grocery Shopping Study are not representative of the American population, given that a full 61% of the respondents were male, 69% of the respondents were in the 18-24 age category, and 64% of the respondents were students. Furthermore, 77% of the respondents were white, compared to only 11% Asian, 4% Hispanic, and 3% black. Therefore, the sample of respondents does not reflect the diversity of American society, and as such, the trends observed from this study's results may not be generalizable to the large population. For example, any analysis of the relationships between various variables and consumers' race cannot necessarily be deemed significant if only six of the respondents were black. May this study instead serve as a quite interesting study of the behavior and attitudes of white undergraduate students? Yes, perhaps!

Nevertheless, this does not mean the results of the Grocery Shopping Study have nothing to offer us in the way of gaining knowledge about consumers' grocery shopping and nutritional label behavior and attitudes. In fact, quite the opposite is true. The study shows us that, in general, many people are concerned about health and nutrition issues, enough that they feel generally familiar with and knowledgeable about nutrition. And as such, they seem somewhat concerned with the calorie, fat, and sugar content of the foods they eat (and less concerned with vitamin content). What's more, very few consumers *never* read nutritional labels; rather, most people either do so from time to time or do so fairly regularly – and find the labels rather understandable. From this perspective, it appears that the Nutrition Labeling and Education Act is working towards meeting its goal of educating consumers about nutrition and giving them the ability to make healthy decisions about their diet.

But this is not the whole picture. For example, 16.21% of respondents rarely or never read nutritional labels. Why not? There is perhaps a need here to educate the entire population on the importance of nutrition and the potential usefulness of food labels. Aboulnasr and Sivaraman agree with this concept, proposing public service announcements to increase consumers' motivation to use nutrition information (Aboulnasr and Sivaraman 2003). This also raises another question: are labels really as useful as they could be? Given the significant influence that such labels have on consumers' buying decisions (a conclusion drawn supported by the results from the Grocery Shopping Study), they arguably ought to be understandable to as many consumers as possible. But this is apparently not the reality. Contrary to the goals of the NLEA, "the new nutrition labels contain much information that is new and unfamiliar, and for many consumers it may not be clear how this information can be best utilized" (Burton and Andrews 71). As we have seen, many participants in the Grocery Shopping Study did not understand the terms RDI and DRV, which are central components of nutritional information. This issue of understandability is crucial for older consumers in particular. These consumers tend to have more significant health concerns, and yet these are also the consumers who seem to understand labels the least! Thus, the NLEA may not be accomplishing its goal in entirety. Perhaps the labels do contain too much information! Or perhaps consumers have not been educated enough to be able to understand that information. Either way, there is a clear need for further research into how consumers' interaction with nutrition and nutritional labels can be improved.

**APPENDIX**  
**Online Survey: Grocery Shopping Study**

## GROCERY SHOPPING STUDY

We are interested in examining your attitude toward food purchases in this study. As you know, sometimes we pay more attention to our diet and at other times we do not. To help us in our choices, information is available on food packages. Some of this information is useful; some of it is hard to understand. At this time, we are only interested in knowing about the present condition in the market. So, there are no right or wrong answers to any of the questions. Please be assured that the individual responses will be kept CONFIDENTIAL. Could you kindly assist us in our study?

\* Required

**How much of the food shopping do you do for your household? \***

- All
- Most
- Little
- None

**What is your gender? \***

- Male
- Female

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## GROCERY SHOPPING STUDY

\* Required

### SECTION A

This section deals with some general questions about grocery shopping.

**1. How many times a month do you do major grocery shopping? \***

- zero
- 1-2 times
- 3-4 times
- 5 or more times

**2. How many times a month do you go "filler shopping?" (i.e. shopping trips between the major grocery trips to buy small items such as milk, bread, eggs, etc.) \***

- zero
- 1-2 times
- 3-4 times
- 5 or more times

**3. Approximately how much money does your household spend each month on groceries? \***

\$

**4. When you buy food products for the first time, how often do you read the labels on the packages? (i.e. information about the content of the food) \***

- Always
- Often

- Sometimes
- Rarely
- Never

**5. How understandable do you find the information about the content on food packages? \***

- Very easy to understand
- Somewhat easy to understand
- Somewhat hard to understand
- Very hard to understand

**6. How much influence does this content information have on your buying decisions? \***

- A great deal of influence
- A fair amount of influence
- Some influence
- Little influence
- No influence at all

**7. How would you rate your familiarity with nutrition issues? \***

1 2 3 4 5 6 7

Not at all familiar        Extremely familiar

**8. What is your feeling on the amount of information on labels? \***

- Too much
- Right amount
- Not enough
- No opinion

9. What kinds of changes would you like to see made in the information provided about the content of what we eat and/or drink? \*

10. When you spend an hour doing grocery shopping, you lose the opportunity to do something else with your time. In general, what dollar value would you assign to the hour you lost grocery shopping? \*

\$

11. Suppose someone offers you an extra hour of work suitable to your skills. At what rate will you be willing to work? \*

\$

12. Please rate your knowledge of nutrition compared to the average buyer: \*

1 2 3 4 5 6 7

One of the least knowledgeable        One of the most knowledgeable

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## GROCERY SHOPPING STUDY

\* Required

### SECTION B

I have some specific questions about the kinds of information available to us when we do grocery shopping. Some terms may be more common than other terms. Some of the information is used more than others. We are interested in knowing your opinion on the following.

**1. What does the term R.D.I. ("Reference Daily Intake") mean to you? \***

**2. What does the term D.R.V. ("Daily Reference Value") mean to you? \***

**3a. With regard to the foods you purchase, how important is convenience? \***

1 2 3 4 5

Most important      Least important

**3b. With regard to the foods your purchase, how important is nutrition? \***

1 2 3 4 5

Most important      Least important

**3c. With regard to the foods your purchase, how important is taste? \***

1 2 3 4 5

Most important      Least important

**3d. With regard to the foods your purchase, how important is price? \***

1 2 3 4 5

Most important      Least important

**4. How often do you use the nutrition information on food packages to do the following: \***

	Always	Sometimes	Rarely	Never
Decide which brand to buy:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Compare types of foods:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Check advertising claims:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Check fat content:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Check calorie content:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Determine suitability for family consumption:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Help in meal planning:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Determine serving size:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Get storage instructions:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Get cooking instructions:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**5. How adequate do you find the nutritional information on food packages in doing the following: \***

	Very Adequate	Somewhat Adequate	Somewhat Inadequate	Very Inadequate
Deciding which brand to buy:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Comparing types of foods:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Checking advertising claims:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Checking fat content:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Checking calorie content:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Determining suitability for family consumption:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Helping in meal planning:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Determining serving size:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Finding storage instructions:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Finding cooking instructions:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**6. How important is the following nutritional information to you? (1 = very important; 5 = not important) \***

	1 (Very Important)	2	3	4	5 (Not Important)
Total Calories	<input type="radio"/>				
Calories from Fat	<input type="radio"/>				
Total Fat	<input type="radio"/>				
Saturated Fat	<input type="radio"/>				
Cholesterol	<input type="radio"/>				
Sodium	<input type="radio"/>				
Total Carbohydrates	<input type="radio"/>				
Dietary Fiber	<input type="radio"/>				
Sugars	<input type="radio"/>				
Protein	<input type="radio"/>				
Vitamin A	<input type="radio"/>				
Vitamin C	<input type="radio"/>				
Calcium	<input type="radio"/>				
Iron	<input type="radio"/>				

**7. Please indicate your degree of agreement with the following statements, using a 1-7 scale, where 1 = Strongly Agree and 7 = Strongly Disagree. Remember that it is just an opinion and there is no right or wrong answer to any of the items.**









**8. It has been found that some sources of information may be more important than others. Also some sources may not be adequate for some people, and they use several sources. We'd like to know what you think. Please remember that there are no right or wrong answers.**

**Degree of use: \***

	1 (Always)	2	3	4	5 (Never)
Newspapers	<input type="radio"/>				
Television	<input type="radio"/>				
Radio	<input type="radio"/>				
Magazines	<input type="radio"/>				
Other people	<input type="radio"/>				

**Degree of importance: \***

	1 (A lot)	2	3	4	5 (None)
Newspapers	<input type="radio"/>				
Television	<input type="radio"/>				
Radio	<input type="radio"/>				
Magazines	<input type="radio"/>				
Other people	<input type="radio"/>				

**Degree of adequacy: \***

	1 (Total)	2	3	4	5 (None)
Newspapers	<input type="radio"/>				
Television	<input type="radio"/>				
Radio	<input type="radio"/>				
Magazines	<input type="radio"/>				
Other people	<input type="radio"/>				

**9. Regarding nutrition, compared to the average person, would you say that you are \***

	1	2	3	4	5	6	7	
One of the most knowledgeable	<input type="radio"/>	One of the least knowledgeable						

**10. Several claims are being made on food packages. Please indicate whether you are more likely, less likely, or not affected by health claims if you believed the following about whatever you buy: \***

	More Likely	Less Likely	No Effect
Low in Calories	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
High in Fat	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
High in Unsaturated Fat	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Low in Saturated Fat	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Low in Cholesterol	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
High in Sodium or Salt	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Low in Carbohydrates	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
High in Dietary Fiber	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Low in Sugars	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
High in Protein	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Low in Vitamin A	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
High in Vitamin C	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
High in Calcium	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Low in Iron	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**11. Are you or any member of your household on any form of restrictive diet? Check all that apply. \***

- Myself
- Someone else in the family
- None

**12. Which of the following do you watch out for while grocery shopping? Check all that apply. \***

- Calories
- Unsaturated Fat
- Sodium or Salt
- Sugars
- Fat
- Saturated Fat
- Carbohydrates
- Protein
- Cholesterol
- Iron
- Dietary Fiber
- Vitamin A
- Calcium
- Vitamin C

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## GROCERY SHOPPING STUDY

\* Required

### SECTION C

Finally, we'd like some information for classification purposes only.

#### 1. Which category best describes your age? \*

- 18-24
- 25-34
- 35-44
- 45-54
- 55-64
- 65-74
- Above 74

#### 2. What is your marital status? \*

- Single
- Married
- Divorced
- Widowed

#### 3. What is your present employment status? \*

- Don't work
- Work full time
- Work part time
- Student
- Retired

**4. Including yourself, how many people are there in your household? \***

- 1
- 2
- 3
- 4
- 5 or more

**5. Including yourself, how many of the people in your household work outside the home? \***

- 1
- 2
- 3
- 4
- 5 or more

**6. What is your race? \***

- American Indian
- Black
- Asian
- Hispanic
- Caucasian White
- Other:

**7. What is the highest level of education you have attained? \***

- Less than high school
- High school
- Some college
- College graduate
- Graduate education

8. Which category best fits your household income for 2009? \*

- \$0-19,999
- \$20,000-39,999
- \$40,000-59,999
- \$60,000-79,000
- \$80,000-99,000
- \$100,000 and above.

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