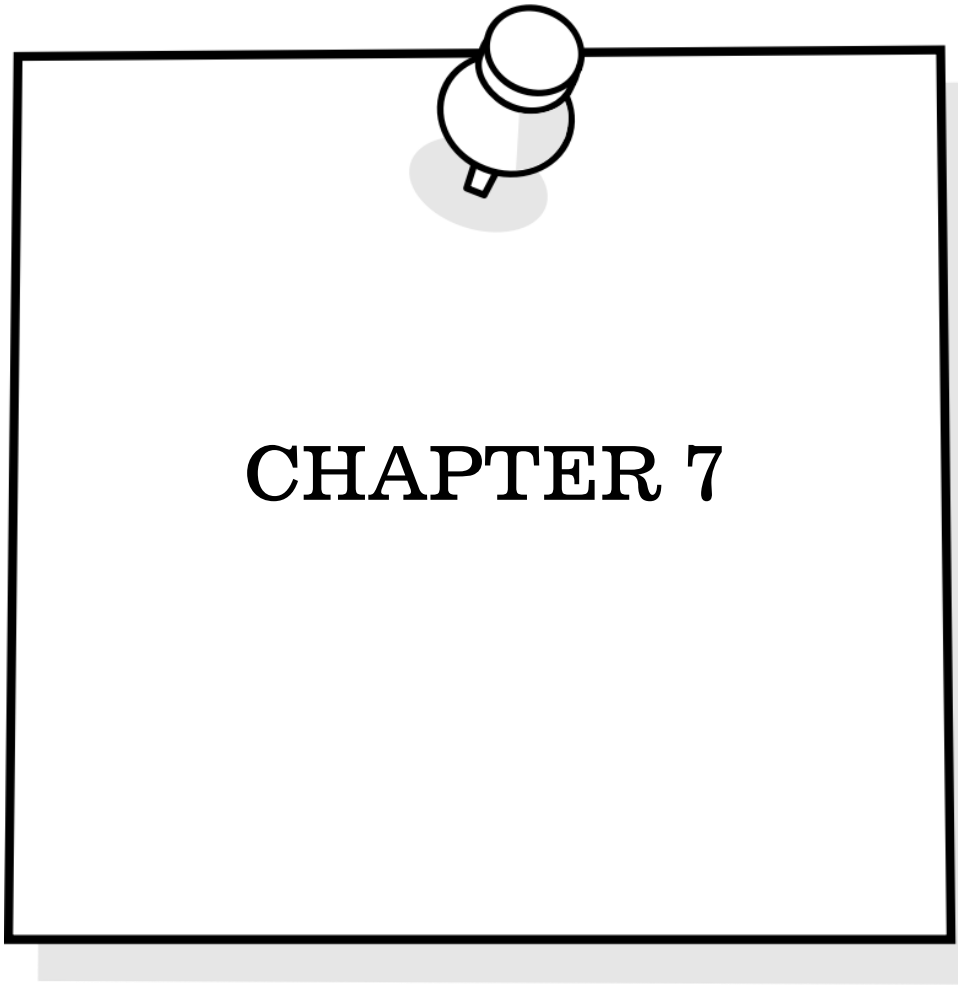

CHAPTER 7

ISBN: 978-625-6454-11-8

IMPACT OF DEMOGRAPHICS ON THE USE AND IMPORTANCE OF NUTRITION LABELS

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Introduction

There is a growing body of literature in consumer use of food labels because of the possible impact of nutritional information on people's health. In fact, governmental agencies are involved in most countries and regulate the content and size of food labels. Drichoutis, Lazaridis, and Nayga (2006) have compiled research studies on nutritional labeling in the areas of determining factors for consumer label use, preference on labeling formats, and the impact of label use on food purchase and dietary behavior. Similarly, Campos et al. (2011) systematically reviewed the nutrition label literature on prepackaged foods and concluded that there is a consistent relationship between the use of nutrition labels and healthier diets. Indeed, food labeling has become increasingly important in recent years so that, in some countries, food produces have begun placing warnings for certain food ingredients on labels (Söderlund et al., 2020). Similarly, in 2015, the World Health Organization (WHO) office of Europe published the European Food and Nutrition Action Plan 2015–2020, encouraging food producers to utilize the interpretative, consumer-friendly labelling on front of food packages (WHO 2015). A study conducted in Australia indicate that there is indeed public support for mandatory front-of-pack food labeling (Watson et al., 2021). In a meta-analysis (findings of 114 articles), Ikonen et al. (2020) determined that although front of package nutrition labels help consumers to identify healthier products, they do not necessarily lead them toward healthier products. Indeed, front of package labeling has gained popularity among

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consumers because of their simplifications, but further research is needed to determine the effectiveness of this kind of labeling (Bix et al., 2015).

Some of the label formats considered include 'traffic light" labeling, a simplified version of the "percent of daily value," bold text, colored nutrition information without decimals. According to Drichoutis et al. (2006), it appears that consumers prefer the 'traffic light" labeling format. Also, A study conducted in Australia and New Zealand showed that the traffic light labeling has strengths in helping consumers to identify healthier food options (White and Signal, 2012). An earlier study indicated that the percentage of daily-recommended values for all nutrients is the most beneficial format for dietary management (Levy et al., 1996). Indeed, this would be true if the serving sizes were standardized, but different serving sizes used on food labels make it very difficult for consumers to compare products and make choices. Graham et al. (2012) reviewed published studies that have used eye-tracking methodology and concluded that nutrition labels should be modified so that consumers can easily locate and comprehend nutrition information.

There have been proposals and experiments testing different forms of nutritional labels (e.g., numerical vs. verbal nutritional information, etc.,). In a study, shoppers showed a strong preference for presentation of nutrition information on store shelf-labels (Berning et al., 2010). Another study showed that consumers prefer the "per 100 grams" label type used in European Union Countries versus per serving type label used in the U.S. (Higginson et al., 2002). In an Australian study, overall, the colored star-only Health Star Rating (HSR) performed significantly better than black and white HSR for both choice and understanding food labels (Pettigrew et al., 2020). Using detailed, easily identifiable labels may become necessary for all manufacturers to compete in the marketplace as the average age and education of consumers increase, and they demand better labels.

Literature Review

It seems that there are attempts to reduce consumer risk by providing more information on food labels. A recent research examined consumer involvement with food labels and perceived risk with food nutrients listed on food labels, and found positive association between food label use and perceived risk in food nutrients for health (Karakaya and Saracli 2018). In an earlier research study, Kim et al. (2001) found that food label use has positive effect on diet quality.

ISBN: 978-625-6454-11-8

Most previous studies about consumer use of nutritional labels relate to Stigler's cost and benefit analysis (Stigler, 1961). If benefits of reading nutrition labels outweigh the costs, then consumer are likely to read nutrition labels. While Stigler's theory has a lot of merit, it is outdated. Today's consumers are more educated and are well aware of the importance of diet on their health. In fact, consumers read labels for a number of reasons including, product ingredients that affect health, serving size, calorie input information, direction for use, product expiration dates, warning information, and other reasons. In a review of research studies, Barreiro-Hurle et al. (2010) concluded that food label use is influenced by nutrition knowledge, individual factors, economic conditions, time constraints, health concerns, product involvement, and life styles. Of course, one may argue that food label use or the lack thereof may be related to consumers' having difficulty in understanding the information presented on them (Grunert and Wills, 2007). However, new advances in technology is now trying to make reading of food labels easier for consumers. The radio-frequency identification labels and two dimensional codes read by smart phone applications are now becoming more common and are utilized by consumers (Lowe et al., 2013). Nevertheless, the use of food label applications are still in their infancy stages and there has been no research about their effectiveness up to date.

Nutrition Label Use and Demographics

Previous studies show that not all consumers read food labels and the percentage of consumers who read them varies where Guthrie et al. (1995), Kreuter and Brennen (1997) studies showed that 71%, and 80% of consumers read nutrition labels respectively. Surprisingly, the percentage of people reading nutrition information declined to 51% in the U.S. (see Toops, 2006). However, these numbers are still high compared to some European countries. For example, in a study of six countries, UK, Sweden, France, Germany, Poland, and Hungary, on average 16.8% of the respondents used nutrition labels in stores. The highest percentage was in UK (27%) while the lowest was in France (8.8%) (Grunert, et al., 2010). A more recent study conducted in India showed that 75% of the respondents read food labels before purchase of food products, and 55 percent of the respondents thought that food labels influenced their food purchase decisions (Kumar and Kapoor, 2017). Drichoutis et al. (2006) claim that previous research show conflicting findings on the impact of demographics on nutritional label use. While some studies have found age to have positive effect on using nutrition labels (see for example, Coulson 2000; Drichoutis, et al., 2005; Lin and Lee 2003; Vemula et al., 2014), other studies have shown just the opposite (see Bender and

Derby 1992; Burton and Andrews 1996; Kumar and Kapoor 2017; Kim et al., 2001). Literature review also indicates that education and being female have positive effects in nutrition label use (see Drichoutis et al., 2005; Guthrie et al., 1995; Kim et al., 2001). One of the earliest studies about the impact of demographics on food label use found that consumers who are most likely to read labels are older, economically well off and have a higher than average level of education (Mueller, 1991). In addition, women are more inclined to read labels than men (Campos et al., 2011; Cowburn and Stockley, 2005). It was also determined that children, adolescents and older adults who were obese had very low use of nutrition labels (Campos et al., 2011). In addition, the same study indicated that older adults, adolescents, infrequent label users and those with less education have difficulty with quantitative information presented on labels, including recommended daily amounts, percent of daily values, serving sizes, and other types of reference information on nutrition labels. An exploratory study interviewing 130 participants in federal food assistance programs and 51 low-income nonparticipants found that most of the people surveyed did not read food labels (McArthur et al., 2001). Similarly, a more recent study that was conducted in India found that consumer household income had a significant influence on reading of food labels (Kumar and Kapoor, 2017). However, the final decision to purchase a product based on the food labels varied significantly based on the consumers' gender, age, food habit, and residential locality. An earlier study conducted in India in 2009 (Ali and Kapoor, 2009) showed that educated male consumers of young age, belonging to higher income groups and living in comparatively larger cities require more technical information on a food label as compared with others. In Thailand, researchers found that income, and gender were strongly associated with nutrition label reading, understanding, and using nutrition labels (Rimpeekool et al., 2017).

Most of the studies dealing with nutrition labeling have been conducted in the U.S. because of government regulation. Most other countries, especially the ones in the developing world economies, do not have mandatory nutrition label requirements. For example, India is one of such countries where a study of this topic showed that income level, size of household, number of children and age did not play a role in the usage of nutritional labels by the consumers (Singla, 2010).

Similarly, a study conducted in Turkey found differences among people living in different district of a city in understanding of the nutritional labels (Aygen, 2012). Further information from this research indicated that the differences in the city districts in Turkey were likely to translate to income and education affects.

In a large study, in Thailand, Rimpeekool et al. (2017) studied 42,750 distance learning Open University adults aged 23-96 years. Females, older persons, and professionals were found to be frequent users of food labels and were less likely to consume unhealthy foods. A more recent study (Kumar and Kapoor, 2017) conducted in India examining the relationship between demographics and people's reading of food label showed that gender difference was significant in reading food labels. More female consumers paid attention to food labels as compared males. Age and education did not influence reading of food labels. A large study (over 30,000 people) conducted in Malaysia showed that younger individuals were more likely to read fat and sugar content information on food labels. Similarly, more educated people were more likely to read fat and sugar information while smokers were less likely to read fat and sugar content information (Cheah et al., 2015).

As people get older, they are more concerned about their health and gain education/ knowledge about nutrition impact on health. Higher income levels influence people to ignore price tags and focus their attention to health benefits and nutritional facts (both positive and negative). Drichoutis et al. (2006) claim that nutrition knowledge can affect nutritional label use, but it is also possible for label use to affect nutrition knowledge. Some studies question consumer knowledge and ability to fully utilize nutrition labels. For example, a study showed that consumers have difficulty in distinguishing between sugar and carbohydrates, and sodium and salt (Co-operative Wholesale Society, 2002). These issues are highly likely to be related to consumer education. For example, someone who has never been exposed to high school or college courses that teach nutrition knowledge would have difficult time in understanding the nutrition information on food labels. Indeed, in a comprehensive literature review, Hieke and Taylor (2012) concluded that most consumers do not have the nutritional knowledge to comprehend information on certain nutrients, and their effects that on biological processes. However, Drichoutis et al. (2005) indicate that individuals' characteristics moderate food label usage. Previous studies measuring the impact of demographics have conflicting findings. As seen above some state that age, education, income, and gender impact consumer use of food labels, but others state the opposite. Therefore, we attempt to shed more light on the topic by testing the impact of demographics including, age, education, income, gender, family size, and being household primary shopper by using rigorous statistical procedures that go beyond descriptive analysis, and state the following hypotheses:

H_1: Demographics including, age, education, income, gender, family size, and being primary household shopper have impact on consumers' reading food labels.

We note that consumer involvement with food labels is more than just reading food labels, and includes, understanding nutrients, and food serving size. Therefore, as a subset of the above hypothesis, we also hypothesize that demographics impact consumers' reading of food labels and state the following:

H_{2a}: Demographics including, age, education, income, gender, family size, and being primary household shopper have impact on consumer involvement with food labels.

H_{2b}: Demographics including, age, education, income, gender, family size, and being primary household shopper have impact on consumer involvement with food labels among those who read food labels.

H_{2c}: Demographics including, age, education, income, gender, family size, and being primary household shopper have impact on consumer involvement with food labels for those who do not read food labels.

H_{3a}: Demographics including, age, education, income, gender, family size, and being primary household shopper have impact on perceived risk associated with nutrients.

H_{3b}: Demographics including, age, education, income, gender, family size, and being primary household shopper have impact on perceived risk associated with nutrients for those who read food labels.

H_{3c}: Demographics including, age, education, income, gender, family size, and being primary household shopper have impact on perceived risk associated with nutrients for those who do not read food labels.

H_{4a}: Demographics including, age, education, income, gender, family size, and being primary household shopper have impact on perceived risk associated with food serving sizes.

H_{4b}: Demographics including, age, education, income, gender, family size, and being primary household shopper impact on perceived risk associated with food serving sizes for those who read food labels.

H_{4c}: Demographics including, age, education, income, gender, family size, and being primary household shopper have impact on perceived risk associated with food serving sizes for those who do not read food labels.

ISBN: 978-625-6454-11-8

Methodology

Data

Three hundred panel members from Qualtrics Internet Survey Panel served as participants and were randomly selected for an online survey. Food label readers and non-readers were selected so that the two groups could be compared. 1,900 people attempted to participate in the survey. However, 161 did not fully complete the survey, and 64 were excluded from the analysis because of failing to pass attention filters. The survey system continued to invite people to take the survey until 200 food label readers and 100 non-readers completed the survey. Once the desired quota limits were reached people asked not to complete the survey (1,375 people). A total of 1675 people attempted complete the survey– 200 people reading food labels and 100 people not reading food labels completed the survey while 1,375 people were asked not to complete the survey. Limiting the sample size to 300 people was mainly due to our research budget. Qualtrics Survey System tried to select a sample that is representative of U.S. population who is over the age of 18. One of the most recent studies (see Mohr et al., 2012) on this subject matter also utilized the same Internet survey panel (Qualtrics).

Sample

The majority of the participants in this study were in the age category of 41-55 (30%) followed by the age category of 25-40 (28%). Approximately eighty-five percent of the respondents were primary food shopper for their households. Fifty Percent of the respondents was male. Fifteen percent of the respondents had annual household income of $15.000 or lower while 5.7% had income levels of $100,000 or higher. The majority of the participants were from the household size of two (36.7%). Approximately forty three percent of the respondents has annual household income of $25,000 - $60,000 while 27% has over $60,000. In terms of education, 22.7% of participants had college degrees while 10% had graduate degrees. Eighty-five percent of the respondents were primary shoppers for their household and 37 percent of the households had had household size of two while 41 percent had 3 or more people per household.

Instrument

An Internet survey was developed using the Qualtrics Survey portal. The questions included the nutrients present on food facts labels as well as the importance of food serving size for major category of foods including, breakfast

cereal, pasta, potato chips, snack foods, candy bars, prepackaged vegetables, prepackaged meats, bread. Both categories of products label panels were measured on a five-points Likert scale ranging from very important to not important at all. For example, the importance of all nutrients (e.g., sugar, fat, salt, cholesterol, etc.,) and the importance of serving sizes for certain category of products (e.g., bread, snack food, etc.;) were measured on a five-point scale ranging from not at all important (1) to very important (5). Variables related to consumer involvement with nutrition information and food serving sizes were measured on a five-point scale ranging from never (1) to always (5).

In an attempt to confirm the negative nutrients identified in the literature, we performed a factor analysis on the fallowing variables. Calories, cholesterol fat, carbohydrates, sodium and sugar. These six variables loaded to a single factor (perceived risk associated with nutrients) with a clean factor structure. In the same factor analysis, seven variables dealing with serving sizes were included. These seven variables also loaded to a single factor (perceived risk associated with serving size) as well. In measuring consumer involvement with food labels, another factor analysis was conducted using four variables. These variables also loaded to a single factor.

Results

As indicated earlier, we selected a total of 300 consumer panelist 200 of whom read food labels and 100 of whom do not read food labels These numbers do not represent the percentage of people who actually read or do not read food labels. We calculated the percentage of the people who read and who do not read food labels by weighting the percentage of the sample who read/do not read nutrition labels using the type of panel members who agreed to participate in the study. This calculation showed that 80 per cent of the consumer panelist in this study reads food labels.

Hypothesis Test Results

In an attempt to test the impact of demographic variables on consumers who read nutrition labels (*H1*), we employed Chi-Square Automatic Interaction Detection (CHAID) analysis. The results show that in general, those who read nutrition labels have higher education levels. Annual household income has a positive impact on people with lower education levels in reading nutrition labels ($\chi^2_{(4)} = 83.97$, $p < .01$). In other words, those people with lower education, but higher income levels tend to read nutrition labels. Also, those consumers who

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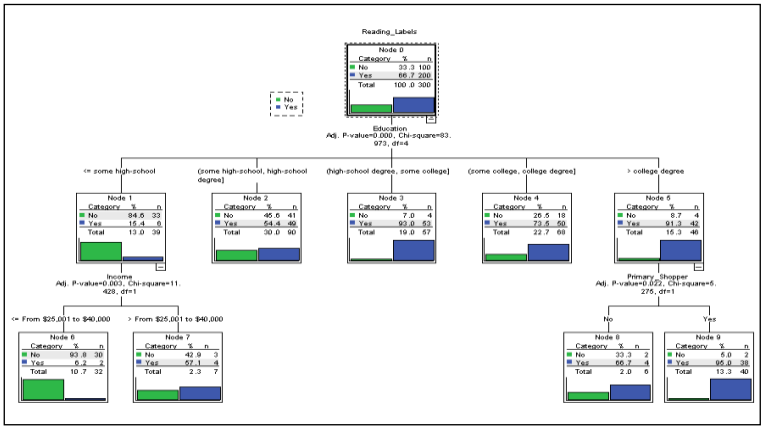
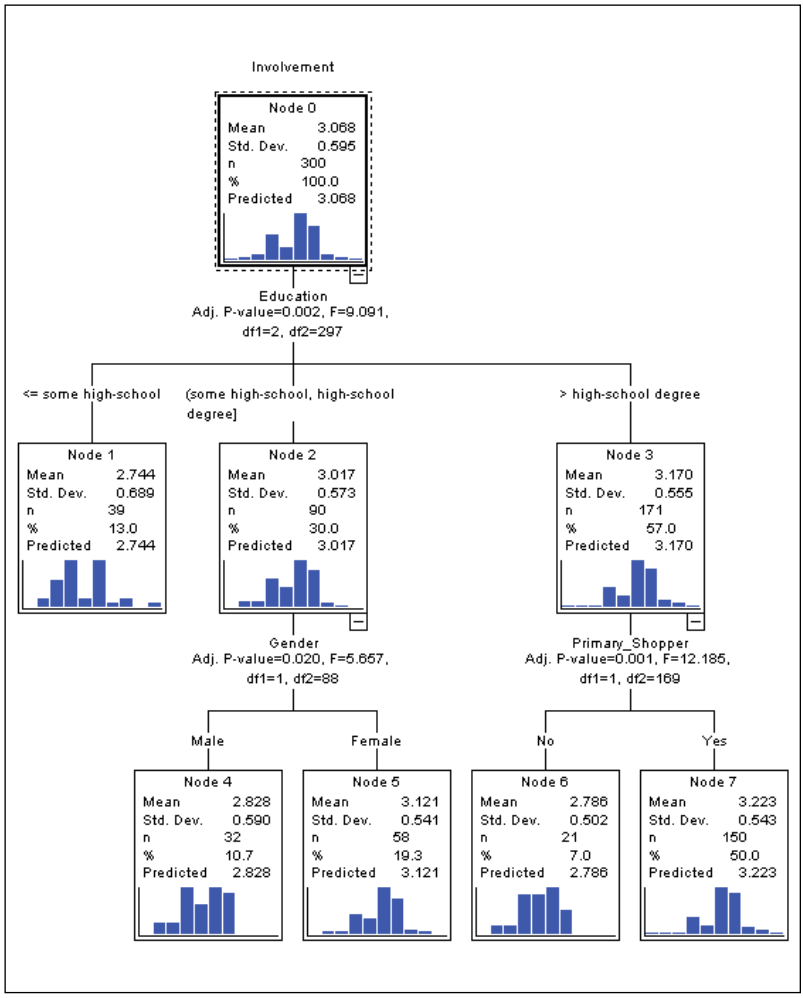
have higher than college degrees and who are primary household shoppers read nutrition labels (see Figure 1)

Figure 1. Impact of Demographic Variables on Consumers' Reading Nutrition Labels



In testing the impact of demographics on consumer involvement with food labels (H_{2a}), we again used CHAID analysis. The results indicate that education is important in influencing consumers' involvement with nutrition labels ($F_{2,297}$=9.09, p=0.002). Those consumers who have education level higher than high school degree (mean =3.17) are more involved with nutrition labels compared to other educational categories (high school and lower than high school). Female consumers with high school degrees are more involved with nutrition labels, compared to male consumers with mean scores of 3.12 and 2.82 respectively ($F_{1,88}$=5.657, p=0.02). For more details see Figure 2.

Figure 2. Impact of Demographic Variables on Consumers' Involvement with Nutrition Labels



In testing the impact of demographics on consumer involvement with food labels for those who read nutrition labels (H_{2b}), the CHAID analysis indicate that, being a primary shopper has a significant impact on consumer involvement with nutrition labels. ($F_{1,198}$=6.683, p=0.01). Of the primary shoppers, those consumers who are 55 years old and younger are more involved with nutrition labels compared to consumers over 55 years old with mean scores of 3.40 and 3.22 respectively (for more details see Figure 3).

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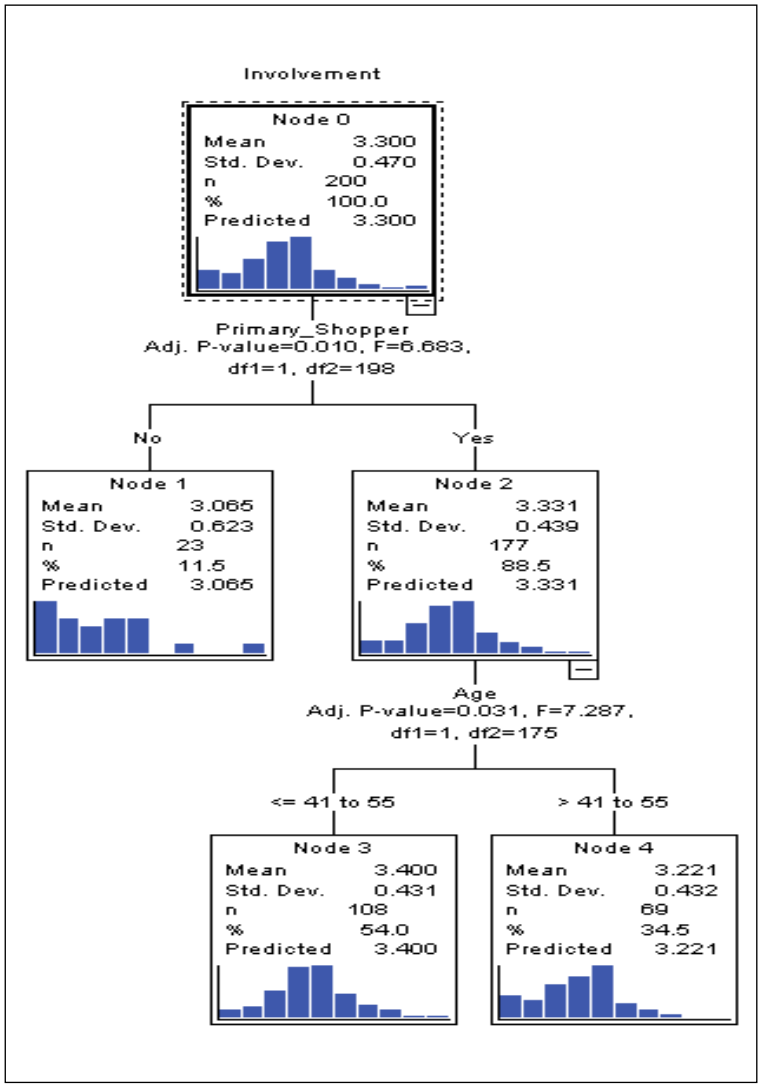
Figure 3. Impact of Demographic Variables on Consumers' Involvement who Read Nutrition Labels

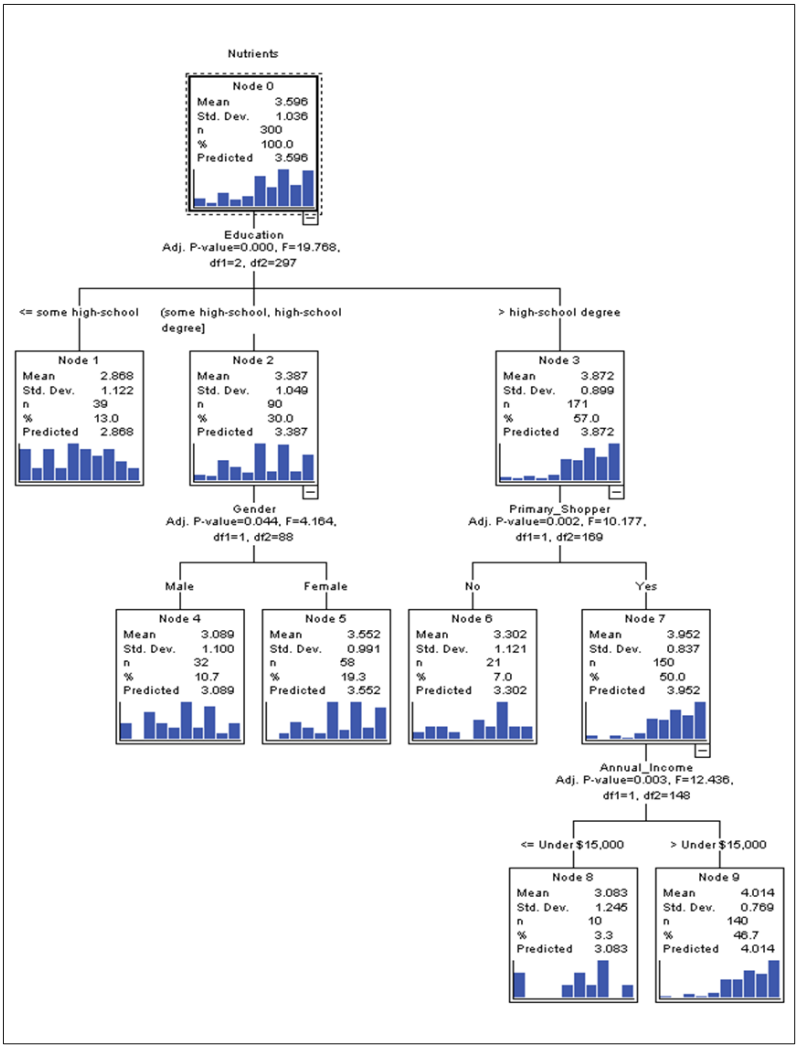


In testing hypothesis H_{2c}, impact of demographics on consumer involvement with food labels for those who do not read nutrition labels, we again utilized CHAID analysis. The results indicated that none of the demographic variables has any impact on consumer involvement with nutrition labels.

In testing the impact of demographics on perceived risk associated with nutrients (H_{3a}), we used CHAID analysis. The results indicate that education is

important as H_{2a}, for consumers whose education level is higher than high school degree. Of this group of consumers, being a primary shopper and having annual income from $15.000 to over $100.000 perceive more risk due to food nutrients (see Figure 4).

Figure 4. Impact of Demographic Variables on Consumers' Perceived risk Associated with Nutrients



The test of hypotheses H_{3b}, and H_{3c}, the impact of demographics on perceived risk associated with nutrients for those who read or do not read nutrition labels

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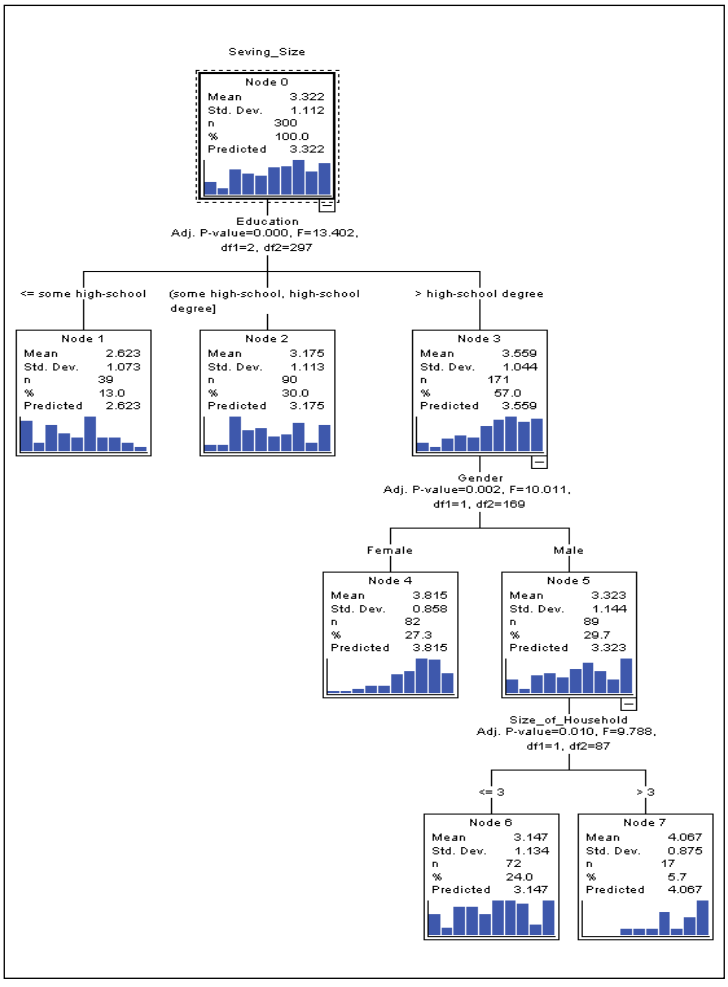
respectively show that none of the demographic variables has any statistically significant effect. These results were obtained using CHAID analysis.

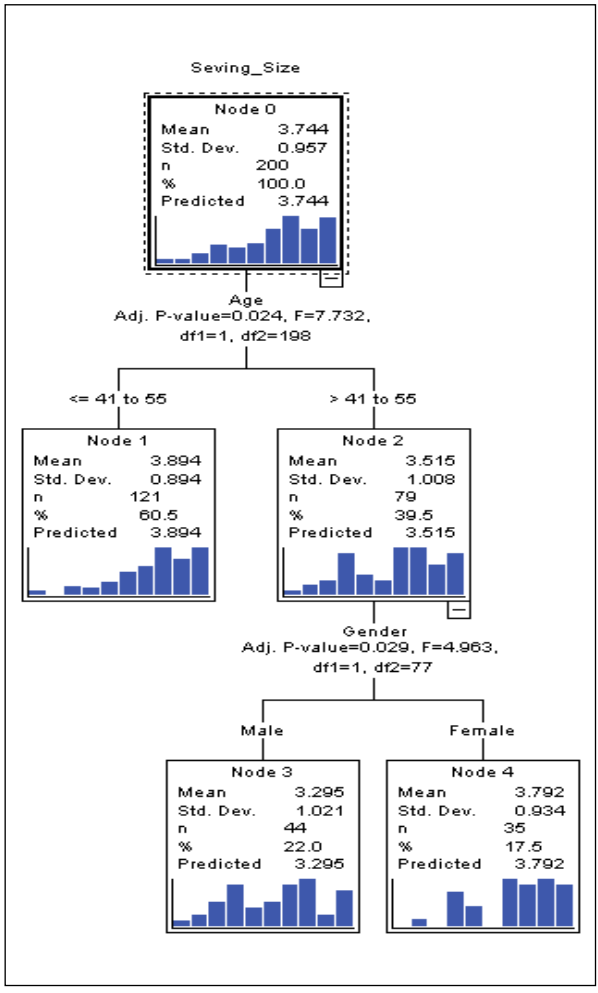
As indicated in the hypothesis (H_{4a}) we tested the impact of demographics on perceived risk associated with food serving sizes by using CHAID analysis. The results indicate that education is important ($F_{2,297}$=13.402, p=0.0001). Those consumers whose education level is higher than high school degree and whose gender is male ($F_{1,169}$=10.01, p=0.002) with household size ($F_{1,87}$=9.78, p=0.01) more than three, consider the importance of serving size as more important compared to other consumer categories (see Figure 5)

Figure 5. Impact of Demographic Variables on Consumers' Perceived risk Associated with Serving Size



CHAID analysis results (Figure 6) showed that age and gender are the two demographic variables that impact consumers' reading nutrition labels and considering food serving size as more important than other demographic consumer categories (H_{4b}). Consumers who are older than 55 place less importance on food serving size ($F_{1,198}$=7.73, p=0.024). Of this same age group, female consumer place more importance on serving size compared to males ($F_{1,77}$=4.96, p=0.029).

Figure 6. Impact of Demographic Variables on Consumers' Perceived Risk Associated with Serving Size for Consumers who Read Nutrition Labels

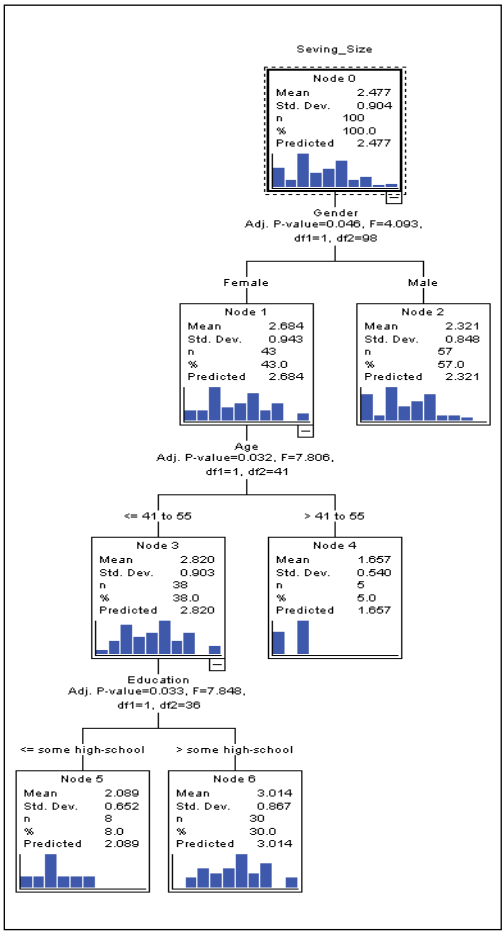


Once again female consumers place more importance on perceived risk associated with food serving size despite the fact that they do not read nutrition

ISBN: 978-625-6454-11-8

labels (H_{4c}), ($F_{1,98}$=4.09, p=0.046).Of this female group just mentioned, those who are 55 years old or lower place more importance on perceived risk associated with food serving size compared to other age groups ($F_{1,41}$=7.806, p=0.032). Those consumers who are female with the age category of 55 or lower with education level some high school and less than some high school place less importance (mean= 2.089) on perceived risk associated with food serving size($F_{1,36}$=7.847, p=0.032). In other words, female consumers with the age category higher than 55 and educational level high school and higher than high school give more importance (mean= 3.014) on perceived risk associated with food serving size(see Figure 7).

Figure 7. Impact of Demographic Variables on Consumers' Perceived Risk Associated with Serving Size for Consumers who do not Read Nutrition Labels



Discussion And Conclusions

As we indicated earlier, 80% of the consumer panellists in this study reads food labels. This finding is very much similar to the findings of the previous studies showed that 71%, and 80% of consumers read nutrition labels respectively (Guthrie et al., 1995; Kreuter and Brennen, 1997), but much higher than the study finding of Toops (2006) who had shown that 51% of consumers read food labels. In fact, a study conducted by Grunert, et al., (2010) showed even much lower percentages in various European countries as discussed in the literature review section.

Detailed analysis of the demographic variables and their impact on consumer involvement, perceived risk associated with nutrients, and perceived risk associated with food serving size showed some interesting results. As shown in the results section, demographic variables such as education, annual income, and being primary shopper have influence on consumers reading nutrition labels. Those consumers who have higher education levels and higher income levels tend to read nutrition labels compared to those who have low education and low-income levels. In addition, being a primary shopper in a household also affects reading of nutrition labels.

One can develop the profile of those people who are more involved with nutrition labels as female, 41-70 years old, with higher education degrees, higher income levels, household size of 6, and being primary shoppers. Education and gender variables are consistent with previous studies (see Drichoutis, Lazaridis, and Nayga 2005; Guthrie et al., 1995; Kim et al., 2001). The higher income levels is consistent with Kumar and Kapoor (2017), Mueller (1991), and Rimpeekool et al. (2017), but it is in contrast with (Singla 2010). The similar profiles also apply to perceived risk associated with nutrients and perceived risk associated with serving size with the exception of the age category of 56-70. In other words, people in the age category 56-70 place more importance on food nutrients.

When we examine the impact of demographic variables on consumer involvement with food labels we see a common pattern. Female and more educated people are more involved with food labels. In addition, of those who read nutrition labels consumers who are primary household shoppers and with the age category of 55 and lower are more involved with nutrition labels. Interestingly, involvement with nutrition labels is not related to any demographic variables for those consumers who do not read nutrition labels. This finding is not unusual since this group of consumers have little or no interest in reading nutrition labels.

Managerial Implications

Governments and food manufacturers can develop educational programs targeted to especially those consumers who do not read nutrition labels (e.g., male, low income and low education consumers). By education the consumers, companies will, in fact, become more competitive with their products and distinguish themselves. Of course, governments will improve health conditions and reduce health care cost due to obesity and uneducated use or non-use of food labels.

Limitations And Future Research

While most of the results are consistent with previous studies in other countries this research only applies to the U.S.A. As indicated, food labels and their contents are important in consumer decision making and ultimately in affecting people's health. Therefore, the accuracy and readability of food label information need continuous attention and research by governmental agencies and researchers involved not just in the developed countries but in other parts of the world as well.

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