FREQUENCY OF AND FACTORS ASSOCIATED WITH NUTRITION FACTS LABEL USE AMONG ADULTS
A RESEARCH PROJECT
SUBMITTED TO THE GRADUATE SCHOOL
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE
MASTER OF ARTS
BY
STACEY GRIFFITH
ADVISOR – JAMES F. MCKENZIE, Ph. D., MPH, CHES
BALL STATE UNIVERSITY
MUNCIE, INDIANA
MAY 2009
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>INTRODUCTION…………………………………………………………………………………1</td>
</tr>
<tr>
<td></td>
<td>Statement of the Problem…………………………………………………………………3</td>
</tr>
<tr>
<td></td>
<td>Purpose of the Study……………………………………………………………………...3</td>
</tr>
<tr>
<td></td>
<td>Questions to be Answered………………………………………………………………..4</td>
</tr>
<tr>
<td></td>
<td>Delimitations of the Study………………………………………………………………4</td>
</tr>
<tr>
<td></td>
<td>Limitations of the Study…………………………………………………………………5</td>
</tr>
<tr>
<td></td>
<td>Assumptions of the Study…………………………………………………………………5</td>
</tr>
<tr>
<td></td>
<td>Definition of Terms………………………………………………………………………...5</td>
</tr>
<tr>
<td></td>
<td>Significance of the Study………………………………………………………………..7</td>
</tr>
<tr>
<td>2.</td>
<td>METHODOLOGY…………………………………………………………………………………8</td>
</tr>
<tr>
<td></td>
<td>Introduction…………………………………………………………………………………...8</td>
</tr>
<tr>
<td></td>
<td>Design of Study……………………………………………………………………………...8</td>
</tr>
<tr>
<td></td>
<td>Arrangements for Conducting the Study…………………………………………………..8</td>
</tr>
<tr>
<td></td>
<td>Procedures for Conducting the Study……………………………………………………9</td>
</tr>
<tr>
<td>3.</td>
<td>REVIEW OF LITERATURE…………………………………………………………………...17</td>
</tr>
<tr>
<td></td>
<td>Introduction…………………………………………………………………………………17</td>
</tr>
<tr>
<td></td>
<td>History of Nutrition Facts Labels………………………………………………………17</td>
</tr>
<tr>
<td></td>
<td>The Nutrition Labeling and Education Act of 1990……………………………………..18</td>
</tr>
<tr>
<td></td>
<td>Potential Health Benefits Associated with Nutrition Facts Label Use………………21</td>
</tr>
<tr>
<td></td>
<td>Nutrition Facts Label Use among Adults…………………………………………….28</td>
</tr>
</tbody>
</table>
Summary.................................................................................................................48

4. RESULTS, DISCUSSION, CONCLUSIONS, RECOMMENDATIONS......50
  Results................................................................................................................50
  Discussion.........................................................................................................52
  Conclusions......................................................................................................58
  Recommendations for Implementation..............................................................59
  Recommendations for Further Research.........................................................61
  References........................................................................................................63
CHAPTER I

THE PROBLEM

Introduction

Proper nutrition is a critical component of human growth, development, and overall health. Although the global population as a whole is more prosperous than ever, malnutrition remains a leading public health problem throughout the world. The World Health Organization (WHO) defines malnutrition as “an imbalance, either a deficiency or an excess, of the nutrient intake needed to sustain a healthy life” (WHO, 2007, ¶ 2). As the definition implies, this imbalance can include consuming too many nutrients (overnutrition), too few nutrients (undernutrition), or the inability to properly digest and absorb nutrients due to disease or illness (secondary malnutrition). All forms of malnutrition increase the risk of acquiring both infectious and noninfectious diseases, and can ultimately lead to premature death.

In general, adults in the United States struggle simultaneously with undernutrition and overnutrition. According to the United States Department of Agriculture (USDA), although most adults consume more than the recommended 2,000 calories per day, they do not consume adequate amounts of calcium, potassium, fiber, magnesium, and vitamins A, C, and E (2007). Consuming the recommended amount of calcium has been shown to prevent osteoporosis, while recommended amounts of fiber and vitamin consumption...
have shown to reduce the risk of heart disease and certain forms of cancer (Food and Drug Administration [FDA] 2007). Furthermore, overweight and obesity are increasing at alarming rates in the United States. An estimated 64 million (66%) U.S. adults are overweight or obese, and approximately 17% of children and adolescents are overweight (Centers for Disease Control and Prevention [CDC], 2007). Based on these rates, it is no surprise that obesity and malnutrition are linked to the two leading causes of death in the United States —cardiovascular disease and cancer (American Heart Association [AHA], 2007; American Cancer Society [ACS], 2007). Other harmful conditions associated with malnutrition in the United States include hypertension, dyslipidemia, type II diabetes, diverticular disease, iron deficiency anemia, and oral disease (USDA, 2007).

To address malnutrition, the *Dietary Guidelines for Americans* (also known as Dietary Guidelines) were developed by the U.S. Department of Health and Human Services (HHS) and the USDA to provide simple recommendations for healthy eating that could be easily adopted by the general public. The FDA also formulated a percent Daily Value (DV) for the vital nutrients needed to sustain healthy living. Both the DV and the Dietary Guidelines are used today by many health professionals, including nutritionists, registered dieticians (RDs), physicians, and health educators to educate and guide individuals toward a healthy diet. However, these tools are also used to form the basis of Nutrition Facts labels.

Nutrition Facts labels were developed in 1973 by the FDA as a tool to address a growing concern for nutrition deficiencies in the United States. The labels were initially voluntary tools for manufacturers to place on products that would provide consumers with nutrient information pertaining to the foods they purchase and consume. However,
today Nutrition Fact labels appear on almost all pre-packaged foods in the United States. Laws regarding label implementation have significantly changed and the format of the label has been drastically improved due to consumer and professional demand. The potential benefits of Nutrition Facts label use have been speculated but remain unclear.

The use of Nutrition Facts labels to help control weight and improve malnutrition among U.S. adults is now recognized by the FDA, HHS, and USDA. A recent program introduced by the FDA entitled Make Your Calories Count (FDA, 2007) includes a tutorial of Nutrition Facts labels and basic nutrition information. It was designed to enhance the general public’s understanding and utilization of the Nutrition Facts label, and to encourage people to use the label to help achieve proper weight management (FDA, 2007). The HHS’s Progress Review: Nutrition and Obesity (2008) assessed the progress of Healthy People 2010’s objectives regarding nutrition and overweight. This review recognized Nutrition Facts labels as an “important tool in helping consumers construct healthful diets” (USDHHS, 2008, p. 3). However, how often consumers actually utilize Nutrition Facts labels and what factors impact their use remain unclear.

Statement of the Problem

The focus of this study was to examine the literature to determine the frequency of and the factors associated with the use of Nutrition Facts labels among adults in the United States.

Purpose of the Study

The purpose of this study was to examine how much Nutrition Facts labels are used and to determine what variables, if any, influence label use among adults in the United States. Although nutrition labels provide simple, reliable, and easily accessible
tools to help consumers track the nutrients they consume, it remains unclear whether these tools are being utilized and what factors impact their use. Understanding these factors will be useful for health professionals such as health educators, nutritionists, registered dieticians, and physicians, who educate individuals and groups regarding healthy eating. In addition, findings can help guide future approaches to nutrition education and the direction of future research.

Questions to Be Answered

1. How much are Nutrition Facts labels being used by adults in the United States?

2. What factors influence Nutrition Facts label use?

3. Are Nutrition Facts labels used more in certain segments of the population and if so, why?

Delimitations

This study was delimited in the following ways:

1. Literature used for this research project was located using the databases listed on the Ball State University Library webpage.

2. Only literature published between 1994 and 2008 was used for this research project.

3. Literature reviewed for this research project included only peer-reviewed articles and documents from government and private agencies.

4. Only literature published in the English language and conducted in the United States was used for this research project.

5. Only databases that produced full-text articles were used for this research project.
Only literature that reported on research that included participants aged 18 years and over for this research project.

Limitations

This study was limited in the following ways:

1. Literature used for research was limited to that available on the Ball State University database webpage.

2. Not all literature regarding the use of Nutrition Facts labels may appear in peer-reviewed journals and documents from government and private agencies.

3. Some of the literature may report on local studies and not be generalizable to a national population.

Assumptions

The basic assumptions of this study included:

1. The literature analyzed for this research paper was presented in an unbiased fashion.

2. The literature was current, accurate, and complete.

3. The researcher correctly interpreted the content of the literature.

Definition of Terms

The following terms were defined for use in this study:

1. Calorie – A unit of energy found in food (NIH, 2007).

2. Dietary Guidelines for Americans – nutritional and dietary information and guidelines for the general public based on the preponderance of scientific and medical knowledge (Spence, 2003).
3. Daily Value (DV) – “a dietary reference value to help consumers use food label information to plan a healthy overall diet, comprised two sets of reference values for nutrients: Daily Reference Values, or DRVs, and Reference Daily Intakes, or RDIs” (USDA, 2008, p. 1).

4. Health Claims – Health claims describe a relationship between a food, food component, or dietary supplement ingredient, and reducing risk of a disease or health-related condition (USDA, 2003).

5. Malnutrition – “an imbalance, either a deficiency or an excess, of the nutrient intake needed to sustain a healthy life” (WHO, 2007, ¶ 2).

6. Nutrient - a substance in food that contributes to growth and health; examples are protein and calcium (FDA, 2007).

7. Nutrient Content Claims – label claims that characterize the level of nutrient in a food made in accordance with the FDA’s authorizing regulations (USDA, 2003).

8. Nutrition Facts label – the label that gives the serving size, servings per container, calories per serving and information on some nutrients (FDA, 2007).

9. Obesity – An adult who has a BMI between 30 or higher (CDC, 2008).

10. Overweight – An adult who has a BMI between 25 and 29.9 (CDC, 2008).

11. Overnutrition – An imbalance caused by consuming more nutrients than the body needs for optimal functioning (WHO, 2007).

12. Secondary malnutrition – The body’s inability to properly digest and absorb nutrients due to disease or illness (WHO, 2007).

13. Undernutrition – An imbalance caused by consuming less nutrients than the body needs for optimal functioning (WHO, 2007).

Significance of the Problem

According to the USDA, most American adults consume more than the recommended 2,000 calories per day, but do not consume adequate amounts of vital nutrients, including calcium, potassium, fiber, magnesium, and vitamins A, C, and E (2007). One approach used to address malnutrition has been the utilization of Nutrition Facts labels, which provide simple, convenient tools for individuals to track the nutrients they put into their body.

The use of Nutrition Facts labels to help control weight and improve malnutrition among U.S. adults has been advocated by the FDA’s program *Make your calories count* (FDA, 2007). This program includes a tutorial of Nutrition Facts labels and basic nutrition information. It was designed to enhance the general public’s understanding and utilization of the nutrition label, and to encourage people to use the label to help achieve proper weight management (FDA, 2007). While achieving weight management and acquiring proper nutrition are the goals the FDA has for Nutrition Facts labels, it is unclear whether the label has actually been helping U.S. adults achieve these goals. In a study by Rasberry Chaney, Housman, Misra, and Miller (2007), some young adults reported using the Nutrition Facts label for weight control. In another study, Neuhouser, Kristal, and Patterson (1999) found that the use of Nutrition Facts labels was associated with lower fat intake, but they did not assess the relationship between label use and actual body weight and/or mass. The current research project will examine the literature to
investigate the frequency of Nutrition Facts label use and determine what variables, if any, influence label use among adults in the United States.
CHAPTER II

METHODOLOGY

Introduction

The problem of this study was to examine the literature to determine the frequency of and factors associated with the use of Nutrition Facts labels among adults in the United States. This chapter presents the methods used to investigate the problem and includes the following sections: 1) design of the study, 2) arrangements for conducting the study, 3) procedures for gathering data and information from the review of literature, and 4) data analysis.

Design of the Study

This study was conducted as an in-depth literature review. Information was gathered from two types of sources including: 1) peer-reviewed journals, and 2) documents from governmental and private agencies.

Arrangements for Conducting the Study

To conduct this study, the researcher met with her advisor to discuss goals and parameters of the study. It was determined that the study would be comprised of four chapters. Chapter I introduced the problem and sub-problems. Chapter II outlined the methods used to conduct the study. Chapter III entailed a thorough review of literature. Chapter IV analyzed and discussed the literature reviewed and important findings, as well
as limitations of the findings, conclusions, and recommendations and implementation for future research.

**Procedures**

The first step taken to complete this study was to identify appropriate literature through the databases available via the Ball State University libraries webpage. The researcher examined all possible health-related databases through the following webpage: http://www.bsu.edu/libraries/electronicsresources/databases.asp. The researcher started with the letter “A” and continued through the alphabet of databases to identify those which were appropriate. Fourteen health-related databases were identified and compiled into a six column, 15 row database chart (see Table 1). The researcher listed all 14 databases in alphabetical order and detailed the name of the database, publisher, subject heading, time period for indexing, type of materials indexed, and the type of information included in each database.

<table>
<thead>
<tr>
<th>Database</th>
<th>Publisher</th>
<th>Subject heading</th>
<th>Time period</th>
<th>Type of documents</th>
<th>Information included</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic Search Premier</td>
<td>EBSCO</td>
<td>General, Philosophy, Religion</td>
<td>1965-present</td>
<td>Journal articles</td>
<td>Abstracts, some full-text</td>
</tr>
<tr>
<td>Annual Reviews</td>
<td>Annual Reviews</td>
<td>Health, psychology, science, social</td>
<td>1930-present</td>
<td>Annual reviews</td>
<td>Some full-text</td>
</tr>
<tr>
<td>CINAHL</td>
<td>EBSCO</td>
<td>Health (nursing)</td>
<td>1982-present</td>
<td>Journal articles</td>
<td></td>
</tr>
<tr>
<td>Database</td>
<td>Publisher</td>
<td>Collection Type</td>
<td>Date Range</td>
<td>Types of Material Available</td>
<td>Types of Documents Available</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-----------</td>
<td>------------------</td>
<td>---------------------</td>
<td>---------------------------------------------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>EBSCO E-Journals</td>
<td>EBSCO</td>
<td>General</td>
<td>1900’s-present</td>
<td>Journal articles</td>
<td>Abstracts, full-texts</td>
</tr>
<tr>
<td>Google Scholar</td>
<td>Google</td>
<td>General, Philosophy, Religion</td>
<td>Varies</td>
<td>Journal articles, citations</td>
<td>Abstracts, citations</td>
</tr>
<tr>
<td>Health Source: Nursing/Acad Edition</td>
<td>EBSCO</td>
<td>Health (Nursing &amp; general)</td>
<td>1975-present</td>
<td>Journal articles, reference books, pamphlets</td>
<td>Abstracts, full-texts</td>
</tr>
<tr>
<td>Medline (EBSCOhost)</td>
<td>National Library of Medicine</td>
<td>Health</td>
<td>1966-present</td>
<td>Abstracts, some full-texts</td>
<td>Abstracts, some full-texts</td>
</tr>
<tr>
<td>MEDLINE Plus</td>
<td>National Library of Medicine</td>
<td>Health</td>
<td>Current</td>
<td>Abstracts, some full-texts</td>
<td>Abstracts, some full-texts</td>
</tr>
<tr>
<td>ProQuest Nursing and Allied Health Source</td>
<td>ProQuest Information &amp; Learning</td>
<td>Health (nursing)</td>
<td>1986-present</td>
<td>Journal Articles</td>
<td>Abstracts, full-texts</td>
</tr>
<tr>
<td>PubMed</td>
<td>NIH</td>
<td>Health</td>
<td>1900-present</td>
<td>Journal articles</td>
<td>Abstracts,</td>
</tr>
</tbody>
</table>
After reviewing all 14 health-related databases, eight were chosen by the researcher for use in this study. These eight databases were selected for various reasons. The first two databases selected were Academic Search Premier and Google Scholar. These databases were primarily chosen because of the researcher’s familiarity with them. The third database selected was the Cumulative Index to Nursing and Allied Health Literature (CINAHL) because of the high quantity of relevant literature identified during the review of this database. The fourth database selected was EBSCO because of its link to several other Internet databases, including four databases listed in Table 1. These databases include CINAHL, Health Source – Consumer Edition, Health Source – Nursing/Academic Edition, and Medline. The fifth database selected was Health Source – Nursing/Academic Edition. This database was selected because it produced several relevant, full-text articles. The sixth and seventh databases selected were Medline (EBSCOhost) and Medline Plus. While Medline (EBSCOhost) provides content geared toward health professionals, Medline Plus provides content geared for the general public. Both of these databases were selected because of the large volume and variety of relevant literature. Proquest Nursing and Allied Health Source was the eighth database selected because of its high volume of peer-reviewed, clinical based articles.
The remaining six databases listed in Table 1 were not selected for use in this study for different reasons. Annual Reviews, science.gov, and Highwire were not selected by the researcher because search results for these databases did not generate an adequate number of full-text, relevant articles. PubMed was not selected because it rarely yielded full-text articles and a search of PubMed Central resulted in no relevant articles. Health Source – Consumer Edition was not selected due to its focus on the general public and lack of peer-reviewed articles.

After the databases were selected, the researcher identified key search words using the thesaurus of each database to conduct the search. The chosen key words for each database were as follows:

**Academic Search Premier**
1. Nutrition Facts label
2. Food labeling
3. Adults
4. College students
5. Public Health
6. Food habits
7. Consumer Behavior

**Google Scholar**
1. Nutrition facts label
2. Nutrition facts panel
3. Food nutrition label
4. Nutritional content
5. Nutrition package claims
6. College students
7. Young adults
8. Adults
9. NLEA
10. Nutrition information

CINAHL
1. Nutrition label
2. Nutrition consumption
3. Nutrition information
4. Adults
5. College students
6. Consumers

EBSCO
1. Nutrition Facts label
2. Food nutrition label
3. Dietary intake
4. Nutrition
5. Knowledge
6. Health seeking behaviors
7. NLEA
8. Older American adults
9. Consumers
1. Nutrition labels
2. Adults
3. College students
4. Public health
5. Nutrient profiling
6. Nutrition
7. Labeling
8. Nutrition Facts Labeling
9. Nutritional declarations

Medline
1. Nutrition labeling
2. Eating habits
3. Adults
4. Older adults
5. Young adults
6. Consumer
7. Nutritional information
8. Food content
9. Labeling
10. Dietary intake

MedlinePLUS
1. Nutrition Facts label
2. Food labeling
3. NLEA
4. Americans
5. FDA

Proquest Nursing and Allied Health Source
1. Nutrition labeling
2. University
3. College students
4. Public Health
5. Nutrition food labeling
7. Nutrition profiling
8. Labeling
CHAPTER III
REVIEW OF LITERATURE

Introduction

The problem of this study was to examine the literature to determine the frequency of and factors associated with the use of Nutrition Facts labels among adults in the United States. This chapter presents literature related to the problem, and includes the following sections: (a) History of Nutrition Facts labels, (b) Nutrition Labeling and Education Act (NLEA), (c) Potential Health Benefits of Nutrition Facts Label Use, (d) Nutrition Facts Label Use among Adults in the United States, and (e) Summary.

History of Nutrition Facts Labels

Basic nutrition labeling was introduced in 1973 by the Food and Drug Administration (FDA) to address a growing concern for nutrient deficiencies in the United States. Initial labeling was voluntary and nutrition information was only required to appear on products with added nutrients or nutrient claims (FDA, 2007). However, after labels began appearing on some foods, consumer interest in nutrition content began to grow and, consequently, food marketing strategies began to focus on nutrient content. Increased interest among consumers sparked a rise in competition among manufacturers. With minimal rules and regulations set forth by the FDA, nutrient information grew increasingly inaccurate and embellished (FDA, 2007). Both consumers and health care
professionals reacted by claiming that nutrition label information was limited, unclear, and inconsistent (Geiger, Wyse, Parent, & Hansen, 1991). This continuous consumer demand eventually led the FDA to initiate an extensive plan to reform Nutrition Facts labels in 1990.

The Nutrition Labeling and Education Act of 1990

The Nutrition Labeling and Education Act of 1990 (NLEA) was signed by then President George H.W. Bush in November 1990. The purpose of NLEA was to improve, standardize, and set regulations for the format and information provided by Nutrition Facts labels. It was understood that these revisions would not necessarily cause more healthful diets among Americans, but would allow Americans the opportunity to choose more healthful diets by providing clear, consistent information. The regulations set by NLEA would be implemented in 1994.

The Nutrition Labeling and Education Act brought forth several revisions to Nutrition Facts labels. This act required that nutrition labeling appear on almost all pre-packaged foods in the United States, and would be required for all foods in which a health claim was made, including restaurant foods. Prior to this time, nutrition labeling was voluntary unless nutrients were added or a nutrient claim was made. The only foods identified as exempt from the mandated nutrition labeling brought forth by NLEA were the following:

- Foods served for immediate consumption, such as in hospital cafeterias or airplanes
- Ready-to-eat foods that are prepared on-site
- Foods shipped in bulk
• Medical foods

• Plain coffee, tea, some spices, and foods with no significant amounts of nutrients

• Meat and poultry

Although voluntary labeling was established for raw fruits, vegetables, fish, meat, and poultry, the FDA developed a point-of-purchase program in which manufacturers and retailers were strongly encouraged to provide nutrition information for these products. This program stated that if voluntary labeling occurred at insufficient levels, agencies would act to make labeling mandatory.

The NLEA was also intended to establish standards regarding the nutrients listed on the label. These standards determined which nutrients were included on the label, the order in which these nutrients were listed, and how these nutrients were defined (Taylor & Wilkening, 2008). The nutrients chosen were those of greatest public health concern and included total calories, calories from fat, total fat, saturated fat, cholesterol, sodium, total carbohydrate, dietary fiber, sugars, protein, vitamins A and C, calcium, and iron. The order in which nutrients would appear was also determined by those nutrients yielding the greatest public health concern. Calorie information was at the top of the label, followed by fat information. Other macronutrients were listed under fat information. Vitamins and minerals appeared at the bottom of the label (See Figure 1).
The NLEA also sought to present information on Nutrition Facts labels in a consistent, easy-to-understand format. The new format was discrete and informative. In addition, a consistent system was developed to standardize all nutrients in equivalent units to allow for quick and easy comparisons. The Daily Value (DV) was developed to help consumers understand the relevance of nutrient information in the context of a daily diet (Taylor, Virginia, & Wilkening, 2008). Each nutrient on the label was expressed not only in metric units, but also as a percentage of the DV. The DV was created using a value known as the Daily Reference Intake (DRI), which was developed by the National Academy of Sciences between 1993 and 2002 to replace the U.S. Recommended Daily
Allowances (RDAs). The new Daily Value took into account not only the RDA, but two other values called the Estimated Average Requirement (EAR) and Tolerable Upper Level of Intake. The culmination of these values provided a more accurate estimate of the daily nutrient needs for the general public.

Providing a comparable and comprehensible serving size value was another goal of NLEA. Previously, under voluntary labeling, manufacturers determined their own serving sizes which caused a great deal of variability among products and confusion among consumers. NLEA required serving sizes to be listed in both metric units and common household units (e.g., pieces, cups). Procedures were developed so that manufacturers could create serving sizes of common household measurements on all packaged foods.

Overall, NLEA provided significant changes to Nutrition Facts labels. This act made labels more accurate, consistent and user friendly. Whether these changes would have a positive impact on the diets and health of Americans was still unclear.

Potential Health Benefits Associated with Nutrition Facts Label Use

A few studies have investigated the potential health benefits of Nutrition Facts labels. Zarkin, Dean, Mauskopf, and Williams (1993) examined the potential health benefits produced by label changes mandated in the Nutrition Labeling and Education Act. Their study utilized a computer model to estimate potential health benefits of new labels. The study provided four different types of estimates. The upper estimates of the potential health benefits provided by Nutrition Facts label use assumed maximum
response. Upper estimates assumed that all consumers understood the information provided by labels regarding nutrient content and that all consumers would meet the daily nutrient requirements set by the new Daily Values (DV). The lower estimates of potential health benefits provided by Nutrition Facts label use were based on actual consumer responses from a shelf-labeling program sponsored by the FDA. This program examined the influence of Nutrition Facts labels on purchase behaviors. Results found that all estimates of label use produced decreased intakes of total fat, saturated fat, and cholesterol for both males and females. Because of these decreased intakes, it was estimated that the number coronary heart disease and cancer cases were reduced by 725,155 (upper) and 39,207 (lower). The number of deaths avoided was 388,978 (upper) and 12,902 (lower), and life years gained were between 1,185,664 (upper) and 40,005 (lower). These values expressed a positive outlook for the new Nutrition Facts labels, suggesting that even small amounts of label use could result in significant health benefits for Americans.

Kim, Nayga, and Capps (2000) found positive results as well after examining the effects of nutrition label use on nutrient intakes following the implementation of NLEA standards. Their study utilized endogenous switching regression techniques to analyze survey data from the United States Department of Agriculture’s (USDA) 1994-1996 Continuing Survey of Food Intake of Individuals (CSFII), as well as the Diet and Health Knowledge Survey (DHKS). These two surveys provided detailed information from 5,203 individuals regarding nutrient intakes, socioeconomic background, health/diet behavior, and label use. Results showed that consumers who utilized the label were more
likely to meet the dietary guidelines for calories from fat, saturated fat, cholesterol, and fiber, indicating that label use would improve the intake of important nutrients. Similar to the findings of Zarkin et al. (2003), these findings demonstrated that even minimal usage of Nutrition Facts labels could provide significant benefits to the dietary intake of Americans.

To examine the immediate effects of NLEA, Balasubramanian and Cole (2002) conducted four studies regarding the impacts of NLEA on consumer attitudes and behaviors. All four studies were reported in the same article (Balasubramanian and Cole, 2002). The first of which was a field study that included 337 participants from three chain grocery stores in the Mid-west. Participants were observed and interviewed by trained facilitators to examine if, and how, new NLEA labels influenced their search for nutrition information. Facilitators unobtrusively recorded search intensity of shoppers, which was defined by researchers as time spent viewing Nutrition Facts Labels. Facilitators then administered questionnaires to measure motivation, knowledge, brand loyalty, and perceived similarity between the nutritional content of different brands. Results showed that NLEA did not impact consumers’ search intensity of products. The researchers suggested NLEA may have altered consumers’ attention to the health claims and nutrient content claims that typically appear on the front of packages rather than the sides or backs of packages where Nutrition Facts labels are found. Results also showed that NLEA did not improve recall efficiency for most nutrients. However, following NLEA there was a stronger negative association found between perceived similarities in nutrient content between brands and consumers’ search for nutrition information. In addition, brand loyalty was less negatively related to search intensity following NLEA.
These findings indicated that consumers were more confident about understanding the similarities of nutrient content between different brands, likely because of better access to nutrition information provided by NLEA.

In the second study by Balasubramanian and Cole (2002), a computerized shopping lab experiment was utilized to examine consumers’ motivation to process nutrition information, knowledge about nutrition information, and the format of Nutrition Facts labels. Participants included 190 students at a major university who were randomly assigned to one of several computers equipped with a Search Monitor program to assess knowledge, motivation to process information, and label format. All three variables were manipulated by researchers. Knowledge was manipulated by assigning one-half of all participants an informative brochure to read regarding nutrition recommendations from the FDA. To manipulate the motivation to process nutrition information, researchers instructed “high motivation” participants to follow a physicians’ recommendation of selecting foods low in fat, sodium, and cholesterol. Finally, label format was manipulated by making both the old and new formats available to randomly selected participants. Results showed that participants who received a knowledge brochure received significantly higher knowledge scores than low-knowledge participants ($p < 0.01$). Similarly, high-motivation participants obtained a higher percentage of the three physician-recommended attributes (low fat, sodium, and cholesterol) ($p < 0.01$). The new label format neither increased nor decreased the time spent viewing Nutrition Facts labels. Regardless of motivation levels, high-knowledge participants spent the same amount of time viewing labels. However, low-knowledge participants spent more time viewing labels when their motivation levels increased. Results also showed that with the
new label format, participants spent less time devoted to positive attributes (healthy nutrients added to foods) on labels rather than negative attributes (unhealthy nutrients reduced or removed from foods), but did not show a change in ability to recall the amounts of nutrients given the new versus old label format. Overall, findings indicated that the new label format did have effects on those who were highly-motivated with low-knowledge. With the new label format, this group benefited from standardized serving sizes, devoted more search effort to Nutrition Facts labels and depended less on nutrition claims found on other areas of food packages.

After examining the immediate effects of NLEA on consumers, Balasubramanian and Cole (2002) wanted to examine changes in longitudinal sales data, hypothesizing that consumers’ food choices over time may be a better indicator of nutritional-related concerns than search efforts and recall ability. Long term sales trends may reveal insights that can not be seen immediately before or after the implementation of NLEA. Furthermore, post-NLEA consumers may rely more on health claims (“low fat”, “reduced fat”, “fat free”) than Nutrition Facts labels. To examine these issues, researchers analyzed longitudinal data from scanner databases at several store locations in a large city between 1989 and 1997. They compiled a list of Universal Product Codes (UPCs) for products that met the NLEA regulations to provide health claims on packages, and selected food categories in which these claims may be found. The following eight categories of health claims with specific food categories were selected: 1) “vitamin C fortified” and bottled juices, 2) “plus calcium/calcium added” and refrigerated juices, 3) “low sodium/ lower salt” and canned soup, 4) “low fat/reduced fat/fat free” and cheese, 5) “low fat/reduced fat/fat free” and cookies, 6) “low calorie/diet/light/lite” and bottled
juices, 7) “light/lite” and frozen entrees, and 8) “light/lite” and frozen dinners. These health claims could further be divided into two groups. The first two categories (“vitamin C fortified” and “plus calcium/calcium added”) were considered positive nutrition attributes, because they indicated healthy nutrients had been added to the product. The following categories (“low sodium/ lower salt”, “low fat/reduced fat/fat free”, “low calorie/diet/light/lite”, and “light/lite”) were considered negative attributes, because they indicated that unhealthy nutrients had either been reduced or removed from the product. Results showed that post-NLEA purchase behavior of products with positive nutrition attributes either decreased or did not change. The purchase of products with negative nutrition attributes increased. Results also showed a post-NLEA decrease in the purchase of products with calorie-healthy descriptors and an increase in the purchase of products with fat-healthy descriptors. Overall, these findings, unlike the previous two studies, indicated that the implementation of NLEA was associated with a change in consumer food purchases. The degree of this change depended on the type of nutrient involved. However, while the results showed the nutrition attributes explored by consumers, they could not explain why consumers choose to explore these attributes. Therefore, researchers conducted a series of focus groups to gain insights regarding when and why consumers used nutrition information.

Researchers conducted six focus groups to investigate consumers’ use of Nutrition Facts labels. Participants were males and females who responded to a newspaper advertisement soliciting focus group participation from community members. Five of these groups were conducted in a university town and included 35 females and five males. The sixth group was conducted in a different university town, consisting of
six females and two males. Trained moderators used a common set of discussion questions in a structured fashion to ensure the involvement of every participant. Participants were questioned regarding when and why they used food labels. Results showed several participants stated that becoming more health conscious prompted them to begin using nutrition information. When asked about what made them become more health conscious, many reported weight management as the primary reason. Weight consciousness also prompted them to look more for information regarding fat and calorie content rather than positive nutrition attributes discussed in the previous study.

Participants also stated that they did not consider nutrition when purchasing foods considered “fun” or “bad”. For example, one participant stated, “If I think it’s fun, I don’t look at nutrition.” Another stated, “The only time I don’t care is when I’ve decided that I’m going to have something really bad.” Some consumers reported not using labels due to skepticism toward nutrition claims and because information was provided that they did not perceive as important. Several participants also expressed frustration with serving size information. Some participants stated that they would not pay extra for one product just because it was more nutritious than another, and some conveyed that taste was as or more important than nutrition content when purchasing products.

Overall, data regarding the impacts of the new NLEA-mandated labels are conflicting. While Zarkin et al (1993) and Kim et al (2000) showed the potential health benefits of Nutrition Facts labels to be very promising, Balasubramanian and Cole (2002) found less promise and indicated that only a few of these benefits have been realized. Consumers did show an increased interest in Nutrition Facts label use following NLEA, but did not indicate increased utilization. One important factor to consider is that these
studies were conducted either prior to or immediately following the implementation of NLEA. Because the size of the U.S. population is so vast, the effects of NLEA are expected to be long in range. To further understand the use of Nutrition Facts labels, it is important to examine how many people are actually utilizing labels and what factors influence label use.

Nutrition Facts Label Use Among Adults

Several studies have investigated the use and impacts of Nutrition Facts labels among adults in the United States. Kristal, Levy, Patterson, Li, and White (1998) compared the use of food labels among adults before and after the implementation of new regulations by the FDA in 1994. A cross-sectional telephone survey was carried out during 1992 and 1993 (n=1001), and again during 1995 and 1996 (n=1450), using a random-digit dialing survey technique. Participants were 18 years of age and older. Results showed a significant increase in usual label use between 1993 and 1996 ($p<.01$). Participants reported an increase in being able to find information they were seeking with the new label regulations ($p<.001$), and also indicated that the new labels were more helpful. In both surveys, approximately 25% of participants reported they were not interested in label use. Principal reasons included, “takes too much time,” “too hard to understand,” and “print too small to read.” Results from this study indicated that although frequency of label use did not increase initially following NLEA, consumer perceptions of the label were more positive and interest levels were rising.

One year following the previous article, Neuhouser, Kristal, and Patterson (1999) published research that examined the relationship between nutrition label use and diet among adults. They investigated associations between label use and diet-related
psychosocial factors, health behavior, and demographic characteristics. Data were collected via a telephone interview survey using the random-digit-dialing technique. The survey consisted of 1,450 adults residing in Washington State aged 18 years and over. The mean age of respondents was 44.1 (+15) years, and included 587 (40.5%) males and 863 (59.5%) females. Results showed that more than 24.7% (n=358) of all participants claimed to read nutrition labels at least sometimes, 20.1% (n=291) read them often, and 35.2% (n=510) read them usually. The most frequently read components of the label were fat grams, calories, and cholesterol. Females were more likely than males to read information regarding serving size, calories, and fat grams (p<.001). Participants who stated that eating a low fat diet was very important to them were 10 times more likely to read the nutrition label, and five times more likely to look at fat grams than those who reported that a low fat diet was not important. In addition, those who believed there was a strong relationship between diet and cancer were three times more likely to read the nutrition label and look at fat grams and percent Daily Value for fat compared to participants who believed there was a weak or no relationship between diet and cancer. Overall, approximately 80% of participants reported reading the label at least “sometimes”. These findings showed that frequency of Nutrition Facts label use was high and that belief regarding diet-disease relationships (diet and cancer) was an important factor in label use.

Nayga (1996) developed a model to examine the association between socio-demographic characteristics of a household and the utilization of Nutrition Facts labels. Data taken from the USDA’s 1991 “Diet and Health Knowledge Survey” were used for this research, and included 1,448 participants from households in 48 states. Data were
collected via in-person interviews as well as computer-assisted telephone interviews. Results showed that household size was positively associated with use of Nutrition Facts labels for information regarding vitamins, minerals, and sugar content. White participants were more likely to use nutrition information regarding fat content than non-white participants. In addition, females were more likely to use nutrition information on packages than males. Results also showed that unemployed participants were more likely to use the Nutrition Facts label than employed participants. The reason for this finding was unclear. However, the researcher indicated that it may be due to employed participants lacking time in which to view labels. The researcher also identified geographic variables pertaining to nutrition label use. Participants who resided in nonmetropolitan areas were more likely to use Nutrition Facts label information than those residing in metropolitan areas. Again, this finding was likely due to a lack of time for individuals residing in metropolitan areas. Households located in the Northeast were more likely to use nutrition information concerning health benefits and sodium than those in the South and Midwest. Households in the Midwest were more likely to use nutrition information concerning health benefits than those in the South.

Furthermore, age, income, and education were all positively related to use of Nutrition Facts labels. Participants with either an undergraduate or graduate degree were significantly more likely to use labels. Finally, a relationship was identified between Nutrition Facts label use and diet-disease belief. Participants who held a stronger belief in the relationship between nutrition and the risk for developing certain chronic diseases were more likely to use Nutrition Facts labels. These findings suggested that educating individuals about diet-disease relationships may encourage label use.
Levy and Fein (1998) examined the ability of consumers to perform tasks using Nutrition Facts labels, as well as associations between label reading ability and demographic characteristics, health status, and label reading. Participants were food shoppers over the age of 18 recruited from eight geographically dispersed shopping malls throughout the United States. They were asked to individually complete four tasks in a private room located in the mall. The first task was completed by 384 participants, and the other three tasks were completed by 800 participants. The first task looked at participants’ ability to compare two different products using Nutrition Facts labels. The second task assessed participants’ understanding of nutrient content claims that may have appeared on the front of a product. The third task examined participants’ ability to adequately balance nutrients over a daily diet, and the fourth task assessed the ability to accurately calculate the daily nutrient contributions of a single food.

Results from Levy and Fein’s (1998) study showed that approximately 80% of participants were able to correctly identify differences between two different Nutrition Facts labels. Participants identified the correct nutrient content claims nearly 58% of the time, and incorrectly identified true claims as false 20% of the time. Participants were able to comprehensively balance a daily diet of nutrients 45% of the time, and 20% of participants correctly calculated the nutrient contributions of a single food. Results of demographic data found that older, non-white participants with less education and a diet-related health condition performed worse than younger, white participants with a college education and no diet-related health conditions. Unlike the previous study, gender showed no significant effects on the ability to perform tasks. This research also showed that individuals have difficulty using labels to perform tasks that involve math. In
addition, the ability to accurately use Nutrition Fact labels to make nutrition judgments was strongly based on prior beliefs. Much like previous findings, the findings from this study indicated that age, education, and beliefs about nutrition and diet positively influenced use of Nutrition Facts labels.

Marietta, Welshimer, and Anderson (1999) examined factors associated with nutrition label use among college students. They investigated the relationships between knowledge, attitudes, and behaviors regarding nutrition label use, and the relationship between these factors and previous nutrition label education. A descriptive, non-experimental design was utilized to survey 208 undergraduate students enrolled in general education courses. Participants included 141 (67.8%) females and 67 (32.2%) males aged 17 to 53 years. Results showed that almost all participants (95.7%, n=199) agreed that Nutrition Facts labels were useful, and more than half (59.6%, n=124) felt they were easy to understand. However, age, sex, and previous nutrition education did not significantly influence attitudes toward nutrition labels. Approximately half of the students (47.6%, n=99) did not believe nutrition claims such as “low fat” or “high fiber” were truthful, however most students (72.1%, n=149) claimed they would purchase a product at least “sometimes” with a health claim on the label rather than a product with no health claim. Most students (70.2%, n=146) claimed to look at nutrition labels at least “sometimes” when purchasing a product for the first time. Females looked at the label significantly more than males ($p<.001$), and were more likely to use the label to fit a food into their daily diet ($p<.001$). Females were also more likely to look at information regarding total calories ($p<.001$), calories from fat ($p<.001$), total grams of fat ($p<.001$), and saturated fat ($p<.01$). Males were more likely to look at information regarding
protein and vitamin A \((p<.001)\). Approximately half of the students \((51.9\%, n=108)\) reported previous nutrition label education. Students with previous label education were more likely to look at calories from fat \((p<.01)\), total carbohydrates \((p<.01)\), and dietary fiber \((p<.001)\) than those without previous label education. According to these results, nutrition education appears to play a significant role in nutrition label use, perhaps due to the increase in nutrition knowledge accompanied by nutrition education.

Nayga (2000) investigated the relationship between nutrition knowledge, gender, and use of Nutrition Facts labels using an econometric approach in which both nutrition knowledge and label use were treated as endogenous variables. A survey of 200 participants was carried out in four supermarkets in different socioeconomic areas of New Jersey. Trained student interviewers randomly selected and approached participants with a questionnaire regarding nutrition label use, nutrition knowledge, and demographic characteristics. Results showed that 55% of participants stated that it was important or very important to avoid too much salt/sodium. Seventy-three percent gave the same response when asked about saturated fats, and 67% about cholesterol. Sixty-nine percent of participants stated that eating a variety of foods was important or very important. However, results of this study found that the relationship between nutrition knowledge and nutrition label use was not statistically significant. In addition, while most studies have found that females are more likely to use the nutrition label than males, the current study did not find such relationship. The current study found that although males do possess less nutrition knowledge than females, when this variable is controlled, males and females do not differ in terms of nutrition label use. These findings vary greatly with other findings.
Furthermore, ethnicity and income were shown to affect nutrition knowledge but not label use. Non-Caucasian and lower income participants revealed lower nutrition knowledge than their counterparts. Unemployed participants were more likely to use the Nutrition Facts label than those employed. Education and age had no significant effects on either nutrition knowledge or label use. An important finding was that participants who placed greater importance on following dietary guidelines were more likely to use labels. Also, those who believed in a diet-disease relationship (i.e., fat and heart disease, calcium and osteoporosis) were more likely to use labels, suggesting the role of health beliefs in nutrition label use.

To more closely investigate individuals’ skills regarding proper nutrition label use, Elbon, Johnson, Fischer, and Searcy (2000) conducted a telephone survey to examine older Americans’ abilities to identify calorie, saturated fat, cholesterol, protein, and calcium information on Nutrition Facts labels. Participants included 475 adults aged 60 years and over who were randomly selected from a white page telephone directory of 74 million households. Participants were interviewed for information regarding demographics, nutrition behavior, and label reading patterns using Computer Assisted Telephone Interviewing. For analysis, researchers divided participants into three groups based on age, including one group in their 60s (n=151), one group in their 70s (n=181), and one group in their 80s (n=141). Results found that on average, 70% of participants reported using the Nutrition Facts label. However, label use declined with increasing age (74% of 60s, 71% of 70s, and 63% of 80s). Age was significantly associated with viewing cholesterol and calories on the Nutrition Facts label. Those in their 60s and 70s were more likely to view calories, while those in their 80s were more
likely to view cholesterol. Females read Nutrition Facts labels more than males before purchasing foods (75% vs. 55%, \( p \leq .001 \)) and females relied more on labels more for calorie, cholesterol, and saturated fat information than males (69%-78% for females vs. 50% - 57% for males, \( p < .001 \)). Females were also more likely to view calcium information than males (53% vs. 36%, \( p \leq .001 \)). Higher nutrition knowledge showed a significant and positive association with use of the Nutrition Facts label (\( p \leq .0001 \)), as well as being female (\( p \leq .003 \)). Analysis showed significant associations between the statements “food labeling gives me confidence” and “reading food labels” (\( r = .64, p \leq .0001 \)). Overall, health-seeking behaviors showed a positive association with Nutrition Facts label use.

Similarly, Alfieri and Byrd-Bredbenner (2000) examined the ability to locate and calculate Nutrition Facts label data and analyze health claim and nutrient content accuracy in females. Participants were 150 females between the ages of 25 and 45 who served as the primary food purchasers in their household, but who had no previous experience in a health or nutrition-related job. Half of the sample had children at home under the age of 18 and the other half of the sample had no children at home. Participants were interviewed face-to-face using a three part instrument. Part 1 introduced the participants to the purpose of the study. Part 2 obtained demographic data, required the participants to self-assess their health status and diet, and collected information regarding Nutrition Facts label use. Part 3 consisted of four Nutrition Facts label knowledge scales. Results found that 85% of participants believed they were somewhat or very informed about nutrition. However, 90% reported never receiving any form of nutrition instruction. Seventy-six percent of participants reported using Nutrition
Facts labels either “sometimes” or “always”, while 23% reported rarely or never using the label. There was no difference in frequency of label use among participants without children versus those with children. More than 91% of participants who indicated label use “sometimes” or “always” stated that Nutrition Facts labels affected purchasing decisions. Participants were highly skilled at locating data on labels, yielding a mean score of $4.97 \pm 0.4SD$, with a maximum score of 5. Participants were also able to effectively manipulate data on Nutrition Facts labels, yielding a mean score of $4.66 \pm 0.6SD$. This score did increase significantly as educational levels increased.

Several factors that appear to play a significant role in the utilization Nutrition Facts labels were examined by Byrd-Bredbenner, Alfieri, and Keifer (2000). They surveyed 453 females to determine demographic, knowledge, and behavior factors that impacted their use of Nutrition Facts labels. Only females were surveyed for this research because 80% or more of females hold the primary responsibility of food purchasing and preparation in the household. Participants who had not previously worked in the health or nutrition field were recruited from various community groups and asked to complete a two part questionnaire. Part one of the questionnaire collected data regarding diet quality, health status, and degree of nutrition knowledge, as well as the frequency of Nutrition Facts label use, how often the labels impacted food purchases, and the stage of change for reading the Nutrition Facts label based on Prochaska’s Transtheoretical model (Prochaska & Velicer, 1997). Part two of the questionnaire examined label-reading knowledge, the ability to perform diet planning calculations, and the perceptions of the truthfulness of nutrient-content claims. Results showed the 80% of participants reported being “label readers,” meaning they reported looking at the label
“sometimes” or “always” when making a purchase decision. Approximately 25% reported using the labels “always”. These findings indicate that Nutrition Facts labels play an important role in purchase decisions. Many of the participants were able to accurately identify information from the label. Older, less educated participants who rated their health status as “fair” to “poor” scored significantly lower than participants with higher education and who rated their health as “excellent” to “good”. Participants were able to correctly decipher the truthfulness of nutrient-content claims 80% of the time.

Attitudes and behaviors regarding Nutrition Facts labels may have significant influences on use as well. McArthur, Chamberlain, and Howard (2001) not only assessed the frequency of Nutrition Facts labels use, but also behaviors and attitudes toward labels. They interviewed 181 participants; 130 of which were low-income and belonged to a federal food assistance program, and 51 of which were low-income but did not belong to a federal food assistance program. Participants partook in a four-part, close-ended interview process. The first part examined how often they used labels for meal and purchase decisions. The second part examined attitudes and behaviors by asking participants how helpful they thought labels were when performing food-related activities. The third part examined participant awareness of Nutrition Facts labels by administering a 15-item questionnaire to assess the ability to identify different nutrients on labels and knowledge of a relationship between diet and disease. Finally, the fourth part examined demographic and health status characteristics. Results showed that participants in food programs generally read Nutrition Facts labels more than nonparticipants. Sixty-five percent of federal food program participants read labels at
least “sometimes”, while 54.9% of non-program participants read labels at least “sometimes”. Education level and age were significantly associated with label use. Participants who at least finished high school were more likely to read labels than those who did not ($p = 0.004$). Participants who were 45 years and younger were more likely to read labels than those 46 years and older ($p = 0.05$). Female participants used labels more often than males to determine the amount of a particular nutrient in a serving size ($p = 0.036$). Participants with a diet-related disease read labels more often than those without such conditions ($p = 0.004$), and participants with children used labels more than those without children to compare nutrients among brands ($p = 0.039$). Participants found Nutrition Facts labels more useful for determining the nutrient content per serving size and least useful in meal planning.

Several studies examined thus far have shown that the majority of individuals do utilize Nutrition Facts labels. A study by Kim, Nayga, and Capps (2001) examined factors associated with Nutrition Facts label use, as well as if and how label use influences diet. They used data from the 1994-1996 Continuing Survey of Food Intakes (CSFH) and the Diet and Health Knowledge Survey (DHKS). These surveys utilized a tool developed by the USDA, called the Healthy Eating Index (HEI), to evaluate diet quality and effectiveness of label use. The HEI provided a single overall measure of an individual’s diet quality by examining ten components of a healthful diet. The first five components measured the degree of conformity to the USDA’s Food Guide Pyramid regarding the amount of servings consumed from the five major food groups – grains, vegetables, fruits, milk, and meat. The sixth and seventh components measured total and saturated fat consumption, and the eighth and ninth components measured total
cholesterol and sodium intake. Component ten measured variety in an individual’s diet. Results showed that males who used Nutrition Facts labels had higher HEIs than female label users. Employed label users also had higher HEIs than unemployed label users. Participants with at least some college education had higher HEIs than those with no college education. Results also found that the probability of using Nutrition Facts labels increased with income and education and decreased with age. Males were less likely to use label information than females. Participants with at least a college education were significantly more likely to use labels than those with no college education. In addition, participants who resided in a metropolitan area were more likely to use labels than those who resided in a nonmetropolitan area. Participants who were on a special diet and who understood the link between diet and health were more likely to use labels than their counterparts. Participants in the Food Stamp Program were less likely to use labels and those who stated that reading labels took too much time were also less likely to read labels. These findings indicated that the perception of time may be associated with the use of Nutrition Facts labels. Furthermore, the major food shoppers of households were more likely to use labels than others.

Much like Kim et al. (2002), Perez-Escamilla and Haldeman (2002) analyzed the Diet and Health Knowledge Survey (DHKS) and the Continuing Survey of Food Intake by Individuals during the years 1994-96 to investigate whether Nutrition Facts label use influenced the relationship between income and dietary quality. Researchers selected a sample of participants aged 20 years and older from households in the United States based on 40 domains defined by age, sex, and income. Participants were divided into a Food Stamp (FS) group and a Non-Food Stamp (NFS). Results found poverty was
significantly higher in the FS group compared to the NFS group. Approximately 70% of all participants reported using Nutrition Facts labels. The percent of participants using labels was about 15 points higher among the NFS group versus the FS group. In addition, participants who were wealthier and used Nutrition Facts labels were more likely to yield a higher Healthy Eating Index than a reference group of those with lower income who did not utilize labels. Participants who were wealthier and did not use Nutrition Facts labels yielded a similar Healthy Eating Index as the reference group.

Some studies have looked at the use of Nutrition Facts labels among specific populations. Macon, Oakland, Jensen, and Kissack (2004) investigated Nutrition Facts label use in older Americans and how it may impact dietary risk factors for heart disease. Data were used from the Diet and Health Knowledge Survey (DHKS) and the USDA’s Continuing Survey of Food Intakes by Individual (CSFII) for the years 1994-96 and included 2,846 participants who were 51 years and older. Both surveys were designed to be a nationally representative sample of Americans. The CSFII included an in-person interview and obtained data regarding participants’ food intake for two, non-consecutive days, as well as social, economic, and demographic information. The DHKS was a follow-up telephone survey for the CSFII and requested participant information such as nutrition knowledge and beliefs, diet-health awareness, and household food preparation behaviors. For analysis, participants were separated into the following age groups: 51-60, 61-70, 71-80, and 81 years and older. Results found that the frequency of Nutrition Facts label use was highest among men ages 71-80 and women ages 61-70. Label use was lowest among men and women ages 81 and older. Understanding of the Nutrition Facts label decreased as age increased. Positive correlations were identified between
Nutrition Facts label use and the use of low-fat food products, as well as Nutrition Facts label use and knowledge of fat content in foods. Negative correlations were found between Nutrition Facts label use and the use of added fat. While older individuals were examined in this study, other studies have focused on various populations.

Satia, Galanko, and Neuhouser (2005) conducted a cross-sectional survey to examine the frequency of Nutrition Facts label use and its association with demographic, behavioral, and psychological factors among African American adults. Participants were 658 randomly selected adults in North Carolina aged 20 to 70 years. Participants completed an 11-page questionnaire regarding nutrition label use, dietary assessment, diet-related psychological factors, and demographic, lifestyle, and behavioral characteristics. Results found that 25% reported using Nutrition Facts labels “usually”, 21% used them “often”, and 32% used them “sometimes”. Only 22% reported reading labels “rarely” or “never”. Older participants (50 to 70 years) reported reading labels more than younger participants (20 to 39 years) ($p<0.05$). Approximately 40% reported using labels “often” or “usually” to locate information about serving size, energy, energy from fat, grams of fat, and cholesterol. Females reported reading the label more than males (82% vs. 73%, $p<0.05$). More females read Nutrition Facts labels for information regarding serving size, energy, and energy from fat. Label use was also associated with diet-related psychological factors. Participants who were highly confident they could eat less fat were five times more likely to read the label ($p<0.001$). Those who had stronger beliefs in the relationship between diet and cancer, as well as higher self-efficacy to eat more fruits and vegetables were two times more likely to read Nutrition Facts labels ($P<0.05$). Participants who reported taking steps toward weight loss were three times
more likely to read labels than those who were not ($P<0.001$). Those who had never smoked were two and a half times more likely to read labels than current smokers ($P<0.01$), and those who had heard of the Food Guide Pyramid were more likely to read serving size information (OR 1.8; 95%). In addition, light and moderate physical activity and multivitamin use were associated with label use ($P<0.05$). Participants who reported often or usual label use reported higher intakes of fruit and vegetables, as well as lower intakes of total fat and saturated fat.

The following researchers looked not only at associations between Nutrition Facts label use and total fat and saturated fat, but also associations between label use and trans fat. Hess, Yanes, Jourdan, and Edelstein (2005) assessed trans and saturated fat knowledge, nutrition attitudes and behaviors, and utilization of Nutrition Fact labels. The study was conducted using a 22-item questionnaire approved by the Simmons College Institutional Review Board. The questionnaire included six demographic questions, 11-nutrition knowledge questions, and five attitude and behavior questions. Participants were 320 males and females between the ages of 18 and 65 who were recruited from a Boston fitness center on a volunteer basis. Results showed that nearly 84% of participants identified themselves as white/non-Hispanic, 8% as Asian, and the remainder as black/African American. Nearly 90% of participants had a bachelor’s degree or higher, demonstrating a very high education level. In addition, nearly 43% reported a household income of $100,000 or more, and more than 60% reported an income of at least $60,000. Results also found that trans and saturated fat knowledge was significantly ($p<.02$) related to Nutrition Facts label use. Approximately 86% of participants claimed to look at Nutrition Facts labels when purchasing food products. Nearly 80% of
participants looked at the total fat when making food purchases, while 74.8% looked at calories. These two elements, total fat and calories, were clearly the most considered aspects on Nutrition Facts labels among participants. Carbohydrates followed with 52.9% of participants claiming to view, and protein with 50.4%. Approximately 44.5% looked at specific types of fat, 29.6% looked at cholesterol, and 27.7% looked at vitamins/minerals, while 0.7% of participants “did not consider any nutrients”. Results of this study support previous research that higher education levels are associated with use of Nutrition Facts labels. Researchers of this study hypothesized that higher education levels lead to greater Nutrition Facts label use, and, in turn, lead to healthier food selections.

Another demographic that has been examined is younger adults. Rasberry, Chaney, Housman, Misra, and Miller (2007) utilized a cross-sectional survey design to investigate the frequency of Nutrition Facts label use among college students and its relationship to basic nutrition and label knowledge, attitudes toward nutrition labels, and beliefs regarding diet-disease relationships. They also examined factors associated with label use and non-use, as well as gender differences in label use. A convenience sample of 2,756 students aged 18 years and over was identified from 88 general physical education courses and recruited for voluntary participation. Of the 2,756 students, 1,294 (47%) completed a 57-item questionnaire. Researchers indicated the low response rate may have been due the students’ option of leaving class early instead of completing the survey. Questionnaires were divided into six sections and measured knowledge, attitudes, and behaviors, beliefs about diet-disease relationships, supplement use, and basic demographic information. In addition, open ended questions were utilized to assess
reasons for frequent or infrequent label use. Results showed that 85.4% (n=1,105) of students claimed to look at Nutrition Facts labels before purchasing foods either “sometimes” (n=553, 43%), “often” (n=153, 27.2%), or “always” (n=195, 15.2%), and 14.6% (n=187) reported they “never” look at labels before purchasing foods. Label users exhibited significantly higher mean scores than nonusers regarding knowledge ($p<.001$), attitudes toward nutrition label use ($p<.005$), and beliefs about diet-disease relationships ($p<.001$). These values indicate that label users had higher nutrition and label use knowledge, more favorable attitudes toward Nutrition Facts label use, and more accurate perceptions of the relationships between diet and chronic diseases. T-tests revealed significant gender differences regarding all four variables discussed above. Females scored significantly higher ($p<0.01$) than males in nutrition label use, knowledge, attitudes toward labels, beliefs regarding diet-disease relationships. This study also identified seven variables for predicting frequent or infrequent label use. Four variables found to predict frequent label use were: health reasons (OR=4.079), looking for specific nutrition information (OR=3.552), weight control (OR=2.940), and knowledge (OR=1.199). Three variables found to predict infrequent label use were: buy the foods one wanted regardless of nutrition content (OR=.354), time constraints (OR=.237), and did not care (OR=.182). Results of this study appeared to be consistent with previous research.

Driskell, Schake, and Detter (2008) also examined younger adults. They used a cross-sectional study to investigate the effects of Nutrition Facts labels on eating behaviors among students in dining halls at a Midwestern university. Participants were 205 (114 males, 91 females) dining hall patrons over the age of 18 who voluntarily
completed a 15-item questionnaire. The questionnaire examined demographic characteristics of participants, frequency of dining in dining halls, use or nonuse of Nutrition Facts labels (called Nutrition Bytes at this university), reasons for use or nonuse of the label, and whether participants would use labels if made available online. Results found that 83% of the sample was between the ages 19 and 21 years, 6.8% was between 22 and 24 years, 3.9% was between 25 and 35 years, and 6.4% was older than 36 years. Nutrition Facts labels were used by 58.5% of the sample, and a significantly greater percentage of females (79.1%) than males (42.1%) reported using labels. Approximately 41% of females indicated they that Nutrition Facts labels should be posted online daily, versus 27.2% of males. Surprisingly, nearly 75% of the sample had not previously taken a health or nutrition course. Participants indicated several reasons for label use, including general knowledge (51.7%), concern about overall health (49.2%), calorie counting (46.7%), and concern about a certain nutrient (43.4%). The two most frequently stated reasons for nonuse of labels were, “will not change my mind about food items I select” (64.7%) and “not enough time” (27.1%). Females showed more interest in serving size, ingredients, and sodium, while males showed more interest in protein.

Kolodinsky, Green, Michahelles, and Harvey-Berino (2008) examined when, why, and how often Nutrition Facts labels influence purchase decisions among college students. This research was conducted at a large northeastern university and used a focus group of 16 volunteer participants who had previously volunteered for a larger nutrition study at the same university. The focus group met for 60 minutes and the researchers developed a set of questions for the facilitator to discuss with participants to determine: 1) how much labels were or were not used, 2) participants’ general
perceptions regarding labels, and 3) the level in which labels were viewed as positive in on-campus restaurant environments. The discussion was recorded using both handwritten notes and an audio tape. The notes and audio tape were compared and the facilitator then used these resources to identify and categorize themes. The five most common themes recorded regarding nutrition labeling in on-campus restaurants were that participants 1) noticed the presence of Nutrition Facts labels, 2) discussed labels among peers, 3) expressed concern when labels were missing, 4) changed behavior due to labels, and 5) noticed certain elements on the label. The most frequently viewed element as stated by participants was calories. Fat was the second most noteworthy element, followed by the ingredient list. Sodium was the fourth most viewed item on the Nutrition Facts label. Overall, these results show that participants not only looked at Nutrition Facts labels but also used them to make purchasing decisions.

Consumer perceptions of Nutrition Facts labels have been examined by Lando and Labiner-Wolfe (2007). They investigated consumer views on Nutrition Facts labels using eight focus groups with a total of 68 participants from four U.S. cities. Participants were at least 18 years of age and recruited using purposive sampling from lists held by focus group companies in each city. The eight focus groups were facilitated by an experienced moderator, and each group was separated by education. Two groups included all females with higher education. Two groups included all females with lower education. Two groups were all males with higher education, and two groups included all males with lower education. Participants were asked about how they make food choices, the factors that influence their purchase decisions, whether they use Nutrition Facts labels for purchase decisions and, if so, what information they look for on the
labels. Results showed that some participants used Nutrition Facts labels to find information regarding calories, fat, carbohydrates, and other nutrients of importance to the participant. Some participants were more conscious of certain nutrients than others based on diet, eating strategy, and/or health conditions. However, participants in general identified other factors that influence purchase decisions, including convenience, taste, price, cravings, and family preferences. When asked to read the mock labels provided, participants expressed frustration with serving size and percent of the DV. One of the mock food labels was a single muffin labeled as two servings. Although the participants knew to multiply the amount of nutrients by two, many stated that calculating the amount of nutrients was neither a priority nor interest. Some participants expressed that they did not understand the percent of the DV listed on the labels, while others viewed this information as irrelevant since they did not consider themselves on a 2,000 calorie diet. However, others stated the percent of the DV as useful in helping gauge a healthy diet. Overall, participants expressed that they were interested in nutrition information and sometimes use Nutrition Facts labels to find this information. They also expressed some limitations to the format of the label.

Results from the previous study found an association between Nutrition Facts label use and having health conditions. The following study by Fitzgerald, Damio, Segura-Perez, and Perez-Escamilla (2008) used a case control study to investigate associations between Nutrition Facts label use, nutrition knowledge, and food intake habits among Latinas with and without diabetes. A convenience sample included 201 females between the ages of 35 and 60 years without severe health conditions. One hundred of the participants had been diagnosed with type 2 diabetes and 101 had not been
diagnosed with type 2 diabetes. Participants completed a 25-item questionnaire regarding the frequency of Nutrition Facts label use, label use behaviors, including the stage of change for label use, and nutrition knowledge. Food intake habits and demographic characteristics were measured using a separate 18-item questionnaire. Approximately 82% of participants reported being familiar with Nutrition Facts labels, and 79.1% felt confident in their ability to properly utilize labels. Participants with higher nutrition knowledge scores were more likely to feel confident using labels (88% vs. 71.6%, $p=0.004$) and also to be in the action stage of change for using the Nutrition Facts labels (66.3% vs. 43.1%, $p=0.001$). In fact, participants with higher nutrition knowledge scores were more than twice as likely to use Nutrition Facts labels to make healthful food choices, including foods low in fat, sugar, and sodium, and foods high in fiber. Food intake patterns also varied between label users and nonusers. Nutrition Facts label users were 49% less likely to consume sweets and 62% less likely to consume salty snacks. Label users were also three times more likely to consume fruits and vegetables. Higher nutrition knowledge scores were associated with higher socio-economic levels, but not associated with higher education levels.

Summary

This chapter presented a review of the literature regarding Nutrition Facts label use among adults in the United States. The literature indicated that the majority of adults studied utilized Nutrition Facts labels at least “sometimes”, and that several factors may impact label use. These factors include gender, age, education, beliefs about diet-disease relationships, socioeconomic and employment status, health consciousness, household size, smoking and/or physical activity status, and race. According to the literature, the
three factors most consistently associated with label use were gender, age, education. However, a belief in the relationship between diet and disease showed the strongest association with Nutrition Facts label use. Overall, the literature showed several consistencies that could undoubtedly prove beneficial for directing future program development and educational strategies.
CHAPTER IV

RESULTS, DISCUSSION, CONCLUSIONS, RECOMMENDATIONS

Results

The problem of this study was to examine the literature to determine the frequency of and the factors associated with the use of Nutrition Facts labels among adults in the United States. To conduct the literature review for this research project, a search using the keywords for each database was conducted. The review of the related literature identified 24 full-text articles from the eight databases used (see Table 2). The studies reviewed were published between 1996 and 2008. All (n=24, 100%) of the articles reviewed studied adults and half (n=12, 50%) of the articles reviewed had fewer than 500 participants. The majority of the articles reviewed used survey designs (n=14, 58%), and were conducted on local, not national, priority populations (n=19, 79%). Only a few studies focused on minority populations (see Table 3).

Table 2

Articles Generated by Literature Search

<table>
<thead>
<tr>
<th>Database</th>
<th>Number of articles found</th>
<th>Years covered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic Search Premier</td>
<td>3</td>
<td>1994-2008</td>
</tr>
<tr>
<td>Database</td>
<td># of</td>
<td>Year</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>------</td>
<td>-------</td>
</tr>
<tr>
<td>CINAHL</td>
<td>3</td>
<td>1999-2004</td>
</tr>
<tr>
<td>EBSCO E-journals</td>
<td>5</td>
<td>1994-2006</td>
</tr>
<tr>
<td>Google Scholar</td>
<td>4</td>
<td>1994-2008</td>
</tr>
<tr>
<td>Health Source: Nursing Edition</td>
<td>2</td>
<td>1996-2000</td>
</tr>
<tr>
<td>Medline (EBSCOhost)</td>
<td>3</td>
<td>1998-2002</td>
</tr>
<tr>
<td>MEDLINEplus</td>
<td>2</td>
<td>1996-2008</td>
</tr>
<tr>
<td>Proquest Nursing and Allied Health</td>
<td>2</td>
<td>1994-2004</td>
</tr>
</tbody>
</table>

Table 3

Articles Found

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Research</th>
<th># of participants</th>
<th>General</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alfieri et al.</td>
<td>2000</td>
<td>Survey</td>
<td>150</td>
<td>Education important factor in label use</td>
</tr>
<tr>
<td>Balasubramanian</td>
<td>2002</td>
<td>Survey</td>
<td>337</td>
<td>NLEA did not increase search intensity of labels</td>
</tr>
<tr>
<td>Byrd-Bredbenner</td>
<td>2000</td>
<td>Survey</td>
<td>453</td>
<td>Education could improve label use</td>
</tr>
<tr>
<td>Driskell et al.</td>
<td>2008</td>
<td>Cross-section</td>
<td>205</td>
<td>Females more likely to use labels</td>
</tr>
<tr>
<td>Elbon et al.</td>
<td>2000</td>
<td>Survey</td>
<td>475</td>
<td>Label use associated w/age and health behavior</td>
</tr>
<tr>
<td>Fitzgererald et al.</td>
<td>2008</td>
<td>Case-control</td>
<td>201</td>
<td>Use Nutrition Facts labels</td>
</tr>
<tr>
<td>Hess et al.</td>
<td>2005</td>
<td>Survey</td>
<td>320</td>
<td>Knowledge associated with label use</td>
</tr>
<tr>
<td>Authors</td>
<td>Year</td>
<td>Study Type</td>
<td>Sample Size</td>
<td>Findings</td>
</tr>
<tr>
<td>-----------------</td>
<td>-------</td>
<td>----------------</td>
<td>-------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Kim et al.</td>
<td>2000</td>
<td>Switching regression</td>
<td>5,203</td>
<td>Nutrition Facts label use increased diet quality</td>
</tr>
<tr>
<td>Kim et al.</td>
<td>2001</td>
<td>Switching regression</td>
<td>5,343</td>
<td>Nutrition Facts label use increased diet quality</td>
</tr>
<tr>
<td>Kolodinsky et al.</td>
<td>2008</td>
<td>Focus Group</td>
<td>16</td>
<td>High interest in labels</td>
</tr>
<tr>
<td>Kristal et al.</td>
<td>1998</td>
<td>Survey</td>
<td>2,451</td>
<td>Label use increased after NLEA</td>
</tr>
<tr>
<td>Lando et al.</td>
<td>2007</td>
<td>Focus groups</td>
<td>68</td>
<td>High interest in Nutrition Facts label</td>
</tr>
<tr>
<td>Levy &amp; Fein</td>
<td>1998</td>
<td>Experimental</td>
<td>384</td>
<td>Age, race, and education associated with label use</td>
</tr>
<tr>
<td>Macon et al.</td>
<td>2004</td>
<td>Survey</td>
<td>2,846</td>
<td>Use Nutrition Facts labels</td>
</tr>
<tr>
<td>McArthur et al.</td>
<td>2001</td>
<td>Survey</td>
<td>130</td>
<td>Use Nutrition Facts labels</td>
</tr>
<tr>
<td>Nayga</td>
<td>1996</td>
<td>Survey</td>
<td>1,448</td>
<td>Several factors impact use</td>
</tr>
<tr>
<td>Nayga</td>
<td>2000</td>
<td>Survey</td>
<td>200</td>
<td>No association between gender, education, &amp; use</td>
</tr>
<tr>
<td>Neuhouser et al.</td>
<td>1999</td>
<td>Survey</td>
<td>1,450</td>
<td>Age and gender associated</td>
</tr>
<tr>
<td>Rasberry et al.</td>
<td>2007</td>
<td>Cross-sect.</td>
<td>1,294</td>
<td>Use Nutrition Facts labels</td>
</tr>
<tr>
<td>Perez-Escamilla</td>
<td>2001</td>
<td>Survey</td>
<td>2,952</td>
<td>Nutrition Facts label use associated w/better diet</td>
</tr>
<tr>
<td>Satia et al.</td>
<td>2005</td>
<td>Cross-sect.</td>
<td>658</td>
<td>Females and higher educated more likely to use labels</td>
</tr>
<tr>
<td>Taylor</td>
<td>2008</td>
<td>N/A</td>
<td>N/A</td>
<td>Purpose of Nutrition Facts</td>
</tr>
<tr>
<td>Taylor</td>
<td>2008</td>
<td>N/A</td>
<td>N/A</td>
<td>Development of labels</td>
</tr>
<tr>
<td>Zarkin et al.</td>
<td>1993</td>
<td>Comp. model</td>
<td>N/A</td>
<td>Label use can provide public Health benefits</td>
</tr>
</tbody>
</table>

Discussion
The purpose of this research project was to investigate the frequency of and factors associated with Nutrition Facts label use among adults in the United States. Since Nutrition Facts labels were introduced in 1973, several revisions have been made to them, particularly following the implementation of the Nutrition Labeling and Education Act (NLEA) in 1994. Although the early Nutrition Facts labels that appeared on some packaged foods and provided limited, unclear information, labels today appear on almost all packaged foods and provide accurate, clear and concise information to consumers. The literature examined for this research project showed that of those adults studied in the United States, the majority are utilizing these labels.

The first question posed by this research project was, “How much are Nutrition Facts labels being used by adults in the United States?” Although results were slightly varied throughout the research examined, most findings suggested that the majority of adults studied in the United States used Nutrition Facts labels at least “sometimes.” In fact, 11 out of the 13 studies that reported on the frequency of Nutrition Facts label use stated that at least 70% of adults claimed to use labels at least “sometimes.” About one-fourth of these adults reported using labels on a daily basis, or “always.” These findings suggest that many adults studied for this project are using Nutrition Facts labels. Furthermore, when looking at the components of Nutrition Facts labels, the literature suggests that the parts that display calories, fat grams, cholesterol, sodium, and the ingredient list are the ones most often used.

The second question posed by this research project was, “What factors influence Nutrition Facts label use?” The literature reviewed identified several factors that may be associated with Nutrition Facts label use, including gender, age, education, beliefs about
diet-disease relationships, socioeconomic and employment status, health consciousness, household size, and race. The three most reported factors that influenced label use were gender, age, and education.

Gender appeared to play a significant role in Nutrition Facts label use. The results of the studies reviewed were consistent in that females used labels more often than males, not only to determine the amount of a particular nutrient in a food, but also to make purchase selections and fit certain foods into their daily diet. Females were more likely to view multiple components of labels, including serving size, calories, cholesterol, total fat, saturated fat, and calcium, more than their male counterparts. However, males were more likely to look at information regarding protein and vitamin A.

Age was also found to influence the use of Nutrition Facts labels. The literature reviewed showed that the probability of using Nutrition Facts labels decreased with age. Adults aged 45 years and younger were more likely to read labels than those 46 years and older. Several studies looked at young adults (Driskell, Schake, & Detter, 2008; Kolodinsky, Green, Marietta, Welshimer, & Anderson, 1999; Michahelles, & Harvey-Berino, 2008; Rasberry, Chaney, Housman, Misra, & Miller, 2007), and found that not only were the majority of young adults utilizing labels, but they also claimed that labels were useful and easy to understand.

The third variable highly associated with Nutrition Facts label use was education. Effectively reading and utilizing labels requires a certain level of health literacy including mathematical ability, and understanding of the Daily Value System. These needed skills could help explain why results consistently showed the use of Nutrition Facts labels increased with education. One study (McArthur, Chamberlain, & Howard, 2001) found
that adults who completed high school were more likely to read labels than those who did not. A different study (Kim, Nayga, & Capps, 2001) showed that adults with either a college or graduate degree were significantly more likely to use labels than those without a college degree. Moreover, higher nutrition knowledge showed a significant and positive association with use of the Nutrition Facts label. Adults with previous nutrition education were more likely to look at calories from fat, total carbohydrates, and dietary fiber than those with no previous label education. According to these results, not only nutrition education, but education in general appears to play a significant role in nutrition label use. This finding is likely due to the increase in nutrition knowledge and mathematical skills accompanied by education.

Beliefs about diet-disease relationships showed an extremely strong association with Nutrition Facts label use. This relationship was strongest of all reviewed. Adults who held a stronger belief in the relationship between nutrition and the risk for developing certain chronic diseases were more likely to use Nutrition Facts labels. Several studies (McArthur et al., 2001; Nayga, 1996; Nayga, 2000; Neuhouser, Kristal, & Patterson, 1999; Rasberry et al., 2007; Satia, Galanko, & Neuhouser, 2005) found links between the belief in a relationship between diet and cancer and label use. One study (Neuhouser et al., 1999) in particular reported that adults who held this belief were three times more likely to read labels and look at fat grams and percent Daily Value for fat compared to participants who believed there was a weak or no relationship between diet and cancer. Furthermore, adults who stated that eating a low fat diet was very important to them were 10 times more likely to read the nutrition label, and five times more likely to look at fat grams than those who reported that a low fat diet was not important.
However, results were inconsistent regarding the relationship between actually having a diet-related disease and using Nutrition Facts labels. Findings suggest that solely obtaining a health condition does not necessarily impact label use, but that holding the belief in a relationship between diet and disease strongly impacts label use. Therefore, discovering methods to increase the belief in diet-disease relationships may encourage label use.

According to the literature, another factor associated with Nutrition Facts label use is the presence of a health claim on food packages. Health claims located on the front of packages appear to compete with Nutrition Facts labels located on the sides and the backs of packages. Results from one study (Marietta, Welshimer, & Anderson, 1999) found that more than 70% of college students claimed to purchase products with health claims on the front rather than no health claims. In general, results found that individuals who read health claims on the front of packages were less likely to rely on information provided by Nutrition Facts labels.

Other studies in the literature reviewed showed an interesting association between both socioeconomic status and employment status with Nutrition Facts label use. The majority of results showed that the probability of using labels increased with income. Adults in the Food Stamp Program were less likely to use labels than those who were not classified as low income. However, adults in food programs generally read Nutrition Facts labels more than other adults with low income who were not in food programs. Although one study (Nayga, 2000) found no association between income and label use, it did find a relationship between income and nutrition knowledge. Contrasting, two different studies (Nayga, 1996; Nayga, 2000) that looked at the relationship between
employment status and label use both found that unemployed individuals were more likely to view labels. While the reason for this finding was unclear, the researchers indicated that “time” may play a significant factor. However, it is very interesting that higher income and unemployment were both positively associated with Nutrition Facts label use.

Finally, numerous other factors were found to have a weak influence on Nutrition Facts label use, including health consciousness, household shoppers, household size, race, and other factors that play a role in food selections other than Nutrition Facts labels. Each of these factors was not examined thoroughly and only appeared in one or two studies (Alfieri & Byrd-Bredbenner, 2000; Byrd-Bredbenner, Alfieri, & Keifer, 2000; Fitzgerald, Damio, Segura-Perez, & Perez-Escamilla, 2008; Nayga, 2000; Satia, Galanko, & Neuhouser, 2005). Findings showed that individuals who reported taking steps toward weight loss, engaging in regular physical activity, and who had heard of the Food Guide Pyramid were more likely to view Nutrition Facts labels than their counterparts. The major food shoppers of households were more likely to use labels than non-food shoppers, and household size was positively associated with label use, especially concerning vitamins, minerals, and sugar content. Some results (Nayga, 2000) showed that white participants were more likely to use nutrition information regarding fat content than non-white participants. Finally, factors other than nutrition that potentially influenced food selections were examined as well. Other factors found to play a role in food selections included convenience, taste, price, cravings, and family preferences. Individuals who regarded these factors as more important than nutrient content were less likely to view Nutrition Facts labels.
The third and final question to be answered by this research project was, “Are Nutrition Facts labels used more in certain segments of the population and if so, why?” Not only did the reviewed literature show that certain segments of the population use labels more, but also people in certain regions in the United States may be more likely to use labels. Adults who resided in nonmetropolitan areas were more likely to use Nutrition Facts label information than those residing in metropolitan areas. This finding was likely due to a lack of time for individuals residing in metropolitan areas. One study (Nayga, 1996) examined label use among different regions in the United States. Households located in the Northeast were more likely to use nutritional information concerning health benefits and sodium than those in the South and Midwest. People living in households in the Midwest were more likely to use nutritional information concerning health benefits than those in the South. However, reasons for these findings were not discussed by the researcher and remain unclear.

Conclusions

Based on findings and within the limitations of this research project, the following conclusions were drawn:

1. The majority of adults in the United States who participated in the studies utilized Nutrition Facts labels to some degree on a regular basis.
2. Females are more likely than males to utilize Nutrition Facts labels to find nutrition information, make purchase decisions, and help formulate a healthy diet.
3. Increasing age is negatively associated with utilization of Nutrition Facts labels. Younger adults use labels more frequently, and view them as useful and easy-to-use tools more so than older adults.

4. Education level is positively associated with utilization of Nutrition Facts labels. Individuals with a college degree are more likely to use labels than those without a college degree.

5. A belief in diet-disease relationships is strongly associated with utilization of Nutrition Facts labels. However, suffering from a diet-related disease alone is not associated with utilization of the label.

6. Several factors serve as barriers to utilizing Nutrition Facts labels. The four most consistent barriers include the presence of health claims on the front of food packages, lack of time, lack of nutrition knowledge, and insufficient label reading skills.

7. Residing in a non-metropolitan area versus a metropolitan area is positively associated with the utilization of Nutrition Facts labels. This factor may be explained due to a slower pace of life and having more time available to view labels.

Recommendations for Implementation

Based on the findings of this research project, several recommendations for healthcare professionals can be made. First of all, while labels are utilized by many adults, it appears that those adults at greatest risk for malnutrition are not utilizing labels. Individuals who are less educated, of a lower socioeconomic status, and elderly are less likely to utilize labels than their counterparts. Therefore, efforts to promote proper
Nutrition Facts label use should target these groups. Government agencies such as the FDA and USDA can use this information to develop such programs that target those populations that are less educated, of a lower socioeconomic status, and/or elderly. The FDA’s web-based program *Make Your Calories Count* provides a tutorial of quality content that addresses label reading skills. However, the priority populations may find that the web-based format serves as an obstacle for completing this program. Making not only this program, but also programs of a similar nature, easily accessible to priority populations should be a high priority to government agencies and health care professionals. Identifying effective channels of communication and developing appropriate marketing strategies will be critical for reaching priority populations to increase Nutrition Facts label use. Perhaps providing training during regular visits with a primary care provider, or providing brief public service announcements would better reach priority populations.

One of the major barriers identified in the literature for utilizing Nutrition Facts labels was a lack of time. While a major goal of the Nutrition Labeling and Education Act was to revise the label format to provide quick and easy information for consumers, many consumers have reported that label reading requires a great deal of time. However, with adequate nutrition knowledge and label reading skills, viewing Nutrition Facts labels can be very time efficient. This message should be continually conveyed by health care professionals during regular primary care visits and appointments with registered dieticians, nutritionists, and health educators. Government agencies should focus on delivering this message through Public Service Announcements and other advertising and promotional efforts. As discussed above, educational classes offered at senior centers,
community centers, churches, and during patient visits with health care providers regarding basic label reading skills can further equip consumers with the tools needed to quickly obtain nutrition information from Nutrition Facts labels.

Finally, findings from this research project also revealed that the strongest association was found between Nutrition Facts label use and beliefs about diet-disease relationships. The focus of program planners should shift from simply increasing nutrition knowledge to developing educational strategies that not only incorporate, but emphasize, the connection between diet and disease. Similarly, health care professionals should redirect educational efforts to include components that increase patients’ understanding about this connection. Educational efforts of this sort could include classes offered by hospitals and/or primary care providers, training given to primary care providers and nurses to properly address this topic during patient visits, high school general health courses, and/or college personal health courses. Delivering this message that addresses the relationship between diet and disease to those who are less educated, are at a lower socioeconomic standing, and/or elderly may be essential to increasing Nutrition Facts label use and overall diet quality of Americans.

Recommendations for Further Study

Further research should focus on the populations that are less likely to utilize Nutrition Facts labels (lower socioeconomic, less educated, elderly) and the reasons for infrequent label use. A better understanding of the barriers that prevent these populations from utilizing labels will be very useful in developing effective programs to increase proper Nutrition Facts label use. In addition, a pivotal aspect of reaching these populations will be marketing strategies and the channels of communication used.
Effective marketing strategies should be investigated, including different marketing methods and the effectiveness of each in reaching target populations.

The research reviewed failed to examine the relationship between Nutrition Facts label use and overweight and obesity, and/or weight management. Although the FDA advocates label use as a means of achieving weight management, research regarding this topic is minimal or non-existent. Because overweight and obesity serve as such a critical public health problem among Americans, this relationship should be examined to identify the role Nutrition Facts labels could potentially play in addressing this problem. If label use shows to have a significant effect on weight management then efforts to promote proper use should be escalated.
REFERENCES


