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Reliability and validity of survey questions on food label use, nutrition knowledge and attitudes of U.S. adults: Diet and Health Knowledge Survey (DHKS) 1994-1995

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RELIABILITY AND VALIDITY OF SURVEY QUESTIONS ON FOOD LABEL USE, NUTRITION KNOWELDGE AND ATTITUDES OF U.S. ADULTS: DIET AND HEALTH KNOWLEDGE SURVEY (DHKS) 1994-1995

By

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ABSTRACT

RELIABILITY AND VALIDITY OF SURVEY QUESTIONS ON FOOD LABEL USE, NUTRITION KNOWLEDGE AND ATTITUDES OF U.S. ADULTS: DIET AND HEALTH KNOWLEDGE SURVEY (DHKS) 1994-1995

By

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The assessment of reliability and validity of survey questions is essential to collect meaningful data with small measurement errors. The purposes of this study are: 1) to evaluate the reliability and validity of questions on nutrition knowledge, attitudes, and food label use of U.S. adults included in DHKS 1994-1995, and using the results of this analysis; 2) to assess changes in nutrition knowledge, attitudes, and use of the food label (the list of ingredients, nutrition facts, health claims and nutrient content descriptors) among the U.S. population between DHKS 1994 and 1995. Item total correlation, alpha if item deleted, and Cronbach's alpha were calculated to test reliability. Validity was assessed by content validity, divergent validity, and discriminant validity. Twenty constructs were created from DHKS 1994-1995 in this study: five for nutrition knowledge, 14 for attitude, and one construct for frequency of food label use. Eight of 13 constructs tested had a good reliability with Cronbach's alpha $r \geq 0.70$. Fifteen of 20 constructs were valid.

Between 1994 and 1995, nutrition knowledge, attitudes, and food label use were improved. The reliable and valid national survey questions for selected constructs are important to establish theoretical models to understand the relationships among nutrition knowledge, attitudes, use of food label, and dietary intakes in the future.

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Chapter One

INTRODUCTION

The current food label legislation was enacted in 1994 in the U.S (Nutrition Labeling Education Act of 1990. Pub L No.101-535). The food label was developed through the cooperative efforts of the government, food industry, consumer groups and academia as a nationwide nutrition education tool. It was designed to enhance consumers' awareness of nutrition issues, nutrition knowledge, and healthy eating habits (Kristal AR et al, 1998; Kessler DA, 1989; Zarkin GA et al, 1993).

Factors associated with an individual's nutrition knowledge, attitudes and use of food labels are important in achieving the intended purposes of the food label. In several studies, individuals' nutrition knowledge, awareness, attitudes, perceptions, and dietary behaviors were affected by different label formats (Burton et al, 1994; Burton and Biswas, 1993; Levy et al, 1992; Geiger et al, 1991). However, these studies were carried out in limited locations or with small sample sizes (most of study samples were less than n= 500). In addition, changes in subjects' dietary behaviors were measured by food purchase at supermarkets, rather than by their dietary intake, quality and quantities.

Characteristics of users of the former food label and the nutrient density of their diets have been reported by Guthrie et al (1995). Positively associated with food label use were: having a college education; being a female; living with others rather than living alone; knowledge about nutrition; beliefs in the importance of following the principles of the Dietary Guidelines for Americans; and concerns with nutrition and product safety, and less with taste when food shopping. Guthrie and colleagues also reported that food

label use was associated with higher vitamin C and lower cholesterol intakes than was non-use.

Past studies have reported that those with low socioeconomic status are less knowledgeable about nutrition than those with high socioeconomic status (Morton and Guthrie, 1997; Jacoby et al, 1977; Levy et al, 1992). Michel et al (1994) examined nutrition knowledge, attitudes and food label reading habits by clients in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) at two Northern Virginia clinics. Most respondents occasionally read food labels, but their understanding was generally poor.

Current literature supports the theory that a variety of factors are associated with individuals' nutrition knowledge, attitudes, perceptions, use of food labels, and dietary behaviors (Bender and Debby, 1992; Fullmer et al, 1991; Guthrie et al, 1995; Michel et al, 1994). However, findings are not consistent across studies. For example, Morton et al (1997) reported that low income respondents were significantly less likely to follow low-fat and low-cholesterol eating practices than were high income respondents. Colavito et al (1996) and Frazao et al (1994), however, found no relation between income levels and fat or cholesterol consumption. Frazao et al (1994) reported that no gender differences were seen in awareness of fat, cholesterol, and saturated fat intakes and disease relationships. On the other hand, Variyam et al (1996) reported that females were more aware of diet-disease relationships than males. Inconsistent results across studies are due in part to lack of valid and reliable questions to inquire about respondents' nutrition knowledge, attitudes, food label use and dietary behaviors (Sapp and Jensen, 1997; Axelson and Brinberg, 1992; Sims, 1981).

Studies are limited, especially after the 1994 implementation of the Food label Act, on the relationship between food label use and dietary behaviors. Kristal et al (1998) examined the influence of the 1994 implementation by examination of Washington State residents' nutrition knowledge, attitudes and use of the food label. Results showed that use of and satisfaction with food labels increased after 1994. However, 70% of Washington State residents still wanted food labels to be easier to understand than the current food label. Thus, the relationship between current food label use and dietary behaviors.

Multiple factors affect individuals' dietary behaviors directly and indirectly as well as independently and interactively. A number of theoretical models consisting of factors such as sociodemographics, nutrition knowledge and attitudes were used to explain individuals' dietary habits (Shepherd and Stockley, 1985; Shepherd and Stockley, 1987; Tuorila and Pangborn, 1988; Saunders and Rahilly, 1990). However, factors included in models were limited, and applicability of these models differed depending on subgroups. Thus, researchers suggested integrating models developed in the past so that individuals' dietary behaviors could be understood from broader perspectives (Achterberg and Clark, 1992; Colavito and Guthrie, 1996).

Continuing Survey of Food Intakes by Individuals/Diet and Health Knowledge Survey (CSFII/DHKS) between 1994 and1996 was developed, incorporating factors from various theoretical models and subgroups (Colavito and Guthrie, 1996). CSFII/DHKS had a large, complex, multistage clustered, nationally representative sample. The question items inquired about individuals' nutrition knowledge, attitudes, food label use and dietary intake information. Other improvements of CSFII/DHKS 1994-1996 from

previous CSFII/DHKS surveys are summarized in Table 1. Thus, CSFII/DHKS 1994-1996 is the most appropriate data source for studying the association of individuals' nutrition knowledge, attitudes, use of food labels and their dietary intake.

Because inconsistency of the results from past studies was in part due to lack of valid and reliable questions, assessing reliability and validity of survey questionnaire is crucial to minimize measurement errors of the result. Otherwise, one couldn't identify whether the result showed weak relationship because: a) the association was actually weak or b) because the ability of variables to measure the association was weak, and results were attenuated (Axelson and Brinberg, 1992). Thus, results could be misleading.

Sapp and Jensen (1997) reported that the reliability of nutrition knowledge questions and nutrition awareness questions in DHKS 1989-1991 were modest (alpha $<$ 0.7) and high (alpha $\geq$ 0.7), respectively. Because DHKS is the National Nutrition Monitoring and Related Research Program, the changes in nutrition knowledge and attitudes can be monitored if the question items are compatible, reliable and valid across different years.

Thus, the reliability and validity of questions related to nutrition knowledge, attitudes, food label use in DHKS 1994-1995 should be examined before assessing the relationship between those factors and dietary intake reported in CSFII 1994-1995. The results obtained from the reliability and validity tests can be also to improve the design of survey questionnaires in the future.

The purposes of this study are: 1) to evaluate reliability and validity of questions on nutrition knowledge, attitudes, and food label use of U.S. adults included in DHKS 1994-1995, and using the results of this analysis; 2) to assess changes in nutrition

Table 1. Comparison of the current (1994-96) and previous CSFII/DHKS's

Survey	1985-86 CSFII	1989-91CSFII/DHKS	1994-96 CSFII/DHKS
Population	48 States	48 States	50 States
Sample of housing units	Two separate samples (Basic and low income)	Two separate samples (Basic and low income)	One sample (oversampling of the low-income population)
Sample of individuals	Women 19-50 yrs and their children 1-5 yrs for both years. Men 19-50 yrs in 1985 only.	All household members were asked to provide intake information.	Only selected household members were asked to provide intake information.
Day1 response rates	—	57.6 percent	80.0 percent
Dietary data	6 nonconsecutive days for women and children. 1day for men.	3 consecutive days	2 nonconsecutive
	24 hr dietary recalls. Day 1 in person,remaining days by telephone.	24 hr dietary recall in person and 2-day self-administered diet records.	24 hr dietary recalls in person.

Table 1. Comparison of the current (1994-96) and previous CSFII/DHKS's (Cont'd)

Survey	1985-86 CSFII	1989-91CSFII/DHKS	1994-96 CSFII/DHKS
DHKS respondent	Not available	Main meal planner/ preparer	Randomly selected CSFII participant 20 yrs and over.
DHKS interview method	—	By telephone	By telephone

Information source: Design and operation: the Continuing Survey of Food Intakes by Individuals and the Diet and Knowledge Survey, 1994-96. NFS Report No.96-1

knowledge, attitudes and use of food labels among the U.S. population between DHKS 1994 and 1995.

The objectives of this study are:

1. To describe the sample of DHKS 1994-1995
2. To establish the reliability of nutrition knowledge, attitudes and food label use scores created from the DHKS 1994 and 1995 by examining correlation and covariance matrix; item total correlation (ITC); alpha if item deleted; and Cronbach's alpha.
3. To establish the validity of nutrition knowledge, attitudes, and food label use scores created from the DHKS 1994 and 1995 by content (face) validity; divergent validity; and discriminant validity.
4. To compare changes in nutrition knowledge, attitudes and food label use in the U.S. between 1994 and 1995.

Hypotheses of this study are:

1. Nutrition knowledge, attitudes and food label use scores created from DHKS 1994-1995 are reliable.
2. Nutrition knowledge, attitudes and food label use scores created from DHKS 1994-1995 are valid.
3. The type of nutrients on food labels affect frequency of food label use.
4. Individuals' nutrition knowledge and attitudes toward healthy dietary behaviors and use of food label had improved between 1994 and 1995.

Chapter Two

SUMMARY OF PAST STUDIES

Food labels were developed to increase consumers' knowledge so that consumers could ultimately improve their diet (Constance et al, 1991). Researchers tested different types of food labels and nutrition education programs to identify which one would facilitate more consumer use and understanding of the information (Burton et al, 1993; Levey et al, 1992; Geiger et al, 1991). Other researchers studied the mechanisms of how nutrition information was processed by consumers, and what factors were associated with these mechanisms (Moorman, 1990; Cole and Gaeth, 1990; Russo et al, 1986). Various studies examined the relationship between use of information on food labels or nutrition education programs and consumers' demographic and socioeconomic characteristics, nutrition awareness, knowledge, attitudes, and dietary behaviors (Bender and Debby, 1992; Fullmer et al, 1991; Michel et al, 1994, Guthrie et al, 1995). Factors associated with dietary behaviors have also been extensively studied (Contento and Murphy, 1990; Beck and Lund, 1981; Maiman and Becker, 1974). Although results were not always consistent because of different definitions of variables, sample populations, and statistical analyses across studies, theories about consumers' nutrition awareness, knowledge, attitudes and dietary behaviors including use of food labels were established. Thus, this section consists of five different parts: 1) History of the food label; 2) Nutrition knowledge, attitudes and behaviors depending on various food label formats and education programs before the 1990 Nutrition Labeling Education Act (NLEA); 3) Food label reading behaviors and their relation with individuals' characteristics, nutrition

knowledge, attitudes and dietary behaviors; 4) Factors which might affect an individual's dietary behaviors; and 5) Reliability and validity of questions related to food label use and dietary intake in CSFII and DHKS. Tables for the summary of findings in the past are listed in the Appendices A through C.

2.1. History of the food label

The goal of the food label is to improve consumers' diets by increasing their understanding of nutrition (French et al, 1974). Survey results conducted by the Food and Drug Administration (FDA), food industry and consumer groups reported positive consumers' opinions about nutrition labels in the early 1970s (Consumer Nutrition Knowledge Survey, 1973-1974; Consumer Nutrition Knowledge Survey, 1975; Opinion Research Corporation, 1990; Stokes, 1972). However, in the late 1970s and early 1980s, studies revealed that consumers were confused with the information on food labels, and wanted additional information and changes in formats (FDA 1978 Consumer Food Labeling Survey, 1979). Responding to this demand, an extensive number of experimental studies were conducted for nutrition information to be used most effectively through food labels and education programs (Geiger et al, 1991; Levy et al, 1992; Jacoby et al, 1977; Cole et al, 1990; Moorman, 1990; Burton et al, 1993; Burton et al, 1994; Muller, 1985; Schucker et al, 1992; Levy et al, 1988; Mullis et al, 1987; Davis-Chervin et al, 1985; Ernst et al, 1986; Jeffery et al, 1982; Pennington et al, 1988; Russo et al, 1986).

In 1990, the Nutrition Labeling and Education Act was passed (Nutrition Labeling and Education Act of 1990. PL 101-535.104 Stat 2353). It initiated new mandatory nutrition labeling of most foods under FDA jurisdiction, except meat and poultry (under

USDA jurisdiction). It also encouraged nutrition education programs to teach consumers how to read labels. Changes on current food labels included: 1) expression of serving sizes; 2) selected nutrients; 3) the % Daily Value; 4) nutrient content descriptors; and 5) health claims.

Up to this point, only Kristal et al (1998) had conducted a study on the current food label. The authors concluded that Washington State residents (n=1001 in 1993 and n=1450 in 1996) had positive attitudes toward the current food label, and their use had been increased since 1994. However, residents' level of understanding food labels was still low, and some respondents wanted an easier to understand format than the current food label in the future (Kristal et al, 1998).

In summary, changes and efforts have been made by cooperative efforts of the government, food industries, consumer groups and research institutes to make food labels more easily understandable and to be used for improving individuals' diet. Although consumers generally show positive attitudes toward food labels, some people still have difficulty in understanding the label. To date there are limited studies on the current food labels, and additional changes on the current food label might occur in the future depending on the findings generated from future studies.

2.2. Nutrition knowledge, attitudes and behaviors depending on various food label formats and education programs before the 1990 Nutrition Labeling Education Act (NLEA)

Before the passing of the Nutrition Labeling Education Act (NLEA) in 1990, various nutrition education programs and formats were tested to develop a nutrition

education tool to increase consumers' nutrition knowledge and improve their diets. Information was provided on packaged food nutrition labels, supermarket tags and posters, and through other point-of-purchase nutrition information programs to meet the demands of consumers. Studies showed that participants'nutrition knowledge, attitudes and behaviors such as food purchases and food selections were influenced by not only user socioeconomic, demographic characteristics and lifestyle factors, but also by information formats and programs (Ernst et al, 1986; Mullis et al, 1987; Jeffery et al, 1982; Schucker et al, 1992; Davis-Chervin et al, 1985; Mullis and Pirie, 1988; Jacoby et al, 1977; Cole and Gaeth, 1990; Russo et al, 1986; Viswanathan, 1994; Moorman, 1990). For example, Russo et al (1986) reported that making nutrition information more readily available increased respondents' nutrition knowledge. Moorman (1990) found that the age was positively related to the ability to process the nutrition information. More detail is followed:

2.2.1. Nutrition education programs at point-of-purchase

Davis-Chervin et al (1985) conducted a study to compare the effect of different nutrition education programs with intangible incentives between two cafeterias. The first cafeteria (dorm1), serving 175-200 first-year students, provided general nutrition information, recommendations for changing food selection, and information on the nutrient composition. The second cafeteria (dorm2), serving 450-500 undergraduate students from all four classes, provided only information of the amount of nutrients. The results showed that the first cafeteria influenced students' likelihood of choosing low-cholesterol, - calorie and - fat foods more than the second cafeteria did.

Ernst et al (1986) evaluated the effect of "*Foods for Health*", a cardiovascular nutrition education program at the point of purchase in Washington D.C., and Baltimore and other Maryland areas as control groups. The study was sponsored by the National Lung and Blood Institute and Giant Food Inc. The program was intended to change food selection and preparation behaviors to prevent cardiovascular diseases. It provided shoppers with a series of four page brochures on cardiovascular health, nutrition information, and practical suggestions from October 1978 to October 1979. Results were obtained from telephone surveys and food sales data. The results showed a significant effect of the program on increasing consumers' awareness and knowledge of cardiovascular nutrition, but no apparent effect on the food sales.

Schucker et al (1992) studied the effect of providing a brand-specific nutrition shelf-tag and a supplementary explanatory booklet on consumers' food purchases in the Baltimore area Giant Food chain, replicating a previous success of the program in Washington D.C. (Levy et al, 1985). The results suggested that shoppers' purchases were influenced by the number of nutrients listed on the tag as well as by the nature of the nutrient. For example, there was higher sales growth in products with larger number of nutrition shelf-tags than in products with a smaller number of nutrition shelf-tags. In this study, the relationship between the subject demographic variables and the information use was also examined. The results showed that the shoppers' concerns about nutrition and health status of family members correlated with the use of provided information use and shelf-tags product sales more than education, income and age. The previous study conducted by Levy et al (1985) hypothesized that self-labeling may be less effective in categories that already have reduced-nutrient product alternatives. In the

study conducted by Schucker et al (1992), this hypothesis was accepted in the fluid milk category such as reduced-fat alternatives.

From past studies of point-of-purchase nutrition information programs, it appears that programs with more nutrition information with targeted nutrients are more likely to be successful in influencing consumers' nutrition awareness, knowledge, attitudes, and use of provided information than programs with less nutrition information (Schucker et al, 1992; Davis-Chervin et al, 1985). Factors such as concern about nutrition and health status of family members and demographic and socioeconomic characteristics were also found to be related to the use of information provided in the programs (Schucker et al, 1992). Furthermore, labeling was found to be less effective on the product which had already reduced nutrient product alternatives (Schucker et al, 1992; Levy et al, 1985)

2.2.2. Food label formats

Burton et al (1993) tested potential impact of the nutrition labels proposed under the NLEA of 1990 on individuals' attitudes and perceptions of product nutritional value and the resulting purchase likelihood. The author's study concluded that the proposed label with additional information in the NLEA (i.e., cholesterol, amount of saturated fat, calories from fat, and fiber) tended to lower individuals' nutrition perceptions and product purchase likelihood than the label used at the time of the study. Thus, the result suggested the potential negative effects from the food marketer's perspective for products with negative nutritional values.

Levy et al (1992) conducted a study on the relationship between different types of nutrition label formats and people's preferences and understanding. They found that

preference for certain types of labels was not necessarily correlated with the level of understanding. They also found that demographic characteristics such as age, education and race were related to understanding of labels. For example, older subjects took a longer time to process the nutrition information on food labels and had a lower accuracy of understanding this information than younger subjects.

Geiger et al (1991) tested multiple levels and combinations of nutrition information formats, the amount of information, expression and order on consumers' perceptions of label usefulness in purchase decisions. Geiger and colleagues found that consumers preferred the nutrition label that displayed all nutrient values by both absolute numbers and percentages of U.S. Recommended Daily Allowances (RDA's) for adults. They also found that consumers preferred the nutrients that should be consumed in adequate amounts on the top (i.e., protein, total carbohydrate, complex carbohydrates, calcium, iron, vitamin A, thiamin, riboflavin, and niacin), calories in the middle, and nutrients that should be consumed in limited amounts on the bottom of the label (i.e., sodium, fat. cholesterol, and sugar). Rudd (1986) reported that a bar graph format was more effective than the traditional label format to help consumers obtain better understanding of nutrition information.

In summary, past studies indicated that consumers preferred labels that provided maximum information in the most easily understandable format, such as a graph (Geiger et al, 1991; Viswanathan, 1994). The preferences were not necessarily related to better understanding of nutrition information (Levy et al, 1992). Users' degree of understanding of different formats appeared to be associated with their demographic and socioeconomic characteristics and life style factors (Levy et al, 1992).

2.2.3. Studies on nutrition information processing

Marketing research groups have studied the mechanism of how individuals process nutrition information. Moorman (1990) emphasized that it was important to consider both consumer characteristics and stimulus characteristics (e.g. format and content of the information) in helping individuals to improve their nutrition information processing and decision quality. Cole and Gaeth (1990) conducted three experiments to indicate how age, cognitive style, and aid to stimulate perceptions affected consumers' use of nutritional information. They found that age and aids to stimulate perceptions influenced consumers' accuracy in choosing the most nutritious cereal from three choices. They also found that aids to stimulate perceptions interacted with cognitive style, influencing accuracy and decision time.

Russo et al (1986) examined whether lists of information in supermarkets were effective in reducing the load of information processing in comparing alternative foods. They found that adding information, especially on nutrients that were perceived as negative (e.g., sugar) was an effective technique to increase information use. Thus, the study indicated the complexity of individuals' nutrition information processing. Understanding this mechanism of how individuals process nutrition information and what factors were involved would be helpful for nutrition educators to develop effective nutrition education tools.

In summary, various types of nutrition information and education programs were tested before the implementation of the current food labels in 1994 (Burton et al, 1993; Levy et al, 1992; Burton et al, 1994; Geiger et al, 1991; Muller et al, 1985; Ernst et al, 1986). Nutrition information processing is a complex task. Results differed depending

on the selected subject's ability to process the nutrition information, the type of information and programs, and other factors such as perception of nutrients. Thus, future studies need sophisticated models of individuals' nutrition information processing to include all factors involved in the individuals' use of information on food labels.

2.3. Food label reading behaviors and their relation with individuals' characteristics, nutrition knowledge, attitudes and dietary behaviors.

Bender and Debby (1992) identified the trends of ingredient lists and nutrition labels usage from 1982-1988 National Health and Diet Surveys. They reported a significant increase of nutrition label usage from 1982 to 1986. In their study, users of both ingredient lists and nutrition labels were more likely to be young (25-34 yrs), white, female, highly educated, and following a self-initiated or doctor-prescribed low-sodium or low-cholesterol diet.

Fullmer et al (1991) assessed consumers' knowledge of fiber, understanding, and attitudes toward health claims on food labels of breakfast cereals from 241 grocery shoppers in Utah. They found that education had positive effects on understanding of diet-disease relationships and positive attitudes toward health claims on food labels. Knowledge of fiber was significantly correlated with understanding and positive attitudes toward of health claims. However, consumers' understanding of fiber was low regardless of their attitudes toward health messages.

Michel et al (1994) examined food label reading habits of WIC clients in two Northern Virginia WIC clinics. They reported that clients understood very little food label information. Nutrients and products clients evaluated were vitamins, iron, calcium

and milk. Interestingly, these nutrients and food products correspond to the targeted nutrients and food supplements of the WIC program.

Guthrie et al (1995) identified from the 1989 Continuing Survey of Food Intakes by Individuals and Diet and Health Knowledge Survey (CSFII/DHKS) the characteristics of individuals using nutrition labels and the effects of label use on diet quality. Positively associated with food label use were: being a female; having a college education; living with others rather than alone; knowledge about nutrition; beliefs in the importance of following the principles of the Dietary Guidelines for Americans; and concerns with nutrition and product safety, and less with taste when food shopping. They reported that label use was related to the consumption of diets high in vitamin C and lower in cholesterol.

In summary, consumers' awareness, attitudes and behaviors regarding food labels have been changing positively over a period of time. Many studies reported that females and those who had a college educational background and high income were likely to be food label users. Not yet adequately addressed were other possible factors determining food label use, such as having concerns about nutrition, or having a family member who has health problems. There are few studies that described the relationship of individuals' nutrition knowledge, attitudes and use of food labels with their actual dietary intakes. Since the implementation of the current food label in 1994, only one study of Kristal et al (1998) measured all of consumer knowledge, attitudes, use of food labels, and dietary intake (See history of food labels). Thus, the effectiveness of current food labels on increasing consumers' nutrition knowledge and improving their attitude and dietary behaviors have not been evaluated.

2.4. Factors which might affect an individual's dietary behaviors

Nutrition educators in general classified various internal and external factors that might affect an individual's dietary habits into four groups: 1) nutrition knowledge and attitude factors; 2) demographic and socioeconomic factors; 3) behavioral and lifestyle factors; and 4) sensory preferences and environmental factors.

2.4.1. Knowledge and attitude factors affecting dietary behaviors

Various knowledge and attitude factors affecting individual's dietary habits have been explained by a number of theories. Commonly accepted theories are: the Health Belief Model (Maiman and Becker, 1974); Theory of Reasoned Action (Fishbein and Ajzen, 1975); Social Cognitive Theory (Bandura, 1977); and the Theory of Diffusion of Innovation (Rogers, 1983). Brief descriptions of each theory along with some research findings are summarized below.

Health Belief Model. According to this theory, preventive health behaviors were determined by four underlying beliefs: 1) perceived barriers to the behaviors; 2) perceived benefits of the behaviors; 3) perceived severity of the health risk associated with the behaviors; and 4) perceived susceptibility to risk (Maiman and Becker, 1974). Contento and Murphy (1990) used the Health Belief Model with other theories such as self-efficacy (Bandra, 1977) and behavioral intention model (Ajzen and Fishbein, 1980) to examine whether psychosocial factors differentiated those who reported making desirable changes in their diets from those who did not. They reported that perceived susceptibility and severity of the health risk certainly seemed important in dietary

changes. They also reported that those who made dietary changes felt not only susceptible, but also believed that given dietary behaviors would help reduce the threat of diet-related disease and bring about the health outcomes they desired. The importance of coexistence of feelings of susceptibility and self-efficacy to change behaviors was also emphasized (Beck and Lund, 1981).

Theory of Reasoned Action. This theory was based on two factors: 1) perception of the outcome behavior and the evaluation of the outcome (e.g., whether the behavior is seen as good or bad); and 2) subjective norm (e.g whether the person believes that other people such as his/her family or friends think he or she should perform the behavior) (Fishbein & Ajzen's, 1975). The reliability and validity of this theory have been reported by Stafleu et al (1994), Towler and Shepherd (1992) and Glanz et al (1993).

Shepherd and Stockley (1985) examined the relationship between attitudes and subjective norms toward consumption of high fat foods in various demographic groups. They showed that a person's own feelings toward consumption of a type of food were good predictors of fat consumption. They also found that behaviors were weakly correlated with the subjective norm, and strongly correlated with attitudes. They identified friends and family as subgroups who affected behaviors, followed by nutritionists, manufacturers and advertisers. Weight concern also appeared to be a significant factor that predicted intention and consumption of high fat foods. However, those attitudes were found to vary depending on products. Tuorila and Pangborn (1988) reported that attitudinal and belief factors related to the consumption of fat-containing foods varied across products (e.g. milk, cheese, ice cream, chocolate and high fat foods).

Social Cognitive Theory. In 1986, Bandura published a comprehensive framework of Social Cognitive Theory based on Social Learning Theory (Bandura, 1986). This theory explained human behaviors in the model in which behaviors, personal factors such as cognition, and environmental influences all interacted. The factors in this model were: environments, situations, behavioral capacities, expectations, reinforcements (responses to a person's behavior that increase or decrease the likelihood of reoccurrence), self-efficacy, and reciprocal determination (interaction of the person, behavior, and the environment in which the behavior is performed).

Lewis et al (1989) applied this theory to examine how specific nutrition/health knowledge, attitudes and behaviors were related to the frequency of consuming four beverages (whole milk, low fat/skim milk, regular soda, and diet soda) among a middle aged group, and a college student group. They concluded that factors associated with the consumption of the beverages differed between the two age groups and that variables of social reinforcement, behavior modeling, and nutrition knowledge might influence consumption indirectly through other factors, such as attitudes and behavior commitment.

Model of Diffusion of Innovations. This model was often used for evaluating behavior changes over time as a result of adapting new behaviors (Rogers, 1983). It divided an individual's innovation-decision process into five stages. The first stage was to gain knowledge. There were three types of knowledge: awareness, how-to knowledge, and knowledge of principles. Awareness motivated people to seek how-to and principles knowledge. How-to knowledge provided information on how to use the innovation. Principle knowledge gave the information of how the innovation worked. The second

stage was the persuasion stage, where people tested the innovation, and set their attitudes. The last three stages included decision making, implementation, and seeking either confirmation or reinforcement for the decision. Axelson and Brinberg (1992) and Sims (1981) suggested that broadening the conceptualization of nutrition knowledge to include cognitive processes necessary for integrating nutrition knowledge with dietary behaviors should be facilitated for the future program development.

2.4.2. Sociodemographic factors affecting dietary behaviors

Although unmodifiable, sociodemographic factors are strongly related to dietary habits. Identification of subgroups who are at risk can help one develop various programs to improve the knowledge and dietary habits of the target population.

Women have traditionally been and still are responsible for preparing meals and show higher awareness and knowledge of nutrition related issues than other subgroups (Frazao and Cleveland, 1994; Jensen et al, 1992; Glanz et al, 1993; Smallwood and Blaylock, 1994; Variyam et al, 1996). Contento and Murphy (1990) reported that women were more likely to make desirable dietary changes than men. Women tended to have more negative attitudes toward consumption of high-fat foods and more positive attitudes and behaviors for healthy eating than men (Shepherd and Stockley, 1987; Towler and Shepherd, 1992; Shepherd and Stockley, 1985; Sheilham et al, 1987). However, no gender differences were seen in the perception of the importance of reducing fat intake (Reid and Henddricks, 1994); and in the perception of risk factors on coronary heart disease (CHD), smoking, lowering blood pressure and blood cholesterol, and eating less fat (Hyman et al, 1993). As far as dietary intake was concerned, in the study of Hyman et

al (1993), intakes of total and saturated fat among all races were positively influenced by male gender of the meal planner. On the other hand, Stafleu et al (1994) showed no gender differences for energy percentage of fat. Frazao and Cleveland (1994) found that both men and women tended to underestimate the amount of fat and saturated fat in their diets, but overestimated the amount of cholesterol intake. Woolcott et al (1983) concluded that men who participated in food preparation improved their diets more toward the direction of recommended dietary goals. Thus we are yet uncertain whether those differences are caused by gender or by other factors such as increased awareness and knowledge of food preparers.

Education level showed positive effects on knowledge and awareness (Levy et al, 1992; Reid and Henddricks,1994; Variyam et al, 1996; Carlson and Gould, 1994; Frazao and Cleveland, 1994). Compared to people with a lower socioeconomic status, those with a higher socioeconomic status: have been more knowledgeable about nutrition (Frazao and Cleveland, 1994; Variyam et al, 1996; Carlson and Gould, 1994); had more positive attitudes to nutrition (Grotkowski and Sims, 1978); were more aware of nutritional issues (Nash and McIntyre, 1987); had more positive attitudes and behavior in relation to healthy eating (Sheiham et al, 1987); and had more negative attitudes toward consumption of high fat foods (Shepherd and Stockley, 1987). Thompson et al (1992) found that food sources of fat and fiber differed among various social strata. In contrast, Shepherd and Stockley (1985) found no differences among socioeconomic classes in nutrition knowledge and attitudes, and dietary intakes.

Government programs have been developed to improve nutritional conditions of low-income segments. These include: Food Stamps, National School Lunch, National

School Breakfast, and nutrition education programs (Akin et al, 1985; Butler et al, 1985; Davis and Neenan, 1979; Devaney and Fraker, 1989; Long, 1991). Capps and Schmitz (1991) stated that most of these studies found participation in government food assistance programs had a positive influence on nutrition intake, if other conditions were the same.

Age is another factor that showed various effects on knowledge, attitudes and behaviors across studies. Those 24-45 years of age tended to have more negative attitudes toward consumption of high fat foods, whereas older and youngest subjects had more positive attitudes to such foods (Shepherd and Stockley, 1987). Older subjects were reported to meet the recommendation of dietary intakes of fat, saturated fat and cholesterol more often than younger meal planners (Frazao and Cleveland, 1994; Carlson and Gould, 1994). Older subjects agreed with more healthful attitudes than younger subjects (Glanz et al, 1993; Reid and Henddricks, 1994; Carlson and Gould, 1994). However, regardless of their positive attitudes and behaviors, older age was shown to have a negative effect on the level of knowledge (Levy et al, 1992; Variyam et al, 1996). On the other hand, Moorman (1990) reported that age had a positive influence on health maintenance behavior and a negative influence on health information acquisition. The inconsistency was due in part to different categorizations of age among studies. Older subjects were one of the commonly reported groups at risk for nutrition inadequacy, and educators need to understand the characteristics of each age group when they develop nutrition education programs.

Others factors such as region, urbanization, household size and occupation have been reported to be associated with dietary intakes in some studies. For example, Jensen et al (1992) reported that people from the South consumed less dairy products compared

to people from other regions. Many demographic and socioeconomic factors are correlated with each other such as income and education. Thus, controlling confounding effects is crucial in examining the associations of demographic and socioeconomic factors with dietary habits.

2.4.3. Behavioral and lifestyle factors affecting dietary behaviors

Several behavioral and lifestyle factors were reported to affect dietary behaviors. Lewis et al (1989) examined milk consumption among subjects who were committed to select beverages low in fat and sugar. The results showed that subjects who were committed to select beverages low in fat and sugar tended to consume less whole milk and more low fat/skim milk than those who were not committed.
Frazao and Cleveland (1994) reported that the presence of conditions in which a low fat/cholesterol diet may be recommended was positively correlated with adherence.

Carlson and Gould (1994) reported a positive relationship between the number of hours of watching TV and nutrition knowledge. The authors hypothesized that the number of hours of watching TV might be related to the physical activity level. However, the hours of watching TV may be positively related to the individuals' diet because of increased nutrition knowledge, but may be also negatively related to unhealthiness because of decreased physical activity level. Other behavioral and lifestyle factors possibly affecting dietary behaviors were: frequency of exercise; vegetarianism; supplement use; and having small children (Variyam et al, 1996; Jensen et al, 1992). Further studies on the association between those factors and dietary behaviors are needed.

2.4.4. Sensory preferences and other factors affecting dietary behaviors

Sensory preferences are important factors that affect individuals' food choices (Guthrie, 1994). Towler and Shepherd (1992) reported that individual belief-evaluation of the taste of products was closely related to attitudes toward high fat food consumption. Colavito et al (1996) reported from the 1989-91 CSFII/DHKS data that people who were concerned about utilities of food (e.g. easiness of preparation, taste, and price) were likely to have higher fat intake than people without these concerns.

Lewis et al (1989) developed a model that incorporated factors for social environment, reinforcement, commitment, behavior modeling, knowledge, and attitudes relative to the frequency of consumption of four beverages (whole milk, low-fat/skim milk, regular soda, and diet soda) among 457 middle-aged adults. They found that enjoyment of the taste was related to frequency of beverage consumption by all respondents.

Colavito et al (1996) examined the relationship between diet-health attitudes and nutrition knowledge of household meal planners and fat and fiber intakes of meal planners and preschoolers. They found that unpalatable taste was a significant barrier to healthy eating among younger adults. People who had lower fiber intakes had greater taste concerns than those who had higher fiber intake. Taste was an extremely important factor in determining food purchase for WIC participants (75% of 69 individuals, Michel et al, 1994).

Thus, sensory preferences for selecting foods could lead most people to over-eat in this era of food abundance. Nutrition educators should encourage people to better understand nutrition-related problems, including over-consumption, by increasing their

nutrition awareness and knowledge, and modifying attitudes to improve their health status.

In summary, many theory-based research endeavors have attempted to understand individuals' dietary behaviors. However, none of those theories could yield a satisfactory explanation which identified factors and the mechanisms for their effect on individuals' dietary behaviors. They failed to explain individuals' dietary behaviors, due to interaction of various involved factors. Different results of various studies were obtained because of the selection of different subjects, types of theories, and statistical analyses. To overcome these limitations, recently, many researchers suggested combining reported findings and various health-behavior models together to obtain reliable and valid information regarding factors affecting individual's dietary behaviors (Achterberg and Clark, 1992; Colavito and Guthrie, 1996). Thus, a sophisticated study design to combine reported findings and theories is required for the future study to examine the effectiveness of food label usage on improving individuals' diets.

2.5. Reliability and validity of questions related to food label use and dietary intake in CSFII/DHKS

2.5.1. CSFII/DHKS 1994-1996

Continuing Survey of Food Intakes by Individuals (CSFII) and Diet and Health Knowledge Survey (DHKS) was conducted in 1994-1996 by the Agricultural Research Service (ARS) of the U.S. Department of Agriculture (USDA). The CSFII 1994-1996 included two nonconsecutive days of dietary intake information by using the 24-hr

etary recall method for individuals of all ages. In the CSFII 1994, 5,589 individuals ovided at least one day of dietary intake data.

Each year, a stratified, probability sample method was used to select samples. For s method, the population was stratified based on geographical location, degree of anization, and sociodemographic considerations. Areas within these strata were ided into smaller, relatively homogeneous sampling units or "clusters" (Colavito and thrie, 1996). Selected individuals within each household rather than from all usehold members were obtained to avoid bias effects of the individual characteristics m the same household. The low-income population was over-sampled, and the sample resented the entire United States rather than only the 48 contiguous States and shington D.C. Data were collected from mid-January to mid-January of the next year ng one day recalls on two non-consecutive days in the form of in-person interviews. s sampling method allowed users to obtain generalized population data, by using ple weight and variance estimates within special statistical software programs such as stvar and SUDAAN (Colavito and Guthrie, 1996).

The DHKS 1994-1996, on the other hand, included questions on individuals' dietary wledge and attitudes developed based on educational theories. Topics included: diet-ase relationships; food safety issues; information of the food label use; and other tional issues such as importance of nutrition. Included in DHKS were participants in CSFII 1994-1996 that were 20 years of age and older. The sample size was 1,879 viduals in DHKS 1994. Other improvements made in CSFII/DHKS 1994-1996 from ious years are summarized in Table 1.

In summary, CSFII/DHKS 1994-1996 is a unique database in which researchers n relate individuals' actual food intakes with their dietary knowledge and attitudes in e U.S. It included a number of food label related questions, allowing the survey data to most appropriate for the studies on current food labels and dietary intakes among the S. population at that time point. The complicated survey design, however, might have couraged many researchers from attempting to use the data of national surveys, such DHKS 1994-1996.

2. Reliability test for survey questions

Many researchers have attempted to explain an individual's dietary behaviors n socio-psychological theories such as the Health Belief Model, Social Cognitive ory, and Theory of Reasoned Action (Colavito and Guthrie, 1996). Various theories ained dietary behaviors only partially, because individuals' dietary behaviors were cted by multiple factors. The inability to explain the dietary behaviors substantially nose theories might have resulted from other reasons such as lack of reliable surements of dietary behaviors.

Reliability is a measurement of the extent to which question items or scores of the ield the same result upon repeated administration, when all other factors are held the . When the same survey is conducted repeatedly, reliability is measured by lation of repeated measurements. However, when repeated measurements are not ble such as CSFII/DHKS, a group of question items (construct) is examined for al consistency of the question items within a construct instead. Frequently internal stency of the question items is assessed by: correlation and covariance matrixes;

n total correlation (ITC); alpha if item deleted; and Cronbach's alpha (Sapp and sen, 1997; Nunnally and Bernstein, 1994; SPSS professional statistics 6.1, 1994). The itation of this assessment is that it requires mode than 1 question item for the ability of the construct to be tested.

2.1. Correlation and covariance matrixes

Correlation and covariance matrixes are to identify question items that have erent relations from the rest of items in the group (construct). When a question item ws a negative correlation with the rest of items and correlations among the rest of s in the construct are positive, one concludes that the question item may represent erent characteristics (content) from the rest of items, and vice versa. If the content of question item is apparently different from the rest of items, that question item is oved from the construct. This quick and convenient method at the very beginning of est of reliability minimizes the number of the question items in the construct (SPSS essional statistics 6.1, 1994).

2.2. Item total correlation (ITC)

Item total correlation is a correlation of an item with the average of all items in onstruct. While correlation and covariance matrixes examined all possible ation between two items within the same construct, ITC examined how the dual item associate with the construct. ITC ranges from 0 to 1.0 (Sapp and Jensen, Nunnally and Bernstein, 1994; SPSS professional statistics 6.1, 1994).

2.3. Alpha if item deleted

Alpha if item deleted is examined to obtain the reliability of the construct after luding the question item (Sapp and Jensen, 1997; Nunnally and Bernstein, 1994; S professional statistics 6.1, 1994). Thus, this measurement examines the effect of a icular question item on the construct. While Cronbach's alpha examines the average ll possible correlations among items within the same construct, alpha if item deleted ws one to assess the average of all possible correlations without the item. Thus, if a if item deleted is higher than Cronbach's alpha, there is a possibility that the item esents a different content from the rest of items in the construct. In this case, the ent of the item is examined. If the content of the question item is apparently different the rest of items in the construct, the question is removed. Alpha if item deleted es from 0 to 1.0.

.4. Cronbach's alpha

Conbach's alpha is an average of all possible correlations within the same ruct. Cronbach's alpha measures the internal consistency of the question items in a ruct. When a survey is not repeated but contains multiple question items in a ruct, we assume that the question items within a construct inquire about the same cteristic (internal consistency). Thus, a sum of responses from question items in the ruct would be equivalent to repeating surveys (Nunnally and Bernstein, 1994; SPSS ssional statistics 6.1, 1994).

To obtain a high Conbach's alpha, question items in each construct should be ternally highly correlated. Cronbach's alpha ranges from 0 to 1.0, representing the nge of no correlation to high correlation. It is calculated by the following equation:

$= k\bar{r} / 1 + (k\text{-}1)\bar{r}$

when k is the number of items, and r is the average correlation between items in e construct. In nutrition, $r \geq 0.7$ is considered desirable to measure nutrition knowledge nd knowledge structure (Axleson and Brinberg, 1992). The limitation of Cronbach's pha is that it increases when the number of items increase (SPSS professional statistics .1, 1994).

.5.3. Validity test of survey questions

A test of validity of the question items is to confirm that the question items neasure characteristics purported to be measured (Sapp and Jensen, 1997; Nunnally and Bernstein, 1994; SPSS professional statistics 6.1, 1994). As long as this is confirmed, the est of validity can evaluate the construct with even one question item, while it is not ossible for the examination of the reliability. Validity is assessed for the content content validity) and the construct (construct validity).

Content validity measures the extent to which the items or scores represent the lomain of a given characteristic (construct). Another word, content validity measures now much of the characteristic is represented by the responses to the question items. It is a judgement usually made through consensus agreement of scholars who determine if question items or scores cover the full domain of the characteristic without contamination by unrelated items.

Construct validity examines the structure of the construct. Construct validity is often measured by discriminant validity or divergent validity. Discriminant validity examines the ability of a question to separate respondents based on respondents' known characteristics "criteria". For example, females generally have higher nutrition knowledge than males (Jensen et al (1992); Frazao et al (1994); Smallwood et al (1994); Variyam et al (1996)). Thus, if females correctly answered nutrition knowledge questions more often than males, questions are determined to be valid.

Divergent validity examines the ability of constructs to lead respondents into different directions. Each construct is designed to measure different characteristics, and divergent validity is measured by the correlation between constructs. Thus, correlation between nutrition knowledge and nutrition perception, for example, is expected to be small, although a certain degree of relationship between nutrition knowledge and nutrition perception might exist.

2.5.4. Tests for reliability and validity of DHKS 1994-1996

Sapp and Jensen (1997) established the reliability and validity of nutrition knowledge and diet-health awareness questions included in the 1989-1991 DHKS. They used KR-20 and Spearman-Brown rho calculated with a split halves procedure instead of Cronbach's alpha for tests of reliability. KR-20 is often used for dichotomous data, while Cronbach's alpha is used for continuous data (Sapp and Jensen, 1997).

Split halves procedure is another popular method for the test of reliability. Question items in a construct are divided into two subconstructs in various parts, and estimated by an average between pairs of these subconstructs. High correlation between

constructs is obtained when these two constructs share similar characteristics. The tation of this measurement is that it depends on how question items are divided into groups (SPSS professional statistics 6.1, 1994). Sapp and Jensen reported that: R-20 reliability and split halves reliability of the 23-item nutrition knowledge test less than 0.7 for all three years of 1989-91 CSFII (1989, 1990, and 1991); 2) KR-20 bility and split halves reliability of the 27-item diet-health awareness test was greater 0.7 for all three years of the survey; 3) both nutrition knowledge and diet-health reness validity tests received support for discriminant and convergent validity mines the ability of constructs to lead respondents into similar direction because of similarities); and 4) there was low the correspondence validity (which examines ther the construct correlates significantly or substantially with measures of behaviors) oth nutrition knowledge and diet-health awareness tests with three measures of ry quality (percentage of calories from fat; percentage of calories from saturated fat; ercentage of the recommended daily allowance of calcium) was low. No studies to reported the reliability and validity of survey questions included in DHKS 1994-

In summary, construction of question items that are reliable and valid is important tain accurate and meaningful information. Desirable questionnaires: include ple items that are internally highly correlated; represent characteristics of interest in; ave the ability to separate respondents based on the gold standard. No information late available for the reliability and validity of DHKS 1994-1996. Tests of ility and validity of the survey questions are necessary before the effect of current abels on improving an individual's diet can be investigated.

Chapter Three

METHODS

Throughout the present study, sample weights provided in DHKS 1994-1995 was
:d. All reliability tests and divergent validity test were conducted by SPSS 7.5. Mean
tandard errors and tests of significant differences in the discriminant validity test were
culated using SUDAAN to account for the sample survey design effect of DHKS
)4-1995 (Colavito and Guthrie, 1996).

. Description of the sample of DHKS 1994-1995 (Objective 1)

1994-1995 CSFII/DHKS was provided from the U.S. Department of Agriculture on
-ROM [US Department of Agriculture, Agricultural Research Service. 1994 and 1995
ıtinuing Survey of Food Intakes by Individuals and 1994 and 1995 Diet and Health
)wledge Survey. Springfield, VA: National Technical Information Service, 1994 and
5. (Accession no. PB96-501010 for 1994 and PB97-500789 for 1995)]. The
:ription of CSFII/DHKS 1994-1995 and how data was collected were collected are
:ribed in chapter 2 (2.5.1. CSFII/DHKS 1994-1996). CSFII/DHKS 1994-1995 were
gorized into different record types based on the information such as respondents'
intake information and nutrition knowledge and attitudes. Record type 50, which
used in this study, included DHKS response data (n= 1879 and n= 1966 for 1994 and
, respectively). All subjects who participated in DHKS were 20 years of age and
. Question items that were not answered by subjects were excluded from statistical
'ses.

The original DHKS had assigned numbers (e.g., 1,2,…) or strings (e.g., A, B,…) to nographic, socioeconomic, health and lifestyle variables based on their levels (e.g. , income) and subgroups (e.g. gender, race). The variables examined in the present dy were: demographic variables (gender, age, race, status of meal planner/preparer, on, degree of urbanization); socioeconomic variables (income, education, status of C and food stamp participation); health indicators (pregnancy status; presence of gnosed diabetes, high blood pressure, heart disease, cancer, osteoprosis, high blood lesterol, and stroke; practicing special diet such as weight loss/low calorie, low cholesterol, low salt/sodium, high fiber, and diabetic diet); lifestyle factors (smoking us, practice of physical exercise, hours of TV watching, use of vitamin supplements). h of the variables was relabeled (i.e., age was relabeled as "reage") for ease in the sequent statistics, and listed on Table 2.

Reliability tests of DHKS 1994-1995 (Objective 2)

1. Score definitions

1.1. Nutrition knowledge scores

Nutrition knowledge questions in 1994-1996 DHKS were grouped based on the topic. example, the first question (KQ1) asked,

w many servings from:

a) fruit group

b) vegetable group

c) milk, yogurt, and cheese group

d) bread, cereal, rice, and pasta group

Variables	Definitions	Subgroups
Demographic variables		
Gender	sex	Male (1), Female (2)
Age	reage	24-34 yrs (1), 35-54 yrs (2), 55-89yrs (3) 90 yrs and over (4)
Race	race	White (1), Black (2), Asian, Pacific Islander (3), American Indian, Alaskan native (4), Others (5)
Meal planner/preparer	rekq42	No (0), Yes (1), Missing (8)
Region	region	Northeast (1), Midwest (2), South (3), West (4)
Urbanization	urb	MSA[a], central city (1) MSA, outside central city (2) Non-MSA (3)
Socioeconomic variables		
Income	repovcat	To 130% (0), More than 130% (1)

Variables	Definitions	Subgroups
Socioeconomic variables (Cont'd)		
Education	regrade	Less than high school; 0-8 yrs of school (1), High school education; 9-12 yrs of school (2), More than high school; 13-17 yrs (3), Missing (9)
WIC participation (Present)	rewic_yn	No (0), Yes (1), Missing (9)
Food Stamp received (Past 12 months)	refs_rcv	No (0), Yes (1), Missing (7,8 & 9)
Authorized to receive food stamps (Present)	refs_aut	No (0), Yes (1), Missing (9)
Health indicators		
Pregnancy status	pl_stat	Pregnant (1), Lactating (2), Pregnant and lactating (3), Not pregnant or lactating (4), Not female (5)
Presence of diagnosed disease		
Diabetes	redoc1	No (0), Yes (1)
High blood pressure	redoc2	No (0), Yes (1)
Heart disease	redoc3	No (0), Yes (1)
Cancer	redoc4	No (0), Yes (1)

Variables	Definitions	Subgroups
Health indicators (Cont'd)		
Osteoporosis	redoc5	No (0), Yes (1)
High blood cholesterol	redoc6	No (0), Yes (1)
Heart disease	redoc3	No (0), Yes (1)
Cancer	redoc4	No (0), Yes (1)
Osteoporosis	redoc5	No (0), Yes (1)
Stroke	redoc7	No (0), Yes (1)
Weight loss/low calorie diet	redt01	No (0), Yes (1), Missing (9)
Low fat/cholesterol diet	redt02	No (0), Yes (1), Missing (9)
Low salt/sodium diet	redt03	No (0), Yes (1), Missing (9)
High fiber diet	redt06	No (0), Yes (1), Missing (9)
Diabetic diet	redt07	No (0), Yes (1), Missing (9)
Lifestyle factors		
Smoking status	resmk	No (0), Yes (1), Missing (9)

Variables	Definitions	Subgroups
Lifestyle factors (Cont'd)		
Practice of physical exercise	rexercis	Rarely or never (1), Once in a week (2), 2-4 times in a week (3), Almost everyday (4)
The hours of TV watching (Day1)	red1_tv	0 hour (0), 1 hour (1), 2 hours (2), 3 hours (3), 4-10 hours (4), 11-24 hours (5), Missing (9)
Vitamin supplement use	revt_fre	Not at all (1), Every so often (2), Everyday or almost everyday (3), Missing (9)

[a] Metropolitan Statistical Area

e) meat, poultry, fish, dry beans, and eggs group

would you say a person of your age and sex should eat each day for good health?". This question (KQ1) contained about five question items (a-e) to assess the respondents' knowledge of number of servings recommended by the Food Guide Pyramid for each food group. Another example (KQ5) was,

" *Have you heard about any health problems by:*

a) eating too much fat

b) not eating enough fiber

c) eating too much salt or sodium

d) not eating enough calcium

e) eating too much cholesterol

f) eating too much sugar

g) *being overweight"*.

This question (KQ5) contained seven question items (a-g) to evaluate the respondents' awareness of diet-disease relationships. Respondents were further asked to link dietary behaviors to health problems (KQ6a-g) if their answers to responses to the previous questions (KQ5a-g) were correct.

Correct answers to the knowledge questions were identified by graduate students and faculty members in the Department of Food Science and Human Nutrition at Michigan State University, referring to *the Dietary Guidelines for Americans*, *the Food Guide Pyramid* and other nutrition text books with over 80% of consensus. Responses to each of the question items were recorded (e.g. 1= correct response, 0= incorrect response for KQ1a through e), and the sum of correct responses was obtained as a score (possible

construct). Later, reliability and validity of the possible construct was tested (refer to 3.2.2. through 3.3.2.2) and if its reliability and validity were confirmed, the score was accepted as a final knowledge construct (Table 3).

3.2.1.2. Attitude scores

Questionnaires on individual's nutrition and food label related perception and attitudes were available in 1994-1996 DHKS. For example, KQ23a asked, *" The nutrition information on food labels is useful to me?"*. Respondents were asked the level of their agreement to each statement. For example, response to KQ23a was labeled as 1= Strongly disagree, 2= Somewhat disagree, 3= Somewhat agree, and 4= Strongly agree. Each of variables were recorded for ease in the subsequent statistics (i.e., KQ23a was relabeled as rekq23a), and the sum of responses was obtained as a score for that group of question items (possible construct). Question items asking similar attitude from two different groups (e.g., perceived adequacy of nutrients that were recommended to decrease: KQ3a; f; g; h; i; k; and KQ7) were merged together into one construct, if possible. Later, reliability and validity of the construct was tested (refer to 3.2.2. through 3.3.2.2). If reliability and validity were confirmed, the score was accepted as a final attitude construct (Table 4).

3.2.1.3. Scores for the food label use

An extensive number of the food label related questions were included in 1994-1996 DHKS, reflecting the enactment of the new food label regulation introduced in

Table 3. Definitions of question items and scores created from DHKS 1994-1995 -Nutrition knowledge questions

Description of the question items	Responses
Knowledge of Food Guide Pyramid construct (Kno1)	Score range: 0-5
How many servings from the food group would you say a person of your age and sex should eat each day for good health? - what about fruit group? (rekq1a)	Incorrect (0), Correct (1)
How many servings from the food group would you say a person of your age and sex should eat each day for good health? - what about vegetable group? (rekq1b)	Incorrect (0), Correct (1)
How many servings from the food group would you say a person of your age and sex should eat each day for good health? - what about milk, yogurt, and cheese group? (rekq1c)	Incorrect (0), Correct (1)
How many servings from the food group would you say a person of your age and sex should eat each day for good health? - what about bread, cereal, rice, and pasta group? (rekq1d)	Incorrect (0), Correct (1)
How many servings from the food group would you say a person of your age and sex should eat each day for good health? - what about meat, poultry, fish, dry beans, and eggs group? (rekq1e)	Incorrect (0), Correct (1)
Knowledge of nutrition and food construct (kno811)	Score range: 0-10
Based on your knowledge, which has more saturated fat: Butter or margarine? (rekq8b)	Incorrect (0), Correct (1)
Based on your knowledge, which has more saturated fat: egg white or egg york ? (rekq8c)	Incorrect (0), Correct (1)
Based on your knowledge, which has more saturated fat: skim milk or whole milk ? (rekq8d)	Incorrect (0), Correct (1)

Table 3. Definitions of question items and scores created from DHKS 1994-1995 (Cont'd)

Description of the question items	Responses
Knowledge of nutrition and food construct (kno811 -Cont'd)	
Based on your knowledge, which has more fat: regular hamburger or ground round ? (rekq9a)	Incorrect (0), Correct (1)
Based on your knowledge, which has more fat: hot dogs or ham ? (rekq9c)	Incorrect (0), Correct (1)
Based on your knowledge, which has more fat: peanuts or popcorn ? (rekq9d)	Incorrect (0), Correct (1)
Based on your knowledge, which has more fat: yogurt or sour cream ? (rekq9e)	Incorrect (0), Correct (1)
Based on your knowledge, which has more fat: porterhouse steak or round steak ? (rekq9f)	Incorrect (0), Correct (1)
Which kind of fat is more likely to be a liquid rather than a solid: saturated fats, polyunsaturated fats, or are they equally likely to be liquids? (rekq10)	Incorrect (0), Correct (1)
If a food has no cholesterol is it also: low in saturated fat, high in saturated fat, or could be either high or low in saturated fat? (rekq11)	Incorrect (0), Correct (1)
Knowledge of the amount of nutrient content per servings construct (Kno22)	Score range: 0-5
If it showed that one serving of the food contained, would you consider that to be a low amount or a high amount? - 100 milligrams of sodium? (rekq22a)	Incorrect (0), Correct (1)
If it showed that one serving of the food contained, would you consider that to be a low amount or a high amount? - 20 grams of fat? (rekq22b)	Incorrect (0), Correct (1)

Table 3. Definitions of question items and scores created from DHKS 1994-1995 (Cont'd)

Description of the question items	Responses
Knowledge of the amount of nutrient content per servings construct (Kno22 -Cont'd)	
If it showed that one serving of the food contained, would you consider that to be a low amount or a high amount? - 15 milligrams of cholesterol? (rekq22c)	Incorrect (0), Correct (1)
If it showed that one serving of the food contained, would you consider that to be a low amount or a high amount? - 5 grams of fiber? (rekq22d)	Incorrect (0), Correct (1)
If it showed that one serving of the food contained, would you consider that to be a low amount or a high amount? - 10 grams of ssaturated fat? (rekq22d)	Incorrect (0), Correct (1)
Knowledge of diet-disease relationships construct (No definition was given, since this construct was excluded)	
Eating too much fat causes	Score range: 0-5
Arteriosclerosis/atherosclerosis, clogged arteries, coronary disease, hardening of the arteries, and heart problems/heart attack (rekq6a01)	Incorrect (0), Correct (1)
Cancer (all types) (rekq6a05)	Incorrect (0), Correct (1)
Colitis/colon problems, constipation, digestive problems, diverticulosis, and irregularity (rekq6a06)	Incorrect (0), Correct (1)
High blood pressure and hypertension (rekq6a12)	Incorrect (0), Correct (1)
Obesity/overweight and fat/overweight (rekq6a15)	Incorrect (0), Correct (1)

Table 3. Definitions of question items and scores created from DHKS 1994-1995 (Cont'd)

Description of the question items	Responses
Knowledge of diet-disease relationships construct -Cont'd	
Not eating enough fiber causes	Score range: 0-3
Arteriosclerosis/atherosclerosis, clogged arteries, coronary disease, hardening of the arteries, and heart problems/heart attack (rekq6b01)	Incorrect (0), Correct (1)
Cancer (all types) (rekq6b05)	Incorrect (0), Correct (1)
Colitis/colon problems, constipation, digestive problems, diverticulosis, and irregularity (rekq6b06)	Incorrect (0), Correct (1)
Eating too much salt or sodium causes	Score range: 0-3
Arteriosclerosis/atherosclerosis, clogged arteries, coronary disease, hardening of the arteries, and heart problems/heart attack (rekq6c01)	Incorrect (0), Correct (1)
High blood pressure and hypertension (rekq6c12)	Incorrect (0), Correct (1)
Kidney disease (rekq6c14)	Incorrect (0), Correct (1)
Not eating enough calcium causes	Score range: 0-2
Bone problems/rickets and osteoporosis (rekq6d03)	Incorrect (0), Correct (1)
Cavities/caries and tooth problems (rekq6d07)	Incorrect (0), Correct (1)
Eating too much cholesterol causes	Score range: 0-2
Arteriosclerosis/atherosclerosis, clogged arteries, coronary disease, hardening of the arteries, and heart problems/heart attack (rekq6e01)	Incorrect (0), Correct (1)
Cancer (all types) (rekq6e05)	Incorrect (0), Correct (1)

Table 3. Definitions of question items and scores created from DHKS 1994-1995 (Cont'd)

Description of the question items	Responses
Knowledge of diet-disease relationships construct (Cont'd)	
Eating too much sugar causes	Score range: 0-3
Cavities/caries and tooth problems (rekq6f07)	Incorrect (0), Correct (1)
Diabetes and high blood sugar (rekq6f08)	Incorrect (0), Correct (1)
Obesity/overweight and fat/overweight (rekq6f15)	Incorrect (0), Correct (1)
Being overweight causes	Score range: 0-5
Arteriosclerosis/atherosclerosis, clogged arteries, coronary disease, hardening of the arteries and heart problems/heart attack (rekq6g01)	Incorrect (0), Correct (1)
Bone problems/rickets and osteoporosis (rekq6g03)	Incorrect (0), Correct (1)
Cancer (all types) (rekq6g05)	Incorrect (0), Correct (1)
Diabetes and high blood sugar (rekq6g08)	Incorrect (0), Correct (1)
High blood pressure and hypertension (rekq6g12)	Incorrect (0), Correct (1)
Awareness of diet-disease relationships construct (Awapr)	Score range: 0-7
Have you heard any health problems by eating too much fat? (rekq5a)	Not aware of (0), Aware of (1)
Have you heard any health problems by not eating enough fiber? (rekq5b)	Same as rekq5a
Have you heard any health problems by eating too much salt or sodium? (rekq5c)	Same as rekq5a
Have you heard any health problems by not eating enough calcium? (rekq5d)	Same as rekq5a
Have you heard any health problems by eating too much cholesterol? (rekq5e)	Same as rekq5a

Table 3. Definitions of question items and scores created from DHKS 1994-1995 (Cont'd)

Description of the question items	Responses
Awareness of diet-disease relationships construct (Awapr -Cont'd)	
Have you heard any health problems by eating too much sugar? (rekq5f)	Not aware of (0), Aware of (1)
Have you heard any health problems by being overweight? (rekq5g)	Same as rekq5f
Awareness of the authority of the government to define phrases on the food label construct (Awauth)	Score range: 0-3
As far as you know, does the government define and enforce the meaning of the phrase on food labels? - low-cholesterol? (rekq21a)	Not aware of (0), Aware of (1)
As far as you know, does the government define and enforce the meaning of the phrase on food labels? - light? (rekq21b)	Same as rekq21a
As far as you know, does the government define and enforce the meaning of the phrase on food labels? - extra lean? (rekq21c)	Same as rekq21a

The items underlined in Kno811 and Kno22 were determined as correct answers.
Health problems listed for diet-disease relationships construct were chosen as correct answers for each question item.

Table 4. Definitions of question items and scores created from DHKS 1994-1995 - Attitude questions

Description of the question items	Responses
Perceived adequacy of own nutrient intakes which are recommended to decrease construct (Adende)	Score range: 6-18
Compared to what is healthy, do you think your diet is _____ in calories? (rakq3a)	Too low (1) About right (2) Too high (3) Missing (8 & 9)
Compared to what is healthy, do you think your diet is _____ in fat? (rakq3f)	Same as rakq3a
Compared to what is healthy, do you think your diet is _____ in saturated fat? (rakq3g)	Same as rakq3a
Compared to what is healthy, do you think your diet is _____ in cholesterol? (rakq3h)	Same as rakq3a
Compared to what is healthy, do you think your diet is _____ in salt or sodium? (rakq3i)	Same as rakq3a
Compared to what is healthy, do you think your diet is _____ in sugar and sweet? (rakq3k)	Same as rakq3a
Perceived adeuqacy of own nutrient intakes which are recommended to increase construct (Adenin)	Score range: 5-15
Compared to what is healthy, do you think your diet is _____ in calcium? (rakq3b)	Same as rakq3a
Compared to what is healthy, do you think your diet is _____ in iron? (rakq3c)	Same as rakq3a
Compared to what is healthy, do you think your diet is _____ in vitamin C? (rakq3d)	Same as rakq3a

Table 4. Definitions of question items and scores created from DHKS 1994-1995 (Cont'd)

Description of the question items	Responses
Perceived adeuqacy of own nutrient intakes which are recommended to increase construct (Adenin -Cont'd)	
Compared to what is healthy, do you think your diet is _____ in protein? (rakq3e)	Too low (1) About right (2) Too high (3) Missing (8 & 9)
Compared to what is healthy, do you think your diet is _____ in fiber? (rakq3j)	Same as rakq3e
Perceived adeuqacy of own weight construct (Adeqwt) Do you consider yourself to be underweight, about right, or overweight? (rakq7)	Score range: 1-3 Underweight (1) About right (2) Overweight (3) Missing (8 & 9)
Perceived barriers from using food labels construct (Barrier) Please tell me if you _____ with the statement - the nutrition information on food labels is hard to interpret (rakq23c).	Score range: 2-8 Strongly agree (1) Somewhat agree (2) Somewhat disagree (3) Strongly disagree (4) Missing (5,8 & 9)
Please tell me if you _____ with the statement - reading food labels takes more time than I can spend (rekq23d).	Same as rakq23c

Table 4. Definitions of question items and scores created from DHKS 1994-1995 (Cont'd)

Description of the question items	Responses
Perceived benefits of using food labels construct (Benef)	Score range: 5-20
Please tell me if you _____ with the statement - the nutrition information on food labels is useful to me (rakq23a).	Strongly disagree (1) Somewhat disagree (2) Somewhat agree (3) Strongly agree (4) Missing (5,8 & 9)
Please tell me if you _____ with the statement - reading food labels makes it easier to choose foods (rakq23g).	Same as rakq23a
Please tell me if you _____ with the statement - sometimes, I try new foods because of the information on the food label (rakq23h).	Same as rakq23a
Please tell me if you _____ with the statement - when I use food labels, I make better food choices (rakq23i).	Same as rakq23a
Please tell me if you _____ with the statement - using food labels to choose foods is better than just relying on my own knowledge about what is in them (rakq23j).	Same as rakq23a
Perceived easiness to understand food labels construct (Ease) Do you think the list of ingredients is _____ to understand? (rakq19a)	Score range: 7-21 Not too easy (1) Somewhat easy (2) Very easy (3) Missing (4,8 & 9)

Table 4. Definitions of question items and scores created from DHKS 1994-1995 (Cont'd)

Description of the question items	Responses
Perceived easiness to understand food labels construct (Ease -Cont'd)	
Do you think a short phrase like "low-fat" or "light" or "good source of fiber" is _____ to understand? (rakq19b)	Not too easy (1) Somewhat easy (2) Very easy (3) Missing (4,8 & 9)
Do you think the number of calories in a serving is _____ to understand? (rakq19c)	Same as rakq19b
Do you think the number of calories from fat in a serving is _____ to understand? (rakq19d)	Same as rakq19b
Do you think the number of grams or milligrams of nutrients like fat and sodium in a serving is _____ to understand? (rakq19e)	Same as rakq19b
Do you think the percent of the daily value for each nutrient is _____ to understand? (rakq19f)	Same as rakq19b
Do you think a description like "lean" or "extra lean" on meats is _____ to understand? (rakq19g)	Same as rakq19b

Table 4. Definitions of question items and scores created from DHKS 1994-1995 (Cont'd)

Description of the question items	Responses
Perceived importance of practicing healthy dietary habits construct (lmdiet)	Score range: 12-48
To you personally, is it _____ to use salt or sodium only in moderation? (rakq4a)	Not at all important (1) No too important (2) Somewhat important (3) Very important (4) Missing (8 & 9)
To you personally, is it _____ to choose a diet low in saturated fat? (rakq4b)	Same as rakq4a
To you personally, is it _____ to choose a diet with plenty of fruits and vegetables? (rakq4c)	Same as rakq4a
To you personally, is it _____ to use sugars only in moderation? (rakq4d)	Same as rakq4a
To you personally, is it _____ to choose a diet with adequate fiber? (rakq4e)	Same as rakq4a
To you personally, is it _____ to eat a variety of foods? (rakq4f)	Same as rakq4a
To you personally, is it _____ to maintain a healthy weight? (rakq4g)	Same as rakq4a
To you personally, is it _____ to choose a diet low in fat? (rakq4h)	Same as rakq4a
To you personally, is it _____ to choose a diet low in cholesterol? (rakq4i)	Same as rakq4a
To you personally, is it _____ to choose a diet with plenty of breads, cereals, rice, and pasta? (rakq4j)	Same as rakq4a

Table 4. Definitions of question items and scores created from DHKS 1994-1995 (Cont'd)

Description of the question items	Responses
Perceived importance of practicing healthy dietary habits construct (lmdiet -Cont'd)	
To you personally, is it _____ to eat at least two servings of dairy products daily? (rakq4k)	Not at all important (1) No too important (2) Somewhat important (3) Very important (4) Missing (8 & 9)
When you buy food, how important is nutrition? (rakq15b)	Same as rakq4k
Perceived importance of food safety construct (lmsafe)	Score range: 1-4
When you buy food, how important is how safe the food is to eat? (rakq15a)	Not at all important (1) No too important (2) Somewhat important (3) Very important (4) Missing (8 & 9)
Perceived importance of the price of food construct (lmpric)	Score range: 1-4
When you buy food, how important is price? (rakq15c)	Same as rakq15a
Perceived importance of how well food keep construct (lmlast)	Score range: 1-4
When you buy food, how important is how well the food keeps? (rakq15d)	Same as rakq15a

Table 4. Definitions of question items and scores created from DHKS 1994-1995 (Cont'd)

Description of the question items	Responses
Perceived importance of easiness of the food to prepare construct (Imease) When you buy food, how important is how easy the food is to prepare? (rakq15e)	Score range: 1-4 Not at all important (1) No too important (2) Somewhat important (3) Very important (4) Missing (8 & 9)
Perceived importance of taste of the food construct (Imtast) When you buy food, how important is taste? (rakq15f)	Score range: 1-4 Same as rakq15e
Willingness to lean more about the food label construct (Attitu) Please tell me if you _____ with the statement - I would like to learn more about how to use food labels to choose a nutritious diet (rakq23f).	Score range: 1-4 Strongly disagree (1) Somewhat disagree (2) Somewhat agree (3) Strongly agree (4) Missing (5,8 & 9)
Perceived reliability of descriptions on the food label (Conf) If a food label says a food is low-fat, would you say you are _____ that description is a reliable basis for choosing foods? (rakq20a)	Score range: 6-18 Not too confident (1) Somewhat confident (2) Very confident (3) Missing (8 & 9)

Table 4. Definitions of question items and scores created from DHKS 1994-1995 (Cont'd)

Description of the question items	Responses
Perceived reliability of descriptions on the food label (Conf - Cont'd)	
If a food label says a food is low-cholesterol, would you say you are _____ that description is a reliable basis for choosing foods? (rakq20b)	Not too confident (1) Somewhat confident (2) Very confident (3) Missing (8 & 9)
If a food label says a food is a good source of fiber, would you say you are _____ that description is a reliable basis for choosing foods? (rakq20c)	Same as rakq20b
If a food label says a food is light, would you say you are _____ that description is a reliable basis for choosing foods? (rakq20d)	Same as rakq20b
If a food label says a food is healthy, would you say you are _____ that description is a reliable basis for choosing foods? (rakq20e)	Same as rakq20b
If a food label says a food is extra lean, would you say you are _____ that description is a reliable basis for choosing foods? (rakq20f)	Same as rakq20b

Table 5. Definitions of question items and scores created from DHKS 1994-1995 - Food label use questions

Description of the question items	Responses
Frequency of food label use construct (Fluse)	Score range: 13-52
When you buy foods, do you use the list of ingredients _____? (rakq16a)	Never & Never seen (1) Rarely (2) Sometimes (3) Often (always) (4) Missing (8 & 9)
When you buy foods, do you use the short phrases like "low-fat" or "light" or "good source of fiber" _____? (rakq16b)	Same as rakq16a
When you buy foods, do you use the nutrition panel that tells the amount of calories, protein, fat, and such in a serving of the food _____? (rakq16c)	Same as rakq16a
When you buy foods, do you use the information about the size of a serving _____? (rakq16d)	Same as rakq16a
When you buy foods, do you use a statement that describes how nutrients or foods and health problems are related _____? (rakq16e)	Same as rakq16a
When you look for nutrition information on the food label, would you say _____ look for nutrition information about calories? (rakq 17a)	Same as rakq16a
When you look for nutrition information on the food label, would you say _____ look for nutrition information about salt or sodium? (rakq17b)	Same as rakq16a

Table 5. Definitions of question items and scores created from DHKS 1994-1995 (Cont'd)

Description of the question items	Responses
Frequency of food label use construct (Cont'd)	
When you look for nutrition information on the food label, would you say _____ look for nutrition information about total fat? (rakq17c)	Never & Never seen (1) Rarely (2) Sometimes (3) Often (always) (4) Missing (8 & 9)
When you look for nutrition information on the food label, would you say _____ look for nutrition information about satrated fat? (rakq17d)	Same as rakq17c
When you look for nutrition information on the food label, would you say _____ look for nutrition information about cholesterol? (rakq17e)	Same as rakq17c
When you look for nutrition information on the food label, would you say _____ look for nutrition information about vitamins or minerals? (rakq17f)	Same as rakq17c
When you look for nutrition information on the food label, would you say _____ look for nutrition information about fiber? (rakq17g)	Same as rakq17c
When you look for nutrition information on the food label, would you say _____ look for nutrition information about sugars? (rakq17h)	Same as rakq17c

1994. The same methods for attitude scores were used to determine definitions of constructs, possible responses, and possible score ranges (Table 5).

3.2.2. Reliability tests

The reliability of the question items in this study were measured by correlation and covariance matrixes, item total correlation (ITC), alpha if item deleted, and Cronbach's alpha (Sapp and Jensen, 1997; Nunnally and Bernstein, 1994; SPSS professional statistics 6.1, 1994; Axelson and Brinberg, 1992) for the construct with more than 1 question item.

3.2.2.1. Correlation and covariance matrixes

Correlation and covariance of question items were examined within each construct. The general rule during the reliability test was, if possible, not to change question items to avoid the loss of original information. However, when there was any question item that showed a different pattern from the rest of items (e.g., the question item shows a negative correlation with the rest of question items when correlations among the rest of items in the construct are positive), content of the question item was compared with other items. Only if the item apparently represented different characteristics from the rest of question items in the construct, the item was excluded. Thus, if there was any similarity between the items, it remained in the construct.

3.2.2.2. Item total correlation and alpha if item deleted

For each construct, item total correlation of question items was examined. When an item had a lower item total correlation than other items, alpha if item deleted was examined. If alpha if item deleted showed an increase from the original Cronbach's alpha, and the content of the question items were different from the rest of items, the item was removed. Otherwise, the item was kept (SPSS professional statistics 6.1, 1994). Some question items in different constructs seemed to measure the similar characteristic and used the similar responses. For example, both KQ1 and KQ22 inquired about individuals' nutrition knowledge, and were labeled as 1= correct and 0= incorrect. Thus, both questions were merged, and its item total correlation and alpha if item deleted were examined. If it showed an increase, the merged question was accepted as a construct.

3.2.2.3. Cronbach's alpha

When the content of questions from different constructs was similar, Cronbach's alpha of merged question items of all constructs was examined along with item total correlation and alpha if item deleted. If measurements of reliability were feasible, the construct with the highest Cronbach's alpha was accepted as a final construct.

3.3. Validity tests of DHKS 1994-1995 (Objective 3)

3.3.1. Content validity

Content validity (i.e., examination of the extent to which question items cover the domain of characteristics such as nutrition knowledge and attitudes) was examined through discussion with faculty members and graduate students in our department,

referring to *the Dietary Guidelines for Americans*, *the Food Guide Pyramid*, and nutrition text books.

3.3.2. Construct validity

Construct validity was assessed by divergent validity and discriminant validity.

3.3.2.1. Divergent validity

After constructs were identified from the reliability test, correlations between different constructs were assessed to measure divergent validity.

3.3.2.2. Discriminant validity

Mean ± standard error (SE) of nutrition knowledge, attitudes and the food label use scores among various subgroups were calculated for both 1994 and 1995. Discriminant validity was assessed by testing significant differences of mean scores of nutrition knowledge, attitudes, and frequency of the food label use constructs between/among subgroups based on criteria by t-test and F-test. The present study used well-accepted findings and theories from past studies as criteria, which were frequently reported across studies, and whose study designs were carefully designed.

They are:

1. Females are more knowledgeable about nutrition than males (Levy et al, 1992; Ernst et al, 1986; Frazao et al, 1994; Smallwood et al 1994; Variyam et al, 1996; Smith et al, 1997).
2. Females are more concerned about their diet than males (Shepherd et al, 1987; Towler et al, 1992; Smith et al, 1997; Shpherd et al, 1985).

3. Females are more motivated to improve their diet than males (Glanz et al, 1993; Contento et al, 1990).
4. Females use food labels more frequently than males (Bender et al, 1992; Guthrie et al, 1995).
5. Meal planners/preparers are more knowledgeable about nutrition than non-meal planners/preparers (Jacoby et al, 1977).
6. Higher-income respondents are more knowledgeable about nutrition than lower-income respondents (Morton et al, 1997; Frazao et al, 1994; Variyam et al, 1996; Reid et al, 1994; Hyman et al, 1993; Carlson et al, 1994; Grotkowski et al, 1978).
7. Higher-income respondents are more concerned about their diet than lower-income respondents (Variyam et al, 1996; Shepherd et al, 1987; Grotkowski et al, 1978).
8. Lower-income respondents are more concerned about the price of food than higher-income respondents (Morton et al, 1997; Hyman et al, 1993).
9. Higher-income respondents use food labels more frequently than lower-income respondents (Guthrie et al, 1995).
10. There are differences in nutrition knowledge among the age group (Levy et al, 1992; Jacoby et al, 1977; Cole et al, 1990; Frazao et al, 1994; Smallwood et al, 1994; Variyam et al, 1996; Carlson et al, 1994; Smith et al, 1997; Levy et al, 1993).
11. There are differences in motivation of improving own diet among the age group (Shpherd et al, 1987; Reid et al, 1994; Towler et al, 1992).
12. There are differences in frequency of food label use among the age group (Bender et al, 1992; Reid et al, 1994).

13. There are differences in understanding of nutrition knowledge depending on the education level (Levy et al, 1992; Ernst et al, 1986; Jeffery et al, 1982; Fullmer et al, 1991; Frazao et al, 1994; Smallwood et al, 1994; Variyam et al, 1996; Smith et al, 1997; Levy et al, 1993).
14. There are differences in frequency of food label use depending on the education level (Bender et al, 1992; Guthrie et al, 1995).
15. Smokers are less knowledgeable about nutrition than non-smokers (Variyam et al, 1996).
16. Smokers are less concerned about their diet than non-smokers (Smith et al, 1997).
17. Smokers are less motivated to improve their diet than non-smokers (Glanz et al, 1993; Smith et al, 1997).

3.4. Comparisons of nutrition knowledge, attitudes and use of the food label by Americans between 1994 and 1995 (Objective 4)

Mean ± standard error (SE) of nutrition knowledge, attitudes and food label use scores for the DHKS 1994-1995 population was calculated. Significant differences in population scores between 1994 and 1995 were tested by t-test.

Chapter Four

RESULTS

4.1. Description of the sample of DHKS 1994-1995 (Objective 1)

Sample distributions categorized by each factor are summarized on Table 6. Both unweighted sample size and percentage of weighted sample are listed. The distribution of selected variables was similar between 1994 and 1995.

The prevalence of females was slightly higher than males (52% vs. 48% in both years, respectively). All DHKS respondents were aged 20 years and older; about 32% of respondents were aged 20-34 years old (33% in 1994 and 32% in 1995); less than 40% of respondents were aged 35-54 years old (38% in 1994 and 39% in 1995); and less than 30% of respondents were aged 55-89 years old (29% in 1994 and 28% in 1995). There were few subjects aged ninety years and older (0.3% in both years). Subjects were predominantly white (81% in 1994 and 80% in 1995), followed by African-American (11% in both years), others (4% in both years), Asian and Pacific Islander (2% in 1994 and 3% in 1995), and American Indian (0.6% in 1994 and 0.7% in 1995). About 60% of respondents were meal planners/preparers (62% in 1994 and 59% in 1995).

The income level of 16 percent of respondents was less than 130% poverty threshold in both years. More than 40% of respondents had more than a high school education (48% in 1994 and 51% in 1995). Over 40% of respondents (44% in 1994 and 43% in 1995) had a high school education (9-12 years). Less than 10 % (7% in 1994 and 6% in 1995) had less than a high school education. Less than 1% (0.4% in 1994 and 0.6% in 1995) of respondents participated in the Women, Infant, and Children

Table 6. Distribution of subgroups in DHKS 1994-1995

Variables	DHKS 1994		DHKS 1995	
	No. of unweighted sample	Weighted sample (%)	No. of unweighted sample	Weighted sample (%)
Demographic variables				
Gender				
Male	901	47.9	988	48.0
Female	978	52.1	978	52.0
Age (yrs)				
20-34	446	32.5	286	32.0
35-54	704	38.4	688	39.2
55-89	720	28.7	976	28.4
90+	9	0.3	16	0.3
Race				
White	1,520	81.6	1,635	80.4
Black	232	11.3	223	11.4
Asian, Pacific Islander	32	2.4	29	3.4
American Indians	17	0.6	11	0.7
Others	78	4.1	68	4.1
Meal planner/preparer				
Yes	1,212	61.8	1,196	58.7
No	638	38.2	741	41.3

Table 6. Distribution of subgroups in DHKS 1994-1995 (Cont'd)

Variables	DHKS 1994		DHKS 1995	
	No. of unweighted sample	Weighted sample (%)	No. of unweighted sample	Weighted sample (%)
Demographic variables (Cont'd)				
Region				
Northeast	363	20.4	401	20.1
Midwest	504	23.4	467	23.3
South	645	34.7	732	35.1
West	367	21.5	366	21.6
Urbanization				
MSA[a] central city	629	34.4	537	31.0
MSA, outside central city	755	45.5	923	46.2
Non-MSA	495	20.1	506	22.9
Pregnancy status				
Pregnant	14	1.0	9	0.8
Lactating	6	0.7	7	0.6
Not pregnant/lactating	580	34.8	477	35.0
Not female 10-55 yrs	1,279	63.5	1,473	63.6

Table 6. Distribution of subgroups in DHKS 1994-1995 (Cont'd)

Variables	DHKS 1994		DHKS 1995	
	No. of unweighted sample	Weighted sample (%)	No. of unweighted sample	Weighted sample (%)
Socioeconomic variables (Cont'd)				
Education (yrs)				
< 8	201	7.3	216	5.5
9-12	867	44.4	905	43.1
≥ 13	783	48.3	833	51.3
Income				
<130% poverty threshold	522	16.3	479	15.7
≥130% poverty threshold	1,357	83.7	1,487	84.3
Health indicators				
Weight loss/low calorie diet				
Yes	135	7.3	127	6.7
No	1,743	92.7	1,839	93.3
Low fat/cholesterol diet				
Yes	185	9.3	199	8.5
No	1,693	90.7	1,767	91.5

Table 6. Distribution of subgroups in DHKS 1994-1995 (Cont'd)

Variables	DHKS 1994		DHKS 1995	
	No. of unweighted sample	Weighted sample (%)	No. of unweighted sample	Weighted sample (%)
Health indicators (Cont'd)				
Diagnosed as high blood pressure				
Yes	476	21.1	574	20.3
No	1,400	78.9	1,390	79.7
Diagnosed as heart disease				
Yes	196	8.0	257	7.1
No	1,680	92.0	1,705	92.9
Diagnosed as cancer				
Yes	110	4.8	145	5.6
No	1,766	95.2	1,819	94.4
Diagnosed as osteoporosis				
Yes	46	2.0	88	3.0
No	1,830	98.0	1,876	97.0
Diagnosed as high blood cholesterol				
Yes	301	13.9	367	15.2
No	1,575	86.1	1,591	84.8
Diagnosed as stroke				
Yes	43	1.7	64	1.8
No	1,833	98.3	1,897	98.2

Table 6. Distribution of subgroups in DHKS 1994-1995 (Cont'd)

Variables	DHKS 1994		DHKS 1995	
	No. of unweighted sample	Weighted sample (%)	No. of unweighted sample	Weighted sample (%)
Health indicators				
Weight loss/low calorie diet				
Yes	135	7.3	127	6.7
No	1,743	92.7	1,839	93.3
Low fat/cholesterol diet				
Yes	185	9.3	199	8.5
No	1,693	90.7	1,767	91.5
Low salt/sodium diet				
Yes	94	4.0	127	4.9
No	1,784	96.0	1,839	95.1
High fiber diet				
Yes	32	1.8	38	1.6
No	1,846	98.2	1,928	98.4
Diabetic diet				
Yes	49	1.8	76	2.4
No	1,829	98.2	1,890	97.6

Table 6. Distribution of subgroups in DHKS 1994-1995 (Cont'd)

Variables	DHKS 1994		DHKS 1995	
	No. of unweighted sample	Weighted sample (%)	No. of unweighted sample	Weighted sample (%)
Lifestyle factors				
Smoking status				
Yes	485	50.5	504	55.4
No	505	49.5	557	44.6
Exercise				
Rarely or never	830	41.1	918	41.4
Once in a week	137	8.2	146	8.6
2-4 times in a week	409	24.7	404	24.0
Almost everyday	496	26.1	491	26.1
Hours of TV watching (hr)				
0	261	14.7	241	13.7
1	364	20.0	410	23.0
2	335	17.9	422	20.3
3	339	18.4	317	16.4
4-10	542	27.3	535	24.6
11-24	31	1.7	35	2.0

Table 6. Distribution of subgroups in DHKS 1994-1995 (Cont'd)

Variables	DHKS 1994		DHKS 1995	
	No. of unweighted sample	Weighted sample (%)	No. of unweighted sample	Weighted sample (%)
Lifestyle factors (Cont'd)				
Vitamin supplement use				
Not at all	971	51.4	993	53.4
Every so often	259	15.0	248	13.7
Everyday or almost everyday	639	33.6	705	33.0

[a] Metropolitan Statistical Area

supplemental program (WIC). About 8% (9% in 1994 and 8% in 1995) of respondents received food stamps in the past 12 months from the surveillance period, and about 5% (5% in 1994 and 6% in 1995) of respondents were authorized to receive food stamps during the surveillance period.

About 20% of respondents were diagnosed with high blood pressure (21% in 1994 and 20% in 1995). More than 10% of respondents were diagnosed with high blood cholesterol (14% in 1994 and 15% in 1995). About 5% of respondents were diagnosed with diabetes (5% in 1994 and 6% in 1995) and cancer (5% in 1994 and 6% in 1995). Less than 5% of respondents were diagnosed with osteoporosis (2% in 1994 and 3% in 1995) or stroke (2% in both years). More than 5% of respondents were on a weight loss/ low calorie diet (7% in both years) or on a low fat/cholesterol diet (9% in both years). About 5% of respondents were on a low salt/sodium diet (4% in 1994 and 5% in 1995). Less than 5% of respondents were on a high fiber diet (2% in both years) or on a diabetic diet (2% in both years). We must remember that all of our respondents were aged 20 years and older.

Smoking prevalence in our respondents slightly increased from 51% in 1994 to 55% in 1995. Forty-one percent of respondents in both years answered that they rarely or never exercised. About 25% (25% in 1994 and 24% in 1995) of respondents answered that they exercised 2-4 times a week, and 26% of respondents in both years answered that they exercised almost every day. Over 25% of respondents (29% in 1994 and 27% in 1995) watched TV more than 4 hours a day. More than 45% of respondents (49% in 1994 and 47% in 1995) used vitamin supplements.

It should be noted that the findings associated with respondents aged 90 years and older, Asian and Pacific Islander (1995 data only), American Indian, pregnant and lactating women, WIC participants were not reliable because of their small sample sizes.

4.2. Reliability tests of DHKS 1994-1995 (Objective 2)

4.2.1. Score definitions

4.2.1.1. Nutrition knowledge scores

Five final knowledge constructs were established: knowledge of the Food Guide Pyramid construct (Kno1; KQ1a-e); knowledge of nutrition and food construct (Kno811; KQ8b-d, KQ9a,c-f, KQ10 and KQ11); knowledge of the amount of nutrient content per servings construct (Kno22; KQ22a-e); awareness of diet-disease relationships construct (Awapr; KQ5a-g); and awareness of the authority of the government to define phrases on the food label construct (Awauth; KQ21a-c) (Table 7).

4.2.1.2. Attitude scores

Fourteen final attitude constructs were established: perceived adequacy of own nutrient intakes which are recommended to decrease construct (Adende; KQ3a-k); perceived adequacy of own nutrient intakes which are recommended to increase construct (Adenin); perceived adequacy of own weight construct (Adeqwt; KQ7); perceived barriers from using the food label construct (Barrier; KQ23c-d); perceived benefits of using the food label construct (Benef; KQ23a, g-j); perceived easiness to understand the food label construct (Ease; Kq19a-g); perceived importance of practicing healthy dietary habits construct (Imdiet; KQ4a-k and KQ15b); perceived importance of food safety

construct (Imsafe; KQ15a); perceived importance of the price of food construct (Impric; KQ15c); perceived importance of how well food keeps construct (Imlast; KQ15d); perceived importance of easiness of the food to prepare construct (Imease; KQ15e); perceived importance of the taste of food construct (Imtast; KQ15f); perceived reliability of descriptions on the food label construct (Conf; KQ20a-f); and willingness of learning more about the food label construct (Attitu; KQ23f) (Table 8).

4.2.1.3. Scores for the food label use

One final construct was determined: frequency of the food label use (Fluse; KQ16a-e and KQ17a-h) (Table 9).

4.2.2. Reliability tests

4.2.2.1. Correlation and covariance matrixes

Correlation and covariance matrixes within the same construct identified question items that showed different relations with the rest of items. For example, all of correlations among items in knowledge of the Food Group Pyramid construct (KQ1a to KQ1e) were small, but positively related to each other. On the other hand, correlations among items in knowledge of nutrition and fat construct (KQ9a to KQ9f) showed positive correlation with each other, except KQ9b that showed a negative correlation with other items in the same construct.

These matrixes identified question items that showed different patterns from the rest of items in the construct. However, they didn't provide any information on what extent each question item related to the construct. Because there were no apparent

explanations for the items to have different patterns from the rest of items, these items were kept in the construct for the following analyses.

4.2.2.2. Item total correlation and alpha if item deleted

The average ITC of the nutrition knowledge constructs ranged from low (less than 0.4) to high (higher than 0.7). Nutrition knowledge constructs with low average ITC were on: the Food Group Pyramid (Kno1) with 0.2 in 1994 and 1995; nutrition and food (Kno811) with 0.3 in both years; and the amount of nutrient content per servings (Kno22) with 0.3 in both years. Nutrition knowledge constructs with moderate average ITC (0.4-0.6) were on: the awareness of nutrition-disease relationships (Awapr) with 0.4 in both years. Nutrition knowledge construct with high average ITC was on the awareness of authority of the government to define phrases on the food label (Awauth) with 0.7 both years (Table 7).

The average ITC of the attitude constructs also ranged from low to high. Attitude constructs with low ITC were on: the perceived adequacy of own nutrient intakes which were recommended to increase (Adenin) with 0.3 both years; and the perceived barriers from using the food label (Barrier) with 0.3 in 1995. Attitude constructs with moderate ITC were on: the perceived adequacy of own nutrient intakes which were recommended to decrease (Adende) with 0.5 in both years; the perceived benefits of using the food label (Benef) with 0.6 in both years; the perceived barriers from using the food label (Barrier) was 0.4 in 1994; the perceived easiness to understand the food label (Ease) with 0.5 in both years; the perceived importance of practicing healthy dietary habits (Imdiet) with 0.6 both years. Attitude construct with high ITC was on perceived reliability of

descriptions on the food label with 0.7 in both years (Table 8). The average ITC of frequency of the food label use construct (Fluse) was moderate with 0.6 in both years (Table9).

Alpha if item deleted identified question items whose exclusion would increase the final reliability (Cronbach's alpha). Thus, this measurement was used to determine whether the item should be kept or not in the construct, depending on the amount of increase between the final reliability and alpha if item deleted. For example, if the question item inquiring about the appropriate number of servings from grains (KQ1d) in the Food Guide Pyramid construct was excluded, would be Cronbach's alpha increase from 0.42 to 0.44 in 1994 in knowledge of the Food Guide Pyramid construct. The item was kept not to loose the original information for small increase with Cronbach's alpha.

The final average alpha if item deleted of the nutrition knowledge constructs ranged from moderate to high. Nutrition knowledge constructs with moderate average alpha if item deleted were on: the Food Guide Pyramid (Kno1) with 0.4 in 1994 and 1995; nutrition and food (Kno811) with 0.6 in both years; and the amount of nutrient content per servings (Kno22) with 0.5 in both years. Nutrition knowledge constructs with high average alpha if item deleted were on: the awareness of nutrition-disease relationships (Awapr) with 0.7 in both years; and the awareness of the authority of the government to define phrases on the food label (Awauth) with 0.8 in both years (Table 7).

The average Alpha if item deleted of the attitude constructs also ranged from moderate to high. The attitude construct with moderate alpha if item deleted was on the perceived adequacy of own nutrient intakes which were recommended to increase

Table 7. Final constructs determined by ITC, alpha if item deleted (alpha deleted), and Cronbach's alpa - Knowledge constructs in DHKS 1994-1995

Characteristics	Question items	ITC		alpha deleted		Cronbach's alpha	
		94	95	94	95	94	95
Knowledge of the Food Guide Pyramid construct (Kno1)							
No. of servings from the fruit group?	rekq1a	.25	.18	.34	.38		
No. of servings from the vegetable group?	rekq1b	.29	.29	.30	.28		
No. of servings from the milk, yogurt, and cheese group?	rekq1c	.21	.20	.37	.35		
No. of servings from the bread, cereal, rice, and pasta group?	rekq1d	.08	.14	.44	.40		
No. of servings from the meat, poultry, fish, dry beans, and eggs group?	rekq1e	.24	.23	.35	.34	.42	.40
Knowledge of nutrition and food construct (Kno811)							
Which has more saturated fat- butter or margarine?	rekq8b	.25	.18	.62	.60		
Which has more saturated fat- egg white or egg yolk?	rekq8c	.39	.33	.59	.55		
Which has more saturated fat- skim milk or whole milk?	rekq8d	.42	.39	.59	.55		
Which has more fat- regular hamburger or ground round?	rekq9a	.29	.31	.61	.56		
Which has more fat- hot doggs or ham?	rekq9c	.30	.24	.61	.57		
Which has more fat- peanuts or popcorn?	rekq9d	.35	.31	.60	.56		
Which has more fat- yogurt or sour cream?	rekq9e	.37	.34	.59	.55		
Which has more fat- porterhouse steak or round steak?	rekq9f	.26	.30	.62	.56		
Which kind of fat is more likely to be liquid rather than a solid - saturated fats, polyunsaturated fats, or equally likely?	rekq10	.24	.25	.62	.57		
If a food has no cholesterol is it also - low in saturated fat, high in saturated fat, or either high or low in saturated fat?	rekq11	.26	.16	.62	.60	.63	.59

Table 7. Final constructs determined by ITC, alpha if item deleted (alpha deleted), and Cronbach's alpa - Knowledge constructs in DHKS 1994-1995 (Cont'd)

Characteristics	Question items	ITC		alpha deleted		Cronbach's alpha	
		94	95	94	95	94	95
Knowledge of the amount of nutrient content per servings construct (Kno22)							
100 mg of sodium?	rekq22a	.15	.16	.55	.54		
20 g of fat?	rekq22b	.35	.34	.49	.46		
15 mg of cholesterol?	rekq22c	.39	.37	.40	.42		
5 g of fiber?	rekq22d	.28	.29	.49	.49		
10 g of saturated fat?	rekq22e	.35	.37	.44	.43	.52	.53
Awareness of diet-disease relationships construct (Awapr)							
Eating too much fat causes health problems?	rekq5a	.43	.45	.65	.68		
Not eating enough fiber causes health problems?	reka5b	.48	.49	.64	.67		
Eating too much salt or sodium causes health problems?	rekq5c	.46	.41	.64	.69		
Not eating enoug calcium causes health problems?	rekq5d	.46	.55	.64	.65		
Eating too much cholesterol causes health problems?	rekq5e	.44	.44	.65	.68		
Eating too much sugar causes health problems?	rekq5f	.30	.31	.69	.72		
Being overweight causes health problems?	rekq5g	.28	.42	.69	.69	.69	.71
Awareness of the authority of the government to define phrases on the food label on the food label construct (Awauth)							
Low-cholesterol?	rekq21a	.71	.72	.76	.76		
Light?	rekq21b	.74	.71	.74	.78		
Extra lean?	rekq21c	.66	.68	.82	.80	.84	.84

Table 8. Final constructs determined by ITC, alpha if item deleted (alpha deleted), and Cronbach's alpa - Attitude constructs in DHKS 1994-1995

Characteristics	Question items	ITC		alpha deleted		Cronbach's alpha	
		94	95	94	95	94	95
Perceived adequacy of own nutrient intakes which are recommended to decrease construct (Adende)							
Calories?	rakq3a	.42	.42	.72	.71		
Fat?	rakq3f	.62	.65	.66	.64		
Saturated fat?	rakq3g	.63	.66	.65	.64		
Cholesterol?	rakq3h	.53	.55	.69	.68		
Salt or sodium?	rakq3i	.34	.26	.74	.75		
Sugar and sweet?	rakq3k	.35	.31	.74	.74	.74	.73
Perceived adequacy of own nutrient intakes which are recommended to increase construct (Adenin)							
Calcium?	rakq3b	.30	.32	.45	.38		
Iron?	rakq3c	.32	.26	.42	.43		
Vitamin C?	rakq3d	.29	.29	.46	.40		
Fiber?	rakq3j	.31	.26	.44	.44	.51	.49
Perceived benefits of using the food label construct (Benef)							
The nutrition information on food labels is useful to me?	rakq23a	.62	.66	.79	.76		
Reading food labels makes it easier to choose foods?	rakq23g	.65	.60	.78	.79		
Sometimes I try new foods because of the inforamtion on the food label?	rakq23h	.54	.54	.82	.82		
When I use food labels, I make better food choices?	rakq23i	.73	.70	.75	.76		
Using food labels to choose foods is better than just relying on my own knowledge about what is in them?	rakq23j	.57	.61	.80	.79	.82	.82

Table 8. Final constructs determined by ITC, alpha if item deleted (alpha deleted), and Cronbach's alpa - Attitude constructs in DHKS 1994-1995 (Cont'd)

Characteristics	Question items	ITC		alpha deleted		Cronbach's alpha	
		94	95	94	95	94	95
Perceived barriers from using the food label construct (Barrier)							
The nutrition iformation on food labels is hard to interpret?	rakq23c	.37	.33	-	-		
Reading food labels takes more time than I can spend?	rakq23d	.37	.33	-	-	.53	.49
Perceived easiness to understand food labels construct (Ease)							
The list of ingredients?	rakq19a	.47	.43	.78	.79		
A short phrase like "low-fat" or "light" or "good source of fiber"?	rakq19b	.45	.44	.79	.79		
The number of calories in a serving?	rakq19c	.56	.59	.77	.76		
The number of calories from fat in a serving?	rakq19d	.62	.66	.75	.75		
The number of grams or milligrams of nutrients like fat and sodium in a serving?	rakq19e	.61	.61	.76	.76		
The percent of the daily value for each nutrient?	rakq19f	.51	.59	.78	.76		
A description like "lean" or "extra lean" on meats?	rakq19g	.48	.40	.78	.80	.80	.80
Perceived reliability of descriptions on the food label construct (Conf)							
Low-fat?	rakq20a	.76	.77	.85	.86		
Low-cholesterol?	rakq20b	.73	.76	.85	.86		
A good source of fiber?	rakq20c	.64	.66	.87	.88		
Light?	rakq20d	.70	.71	.86	.87		
Healthy?	rakq20e	.66	.69	.87	.87		
Extra lean?	rakq20f	.65	.65	.87	.88	.88	.89

Table 8. Final constructs determined by ITC, alpha if item deleted (alpha deleted), and Cronbach's alpa - Attitude constructs in DHKS 1994-1995 (Cont'd)

Characteristics	Question items	ITC		alpha deleted		Cronbach's alpha	
		94	95	94	95	94	95
Perceived importance of practicing healthy dietary habits construct (lmdiet)							
Use salt or sodium only in moderation?	rakq4a	.47	.45	.86	.85		
Choose a diet low in saturated fat?	rakq4b	.70	.68	.85	.84		
Choose a diet with plenty of fruits and vegetables?	rakq4c	.66	.67	.85	.84		
Use sugars only in a moderation?	rakq4d	.55	.49	.86	.85		
Choose a diet with adequate fiber?	rakq4e	.69	.64	.85	.84		
Eat a variety of foods?	rakq4f	.48	.50	.86	.85		
Maintain a healthy weight?	rakq4g	.52	.58	.86	.85		
Choose a diet low in fat?	rakq4h	.72	.68	.85	.84		
Choose a diet low in cholesterol?	rakq4i	.63	.64	.85	.84		
Choose a diet with plenty of breads, cereals, rice, and pasta?	rakq4j	.44	.38	.86	.86		
Eat at least two servings of dairy products daily?	rakq4k	.36	.33	.87	.86		
Nutrition is important when buying food?	rakq15b	.49	.50	.86	.85	.87	.86

ITC, alpha deleted and Cronbach's alpha values for the following constructs were not available because analyses couldn't be consucted due to lack of question items: perceived adequecy of own weight; perceived importance of food safety; perceived importance of the prices of food; perceived importance of how well food keeps; perceived importance of the food to prepare; perceived importance of the taste of food; and willingness to learn more about the food label.

Table 9. Final constructs determined by ITC, alpha if item deleted (alpha deleted), and Cronbach's alpa - Frequency of food label use construct in DHKS 1994-1995

Characteristics	Question items	ITC		alpha deleted		Cronbach's alpha	
		94	95	94	95		
Frequency of food label use construct (Fluse)	rakq16a	.61	.55	.91	.91		
The list of ingredients?	rakq16b	.50	.48	.91	.91		
The short phrases like "low-fat" or "light" or "good source of fiber"?	rakq16c	.67	.70	.90	.91		
The nutrition panel that tells the amount of calories, protein, fat, and such in a serving of the food?	rakq16d	.50	.50	.91	.91		
The information about the size of a serving?	rakq16e	.47	.55	.91	.91		
A statement that describes how nutrients or foods and health problems are related?							
Calories?	rakq17a	.69	.68	.91	.91		
Salt or sodium?	rakq17b	.65	.64	.91	.91		
Total fat?	rakq17c	.77	.78	.90	.90		
Saturated fat?	rakq17d	.74	.77	.90	.90		
Cholesterol?	rakq17e	.74	.71	.90	.90		
Vitamins or minerals?	rakq17f	.61	.61	.91	.91		
Fiber?	rakq17g	.66	.68	.91	.91		
Sugars?	rakq17h	.64	.66	.91	.91	.91	.91

(Adenin) with 0.4in both years. Attitude constructs with high alpha if item deleted were on: the perceived adequacy of own nutrient intakes which were recommended to decrease (Adende) with 0.7 in both years; the perceived benefits of using the food label (Benef) with 0.8 in both years; the perceived easiness to understand the food label (Ease) with 0.8 in both years; the perceived importance of practicing healthy dietary habits (Imdiet) with 0.9 in 1994 and 0.8 in 1995, respectively; the perceived reliability of descriptions on the food label (Conf) was 0.9 in both years (Table 8). The average Alpha if item deleted of frequency of the food label use construct (Fluse) was high at 0.9 in both years (Table 9).

4.2.2.3. Cronbach's alpha

Cronbach's alpha of the knowledge of diet-disease relationships constructs (KQ6a-g) was either too small ($r<0.3$) or out of normal range ($r= 0.0$-1.0). Thus, those constructs were excluded (Appendix F). Final Cronbach's alpha of nutrition knowledge constructs ranged from moderate to high. Nutrition knowledge constructs with moderate Cronbach's alpha were on; the knowledge of the Food Guide Pyramid (Kno1) with 0.4 in 1994 and 1995; and the amount of nutrient contents per servings (Kno22) with 0.5 in both years; nutrition and food (Kno811) was 0.6 in both years. Nutrition knowledge constructs with high Cronbach's alpha were on: the awareness of the authority of the government to define phrases on the food label (Awauth) with 0.8 in both years; and the awareness of diet-disease relationships construct (Awapr) was 0.7 in both years (Table 7).

Cronbach's alpha of attitude constructs ranged from moderate to high. Attitude constructs with moderate Cronbach's alpha were on; the perceived adequacy of own

nutrient intakes which were recommended to increase (Adenin) with 0.5 in both years; and the perceived barriers from using the food label (Barrier) with 0.5 in both years.

Attitude constructs with high Cronbach's alpha were on: the perceived adequacy of own nutrient intakes which were recommended to decrease (Adende) with 0.7 in both years; the perceived reliability of descriptions on the food label (Conf) with 0.9 in both years; the perceived benefits of using the food label (Benef) with 0.8 in both years; the perceived easiness to understand the food label (Ease) with 0.7 in both years; and the perceived importance of practicing healthy dietary habits (Imdiet) with 0.9 in both years (Table 8). Cronbach's alpha of frequency of the food label use construct was high with 0.9 in both years (Table 9).

Final reliabilities as determined by Cronbcah's alpha for the knowledge constructs on the Food Guide Pyramid, on nutrition and food, and on the amount of nutrient content per servings were moderate (r= 0.4, 0.6, and 0.5, respectively). Even the average item total correlations were low (r=0.2, 0.2, and 0.3, respectively). Among attitude constructs, similar results were seen in the perceived adequacy of own nutrient intakes that were recommended to increase construct (the average item total correlation was r= 0.3; the Cronbach's alpha was r= 0.5) and in the perceived barriers from using the food label construct (the average item total correlation was r=0.3 in 1995; the Cronbach's alpha was r= 0.5). These results suggested that those constructs were consisted of question items that didn't represent the characteristic of the construct well. Thus, the final reliability of these constructs increased possibly because of increased number of question items, not because of strong relationships among question items.

4.3. Validity tests of DHKS 1994-1995 (Objective 3)

4.3.1. Content validity

Final constructs covered a wide range of nutritional issues associated with individual's dietary habits and food label use. Nutrition knowledge questions and attitudes toward healthy dietary habits corresponded with what *the American Dietary Guidelines, The Food Guide Pyramid*, and other nutrition textbooks emphasized. Thus, the consensus of content validity of final constructs included in DHKS 1994-1995 was obtained after discussions with faculty members and graduate students in our department, reaching to over 80% of the agreement.

4.3.2. Construct validity

4.3.2.1. Divergent validity

Most correlations among final constructs included in DHKS 1994-1995 were small ($r = 0.0 - 0.3$). Moderate correlations (0.4-0.6) in DHKS 1994 were seen between: perceived easiness to understand the food label construct (Ease) and perceived barriers from using the food label construct (Barrier) with $r = 0.4$; willingness to learn more about the food label construct (Attitu) and perceived benefits of using the food label construct (Benef) with $r = 0.4$; frequency of the food label use construct (Fl use) and perceived benefits of using the food label construct (Benef) with $r = 0.5$; and frequency of using the food label construct and importance of practicing the healthy diet construct with $r=0.5$.

In DHKS 1995, moderate correlations were seen between: perceived easiness to understand the food label construct (Ease) and perceived barriers from using the food label (Barrier) with $r = 0.5$; perceived benefits of using the food label construct (Benef)

and perceived importance of practicing healthy diet (Imdiet) with r= 0.4; perceived benefits of using the food label construct (Benef) and willingness to learn more about the food label construct (Attitu) with r=0.4; perceived benefits of using the food label construct (Benef) and frequency of the food label use construct (Fl use) with r= 0.6; perceived importance of practicing healthy dietary habits (Imdiet) and perceived importance of food safety (Imsafe) with r=0.4; and perceived importance of practicing healthy dietary habits (Imdiet); perceived adequacy of own weight construct (Adeqwt) and knowledge of the Food Guide Pyramid construct (Kno1) with r=0.5; and frequency of the food label use construct (Fl use) with r = 0.5. Thus, results from divergent validity test assured that final constructs were good enough to represent different characteristics without being contaminated by other constructs (Table 10).

4.3.2.2. Discriminant validity

4.3.2.2.1. Knowledge constructs (Kno1, Kno811, Kno22, and Awapr)

Females were significantly more knowledgeable about the Food Guide Pyramid (Kno1) than males (10.6 vs. 10.1 in 1994; 10.8 vs. 10.1 in 1995). They were significantly more knowledgeable about nutrition and food (Kno811) than males (7.0 vs. 6.8 in 1994; 7.0 vs. 6.7 in 1995), and were significantly more aware of diet-disease relationships (Awapr) than males (6.1 vs. 5.6 in 1994; 6.0 vs. 5.7 in 1995). No significant mean score difference was seen in knowledge of the amount of nutrient content per servings construct (Kno22) in this group category. Thus, results obtained from knowledge of nutrition and food construct (Kno811), knowledge of the Food Guide Pyramid construct (Kno1) and awareness of diet-disease construct (Awapr) corresponded with criteria 1

Table10. Divergent validity for each construct by Pearson Correlation in DHKS 1994-1995

	Kno1	Kno22	Kno811	Adenin	Adende	Adeqwt	Benef	Barrier	Ease	Conf
Kno1		.04	.25	-.01	-.09	.02	.08	.03	.10	-.11
Kno22	.09		.08	-.09	.01	.04	.07	.03	.09	.11
Kno811	.24	.11		.08	-.11	.08	.16	.10	.11	-.09
Adenin	-.14	.02	-.08		-.10	.26	-.16	-.06	-.11	-.04
Adende	.03	-.03	.05	-.16		-.01	.10	.02	.02	.04
Adeqwt	.50	-.04	.19	-.06	.27		0	-.06	0	-.03
Benef	.17	.03	.15	-.03	-.07	.02		.20	.23	.17
Barrier	.11	.01	.19	.06	-.04	.06	.34		.40	.02
Ease	.14	.14	.23	.05	-.10	.01	.29	.47		.34
Conf	0	.12	-.07	.01	-.04	-.10	.20	.16	.32	
Imdiet	.14	.12	.13	.09	-.21	.12	.38	.13	.17	.10
Imsafe	.04	.10	-.02	.11	-.13	.01	.20	.08	.12	.03
Imprice	-.01	.02	-.05	.01	-.05	-.01	.03	-.07	-.05	.08
Imlast	-.02	.09	-.14	.07	-.09	.04	-.03	-.07	-.01	.08
Imease	.03	.02	-.05	-.05	.03	.04	.17	.01	.03	.13
Imtast	0	.03	-.01	-.01	.06	.04	0	-.05	.02	.07
Awapr	.16	.03	.28	-.02	.04	.14	.21	.11	.09	-.09
Awauth	.09	.14	.12	0	.01	0	.07	.10	.18	.31
Attitu	-.01	.04	-.06	-.10	-.05	.02	.35	-.02	-.02	.11
Fl use	.13	.10	.14	.10	-.19	.07	.60	.30	.25	.13

Table 10. Divergent validity for each construct by Pearson Correlation in DHKS 1994-1995 (Cont'd)

	Imdiet	Imsafe	Imprice	Imlast	Imease	Imtast	Awapr	Awauth	Attitu	FI use
Kno1	.11	.02	.08	-.03	.04	-.05	.14	.05	.06	.10
Kno22	.09	.06	.01	.10	.02	-.02	0	.24	.04	-.01
Kno811	.10	.03	-.09	-.17	-.06	-.04	.28	.07	.08	.27
Adenin	-.21	-.07	.09	-.03	.02	.08	.05	-.09	-.16	-.16
Adende	.17	.03	-.01	.02	0	-.03	0	.06	-.01	.11
Adeqwt	.08	.01	.03	.05	0	.04	.10	.02	.03	.12
Benef	.27	.12	0	-.01	.09	-.07	.08	.16	.39	.53
Barrier	.09	.04	-.14	-.14	-.14	-.02	.12	.11	-.07	.19
Ease	.13	.07	0	0	-.04	0	-.01	.25	0	.18
Conf	.08	0	.06	.14	.12	.01	-.14	.33	.08	.05
Imdiet		.34	.10	.18	.05	-.03	.30	.09	.21	.46
Imsafe	.36		.10	.23	-.01	.07	.10	.05	.11	.20
Imprice	.12	.13		.28	.23	.02	-.05	.02	.09	-.04
Imlast	.23	.30	.31		.19	.12	-.08	.09	.15	.05
Imease	.08	.13	.21	.26		.09	-.07	.04	.06	-.03
Imtast	.06	.16	.10	.14	.16		-.03	-.02	-.03	-.07
Awapr	.29	.04	-.07	-.05	-.04	.06		.04	0	.29
Awauth	.04	.04	.03	.10	.07	0	-.03		.07	.07
Attitu	.22	.11	.05	.13	.06	0	.02	.04		.33
FI use	.46	.25	0	.09	.09	-.02	.25	.04	.30	

All correlations are significant at the 0.01 level (2-tailed), except correlation between Conf and Kno1 in DHKS 1995.

Correlation indexes above the diagonal are from 1994 data, ones below the diagonal are from 1995 data.

Kno1: Knowledge of the Food Guide Pyramid construct

Kno22: Knowledge of the amount of nutrient content per servings construct

Footnote for Table 10 (Cont'd).

Kno811: Knowledge of nutrition and food construct
Adenin: Perceived adequacy of own nutrient intakes which are recommended to increase construct
Adende: Perceived adequacy of own nutrient intakes which are recommended to decrease construct
Adeqwt: Perceived adequacy of own weight construct
Benef: Perceived benefits of using the food label construct
Barrier: Perceived barriers from using the food label construct
Ease: Perceived easiness to understand the food label construct
Conf: Perceived reliability of descriptions on the food label construct
Imdiet: Perceived importance of practicing healthy dietary habits construct
Imsafe: Perceived importance of food safety construct
Imprice: Perceived importance of the price of food construct
Imlast: Perceived importance of how well food keeps construct
Imease: Perceived easiness of the food to prepare construct
Imtast: Perceived importance of the taste of food construct
Awapr: Awareness of diet-disease relationships construct
Attitu: Willingness to learn more about the food label construct
Fluse: Frequency of the food label use construct

(i.e., females are more knowledge about nutrition than males). However, results obtained from knowledge of the amount of nutrient content per servings construct (Kno22) didn't correspond with this criteria.

Significant mean score differences were seen in knowledge of the Food Guide Pyramid construct (Kno1) and awareness of diet-disease relationships construct (Awapr) among age groups. People who were aged 55-89 years old were less knowledgeable about the Food Guide Pyramid (Kno1) than those who were younger than this group (2.1, while others scored 2.4 and higher in 1994; 2.2, while others scored 2.6 in 1995). People who were aged 20-34 years old were less aware of diet-disease relationships (Awapr) than those who were older than this group (5.6, while others scored 5.8 and higher in 1994; 5.7, while others scored 5.9 and higher in 1995). In 1994, a significant mean score difference was seen in knowledge of the amount of nutrient content construct (Kno22) among age groups. People who were aged 55-89 years were less knowledgeable about the amount of nutrient content per servings than those who were younger than this group (1.0, while others scored 1.1 and higher). In 1995, a significant mean score difference was seen in knowledge of nutrition and food construct (Kno811) among age groups. People who were aged 55-89 years were less knowledgeable about nutrition and food than those who were younger than this group (6.7, while others scored 6.8 and higher). Thus, results obtained from knowledge of the Food Guide Pyramid construct (Kno1) and awareness of diet-disease construct closely corresponded with criteria 10 (i.e., there are differences in understanding nutrition knowledge among age groups). Although there were significant differences in knowledge of nutrition and food construct (Kno811) and

from knowledge of the amount of nutrient content per servings construct (Kno22) among the age group, results were not consistent between two years.

Meal planners/preparers were significantly knowledgeable about the Food Guide Pyramid (Kno1) than non-meal planners/preparers (2.4 vs. 2.2 in 1994; 2.6 vs. 2.3 in 1995). They were also significantly more aware of diet-disease relationships (Awapr) than non-meal planners/preparers (6.0 vs. 5.6 in 1994; 6.0 vs. 5.8 in 1995). In 1994 only, meal planners/preparers were significantly more knowledgeable about nutrition and food (Kno811) than non-meal planners/preparers (7.0 vs. 6.7). No significant mean score difference was seen in knowledge of the amount of nutrient content per servings (Kno22) in this group category. Thus, results obtained from the knowledge of the Food Guide Pyramid construct (Kno1) and awareness of diet-disease relationships construct (Awapr) corresponded with criteria 5 (i.e., meal planners/preparers are more knowledgeable about nutrition than non-meal planners/preparers). Although there was a significant difference in knowledge of nutrition and food construct (Kno811) between meal planners and non-planners, results were not consistent between two years. No significant mean score difference in knowledge of the amount of nutrient content per servings construct (Kno22) was seen between meal planners and non-planners.

Higher income respondents were significantly more knowledgeable about nutrition and food (Kno811) than lower income respondents (7.0 vs.6.1 in 1994; 7.1 vs.5.9 in 1995). They were also significantly more aware of diet-disease relationships (Awapr) than lower income respondents (5.9 vs. 5.4 in 1994; 6.0 vs. 5.1 in 1995). No significant mean score differences were seen in knowledge of the Food Guide Pyramid construct (Kno1) nor in knowledge of the amount of nutrient content per servings

construct (Kno22) in this group category. Thus, results obtained from knowledge of nutrition and food construct (Kno811) and from awareness of diet-disease relationships construct (Awapr) corresponded with criteria 6 (i.e., higher-income respondents are more knowledgeable about nutrition than lower-income respondents). However, results btained from knowledge of the Food Guide Pyramid construct (Kno1) nor from knowledge of the amount of nutrient content per servings construct (Kno22) corresponded with this criteria.

People who had a higher educational background had significantly higher mean scores in four knowledge constructs: knowledge of the Food Guide Pyramid construct (Kno1); knowledge of nutrition and food construct (Kno811); knowledge of the amount of nutrient content per servings construct (Kno22); and awareness of diet-disease construct (Awapr). For example, respondents who had more than a high school education were more aware of diet-disease relationships (Awapr) than those who had less than a high school education (6.2 vs. 5.1 in 1994; 6.2 vs. 4.9 in 1995). Respondents who had more than a high school education were more knowledgeable about nutrition and food (Kno811) than those who had less than a high school education (7.3 vs. 5.4 in 1994; 7.4 vs. 4.9 in 1995). Thus, results obtained from four knowledge constructs mentioned above corresponded with criteria 13 (i.e., there are differences in understanding of nutrition knowledge depending on the education level).

Respondents whose family member received food stamps within past 12 months and respondents who were authorized to receive food stamps had significantly lower mean scores in knowledge of nutrition and food construct (Kno811) and awareness of diet-disease relationships construct (Awapr) than those whose family members didn't

receive food stamps and those who were not authorized to receive food stamps. For example, respondents who were authorized to receive food stamps were significantly less knowledgeable about nutrition and food (Kno811) than those who were not authorized to receive food stamps (5.9 vs. 7.0 in 1994 and 1995). No significant mean score differences were seen in knowledge of the Food Guide Pyramid construct (Kno1) nor in knowledge of the amount of nutrient content per servings construct (Kno22) in this group category.

Few significant mean score differences were seen in knowledge constructs between people who were diagnosed with diet-related diseases such as heart disease and high blood pressure and those who were not diagnosed with those diseases. Significant mean score differences were only seen in knowledge of nutrition and food construct (Kno811) and awareness of diet-disease relationships construct (Awapr) between respondents who were diagnosed with high blood cholesterol and those who were not diagnosed with high blood cholesterol. People who were diagnosed with high blood cholesterol were significantly more knowledgeable about nutrition and food than those who were not diagnosed with high blood cholesterol (7.6 vs. 6.8 in 1994; 7.2 vs. 6.8 in 1995). They were significantly more aware of diet-disease relationships than those who were not diagnosed with high blood cholesterol (6.3 vs. 5.8 in 1994; 6.2 vs. 5.8 in 1995).

People who were on a weight loss/low calorie diet were significantly more aware of diet-disease relationships (Awapr) than those who were not on this diet (6.1 vs. 5.8 in 1994; 6.4 vs. 5.8 in 1995). People who were on a low fat/cholesterol diet were significantly more knowledgeable about the Food Guide Pyramid (Kno1) and nutrition and food (Kno811), and were significantly more aware of diet-disease relationships than

those who were not on this diet. For example, they had a significantly lower mean score in knowledge of the Food Guide Pyramid construct (Kno1) than those who were not on this diet (2.6 vs. 2.3 in 1994; 2.7 vs. 2.5 in 1995). Other significant differences in knowledge mean scores based on a presence of special diets were not consistent between the two years.

Smokers were significantly less knowledgeable about nutrition and food (Kno811) and less aware of diet-disease relationships (Awapr) than non-smokers. Smokers had a significantly lower mean score in knowledge about nutrition and food construct (Kno811) than non-smokers (6.4 vs. 7.3 in 1994; 6.4 vs. 7.3 in 1995). They had a significantly less mean score in awareness of diet-disease relationships construct (Awapr) than non-smokers (5.5 vs. 6.0 in 1994; 5.6 vs. 6.2 in 1995). In 1994 only, smokers had a significantly lower mean score in knowledge of the Food Guide Pyramid construct (Kno1) (2.1 vs. 2.4). No significant mean score differences were seen in knowledge of the amount of nutrient content per servings construct (Kno22) in this group category. Thus, results obtained from knowledge of nutrition and food construct (Kno811) and awareness of diet-disease relationships construct (Awapr) corresponded with criteria 15 (i.e., smokers are less knowledgeable about nutrition than non-smokers). However, results obtained from knowledge of the Food Guide Pyramid (Kno1) was not consistent between the two years, and results obtained from knowledge of the amount of nutrient content per servings construct (Kno22) didn't correspond with this criteria.

Mean score in knowledge of nutrition and food construct (Kno811) varied significantly depending on the frequency of exercises. People who rarely or never exercised and those who exercised almost everyday were less knowledgeable about

nutrition and food (Kno811) than those who exercised once or 2-4 times per week. For example, people who rarely or never exercised scored 6.7 in mean score of knowledge of nutrition and food construct (Kno811), while others scored 7.2 and higher in 1995. Other significant mean score differences were not consistent between the two years. However, it seemed that people who rarely or never exercised and those who exercised almost every day were less knowledgeable about nutrition than people who exercised once or 2-4 times per week.

Few significant mean score differences were seen depending on the hour of TV watching. In 1994, a significant difference was seen in mean score of knowledge of nutrition and food construct (Kno811). People who watched TV more than 11 hours were least knowledgeable about nutrition and food compared to others (5.5, while others scored 6.6 and higher). In 1995, significant difference was seen in mean score of awareness of diet-disease relationships construct (Awapr). People who watched TV more than 11 hours were least aware of diet-disease relationships compared to others (5.1, while others scored 5.6 and higher).

Mean scores in knowledge of the Food Guide Pyramid construct (Kno1) and knowledge of nutrition and food construct (Kno811) varied depending on the frequency of vitamin supplement use. For example, people who took vitamin supplements every day or almost every day were more knowledgeable about the Food Guide Pyramid than those who didn't take supplements at all (2.5 vs. 2.2 in 1994; 2.6 vs. 2.2 in 1995, respectively). Other significant mean score differences were not consistent between the two years (Table 11 for DHKS 1994; Table 12 for DHKS 1995).

4.3.2.2.2. Attitude constructs.

4.3.2.2.2.1. Perceived benefits of using the food label construct (Benef)

People who were on a weight loss/low calorie diet perceived benefits of using the food label significantly more than those who were not on this diet (16.1 vs. 15.3 in 1994; 17.2 vs. 15.3 in 1995). The same trends were seen between people who were on a low fat/cholesterol diet and those who were not on a low fat/cholesterol diet (16.7 vs. 15.2 in 1994; 17.2 vs. 15.2 in 1995) and between people who were on a high fiber diet and those who were not on a high fiber diet (17.7 vs. 15.4 in 1994; 17.1 vs. 15.4 in 1995). The mean score of perceived benefits of using the food label construct also differed significantly depending on the frequency of vitamin supplement use. People who used vitamin supplements every day or almost every day perceived benefits of using the food label more than those who didn't use vitamin supplements at all (15.9 vs. 15.1 in 1994; 16.1 vs. 14.9 in 1995).

In 1994, respondents whose family member received food stamps within the past 12 months perceived benefits of using the food label significantly less than those whose family member didn't receive food stamps within past 12 months (14.6 vs. 15.5). In 1995, females had a significantly higher mean score of perceived benefits of using the food label construct than males (15.8 vs. 14.9). Meal planners/preparers perceived benefits of using the food label significantly more than non-meal planners/preparers (15.7 vs. 15.0). Lower-income respondents perceived benefits of using the food label significantly less than higher income-respondents (14.8 vs. 15.5) (Table 11 for DHKS 1994; Table 12 for DHKS 1995).

Table 11. Weighted mean scores of each construct/question item of DHKS 1994

Variables	Knowledge constructs				Attitude constructs				
	Kno1[1]	Kno811[2]	Kno22[3]	Awapr[4]	Attitu[5]	Benef[6]	Barrier[7]	Ease[8]	Imdiet[9]
Demographic variables									
Gender									
Male	2.2±0.1	6.8±0.2	1.1±0.1	5.6±0.1	3.2±0.1	15.4±0.2	4.8±0.1	14.7±0.2	39.5±0.4
Female	2.5±0.1	7.0±0.2	1.2±0.0	6.1±0.1	3.3±0.1	15.4±0.2	4.8±0.1	14.8±0.2	42.1±0.2
p<0.05	*	*		*					*
Age (yrs)									
20-34	2.5±0.1	6.9±0.2	1.3±0.1	5.6±0.1	3.3±0.1	15.5±0.2	5.0±0.1	15.2±0.3	39.3±0.5
35-54	2.4±0.1	6.9±0.2	1.1±0.0	6.0±0.1	3.3±0.1	15.4±0.2	4.8±0.1	14.8±0.2	41.1±0.2
55-89	2.1±0.1	6.9±0.1	1.0±0.1	5.8±0.1	3.3±0.1	15.2±0.2	4.5±0.1	14.1±0.2	42.0±0.3
90+	1.5±0.4	5.5±0.6	0.7±0.4	4.4±0.7	2.7±0.3	17.0±0.0	3.9±0.5	11.6±2.0	41.5±2.1
p<0.05	*		*	*		*	*		*
Race									
White	2.5±0.0	7.2±0.1	1.1±0.0	5.9±0.1	3.3±0.0	15.5±0.1	4.7±0.1	14.8±0.1	40.9±0.3
Black	1.9±0.3	5.5±0.5	1.1±0.1	5.4±0.1	3.2±0.2	14.4±0.4	5.1±0.2	14.4±0.6	40.2±0.7
Asian, Pacific Islander	1.9±0.5	6.0±0.3	1.2±0.2	6.1±0.2	3.6±0.1	16.9±0.8	4.8±0.5	15.0±0.9	42.0±1.0
American Indian	2.7±0.5	7.2±0.4	1.2±0.4	5.7±0.4	3.0±0.3	14.3±0.7	4.4±0.6	17.2±0.6	41.2±0.8
Others	1.8±0.2	5.3±0.4	1.1±0.2	5.5±0.2	3.6±0.1	16.1±0.7	4.8±0.3	14.1±0.6	40.8±0.7
p<0.05	*	*		*				*	

Table 11. Weighted mean scores of each construct/question item of DHKS 1994 (Cont'd)

Variables	Knowledge constructs				Attitude constructs				
	Kno1[1]	Kno811[2]	Kno22[3]	Awapr[4]	Attitu[5]	Benef[6]	Barrier[7]	Ease[8]	Imdiet[9]
Demographic variables (Cont'd)									
Meal planner/preparer									
Yes	2.4±0.1	7.0±0.1	1.2±0.0	6.0±0.1	3.3±0.1	15.5±0.1	4.9±0.1	15.0±0.2	41.7±0.3
No	2.2±0.1	6.7±0.2	1.1±0.1	5.6±0.1	3.3±0.1	15.3±0.2	4.6±0.1	14.3±0.2	39.5±0.5
p<0.05	*	*		*			*	*	*
Region									
Northeast	2.2±0.1	6.9±0.2	1.2±0.1	5.8±0.12	3.4±0.1	15.5±0.3	4.6±0.1	14.8±0.2	40.8±0.9
Midwest	2.5±0.1	7.1±0.1	1.1±0.1	5.7±0.1	3.3±0.1	15.5±0.2	4.7±0.1	15.1±0.3	40.2±0.7
South	2.4±0.2	6.6±0.4	1.1±0.0	5.9±0.1	3.3±0.1	15.2±0.2	4.7±0.1	14.3±0.3	41.1±0.3
West	2.3±0.1	7.0±0.2	1.2±0.1	5.9±0.14	3.2±0.0	15.5±0.2	5.0±0.2	15.0±0.1	41.4±0.3
p<0.05									
Urbanization									
MSA[a] central city (cc)	2.2±0.1	6.6±0.2	1.1±0.1	5.8±0.1	3.3±0.1	15.3±0.3	4.9±0.1	14.7±0.3	41.4±0.3
MSA , outside cc	2.4±0.1	7.1±0.1	1.2±0.0	5.9±0.1	3.3±0.0	15.7±0.2	4.7±0.1	14.7±0.1	40.1±0.5
Non-MSA	2.4±0.1	7.1±0.2	1.0±0.1	5.7±0.2	3.2±0.0	15.0±0.1	4.6±0.2	15.1±0.2	40.8±0.5
p<0.05		*				*			

Table 11. Weighted mean scores of each construct/question item of DHKS 1994 (Cont'd)

Variables	Knowledge constructs				Attitude constructs				
	Kno1[1]	Kno811[2]	Kno22[3]	Awapr[4]	Attitu[5]	Benef[6]	Barrier[7]	Ease[8]	Imdiet[9]
Demographic variables (Cont'd)									
Pregnancy status									
Pregnant	3.2±0.5	5.9±0.6	0.9±0.2	5.4±0.5	3.5±0.2	15.2±0.5	4.7±0.7	14.7±1.1	43.2±1.2
Lactating	1.9±0.4	7.1±0.5	1.3±0.8	4.8±1.5	3.4±0.3	16.3±0.8	5.0±0.8	15.8±2.2	40.6±1.7
Not pregnant/lactating	2.6±0.1	7.1±0.2	1.1±0.0	6.1±0.1	3.3±0.1	15.6±0.2	4.9±0.1	15.1±0.2	41.8±0.3
Not female 10-55 yrs	2.2±0.1	6.8±0.2	1.1±0.0	5.7±0.1	3.2±0.0	15.3±0.2	4.7±0.1	14.5±0.2	40.3±0.4
$p<0.05$	*			*					*
Socioeconomic variables									
Income									
<130% poverty threshold	2.3±0.1	6.1±0.2	1.2±0.1	5.4±0.1	3.4±0.0	15.3±0.2	4.6±0.1	14.6±0.2	40.9±0.4
≥130% poverty threshold	2.4±0.1	7.0±0.2	1.1±0.0	5.9±0.1	3.3±0.1	15.4±0.1	4.8±0.1	14.8±0.1	40.9±0.3
$p<0.05$		*		*	*				
Education (yrs)									
≤ 8	2.0±0.1	5.4±0.2	0.8±0.1	5.1±0.1	3.6±0.1	15.4±0.4	3.9±0.2	13.3±0.5	40.9±0.6
9-12	2.3±0.1	6.7±0.2	1.1±0.0	5.6±0.1	3.3±0.1	15.1±0.2	4.5±0.1	14.7±0.2	40.5±0.5
≥ 13	2.5±0.1	7.3±0.1	1.2±0.0	6.2±0.1	3.2±0.1	15.6±0.2	5.0±0.1	15.0±0.1	41.1±0.3
$p<0.05$	*	*	*	*	*		*		

Table 11. Weighted mean scores of each construct/question item of DHKS 1994 (Cont'd)

Variables	Knowledge constructs				Attitude constructs				
	Kno1[1]	Kno811[2]	Kno22[3]	Awapr[4]	Attitu[5]	Benef[6]	Barrier[7]	Ease[8]	Imdiet[9]
Socioeconomic variables (Cont'd)									
WIC									
Yes	2.2±0.6	4.9±1.2	1.2±0.3	4.5±0.7	3.9±0.1	15.9±1.3	3.0±0.4	13.3±1.5	41.7±1.9
No	2.4±0.1	6.9±0.1	1.1±0.0	5.8±0.1	3.3±0.0	15.4±0.1	4.8±0.1	14.8±0.1	40.9±0.3
p<0.05					*		*		
Received food stamps (Past 12 months)									
Yes	2.2±0.1	5.9±0.2	1.2±0.2	5.1±0.2	3.3±0.1	14.6±0.3	4.3±0.2	14.8±0.4	39.9±0.9
No	2.4±0.1	7.0±0.2	1.1±0.0	5.9±0.1	3.3±0.0	15.5±0.1	4.8±0.1	14.8±0.1	41.0±0.3
p<0.05		*		*		*	*		
Authorized to receive food stamps (present)									
Yes	2.2±0.1	5.9±0.2	1.1±0.2	5.1±0.1	3.3±0.1	14.7±0.3	4.3±0.2	14.2±0.4	40.9±0.5
No	2.4±0.1	6.9±0.2	1.1±0.0	5.9±0.1	3.3±0.0	15.4±0.1	4.8±0.1	14.8±0.1	40.9±0.3
p<0.05		*		*			*		

Table 11. Weighted mean scores of each construct/question item of DHKS 1994 (Cont'd)

Variables	Knowledge constructs				Attitude constructs				
	Kno1[1]	Kno811[2]	Kno22[3]	Awapr[4]	Attitu[5]	Benef[6]	Barrier[7]	Ease[8]	Imdiet[9]
Health indicators									
Diagnosed diabetes									
Yes	2.2±0.1	6.6±0.2	1.1±0.1	5.9±0.14	3.3±0.1	15.4±0.4	4.4±0.2	14.7±0.5	42.2±0.4
No	2.4±0.1	6.9±0.2	1.1±0.0	5.8±0.1	3.3±0.0	15.4±0.1	4.8±0.1	14.8±0.1	40.8±0.3
p<0.05									*
Diagnosed high blood pressure									
Yes	2.3±0.1	6.9±0.1	1.1±0.1	5.9±0.1	3.3±0.1	15.0±0.3	4.5±0.1	14.2±0.2	41.1±0.6
No	2.4±0.1	6.9±0.2	1.1±0.0	5.8±0.1	3.3±0.1	15.5±0.1	4.8±0.1	14.9±0.2	40.8±0.3
p<0.05							*	*	
Diagnosed heart disease									
Yes	2.2±0.1	6.5±0.3	1.1±0.1	5.7±0.1	3.2±0.1	15.6±0.3	4.2±0.2	13.6±0.4	41.0±1.4
No	2.4±0.1	6.9±0.1	1.1±0.0	5.9±0.1	3.3±0.0	15.4±0.1	4.8±0.1	14.9±0.1	40.9±0.3
p<0.05							*	*	
Diagnosed cancer									
Yes	2.3±0.1	7.3±0.2	1.1±0.1	6.0±0.1	3.2±0.1	15.6±0.3	4.6±0.2	14.7±0.4	41.3±0.5
No	2.4±0.1	6.9±0.2	1.1±0.0	5.8±0.1	3.3±0.0	15.4±0.1	4.8±0.1	14.8±0.1	40.8±0.3
p<0.05									

Table 11. Weighted mean scores of each construct/question item of DHKS 1994 (Cont'd)

Variables	Knowledge constructs				Attitude constructs				
	Kno1[1]	Kno811[2]	Kno22[3]	Awapr[4]	Attitu[5]	Benef[6]	Barrier[7]	Ease[8]	Imdiet[9]
Health indicators (Cont'd)									
Diagnosed osteoporosis									
Yes	2.5±0.2	7.4±0.2	1.0±0.1	6.0±0.3	3.3±0.2	15.2±0.5	4.1±0.2	13.3±0.6	41.9±1.0
No	2.4±0.1	6.9±0.1	1.1±0.0	5.8±0.1	3.3±0.0	15.4±0.1	4.8±0.1	14.8±0.1	40.8±0.3
p<0.05		*					*	*	
Diagnosed high blood cholesterol									
Yes	2.2±0.1	7.6±0.2	1.2±0.1	6.3±0.1	3.3±0.1	15.7±0.3	4.7±0.1	14.3±0.3	42.2±0.4
No	2.4±0.1	6.8±0.2	1.1±0.0	5.8±0.1	3.3±0.1	15.3±0.1	4.8±0.1	14.8±0.1	40.6±0.3
p<0.05		*		*					*
Diagnosed stroke									
Yes	1.6±0.2	5.8±0.6	1.0±0.2	5.1±0.3	3.1±0.2	15.4±0.7	3.4±0.3	12.0±0.7	41.5±1.1
No	2.4±0.1	6.9±0.1	1.1±0.0	5.9±0.1	3.3±0.0	15.4±0.1	4.8±0.1	14.8±0.1	40.9±0.3
p<0.05	*	*		*			*	*	
Weight loss/low calorie diet									
Yes	2.5±0.1	7.2±0.2	1.1±0.1	6.1±0.1	3.6±0.1	16.1±0.4	5.1±0.2	15.8±0.4	42.4±0.4
No	2.3±0.1	6.9±0.2	1.1±0.0	5.8±0.1	3.3±0.1	15.3±0.1	4.7±0.1	14.7±0.1	40.7±0.3
p<0.05				*	*	*		*	*

Table 11. Weighted mean scores of each construct/question item of DHKS 1994 (Cont'd)

Variables	Knowledge constructs				Attitude constructs				
	Kno1[1]	Kno811[2]	Kno22[3]	Awapr[4]	Attitu[5]	Benef[6]	Barrier[7]	Ease[8]	Imdiet[9]
Health indicators (Cont'd)									
Low fat/cholesterol diet									
Yes	2.6±0.1	7.5±0.2	1.2±0.1	6.1±0.1	3.4±0.1	16.7±0.2	4.9±0.1	14.9±0.3	43.2±0.4
No	2.3±0.1	6.8±0.2	1.1±0.0	5.8±0.1	3.3±0.1	15.2±0.1	4.7±0.1	14.8±0.1	40.6±0.3
p<0.05	*	*		*		*			*
Low salt/sodium diet									
Yes	2.4±0.2	7.1±0.3	1.1±0.1	6.1±0.2	3.5±0.1	16.2±0.4	4.7±0.2	14.0±0.4	42.9±0.4
No	2.4±0.1	6.9±0.2	1.1±0.0	5.8±0.1	3.3±0.0	15.4±0.1	4.8±0.1	14.8±0.1	40.8±0.3
p<0.05					*				*
High fiber diet									
Yes	2.6±0.3	6.9±0.4	0.8±0.2	6.2±0.3	3.5±0.1	17.7±0.4	5.1±0.2	15.4±0.5	43.8±0.5
No	2.3±0.1	6.9±0.2	1.1±0.0	5.8±0.1	3.3±0.0	15.4±0.1	4.8±0.1	14.8±0.1	40.8±0.3
p<0.05			*			*			*
Diabetic diet									
Yes	2.5±0.2	6.7±0.2	0.9±0.2	5.8±0.3	3.3±0.2	15.3±0.9	4.3±0.3	14.4±0.7	42.5±0.7
No	2.4±0.1	6.9±0.2	1.1±0.0	5.8±0.1	3.3±0.0	15.4±0.1	4.8±0.1	14.8±0.1	40.8±0.3
p<0.05									

Table 11. Weighted mean scores of each construct/question item of DHKS 1994 (Cont'd)

Variables	Knowledge constructs				Attitude constructs				
	Kno1[1]	Kno811[2]	Kno22[3]	Awapr[4]	Attitu[5]	Benef[6]	Barrier[7]	Ease[8]	Imdiet[9]
Lifestyle factors									
Smoking status									
Yes	2.1±0.1	6.4±0.3	1.0±0.1	5.5±0.1	3.3±0.1	14.9±0.2	4.8±0.1	15.0±0.3	38.9±0.8
No	2.4±0.1	7.3±0.1	1.2±0.1	6.0±0.1	3.2±0.1	15.4±0.2	4.7±0.1	14.4±0.2	41.7±0.2
p<0.05	*	*		*					*
Exercise									
Rarely or never	2.3±0.1	6.6±0.2	1.0±0.0	5.8±0.1	3.2±0.1	15.0±0.2	4.6±0.1	14.6±0.2	40.7±0.4
Once in a week	2.5±0.1	7.4±0.2	1.2±0.1	5.9±0.2	3.4±0.1	15.8±0.4	4.8±0.2	14.7±0.4	40.0±0.4
2-4 times in a week	2.4±0.1	7.2±0.2	1.2±0.1	5.9±0.1	3.3±0.1	15.8±0.2	5.0±0.1	15.0±0.3	41.5±0.5
Almost everyday	2.3±0.1	6.9±0.1	1.2±0.1	5.8±0.1	3.3±0.1	15.5±0.2	4.8±0.1	14.9±0.3	40.8±0.4
p<0.05		*	*			*			
Hours of TV watching (hrs)									
0	2.2±0.2	6.6±0.3	1.1±0.1	6.0±0.1	3.3±0.1	15.5±0.4	5.0±0.2	14.8±0.5	41.2±0.6
1	2.6±0.1	6.9±0.2	1.1±0.1	6.0±0.1	3.3±0.1	15.7±0.3	5.0±0.1	14.9±0.2	41.7±0.2
2	2.3±0.1	7.1±0.2	1.1±0.1	6.0±0.1	3.2±0.1	15.4±0.2	4.7±0.1	14.6±0.3	40.7±0.4
3	2.4±0.1	7.1±0.1	1.2±0.1	5.8±0.1	3.3±0.1	15.3±0.3	4.5±0.1	14.5±0.3	40.5±0.5
4-10	2.3±0.1	7.0±0.1	1.1±0.1	5.7±0.1	3.3±0.1	15.2±0.2	4.6±0.1	14.8±0.3	40.5±0.5
11-24	2.1±0.3	5.5±0.4	1.8±0.7	4.8±0.7	3.1±0.2	14.5±0.7	4.2±0.3	16.5±1.0	37.6±2.5
p<0.05		*					*		*

Table 11. Weighted mean scores of each construct/question item of DHKS 1994 (Cont'd)

Variables	Knowledge constructs				Attitude constructs				
	Kno1[1]	Kno811[2]	Kno22[3]	Awapr [4]	Attitu[5]	Benef[6]	Barrier[7]	Ease[8]	Imdiet[9]
Lifestyle factors (Cont'd)									
Vitamin supplement									
Not at all	2.2±0.1	6.7±0.2	1.1±0.1	5.7±0.1	3.2±0.1	15.1±0.2	4.7±0.1	14.5±0.2	40.4±0.4
Every so often	2.6±0.1	6.9±0.2	1.3±0.1	6.0±0.1	3.3±0.1	15.2±0.3	4.8±0.1	14.8±0.2	40.4±0.5
Everyday or almost everyday	2.5±0.1	7.2±0.1	1.1±0.1	6.0±0.1	3.3±0.0	15.9±0.2	4.8±0.1	15.1±0.2	41.8±0.4
$p<0.05$	*	*				*			*

Table 11. Weighted mean scores of each construct/question item of DHKS 1994 (Cont'd)

Variables	Attitude constructs					FL
	Imsafe[10]	Impric[11]	Imlast[12]	Imease[13]	Imtast[14]	Fluse[15]
Demographic variables						
Gender						
Male	3.7±0.0	3.2±0.1	3.3±0.0	3.0±0.0	3.8±0.0	35.7±0.5
Female	3.9±0.0	3.3±0.0	3.5±0.0	3.1±0.0	3.9±0.0	38.9±0.3
p<0.05	*	*	*	*	*	*
Age (yrs)						
20-34	3.7±0.1	3.3±0.1	3.4±0.1	3.1±0.0	3.8±0.0	36.3±0.6
35-54	3.8±0.0	3.2±0.0	3.4±0.0	3.1±0.0	3.8±0.0	37.5±0.5
55-89	3.8±0.0	3.2±0.1	3.6±0.0	3.0±0.0	3.8±0.0	38.8±0.5
90+	3.6±0.3	3.2±0.3	3.2±0.4	3.0±0.2	3.9±0.1	28.7±4.8
p<0.05			*			*
Race						
White	3.8±0.0	3.2±0.0	3.4±0.0	3.0±0.0	3.8±0.0	37.7±0.3
Black	3.9±0.0	3.4±0.1	3.8±0.1	3.3±0.1	3.9±0.0	35.4±1.4
Asian, Pacific Islander	3.9±0.1	3.3±0.2	3.5±0.1	3.0±0.2	3.7±0.1	39.1±2.0
American Indian	4.0±0.0	3.5±0.2	3.8±0.2	2.5±0.2	3.5±0.2	35.5±3.3
Others	3.8±0.1	3.4±0.2	3.5±0.1	3.1±0.2	3.7±0.1	36.8±1.7
p<0.05	*	*	*	*		

Table 11. Weighted mean scores of each construct/question item of DHKS 1994 (Cont'd)

Variables	Attitude constructs					FL
	Imsafe[10]	Impric[11]	Imlast[12]	Imease[13]	Imtast[14]	Fluse[15]
Demographic variables (Cont'd)						
Meal planner/preparer						
Yes	3.8±0.0	3.3±0.0	3.5±0.0	3.1±0.0	3.8±0.0	38.4±0.3
No	3.7±0.0	3.2±0.1	3.4±0.1	3.0±0.0	3.8±0.0	35.5±0.6
p<0.05	*		*		*	*
Region						
Northeast	3.8±0.0	3.1±0.1	3.4±0.1	2.9±0.1	3.8±0.0	39.1±0.5
Midwest	3.7±0.1	3.3±0.1	3.5±0.0	3.1±0.1	3.8±0.0	37.5±0.9
South	3.9±0.0	3.3±0.1	3.5±0.1	3.2±0.0	3.8±0.0	36.6±0.4
West	3.8±0.0	3.2±0.1	3.3±0.1	3.0±0.1	3.8±0.0	37.3±0.5
p<0.05	*			*		*
Urbanization						
MSA[a] central city (cc)	3.8±0.0	3.3±0.1	3.5±0.1	3.1±0.1	3.8±0.0	37.5±0.6
MSA , outside cc	3.8±0.0	3.2±0.1	3.4±0.0	3.0±0.0	3.8±0.0	37.8±0.4
Non-MSA	3.8±0.0	3.3±0.1	3.4±0.1	3.0±0.1	3.8±0.0	36.7±0.6
p<0.05						

Table 11. Weighted mean scores of each construct/question item of DHKS 1994 (Cont'd)

Variables	Attitude constructs					FL
	Imsafe[10]	Impric[11]	Imlast[12]	Imease[13]	Imtast[14]	Fluse[15]
Demographic variables (Cont'd)						
Pregnancy status						
Pregnant	3.7±0.1	3.3±0.2	3.4±0.2	3.3±0.1	4.0±0.0	33.8±3.5
Lactating	3.8±0.2	3.1±0.5	3.3±0.3	3.3±0.4	4.0±0.0	36.4±4.0
Not pregnant/lactating	3.9±0.0	3.3±0.1	3.5±0.1	3.1±0.0	3.9±0.0	38.8±0.4
Not female 10-55 yrs	3.8±0.0	3.2±0.0	3.4±0.0	3.0±0.0	3.8±0.0	36.7±0.4
$p<0.05$					*	*
Socioeconomic variables						
Income						
<130% poverty threshold	3.9±0.0	3.5±0.1	3.6±0.0	3.1±0.1	3.8±0.0	36.5±0.6
≥130% poverty threshold	3.8±0.0	3.2±0.0	3.4±0.0	3.0±0.0	3.8±0.0	37.6±0.3
$p<0.05$		*	*			
Education (yrs)						
≤ 8	3.9±0.0	3.5±0.1	3.7±0.1	3.3±0.1	3.8±0.0	35.2±1.1
9-12	3.8±0.0	3.3±0.0	3.6±0.0	3.0±0.0	3.8±0.0	36.8±0.6
≥ 13	3.8±0.0	3.2±0.0	3.3±0.1	3.0±0.0	3.8±0.0	38.1±0.3
$p<0.05$		*	*	*		*

Table 11. Weighted mean scores of each construct/question item of DHKS 1994 (Cont'd)

Variables	Attitude constructs					FL
	Imsafe[10]	Impric[11]	Imlast[12]	Imease[13]	Imtast[14]	Fluse[15]
WIC						
Yes	4.0±0.0	3.6±0.2	4.0±0.0	3.6±0.2	4.0±0.0	33.6±2.1
No	3.8±0.0	3.2±0.0	3.4±0.0	3.1±0.0	3.8±0.0	37.5±0.3
p<0.05	*		*	*	*	
Received food stamps (Past 12 months)						
Yes	3.8±0.0	3.5±0.1	3.6±0.1	3.0±0.1	3.9±0.0	34.9±1.7
No	3.8±0.0	3.2±0.0	3.4±0.0	3.1±0.0	3.8±0.0	37.7±0.3
p<0.05		*	*		*	
Authorized to receive food stamps (present)						
Yes	3.8±0.1	3.6±0.1	3.7±0.1	3.1±0.1	3.9±0.0	35.4±0.9
No	3.8±0.0	3.2±0.0	3.4±0.0	3.1±0.0	3.8±0.0	37.5±0.3
p<0.05		*	*			*

Table 11. Weighted mean scores of each construct/question item of DHKS 1994 (Cont'd)

Variables	Attitude constructs					FL
	Imsafe[10]	Impric[11]	Imlast[12]	Imease[13]	Imtast[14]	Fluse[15]
Health indicators						
Diagnosed diabetes						
Yes	3.8±0.1	3.4±0.1	3.5±0.1	3.2±0.1	3.8±0.0	39.2±0.9
No	3.8±0.0	3.2±0.0	3.4±0.0	3.0±0.0	3.8±0.0	37.4±0.3
p<0.05				*		
Diagnosed high blood pressure						
Yes	3.8±0.1	3.3±0.1	3.5±0.1	3.1±0.1	3.8±0.0	37.8±0.5
No	3.8±0.0	3.2±0.0	3.4±0.0	3.1±0.0	3.8±0.0	37.4±0.3
p<0.05						
Diagnosed heart disease						
Yes	3.7±0.1	3.3±0.1	3.6±0.1	3.1±0.1	3.8±0.0	38.1±1.0
No	3.8±0.0	3.2±0.0	3.4±0.0	3.1±0.0	3.8±0.0	37.4±0.3
p<0.05			*			
Diagnosed cancer						
Yes	3.9±0.0	3.1±0.1	3.5±0.1	2.9±0.1	3.8±0.1	39.0±0.9
No	3.8±0.0	3.3±0.0	3.4±0.0	3.1±0.0	3.8±0.0	37.4±0.3
p<0.05	*					

Table 11. Weighted mean scores of each construct/question item of DHKS 1994 (Cont'd)

Variables	Attitude constructs					FL
	Imsafe[10]	Impric[11]	Imlast[12]	Imease[13]	Imtast[14]	Fluse[15]
Health indicators (Cont'd)						
Diagnosed osteoporosis						
Yes	3.9±0.1	3.3±0.1	3.7±0.1	3.2±0.1	3.8±0.1	37.2±1.6
No	3.8±0.0	3.2±0.0	3.4±0.0	3.1±0.0	3.8±0.0	37.5±0.3
p<0.05	*		*			
Diagnosed high blood cholesterol						
Yes	3.9±0.0	3.2±0.1	3.4±0.1	3.0±0.1	3.8±0.0	40.3±0.5
No	3.8±0.0	3.2±0.0	3.4±0.0	3.1±0.0	3.8±0.0	37.0±0.3
p<0.05	*					*
Diagnosed stroke						
Yes	3.9±0.1	3.5±0.1	3.7±0.1	3.3±0.1	3.8±0.1	34.9±2.1
No	3.8±0.0	3.2±0.0	3.4±0.0	3.1±0.0	3.8±0.0	37.5±0.3
p<0.05		*	*	*		
Weight loss/low calorie diet						
Yes	3.9±0.1	3.2±0.1	3.5±0.1	3.0±0.1	3.9±0.0	40.1±0.6
No	3.8±0.0	3.3±0.0	3.4±0.0	3.1±0.0	3.8±0.0	37.2±0.3
p<0.05						*

Table 11. Weighted mean scores of each construct/question item of DHKS 1994 (Cont'd)

Variables	Attitude constructs					FL
	Imsafe[10]	Impric[11]	Imlast[12]	Imease[13]	Imtast[14]	Fluse[15]
Health indicators (Cont'd)						
Low fat/cholesterol diet						
Yes	3.9±0.0	3.2±0.1	3.5±0.1	3.1±0.1	3.8±0.0	42.2±0.5
No	3.8±0.0	3.3±0.0	3.4±0.0	3.1±0.0	3.8±0.0	36.9±0.3
p<0.05						*
Low salt/sodium diet						
Yes	3.8±0.1	3.3±0.1	3.6±0.1	2.9±0.1	3.8±0.1	42.0±0.9
No	3.8±0.0	3.2±0.0	3.4±0.0	3.1±0.0	3.8±0.0	37.3±0.3
p<0.05						*
High fiber diet						
Yes	3.8±0.1	3.3±0.1	3.6±0.1	3.1±0.1	3.9±0.1	42.8±0.9
No	3.8±0.0	3.2±0.0	3.4±0.0	3.1±0.0	3.8±0.0	37.4±0.3
p<0.05						*
Diabetic diet						
Yes	4.0±0.0	3.3±0.2	3.7±0.1	3.2±0.1	3.7±0.1	39.8±1.5
No	3.8±0.0	3.2±0.0	3.4±0.0	3.1±0.0	3.8±0.0	37.4±0.3
p<0.05	*		*			

Table 11. Weighted mean scores of each construct/question item of DHKS 1994 (Cont'd)

Variables	Attitude constructs					FL
	Imsafe[10]	Impric[11]	Imlast[12]	Imease[13]	Imtast[14]	Fluse[15]
Lifestyle factors						
Smoking status						
Yes	3.8±0.1	3.3±0.1	3.4±0.1	3.0±0.1	3.9±0.0	35.8±0.7
No	3.8±0.0	3.2±0.1	3.4±0.0	3.0±0.1	3.8±0.0	37.9±0.4
p<0.05					*	*
Exercise						
Rarely or never	3.8±0.0	3.3±0.0	3.5±0.0	3.1±0.0	3.8±0.0	36.6±0.5
Once in a week	3.7±0.1	3.3±0.1	3.4±0.1	2.9±0.1	3.8±0.1	37.2±1.0
2-4 times in a week	3.8±0.0	3.2±0.1	3.3±0.1	3.1±0.0	3.8±0.0	38.2±0.7
Almost everyday	3.8±0.0	3.1±0.1	3.4±0.1	3.0±0.1	3.8±0.0	38.1±0.6
p<0.05		*	*	*		
Hours of TV watching (hrs)						
0	3.8±0.1	3.3±0.1	3.3±0.1	3.0±0.1	3.8±0.0	37.9±0.8
1	3.8±0.0	3.2±0.1	3.4±0.1	3.0±0.1	3.7±0.0	38.0±0.8
2	3.8±0.0	3.2±0.1	3.4±0.0	3.1±0.1	3.8±0.0	36.6±0.6
3	3.8±0.0	3.2±0.1	3.4±0.1	3.1±0.1	3.8±0.0	37.7±0.7
4-10	3.8±0.0	3.3±0.1	3.6±0.1	3.1±0.0	3.8±0.0	37.7±0.5
11-24	3.8±0.1	3.7±0.1	3.9±0.1	3.1±0.2	4.0±0.0	31.9±4.2
p<0.05		*	*		*	

Table 11. Weighted mean scores of each construct/question item of DHKS 1994 (Cont'd)

Variables	Attitude constructs					FL
	Imsafe[10]	Impric[11]	Imlast[12]	Imease[13]	Imtast[14]	Fluse[15]
Lifestyle factors (Cont'd)						
Vitamin supplement						
Not at all	3.8±0.0	3.2±0.1	3.4±0.0	3.0±0.0	3.8±0.0	36.6±0.4
Every so often	3.8±0.0	3.3±0.1	3.4±0.1	3.1±0.1	3.8±0.0	36.1±1.0
Everyday or almost everyday	3.8±0.0	3.2±0.1	3.5±0.1	3.1±0.0	3.8±0.0	39.3±0.4
$p<0.05$						*

1 Kno1 = sum of mean scores (0-5) of knowledge questions regarding the Food Group Pyramid

[2] Kno811 = sum of mean scores (0-10) of knowledge questions regarding nutrition and food

[3] Kno22 = sum of mean scores (0-5) of knowledge questions regarding the amount of nutrient content per servings

[4]Awapr = sum of mean scores (0-7) of awareness questions regarding diet-disease relationships

[5] Attitu = sum of mean scores of (1-4) attitude questions regarding willingness of learning more about the food label

[6] Benef = sum of mean scores (5-20) of questions regarding perceived benefits of using the food label

[7] Barrier = sum of mean scores (2-8) of questions regarding perceived barriers from using the food label

[8] Ease = sum of mean scores (7-21) of questions regarding perceived easiness to understand the food label

[9] Imdiet = sum of mean scores (12-48) of questions regarding perceived importance of practicing healthy dietary habits

[10] Imsafe = sum of mean scores of questions regarding perceived importance of food safety

[11] Impric = sum of mean scores of questions regarding the price of food

[12] Imlast = sum of mean scores of questions regrading how well food keeps

Footnote for Table 11 (Cont'd)

[13] Imease = sum of mean scores of questions regarding easeiness to understand the food label

[14] Imtast = sum of mean scores of attitude questions regarding the taste of food

[15] Fluse = sum of mean scores (13-52) of questions regarding to the food label use

[a]Metropolitan Statistical Area

Table 12. Weighted mean scores of each construct/question item of DHKS 1995

Variables	Knowledge constructs				Attitude constructs				
	Kno1[1]	Kno811[2]	Kno22[3]	Awapr[4]	Attitu[5]	Benef[6]	Barrier[7]	Ease[8]	Imdiet[9]
Demographic variables									
Gender									
Male	2.2±0.1	6.7±0.1	1.1±0.1	5.7±0.1	3.1±0.1	14.9±0.2	5.0±0.1	14.9±0.3	39.3±0.3
Female	2.7±0.1	7.0±0.1	1.1±0.1	6.0±0.1	3.3±0.0	15.8±0.2	5.0±0.1	15.0±0.2	41.7±0.3
p<0.05	*	*		*	*	*			*
Age (yrs)									
20-34	2.6±0.1	6.8±0.1	1.1±0.1	5.7±0.1	3.2±0.1	15.1±0.3	5.0±0.1	15.0±0.4	39.0±0.5
35-54	2.6±0.1	7.1±0.1	1.1±0.1	6.0±0.1	3.2±0.0	15.6±0.2	5.0±0.1	15.3±0.2	40.8±0.2
55-89	2.2±0.1	6.7±0.1	1.0±0.1	5.9±0.1	3.2±0.0	15.5±0.2	4.8±0.1	14.4±0.2	41.8±0.3
90+	1.4±0.2	5.0±0.6	0.9±0.3	4.8±0.5	3.4±0.2	17.3±0.4	5.6±0.7	14.3±2.1	41.8±2.5
p<0.05	*	*		*		*		*	*
Race									
White	2.5±0.1	7.1±0.1	1.1±0.0	5.9±0.1	3.2±0.0	15.4±0.2	5.0±0.1	15.1±0.2	40.6±0.2
Black	2.3±0.1	5.7±0.2	1.2±0.1	5.6±0.2	3.5±0.1	14.8±0.5	4.8±0.2	14.4±0.6	40.5±0.6
Asian, Pacific Islander	2.7±0.3	6.0±0.5	1.2±0.5	5.5±0.4	3.3±0.2	15.9±0.8	4.1±0.5	12.7±1.3	38.1±1.4
American Indian	2.7±0.2	7.5±0.4	1.2±0.3	4.5±1.0	3.5±0.3	15.4±1.3	4.4±0.3	16.9±1.9	41.2±1.2
Others	2.5±0.2	5.8±0.3	1.0±0.3	5.8±0.1	3.6±0.1	15.9±0.5	4.9±0.3	14.5±0.8	41.7±0.7
p<0.05		*			*		*		

Table 12. Weighted mean scores of each construct/question item of DHKS 1995 (Cont'd)

Variables	Knowledge constructs				Attitude constructs				
	Kno1[1]	Kno811[2]	Kno22[3]	Awapr[4]	Attitu[5]	Benef[6]	Barrier[7]	Ease[8]	Imdiet[9]
Demographic variables (Cont'd)									
Meal planner/preparer									
Yes	2.6±0.1	7.0±0.1	1.1±0.0	6.0±0.1	3.3±0.0	15.7±0.2	5.0±0.1	15.2±0.2	41.3±0.2
No	2.3±0.1	6.7±0.1	1.0±0.1	5.8±0.1	3.2±0.1	15.0±0.3	4.9±0.1	14.5±0.4	39.4±0.4
p<0.05	*			*		*			*
Region									
Northeast	2.4±0.1	6.6±0.1	1.3±0.1	5.9±0.1	3.3±0.1	14.6±0.4	4.9±0.1	15.2±0.4	40.3±0.5
Midwest	2.7±0.1	7.2±0.1	1.2±0.1	6.7±0.1	3.3±0.1	15.9±0.2	4.9±0.1	15.2±0.3	40.8±0.3
South	2.6±0.1	6.8±0.2	1.0±0.1	5.7±0.1	3.1±0.1	15.6±0.2	5.0±0.1	14.6±0.4	40.5±0.6
West	2.3±0.1	7.0±0.1	1.0±0.1	5.9±0.1	3.2±0.1	15.3±0.4	5.0±0.2	14.9±0.4	40.4±0.3
p<0.05		*	*	*		*			
Urbanization									
MSA[a] central city (cc)	2.4±0.1	6.6±0.2	1.0±0.1	5.8±0.1	3.2±0.1	15.1±0.3	5.0±0.1	14.4±0.3	40.3±0.5
MSA , outside cc	2.5±0.1	7.0±0.1	1.1±0.1	6.0±0.1	3.3±0.0	15.7±0.1	5.0±0.1	15.0±0.2	40.5±0.3
Non-MSA	2.6±0.1	7.06±0.1	1.2±0.1	5.8±0.1	3.2±0.1	15.2±0.5	4.9±0.1	15.5±0.5	40.9±0.4
p<0.05	*								

Table 12. Weighted mean scores of each construct/question item of DHKS 1995 (Cont'd)

Variables	Knowledge constructs				Attitude constructs				
	Kno1[1]	Kno811[2]	Kno22[3]	Awapr[4]	Attitu[5]	Benef[6]	Barrier[7]	Ease[8]	Imdiet[9]
Demographic variables (Cont'd)									
Pregnancy status									
Pregnant	2.6±0.5	5.9±0.4	1.0±0.4	6.2±0.4	3.5±0.2	15.8±1.2	5.5±0.6	14.1±1.2	39.9±1.7
Lactating	3.1±0.4	6.9±0.7	1.3±0.3	6.4±0.2	3.4±0.2	14.8±1.1	4.9±0.5	16.7±0.8	41.6±2.6
Not pregnant/lactating	2.9±0.1	7.2±0.1	1.1±0.1	6.1±0.1	3.3±0.0	15.8±0.2	5.0±0.1	15.2±0.3	41.3±0.3
Not female 10-55 yrs	2.3±0.0	6.7±0.1	1.1±0.1	5.8±0.1	3.2±0.0	15.2±0.2	4.9±0.1	14.8±0.2	40.1±0.3
$p<0.05$	*	*		*	*				*
Socioeconomic variables									
Income									
<130% poverty threshold	2.4±0.1	5.9±0.1	1.3±0.1	5.1±0.1	3.5±0.1	14.8±0.4	4.6±0.2	14.4±0.5	40.7±0.4
≥130% poverty threshold	2.5±0.1	7.1±0.1	1.1±0.0	6.0±0.1	3.2±0.0	15.5±0.2	5.0±0.1	15.0±0.2	40.5±0.3
$p<0.05$		*		*	*	*	*		
Education (yrs)									
≤ 8	1.8±0.1	4.9±0.2	0.8±0.1	4.9±0.1	3.3±0.1	14.6±0.3	4.3±0.2	12.9±0.5	40.5±0.7
9-12	2.3±0.1	6.6±0.1	1.1±0.1	5.6±0.1	3.3±0.0	15.0±0.2	4.7±0.1	14.6±0.3	39.9±0.4
≥ 13	2.7±0.1	7.4±0.1	1.1±0.1	6.2±0.1	3.2±0.0	15.8±0.2	5.2±0.1	15.3±0.2	41.0±0.3
$p<0.05$	*	*	*	*	*	*	*	*	*

Table 12. Weighted mean scores of each construct/question item of DHKS 1995 (Cont'd)

Variables	Knowledge constructs				Attitude constructs				
	Kno1[1]	Kno811[2]	Kno22[3]	Awapr[4]	Attitu[5]	Benef[6]	Barrier[7]	Ease[8]	Imdiet[9]
Socioeconomic variables (Cont'd)									
WIC									
Yes	2.9±0.6	6.1±0.6	1.2±0.6	5.4±0.7	3.2±0.3	13.4±1.1	4.9±0.5	12.2±1.1	32.8±2.4
No	2.5±0.1	6.9±0.1	1.1±0.0	5.9±0.0	3.2±0.0	15.4±0.2	5.0±0.1	15.0±0.2	40.6±0.2
p<0.05								*	*
Received food stamps (Past 12 months)									
Yes	2.5±0.1	5.9±0.2	1.2±0.1	5.5±0.2	3.5±0.1	15.0±0.4	4.8±0.2	14.8±0.6	40.0±0.6
No	2.5±0.1	7.0±0.1	1.1±0.0	5.9±0.1	3.2±0.0	15.4±0.2	5.0±0.1	15.0±0.2	40.6±0.3
p<0.05		*		*	*				
Authorized to receive food stamps (present)									
Yes	2.5±0.1	5.8±0.2	1.2±0.1	5.3±0.3	3.5±0.1	14.1±0.9	4.4±0.4	14.0±0.6	40.1±0.8
No	2.5±0.1	6.9±0.1	1.1±0.0	5.9±0.0	3.2±0.0	15.5±0.2	5.0±0.1	15.0±0.2	40.5±0.3
p<0.05		*		*	*				
Health indicators									
Diagnosed diabetes									
Yes	2.4±0.1	6.5±0.2	1.0±0.1	5.8±0.2	3.4±0.1	15.6±0.5	5.0±0.2	14.9±0.5	42.3±0.5
No	2.5±0.1	6.9±0.1	1.1±0.0	5.9±0.0	3.2±0.0	15.4±0.2	5.0±0.1	15.0±0.2	40.4±0.3
p<0.05									*

Table 12. Weighted mean scores of each construct/question item of DHKS 1995 (Cont'd)

Variables	Knowledge constructs				Attitude constructs				
	Kno1[1]	Kno811[2]	Kno22[3]	Awapr[4]	Attitu[5]	Benef[6]	Barrier[7]	Ease[8]	Imdiet[9]
Health indicators (Cont'd)									
Diagnosed high blood pressure									
Yes	2.5±0.1	6.7±0.1	1.1±0.1	6.0±0.1	3.3±0.1	15.7±0.2	4.9±0.1	14.4±0.3	42.0±0.4
No	2.5±0.1	6.9±0.1	1.1±0.1	5.9±0.1	3.2±0.0	15.3±0.2	5.0±0.1	15.1±0.2	40.1±0.3
p<0.05								*	*
Diagnosed heart disease									
Yes	2.1±0.1	6.5±0.2	1.1±0.1	6.0±0.1	3.4±0.1	16.1±0.4	4.8±0.1	14.3±0.4	42.8±0.3
No	2.5±0.1	6.9±0.1	1.1±0.0	5.9±0.0	3.2±0.0	15.4±0.2	5.0±0.1	15.0±0.2	40.4±0.3
p<0.05	*				*				*
Diagnosed cancer									
Yes	2.7±0.2	7.2±0.2	1.0±0.1	6.3±0.1	3.2±0.1	16.4±0.4	5.1±0.3	14.6±0.5	42.2±0.8
No	2.5±0.1	6.9±0.1	1.1±0.0	5.9±0.0	3.2±0.0	15.4±0.2	5.0±0.1	15.0±0.2	40.4±0.3
p<0.05				*		*			*
Diagnosed osteoporosis									
Yes	2.3±0.2	7.2±0.2	1.0±0.1	6.3±0.2	3.4±0.1	16.1±0.5	5.0±0.2	15.2±0.7	42.9±0.5
No	2.5±0.1	6.9±0.1	1.1±0.0	5.9±0.0	3.2±0.0	15.4±0.2	5.0±0.1	14.9±0.2	40.4±0.3
p<0.05				*					*

Table 12. Weighted mean scores of each construct/question item of DHKS 1995 (Cont'd)

Variables	Knowledge constructs				Attitude constructs				
	Kno1[1]	Kno811[2]	Kno22[3]	Awapr[4]	Attitu[5]	Benef[6]	Barrier[7]	Ease[8]	Imdiet[9]
Health indicators (Cont'd)									
Diagnosed high blood cholesterol									
Yes	2.4±0.1	7.2±0.1	1.1±0.1	6.2±0.1	3.4±0.1	16.1±0.2	5.0±0.1	15.1±0.3	42.6±0.3
No	2.5±0.1	6.8±0.1	1.1±0.0	5.8±0.1	3.2±0.0	15.3±0.2	5.0±0.1	14.9±0.2	40.1±0.3
p<0.05		*		*	*	*			*
Diagnosed stroke									
Yes	2.2±0.1	6.5±0.3	0.7±0.1	6.0±0.2	3.5±0.1	15.5±0.6	4.4±0.3	14.6±0.6	40.2±1.4
No	2.5±0.1	6.9±0.1	1.1±0.0	5.9±0.0	3.2±0.0	15.4±0.2	5.0±0.1	14.9±0.2	40.5±0.2
p<0.05			*		*				
Weight loss/low calorie diet									
Yes	3.0±0.2	7.3±0.1	1.1±0.1	6.4±0.1	3.5±0.1	17.2±0.2	5.3±0.2	15.6±0.4	43.5±0.4
No	2.5±0.1	6.9±0.1	1.1±0.0	5.8±0.1	3.2±0.0	15.3±0.2	4.9±0.1	14.9±0.2	40.3±0.3
p<0.05	*	*		*	*	*			*
Low fat/cholesterol diet									
Yes	2.7±0.1	7.5±0.1	1.3±0.1	6.4±0.2	3.5±0.1	17.2±0.2	5.3±0.1	15.1±0.5	43.7±0.3
No	2.5±0.1	6.8±0.1	1.1±0.0	5.8±0.1	3.2±0.0	15.2±0.2	4.9±0.1	14.9±0.2	40.2±0.3
p<0.05	*	*	*	*	*	*	*		*

Table 12. Weighted mean scores of each construct/question item of DHKS 1995 (Cont'd)

Variables	Knowledge constructs				Attitude constructs				
	Kno1[1]	Kno811[2]	Kno22[3]	Awapr[4]	Attitu[5]	Benef[6]	Barrier[7]	Ease[8]	Imdiet[9]
Health indicators (Cont'd)									
Low salt/sodium diet									
Yes	2.6±0.1	7.0±0.2	1.3±0.2	6.4±0.1	3.5±0.1	16.6±0.4	5.4±0.2	14.6±0.6	43.3±0.4
No	2.5±0.1	6.9±0.1	1.1±0.0	5.9±0.0	3.2±0.0	15.3±0.2	4.9±0.1	15.0±0.2	40.4±0.3
p<0.05				*	*	*	*		*
High fiber diet									
Yes	3.0±0.2	7.9±0.2	1.2±0.2	6.9±0.1	3.2±0.2	17.1±0.4	5.6±0.2	15.3±0.7	44.0±0.5
No	2.5±0.1	6.9±0.1	1.1±0.0	5.9±0.0	3.2±0.0	15.4±0.2	5.0±0.1	14.9±0.2	40.5±0.3
p<0.05	*	*		*		*	*		*
Diabetic diet									
Yes	2.7±0.2	6.5±0.2	1.3±0.1	6.0±0.2	3.3±0.1	15.7±0.6	5.4±0.3	15.4±0.7	42.8±0.5
No	2.5±0.1	6.9±0.1	1.1±0.0	5.9±0.0	3.2±0.0	15.4±0.2	5.0±0.1	14.9±0.2	40.5±0.3
p<0.05									

Table 12. Weighted mean scores of each construct/question item of DHKS 1995 (Cont'd)

Variables	Knowledge constructs				Attitude constructs				
	Kno1[1]	Kno811[2]	Kno22[3]	Awapr[4]	Attitu[5]	Benef[6]	Barrier[7]	Ease[8]	Imdiet[9]
Lifestyle factors									
Smoking status									
Yes	2.4±0.1	6.4±0.1	1.0±0.1	5.6±0.1	3.3±0.1	14.5±0.3	4.7±0.1	14.8±0.2	38.7±0.4
No	2.5±0.1	7.3±0.1	1.2±0.1	6.2±0.1	3.2±0.1	15.3±0.2	5.1±0.1	15.1±0.3	41.3±0.3
p<0.05		*		*		*			*
Exercise									
Rarely or never	2.4±0.1	6.7±0.1	1.1±0.1	5.8±0.1	3.3±0.0	15.4±0.2	4.7±0.1	14.3±0.3	40.0±0.4
Once in a week	2.7±0.1	7.2±0.2	0.9±0.1	6.0±0.2	3.2±0.1	15.2±0.4	5.2±0.2	14.9±0.6	40.4±0.7
2-4 times in a week	2.5±0.1	7.3±0.1	1.1±0.1	6.2±0.1	3.1±0.1	15.5±0.3	5.1±0.1	15.0±0.3	41.2±0.5
Almost everyday	2.5±0.1	6.7±0.1	1.2±0.1	5.8±0.1	3.3±0.1	15.4±0.4	5.2±0.1	15.9±0.3	40.8±0.4
p<0.05	*	*		*			*	*	
Hours of TV watching (hrs)									
0	2.6±0.1	6.9±0.2	0.9±0.1	6.1±0.1	3.3±0.1	16.0±0.3	5.1±0.2	15.0±0.4	41.1±0.6
1	2.6±0.1	6.9±0.1	1.2±0.1	6.1±0.1	3.1±0.1	15.6±0.3	5.1±0.1	15.2±0.3	40.6±0.4
2	2.5±0.1	6.9±0.2	1.2±0.1	6.1±0.1	3.2±0.1	15.7±0.2	4.9±0.1	15.0±0.3	41.0±0.4
3	2.6±0.1	7.1±0.2	1.2±0.1	5.8±0.1	3.3±0.1	15.2±0.4	5.0±0.1	14.8±0.4	40.6±0.6
4-10	2.3±0.1	6.8±0.1	1.0±0.1	5.6±0.1	3.3±0.1	15.0±0.3	4.8±0.1	14.7±0.3	39.9±0.5
11-24	2.7±0.2	6.0±0.4	1.2±0.3	5.1±0.5	3.1±0.2	13.7±1.2	4.6±0.4	13.7±0.8	36.9±2.4
p<0.05									

Table 12. Weighted mean scores of each construct/question item of DHKS 1995 (Cont'd)

Variables	Knowledge constructs				Attitude constructs				
	Kno1[1]	Kno811[2]	Kno22[3]	Awapr[4]	Attitu[5]	Benef[6]	Barrier[7]	Ease[8]	Imdiet[9]
Lifestyle factors (Cont'd)									
Vitamin supplement									
Not at all	2.4±0.1	6.6±0.1	1.1±0.1	5.7±0.1	3.2±0.0	14.9±0.3	4.8±0.1	14.8±0.3	39.7±0.4
Every so often	2.7±0.1	7.1±0.2	1.0±0.1	6.1±0.1	3.2±0.1	15.7±0.3	4.9±0.1	14.7±0.3	40.2±0.4
Everyday or almost everyday									
p<0.05	2.6±0.1	7.3±0.1	1.2±0.1	6.2±0.1	3.3±0.1	16.1±0.2	5.2±0.1	15.2±0.2	41.8±0.3
	*	*		*		*	*		*

Table 12. Weighted mean scores of each construct/question item of DHKS 1995 (Cont'd)

Variables	Attitude constructs					FL
	Imsafe[10]	Impric[11]	Imlast[12]	Imease[13]	Imtast[14]	Fluse[15]
Demographic variables						
Gender						
Male	3.7±0.0	3.2±0.1	3.4±0.0	3.0±0.0	3.7±0.0	36.0±0.5
Female	3.9±0.0	3.3±0.1	3.5±0.0	3.2±0.1	3.9±0.0	39.0±0.4
p<0.05	*	*	*	*	*	*
Age (yrs)						
20-34	3.6±0.1	3.3±0.1	3.3±0.1	3.0±0.1	3.8±0.0	36.0±0.6
35-54	3.9±0.0	3.2±0.1	3.5±0.0	3.2±0.1	3.8±0.0	37.7±0.5
55-89	3.9±0.0	3.2±0.0	3.6±0.0	3.0±0.0	3.8±0.0	39.7±0.4
90+	3.9±0.1	3.4±0.2	3.8±0.1	3.5±0.2	3.8±0.1	44.2±2.6
p<0.05	*		*			*
Race						
White	3.8±0.0	3.2±0.0	3.4±0.0	3.1±0.0	3.8±0.0	37.6±0.3
Black	3.9±0.0	3.5±0.1	3.8±0.1	3.4±0.1	3.9±0.0	37.0±1.1
Asian, Pacific Islander	3.5±0.2	3.0±0.2	3.0±0.3	2.8±0.3	3.6±0.1	38.8±1.4
American Indian	3.9±0.1	3.7±0.2	3.8±0.2	3.1±0.5	4.0±0.0	37.1±1.9
Others	3.8±0.1	3.5±0.1	3.6±0.1	3.1±0.1	3.8±0.1	40.3±1.4
p<0.05		*	*		*	

Table 12. Weighted mean scores of each construct/question item of DHKS 1995 (Cont'd)

Variables	Attitude constructs					FL
	Imsafe[10]	Impric[11]	Imlast[12]	Imease[13]	Imtast[14]	Fluse[15]
Demographic variables (Cont'd)						
Meal planner/preparer						
Yes	3.9±0.0	3.3±0.0	3.5±0.0	3.2±0.0	3.8±0.0	38.3±0.3
No	3.7±0.1	3.1±0.1	3.4±0.1	3.0±0.1	3.8±0.0	36.5±0.6
p<0.05	*		*	*		*
Region						
Northeast	3.9±0.0	3.1±0.1	3.5±0.0	3.0±0.1	3.8±0.0	37.3±0.8
Midwest	3.8±0.0	3.2±0.1	3.5±0.1	3.1±0.1	3.8±0.0	38.1±0.5
South	3.8±0.0	3.3±0.1	3.5±0.1	3.2±0.1	3.8±0.0	37.8±0.6
West	3.7±0.1	3.2±0.1	3.3±0.1	2.9±0.1	3.8±0.0	37.5±0.6
p<0.05				*		
Urbanization						
MSA[a] central city (cc)	3.8±0.0	3.2±0.1	3.4±0.1	3.1±0.1	3.7±0.0	37.2±0.7
MSA , outside cc	3.8±0.0	3.2±0.0	3.4±0.0	3.1±0.0	3.8±0.0	38.3±0.4
Non-MSA	3.7±0.1	3.3±0.1	3.5±0.1	3.0±0.1	3.8±0.0	37.1±0.7
p<0.05						

Table 12. Weighted mean scores of each construct/question item of DHKS 1995 (Cont'd)

Variables	Attitude constructs					FL
	Imsafe[10]	Impric[11]	Imlast[12]	Imease[13]	Imtast[14]	Fluse[15]
Pregnancy status						
Pregnant	3.7±0.2	3.2±0.4	3.7±0.3	3.4±0.2	3.9±0.1	38.0±4.1
Lactating	4.0±0.0	3.0±0.1	3.6±0.2	2.9±0.3	3.9±0.1	37.7±3.3
Not pregnant/lactating	3.8±0.0	3.2±0.1	3.5±0.1	3.2±0.1	3.8±0.0	38.5±0.5
Not female 10-55 yrs	3.8±0.0	3.2±0.0	3.4±0.0	3.0±0.0	3.8±0.0	37.2±0.4
$p<0.05$	*			*		
Socioeconomic variables						
Income						
<130% poverty threshold	3.8±0.1	3.6±0.1	3.7±0.1	3.2±0.1	3.8±0.0	35.9±0.9
≥130% poverty threshold	3.8±0.0	3.1±0.1	3.4±0.0	3.1±0.0	3.8±0.0	38.0±0.4
$p<0.05$		*	*			*
Education (yrs)						
≤ 8	3.9±0.0	3.6±0.1	3.7±0.1	3.2±0.1	3.8±0.0	36.8±1.1
9-12	3.8±0.0	3.3±0.0	3.6±0.0	3.1±0.1	3.8±0.0	37.1±0.4
≥ 13	3.8±0.0	3.1±0.1	3.3±0.1	3.1±0.0	3.8±0.0	38.2±0.4
$p<0.05$	*	*	*			

Table 12. Weighted mean scores of each construct/question item of DHKS 1995 (Cont'd)

Variables	Attitude constructs					FL
	Imsafe[10]	Impric[11]	Imlast[12]	Imease[13]	Imtast[14]	Fluse[15]
Socioeconomic variables (Cont'd)						
WIC						
Yes	3.7±0.3	3.8±0.2	3.4±0.4	3.7±0.2	3.9±0.1	25.6±2.2
No	3.8±0.0	3.2±0.0	3.5±0.0	3.1±0.0	3.8±0.0	37.8±0.3
p<0.05		*		*		*
Received food stamps (Past 12 months)						
Yes	3.9±0.1	3.6±0.1	3.7±0.1	3.1±0.1	3.8±0.1	37.2±1.1
No	3.8±0.0	3.2±0.0	3.4±0.0	3.1±0.0	3.8±0.0	37.8±0.3
p<0.05		*	*			
Authorized to receive food stamps (present)						
Yes	3.8±0.1	3.7±0.1	3.7±0.1	3.3±0.2	3.8±0.1	35.9±2.4
No	3.8±0.0	3.2±0.0	3.4±0.0	3.1±0.0	3.8±0.0	37.8±0.3
p<0.05		*	*			
Health indicators						
Diagnosed diabetes						
Yes	3.9±0.0	3.3±0.1	3.6±0.1	3.2±0.1	3.8±0.1	41.6±0.8
No	3.8±0.0	3.2±0.0	3.4±0.0	3.1±0.0	3.8±0.0	37.5±0.3
p<0.05			*			*

Table 12. Weighted mean scores of each construct/question item of DHKS 1995 (Cont'd)

Variables	Attitude constructs					FL
	Imsafe[10]	Impric[11]	Imlast[12]	Imease[13]	Imtast[14]	Fluse[15]
Health indicators (Cont'd)						
Diagnosed high blood pressure						
Yes	3.9±0.0	3.3±0.1	3.7±0.0	3.2±0.1	3.8±0.0	40.1±0.6
No	3.8±0.0	3.2±0.1	3.4±0.0	3.1±0.0	3.8±0.0	37.1±0.3
p<0.05			*	*		*
Diagnosed heart disease						
Yes	3.9±0.0	3.2±0.1	3.7±0.0	3.1±0.1	3.8±0.0	40.3±0.9
No	3.8±0.0	3.2±0.0	3.4±0.0	3.1±0.0	3.8±0.0	37.5±0.3
p<0.05	*		*			*
Diagnosed cancer						
Yes	3.9±0.1	3.3±0.1	3.6±0.1	3.2±0.1	3.8±0.1	41.0±1.1
No	3.8±0.0	3.2±0.0	3.4±0.0	3.1±0.0	3.8±0.0	37.5±0.3
p<0.05						*
Diagnosed osteoporosis						
Yes	3.9±0.0	3.4±0.1	3.7±0.1	3.2±0.2	3.8±0.1	42.0±1.1
No	3.8±0.0	3.2±0.0	3.4±0.0	3.1±0.0	3.8±0.0	37.6±0.3
p<0.05	*		*			*

Table 12. Weighted mean scores of each construct/question item of DHKS 1995 (Cont'd)

Variables	Attitude constructs					FL
	Imsafe[10]	Impric[11]	Imlast[12]	Imease[13]	Imtast[14]	Fluse[15]
Health indicators (Cont'd)						
Diagnosed high blood cholesterol						
Yes	3.9±0.0	3.1±0.1	3.5±0.1	3.0±0.1	3.8±0.0	40.7±0.5
No	3.8±0.0	3.2±0.0	3.4±0.0	3.1±0.0	3.8±0.0	37.2±0.4
p<0.05	*					*
Diagnosed stroke						
Yes	3.8±0.1	3.4±0.1	3.8±0.1	3.1±0.2	3.8±0.1	40.1±1.9
No	3.8±0.0	3.2±0.0	3.5±0.0	3.1±0.0	3.8±0.0	37.7±0.3
p<0.05			*			
Weight loss/low calorie diet						
Yes	3.9±0.0	3.3±0.1	3.5±0.1	3.0±0.1	3.8±0.0	42.9±1.1
No	3.8±0.0	3.2±0.0	3.5±0.0	3.1±0.0	3.8±0.0	37.3±0.3
p<0.05	*					*
Low fat/cholesterol diet						
Yes	4.0±0.0	3.0±0.1	3.5±0.1	3.1±0.1	3.7±0.1	43.9±0.5
No	3.8±0.0	3.2±0.0	3.5±0.0	3.1±0.0	3.8±0.0	37.0±0.4
p<0.05	*	*				*

Table 12. Weighted mean scores of each construct/question item of DHKS 1995 (Cont'd)

Variables	Attitude constructs					FL
	Imsafe[10]	Impric[11]	Imlast[12]	Imease[13]	Imtast[14]	Fluse[15]
Health indicators (Cont'd)						
Low salt/sodium diet						
Yes	4.0±0.0	3.1±0.1	3.6±0.1	3.0±0.1	3.7±0.1	44.0±0.5
No	3.8±0.0	3.2±0.0	3.4±0.0	3.1±0.0	3.8±0.0	37.4±0.3
p<0.05	*		*			*
High fiber diet						
Yes	4.0±0.0	3.0±0.1	3.4±0.1	2.9±0.2	3.7±0.1	45.9±0.9
No	3.8±0.0	3.2±0.0	3.5±0.0	3.1±0.0	3.8±0.0	37.5±0.3
p<0.05	*					*
Diabetic diet						
Yes	3.9±0.1	3.2±0.2	3.8±0.1	3.2±0.2	3.8±0.1	43.9±1.2
No	3.8±0.0	3.2±0.0	3.4±0.0	3.1±0.0	3.8±0.0	37.5±0.3
p<0.05			*			*

Table 12. Weighted mean scores of each construct/question item of DHKS 1995 (Cont'd)

Variables	Attitude constructs					FL
	Imsafe[10]	Impric[11]	Imlast[12]	Imease[13]	Imtast[14]	Fluse[15]
Lifestyle factors						
Smoking status						
Yes	3.7±0.0	3.3±0.1	3.5±0.1	3.1±0.1	3.8±0.0	34.5±0.9
No	3.8±0.0	3.1±0.1	3.4±0.1	3.0±0.0	3.8±0.0	38.3±0.5
p<0.05	*	*				*
Exercise						
Rarely or never	3.8±0.0	3.2±0.1	3.4±0.1	3.1±0.1	3.8±0.0	37.2±0.5
Once in a week	3.8±0.1	3.1±0.1	3.5±0.1	3.3±0.1	3.9±0.0	37.7±1.2
2-4 times in a week	3.8±0.1	3.2±0.1	3.4±0.1	3.0±0.1	3.7±0.1	38.3±0.6
Almost everyday	3.8±0.0	3.2±0.1	3.5±0.1	3.0±0.1	3.8±0.0	37.9±0.6
p<0.05				*	*	
Hours of TV watching (hrs)						
0	3.8±0.1	3.3±0.1	3.3±0.1	3.0±0.1	3.8±0.0	38.3±0.7
1	3.8±0.1	3.1±0.1	3.4±0.1	3.0±0.1	3.8±0.0	37.9±0.6
2	3.8±0.0	3.2±0.1	3.4±0.1	3.1±0.1	3.8±0.0	38.4±0.5
3	3.8±0.1	3.2±0.1	3.5±0.1	3.0±0.1	3.8±0.1	37.9±0.9
4-10	3.8±0.0	3.3±0.1	3.6±0.1	3.2±0.1	3.8±0.0	36.7±0.8
11-24	3.9±0.1	3.2±0.2	3.7±0.2	3.3±0.2	4.0±0.0	33.4±3.1
p<0.05			*	*	*	

Table 12. Weighted mean scores of each construct/question item of DHKS 1995 (Cont'd)

Variables	Attitude constructs					FL
	Imsafe[10]	Impric[11]	Imlast[12]	Imease[13]	Imtast[14]	Fluse[15]
Lifestyle factors (Cont'd)						
Vitamin supplement						
Not at all	3.7±0.0	3.3±0.1	3.5±0.0	3.1±0.1	3.8±0.0	36.4±0.5
Every so often	3.8±0.0	3.1±0.1	3.3±0.1	3.0±0.1	3.8±0.0	37.2±0.7
Everyday or almost everyday	3.9±0.0	3.2±0.1	3.5±0.1	3.1±0.1	3.8±0.0	39.8±0.5
$p<0.05$	*					*

1 Kno1 = sum of mean scores (0-5) of knowledge questions regarding the Food Group Pyramid

[2] Kno811 = sum of mean scores (0-10) of knowledge questions regarding nutrition and food

[3] Kno22 = sum of mean scores (0-5) of knowledge questions regarding the amount of nutrient content per servings

[4]Awapr = sum of mean scores (0-7) of awareness questions regarding diet-disease relationships

[5] Attitu = sum of mean scores of (1-4) attitude questions regarding willingness of learning more about the food label

[6] Benef = sum of mean scores (5-20) of questions regarding perceived benefits of using the food label

[7] Barrier = sum of mean scores (2-8) of questions regarding perceived barriers from using the food label

[8] Ease = sum of mean scores (7-21) of questions regarding perceived easiness to understand the food label

[9] Imdiet = sum of mean scores (12-48) of questions regarding perceived importance of practicing healthy dietary habits

[10] Imsafe = sum of mean scores of questions regarding perceived importance of food safety

[11] Impric = sum of mean scores of questions regarding the price of food

[12] Imlast = sum of mean scores of questions regrading how well food keeps

Footnote for Table 12 (Cont'd)

[13] Imease = sum of mean scores of questions regarding easeiness to understand the food label

[14] Imtast = sum of mean scores of attitude questions regarding the taste of food

[15] Fluse = sum of mean scores (13-52) of questions regarding to the food label use

[a]Metropolitan Statistical Area

4.3.2.2.2.2. Perceived barriers from using the food label construct (Barrier)

Mean scores in perceived barriers from using the food label varied significantly depending on the level of education. People who had less than a high school education perceived barriers from using the food label more than those who had more than a high school education (3.9 vs. 5.0 in 1994; 4.3 vs. 5.2 in 1995).

In 1994, mean scores in perceived barriers from using the food label varied significantly among age groups. Respondents who were 55-89 years old perceived barriers from using the food label more than younger respondents (4.5, while others scored 4.8 and higher). Non-meal planners/preparers perceived barriers from using the food label significantly more than meal planners/preparers (4.6 vs. 4.9). Respondents whose family member received food stamps within the past 12 months and those who were authorized to receive food stamps perceived barriers from using the food label significantly more than those whose family members didn't receive food stamps within the past 12 months and those who were not authorized to receive food stamps (e.g., respondents who were authorized to receive food stamps scored 4.2, while those who were not authorized to receive food stamps scored 4.8). People who were diagnosed with high blood pressure, heart disease, osteoporosis, or stroke perceived barriers from using food labels significantly more than those who were not diagnosed with these diseases (e.g., respondents who were diagnosed with high blood pressure scored 14.2, while those who were not diagnosed with high blood pressure scored 14.9). The mean score in perceived barriers from using the food label varied significantly depending on the hour of TV watching. Respondents who watched TV 4-10 hours per day perceived barriers from using the food label more than those who watched TV an hour per day (4.6 vs. 5.0).

In 1995, lower-income respondents perceived barriers from using the food label significantly more than higher-income respondents (4.6 vs. 5.0). People who were on a low fat/cholesterol diet perceived barriers from using the food label significantly less than those who were not on this diet (5.3 vs. 4.9). People who were on a low salt/sodium diet perceived barriers from using the food label significantly less than those who were not on this diet (5.4 vs. 4.9). Also, people who were on a high fiber diet perceived barriers from using the food label significantly less than those who were not on this diet (5.6 vs. 5.0). The mean score in perceived barriers from using the food label varied significantly depending on the frequency of exercise. For example, people who rarely or never exercised perceived barriers from using the food label more than those who exercised once in a week (4.7 vs. 5.2). The mean score in perceived barrier from using the food label varied significantly depending on the frequency of vitamin supplement use. For example, people who didn't use vitamin supplements perceived barriers from using the food label more than those who used vitamin supplements every day or almost every day (4.8 vs. 5.2) (Table 11 for DHKS 1994; Table 12 for DHKS 1995).

4.3.2.2.2.3. Perceived easiness to understand the food label construct (Ease)

People who were diagnosed with high blood pressure perceived easiness to understand the food label significantly less than those who were not diagnosed with high blood pressure (14.4 vs. 15.1 in 1994; 14.2 vs. 14.9 in 1995). In 1994, meal planners/preparers perceived easiness to understand the food label significantly more than non-meal planners/preparers (15.0 vs. 14.3). People who were diagnosed with heart disease, osteoporosis, or stroke perceived easiness to understand the food label

significantly less than those who were not diagnosed with these diseases. For example, people who were diagnosed with heart disease scored 13.6, while those who were not diagnosed with heart disease scored 14.9. People who were on a weight loss/low calorie diet perceived easiness to understand the food label significantly more than those who were not on this diet (15.8 vs. 14.7).

In 1995, mean score of perceived easiness to understand the food label varied significantly among age groups. People who were 55-89 years perceived easiness to understand the food label less than those who were younger than this group (e.g., people who were 55-89 years scored 14.4, while those who were 20-34 years scored 15.0). Mean score of perceived easiness to understand the food label varied significantly depending on the level of education. People who had less than a high school education perceived easiness to understand food labels less than those who had more than a high school education (12.9 vs. 15.3). Mean score of perceived easiness to understand the food label varied significantly depending on the frequency of exercise. People who rarely or never exercised perceived easiness to understand the food label less than those who exercised 2-4 times in a week (14.3 vs. 15.0) (Table 11 for DHKS 1994; Table 12 for DHKS 1995).

4.3.2.2.2.4. Perceived importance of practicing healthy dietary habits construct (Imdiet)

Females perceived importance of practicing healthy dietary habits significantly more than males (42.1 vs. 39.5 in 1994; 41.7 vs. 39.3 in 1995). This result corresponded with criteria 2 (i.e., females are more concerned about their diet than males). The mean score of perceived importance of practicing healthy dietary habits varied significantly

among age groups. People who were aged 20-34 years perceived importance of practicing healthy dietary habits less than those who were older than this group (e.g., 39.3, while others scored 41.1 and higher in 1994; 39.0, while others scored 40.8 and higher in 1995). Meal planners/preparers perceived importance of practicing healthy dietary habits significantly more than non-meal planners/preparers (41.7 vs. 39.5 in 1994; 41.3 vs. 39.4 in 1995). People who were diagnosed with diabetes perceived importance of practicing healthy dietary habits significantly more than those who were not diagnosed with diabetes (42.2 vs. 40.8 in 1994; 42.3 vs. 40.4 in 1995). People who were diagnosed with high blood pressure perceived importance of practicing healthy dietary habits significantly more than those who were not diagnosed with high blood pressure (42.2 vs. 40.6 in 1994; 42.6 vs. 40.1 in 1995). People who were on weight loss/low calorie diet, on a low fat/cholesterol diet, on a low salt/sodium diet, or on a high fiber diet perceived importance of practicing healthy dietary habits significantly more than those who were not on these diets. For example, people who were diagnosed with high blood pressure scored 42.2 in 1994 and 42.6 in 1995, while those who were not diagnosed with high blood pressure scored 40.6 in 1994 and 40.1 in 1995.

Smokers perceived importance of practicing healthy dietary habits significantly less than non-smokers (38.9 vs. 41.7 in 1994; 38.7 vs. 41.3 in 1995). This result corresponded with criteria 16 (i.e., smokers are less concerned about their diet than non-smokers). The mean score in perceived importance of practicing healthy dietary habits varied significantly depending on the frequency of vitamin supplement use. People who didn't use vitamin supplements at all perceived importance of practicing healthy dietary

habits less than those who took vitamin supplements every day or almost every day (40.4 vs 41.8 in 1994; 41.8 vs. 38.7 in 1995).

In 1994, the mean score in perceived importance of practicing healthy dietary habits varied significantly depending on the hour of TV watching. People who watched TV more than 11 hours perceived importance of practicing healthy dietary habits less than those who watched TV an hour per day (37.6 vs. 41.7). In 1995, the mean score in perceived importance of practicing healthy dietary habits varied significantly depending on the education level. People who had more than a high school education perceived importance of practicing healthy dietary habits more than those who had less than a high school education (41.0 vs. 40.5). People who were diagnosed with high blood pressure, heart disease, cancer, or osteoporosis perceived importance of practicing healthy dietary habits significantly more than those who were not diagnosed with these diseases. For example, people who were diagnosed with high blood pressure scored 42.0, while those who were not diagnosed with high blood pressure scored 40.1. People who were on a diabetic diet perceived importance of practicing healthy dietary habits significantly more than those who were not on this diet (42.8 vs. 40.5).

There was no significant mean score difference in perceived importance of practicing healthy dietary habits depending on the income level. Thus, results didn't correspond with criteria 7 (i.e., higher-income respondents are more concerned about their diet than lower-income respondents) (Table 11 for DHKS 1994; Table 12 for DHKS 1995).

4.3.2.2.2.5. Perceived importance of food safety construct (Imsafe)

Females perceived importance of food safety significantly more than males (3.9 vs. 3.7 in both years). Meal planners/preparers perceived importance of food safety significantly more than non-meal planners/preparers (3.8 vs. 3.7 in 1994; 2.6 vs. 2.3 in 1995). In 1994, people who were on a diabetic diet perceived importance of food safety significantly more than those who were not on this diet (4.0 vs. 3.8). In 1995, people who were on a weight loss/low calorie diet, on a low fat/cholesterol diet, on a low salt/sodium diet, or on a high fiber diet perceived importance of food safety significantly more than those who were not on these diets. For example, people who were on a weight loss/low calorie diet scored 3.9, while those who were not on this diet scored 3.8 (Table 11 for DHKS 1994; Table 12 for DHKS 1995).

4.3.2.2.2.6. Perceived importance of the price of food construct (Impric)

Females perceived importance of the price of food significantly more than males (3.3 vs. 3.2 in both years). Lower-income respondents perceived importance of the price of food significantly more than higher-income respondents (3.5 vs. 3.2 in 1994; 3.6 vs. 3.1 in 1995). This result corresponded with criteria 8 (i.e., lower-income respondents are more concerned about the price of food more than higher-income respondents). Respondents whose family member received food stamps within the past 12 months and those who were authorized to receive food stamp perceived importance of the price of food significantly more than respondents whose family member didn't receive food stamps and those who were not authorized to receive food stamps. For example, respondents who were authorized to receive food stamps scored 3.6 in 1994 and 3.7 in

1995, while those who were not authorized to receive food stamps scored 3.2 in 1994 and 3.2 in 1995 (Table 11 for DHKS 1994; Table 12 for DHKS 1995).

4.3.2.2.2.7. Perceived importance of how well food keeps construct (Imlast)

Females perceived importance of how well food kept significantly more than males (3.3 vs. 3.2 in both years). Meal planners/preparers perceived importance of how well food kept significantly more than non-meal planners/preparers (3.5 vs. 3.4 in both years). Lower-income respondents perceived how well food kept significantly more than higher-income respondents (3.6 vs. 3.4 in 1994; 3.7 vs. 3.4 in 1995). Respondents whose family member received food stamps within the past 12 months and those who were authorized to receive food stamps perceived importance of how well food kept significantly more than respondents whose family member didn't receive food stamps and those who were not authorized to receive food stamps. For example, respondents who were authorized to receive food stamps scored 3.7 in 1994 and 1995, while those who were not authorized to receive food stamps scored 3.4 in 1994 and 1995 (Table 11 for DHKS 1994; Table 12 for DHKS 1995).

4.3.2.2.2.8. Perceived importance of easiness of the food to prepare construct (Imease)

Females perceived importance of easiness of the food to prepare significantly more than males (3.1 vs. 3.0 in 1994; 3.2 vs. 3.0 in 1995) (Table 11 for DHKS 1994; Table 12 for DHKS 1995).

4.3.2.2.2.9. Perceived importance of taste of food construct (Imtast)

Females perceived importance of the taste of food significantly more than males (3.9 vs. 3.8 in 1994; 3.9 vs. 3.7 in 1995) (Table 11 for DHKS 1994; Table 12 for DHKS 1995).

4.3.2.2.2.10. Willingness to learn more about the food label construct (Attitu)

Lower-income respondents were willing to learn more about the food label significantly more than higher-income respondents (3.4 vs. 3.3 in 1994; 3.5 vs. 3.2 in 1995). The mean score in willingness to learn more about the food label construct varied significantly depending on the education level. People who had less than a high school education were willing to learn about the food label more than those who had more than a high school education (3.6 vs. 3.2 in 1994; 3.3 vs. 3.2 in 1995). People who were on a weight loss/low calorie diet were willing to learn about the food label significantly more than those who were not on this diet (3.6 vs. 3.3 in 1994; 3.5 vs. 3.2 in 1995). The same trends were seen between people who were on a low fat/cholesterol diet and those who were not on this diet (3.5 vs. 3.3 in 1994; 3.5 vs. 3.2 in 1995).

In 1995, females were willing to learn more about the food label significantly more than males (3.3 vs. 3.1). Thus, results correspond with criteria 3 (i.e., females were more motivated to improve their diet than males) in 1995, but not in 1994. Respondents whose family member received food stamps within the past 12 months and those who were authorized to receive food stamps were willing to learn more about the food label significantly more than respondents whose family member didn't receive food stamps and those who were not authorized to receive food stamps. For example, respondents

who were authorized to receive food stamps scored 3.5, while those who were not authorized to receive food stamps scored 3.2.

No mean score difference in willingness to learn more about the food label was seen among age groups. Thus, results didn't correspond with criteria 11 (i.e., there are differences in motivation of improving own diet among age groups) at least by learning more about the food label. No mean score difference in willingness to learn more about the food label was seen between smokers and non-smokers. Thus, results didn't correspond with criteria 17 (i.e., smokers are less motivated to improve their diet than non-smokers) at least by learning more about the food label (Table 11 for DHKS 1994; Table 12 for DHKS 1995).

4.3.2.2.2.11. Frequency of the food label use construct (Fluse)

Females used food labels significantly more frequently than males (38.9 vs. 35.7 in 1994; 39.0 vs. 36.0 in 1995). Thus, results corresponded with criteria 4 (i.e., females used food labels significantly more frequently than males). The mean score in frequency of the food label use construct varied significantly among age groups. People who were aged 20-34 years used food labels less frequently than those who were aged 55-89 years (36.0 vs. 39.7 in 1994; 36.3 vs. 38.8 in 1995). Thus, results corresponded with criteria 12 (i.e., there are differences in frequency of food label use among age groups). Meal planners/preparers used food labels significantly more frequently than non-meal planners/preparers did (38.4 vs. 35.5 in 1994; 38.3 vs. 36.5 in 1995). People who were diagnosed with high blood cholesterol used food labels significantly more frequently than those who were not diagnosed with high blood cholesterol (40.3 vs. 37.0 in 1994; 40.7 vs.

37.2 in 1995). People who were on a weight loss/low calorie diet, on a low fat/cholesterol diet, on a low salt/sodium diet, or on a high fiber diet used food labels significantly more frequently than those who were not on these diets. For example, people who were on a weight loss/low calorie diet scored 40.1 in 1994 and 42.9 in 1995, while those who were not on this diet scored 37.2 in 1994 and 37.3 in 1995. Smokers used food labels significantly less frequently than non-smokers did (35.8 vs. 37.9 in 1994; 34.5 vs. 38.3 in 1995). The mean score in frequency of the food label use varied significantly depending on the frequency of vitamin supplement use. People who used vitamin supplements used food labels more frequently than those who didn't use vitamin supplements at all (39.3 vs. 36.6 in 1994; 39.8 vs. 36.4 in 1995).

In 1994, the mean score in frequency of the food label use varied significantly depending on the education level. People who had less than a high school education used food labels less frequently than those who had more than a high school education (35.2 vs. 38.1). Thus, results corresponded with criteria 14 (i.e., there are differences in frequency of the food label use depending on the education level) in 1994, but not in 1995. People who were authorized to receive food stamps used food labels significantly less frequently than those who were not authorized to receive food stamps (35.4 vs. 37.5).

In 1995, lower-income respondents used food labels significantly less frequently than higher income respondents (35.9 vs. 38.0). Thus, results corresponded with criteria 9 (i.e., higher-income respondents used food labels more frequently than lower-income respondents) in 1995, but not in 1994.

In summary, constructs created from DHKS 1994-1995 sorted respondents into subgroups, meeting 14 criteria out of 17 criteria set initially in either one of 1994 and

1995 or in both years. Also, those constructs sorted respondents into subgroups based on other criteria which were not completely established but reported in the past. Thus, constructs created from DHKS 1994-1995 appeared to be valid (Table 11 for DHKS 1994; Table 12 for DHKS 1995).

4.4. Nutrition knowledge, attitudes, and food label use in the U.S. between 1994 and 1995 (Objective 4).

4.4.1. Nutrition knowledge between 1994 and 1995

Only nutrition knowledge question which had significant difference between 1994 and 1995 was the one which inquired about the relationship between not eating enough calcium and cavities and tooth problems (11% correct response in 1994 vs. 15% in 1995). Majority of respondents (about 80% of respondents) recognized dietary behaviors, which would cause health problems such as eating too much fat (88% in both years); eating too much salt (87% in 1994 and 89% in 1995, respectively); not eating enough calcium (81% in both years); eating too much calorie (89% in 1994 and 90% in 1995, respectively); eating too much sugar (81% in 1994 and 79% in 1995, respectively); and being overweight (95% in 1994 and 94% in 1995, respectively). Over 60% of respondents recognized that not eating enough fiber would cause health problems (64% in 1994 and 66% in 1995, respectively).

However, when respondents were asked to identify health problems caused by those dietary behaviors, correct response ratio varied. Questions which received about 75% of correct responses were: not eating enough calcium would cause bone problems/rickets and osteoporosis (74% in both years); eating too much cholesterol

would cause heart diseases and problems of arteries (74% in 1994 and 77% in 1995, respectively); and being overweight would cause heart disease and problems of arteries (75% in 1994 and 74% in 1995, respectively). On the other hand, less than 10% of respondents could answer correctly that: eating too much fat would cause cancer (8% in 1994 and 6% in 1995, respectively); not eating enough fiber would cause heart disease and problems of arteries (3% in both years); eating too much salt would cause kidney problems and renal disease (3% in 1994 and 2% in 1995, respectively).

Fruit group in the food guide pyramid received the highest correct responses (72% in 1994 and 73% in 1995, respectively) to questions on the number of adequate servings per day among all food groups, while grain group received the lowest correct responses (6% in 1994 and 8% in 1995, respectively).

Given two sets of food items, 49-93 % of respondents could correctly identify which food item had higher amount of saturated fat or fat than the other. For example, comparison between whole milk and skim milk for the amount of saturated fat had 93% of correct responses in both years, while comparisons between porterhouse steak and round steak for the amount of fat had 50% of correct responses in 1994 (49% in 1995). Only 27% of respondents could correctly identify the difference in characteristics of saturated fat and polyunsaturated fat (KQ10) in both years.

Less than 25% of respondents had adequate knowledge of the amount of nutrient content per servings (KQ22a-e) except the amount of fiber (51% of respondents had correct responses in both years). About 30% of respondents knew the authority of the government to define the phrases on the food label (KQ21a-c) (Table 13).

4.4.2. Attitudes between 1994 and 1995

Significant mean score differences were seen in: perceived importance of maintaining a healthy weight; and perceived barriers from using the food label between 1994 and 1995. People perceived less importance of maintaining a healthy weight in 1995 than in 1994 (3.69 vs. 3.63). On the other hand, people perceived less barriers from using the food label in 1995 than in 1994 (2.33 vs. 2.22).

Mean scores, which indicated respondents' perceived importance of practicing various recommended dietary behaviors such as using salt in moderation and choosing a diet low in fat, showed that respondents perceived those dietary behaviors between somewhat important (Mean= 3.00) and very important (Mean= 4.00). For example, the mean score of "perceived importance of eating at least 2 servings of dairy products daily" was 3.00 in 1994 and 2.99 in 1995, respectively, while the one of perceived importance of maintaining a healthy weight was 3.69 in 1994 and 3.63 in 1995, respectively.

Mean scores, which indicated respondents' perceived easiness of understanding the food label, ranged from not too easy (Mean=1.00) to very easy (Mean=3.00). For example, the mean score of "perceived easiness of understanding the number of gram or milligram of nutrients like fat in serving" was 1.82 (close to somewhat easy) in 1994 (1.95 in 1995), while the mean score of "perceived easiness of understanding the number of calories in a serving" was 2.49 (somewhat easy) in 1994 (2.43 in 1995).

Mean scores, which indicated respondents' perceived benefits of using the food label, ranged from somewhat disagree (Mean=2.00) to somewhat agree (Mean=3.00). For example, the mean score of "the nutrition information on the food label was useful for me" was 3.21 in 1994 and 3.24 in 1995, respectively.

Finally, respondents were somewhat willing to learn how to use the food label (Mean=3.27 in 1994 and 3.23 in 1995, respectively) (Table 14).

4.4.3. Frequency of the food label use between 1994 and1995

The mean score of frequency of the information on the food label use ranged from rarely (Mean=2.00) to sometimes (Mean=3.00). Significant increase of using health claim information on the food label was seen between 1994 and 1995 (2.31 in 1994 vs. 2.48 in 1995). The information respondents used most was the information of the total fat (3.13 in 1994 and 3.22 in 1995, respectively), while health claim information on the food label was least frequently used (2.31 in 1994 vs. 2.48 in 1995) (Table 15).

Table 13. Percentage of responses and mean scores ± S.E. for questions created from DHKS 1995 and the test of significance between DHKS 1994 and 1995[a] -Nutrition knowledge questions

Definition	Responses (%) Correct/ Aware	Uncorrect/ Unaware	Mean ± S.E.	p between 1994&95
Knowledge and awareness of diet-disease relationships				
Health problems caused by eating too much fat? (rekq5a)	88	12	0.88 ± 0.01	NS
Heart disease and problems of arteries (rekq6a01)	67	33	0.67 ± 0.02	NS
Cancer (all types) (rekq6a05)	6	94	0.06 ± 0.01	NS
Colon problems, irregularity, and digestive problems (rekq6a06)	3	97	0.03 ± 0.01	NS
High blood pressure and hypertension (rekq6a12)	10	90	0.10 ± 0.01	NS
Fat/overweight and obesity (rekq6a15)	26	74	0.26 ± 0.02	NS
Health problems caused by not eating enough fiber? (rekq5b)	66	34	0.66 ± 0.02	NS
Heart disease and problems of arteries (rekq6b01)	3	97	0.03 ± 0.00	NS
Cancer (all types) (rekq6b05)	14	86	0.14 ± 0.01	NS
Colon problems, irregularity, and digestive problems (rekq6b06)	51	49	0.51 ± 0.02	NS
Health problems caused by eating too much salt? (rekq5c)	89	11	0.89 ± 0.01	NS
Heart disease and problems of arteries (rekq6c01)	28	72	0.28 ± 0.02	NS
High blood pressure and hypertension (rekq6c12)	59	41	0.59 ± 0.02	NS
Kidney problems and renal disease (rekq6c14)	2	98	0.02 ± 0.00	NS
Health problems caused by not eating enough calcium? (rekq6d)	81	19	0.81 ± 0.01	NS
Bone problems/rickets and osteoporosis (rekq6d03)	74	26	0.74 ± 0.02	NS
Cavities/caries and tooth problems (rekq6d07)	15	85	0.15 ± 0.02	p=.02 (↑)

Table 13. Percentage of responses and mean scores ± S.E. for questions created from DHKS 1995 and the test of significance between DHKS 1994 and 1995[a] -Nutrition knowledge questions (Cont'd)

Definition	Responses (%) Correct/ Aware	Uncorrect/ Unaware	Mean ± S.E.	p between 1994&95
Knowledge and awareness of diet-disease relationships (Cont'd)				
Health problems caused by eating too much cholesterol?(rekq5e)	90	10	0.90 ± 0.01	NS
Heart disease and problems of arteries (rekq6e01)	77	23	0.77 ± 0.01	NS
Cancer (all types) (rekq6e05)	2	98	0.02 ± 0.00	NS
Cavities/caries and tooth problems (rekq6e07)	12	88	0.12 ± 0.02	NS
Health problems caused by eating too much sugar? (rekq5f)	79	21	0.79 ± 0.01	NS
Diabetes and high blood sugar (rekq6f08).	52	48	0.52 ± 0.02	NS
Fat/overweight and obesity (rekq6f15)	22	78	0.22 ± 0.02	NS
Health problems caused by being overweight? (rekq5f)	94	6	0.94 ± 0.01	NS
Heart disease and problems of arteries (rekq6g01)	74	26	0.74 ± 0.02	NS
Bone problems/rickets and osteoporosis (rekq6g03)	5	95	0.05 ± 0.01	NS
Cancer (all types) (rekq6g05)	2	98	0.02 ± 0.00	NS
Diabetes and high blood sugar (rekq6g08)	16	84	0.16 ± 0.01	NS
High blood pressure and hypertension (rekq6g12)	21	79	0.21 ± 0.01	NS

Table 13. Percentage of responses and mean scores ± S.E. for questions created from DHKS 1995 and the test of significance between DHKS 1994 and 1995[a] -Nutrition knowledge questions (Cont'd)

Definition	Responses (%) Correct/ Aware	Uncorrect/ Unaware	Mean ± S.E.	p between 1994&95
Knowledge of food guide pyramid				
No of servings from fruit group? (rekq1a)	73	27	0.73 ± 0.01	NS
No of servings from vegetable group? (rekq1b)	51	49	0.51 ± 0.02	NS
No of servings from milk, yogurt, and cheese group? (rekq1c)	58	42	0.58 ± 0.01	NS
No of servings from bread, cereal, rice and pasta group? (rekq1d)	8	92	0.08 ± 0.01	NS
No of servings from meat, poultry, fish, dry beans, and egg group? (rekq1e)	59	41	0.59 ± 0.02	NS
Knowledge of nutrition and food				
Butter or margarine? (rekq8b)	73	27	0.73 ± 0.02	NS
Egg white or egg yolk? (rekq8c)	80	20	0.80 ± 0.02	NS
Skim milk or whole milk? (rekq8d)	93	7	0.93 ± 0.01	NS
Regular hamburger or ground round? (rekq9a)	79	21	0.79 ± 0.02	NS
Hot doggs or ham? (rekq9c)	63	37	0.63 ± 0.02	NS
Peanuts or popcorn? (rekq9d)	86	14	0.86 ± 0.01	NS
Yogurt or sour cream? (rekq9e)	85	15	0.85 ± 0.02	NS
Porterhouse steak or round steak? (rekq9f)	49	51	0.49 ± 0.02	NS
Saturated fats vs. polyunsaturated fats -which one is more likely to be a liquid than a solid? (rekq10)	27	73	0.27 ± 0.02	NS
No cholesterol -low in saturated fat or high in saturated fat? (rekq11)	54	46	0.54 ± 0.02	NS

Table 13. Percentage of responses and mean scores ± S.E. for questions created from DHKS 1995 and the test of significance between DHKS 1994 and 1995[a] -Nutrition knowledge questions (Cont'd)

Definition	Responses (%) Correct/ Aware	Uncorrect/ Unaware	Mean ± S.E.	p between 1994&95
Knowledge of amount of nutrient content per servings				
100mg of sodium -low? (rekq22a)	16	84	0.16 ± 0.01	NS
20g of fat -low? (rekq22b)	8	92	0.08 ± 0.01	NS
15mg of cholesterol -low? (rekq22c)	23	77	0.23 ± 0.02	NS
5g of fiber -low? (rekq22d)	51	49	0.51 ± 0.02	NS
10g of saturated fat -low? (rekq22e)	11	89	0.11 ± 0.01	NS
Awareness of the authority of the Government to define the phrases				
Low-cholesterol? (rekq21a)	31	69	0.31 ± 0.02	NS
Light? (rekq21b)	23	77	0.23 ± 0.01	NS
Extra lean? (rekq21c)	31	69	0.31 ± 0.01	NS

[a] DHKS 1994 results are listed in Appendix F

Description of the question items are summarized. The original description of the question items are on Table 3-5.

Table 14. Percentage of responses and mean scores ± S.E. for questions created from DHKS 1995 and the test of significance between DHKS 1994 and 1995[a] -Attitude questions

Definition	Responses (%)					p between 1994&95
	Very important	Not too important	Somewhat important	Very important	Mean ± S.E.	
Perceived importance of practicing healthy diet						
Use salt only in moderation? (rakq4a)	6	13	30	51	3.26 ± 0.03	NS
Choose a diet low in saturated fat? (rakq4b)	3	11	33	54	3.37 ± 0.03	NS
Choose a deit w/ plenty of fruits and veg? (rakq4c)	1	7	23	69	3.59 ± 0.03	NS
Use sugar only in moderation? (rakq4d)	2	12	35	50	3.34 ± 0.02	NS
Choose a diet with adequate fiber? (rakq4e)	2	12	36	51	3.36 ± 0.04	NS
Eat a variety of foods? (rakq4f)	1	8	31	60	3.50 ± 0.04	NS
Maintain a healthy weight? (rakq4g)	1	5	24	70	3.63 ± 0.02	p=.01(↓)
Choose a diet low in fat? (rakq4h)	2	10	32	56	3.42 ± 0.03	NS
Choose a diet low in cholesterol? (rakq4i)	2	12	31	56	3.39 ± 0.03	NS

Table 14. Percentage of responses and mean scores ± S.E. for questions created from DHKS 1995 and the test of significance between DHKS 1994 and 1995[a] -Attitude questions (Cont'd)

Definition	Responses (%)					p between 1994&95
	Very important	Not too important	Somewhat important	Very important	Mean ± S.E.	
Choose a diet w/ plenty of grain products? (rakq4j)	5	20	45	30	2.99 ± 0.03	NS
Eat at least 2 serv. of dairy products daily? (rakq4k)	6	24	35	35	2.99 ± 0.04	NS
Nutrition is important when buying food? (rakq15b)	1	5	32	62	3.56 ± 0.02	NS
Perceived importance of food safety (rakq15a)	1	3	12	84	3.79 ± 0.02	NS
Perceived importance of the price of food (rakq15c)	4	13	41	42	3.21 ± 0.04	NS
Perceived importance of how well food keeps (rakq15d)	2	9	30	59	3.45 ± 0.03	NS
Perceived importance of easienss to prepare (rakq15e)	6	18	38	38	3.08 ± 0.03	NS
Perceived importance of the taste of food (rakq15f)	1	1	16	82	3.80 ± 0.02	NS

Table 14. Percentage of responses and mean scores ± S.E. for questions created from DHKS 1995 and the test of significance between DHKS 1994 and 1995[a] -Attitude questions (Cont'd)

Definition	Responses (%) Not too easy	Somewhat easy	Very easy	Mean ± S.E.	p between 1994&95
Perceived easiness of understanding the food label					
The list of ingredients? (rakq19a)	21	38	41	2.19 ± 0.03	NS
A short phrase such as "low fat" or "light"? (rakq19b)	27	39	35	2.08 ± 0.03	NS
No of calories in a serving? (rakq19c)	14	29	57	2.43 ± 0.03	NS
No of calories fom fat in a serv? (rakq19d)	28	36	36	2.09 ± 0.04	NS
No of g or mg of nutrients like fat in a serving? (rakq19e)	35	36	30	1.95 ± 0.03	NS
% of the daily value for each nutrient? (rakq19f)	34	38	29	1.95 ± 0.03	NS
A description like "lean" on meats? (rakq19g)	20	36	45	2.26 ± 0.04	NS

Table 14. Percentage of responses and mean scores ± S.E. for questions created from DHKS 1995 and the test of significance between DHKS 1994 and 1995[a] -Attitude questions (Cont'd)

Definition	Responses (%)				p between 1994&95
	Not too confident	Somewhat confident	Very confident	Mean ± S.E.	
Perceived reliability of descriptions on the food label					
Low-fat? (rakq20a)	33	57	10	1.78 ± 0.02	NS
Low-cholesterol? (rakq20b)	33	56	12	1.79 ± 0.02	NS
A good source of fiber? (rakq20c)	23	58	19	1.96 ± 0.02	NS
Light? (rakq20d)	44	47	10	1.66 ± 0.02	NS
Healthy? (rakq20e)	47	44	9	1.61 ± 0.03	NS
Extra lean? (rakq20f)	26	58	16	1.89 ± 0.02	NS

Table 14. Percentage of responses and mean scores ± S.E. for questions created from DHKS 1995 and the test of significance between DHKS 1994 and 1995[a] -Attitude questions (Cont'd)

Definition	Responses (%)					p between
	Strongly disagree	Somewhat disagree	Somewhat agree	Strongly agree	Mean ± S.E.	1994&95
Perceived benefits from using the food label						
The nutrition info. on food label is useful for me (rakq23a)	5	8	46	41	3.24 ± 0.03	NS
Reading food labels makes it easy to choose food (rakq23g)	5	14	43	38	3.13 ± 0.04	NS
I try new foods because of the info. on the food label (rakq23h)	18	21	38	23	2.66 ± 0.04	NS
When I use food labels, I make better food choices (rakq23i)	8	15	43	34	3.03 ± 0.04	NS
Using food labels is bettwe than without using food labels to choose food (rakq23j)	6	11	40	44	3.22 ± 0.04	NS
Perceived barriers from using food labels						
The nutrition info. On food labels is hard to interpret (rakq23c)	11	29	44	17	2.33 ± 0.03	p=.01(↓)
Reading food labels takes more time than I can spend (rakq23d)	24	30	30	16	2.62 ± 0.04	NS

Table 14. Percentage of responses and mean scores ± S.E. for questions created from DHKS 1995 and the test of significance between DHKS 1994 and 1995[a] -Attitude questions (Cont'd)

Definition	Responses (%)						p between
	Strongly disagree	Somewhat disagree	Somewhat agree	Strongly agree	Mean ±	S.E.	1994&95
Willingness to learn how to use the food label (rakq23f)	5	11	41	44	3.23 ±	0.03	NS

[a] DHKS 1994 results are listed in Appendix F

Description of the question items are summarized. The original description of the question items are on Table 3-5.

Table 15. Percentage of responses and mean scores ± S.E. for questions created from DHKS 1995 and the test of significance between DHKS 1994 and 1995[a] -Frequency of the food label questions

Definition	Responses (%)					p between
	Never	Rarely	Sometimes	Often (always)	Mean ± S.E.	1994&95
Frequency of the food label use						
The list of ingredient? (rakq16a)	20	16	37	27	2.71 ± 0.04	NS
The short phrases like "low-fat"? (rakq16b)	23	16	36	26	2.64 ± 0.03	NS
The nutrition panel that tells the amount of calorie, protein, fat, etc (rakq16c)	21	14	29	36	2.80 ± 0.04	NS
The info. about the size of a serving?(rakq16d)	29	20	28	22	2.44 ± 0.04	NS
Health claims (rakq16e)	26	21	33	21	2.48 ± 0.04	.000
Calories? (rakq17a)	9	16	33	43	3.09 ± 0.03	NS
Salt or sodium? (rakq17b)	11	22	31	36	2.91 ± 0.03	NS
Total fat? (rakq17c)	7	14	28	51	3.22 ± 0.03	NS
Saturated fat? (rakq17d)	11	19	29	40	2.99 ± 0.04	NS
Cholesterol? (rakq17e)	12	20	31	36	2.91 ± 0.04	NS

Table 15. Percentage of responses and mean scores ± S.E. for questions created from DHKS 1995 and the test of significance between DHKS 1994 and 1995[a] -Frequency of the food label questions (Cont'd)

Definition	Responses (%)					p between
	Never	Rarely	Sometimes	Often (always)	Mean ± S.E.	1994&95
Frequency of the food label use (Cont'd)						
Vitamins or minerals? (rakq17f)	9	27	41	24	2.79 ± 0.04	NS
Fiber? (rakq17g)	15	30	36	19	2.58 ± 0.03	NS
Sugars? (rakq17h)	12	24	34	30	2.82 ± 0.04	NS

[a] DHKS 1994 results are listed in Appendix F

Description of the question items are summarized. The original description of the question items are on Table 3-5.

Chapter Five

DISCUSSION AND CONCLUSION

1. Sample of DHKS 1994-1995 (Objective1)

This study established the reliability and validity of questions from DHKS 1994-1995 using a large sample of U.S. representative population included in DHKS (n=1,879 and n=1,966 for 1994 and 1995, respectively). Thus, results are generalizable for the nation and also for subgroup populations categorized by: demographic variables (eg. gender, age, race, and income); socioeconomic variables (eg. education and the status of the Food Stamps participation); health indicators (eg. presence of diagnosed diseases such as heart disease, high blood pressure, and diabetes, presence of special the diet such as weight loss/low calorie diet, low fat/cholesterol diet and low salt/sodium diet); life style factors (eg. smoking, frequency of the exercise, vitamin supplement use, and the hours of TV watching). Since findings regarding to various subgroups in the past tend to be limited with locations, the information characteristic of the subgroups obtained from the national survey, which is free from the restrictions of the locations, are very variable.

The sample sizes of the WIC participants, pregnant and lactating women, respondents who were 90 years and older, Asian and Pacific Islanders (1995 only) and American Indians were found to be too small to make any conclusions. Since the WIC program teaches how to read food labels, and studies on WIC participants and food label reading behaviors are limited, the sample size describable of the WIC population would be desirable in the future DHKS.

2. Reliability of the final constructs (Objective 2)

Thirteen final constructs were established in the reliability tests: 5 nutrition knowledge constructs with reliability ranging from moderate to high (r=0.4-0.8); 7 attitude constructs with reliability ranging from moderate to high (r=0.5-0.9); and 1 frequency of food label use construct with high reliability (r =0.9).

Findings from the present study are comparable with the results reported by Sapp et al (1997) who used the DHKS 1989-1991. DHKS 1989-1991 included similar types of questions as DHKS 1994-1995. For example, 23 question items of the nutrition knowledge construct created by Sapp and colleagues were comparisons of sources for the cholesterol and fat between two food items and the characteristics of nutrients. Ten question items of knowledge of nutrition and food construct used in this study were comparisons of sources for fat and saturated fat between two food items and the characteristics of nutrients. Although nutrients inquired about in the two studies were different (cholesterol and fat vs. fat and saturated fat), these constructs did inquire about the same information (sources of nutrients and the characteristics of nutrients), and were defined as a nutrition knowledge construct. The reliability of these constructs was less than r= 0.70 (r= 0.58-0.69 during three years in the study by Sapp and colleagues; r= 0.59-0.63 during two years in this study). Thus, knowledge of nutrition and food construct created in the present study was as reliable as the one created by Sapp and colleague with even fewer items. Another construct common between two studies was knowledge of diet-disease relationships construct. The reliability of this construct established by Sapp and colleagues was greater than r= 0.70 from DHKS 1989 to 1991 (r= 0.76-0.81). However, the present study failed to establish the adequate reliability for

this construct. This could be due to the differences in the study design between two studies or inconsistency of the question items in the construct (Appendix E).

Additionally, the present study created 3 knowledge constructs, 7 attitude constructs, and 1 frequency of food label use construct not used in the 1989-1991 DHKS: knowledge of the amount of nutrient content per servings construct (reliability r= 0.4); awareness of the authority of the government to define phrases on the food label construct (reliability r= 0.8); awareness of diet-disease relationships construct (reliability r= 0.7); perceived adequacy of own nutrient intakes which were recommended to decrease construct (reliability r= 0.7); perceived adequacy of own nutrient intakes which were recommended to increase construct (reliability r= 0.5); perceived benefits of using the food label construct (reliability r= 0.8); perceived barriers from using the food label (reliability r= 0.5); perceived easiness to understand the food label construct (reliability r= 0.8); perceived reliability of descriptions on the food label construct (reliability r=0.9); perceived importance of practicing healthy dietary habits construct (reliability r=0.9); and frequency of food label use construct (reliability r= 0.9).

Fullmer et al (1991) reported that consumers were more familiar with the role of fiber might play in the prevention or treatment of certain diseases or conditions than with sources, classifications, and recommended intakes. Viswanathan (1994) reported that verbal presentation of nutrition information was found to lead to a greater degree of usage of such information than numerical presentation. Thus, consumers respond to the nutrition information differently depending on the type of questions. It is possible that nutrition knowledge questions selected by the nutrition experts in this study were not appropriate to measure consumers' levels of knowledge. Or, because knowledge and

attitudes are difficult concepts to measure, researchers may obtain wide range of reliability of knowledge and attitude constructs depending on how they categorize question items into different constructs. For example, knowledge of the Food Guide Pyramid construct expected that respondents answered the number of servings from grains correctly as well as the number of servings from vegetables and fruits, because all question items equally measured the respondents' understanding of the Food Guide Pyramid. On the other hand, for the knowledge of nutrition and food construct, all question items were expected to equally measure the respondents' understanding of nutrition and food. Because question items inquiring about the number of servings from dairy products (KQ1c) and meat, poultry, fish, dry beans and eggs (KQ1e) in knowledge of the Food Guide Pyramid construct and question items inquiring about fat (KQ9a, c-f) in knowledge of nutrition and food construct could equally measure respondents' knowledge of fat (One inquires about the adequate amount of intakes of food high in fat, while the other inquired about food sources of fat), those items can be merged to create another construct. To avoid the loss of original information, this study maintained the categorization that the original data used as much as possible. However, it would be interesting to test reliability of constructs with question items that were not tested in this study in the future. Variyam et al (1996) developed statistical equations to compare pairs of knowledge questions such as orange juice/apple and white/whole wheat bread to decide question items that indicated fiber knowledge than other question items. Continuing efforts should be made to develop question items that represent the construct better than the other items and are inconsistent with other items.

3. Validity of final constructs (Objective 3)

Twenty constructs were confirmed for their divergent validity: 5 nutrition knowledge constructs; 14 attitude constructs; and 1 frequency of food label use construct. Low correlation (r=0.3) in the divergent validity test between perceived importance of practicing healthy dietary habits construct and awareness of diet-disease relationships construct created from DHKS 1994-1995 correspond to findings reported by Contento et al (1990) and Shepard et al (1987); knowledge did not related to behaviors directly, but only indirectly through attitudes, intentions, or perceived threats to health. Moderate correlation (r=0.6) between perceived benefits of using the food label construct and frequency of the food label use construct corresponded to Fishbein & Ajzen's (1975) theory of reasoned action; behaviors could be predicted by the individual's intention to perform that behavior. Thus, the final constructs were not strongly related to each other, representing different characteristics, although some of constructs were related each other corresponding to the theories established in the past. Further studies are necessary to understand the detail of these relationships.

Discriminant validity successfully confirmed the validity of 8 final constructs (4 nutrition knowledge constructs, 3 attitude constructs, and 1 frequency of food label use) for their ability to sort respondents into different subgroups corresponding to 14 out of 17 criteria established from the findings and theories from the past studies on food label use and dietary habits (See the method of discriminant validity). For example, the first criteria was that females were more knowledgeable about nutrition than males (Levy et al, 1992; Ernst et al, 1986; Jensen, 1992). Knowledge of nutrition and food construct, knowledge of the Food Guide Pyramid construct, and awareness of diet-disease

relationships construct created from DHKS 1994 and 1995 corresponded to this criteria. The sixth criteria was that higher-income respondents were more knowledgeable about nutrition than lower-income respondents (Morton et al, 1997; Frazao et al, 1994; Smallwood et al, 1994). Knowledge of nutrition and food construct and awareness of diet-disease relationships construct created from DHKS 1994 and 1995 corresponded to this criteria.

In addition, significant differences were seen in other constructs among various subgroups. Mean scores differed significantly in knowledge of nutrition and food construct in 1994 and in awareness of diet-disease relationships in 1995 depending on the hour of TV watching. This result is comparable with the study reported by Carlson and Gould (1994), who reported that the relationship between the hours of watching TV and nutrition knowledge was positive. Another example was that meal planners/preparers used food labels significantly more frequently than non-meal planners in the present study. This result is comparable with the study conducted by Woolcott et al (1983), who reported that men who participated in food preparation reported more changes in diet towards the recommended dietary goals. Because meal planners/preparers tend to be females, the effect of being a meal planner on the food label use and dietary habits should be examined.

People who were on a weight loss/low calorie diet or low fat/cholesterol were willing to learn more about the food label significantly more than those who were not on either diet in the present study. This example is comparable with the study by Bender et al (1992) who reported that those who were on a low-sodium diet used the list of ingredient more frequently than those who were not on this diet.

Thus, validity of final constructs was confirmed based on the findings and theoretical models on food label use and dietary habits established in the past. However, past findings and theoretical models on food label use and dietary habits were limited in certain aspects of nutrition knowledge, attitudes, food label use, and dietary behaviors. There are few studies that examined nutrition knowledge, attitudes, food label use and dietary intakes simultaneously. Also, theories used in the past were limited to certain populations and underestimated the effects of individual characteristics and situational differences. For example, health belief model successfully established that health behaviors were determined by people's belief of their susceptibility to a particular disease (Becker, 1974). This model, however, hasn't been applied to the frequency of food label use, which can be possible by using the presence of diagnosed disease in DHKS 1994-1995. Fishbein and Ajzen's (1975) theory of reasoned action explained that behaviors could be predicted by an individual's intention to perform that behavior. Saunders and Rahilly (1985) concluded that attitudes toward the behavior predicted the intention of reducing fat and sugar intakes of university health majors, but subjective norms predicted the intakes of non-health majors in this study. Thus, variables within a same theory predict the behaviors differently depending on subjects. Willingness to learn more about the food label construct in DHKS 1994-1995, for example, can be used to represent this theory along with other factors and subgroups not examined in the past. On the other hand, Belk (1985) suggested that habits and situational factors explained why intention wouldn't determine behaviors. According to Belk, if the behavior is a habit, factors involved in the behavior differ from those involved in a behavior taken for the first time. The enactment of the food label in 1994 could be a situational factor affecting on

respondents' knowledge, attitudes, and use of the food label. By monitoring the responses to the food label related constructs in the future DHKS, one might be able to contribute some information to this question.

Another recent argument among several health behavior researchers was that there were similarities and overlaps in many of the variables defined by these theories (Commings et al, 1980; Janz and Becker, 1984; Rosenstock et al, 1988). As already described above, some of question items and subgroups used in theoretical models on the food label use and dietary habits established in the past were included in DHKS 1994-1995. Thus, integrating different theories together was suggested (Colavito and Guthrie, 1996; Wallston and Wallston, 1984; and Rosenstock et al, 1988). Reliable and valid constructs created from DHKS 1994-1995 can contribute to understand the relationships between nutrition knowledge, attitudes, use of the current food label and individuals' dietary habits relative to behavioral theories and models. During this process, the definition of variables is particularly important and has to be specific rather than to be general, so that nutrition educators can plan specific strategies for each targeted population. Food label related questions in DHKS 1994-1995, for example, will be specific examples of how people assessed new nutrition information, how much they understand them, and how frequently and what information on the food label they used to improve their diet.

As a summary, 5 nutrition knowledge constructs were tested either for their reliability or validity or for both. Four out of 5 final nutrition knowledge constructs established in this study (knowledge on the Food Guide Pyramid, knowledge on nutrition and food, knowledge on the amount of nutrient content per servings, and awareness of

diet-disease relationships) were either moderately or highly reliable, and their divergent and discriminant validity were confirmed. The other nutrition knowledge construct (awareness of the authority of the government to define phrases on the food label) was highly reliable, and its divergent validity was confirmed. Since there was no criteria, discriminant validity of this construct was not obtained.

Fourteen attitude constructs were tested either for their reliability or validity or for both. Perceived importance of practicing healthy dietary habits construct was highly reliable, and its divergent and discriminant validity was confirmed. Six attitude constructs (perceived adequacy of own nutrient intakes which are recommended to decrease, perceived adequacy of own nutrient intakes which are recommended to increase, perceived benefits of using the food label, perceived barriers from using the food label, perceived easiness to understand the food label, and perceived reliability of descriptions on the food label) were moderately or highly reliable, and their divergent validity was confirmed. Since there was no criteria, discriminant validity of those constructs was not obtained. Divergent and discriminant validity of perceived importance of the food construct was confirmed. However, since there was no more than one item in this construct, reliability of this construct was not obtained. Divergent validity of 6 attitude construct (perceived adequacy of own weight construct, perceived importance of food safety, perceived importance of how well food keeps, perceived importance of easiness of food to prepare, perceived importance of the taste of the food, willingness to learn more about the food label) was confirmed. However, since there was no criteria and was no more than one item in this construct, discriminant validity and reliability of this construct were not obtained. Frequency of food label use was highly

reliable, and its divergent and discriminant validity was confirmed. As far as applying those constructs to the future studies, all constructs are reasonable as long as the user recognizes the limitations of each construct.

4. Changes in nutrition knowledge, attitudes and use of the food label in the U.S. between 1994 and 1995

The result from the comparisons between DHKS 1994 and 1995 showed that:1) respondents in DHKS 1995 answered to the question of relationship between calcium and cavities/caries, and tooth problems significantly more correctly than respondents in DHKS 1994; 2) respondents in DHKS 1995 perceived barriers from using the food label significantly less than respondents in DHKS 1994; 3) respondents in DHKS 1995 used health claims on the food label significantly more frequently than respondents in DHKS 1994; 4) respondents in DHKS 1995 perceived the importance of maintaining health weight significantly more than respondents in DHKS 1994. Thus, some aspects of individuals' nutrition knowledge and attitudes toward healthy dietary behaviors were improved between 1994 and 1995.

One piece of information added to the food label enacted in 1994 was the health claim. It was interesting to see the increase of the use of health claims and the decrease of perceived barriers from using the food label between 1994 and 1995. This result was not surprising, because various shelf-labeling and point-of-purchase campaigns would have caught consumers' attention, and consumers usually requested additional nutritional information (Schucker et al, 1992; Burton et al, 1994). Jacoby (1977) reported, however, that most nutrition information would not be comprehended once it was received, because such information was not coupled with comprehensive programs of education for

consumer to help them apply them into their dietary behaviors. Even for the nutrition education program conducted by Schucker et al (1992) which was successful, Schucker and colleagues concluded that the lasting effect of the program was unknown. Thus, use of the information on the food label and dietary behaviors among consumers should be monitored. Examination of frequency of the information use on the food label revealed that people used the information of fat on the food label most frequently, followed by the information of calorie in both 1994 and 1995. This indicated that the effort of sending the messages to reduce fat intake of the U.S. population by the public community for several decades seemed to be effective. Because many factors involved in individuals' nutrition knowledge, attitudes, and food label use, it is not appropriate to conclude that these improvement was due to the 1994 enactment of the new food label. Further studies are necessary to examine whether these changes were due to the 1994 enactment of the new food label or due to other factors such as increased individuals' nutrition knowledge or increased individuals' perceived benefits of using food labels.

The majority of people were aware of the six out of seven dietary behaviors/physical conditions that could cause health problems. Most known physical condition by people was overweight, followed by eating too much cholesterol, too much salt and too much fat. On the other hand, the dietary behavior which least people were aware of was not eating enough fiber. Same questions were asked in DHKS 1989-90. Compared to the responses in DHKS 1989-90, more people recognized the potential risks of eating too much cholesterol (87% in 1989-90, 89% in 1994, and 90% in 1995, respectively), eating too much fat (76% in 1989-90, 88% in 1994-95, respectively), and not eating enough fiber (54% in 1989-90, 64% in 1994, and 66% in 1995, respectively)

(Frazao and Cleveland (1994); and Smallwood and Blaylock (1994)). Among knowledge of the Food Guide Pyramid construct, less than 10% of respondents could answer the number of servings from grain group correctly. These results suggested that people had less knowledge on dietary fiber, and the nutrition campaigns such as 5 a day program should be encouraged to help people recognize the importance of increasing dietary fiber in their diet. More than 60% of respondents could link diet-disease relationships such as: eating too much fat and arteriosclerosis; not eating calcium and bone problems; and being overweight and arteriosclerosis. All of those responses were higher than responses from past DHKS (eg. 74% of respondents were aware of the link between not eating enough calcium and bone problems in 1995, while 51.1 % of respondents were aware of this link in 1991) (Sapp and Jensen, 1997). However, few could link other diet-disease relationships such as eating too much fat and obesity/overweight and not eating enough fiber and arteriosclerosis. Similar results were reported by Sapp and Jensen (1997) in DHKS 1989-1991. More than 60% of people could answered most of knowledge questions that were comparisons of sources for fat and saturated fat between two food items. Similar results were obtained by Sapp and Jensen in DHKS 1989-91 with the questions regarding to the comparisons of food items high in fat. However, less than 30% of respondents knew the adequacy of the amount of nutrients inquired. Understanding what type of nutrition knowledge would help people to improve their diet is important as well as creating question items to characterize nutrition knowledge. Effort should be made to identify the type of knowledge questions which distinguish people who practice healthy diet from those who don't practice healthy diet in the future study.

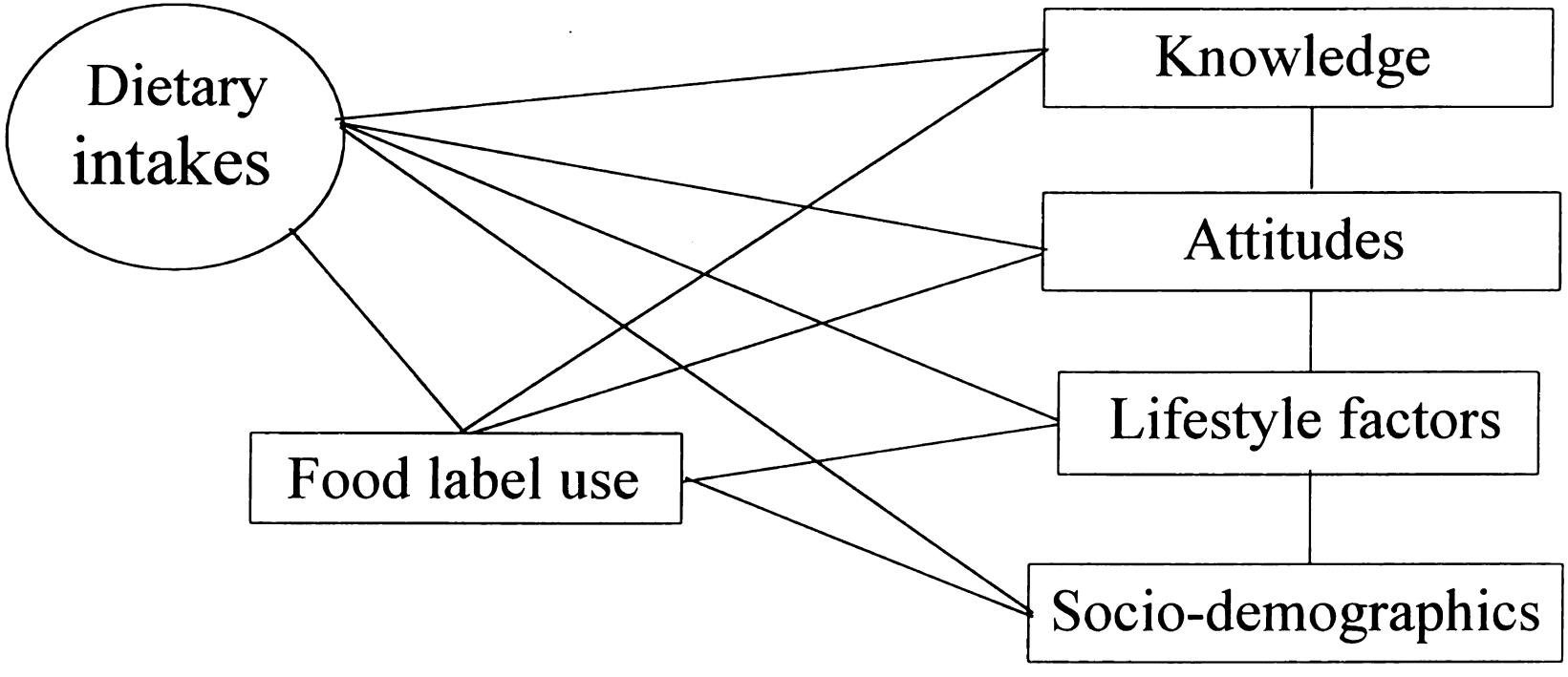
Mean score obtained from the DHKS 1994-1995 respondents indicated that they perceived practicing healthy dietary habits somewhat important. They also perceived some degree of benefits of using the food label.

Chapter Six

RECOMMENDATIONS FOR THE FUTURE STUDY

The next step is to examine the relation among nutrition knowledge, attitudes, use of food labels, and dietary intakes built on the findings of the current study. In the past studies, nutrient was used extensively to assess individual diet quality, the major measurements as the mean adequacy ratio and percentage of Recommended Dietary Allowance (RDA). Many of the studies, however, limited nutrients to total fat and/or saturated fat, cholesterol, and/or sodium (Kennedy et al, 1995). Because people consume various foods, it is not a realistic approach to consider that a limited number of nutrients would represent the individual diet quality. Thus, the first recommendation for the future research is to use a dietary index which measures both quality and quantity aspects of diet such as Healthy Eating Index (Kennedy et al, 1995). The recommendation is to use path analysis to examine the relation among nutrition knowledge, attitudes, use of food labels and dietary intakes. General regression analysis examines direct affects only on a dependent variable from each independent variable. Path analysis on the other hand, examines the affect of an independent variable to another independent variable. Since nutrition knowledge, attitudes, use of food labels, and dietary intake are interrelated, and indirect relationships may exist among these factors, path analysis would appropriately assess the relationships among the variables (Fig 1).

Fig1. Path analysis on the relationship between nutrition knowledge, attitudes, food label use and dietary intakes



APPENDICES

APPENDIX A

STUDIES ON NUTRITION KNOWELDGE, ATTITUDES, AND DIETARY BEHAVIORS IN RELATION TO VARIOUS FOOD LABEL FORMATS AND EDUCATION PROGRAMS BEFORE THE 1990 NUTRITION LABELING EDUCATION ACT (NLEA)

Appendix A. Studies on nutrition knowledge, attitudes, and dietary behaviors in relation to various food label formats and education programs before the 1990 Nutrition Labeling Education Act (NLEA)

Authors	Description of the study	Results & others
Burton et al (1993)	Study was conducted to assess some changes resulting from NLEA (type of nutrition labels, nutr. values, and presence of a nutrition warning, etc) on macaroni and cheese products. Convenience sample of non-student subjects 18 yrs. of age or older who are grocery shoppers (n=343). **Variables** type of nutr. label (current label, NLEA, Consumer Reports), values, presence of a nutrition warning, nutrition attitudes, perceptions of product nutritiousness, product purchase likelihood	**The effect of changes in labels required by the NLEA on respondents' attitude, perception and product purchase likelihood** The type of nutr. label recommended by the NLEA can significantly affected respondents' attitudes and perceptions of nutrition and product purchase likelihood. **Nutritional value and warning** Respondents' attitude, perception and product purchase likelihood varied depending on the nutritional value conditions (good, moderate, and poor). The inclusion of a warning on the label had no effect on respondents' attitude, perception and purchase likelihood. **Perceived importance of the specific nutr. info** Amount of total fat, calories and cholesterol. were perceived of greatest importance followed by amounts of saturated fat, calories from fat and sodium Percentages were viewed of less importance than absolute amounts. These importance ratings were generally consistent with changes specified in the NLEA of 1990. **Demographics vs. perceived importance** Demographic variables such as age and sex significantly affected perceived importance; women perceived importance of inclusion of all suggested info. on FL than men; Older subjects perceived importance of inclusion of various info. than younger subjects.

FL=food label. NS=Not significant

Authors	Description of the study	Results & others
Levy et al (1992)	The study was conducted to compare performance and preference for five different nutr. label formats. Food shoppers over 18 yrs old (n=1460) at shopping mall. **Variables** presence of nutrition profile info., adjective description, daily reference values, graphic format, age, education, race, gender, presence of household members who practice special diet, health status of household members, intake of sodium, fat and cholesterol, accuracy of understanding info. , time required to understand the info., preference	**The effect of formats on accuracy, task times for the food selection and preference** Accuracy and time spent to process the info. differed by formats. Format was strongly related to preference, but none of formats became a consensus choice for most or least helpful for food selection. The subjects' ability to recognize true differences between products was affected more by type of nutrients than by formats. **Age vs. accuracy and task time** Older subjects tended to have lower accuracy scores and to take longer time for the task than younger subjects. **Education vs. accuracy and task time** People with lower level of education had lower accuracy and took longer time for the task than those with higher education. **Race vs. accuracy and task time** Nonwhites had lower accuracy and took longer time for the task than others. **Gender and race vs. accuracy** Men and nonwhites were less likely to judge nutrition quality correctly.

FL=food label. NS=Not significant

Authors	Description of the study	Results & others
Levy et al - Cont'd		**Household status vs. performance** ~NS **Dieting behaviors vs. performance** ~NS **Frequency of FL reading vs. performance** ~NS **Gender and frequency of FL reading vs. familiarity with FL** Gender and frequency of FL were reasonable surrogates for familiarity w/ current FL (female and people who read FL frequently were more familiar w/ F than male and people who didn't read FL frequently) **Demographic vs. preferences toward different formats** Only gender was related. **Nutrients vs. accuracy** The accuracy rate was highest for sodium, energy, and cholesterol and lowest for energy from fat, saturated fat, Ca, and Vit C.

FL=food label. NS=Not significant

Authors	Description of the study	Results & others
Burton et al (1994)	Study was conducted to determine if consumers' perception and evaluation of nutr. info. were affected by certain provisions associated with NLEA. **Variables** label format (pre-NLEA, simplified NLEA, adjectival, percentage formats), presence of reference values, nutr. knowledge and perceived product nutritiousness, nutrition beliefs about the product, nutrition attitudes and product purchase likelihood,	**The effect of different formats toward awareness on accuracy** Awareness of whether the product contained more than recommended amts. of negative nutrients differed depending on formats; accuracy was highest for the adjectival condition and decreased for the % condition. **The effect of amount of info. on understandability** The result suggests some potential negative consequences of attempting to provide too much detail info. on nutr. label (e.g. the % format may contain more info. than desired by many consumers in this study). **The effect of reference values & nutrition info. on likelihood of purchase** Inclusion of info. of products which were considered as highly nutritious (low i fat, saturated fat, protein and cholesterol and high in carbohydrates) increase the likelihood of purchase, whereas info.of products which were considered as negative (high in fat, saturated fat, protein, cholesterol and low in carbohydrat decreased the likelihood of purchase. **The effect of knowledge on likelihood of purchase** Consumers w/ high knowledge had higher evaluation and purchase likelihood of a product with high nutr. value and lower evaluation and likelihood of a product w/ low nutr. value.

FL=food label. NS=Not significant

Authors	Description of the study	Results & others
Geiger et al (1991)	This shopping mall intercept study estimated the effects of changing multiple levels and combinations of nutr. info. format, load (amount of info.), expression, and order on consumers' perceptions of label usefulness in purchase decisions. Consumer preferences for 12 label alternatives produced on Cambell's soup cans were examined. n=252 aged 18 and older H1: Consumers will have a greater preference for a bar graph format than the traditional format. H2: Consumers will prefer a bar graph/ nutrient density format as much as, if not more than, the traditional format. H3: Consumers will have a greater preference for the most nutrition info. load than the some nutrition info. load.	**Consumer preferences** H1 was supported. The first half of H2 was supported, but the second half was not supported H3 was supported. Consumers clearly preferred the nutr. label that displayed all nutr. values usin a bar graph format, offered the most info. load, and expressed nutr. values usi both absolute numbers and percentages. **Reasons not using and using food labels** Lack of time (37%) and confusing info. (27%) are reasons for not using FL. Consumers read food labels to avoid certain nutrients.

FL=food label. NS=Not significant

Authors	Description of the study	Results & others
Geiger et al (1991) -Cont'd	**Variables** Info. format (traditional, bar graph, bar graph nutr. density), nutr. info load (some, more, most), nutr. info. expression (traditional, absolute numbers, both absolute numbers and percentages), nutr. info. order (traditional order, rearranged), marriage status, sex, education, nutrients which respondents look for, nutrients which respondents consider as useful, reasons for not using labels, frequency of food labels	
Muller (1985)	Experiments were conducted at supermarkets to test the four hypotheses;	H1 was supported; introducing nutrition information into the supermarket in a brand-by-nutrient sign format increased nutritiousness of consumer purchases.
	H1: Sales will shift toward nutritionally higher ranked brands whenever nutr. info is pretended as a brand-by-nutrient format on a single point-of-purchase sign.	H2 was partially supported; consumers tend not to incorporate nutr. info. in th their purchase decisions if differences among brands are below some minimal level. However, once the minimum level has been reached or exceeded, the extent of nutr. info. use is unrelated to the degree of variation among brands.
	H2: The shifts in sales toward nutritionally higher ranked brands is directly proportional to the average variation among brands disclosed by the signs.	H3 was not supported. H4 was not supported.

FL=food label. NS=Not significant

Authors	Description of the study	Results & others
Muller (1985) - Cont'd	H3: The shift in sales toward nutritionally higher ranked brands depends on the average consumer importance result in larger shifts than nutrients rated lower in importance. H4:Increasing the amount of nutrition info. on point-of-purchase signs decreases the shift in sales toward nutritionally higher ranked brands. brands. **Variables** info. format, variation among brands, nutrient importance, amt. of info., the use of info. in purchase decision	

FL=food label. NS=Not significant

Authors	Description of the study	Results & others
Ernst et al (1986)	"Foods for Health" sponsored by the National Heart, Lung and Blood Institute (NHLBI) and Giant Food Inc. is a point-of-purchase cardiovascular nutr. education program. Program's effectiveness, and consumer's awareness, knowledge and food purchase behaviors before, during and after the campaign were determined. The program was conducted in Washington DC area w/ Baltimore, Maryland area stores as controls. Nutrients emphasized were fat and cholesterol. **Variables** the level of exposure, age, sex, having a family member on a special diet, education, interest of outside groups, knowledge and awareness about fat and cholesterol, food purchase habits, food sales.	**Respondent's knowledge** In Washington DC where program was conducted, there were increases of 4% in correct answers to questions about fat and cholesterol contents in foods. 5.8% in correct answers to questions about dietary fat-serum cholesterol relationship. **People's interests** There was an increase in consumer's awareness of the program and requests for program info. **Food sales attributable to the intervention** ~ NS **Knowledge vs. demographic data** Being females, older respondents w/ higher education levels, and respondents w/ a family member on a special diet had positive effects on knowledge. Although there were significant increases in knowledge of fat, cholesterol, and related problems and awareness toward the program, there was not significant difference in food purchase behaviors.

FL=food label. NS=Not significant

Authors	Description of the study	Results & others
Mullis et al (1987)	The effectiveness of Shop Smart for Your Heart is an in-store shelf labeling program was examined. Materials used included flyers, shopping lists, and publication which contained nutr. info. on various food products. Taste testing which allowed consumers tried sample heart healthy recipes were also conducted. Nutrients emphasized were fat and sodium. Samples were collected after one month (T1) in Mankato (n=154) and after four months (T2) in Fargo-Moorhead (n=221), respectively. Those were population based, not store based. Thus, data indicate the effect on overall population and not just those people w/ known program exposure. **Variables** awareness of the program, effect of programs on behaviors.	At T2, 27% of interviewees reported the labels influenced their food choices, and in Fargo-Moorhead 41% reported that the signs changed their food choices.

FL=food label. NS=Not significant

Authors	Description of the study	Results & others
Jeffery et al (1982)	The study was conducted to determine the feasibility of nutr. education programs at eight supermarkets in the Twin Cities metropolitan area. Campaign was designed to inform shoppers of the fat content of various foods and to help them make food choices consistent w/ good cardiovascular health. **Variables** Effectiveness of poster, recipes, and brochures, education, knowledge, product sales	**Changes in knowledge** The score of posttest was sig. higher than the one of pre-test. ~ NS b/n experimental and control groups. **Education vs. knowledge** Positive relationship. **Changes in product sales** ~ NS for product sales effect due to the education campaign.

FL=food label. NS=Not significant

Authors	Description of the study	Results & others
Schucker et al (1992)	Following the previous success of a program in Washington DC, point-of-purchase labeling program was conducted. This program consisted of brand-specific nutrition shelf-tags and a supplementary explanatory booklet. Nutrients flagged were sodium, fat, calories, cholesterol and a 2:1 or greater ratio of polyunsaturated to saturated fat. **Variables** education, age, income, race, concerns about nutr., health status of family members, purchase behaviors in the 16 food categories that were included in original program to see the effect of the program for the first time and its continuos effect), purchase behaviors in the new 29 food categories w/ different No. of flagged nutr. to see the effects of increasing the No. of flagged nutr.	**Purchase behaviors** Market shares of shelf-tagged products increased in Baltimore stores in 8 of 16 product categories that had been included in the original program in Washington. Shoppers purchases tended to be influenced by the No. of featured nutrients as well as by the nature of the nutrients themselves. **FL use vs. demographic data** Shoppers concerned about nutrition and healthy status of family members were more highly correlated with label reading than were education, income and age.

FL=food label. NS=Not significant

Authors	Description of the study	Results & others
Davis-Chervin et al (1985)	This study examined the effect of point-of-choice nutrition information program without tangible incentives. Study was done in 2 cafeterias: 1) cafeteria w/ both nutrition sign (providing general nutr.info. and recommendations for changing food selections) and nutrient display cards (info.of the No. of calories, mg of cholesterol and so on) 2) cafeteria w/ only nutrient display cards Study was conducted in two dormitories for an academic year. **Variables** presence of education signs and nutrient display cards, choices of the low-cholesterol, -fat, and -calorie entrees	Food selection behavior was influenced only in the first cafeteria.

FL=food label. NS=Not significant

Authors	Description of the study	Results & others
Davis-Chervin et al (1985)	This study examined the effect of point-of-choice nutrition information program without tangible incentives. Study was done in 2 cafeterias: 1) cafeteria w/ both nutrition sign (providing general nutr.info. and recommendations for changing food selections) and nutrient display cards (info.of the No. of calories, mg of cholesterol and so on) 2) cafeteria w/ only nutrient display cards Study was conducted in two dormitories for an academic year. **Variables** presence of education signs and nutrient display cards, choices of the low-cholesterol, -fat, and -calorie entrees	Food selection behavior was influenced only in the first cafeteria.

FL=food label. NS=Not significant

Authors	Description of the study	Results & others
Mullis et al (1988)	"Lean Meats Make the Grade", a collaborative nutrition intervention program involving the Minnesota Heart Health (MHHP) and meat producer council, evaluated for its effect on people's awareness, knowledge and belief among respondents. The program was conducted at grocery stores in Mankato, MN and Fargo/ Moorhead. Responses were collected through telephone surveys. **Variables** age, education, price, awareness of the program, knowledge of lean cuts and low fat preparation methods, beliefs that lean meats are tasty, easy to prepare, and can be incorporated into low-fat diet, attitude about reliability of nutr. info., sales.	**Awareness vs. age and education** ~ NS **Awareness of the program** Although significantly more Mankato and Fargo/Moorhead than comparison respondents were aware of a lean meats labeling program in their community, the proportion citing awareness of such a promotion was high in both communities. **Beliefs vs. age and education** The least favorable beliefs were held by those over 55 yrs. of age and by those with high school education or less. **Sales data** Meat price had much greater influence on meat sales than did nutrition info.

FL=food label. NS=Not significant

Authors	Description of the study	Results & others
Jacoby et al (1977)	The objective of this study was 1) to measure actual info. acquisition behavior in purchase decision; 2) to test the proposition that consumers do not generally understand nutr. info. Nutr.chosen for questionnaire are calories, carbohydrate, fat, and protein. **Variables** age, education, knowledge, status of being a meal planner, attitude	**Age vs. knowledge** Older < younger **Education vs. knowledge** More education > less **Meal planners vs. knowledge** Positive effect of being a meal planner **Meal planner vs. attitude to use nutr. info.** Positive effect of being a meal planner **Attitude vs. knowledge** Majority of consumers say they want and are willing to pay for nutr. info., but neither acquire such info. when making a purchase decision nor comprehend nutr. info once they receive it.
Cole et al (1990)	Objectives in this study include: 1) To extend the growing literature on the older consumer by testing hypotheses about the extent to which age-related declines in cognitive style interfere with older adults' ability to use nutr. info. 2) To test whether deficits related to age and cognitive style can be overcome by training consumers and providing a perceptual aid	**Age vs. field dependency and accuracy** The elderly are more likely to be field dependent (have hard time to distinguis relevant info. from irrelevant info.) than the younger. Younger subjects had higher accuracy than older subjects. **The effect of perceptual aid on accuracy** The perceptual aid reduced decision time for everyone and improved accurac for subjects with high field dependence.

FL=food label. NS=Not significant

Authors	Description of the study	Results & others
Cole et al (1990) - Cont'd	3) To provide a more thorough understanding of how all consumers- regardless of age- obtain and use nutr. info. Cereals were used as food product. **Variables** age, field dependency (people with field dependency experience difficulty in distinguishing relevant info. from irrelevant info), presence of perceptual aid, nutritional awareness, cereal use, accuracy, decision time	**Cereal intake vs. age** Older subjects consumed more cereals than younger subjects.

FL=food label. NS=Not significant

Authors	Description of the study	Results & others
Russo et al (1986)	2 components were conducted to reduce consumer's info-processing costs (collection, comprehension, and computation of info) of comparing foods;1) the effect of lists of vitamins and minerals on knowledge and purchase 2) the impact of a list of added sugar - a negative component of food **Variables** presence of summary information (lists of vitamins and minerals, lists of added sugar), age, education, income, knowledge, attitudes, actual purchase behavior.	**Knowledge vs. demographic variables** The impact of the info. was greatest on those people who most needed it (e.g.people who need to eat fewer calorie). **The effect of lists of vitamins and minerals on knowledge, attitude and purchase behaviors** It increased nutrition knowledge and attitude but had no influence on actual purchases. **The effect of lists of added sugar on purchase behaviors** Positive effect Making nutrition information more readily available increased knowledge, although the effects differed by type of knowledge and format.
Viswanathan (1994)	The study was conducted to investigate 1) whether the provision of summary info along with numerical nutr. info. would lead to a greater degree of usage of numerical nutr. info.; 2) whether verbal presentation of nutr. info. would lead to a greater degree of usage of such info. when compared with numerical presentations.	**The effects of summary information** Provision of summary info. along with nutrition info. appears to lead a greater degree of differences in use, healthiness judgement, and recall accuracy whe compared with no summary info. **The effects of verbal presentation** Verbal presentations of nutr. info appear to lead to a greater degree of differences in use, healthiness judgement, recall accuracy when compared wit numerical presentations.

FL=food label. NS=Not significant

Authors	Description of the study	Results & others
Viswanathan (1994) -Cont'd	12 undergraduate students at Midwest Univ were assigned to each of four conditions (nutr. info w/ no-summary; nutr. info. w/ summary in the form of average; nutr. info. w/ summary in form of the range; nutr. info. described verbally) **Variables** verbal description, numerical nutr. info., presence of summary info., rating of healthiness, accuracy of recall the info., time spent on info.	**Time spent on information** The provision of summary info. described numerically or verbally appeared to lead to more time being spent on brand info. and significantly higher scores on both the quality of info. and of judgement measures.
Moorman (1990)	The effects of consumer characteristics and stimulus characteristics (e.g. info. format and content) on the usage of nutrition info. n=180 **Variables** age, education, motivation, the effect of reference info., familiarity, info. processing, decision quality	Both types of characteristics influenced info. processing and decision quality. Stimulus characteristics were founded to facilitate activities such as info. processing, understanding, and decision quality regardless of consumer differences in general. Age was found to be positively related to ability to process and comprehensio accuracy.

FL=food label. NS=Not significant

APPENDIX B

STUDIES ON THE RELATIONSHIP AMONG INDIVIDUALS' SOCIODEMOGRAPHIC CHARACTERISTICS, NUTRITION KNOWLEDGE, ATTITUDES, FOOD LABEL USE, AND DIETARY HABITS

Appendix B. Studies on the relationship among individuals' sociodemographic characteristics, nutrition knowledge, attitudes, food label use and dietary habits.

Authors	Description of the study	Results & others
Fullmer et al (1991)	The purpose was to assess consumer's knowledge of current fiber recommendations and attitudes, awareness, and understanding of health claims on breakfast cereal labels. Respondents (n=241) recruited from four grocery stores of a local chain in Utah during March and April 1989. **Variables** education, knowledge on fiber (functions, classifications, and possible role of fiber in certain diseases), attitudes toward health message.	**Education vs. attitudes toward health claims** Positive relation **Education vs. understanding of diet-disease-related message** Positive relation **Fiber knowledge vs. attitudes toward health messages on FL.** Positive relation **Understanding of health message vs. attitudes toward health message.** Positive relation **Consumer's knowledge** Low. Consumers were more familiar w/ the role of fiber preventing certain diseases or conditions than w/ sources, classifications, and recommended intake of fiber. **Frequency of FL use** Concerned of perceived risks w/ negative nutrients (energy, cholesterol, saturated fat, salt, or sugar) than with positive nutrients (protein, vitami minerals). The respondents reported reading ingredients, sugar, calories, cholesterol, food additives in order. Fiber was ranked tenth.

FL=food label. NS= not signifincant

Authors	Description of the study	Results & others
Bender et al (1992)	Four FDA Health and Diet Surveys conducted in the 1980s were used to estimate trends and No. of consumers who paid attention to ingredient lists and FL. National Health and Diet surveys by FDA over the past 10 yrs. (1982, 84, 86, 88) n=7200. Data related to FL were from about n=1000 in 82, 84, 86, and n=400 in 88. **Variables** sex, age, education, race, use of special diets, income, education, status of being a meal planner, level of nutrition knowledge, nutrients consumers looked for, awareness, health status, year, attention to ingredient lists and nutrition labels, use of ingredient info. to avoid using a particular ingredient.	**((Results related to list of ingredients))** **1982-88** No net increase in consumer attention to ingredient lists between 82-86. **Nutrients info most frequently used b/n 1986-88** NS for sodium, sugar and preservatives. Significant increase for the info. of fats/oils and cholesterol to avoid. **Use vs. Demographic data** Year, age, sex, education and the presence of low-sodium diet had significant effects on list of ingredient usage. Income, race or existence of high blood pressure didn't have significant effects on list of ingredient usage. A growing proportion of less-educated consumers (less than high school) was narrowing the gap of education level for the use. **1984-88** **Use vs. Demographic data** Year, age, sex, education, obesity, the presence of low-cholesterol and low-sodium diets, knowledge about fat, and knowledge had significant effects on list of ingredient usage. Income, race or presence of high blood pressure had no significant effects on list of ingredient list usage.

FL=food label. NS= not signifincant

Authors	Description of the study	Results & others
Bender et al (1992) -Cont'd		**((Results related to Nutrition labels))** **1982-88** Significant increase of use during 1982-88. **Use vs. Demographic data** Year, age, sex, education, presence of low-sodium diet, w/race nested i year because of a significant interaction with year had significant effect on nutrition label usage. Income or presence of high blood pressure had no significant effects on nutrition label usage **1988** Age, gender, race, presence of low-cholesterol or -sodium diet, dietary changes to prevent heart disease had significant effects on nutrition label usage. Income, education, high blood pressure, obesity, knowledge of fat, had no significant effects on nutrition label usage. **((Results from both list of ingredients and Nutrition labels))** Sig. decrease in use only list of ingredient during1982-88. **Use vs. Demographic data** People who paid attention to ingredient lists but not labels were likely to be older (55yrs≥), non-white and male. People who paid attention to ingredient lists but not labels were less likely to be on a self-initiated low-sodium diet, but may be on a doctor-prescribed low-sodium diet or to have been told at least once that they had high blood pressure.

FL=food label. NS= not signifincant

Authors	Description of the study	Results & others
Bender et al (1992) -Cont'd		People who read label but not list of ingredient tended to be younger (<25 yrs) and less educated. People who used both types of info. tended to be younger (25-34 yrs), white, female and better educated, people who followed a doctor-prescribed or self-initiated low-sodium diet. People who paid attention to neither were more likely to be older, non-white, male, less educated and to follow a low-sodium diet.
Guthrie et al (1995)	Study was conducted to characterize people who used FL and to evaluate the effects of FL use on their diet quality. 1989 CSFII & DHKS were used.	**Dietary habits vs. FL users** People who used FL appeared to consume higher Vit.C and lower cholesterol intakes. **FL use vs. education and income** Positive relation **FL use vs. age** Most prevalent in the middle-age group (35-54 yrs) and least common among the youngest and the oldest. **FL use vs. sex** Female were more likely to use FL. **FL use vs. living with others** People living w/ others were more likely to use FL.

FL=food label. NS= not signifincant

Authors	Description of the study	Results & others
Guthrie et al (1995) -Cont'd	**Variables** education, sex, race, age, region, urbanization, health concern (special diet, belief that it is important to maintain a desirable weight), employment, food stamp participation, household types, attitudes, importance, knowledge, product attributes (taste, nutrition, product safety, price, easiness to prepare,etc) likelihood of using nutr. labeling, dietary intake.	**FL user vs. special diet** Positive relation **FL use vs. knowledge** Positive relation **FL use vs. belief that following the Dietary Guideline is important** Positive relation **FL use vs. concern about nutrition and product safety** People who concerned about were more likely to use FL. **FL use vs. concern about taste** People who concerned less about taste were more likely to use FL. **FL use vs. importance** FL users showed significantly higher importance scores on both the AVOID (nutrients recommended to avoid) and APPROACH (dietary habits recommended).

FL=food label. NS= not signifincant

Authors	Description of the study	Results & others
Michel et al (1994)	Study was done to evaluate food label related habits, attitudes and knowledge among WIC participate women. Women (n=69) waiting in the rooms of two Northern Virginia WIC clinics. All subjects were low-income, primary food shoppers, 18 yrs. of age or older, literate, and pregnant, lactating, and/or had small children. **Variables** age, education, race, existence of chronic diseases, food label related knowledge, attitudes, frequency of food labels, etc.	**Frequency of food label use** Nearly all of the participants (89%) reported that they "almost always" o "sometimes" read the food label when purchasing a food product for the first time. **Nutrients people look at.** Over 70% of respondents reported that they read info. of calcium, calories and carbohydrate. Over 60% of respondents reported that they read info. of cholesterol an fat. Less than 50% of respondents reported that they read info. of fiber, iron protein, sodium and vitamins. **Perceived easiness to understand food labels** Most reported that food labels were either "easy to understand (32%)" or "somewhat easy to understand but could be improved"(41%). **Perceived benefits of food labels** 89% claimed that a product's food label had "a great deal" (47%) or "some" (42%) influence on their decision to purchase the product. **Knowledge and label understanding** Only 13% could correctly answered at least 2/3 of the food label related questions. 38% answered less than 1/3 of the questions. Although shoppers seemed concerned with fat in their diet (over 40% looked for fat and cholesterol on the label), most could answer less tha half of the questions on basic facts about dietary fat.

FL=food label. NS= not signifincant

Authors	Description of the study	Results & others
Reid et al (1993)	Consumers' awareness of nutr. info., importance, understanding, and use of ingredient lists, claims and nutrition panels were evaluated as well as what additional info. they wanted on foods. Principal grocery shoppers (n=820) in five cities across Canada. **Variables** household size, composition and income, education, occupation, language, importance of nutrition, importance attributed to nutrition and food labels, importance and usability of the ingredient lists, claims and nutr. panels, product selection w/ actual food packages, understanding and use of the info on food labels.	64% claimed to read FL for nutrition info. 71% read FL when choosing b/n products in the store. **FL use vs demographic** French speaking respondents reported greater usability than English speaking respondents Although statistical analyses were not conducted, older, less educated respondents and adults w/o children were less interested in nutrition. **FL use vs importance** Reported importance of ingredient lists, claims, and nutrition panels wer 82, 78, and 74% respectively. People in the committed segment reported a greater importance, usability and understanding for all components of food labels than indifferent segment. **FL use vs reported understanding** Respondents who answered that they understand ingredient lists, claim and nutrition panels were 77, 83, and 71% respectively. **Perceived barriers from FL use** Complexity for ingredient list and panel usage, credibility for claim usag

FL=food label. NS= not signifincant

Authors	Description of the study	Results & others
Reid et al (1993) -Cont'd		Not only do consumers believe the nutrition info. on FL (ingredient lists, claims and nutr. panel) to be important (47, 41 and 37%, respectively), also report a good degree of understanding of the info. The claim seem best understood, the nutrition panel the least (ingredient lists, claims and nutr. panel ; 38, 45 and 34%, respecti **FL use by contents** Reported FL use of ingredient lists, claims, and nutrition panels were; 78, 75, and 70%, respectively 59% of respondents did not want additional info. on food labels. 26% suggested improvements to enhance understanding of FL. 71% read food packages as a source of nutr. info. when choosing b/n products in the store. 46% did when buying products for the first time. 19% did in the home. The vast majority determine the fat content of products by using the numerical (gram) or percent fat value of the product. **Perceived benefits of FL use** Very useful for choosing b/n foods (37, 30 and 33% for ingredient lists, claims and nutr. panel, respectively). A significant number of Canadian grocery shoppers are interested in having nutrition info. available for fresh products in the store. Shoppers preferred simple and understandable nutrition info. on FL. (simple terms in easy-to-read and standardized formats).

FL=food label. NS= not signifincant

Authors	Description of the study	Results & others
Morton et al (1997)	The study was conducted to compare the nutrition related knowledge, attitudes, and practices of low- and high- income American consumers with children in the household using data from the 1994 Continuing Survey of Food Intakes by individuals (CSFII) and Diet and Health Knowledge Survey (DHKS).	**Income vs. Low-fat and -cholesterol eating practices** Low-income respondents were significantly less likely to follow low-fat and -cholesterol eating practices than higher income respondents w/ children. **Income with children vs. awareness** Low-income respondents with children were less likely to be aware of diet-disease relationships than higher income respondents w/ children. **Income with children vs. belief that what you eat can make a big difference in your chance of getting a disease.** Lower income respondents with children were less likely to believe than higher income respondents w/ children. **Income vs. food group knowledge** Positive relation **Income vs. importance of following specific dietary recommendations** ~NS **Income vs. importance of nutrition compared with other product attributes** ~NS **Income vs. importance of price, ease of preparation and perishability of food** Negative relation **Nutrition panel use vs. income with children** Significant negative relation in general. However, low-income respondents use info. significantly more than high income respondents.

FL=food label. NS= not signifincant

APPENDIX C

STUDIES ON FACTORS WHICH MIGHT AFFECT ON DIETRY HABITS

Appendix C. Studies on factors which might affect on dietary habits

Authors	Description of the study	Results & others
Colavito et al (1996)	The Objectives were 1) to examine the relationship of household meal planners' diet-health attitudes and nutr. knowledge to their fat and fiber intakes at home and in the total diet and to the fat and fiber intakes of a preschool child in the household. 2) to evaluate whether the relationship to children's intakes was the same as the relationship to the meal planner's intakes. First day of 24 hr. recall & DHKS data from 1989-91 CSFII & DHKS were used. Children aged 2-5 yrs. and meal planners from 478 households. Health Belief Model was applied.	**Place where food were eaten vs. % calorie from fat** ~NS **Place where food were eaten vs. fiber intake** ~NS **Income vs. fat and fiber intakes** ~NS **Attitudes vs. fat & fiber intakes** The more concerned about utility (price, easiness to prepared, etc) , the mor fat consumed. Meal planners who believed their health status were poor consumed significantly less fat. Meal planners w/ great taste and utility concerns consumed significantly less fiber at home and in total diet. Self-rated health status was not associated with fiber intake. **Knowledge vs. fat intake** Meal planners w/ high knowledge score consumed significantly less fat at home, but the relationship of knowledge with total fat intake failed to reach statistical significance. **Knowledge vs. fiber intake** Those with higher nutrition knowledge scores consumed significantly more fiber at home and in the total diet.

FL=food label. NS=not significant.

Authors	Description of the study	Results & others
Colavito et al (1996) - Cont'd	**Variables** attitude (perceived benefits of healthy eating), barriers (utility such as price, perishability, ease of preparation), awareness, health status, knowledge, race, income, education, head of household status, employment status, food stamp participation, region, urbanization, season, day of the week of food intake, meal planner's fat and fiber intakes, children's fat and fiber intakes,	**People's concern** The majority considered that utilization features of food products are important. Taste was considered as important consideration for almost all respondents. **The level of knowledge** The mean knowledge score was relatively high; however, none of the respondents answered all questions correctly. **The level of awareness** Many respondents rated their health status as very good. There was a high awareness that diseases were related to the selected dieta components. **Perception of the effect of dietary changes** Most people agreed that diet could make difference in an individual's risk for disease.

FL=food label. NS=not significant.

Authors	Description of the study	Results & others
Jensen et al (1992)	Study was conducted to measure the impact of health awareness and the level of consumption lead by the advertising campaign on purchases of the dairy products. 1985/86 CSFII (n=947women ages of 19 through 50 yrs) and Calcium Advertisement Tracking survey (CAT) by Market Facts, Inc. under contact w/ the National Dairy Board (n=2996) women ages of 18-54 yrs) were used. **Variables** age, sex, income, race, region, having children under 5 yrs, attitudes & beliefs related to Ca intakes and health, awareness.	**Attitudes vs. likelihood of purchase of dairy products (all dairy products, milk, and cheese)** Significant positive effects, but not on milk. **Age vs. cheese consumption** Negative effect **Sex, awareness and attitudes vs. dairy products** Women with higher awareness and positive attitudes consumed dairy produ and cheese, but not milk. **Being Blacks vs. all dairy products and milk** Negative effect on consumption. **Having children under 5 yrs. vs. consumption of dairy products and milk** Positive effect on consumption. **Region vs. consumption of dairy products** People living in the South were less likely to consume dairy products and mil **The effect of info. on people who are already consuming the products** ~NS

FL=food label. NS=not significant.

Authors	Description of the study	Results & others
Lewis et al (1989)	Based on the social cognitive theory, they developed the model which incorporated factors for social environment (influence from family, friends, media, and health experts), reinforcement (taste enjoyment), commitment, knowledge and attitudes to predict the frequency of consumption of four beverages (milk, skim milk, soda, and diet soda). Middle aged adults (n=457) and college students (709) answered the questions. **Variables** social environment (influences from family, friends, media, and health experts), evaluative definitions (nutr. knowledge, attitudes, related food behavior commitment), non-social reinforcement (taste enjoyment), being adults, being students, frequency of consumption of beverages (milk, skim milk, soda, and diet soda)	Different attitude and belief relationships with consumption were seen depending on products and subgroups or among different attitudes and belie **Taste enjoyment of milk vs. milk consumption** Directly related. **Commitment to select beverage low in fat and sugar vs. milk consumption** For both subject groups, commitment was a considerably stronger negative predictor of whole milk consumption than it was a positive predictor of low/ skim milk consumption. **The media and family scale vs. milk consumption** Some characteristics from those scales directly related to student whole milk consumption. **Taste enjoyment vs. commitment** Taste enjoyment was related to commitment to select beverages low in fat a sugars as well as attitude. **Commitment to select beverages low in fat and sugar vs. soda consumption** Commitment was negatively associated with regular soda consumption. Commitment was positively associated with diet soda consumption. **Taste enjoyment vs. attitude and commitment** Taste enjoyment of soda was associated with attitude toward the acceptabilit of soda and commitment regardless of type of soda or subject group.

FL=food label. NS=not significant.

Authors	Description of the study	Results & others
Frazao et al (1994)	Study described consumers' awareness, knowledge, dietary intakes of fat and cholesterol. The data were from 1989 and 90 CSFII DHKS. Main meal planners/preparers w/ completed 3 days food intake records (n=2880). **Variables** sex, age, ethnicity, health conditions, perceptions, income, education, being on a special diet, knowledge, fat and cholesterol. intakes	**Sex vs. fat & saturated fat intakes** ~NS **Sex v. cholesterol. intake** 4/5 women met recommendation of cholesterol, and less than half of men m recommendation of cholesterol. However, their intakes were different, even though the recommendation is the same. **Age vs. fat, saturated fat, and cholesterol intakes** Over 50 yrs. met the recommendation more than younger meal planners. **Income or education vs. fat., saturated fat and cholesterol intakes** ~NS. **Ethnicity vs. meeting the recommended cholesterol intake** White people met better than black people did. **Ethnicity vs. fat & sat. fat intakes** ~NS **Health conditions vs. dietary change** The existence of the recommendation of a low-fat, -sat.fat or -cholesterol intakes is positively associated w/ being on a special low-fat, -sat.fat, or -cholesterol diets. **Awareness vs. fat,, saturated fat and cholesterol. intakes** ~NS **Awareness vs. gender** ~NS

FL=food label. NS=not significant.

Authors	Description of the study	Results & others
Frazao et al (1994) -Cont'd		**Awareness vs. age** Under age 30 < older meal planners. **Awareness vs. education and income** Positive relation **Awareness vs. race** Whites > Blacks. **Perceptions of adequacy of fat., sat.fat and cholesterol intakes vs. gender** Only 25 % out of people who thought their diets of fat and saturated fat were about right (41%, 49% respectively) actually met the recommendations for f and sat. fat intakes. Both men & women underestimate their fat and sat. fat intakes.

FL=food label. NS=not significant.

Authors	Description of the study	Results & others
Frazao et al (1994) - Cont'd		**Perception of adequacy of cholesterol intake vs. gender** Both men and women tended to overestimate. **Gender vs. knowledge** Women > men. **Ethnicity vs. knowledge** Higher among white than others **Education, income and age vs. knowledge** Positive relation **Being on a special diet vs. knowledge** Positive relation **Sex vs. awareness of fat, sat. fat, cholesterol. and health relationships.** ~NS

FL=food label. NS=not significant.

Authors	Description of the study	Results & others
Glanz et al (1993)	The questionnaire for pretesting in a worksite health promotion interventions funded by the National Cancer Institute (NCI) was conducted to understand psychosocial factors influencing fat and fiber related dietary behaviors and tested its validation. Employees (n=652) from Working Well projects. **Variables** predisposing factors (belief in diet disease connection, perceived benefits of healthy diet, knowledge) enabling factors (perceived barriers to healthful diet, social support, perceived norms for healthful eating), change-related factors (self-rated diet, motivation, interest in changing diet, behavioral intentions to change diet, self-efficacy for changing diet, eating habit changes, experience w/ weight loss attempts), sociodemographic characteristics, behaviors related to nutrition, smoking, and cancer detection.	**Self-rated diet vs. fat and fiber intakes** Strongly associated. **Previous success at changing diet vs. fat and fiber intakes** Strongly associated. **Motivation to eat low foods vs. fat and fiber intakes** Strongly associated. **Beliefs that diet is important to one's health vs. fat and fiber intakes** Inconsistently associated. **Perceived norms (eg. there is a lot of info. on healthy eating where I work) vs. fat and fiber intakes** Inconsistently associated. **Perceived social support vs. fat and fiber intakes** Inconsistently associated. **Knowledge vs. fat and fiber intakes** Inconsistently associated. **Sex vs. agreement w/ more healthful attitudes** Women > men **Age vs. agreement w/ more healthful attitudes** Older > younger

FL=food label. NS=not significant.

Authors	Description of the study	Results & others
Glanz et al (1993) - Cont'd		**Smoking status vs. agreement w/ more healthful attitudes** Non smokers > smokers **Sociodemographic characteristics vs. belief that diet is important to one's health and past success at changing diet** ~NS
Smallwood et al (1994)	Study described main meal planner/ preparer's knowledge, attitudes, awareness and dietary intake of fiber and sources of fiber from result of 1989 and 90 CSFII & DHKS. Respondents w/ three days records of intakes (n=2880). **Variables** education, sex, income, race, knowledge, attitudes, awareness and intake of fiber, sources of fiber	**Perception of adequacy of diet** 59% felt their diet was healthy and saw no needs to change **Belief toward changing dietary habits** 9 out of 10 meal planners believed that what they ate made a big difference their chance of getting a disease. **Race vs. sources of fiber** Black 36% from cereal, 31% from vegetables & potato vs. white 43% and 28 respectively. **Age vs. sources of fiber** The older, the more from fruits. **Income vs. sources of fiber** The higher, the less from legumes, nuts and seeds. The higher, the more from fruits, cereals and bakery products.

FL=food label. NS=not significant.

Authors	Description of the study	Results & others
Smallwood et al (1994) -Cont'd		**Awareness of health problems vs. fiber intakes** aware 12.9g > unaware 10.5g **Sex vs. knowledge** Females were more likely to correctly identify the better fiber sources than males. **Income and education vs. knowledge** The lower, the less knowledge about sources of fiber. **Sex vs. awareness** Females were more likely to aware of problem associated w/ fiber intakes. **Sex vs. perception of adequacy of fiber intake** ~NS **Race vs. awareness** Black were less likely aware of health problems related to fiber intake. **Income and education vs. awareness** The lower, the less aware of health problems.

FL=food label. NS=not significant.

Authors	Description of the study	Results & others
Contento et al (1990)	Study was conducted to investigate factors to differentiate adult shoppers who reported having voluntarily made positive changes in their diets from those who had not. Adult supermarket shoppers (n=117) **Variables** attitudes, perceptions, cues to actions, chance locus of control, demographic data, whether self-changers or not.	**Age vs. whether self-changers or not** Older > younger **Sex vs. whether self-changers or not** Female >male **Self-changers vs. perceptions** The following were identified as variables which distinguish self-changers from non-changers: **Perception of personal susceptibility to diet-related disease** Self-changers > no-changers **Overall health concerns** Self-changers > no-changers **Cues to action** Self-changers > no-changers **Chance locus of control** Self-changers > no-changers

FL=food label. NS=not significant.

Authors	Description of the study	Results & others
Variyam et al (1996)	Study was conducted to investigate the relationship b/n sociodemographic characteristics and knowledge, attitudes and disease awareness related to fiber intake. 1989-90 CSFII & DHKS were used Main meal planner/preparer w/ three days of dietary intake data and DHKS data (n=2554). **Variables** sex, education, race, income, age, smoking status, region, urbanization, participation of government programs, being vegetarian, knowledge, household size, attitudes (importance of eating 6 serv. of grains), diet-disease awareness,	**Region vs. attitudes** Westerners were more likely to believe that it was important to eat at least 6 serv. of grain products a day than others. **Urbanization vs. attitudes** Rural residents were more likely to have positive attitudes about grain consumption. **Household size vs. attitudes** Larger household were more likely to believe it important to eat 6 serv. of grains. **Vegetarian vs. attitudes** Vegetarians were more likely to think it important to consume 6 serv. of grai **Race vs. attitudes** ~NS **Smoking status vs. attitudes** NS for the attitudes about grain consumption. **Education vs. attitudes** Positive effects on attitudes. **Income vs. attitudes** Negative effect on attitudes about the importance of grain consumption. **Gender vs. attitudes** ~NS **Food stamp or WIC participation vs. knowledge and awareness** Negatively related to being participants.

FL=food label. NS=not significant.

Authors	Description of the study	Results & others
Variyam et al (1996) - Cont'd		**Sex vs. knowledge and awareness** Positively related to being a female **Race vs. knowledge** Blacks and Hispanics tended to be less knowledgeable than Whites about fiber content of foods and fiber/health problems. **Vegetarians vs. knowledge and awareness** Positively related to being vegetarians. **Age vs. knowledge and awareness** Negative relation of being older with knowledge level, and positive relation o being old with awareness level. **Region vs. awareness** Westerner were more aware of health problems associated with fiber. **Urbanization vs. awareness** Rural residents were more likely to be aware of fiber- disease relationships than others. **Household size vs. awareness** Positive relation

FL=food label. NS=not significant.

Authors	Description of the study	Results & others
Variyam et al (1996) - Cont'd		**Smoking status vs. knowledge and awareness** Negative effect of being a smoker. **Income vs. knowledge and awareness** Positive effect on knowledge. NS for fiber-disease awareness **Education vs. knowledge and awareness** Positive effect of education. **Knowledge vs. disease awareness** Relatively large correlation. **Attitudes vs. knowledge and awareness** Relatively low correlation with knowledge, and a negative but insignificant correlation with disease awareness.
Shepherd et al (1987)	Study was conducted to see the level level of knowledge, attitudes and consumption of foods high in fat among respondents. Residents in United Kingdom (n=210) **Variables** sex, age, social class, knowledge, attitudes (attitudes toward the behavior, subjective norm), food consumption high in fat.	**Attitudes vs. fat intake** Personal attitudes were found to be good indicators of consumption and much more important than perceived social pressure from other persons. **Knowledge vs. fat intake** ~NS **Sex vs. attitudes toward consumption of foods high in fat** Women tended to have more negative attitudes toward consumption of such foods.

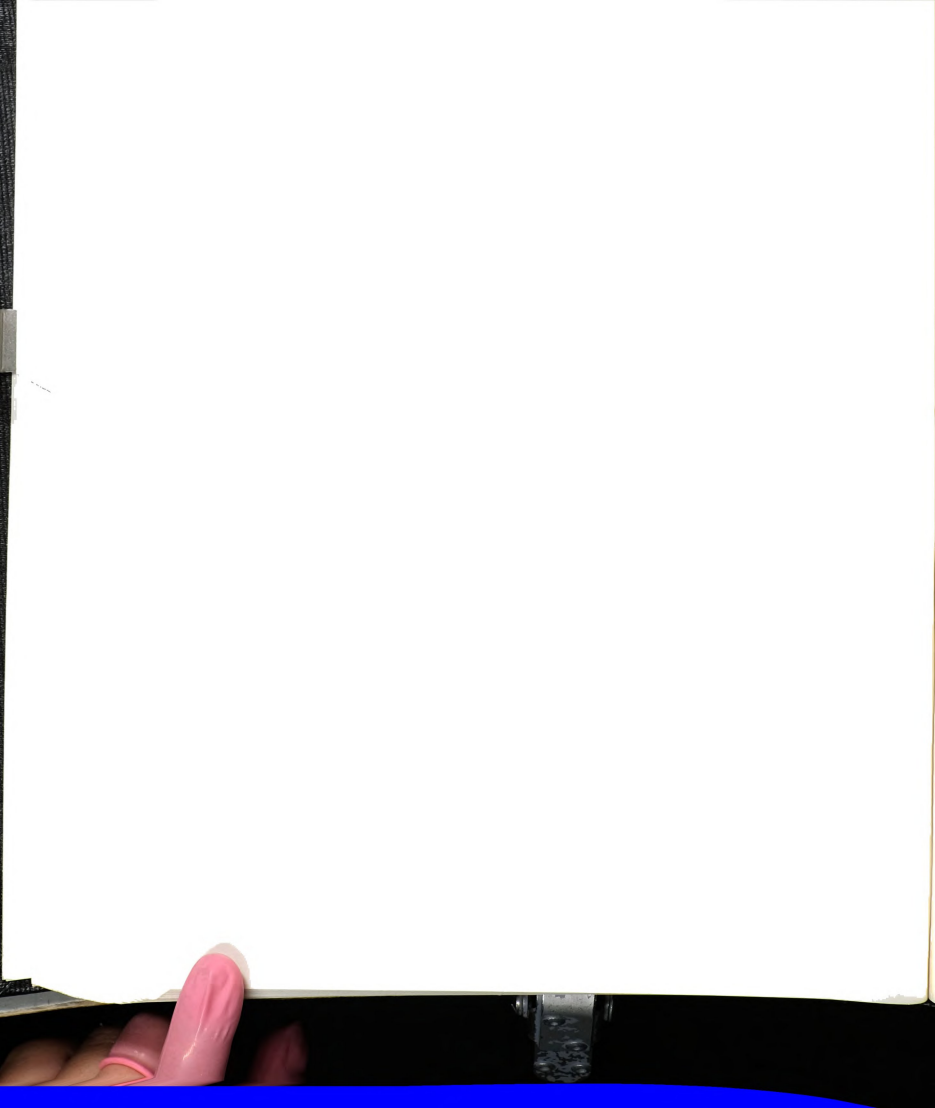
FL=food label. NS=not significant.

Authors	Description of the study	Results & others
Shepherd et al (1987) - Cont'd		**Age vs. attitudes toward consumption of foods high in fat** Subjects in the 26- to 45-year age group tended to have more negative attitudes toward consumption of such foods. **Socioeconomic class vs. attitudes toward consumption of foods high in fat** Those who belonged to higher socioeconomic class tended to have more negative attitudes toward consumption of foods high in fat.
Beck et al (1981)	Roger's theory was applied in this study. The experiment was conducted to test the hypothesis that the degree of threatening info. would interact with the degree of control (health locus control) in affecting intentions and subsequent behaviors. Dental patients aged of 17 to 81 (n=80).	**Knowledge vs. attitudes** ~NS **The effect of seriousness on attitudes** The high seriousness condition increased feeling of fear, concern, and threat as well as intentions and reported compliance w/ recommended oral hygiene procedures. **The effect of personal efficacy on intention and behaviors** Personal efficacy was positively related to both intention to floss and reporte flossing behaviors. **The effect of fear on intention and behaviors.** Low and moderate fear didn't predict either intention or behaviors.

FL=food label. NS=not significant.

Authors	Description of the study	Results & others
Beck et al (1981) - Cont'd	**Variables** belief of seriousness and susceptibility, health locus control (response efficacy of each of the three recommended actions, personal efficacy at being able to perform recommended actions), intention to engage in recommended actions, fear arousal, frequency that patients brunched, flossed, duration of brushing and flossing	
Reid et al (1994)	Study was conducted to evaluate the understanding and the use of label info. about fat and cholesterol in Canada. Women and men (80%vs.20%) in London and Toronto (n=149). Those people were recruited by mail intercept interactions, focusing on English speaking grocery shoppers who did the majority of purchase. **Variables** age, sex, education, household size & composition, martial status, children in the house, knowledge, awareness, FL use	**Sex, income, martial status, education, or children intake house vs. importance to reduce the amount. of fat intake** ~NS **Age vs. importance to reduce the amount. of fat** Older > younger **Age vs. use of info. on polyunsaturates., monosaturates and saturates** Older > younger **Age vs. use of term** Older > younger **Children in the house vs. use of term** Higher in household w/o children

FL=food label. NS=not significant.



Authors	Description of the study	Results & others
Reid et al (1994) - Cont'd		**Concern about their fat intake vs. use of info. on polyunsaturates, monosaturates and saturates** People who concern > people who don't. **People who think it important to reduce fat vs. use of term** Higher among those who think important to reduce fat intake. **Income vs. knowledge of claims** Correct answers 64% in higher income > 48% in lower income
Hyman et l (1993)	Study was conducted to examine attitude, knowledge, and cholesterol measurement (intake, knowledge, etc) in a low-income, urban patient population. Respondents aged of 18 yrs. and older in Harris county, Texas (n=547). Hispanic(54%), black(28%), and non-Hispanic (14%). **Variables** age, sex, education, ethnicity, knowledge, physician visits, smoking status, dietary change, attitudes, belief, perception	**Income, education vs. the rate of recognition of the term** Higher among higher categories. **Ethnicity vs. selection of foods** Hispanic reported selection of foods w/ the highest fat (vs. Black, non-Hispanic white, Asian, Native American, or others) **Knowledge vs. dietary change** 63% who had ever heard of high blood or serum cholesterol. had reduced fa intakes in their diets a lot or somewhat. Only15% reported they were on a diet specifically for blood cholesterol reduction. **Ethnicity vs. knowledge and awareness** All knowledge questions and awareness are significantly lower in Hispanics.

FL=food label. NS=not significant.

Authors	Description of the study	Results & others
Hyman et al (1993) -Cont'd		**Ethnicity vs. desire to reduce fat and cholesterol.** ~NS **Ethnicity vs. willingness to obtain more information about diet and health.** ~NS **Ethnicity vs. belief that their own personal diets would not affect their chances of Coronary Heart Diseases (CHD)** Hispanic > black or non-Hispanic **Ethnicity vs. belief that making diet changes after the age 65 yrs probably would not help prevent CHD** Lower in non-Hispanic whites. **The ratio who perceived that cost for eating healthy was expensive vs. not expensive** ~NS

FL=food label. NS=not significant.

Authors	Description of the study	Results & others
Hyman et al (1993) -Cont'd		**Ethnicity & sex vs. willingness to learn info.** ~NS **Presence of high blood pressure vs. conducting intervention** Highly related. **Ethnicity vs. perception of being overwhelmed by the many recommendations about healthy eating that they could not distinguish the useful from the specious** Hispanics >non- Hispanic whites and blacks **Food label use vs. ethnicity** Blacks and non-Hispanic whites > Hispanics
Carlson et al (1994)	Study was conducted to examine how info. concerning about fat intake influenced the meal planner's daily intake of total and saturated fat intakes. 1989, 90 and 91 CSFII & DHKS were used. Meal planners w/ three day food records (n=2901)	**Race & sex vs. fat and saturated intakes** For all races, demand for total and sat. fat intakes were positively influenced by being male. (this display in fat intake, on the basis of gender, is consistent w/ RDA of energy intakes. Also, part likely resulted from men being less willing to forgo high fat food) **Income vs. fat and saturated fat intake** Positive relationship

FL=food label. NS=not significant.

Authors	Description of the study	Results & others
Carlson et al (1994)	**Variables** awareness of health problems related to total & saturated fat intakes and CHD, knowledge, income, age, sex, pregnancy, race, the hour of watching TV, importance, w and w/o children, FL use, total fat & saturated fat intakes	**Age vs. both fat types(total and saturated fat)** Negative effect (this is due to the increased health awareness that is associated w/ additional years of planning meals as well as the decreasing need for calorie intake that occurs as an adult age). **Pregnancy vs. saturated fat intake** Positive effect in the unaware regime only (one would expect a pregnant me planner to increase fat intake as she increase her total energy intake). **Region w/ into vs. total fat intake** Northeast, Middle Atlantic and East South Central regions w/ info. concernin the implications of total fat intake consumed more than Pacific. **Region vs. saturated fat intake** People from Pacific consume less sat. fat than others. **Age vs. knowledge and behaviors** Age has a positive influence on health maintenance behavior and a negativ influence on health info. acquisition. **Income vs. knowledge** Positive relation **Education vs. knowledge** Positive relation **Race vs. knowledge** Black and Hispanic had a lower probability of processing health knowledge than non-minority.

FL=food label. NS=not significant.

Authors	Description of the study	Results & others
Carlson et al (1994) - Cont'd		**Low fat diet vs. awareness of the health implication of total or saturated fat intake** ~NS (this may be due to the influence of individuals who used dieting as an exclusive means for managing body wt., and who were unaware of other he risks associated w/ excessive fat intake). **The hour of watching TV vs. knowledge** Positive effects. However, it might be negatively related to the level of activeness also. **FL use vs. health awareness** Positive relation
Stafleu et al (1994)	Study was conducted to examine the relationship b/n attitudes toward high-fat foods and intake of low-fat alternatives and fat. Fishbein & Ajzen model was applied. Respondents aged 18 yrs and older, living in low-income areas in Netherlands (n=419).	**Being on special diet vs. energy % of fat** People on a special diet < people who are not. **Age vs. energy % of fat** 18-35 yrs. > 35-55 yrs. **Sex vs. energy % of fat** ~NS **Education vs. energy % of fat** ~NS **Occupation level vs. energy % of fat** ~NS

FL=food label. NS=not significant.

Authors	Description of the study	Results & others
Stafleu et al (1994) -Cont'd	**Variables** age, education, occupation level, BMI, household size, attitudes, sex, special diet, fat, fatty acid, cholesterol, and energy intakes	**BMI vs. energy % of fat** ~NS **Household size vs. energy % of fat** ~NS **Sex vs. attitudes** Women showed positive attitude toward low-fat foods. **Being on a special diet vs. attitudes** People who were following a dietary treatment had positive attitude toward low-fat foods and negative attitude toward high fat foods. **People who are following to the Dutch Dietary Guidelines vs. attitudes** People who were following had positive attitudes toward low-fat foods and negative attitude toward high fat foods. **Age vs. attitudes** ~NS **Education vs. attitudes** ~NS **Occupation levels vs. attitudes** ~NS **BMI vs. attitudes** ~NS **Household size vs. attitudes** ~NS

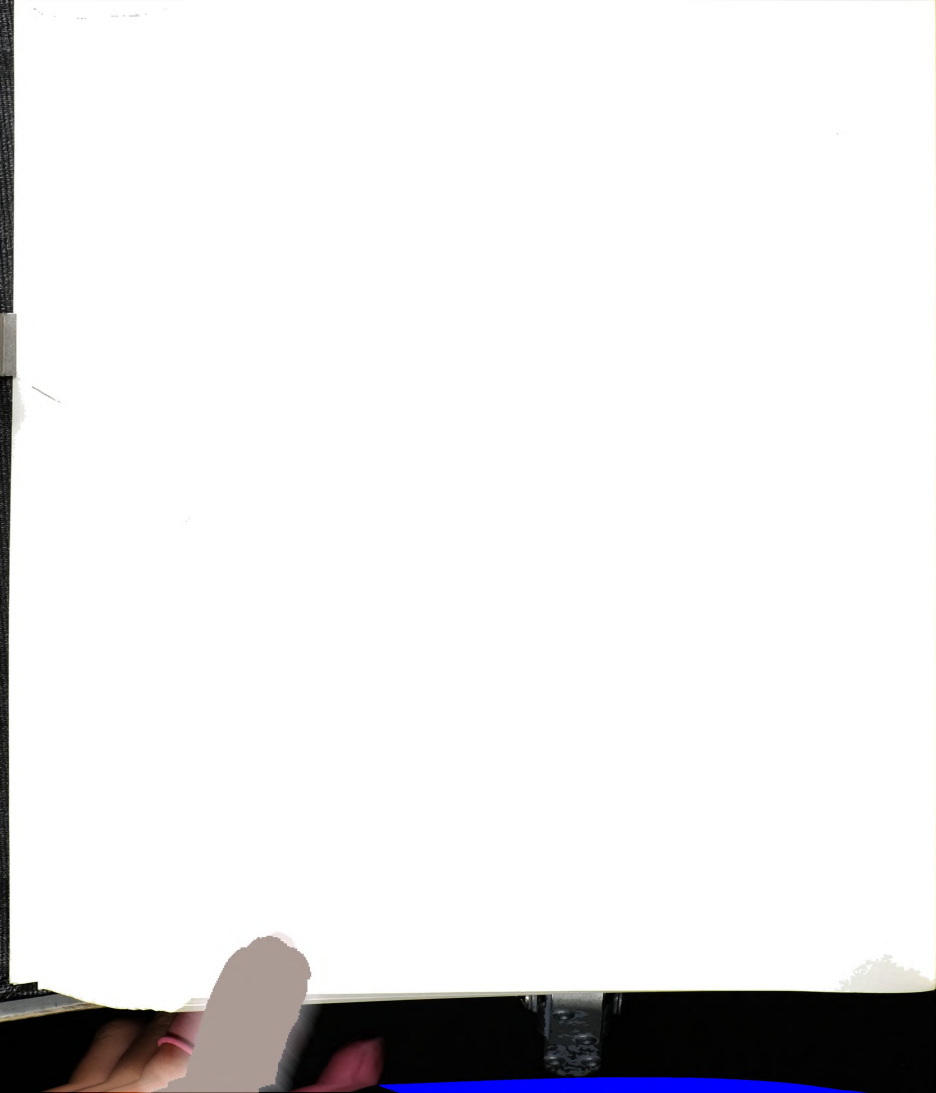
FL=food label. NS=not significant.

Authors	Description of the study	Results & others
Towler et al (1992)	Fishbein and Ajzen's Expectancy Values Model was applied to examine the relationship b/n beliefs or attitude toward food high in fat and consumption of those types of foods, and to determine whether there measurements differed depending on the subgroups. Respondents who were quota sampled for sex, age and social class in the the town of Norwich was used for the study (n=240).	**Sex vs. dietary intake** Females < males **Age vs. dietary intake** Lower age groups were found to have lower consumption **Social classes vs. dietary intake** Higher social classes were found to have lower consumption. **Dietary intake vs. attitudes** The person's attitudes were found to be good predictors for consumption of foods high in fat. The relationship between attitude and behavior or among different attitudes differed depending on products. **Age vs. attitudes** The lower age groups were found to have negative attitudes toward consumption of foods high in fat. **Social classes vs. attitudes** Higher social classes were found to have negative attitudes toward consumption of foods high in fat. **Sex vs. attitudes** Females were found to have negative attitudes toward consumption of foods high in fat.

FL=food label. NS=not significant.

Authors	Description of the study	Results & others
Towler et al (1992) - Cont'd	**Variables** age, sex, social class, attitudes, product attributes (price, taste, convenience, healthiness), consumption of foods high in fat	**The effects of different beliefs on attitudes toward consumption of foods high in fat** Taste and healthiness of the foods were more closely related to attitudes toward consumption than were other beliefs such as convenience and process.
Cronin et al (1982)	The objective of this study was to report usage and average frequency of consumption of foods by demographic characteristics in U.S. using three day records. USDA's 1977-78 NFCS data was used. n=25557 excluding children under 3 yrs. of age, pregnant or lactating women, vegetarians and unrelated members of a household, age, gender, race, region, income, food group intake.	Study showed different food group intakes for each demographic variables.

FL=food label. NS=not significant.



Authors	Description of the study	Results & others
Smith et al (1997)	Study was conducted to examine the association b/n smoking and the diet, and health attitudes, awareness, and knowledge among low-income parents. **Variables** smoking status, occupation, race, health beliefs and expectation, attitude, knowledge	**Smoking status vs. attitudes** Smoking were negatively related to attitudes toward nutrients and other components needed for health. **Age vs. knowledge** Positively related **Sex vs. knowledge** Significantly related **Race vs. knowledge** Whites > blacks. **Education vs. knowledge** Positively related **Sex vs. attitudes, and awareness** Significantly related **Race vs. awareness** Whites > others (Asians, Pacific Islander, Aleuts, American Indians, and Eskimos) **Awareness vs. knowledge** Positive relation

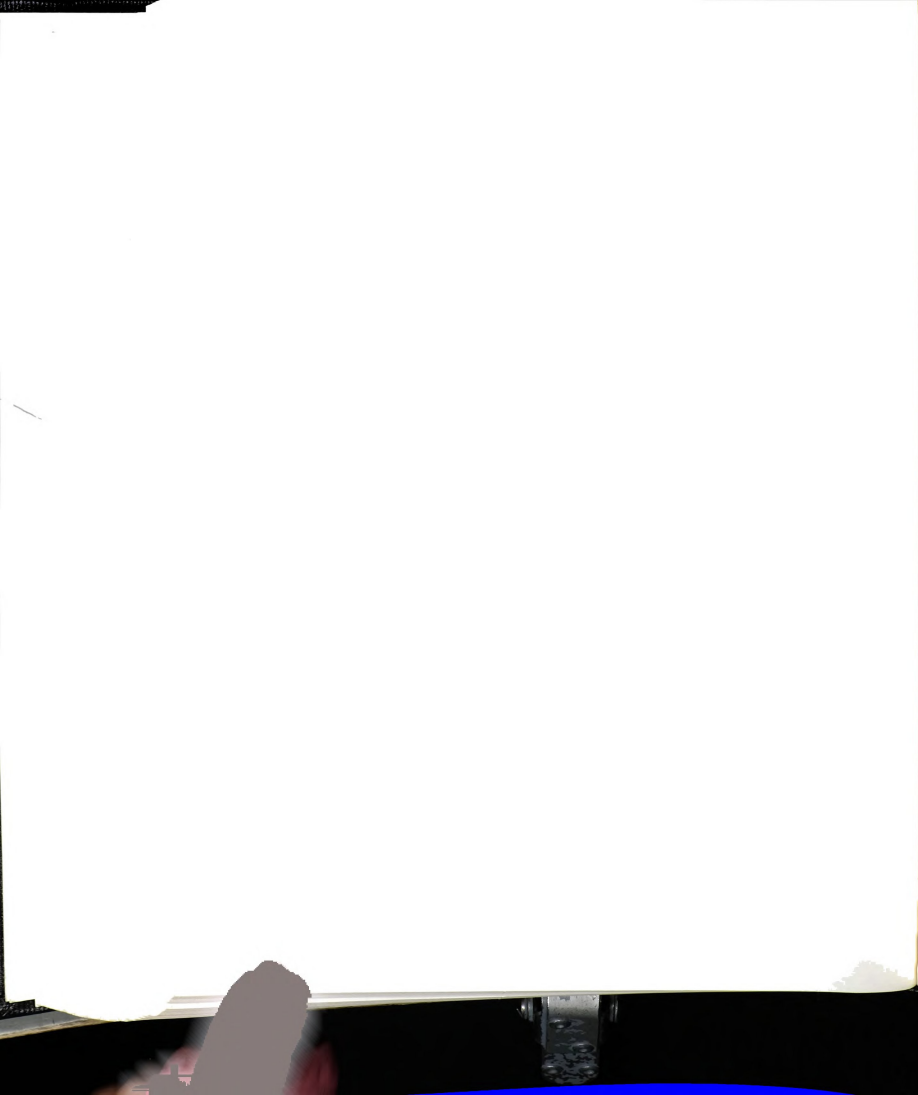
FL=food label. NS=not significant.

Authors	Description of the study	Results & others
Tuoria et al (1988)	Fishbein and Ajzen's Model was applied to examine attitudinal and belief factors related to the fat and fat-containing food consumption.	**Different perceptions on foods** On the average, subjects reported liking all the products but not "high fat foo However, two of which also included in the high fat food were well liked. Thus, negative attributes assigned to a food ingredient or category do not necessarily embrace the actual foods.
	American female students and a few university employees (n=100).	**Different effects of psychological predictors** Liking was the predominant predictor of reported consumption for all the analysis, but various belief factors, particularly those related to concern w/ weight also significantly predicted consumption.
	Variables Social factors, attitude towards behaviors and subjective norms (health concerns, motivation, opinions from manufactures, friends and parents) liking, consumption of high-fat-foods (intention to consume, frequency of consumption)	**Demographic factors vs. consumption** Played only minor role. **Food consumption vs. attitudes** Attitudes towards food consumption had affect on food consumption and differed by products.

FL=food label. NS=not significant.

Authors	Description of the study	Results & others
Shepherd et al (1985)	In this study, Fishbein and Ajzen Theory of Reasoned Action was applied to relate attitudes and subjective norms to the high-fat food consumption, and tested the differences b/n various demographic groups. n=518. (n=301 from the Royal Agricultural Show at Stoneleigh and n=217 from the British Association Meeting in UK).	**Sex vs. consumption** Females were found to have lower consumption of foods high in fat **Age vs. consumption** 26-45 yrs. old subjects were found to have lower food consumption high in f compared w/ both younger and older subjects. **Social class vs. consumption** ~NS **Ability to predict food intake high in fat between attitude vs. subjective norm.** Attitudes to the behavior was a better predictor of food intake high in fat tha the subjective norm. **Perception, attributes of food vs. food intake high in fat** Pleasantness of the foods correlated slightly higher than perceived benefits of the foods with frequency of intake.

FL=food label. NS=not significant.



Authors	Description of the study	Results & others
Shepherd et al (1985) - Cont'd	**Variables** age, social class, sex, attitude (belief about the outcome of the behavior, evaluation of the outcome), subjective norm (the social pressure to behave in a a certain way that the subject perceives persons he or she sees as important such as friends and family and so on).	**Sex vs. attitudes toward foods high if fat** Females were found to have negative attitudes toward foods high in fat. **Age vs. attitude** 26-45 yrs. old subjects showed more negative attitudes towards the high-fat foods compared to others. **Personal feeling vs. consumption** The person's own feelings toward consumption were found to be good indicators for both the individual type of foods and foods combined. **The level of effects from different attitudes toward consumption** Subjective corm (pressure from others) was found to be less predictive of consumption than other attitude (how pleasant the food is , how beneficial th food is) **Social class vs. attitudes toward foods high in fat** ~NS **The degree of prediction of those attitudes toward consumption among various groups** ~NS **Subjective norm vs. social class** Respondents who from a higher social class received higher pressure of not eating foods high in fat than those who were from a lower social class.

FL=food label. NS=not significant.

Authors	Description of the study	Results & others
Tompson et al (1992) et al (1992)	Study was conducted to identify the food groups which contributed to fiber and fat, using frequency, serving size, and nutrition density. Women aged 19 to 50 yrs from the Continuing Survey of Food Intakes by Individuals (CSFII) 1985-86 data (n=2134). **Variables** region, sex, income, race/ethnicity, frequency of food groups, serving size, and nutrient density.	Major determinants of fiber intake included vegetables (including potato), bread, fruit, soups, ready-to-eat cereal and so on. Major determents of total fat, saturated fat, and cholesterol intakes included sweet grains, beef, eggs, cheese/cream, whole milk and additions to foods (e.g. regular salad dressing and butter/margarine) Demographic characteristics were found to be related to various food group consumption parameters.

FL=food label. NS=not significant.

Authors	Description of the study	Results & others
Smith et al (1992)	Associations of social status and diet-related and health related beliefs and expectations with dietary fat and fiber densities were examined. n=874 **Variables** Health Belief questions (social and environmental, genetic, lifestyle threats to health), disease belief, self-efficacy, perceived barriers from eating a healthy diet, importance, social status, previous attempt to dietary changes, willingness to eat healthier, fat and fiber densities	**Health beliefs vs. fat and fiber densities** Stronger and more positive health-, diet, and confidence- related beliefs and expectations were found to be associated with more favorable dietary fat an fiber densities. **Belief and occupation vs. fat density** Strength of belief in the effects of diet on health had little associated with dietary fat density in the high-status group. In the medium- and low-status groups, only those who believed that dietary intake does affect long-term health had lower fat densities. Strength of belief that diet is a major cause of stroke, hypertension, and diabetes had the strongest effect in the high- and medium-stuatus groups. Those in the low-status group had a smaller variation in dietary fiber density relative to the differences in strength of belief that diet is a major cause of stroke, hypertension, and diabetes **Perceived barriers vs. fat and fiber densities** Perception of money as a barrier from eating a healthy diet was associated dietary fat and fiber densities (the stronger, the higher dietary fat density in t subsample that desired healthier eating habits.) **Perception of health as the main consideration when making food choices vs. fat density** Negative relation **Lifestyle threats vs. occupation** Smoking and alcohol abuse were seen to be more threatening to the upper status groups than to the lower status group.

FL=food label. NS=not significant.

Authors	Description of the study	Results & others
Carruth et al (1977)	The study was conducted to resolve the following questions; 1) whether a significant relationship existed among the variables of nutr. knowledge, attitudes, personality traits, and nutrition related behaviors. 2) if so, which of the first three of these variables, or combination of these is the best predictor of nutrition related behaviors. **Variables** nutrition knowledge, personality factor (flexibility to change), age, attitudes, exposure to training, months in EFNEP, children, income, education, martial status, nutrition related behaviors (brochure requests for free literature, verbal and overt application of nutrition knowledge)	**Being flexible vs. brochure requests** People who were characterized as flexible were more likely to order literatur than those characterized as rigid. **Age vs. application of nutrition knowledge** Negative relation **Age and exposure to training (experimental group) vs. brochure requests** Age was negatively associated with requests in the experimental group. **Income and exposure to training vs. brochure requests** Income was positively associated with requests in the experimental group. **Months in the EFNEP vs. brochure requests** Months in the EFNEP were significantly associated with brochure requests i the control group. **Knowledge vs. brochure requests** ~NS

FL=food label. NS=not significant.

Authors	Description of the study	Results & others
Grotkowski et al (1978)	The study was designed to assess nutritional knowledge and attitudes of elderly persons in relation to their nutrient intake and adherence to food fads. Caucasian aged over 62 yrs (n=64). **Variables** sex, socioeconomic status, attitude, knowledge, supplement use, importance, % calorie and protein eaten as snacks, % calorie and protein eaten with others, nutrient intakes, healthy food purchase	**Dietary behaviors vs. socioeconomic status** Socioeconomic status was positively related to caloric and protein intakes eaten with others. The purchase of healthy foods and supplements was positively related to socioeconomic status. **Dietary intakes vs. attitudes/beliefs** % of calories consumed as snacks was positively correlated with importance of nutrition. % calorie consumed as snacks was inversely related to misbeliefs related to supplement use and weight reducing diet. **Dietary intakes vs. knowledge** % of calorie consumed as snacks was positively related with self-evaluation nutritional knowledge. **Socioeconomic status vs. knowledge** Positive relation **Socioeconomic status vs. attitude and importance of nutrition and belief** Positively related to importance and attitude. Negatively related to misbelief about supplement use.

FL=food label. NS=not significant.

Authors	Description of the study	Results & others
Grotkowski et al (1978) -Cont'd		**Knowledge vs. importance of nutrition and attitude** Highly correlated. Knowledge was negatively related to misconceptions about weight reducing diets and supplement use. **Food label use vs. attitudes, importance of nutrition and misconceptions about weight reducing diets.** Positive relation with attitude and importance. Negative relation with misconceptions. **Food label use vs. knowledge** Positive relation
Hulshof et al (1991)	The prevalence of and the interdependencies of diet, sociodemographic, and life-style factors among various socio-economic strata were examined. Men (n=1930) and women (n=2204) aged 19 yrs and over from the Dutch National Food Consumption Survey 1987-88. **Variables** Wt, Ht, use of nutr. supplements, special dietary practices, smoking status, meal patterns, hrs. of sleep, education, occupation, socio-economic status, demographic background, dietary intake	**Gender vs. dietary habits** Dietary regimen and nutritional supplement use were more prevalent among women than among men. **Socioeconomic status (SES) vs. dietary habits** Subjects with higher SES followed a special dietary rule such as a vegetaria diet more often than others. **SES vs. supplement use** Subjects with higher SES use supplements more often than others. **SES vs. skipping breakfast** Percentage of subjects who skipped breakfast was lowest in high SES. **SES vs. alcohol consumption** Positive relation

FL=food label. NS=not significant.

Authors	Description of the study	Results & others
Hulshof et al (1991) -Cont'd		**SES and age vs. smoking status** In most age groups, smoking and SES were inversely associated. However, among those aged 65 or over the highest proportion of smokers was observed in the high SES class. **SES vs. being overweight and obesity** The highest prevalence of both overweight and obesity was seen in the low SES class. **Gender vs. energy intake** Men > women **Age vs. energy intake** Negative relation **Gender, Age vs. amt. of macronutrients described as a proportion of energy intake.** ~NS **Gender vs. % of energy derived from alcohol** Women < men. **Gender and age vs. nutrient density** Women > men, and older > younger **Gender and SES vs. dietary intake** Men with a low SES had the highest intake of energy, more energy from fat sugar than high SES.

FL=food label. NS=not significant.

Authors	Description of the study	Results & others
Hulshof et al (1991) - Cont'd		The energy derived from alcohol and intake of dietary fiber, Ca, and Vit.C w significantly lower among men with a low SES. **SES vs. dietary intakes** P:S ratio and Vit. B-6/g protein were higher in lower SES. Contribution of saturated fat was NS among various SES. However, without the energy derived from alcohol, contribution was lower among the low SES class. Except for vitamins B1 and B6, the intake of minerals and vitamins was high in the higher SES groups. Contribution of fat and saturated fat to energy exclusive of alcohol was high among the high SES than lower SES. Iron intake was slightly lower among women with a low SES than those with high SES. Although total consumption of milk was similar, contribution of milk products with low fat was seen more in higher SES than in lower SES. Contribution of low fat spreads was slightly higher in the low SES than in the high SES. Contribution of high fiber cereals to total consumption was higher among the high SES than the low SES.

FL=food label. NS=not significant.

Authors	Description of the study	Results & others
Hulshof et al (1991) -Cont'd		**Age vs. fruits, vegetables (women only) and pastry/biscuit consumption** Older > younger **Gender and SES vs. potatoes, meat, fruits, cereals and cheese consumption** Highest consumption of potatoes and meats and lowest consumption of fruit fruits, cereals and cheese among both male and female in the low SES clas
Levy et al (1993)	Consumer knowledge of dietary fat and cholesterol was analyzed for trends over time and for relationships with demographic characteristics and health and dieting behaviors. The data were obtained from three biennial Health and Diet Surveys conducted by the Food and Drug Administration and the National Heart, Lung and Blood Institute between 1983 and 1988. n=4,000 in 1983 and 1986, n=3,200 in 1988. **Variables** knowledge of dietary fats and cholesterol, age, education, being on a special diet, race, exercise,	**Knowledge vs. education** Positive relation in 1988. **Knowledge vs. age** Middle-aged subjects had greater knowledge than others in 1988. **Knowledge vs. being on a special diet** Those who were on a cholesterol-lowering diet had greater knowledge than those who were not in 1988. Being on a self-prescribed cholesterol-lowering diet was related to higher knowledge, but being on a physician-recommended diet was related to highe knowledge scores only for younger respondents. **Knowledge vs. race** White had greater knowledge than others in 1988.

FL=food label. NS=not significant.

Authors	Description of the study	Results & others
Levy et al (1993) -Cont'd		**Knowledge vs. being diagnosed** Being diagnosed as having high blood cholesterol had a negative effect on knowledge. **Exercise vs. knowledge** Positive relation **Knowledge levels depending on the types of questions** Knowledge levels were clearly higher on Factor 1 questions (sources and characteristics of nutrients, and effects depending on different types of fats) than on Factor2 (detailed knowledge of types of fats) or Factor 3 (esoteric knowledge about fats and dietary cholesterol) questions.

FL=food label. NS=not significant.

APPENDIX D

ITC, ALPHA IF ITEM DELETED, AND CRONBACH'S ALPHA FOR QUESTIONS ON DIET-DISEASE RELATIONSHIPS IN DHKS 1994

Appendix D. ITC, alpha if item deleted, and Cronbach's alpha for questions on diet-disease relationships in DHKS 1994

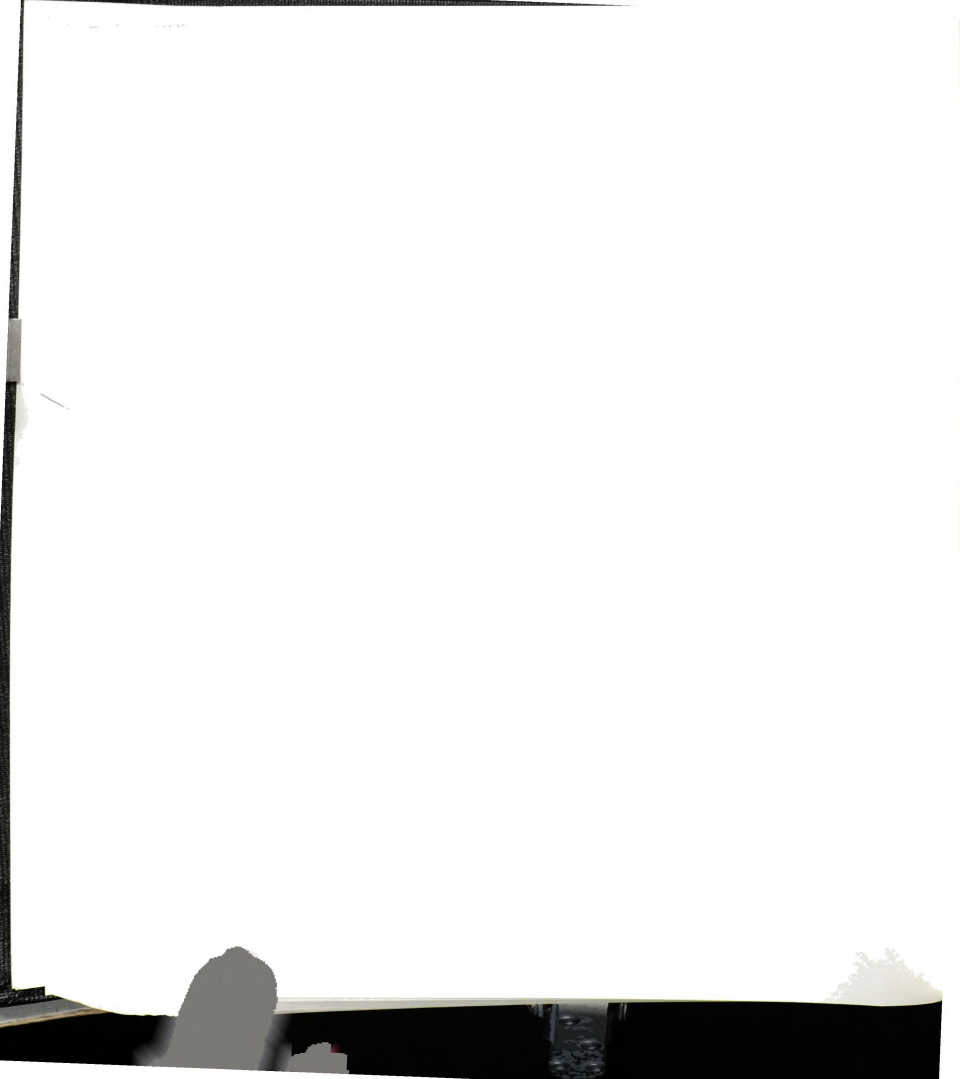
Description	Definitions	No.	ITC	alpha deleted	Cronbach's alpha
Eating too much fat causes...	**Rekq6a**				
Arteriosclerosis/atherosclerosis, clogged arteries, coronary disease, hardening of the arteries, heart problems/heart attack		rekq6a01	.04	-.05	
			.06	-.04	
Cancer (all types)		rekq6a05	.03	-.01	
Colitis/colon problems, constipation, digestive problems, diverticulosis, irregularity		rekq6a12	.02	-.01	
High blood pressure, hypertension		rekq6a15	-.08	.16	.02
Obesity/overweight, fat/overweight					
Not eating enough fiber causes...					
Arteriosclerosis/atherosclerosis, clogged arteries, coronary disease, hardening of the arteries, heart problems/heart attack	**Rekq6b**	rekq6b01	.03	-.00	
Cancer (all types)		rekq6b05	.04	-.06	
Colitis/colon problems, constipation, digestive problems, diverticulosis, irregularity		rekq6b06	-.02	.17	.02
Eating too much salt or sodium causes...					
Arteriosclerosis/atherosclerosis, clogged arteries, coronary disease, hardening of the arteries, heart problems/heart attack	**Rekq6c**	rekq6c01	-.08	-.11	
High blood pressure, hypertension		rekq6c12	-.11	.02	
Kidney disease		rekq6c14	-.06	-.09	-.18
Not eating enough calcium causes...	**Rekq6d**				
Bone problems/rickets, osteoporosis		rekq6d03	.13	-	
Cavities/caries, tooth problems		rekq6d07	.13	-	.21
Eating too much cholesterol causes...	**Rekq6e**				
Arteriosclerosis/atherosclerosis, clogged arteries, coronary disease, hardening of the arteries, heart problems/heart attack		rekq6e01	.07	-	
Cancer (all types)		rekq6e05	.07	-	.08

Appendix D. ITC, alpha if item deleted, and Cronbach's alpha for questions on diet-disease relationships (Cont'd) in DHKS 1994

Description	Definitions	No.	ITC	alpha deleted	Cronbach's alpha
Eating too much sugar causes...	**Rekq6f**				
Cavities/caries, tooth problems		rekq6f07	-.03	-.21	
Diabetes, high blood sugar		rekq6f08	-.14	.15	
Obesity/overweight, fat/overweight		rekq6f15	-.04	-.24	-.17
Being overweight causes...	**Rekq6g**				
Arteriosclerosis/atherosclerosis, clogged arteries, coronary disease, hardening of the arteries, heart problems/heart attack		rekq6g01	.07	.08	
Bone problems/rickets, osteoporosis		rekq6g03	-.03	.16	
Cancer (all types)		rekq6g05	.07	.10	
Diabetes, high blood sugar		rekq6g08	.08	.07	
High blood pressure, hypertension		rekq6g12	.07	.08	.13

APPENDIX E

THE RESULTS OF CRONBACH'S ALPHA WITH DIFFERENT QUESTION ITEMS



Appendix E. The results of Cronbach's alpha with different question items - Knowledge constructs in DHKS 1994-1995

Characteristics	Question No. in DHKS 1994-95	Question items	Cronbach's alpha 94	95
Knowledge of the Food Guide Pyramid	KQ1	Rekq1a-e	.42*	.40*
Knowledge of saturated fat	KQ8	Rekq8b,c & d	.48	NC
Knowledge of fat	KQ9	Rekq9a, c-f	.51	NC
Knowledge of amount of nutrient content per servings	KQ22	Rekq22a-e	.52*	.53*
Knowledge of nutrition and food group pyramid	KQ1 & KQ22	Rekq1a-e & Rekq22a-e	.44	NC
Knowledge of nutrition claims on food labels	KQ13 & KQ14	Rekq13 & 14	.36	NC
Knowlegde of nutrition and food	KQ8,9 & 12	Rekq8b-d, Rekq9a,c-f & Rekq12	.59	NC
Knowledge of nutrition	KQ8 & KQ9	Rekq8b-d & Rekq9a, c-f	.61	NC
Knowledge of nutrition and food	KQ8 -11	Rekq8b-d, Rekq9a,c-f, Rekq10 & Rekq11	.63*	.59*
Knowledge of nutrition-disease relationships	KQ6	Rekq6a01, 05, 06, 12 & 15	-.42	NC
		Rekq6b01, 05 & 06	-1.36	NC
		Rekq6c01,12 & 14	-.67	NC
		Rekq6d03 & 07	-.14	NC
		Rekq6e01 & 05	-.05	NC
		Rekq6f07, 08 & 15	-1.04	NC
		Rekq6g01, 03, 05, 08 & 12	-.06	NC

* Final constructs included in DHKS 1994-1995
NC=not conducted

Appendix E. The results of Cronbach's alpha with different question items - Knowledge constructs in DHKS 1994-1995 (Cont'd)

Characteristics	Question No. in DHKS 1994-95	Question items	Cronbach's alpha 94	95
Awareness of the authority of the Government to define phrases on the food labels	KQ21	Rekq21a-c	.84*	.84*
Awareness of the authority of the Government to define phrases among people who never see or use food lables	KQ25	Rekq25a-c	.90	NC
Awareness of diet-disease relationships	KQ5	Rekq5a-g	.69*	.71*

* Final constructs included in DHKS 1994-1995
NC=not conducted

Appendix E. The results of Cronbach's alpha with different question items - Attitude constructs in DHKS 1994-1995

Characteristics	Question No. in DHKS 1994-95	Question items	Cronbach's alpha 94	95
Perceived importance of practicing healthy diets	KQ4	Rakq4a-k	.86	NC
Perceived importance of utilities of food	KQ15	Rakq15a-f	.50	NC
Perceived reliability of descriptions on the food label	KQ20	Rakq20a-f	.88*	.89*
Perceived benefits of the food label use	KQ23	Rakq23a, g, h, i & j	.82*	.82*
Perceived barriers from the food label use	KQ23	Rakq23c & d	.53*	.49*
Perceived barriers from the food label use	KQ24	Rakq24b & c	.46	NC
Perceived adequecy of nutrient intakes	KQ3	Rakq3a, f, g, h, l & k	.74*	.73*
Perceived easiness of understanding the food label	KQ19	Rakq19a-g	.80*	.80*
Perceived adequecy of own nutrient intakes	KQ3	Rakq3b-d &j	.51*	.49*
Perceived importance of practicing healthy diets	KQ4 & KQ15	Rakq4a-k & Rakq15b	.87*	.86*

* Final constructs included in DHKS 1994-1995
NC=not conducted

Appendix E. The results of Cronbach's alpha with different question items - Frequency of food label use constructs in DHKS 1994-1995

Characteristics	Question No. in DHKS 1994-95	Question items	Cronbach's alpha 94	95
Frequency of the food label use by contents	KQ16	Rakq16a-e	.87	NC
Frequency of the food label use by nutrients	KQ17	Rakq17a-h	.90	NC
Frequency of the food label use	KQ16 & KQ17	Rakq16a-e & Rakq17a-h	.91*	.91*

* Final constructs included in DHKS 1994-1995
NC=not conducted

APPENDIX F

PERCENTAGE OF RESPONSES AND MEAN SCORE ± S.E. WITH THE TEST OF SIGNIFICANCE FOR NUTRITION RELATED QUESTIONS BETWEEN DHKS 1994-1995

Appendix F. Percentage of responses and mean scores ± S.E. with the test of significance for nutrition related questions between DHKS 1994-95

Knowledge

Definition	DHKS 1994 Responses (%)			DHKS 1995 Responses (%)			
	Correct/ Aware	Uncorrect/ Unaware	Mean ± S.E.	Correct/ Aware	Uncorrect/ Unaware	Mean ± S.E.	Sig
Knowledge of nutrition-disease relationships							
Rekq5a	88	12	0.87 ± 0.01	88	12	0.88 ± 0.01	NS
Rekq6a01	67	33	0.67 ± 0.02	67	33	0.67 ± 0.02	NS
Rekq6a05	8	92	0.08 ± 0.01	6	94	0.06 ± 0.01	NS
Rekq6a06	5	95	0.05 ± 0.01	3	97	0.03 ± 0.01	NS
Rekq6a12	9	91	0.09 ± 0.01	10	90	0.10 ± 0.01	NS
Rekq6a15	25	75	0.25 ± 0.02	26	74	0.26 ± 0.02	NS
Rekq5b	64	36	0.64 ± 0.02	66	34	0.66 ± 0.02	NS
Rekq6b01	3	97	0.03 ± 0.00	3	97	0.03 ± 0.00	NS
Rekq6b05	15	85	0.15 ± 0.01	14	86	0.14 ± 0.01	NS
Rekq6b06	48	52	0.48 ± 0.02	51	49	0.51 ± 0.02	NS
Rekq5c	87	13	0.87 ± 0.01	89	11	0.89 ± 0.01	NS
Rekq6c01	27	72	0.27 ± 0.01	28	72	0.28 ± 0.02	NS
Rekq6c12	54	46	0.54 ± 0.03	59	41	0.59 ± 0.02	NS
Rekq6c14	3	97	0.03 ± 0.01	2	98	0.02 ± 0.00	NS
Rekq5d	81	19	0.81 ± 0.02	81	19	0.81 ± 0.01	NS
Rekq6d03	74	26	0.74 ± 0.02	74	26	0.74 ± 0.02	NS
Rekq6d07	11	89	0.11 ± 0.01	15	85	0.15 ± 0.02	0.02
Rekq5e	89	11	0.89 ± 0.01	90	10	0.90 ± 0.01	NS
Rekq6e01	74	26	0.74 ± 0.02	77	23	0.77 ± 0.01	NS
Rekq6e05	2	98	0.02 ± 0.00	2	98	0.02 ± 0.00	NS
Rekq6e07	13	87	0.13 ± 0.01	12	88	0.12 ± 0.02	NS
Rekq5f	81	19	0.81 ± 0.01	79	21	0.79 ± 0.01	NS
Rekq6f08	50	50	0.50 ± 0.02	52	48	0.52 ± 0.02	NS

Appendix F. Percentage of responses and mean scores ± S.E. with the test of significance for nutrition related questions between DHKS 1994-95

Knowledge (Cont'd)

Definition	DHKS 1994 Responses (%)			DHKS 1995 Responses (%)			
	Correct/ Aware	Uncorrect/ Unaware	Mean ± S.E.	Correct/ Aware	Uncorrect/ Unaware	Mean ± S.E.	Sig
Rekq6f15	25	75	0.25 ± 0.02	22	78	0.22 ± 0.02	NS
Rekq5g	95	5	0.95 ± 0.01	94	6	0.94 ± 0.01	NS
Rekq6g01	75	25	0.75 ± 0.02	74	26	0.74 ± 0.02	NS
Rekq6g03	4	96	0.04 ± 0.01	5	95	0.05 ± 0.01	NS
Rekq6g05	3	97	0.03 ± 0.01	2	98	0.02 ± 0.00	NS
Rekq6g08	15	85	0.15 ± 0.01	16	84	0.16 ± 0.01	NS
Rekq6g12	23	77	0.22 ± 0.01	21	79	0.21 ± 0.01	NS
Knowledge of food group pyramid							
Rekq1a	72	27	0.72 ± 0.02	73	27	0.73 ± 0.01	NS
Rekq1b	48	52	0.48 ± 0.02	51	49	0.51 ± 0.02	NS
Rekq1c	53	47	0.53 ± 0.02	58	42	0.58 ± 0.01	NS
Rekq1d	6	94	0.06 ± 0.01	8	92	0.08 ± 0.01	NS
Rekq1e	57	43	0.57 ± 0.02	59	41	0.59 ± 0.02	NS
Knowledge of saturated fat							
Rekq8b	73	27	0.73 ± 0.02	73	27	0.73 ± 0.02	NS
Rekq8c	81	19	0.81 ± 0.01	80	20	0.80 ± 0.02	NS
Rekq8d	93	7	0.93 ± 0.02	93	7	0.93 ± 0.01	NS

Appendix F. Percentage of responses and mean scores ± S.E. with the test of significance for nutrition related questions between DHKS 1994-95

Knowledge (Cont'd)

Definition	DHKS 1994 Responses (%)			DHKS 1995 Responses (%)			
	Correct/ Aware	Uncorrect/ Unaware	Mean ± S.E.	Correct/ Aware	Uncorrect/ Unaware	Mean ± S.E.	Sig
Knowledge of fat							
Rekq9a	81	19	0.81 ± 0.01	79	21	0.79 ± 0.02	NS
Rekq9c	60	40	0.60 ± 0.02	63	37	0.63 ± 0.02	NS
Rekq9d	85	15	0.85 ± 0.02	86	14	0.86 ± 0.01	NS
Rekq9e	85	15	0.84 ± 0.03	85	15	0.85 ± 0.02	NS
Rekq9f	50	50	0.50 ± 0.02	49	51	0.49 ± 0.02	NS
Knowledge of nutrition and food							
Rekq10	27	73	0.27 ± 0.02	27	73	0.27 ± 0.02	NS
Rekq11	53	47	0.53 ± 0.02	54	46	0.54 ± 0.02	NS
Knowledge of amount of nutrient content per servings							
Rakq22a	18	82	0.18 ± 0.01	16	84	0.16 ± 0.01	NS
Rakq22b	9	91	0.08 ± 0.01	8	92	0.08 ± 0.01	NS
Rakq22c	23	77	0.23 ± 0.01	23	77	0.23 ± 0.02	NS
Rakq22d	51	49	0.51 ± 0.01	51	49	0.51 ± 0.02	NS
Rakq22e	12	88	0.12 ± 0.01	11	89	0.11 ± 0.01	NS
Awareness of the authority of the Government to define the phrases							
Rekq21a	27	73	0.27 ± 0.02	31	69	0.31 ± 0.02	NS
Rekq21b	23	77	0.23 ± 0.01	23	77	0.23 ± 0.01	NS
Rekq21c	30	70	0.29 ± 0.02	31	69	0.31 ± 0.01	NS

Appendix F. Percentage of responses and mean scores ± S.E. with the test of significance for nutrition related questions between DHKS 1994-95

Attitude

Definition	DHKS 1994					DHKS 1995					
	Responses (%)					Responses (%)					
	Very important	Not too important	Somewhat important	Very important	Mean ± S.E.	Very important	Not too important	Somewhat important	Very importan	Mean ± S.E.	Sig
Perceived importance of practicing healthy diet											
Rakq4a	6	13	26	55	3.30 ± 0.03	6	13	30	51	3.26 ± 0.03	NS
Rakq4b	3	11	30	57	3.41 ± 0.04	3	11	33	54	3.37 ± 0.03	NS
Rakq4c	1	6	26	67	3.59 ± 0.02	1	7	23	69	3.59 ± 0.03	NS
Rakq4d	3	11	32	54	3.36 ± 0.04	2	12	35	50	3.34 ± 0.02	NS
Rakq4e	3	11	36	51	3.35 ± 0.03	2	12	36	51	3.36 ± 0.04	NS
Rakq4f	2	6	31	61	3.51 ± 0.02	1	8	31	60	3.50 ± 0.04	NS
Rakq4g	1	3	21	75	3.69 ± 0.02	1	5	24	70	3.63 ± 0.02	0.01
Rakq4h	3	8	28	61	3.47 ± 0.03	2	10	32	56	3.42 ± 0.03	NS
Rakq4i	4	9	30	58	3.42 ± 0.03	2	12	31	56	3.39 ± 0.03	NS
Rakq4j	5	22	40	33	3.02 ± 0.04	5	20	45	30	2.99 ± 0.03	NS
Rakq4k	7	23	33	37	3.00 ± 0.03	6	24	35	35	2.99 ± 0.04	NS
Rakq15b	1	5	30	64	3.57 ± 0.02	1	5	32	62	3.56 ± 0.02	NS

Appendix F. Percentage of responses and mean scores ± S.E. with the test of significance for nutrition related questions between DHKS 1994-95

Attitude (Cont'd)

Definition	DHKS 1994 Responses (%)					DHKS 1995 Responses (%)					
	Very important	Not too important	Somewhat important	Very important	Mean ± S.E.	Very important	Not too important	Somewhat important	Very importan	Mean ± S.E.	Sig
Perceived importance of safetiness of food											
Rakq15a	2	3	11	85	3.79 ± 0.02	1	3	12	84	3.79 ± 0.02	NS
Perceived importance of price of food											
Rakq15c	4	12	41	44	3.24 ± 0.04	4	13	41	42	3.21 ± 0.04	NS
Perceived importance of how well food last											
Rakq15d	2	10	30	58	3.44 ± 0.03	2	9	30	59	3.45 ± 0.03	NS
Perceived importance of easienss to prepare											
Rakq15e	6	19	40	36	3.05 ± 0.03	6	18	38	38	3.08 ± 0.03	NS
Perceived importance of taste of food											
Rakq15f	1	2	15	83	3.80 ± 0.01	1	1	16	82	3.80 ± 0.02	NS

Appendix F. Percentage of responses and mean scores ± S.E. with the test of significance for nutrition related questions between DHKS 1994-95

Attitude (Cont'd)

Definition	DHKS 1994 Responses (%)				DHKS 1995 Responses (%)				
	Not too easy	Somewhat easy	Very easy	Mean ± S.E.	Not too easy	Somewhat easy	Very easy	Mean ± S.E.	NS
Perceived easiness of understanding food labels									
Rakq19a	21	40	40	2.19 ± 0.03	21	38	41	2.19 ± 0.03	NS
Rakq19b	29	39	32	2.03 ± 0.03	27	39	35	2.08 ± 0.03	NS
Rakq19c	13	30	58	2.49 ± 0.02	14	29	57	2.43 ± 0.03	NS
Rakq19d	31	35	34	2.04 ± 0.02	28	36	36	2.09 ± 0.04	NS
Rakq19e	38	34	28	1.89 ± 0.03	35	36	30	1.95 ± 0.03	NS
Rakq19f	36	36	28	1.92 ± 0.03	34	38	29	1.95 ± 0.03	NS
Rakq19g	22	37	41	2.19 ± 0.03	20	36	45	2.26 ± 0.04	NS

Attitude (Cont'd)

Definition	DHKS 1994 Responses (%)				DHKS 1995 Responses (%)				
	Not too confident	Somewhat confident	Very confident	Mean ± S.E.	Not too confident	Somewhat confident	Very confident	Mean ± S.E.	Sig
Perceived reliability of description on food labels									
Rakq20a	35	55	10	1.75 ± 0.02	33	57	10	1.78 ± 0.02	NS
Rakq20b	34	55	12	1.78 ± 0.02	33	56	12	1.79 ± 0.02	NS
Rakq20c	24	57	18	1.94 ± 0.02	23	58	19	1.96 ± 0.02	NS
Rakq20d	46	46	8	1.62 ± 0.02	44	47	10	1.66 ± 0.02	NS
Rakq20e	53	39	9	1.56 ± 0.02	47	44	9	1.61 ± 0.03	NS
Rakq20f	29	55	16	1.87 ± 0.02	26	58	16	1.89 ± 0.02	NS

Appendix F. Percentage of responses and mean scores ± S.E. with the test of significance for nutrition related questions between DHKS 1994-95

Attitdue (Cont'd)

Definition	DHKS 1994					DHKS 1995					
	Responses (%)					Responses (%)					
	Strongly disagree	Somewhat disagree	Somewhat agree	Strongly agree	Mean ± S.E.	Strongly disagree	Somewhat disagree	Somewhat agree	Strongly agree	Mean ± S.E.	Sig
Perceived benefits from using food labels											
Rakq23a	4	10	47	39	3.21 ± 0.02	5	8	46	41	3.24 ± 0.03	NS
Rakq23g	6	14	41	39	3.13 ± 0.03	5	14	43	38	3.13 ± 0.04	NS
Rakq23h	18	20	38	24	2.69 ± 0.04	18	21	38	23	2.66 ± 0.04	NS
Rakq23i	7	15	44	35	3.06 ± 0.03	8	15	43	34	3.03 ± 0.04	NS
Rakq23j	5	10	41	44	3.23 ± 0.03	6	11	40	44	3.22 ± 0.04	NS
Perceived barriers from using food labels											
Rakq23c	8	26	45	21	2.22 ± 0.03	11	29	44	17	2.33 ± 0.03	p=0.01
Rakq23d	21	30	32	18	2.53 ± 0.05	24	30	30	16	2.62 ± 0.04	NS

Appendix F. Percentage of responses and mean scores ± S.E. with the test of significance for nutrition related questions between DHKS 1994-95

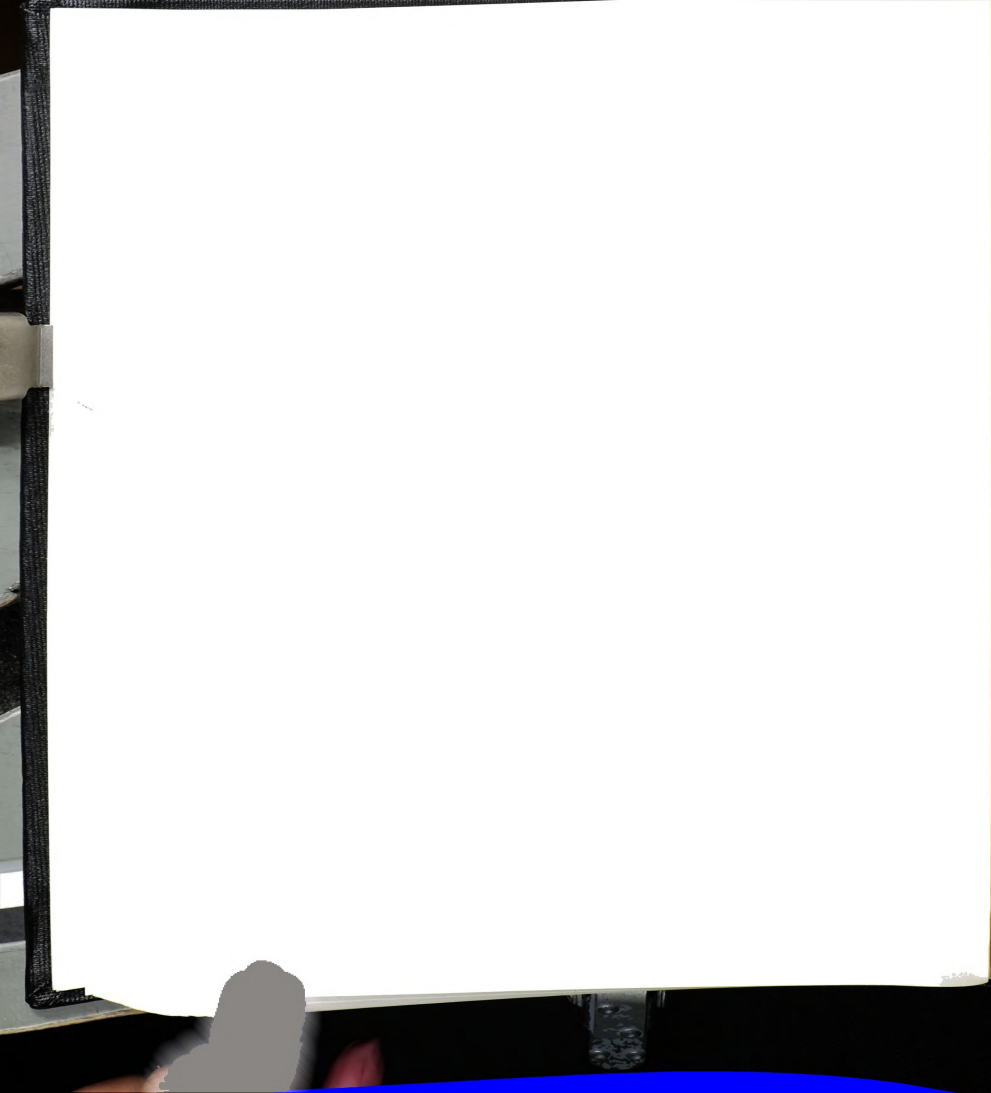
Attitude (Cont'd)

Definition	DHKS 1994					DHKS 1995					
	Responses (%)					Responses (%)					
	Strongly disagree	Somewhat disagree	Somewhat agree	Strongly agree	Mean ± S.E.	Strongly disagree	Somewhat disagree	Somewhat agree	Strongly agree	Mean ± S.E.	Sig
Willingness to learn how to use food labels											
Rakq23f	4	12	34	49	3.27 ± 0.04	5	11	41	44	3.23 ± 0.03	NS

Appendix F. Percentage of responses and mean scores ± S.E. with the test of significance for nutrition related questions between DHKS 1994-95

Frequency of food label use

Definition	DHKS 1994 Responses (%)					DHKS 1995 Responses (%)					
	Never	Rarely	Sometimes	Often (always)	Mean ± S.E.	Never	Rarely	Sometimes	Often (always)	Mean ± S.E.	Sig
Frequency of food label use by contents on labels											
Rakq16a	20	16	33	31	2.75 ± 0.04	20	16	37	27	2.71 ± 0.04	NS
Rakq16b	23	14	34	29	2.70 ± 0.04	23	16	36	26	2.64 ± 0.03	NS
Rakq16c	22	12	32	34	2.79 ± 0.04	21	14	29	36	2.80 ± 0.04	NS
Rakq16d	29	20	28	23	2.44 ± 0.04	29	20	28	22	2.44 ± 0.04	NS
Rakq16e	33	20	29	17	2.31 ± 0.04	26	21	33	21	2.48 ± 0.04	p=0.000
Frequency of food label use by nutrients											
Rakq17a	10	18	31	40	3.02 ± 0.03	9	16	33	43	3.09 ± 0.03	NS
Rakq17b	12	22	31	35	2.88 ± 0.04	11	22	31	36	2.91 ± 0.03	NS
Rakq17c	10	15	27	48	3.13 ± 0.04	7	14	28	51	3.22 ± 0.03	NS
Rakq17d	12	20	28	40	2.95 ± 0.04	11	19	29	40	2.99 ± 0.04	NS
Rakq17e	12	19	31	39	2.98 ± 0.03	12	20	31	36	2.91 ± 0.04	NS
Rakq17f	12	24	39	26	2.79 ± 0.03	9	27	41	24	2.79 ± 0.04	NS
Rakq17g	15	30	33	22	2.62 ± 0.03	15	30	36	19	2.58 ± 0.03	NS
Rakq17h	13	25	33	29	2.79 ± 0.03	12	24	34	30	2.82 ± 0.04	NS



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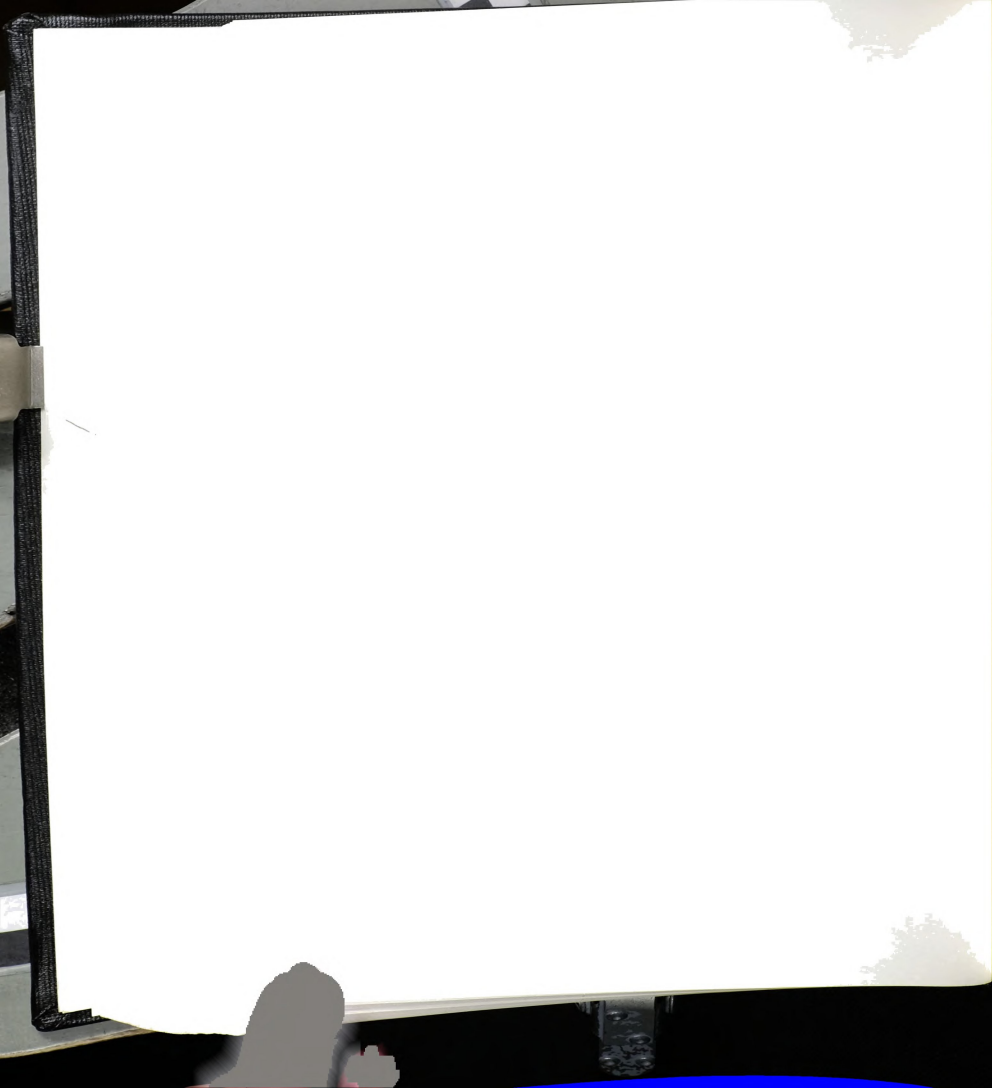

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