

**KNOWLEDGE OF GENERAL NUTRITION, SOY NUTRITION, AND
CONSUMPTION OF SOY PRODUCTS: ASSESSMENT OF A SAMPLE ADULT
POPULATION IN MONTGOMERY COUNTY, VIRGINIA**

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(ABSTRACT)

Nutrition education programs in the prevention of chronic diseases has flourished over the last 15 years. Investigators continue to demonstrate that soy consumption plays a role in decreasing chronic diseases such as cardiovascular disease, cancer, osteoporosis and problems regarding menopause. Although research focuses on soy benefits regarding chronic disease, to date, no program exists focusing on soy consumption.

164 surveys distributed to 18-65 year-olds in Southwest Virginia assessed the population's chronic disease knowledge and information sources regarding soy foods and three nutrition education programs. Purchases of and opinions on soy products along with 62 single-blind taste evaluations comparing soy and non-soy taste preferences were assessed.

73.4% of the population sample knew at least one of three nutrition programs while 37.1% knew soy's relationship to chronic disease. Information sources for both were significantly ($p < .006$) higher for magazines and newspapers. Health and belief of not liking the taste of soy were significant ($p < .017$) reasons influencing purchase of soy foods. Tofu and soy burgers were consumed significantly ($p < .001$) more than other soy foods. No significant ($p > .05$) difference in preference was found between all cookies and muffins. Women knew significantly ($p < .04$) more about soy than men. Knowledge about soy was significantly ($p < .03$) correlated with soy consumption.

Results indicate a need for soy education and consumption in preventing chronic diseases. Target populations should focus on non-Asians, males, 18-24 years, with less than a college education level. Implementing a soy education program in preventing chronic diseases is feasible, necessary, and cost-effective.

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*The woods are lovely, dark, and deep,
But I have promises to keep,
And miles to go before I sleep,
And miles to go before I sleep.
- Robert Frost*

Upon arrival to Virginia Tech, I held in my mind Frost's philosophy that I was sure was written for all students who ever thought to seek a graduate degree. I have realized that these two successful and memorable years and many miles of hard work have largely been possible by all of the wonderful people I have previously had in my life and the ones I have been blessed to meet.

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*It is always good to have an end to a journey towards,
But it is the journey that matters in the end.
- Ursula le Guir*

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CHAPTER I: INTRODUCTION

Chronic diseases, such as coronary heart disease (CHD), cancer, and diabetes mellitus (DM), have remained the leading causes of disability and death in the United States for over the last 15 years.¹ Over 2.5 million Americans are diagnosed and over one half million die annually due to some form of chronic disease.² To decrease morbidity and mortality associated with chronic diseases, dietary guidelines have been created by the United States Department of Agriculture (USDA) and by the United States Department of Health and Human Services (USDHHS). The overall message presented in the dietary guidelines focuses on decreasing the amount of fats, saturated fats, and cholesterol in the diet while increasing the consumption of fiber, fruits, and vegetables. This message is targeted at Americans especially between the ages of 18 to 65 years, who are at high risk for developing a chronic disease. At risk groups include individuals who possess certain characteristics such as: a sedentary lifestyle, smoking, obesity, sex, family history of chronic disease, age, and poor dietary habits.³ For instance, one specific dietary guideline stresses the importance of obtaining anticarcinogenic effects from both the nutrient and non-nutrient components in fruits and vegetables.⁴ However, new research is currently focusing on how well the American population listens, understands, and implements these dietary recommendations for a healthier lifestyle. Above all, taste of the food product is one of the most important factors to the American public when considering changing a diet to lower the risk of developing a chronic disease.⁵ If the food item does not appeal to the general public then it will not be a successful product for implementing good dietary changes.

The use of food items for nutrition education in the prevention of chronic disease has become a goal for many different health programs throughout the United States. For example, the *Healthy People 2000 Objectives for the Nation* launched a nutrition campaign to recommend that dietary fat consumption should be decreased to 30% or less of daily calorie intake and the consumption of vegetables and fruits should be increased to five servings or more a day to promote better health and prevent the onset of chronic diseases.⁶ Another nutrition campaign was created by the National Cancer Institute called *5 A Day for Better Health Program*. This program was specifically designed to focus on the reduction of cancer by consuming at least 5 or more servings of fruits and vegetables a day.⁷ In addition, the “Eat For Health” nutrition intervention program focused on individuals choosing healthy food products in the supermarket

that were considered to have taste appeal as well as helping to reduce the risk of chronic diseases.⁸ Many other nutrition education programs have been implemented with the use of foods such as fruits, vegetables, fiber, and foods containing fat as the focus for the prevention of chronic diseases.^{9,10,11,12} However, one food ingredient- soy protein, has shown evidence to decrease the risks associated with the development of chronic diseases but has received little attention for nutrition education.

Extensive research on the benefits of soy consumption in the diet with regards to the prevention of chronic diseases has been conducted for several years. The consumption of soy protein is related to a reduction in total cholesterol (TC) levels,¹³ thus decreasing the risk of developing CHD.¹⁴ Also, soy protein consumption has been used successfully as hormone replacement therapy (HRT) for postmenopausal symptoms,¹⁵ which has decreased the risk of developing CHD as well as osteoporosis.¹⁶ Preventing the risk of cancer through the consumption of soy protein has also been researched successfully.¹⁷ Although research on soy protein has been associated with the prevention of chronic diseases, at the present time there is no current nutrition education program in place to focus on the prevention of chronic diseases by consuming soy products, which is the focus of this study.

Overall Goal of Study:

To assess a general Southwestern Virginia population sample between the ages of 18 to 65 years for basic nutritional knowledge as it relates to reducing the risk of chronic diseases, as well as their knowledge of soy foods as it relates to taste appeal and reducing the risk of chronic diseases. These findings will be used as a basis for establishing a nutrition education program focusing on the consumption of soy products in the prevention of chronic diseases. This would provide nutrition educators with another method in which to promote healthy lifestyle habits. Such a program would also enable Americans to be more aware of another, non-invasive lifestyle change that could be made to reduce the risk of developing a chronic disease.

Underlying assumptions for the need of this nutrition education project are:

1. Basic nutritional knowledge on how to prevent chronic disease has reached Americans through many different methods such as: television, advertising, health educators, etc., and assessing where this information is received and processed the most will enable a future nutrition education program using soy products to use the same, successful standards.
2. The people who are of primary focus for this study are between the ages of 18 to 65 years due to the fact that this is the age group that most nutrition education programs send their messages to because this age group is most vulnerable to the onset of chronic disease.
3. The age of an individual also plays a role on how much nutrition knowledge will influence a behavior change; the older a person becomes the more knowledgeable and more willing he or she is to make a behavior change that will affect his or her health.
4. The level of education a person has will also influence how much nutritional knowledge he or she has, thus influencing their health behavior.
5. A person's race will also affect how much nutrition knowledge he or she has. This is due to the fact that some ethnic groups are at a disadvantage for obtaining nutrition information due to a lower socioeconomic status.
6. Sex also plays an important role in who understands and promotes better nutritional health. For instance, women on average tend to buy groceries more often than men; therefore women may have a greater nutritional knowledge for chronic disease risk.
7. People that purchase soy products most likely purchase them knowing the health benefits associated with soy. Finding out how these particular people heard of its health benefits

will provide a good foundation for proper nutrition education with the use of soy products for Americans not already consuming soy.

8. People who do not consume soy products may have a preconceived dislike for the taste of soy, therefore decreasing the likelihood of purchasing it.
9. To be effective, an initial assessment of how general nutrition education is provided in Montgomery County, Virginia, will provide a good foundation for implementing a successful soy education program in the near future.

Objectives of the Study:

1. To determine how a general Southwestern Virginia population sample acquires basic nutrition and soy nutrition knowledge in the prevention of chronic disease.
2. To determine if certain demographics such as: age, race, sex, and education level, play a role in the acquisition of basic nutrition knowledge in the prevention of chronic disease is obtained.
3. To determine the attitudes and beliefs that people in Southwestern Virginia have about soy products.
4. To determine why people in Southwestern Virginia do or do not purchase soy foods.
5. To determine if certain demographics such as: age, race, sex, and education level, play a role in the acquisition of soy nutrition knowledge as it relates to the prevention of chronic disease is obtained.
6. To assess if there is a discrepancy between people who believe they do not like the taste of soy products and the actual single-blind taste evaluation of soy versus non-soy products.

Definition of Terms:

Chronic Disease: Any disease that usually begins at low levels in the body and progresses to more extreme measures as time of the disease onset increases. For example, CHD, cancer, DM, and osteoporosis are chronic diseases. Chronic disease is associated with increased morbidity and mortality.

Isolated Soy Protein: A product that is made from dehulled and defatted soybeans, and has at least 90% moisture-free protein. It is used as a functional ingredient and can be incorporated into baked goods.

Low Education Level: A situation in which an individual may have completed high school or have obtained a vocational degree, but most likely does not have a college degree or any other further form of education beyond the high school level.

Miso: The fermentation of soybeans into a paste that is used in soups, broths, and teas.

Self-efficacy: A person's belief in his or her ability to overcome the difficulties involved with performing a certain task in a particular manner. High self-efficacy is associated with a strong personal belief in overcoming a certain task whereas low self-efficacy is the opposite.

Soymilk: The aqueous extraction from soybeans, and this is used as a base for making many other soy products such as: soy yogurt, tofu, and soy cheese.

Tempeh: Baked soybeans that have been fermented and made into a firm cake.

Tofu: Soybean extract that forms a curd and resembles a soft white cheese.

CHAPTER II: REVIEW OF LITERATURE

DIET AND CHRONIC DISEASE:

The link between dietary intake and the development of chronic diseases has been researched for many years. Evidence has supported the idea that certain dietary behaviors have been associated with the onset of chronic diseases such as cancer, CHD, and DM.¹⁸ The sources of evidence that were used to establish data on this topic come from animal and some human experiments. Dietary intakes among specific populations in the United States also began to be researched once diet and chronic disease risk began to be more of a concern. Case-control studies and questionnaires were some of the methods used to gather data on the public's dietary habits as well as their health status. The overwhelming evidence that associated dietary intake with the development of chronic disease led to the establishment of a new focus for the Recommended Dietary Allowances (RDAs). Previously, these nation-wide nutritional guidelines served individuals and institutions by promoting good eating habits for the prevention of nutrient deficiencies. Now, however, the RDA has begun to focus more on providing dietary allowances for the prevention of chronic disease.¹⁹ Certain types of foods have been researched *in vivo* and *in vitro* for evidence in their link with the onset or decrease in the onset of developing a chronic disease. In particular, extensive research has been conducted on the consumption of fats, fruits and vegetables, and fiber as they relate to chronic disease prevention.

Fat Consumption

Evidence suggests that the incidence of cancer and CHD is associated with an increase in the consumption of total fat and saturated fat in the diet.¹⁸ Restricting the amount of calories consumed from fat has been positively correlated with the development of breast, prostate, colorectal, and lung cancers.²⁰ The type of fat strongly associated with the development of a chronic disease focuses on the use of saturated fats. There is very little evidence linking the onset of a chronic disease due to the consumption of other types of fats like: monounsaturated and polyunsaturated fats. Therefore, the excess ingestion of saturated fats (over 10% of calories from total fat) in the diet may lead to the onset of a chronic disease.²⁰

A study conducted by Levy, Fein, and Stephenson investigated how nutrition knowledge affects dietary fat and cholesterol consumption.²¹ Telephone interviews were conducted through random-digit dialing with approximately 4,000 people in the United States in 1983 and again in 1986. In addition, 3,200 people were randomly called in 1988. The total respondents for the study were 3,935 women and 7,277 men over the age of 18 years. The researchers discovered that only 60% of the respondents answered some of the questions in the interview correctly about the consumption of saturated fats as it relates to TC. For the most part, nutrition knowledge as it relates to fat consumption did not improve over the five years of the study. The respondents that knew the most about how nutrition affects dietary health were well-educated (more than high school level), white, middle aged (35-54 years), had a present health condition related to diet, or were currently attempting to lower their TC levels. The only area where women significantly ($p < .05$) differed in men compared to nutrition knowledge was found in women's greater understanding for sources, effects, and characteristics of certain fats in the diet. Close to only half of the participants knew *something* about how dietary fat consumption affects TC levels, but they were most likely in the higher-educated, white class bracket.

A study by Bogan focused on 52 elderly women (mean age was 73.4 years) from Nova Scotia and their fat intake over a six-month period.²² The group of women were well-educated and from a higher socioeconomic status (SES), and therefore the assumption was made by the researcher that they would be more likely to have a higher nutrient intake compared to economically disadvantaged women. Bogan found that on average senior women of higher SES had a mean consumption of close to 30% of calories coming from fat, and that meets the Recommended Nutrient Intake (RNI). This study emphasizes that senior women (over the age of 70 years) are not a high-risk group for excessive fat consumption, therefore they are less likely to need nutritional education in the prevention of chronic disease.

Fruit and Vegetable Consumption

The protective role of fruit and vegetable consumption against the onset of a chronic disease has been researched for many years.²³ This protective role involves individual nutrients provided by the consumption of fruits and vegetables. The nutrients strongly associated with the prevention of cancer as well as CHD are vitamins A, C, and E. The protective role of plant foods has also been associated with the folate, carotenoids, fiber, flavonoids, indoles, glucosinolates,

dithiols, phenols, d-limonene, and allium levels found in them.^{23,24} The consumption of fresh fruits and vegetables in the United States has increased by 17% over the past 20 years, however this increase still does not meet the recommended five servings a day for most American people.²⁵ This recommended number of servings a day was achieved by assessment of how many fruits and vegetables a day led to a decreased incidence of cancer.⁷

The study conducted by Brug, Lechner and De Vries focused on attitudes, societal influence, and self-efficacy as they related to the consumption of fruits and vegetables in 367 randomly sampled Dutch men and women (162 and 203, respectively) over the age of 17 years.²⁶ The researchers found that the average consumption of fruits and vegetables was two servings a day compared to the recommended five servings a day. 56% of the people surveyed ate less than two servings of fruits and vegetables a day. The intention to consume fruits and vegetables was significantly associated ($p < .05$) with a personal attitude toward food, social influence, and a high self-efficacy about how food can affect one's health. In addition, the people who consumed the most fruits and vegetables had the greatest belief about the healthfulness these foods provided. The overall suggestion from this study is that to increase the consumption of fruits and vegetables in people over the age of 17 years, interventions should be made that focus on increasing self-efficacy and positive attitudes about fruit and vegetable consumption. This, in turn, will create a more beneficial social influence on the consumption of these foods.

Dittus, Hillers, and Beerman studied the attitudinal barriers and benefits in the consumption of fruits and vegetables in 1,069 Washington state residents (59% female, 41% male) over the age of 18 years.²⁷ The researchers found a positive correlation between nutrition behavior and a concern for the susceptibility to cancer. On the other hand, a negative correlation was found for respondents who had barriers to fruit and vegetable consumption when associated with their belief in the benefits of fruit and vegetable intake, concern for nutrition, and actual nutrition behavior. Therefore, a person who cannot consume many vegetables or fruits due to low income, lack of resources, or other personal reasons, is more likely not to accept that the consumption of these foods is associated with good health. The males in the study had significantly ($p < .001$) more barriers to fruit and vegetable consumption compared to the females. The females actually showed a significantly ($p < .001$) higher association between health benefits through fruit and vegetable consumption. The researchers concluded that the increased concern for the susceptibility to cancer is positively correlated with the consumption of fruits and

vegetables. Lastly, the respondents in the low-income, low-education bracket were more likely to have barriers associated with fruit and vegetable consumption compared to a higher-income and education level. Therefore, addressing many of the barriers associated with a decreased consumption of fruits and vegetables is recommended for males and low-income, low-education populations.

Fiber Consumption

Public knowledge about the beneficial effects of fiber consumption is low compared to other components of fruits and vegetables. Many people currently believe that fiber has little or very little importance in preventing certain cancers and lowering cholesterol.¹ Foods high in soluble-fiber (oats, barley, guar gum, beans and psyllium) are linked with the decrease in serum TC levels, thus decreasing the risk of heart disease. Also, diets low in insoluble-fiber increase the risk of developing certain cancers relating to the digestive tract.³ Although the current fiber intake in the United States reaches 12 grams/day, the daily recommended amount of fiber to reduce the risk of CHD and cancer is between 25 and 35 grams.²⁸ This recommendation is more than two times greater than what the population is currently consuming.

Variyam, Blaylock, and Smallwood conducted study on nutrition attitude and knowledge as they relate to diet and disease awareness as it pertains to dietary fiber.²⁹ The sample population used for this study was 2,554 (80% females, 20% males). The researchers found that 37% of the sample thought that eating at least 6 servings of grains and breads were important for good health. 50% of the sample said that they had heard that low fiber consumption is related to health problems. The hypothesis was made that as a person ages he or she will most likely be more knowledgeable on the healthful effects associated with fiber consumption. In addition, women knew more about fiber's role in preventing CHD and cancer due to the fact that the majority of meal planners and preparers for a household were female. The race and ethnicity of an individual also played a role in fiber knowledge. Blacks and Hispanics are not as knowledgeable as whites about the benefits of fiber consumption as it relates to the decrease of chronic diseases. The conclusion was made that increasing fiber knowledge and attitudes may increase fiber consumption in Americans.

DIET AND DEMOGRAPHICS:

Demographics plays a major role in defining what United States populations consume certain foods, have a concern or lack of concern for diet-related chronic diseases, and are more or less knowledgeable about the benefits of health through good eating habits. Certain characteristics of some populations put them at higher risk for developing a chronic disease than others. Studies like the National Health and Nutrition Examination Surveys (NHANES I-III) have been helpful in providing demographic information along with certain types of food consumption patterns found in the United States.³⁰

Sex

Food preparation and planning differs widely between men and women. Research by Fieldhouse focused on how gender effects food knowledge, attitudes, and behavior.³¹ He found that there has been a food-related sexual division of labor between men and women for many centuries. Women, for the most part, have had a 75% greater responsibility of food-related activities compared to men in the same culture. Gathering and preparing food was and is a more feminine role and the hunting and fishing for food has been and still continues to be a more masculine role. Therefore, due to the fact that women are more closely involved with food-related activities, they are also likely to be more knowledgeable than men on how consumption of food relates to the decrease or development of a chronic disease.^{26,27,29}

Age

Brevard and Ricketts investigated the dietary intakes of 104 college students between the ages of 18 to 41 years (84 women and 30 men).³² The researchers found that this age group consumed more high fat foods and fewer foods containing fiber. The percentage of fat from calories averaged 34 to 36% daily. Alcohol intake in this college study was higher than other age groups. The level of physical activity increased with age. This could be due to a greater concern for the onset of a chronic disease as a person ages and becomes more prone to a debilitating illness. Brevard and Ricketts concluded that college-age students around the age of 20 years are at a high risk for the development of a chronic disease in the future due to poor

health concerns and poor dietary habits. This age group is in need of educational health promotion to decrease the risk of developing a chronic disease in the future.

Race

Different races and ethnic backgrounds can also affect dietary behavior. For instance, Chinese-Americans have greater knowledge, attitude, and behavior concerning food intake and health compared to Chinese living in China.³³ Although Chinese-Americans know more about the health benefits associated with good nutritional habits, the Chinese consumed a diet lower in fat, saturated fat, and cholesterol and consumed higher amounts of fruits, vegetables, and fiber. Therefore, Chinese-Americans were knowledgeable about the benefits of good nutrition but did not practice these dietary methods as well as the Chinese; who were less educated on good nutritional habits. The researchers concluded that nutrition education for Chinese Americans must not only incorporate good nutritional knowledge but also must create a method of lifestyle change they could adopt.

Hispanics have become the fastest-growing ethnic group in the United States, and they have worse CHD risk factors compared to their Anglo counterparts. For example, Hispanics have higher blood pressure and triglyceride levels and lower high-density lipoprotein cholesterol levels compared with whites of the same age.³⁴ Due to a rising health concern for this ethnic group, Woodruff et al. conducted a study to assess nutrition-related factors in 400 Hispanic adults (mean age was 28.7 years).³⁵ 40% men and 60% women participated in the study. The self-report survey on nutrition knowledge and behavior showed that Hispanic women have a greater aversion to dietary fat, are more concerned about their health, and have greater intentions to improve their diets compared to Hispanic men. Although Hispanic women possess greater nutrition knowledge compared to the men in this culture, both sexes from the Hispanic population are not well educated on nutritional benefits in the prevention of chronic diseases compared to Caucasians.

A third minority population that differs in dietary knowledge and behavior compared to Caucasians are African-Americans. Airhihenbuwa et al. studied how cultural aspects in an African-American community affect eating patterns.³⁶ There were 53 participants in the group discussion study (21 male, 32 female) with ages ranging from 12 to over 65 years. The dietary knowledge of how food intake affects the prevalence of chronic diseases was very low compared

to Caucasians. They also consumed large amounts of dietary fats and low levels of fruits and vegetables. The baking procedures most commonly used in African-American cultures was high in fat and depleted of the many nutrients found in fruits and vegetables. The researchers concluded that nutritional as well as behavioral counseling would help aid in the prevention of chronic disease in African-Americans.

Education

Education level can affect how well a person understands and participates in good nutritional habits for the prevention of chronic disease. Dollahite, Thompson, and McNew studied 807 low education volunteers (66% female, 34% male) between the ages of 16 to 77 years using questionnaires to evaluate nutrition knowledge.³⁷ This population usually consumed higher fat foods and less fruits, vegetables, and dairy products than lower education levels. Therefore, education level and dietary knowledge were positively correlated.

NUTRITION EDUCATION AND DEMOGRAPHICS:

The intervention of nutrition education for Americans has been conducted using many different methods. For instance, using a place of work to educate people on the benefits of good nutrition has been used to help decrease truancy in the workplace due to illnesses. This, in turn, has cut down on costs for the company and has financially benefited them in the long run.³⁸⁻
⁴¹ Other sites for nutrition education programs have been using the grocery store to provide nutritional information to consumers while they shop.⁴² Schools have also been used to help educate children, adolescents, and college students on the benefits of good nutrition in the prevention of chronic disease by emphasizing prevention at an earlier age.⁴³ Some of the more common methods used for nutrition education are reading materials such as pamphlets, newspaper articles, journal articles and fact sheets. This is a less costly and less time-consuming method of nutrition education compared to other methods used. Forms of media such as television and radio have also been methods used to promote nutrition knowledge in Americans.⁴⁴ Lastly, individuals such as doctors, nurses, registered dietitians, and friends play a major role in promoting healthy food habits to decrease the risk of chronic disease.⁴⁵

The overall purpose of these nutritional interventions is to promote better nutritional knowledge of how food is directly associated with well being and thus, improve nutritional habits throughout the individual's lifetime. To properly assess the type of audience receiving the nutritional messages, demographics are used to categorize the individuals by the particular needs for that group that would ultimately decrease the risks associated with chronic disease. Demographics play a major role in how well a person may listen, interpret, and integrate nutritional messages presented to him or her. Therefore, different nutrition education programs have been implemented by focusing on what groups are at high risk for the development of a chronic disease. The nutrition education program is then created by primarily focusing on these groups and using special intervention styles that reflect the needs of that particular group.⁴⁶

Obtaining information for the implementation of a nutrition education program for a particular population sample focuses primarily on demographics such as sex, age, race, and education level. Many times the goal of a nutrition education program is to assess whether population groups are or are not aware of the nutritional messages presented. The main focus of these programs over the past 15 years has been to educate the public on the dietary risks associated with the development of chronic diseases.⁴⁷ Several multimillion dollar programs lasting for years have focused on educating the public about decreasing the risk of CHD and cancer through diet-related interventions. One such study, for example, was the *Stanford Five-City Project* (SFP) from 1980 to 1986. SFP worked with communities to promote behavior change to reduce the risk factors associated with chronic disease in adults between the ages of 18 to 65 years.^{10,11} Other programs that focused on the reduction of risk factors associated with chronic disease have been the *Minnesota Heart Health Program*,⁹ the *Cancer and Diet Intervention Project* (Project CANDI),⁴⁸ and the *South Carolina Cardiovascular Disease Prevention* ("Heart to Heart").⁴⁹

There have been three national health education programs over the past two decades that have succeeded in increasing nutrition awareness and knowledge in some populations throughout the United States. These programs are the *National 5 A Day for Better Health Program*,⁵⁰ the *National High Blood Pressure Education Program* (NHBPEP),¹² and the *National Cholesterol Education Program* (NCEP).⁵¹ The *National 5 A Day for Better Health Program*, that is jointly sponsored by the National Cancer Institute, has as its goal to meet the year 2000 health objective by educating the public on increasing the consumption of fruits and vegetables to five servings a

day to decrease the risk of developing a chronic disease. The program began in 1992 with only 8% of the population knowing of its existence and grew to 29% knowing it existed in 1995. The success of NHBPEP was due to their nutritional message that stressed how high blood pressure (HBP) is considered a serious illness. When the program began only 24% of the general public was aware that HBP was associated with an increased risk of developing CHD, but 20 years after the initiation of the program in 1995, the public awareness grew from 24% to 92%. NCEP was also a successful nutrition education program that began in 1985. The overall goal was to increase the cholesterol awareness in the United States. When the program began only 35% had their cholesterol checked but only 3% knew their cholesterol level. Five years later after the program was initiated, 65% of the American population has had their cholesterol checked and 17% knew their cholesterol level. These three successful programs focused on nutrition education by promoting the prevention of chronic disease in Americans.

The success of *National 5 A Day for Better Health*, NCEP, and NHBPEP was measured by assessing what types of populations were acquiring, understanding, and behaviorally changing their nutritional habits.⁵² To acquire this information, the researchers focused on age, sex, education level, and race. Other factors looked at for success in promoting proper nutrition education were income level and marital status. Overall, these demographics played a major role in who acquired and understood nutritional messages as well as who made a healthy behavior change. For instance, adults between the ages of 35-59 years had the strongest association and the most knowledge about dietary habits relating to cancer and other chronic diseases. On the other hand, adults over the age of 60 years had the lowest level of nutrition knowledge and beliefs that diet was related to the prevention of chronic disease. Gender was also found to play a role in who obtained nutritional knowledge from a nutrition education program. Women between the ages of 35 to 49 years had the greatest nutritional knowledge on diet as it related to chronic disease compared to people between the ages of 18 to 34 years and 50 to 65 years. Race also played a contributing role in who acquired nutritional messages. Caucasians compared to minority populations had the greatest availability to nutritional messages and therefore acquired more nutritional information. Lastly, educational level among recipients of nutritional education influenced nutritional understanding and behavior change. Lower education levels had lower levels of nutrition knowledge and fewer healthy behavior changes compared to higher educated people of the same age, sex, and race. The researchers found that education level was an

important factor in the success of nutrition education programs for obtaining, understanding and implementing a nutritional behavior change. The assessment was made that the more knowledgeable a person was the more willing he or she would be to critically evaluate the presented nutritional information and to retain this information over a longer period of time.

SOY CONSUMPTION AND CHRONIC DISEASE:

Although soy foods have been consumed since 2838 BC, it was not until the immigration of Chinese laborers in the mid-19th century that led to the introduction of soy foods in America.⁵³ At the present time there are more than 10,000 known varieties of soybeans and it is matched with wheat as the leading crop in the United States (26% of U.S. crop area planted is wheat and 26% is soybeans). Currently, the United States is the world leader in the production of soybeans; 29 states have soybean crops as of 1998.⁵⁴ 95% of the production of soybeans is used for oil crushing (75%), stock (15%), and human foods (5%). Oil crushing is divided into 54% for meal and 13% for oil. The meal is primarily used for animal feed.⁵⁵ Therefore, most of the soybeans produced are for animal feed and the least amount is used for human consumption.

Although the human consumption of soy is very minimal, there are many benefits of soy foods for the human diet. Current research focuses on how the consumption of soy foods can decrease the risk of developing chronic diseases such as cancer, CHD, and osteoporosis. The polyphenols found in soybeans have been shown to have a beneficial effect in the reduction of chronic diseases. Types of polyphenols associated with this nutritional benefit are called isoflavonoids. The isoflavonoids genistein and daidzein have received the most attention in preventing chronic diseases.⁵⁶ In addition to the health benefits associated with isoflavonoids, soybeans also have a very high protein content (99.9% of total essential amino acids as established by the United Nations' Food and Agriculture Organization) that meets the protein needs of adults better than any other form of plant protein.⁵⁷

Soy and Cholesterol

Anderson et al. conducted a meta-analysis of 37 research articles relating to serum cholesterol levels as it pertained to soy consumption in men and women (ages not given).⁵⁸ The studies showed that the ingestion of soy protein (range of soy protein consumed in the studies

was between 17 and 124 grams per day) significantly ($p < .05$) reduced serum TC, serum low-density lipoprotein (LDL-C), and serum TG levels compared to the control groups who did not consume soy protein. Soy protein consumption, however, did not affect serum high-density lipoprotein (HDL-C) levels. On average, the consumption of over 25 grams of soy protein a day was associated with a decline in serum TC.

Soy and Coronary Heart Disease

Researchers Wilcox and Blumenthal studied the potential impact soy proteins may play in preventing atherosclerosis.⁵⁹ Blood lipids may be primary initiators in early inflammatory lesions in the blood vessels that are commonly associated with the first stages of atherosclerosis. These lesions become fatty streaks and then possibly turn into fibrous plaques, inhibiting or obstructing the flow of blood. The consumption of soy proteins could potentially decrease the risk of atherosclerosis through many pathways. Soy protein has been shown to decrease serum TC levels. This would decrease the deposit of fatty streaks on the arterial walls of blood vessels. Another theory is that the high levels of genistein found in soy protein block the growth factor of fatty streaks and plaques. Therefore, genistein in soy protein could prevent atherosclerosis due to its effects on plaque formation.

Soy and Hormone Replacement Therapy

Arjmandi et al. studied seventy-two 90 day-old female Sprague-Dawley rats to assess how hormone deficiency-induced hypercholesterolemia due to an ovariectomy (mimic menopause) could be reversed with soy protein.⁶⁰ The researchers found that the ovariectomy-induced rise in serum TC was prevented by soy protein treatments before, during, and after surgery (menopause). The hormone replacement therapy (HRT) of soy protein is derived from its phytoestrogens, which mimic the regular estrogen hormone. Therefore, soy protein can effectively prevent the rise in serum TC due to hormone deficiency after menopause.

Soy and Osteoporosis

Researchers Yamaguchi and Gao studied how the isoflavone, genistein, found in soy protein may stimulate or inhibit bone resorption in elderly female Wistar rats (50 weeks old).⁶¹ The researchers found that bone-resorbing cells, osteoclasts, may be inhibited by genistein found

in soy protein, and therefore decrease bone resorption and increase bone formation. This process allows the bone-forming cells, osteoblasts, to work more productively and maintain better bone integrity. Therefore, the researchers concluded that soy protein, specifically genistein found in soy protein, may play a beneficial role in the prevention of osteoporosis as a person ages by decreasing osteoclast activity.

Soy and Cancer

Messina et al. conducted a meta-analysis of 40 research studies on soy protein consumption and the risk of cancer.⁶² More specifically, soy foods have been reported to decrease the risk of breast, colon, and prostate cancers. The isoflavone genistein has been shown to be capable of inhibiting the growth of many cancer cells, specifically hormone-related cancers. New evidence now supports the hypothesis that soy protein may also inhibit the growth of other cancers that are not hormone-related such as stomach, intestinal, pancreatic, and esophageal cancers. The researchers concluded that although the assumption that soy foods decrease the risk of cancer cannot be stated due to low levels of reported data, it is a promising hypothesis that should be investigated further.

SOY EDUCATION FOR CHRONIC DISEASE:

Due to the lack of nutrition education programs that focus on soy consumption in the prevention of chronic disease, there is a need for the implementation of a soy nutrition education program. This program would serve to educate Americans on how soy foods can decrease the risks associated with cancer, CHD, osteoporosis, and problems associated with menopause. First, assessing what the public knows about soy products and how they feel about the taste of soy products must be measured to create a beneficial nutrition education program using soy foods.

QUESTIONNAIRES AS SURVEY INSTRUMENTS:

Questionnaires as surveys need to be as understandable as possible. The request for demographics should appear at the end of the survey since many respondents find these questions to be obtrusive.⁶³ To also allow easy readability throughout the questionnaire, the format should be consistent throughout so that the respondents do not get confused with the make-up of the questions.⁶⁴ The questions should not ask embarrassing information so that the respondents feel comfortable filling out the questionnaire.⁶⁴ Placing the easiest questions in the beginning of the questionnaire will increase the likelihood that the respondents would finish the survey.⁶³ Questions should be written at a fifth grade reading level because 20% of the American population reads at or below this level.⁶⁵

CHAPTER III: METHODOLOGY

Overview of the Research Design

A timetable for the study is presented in Appendix A. This study distributed questionnaires on nutritional knowledge, soy knowledge, and soy consumption to investigate the most effective way to provide nutrition education using soy products (Appendix B). A total of 164 questionnaires were filled out by volunteers in this study. The volunteers were between the ages of 18 and 65 years because this population is the most targeted age group for chronic disease prevention in other nutrition education programs. Ages, races, education levels, and sex were assessed to arrive at a diverse population sample for Southwestern Virginia.

Taste evaluation questionnaires (Appendix C) were also distributed at the same time. A total of 62 taste evaluations were filled out by the same volunteers that participated in the first questionnaire on food knowledge and consumption. This study was approved by the Institutional Review Board for Research Involving Human Subjects at Virginia Polytechnic Institute and State University.

Population Sample Description / Population Sample Selection Process

The population sample included males and females between the ages of 18 to 65 years with education levels ranging from less than high school to graduate school or beyond in education. Asians, Blacks, Hispanics, and Whites were included in the study. The questionnaires were distributed at the K-Mart store and at the New River Valley Mall, both of which were located in Christiansburg, Virginia. These two locations represented a random population sample in Southwestern Virginia. The participants in the study voluntarily chose to fill out the questionnaires as they passed by the tables set up for the study. A brief description and purpose of the study was given upon request to each participant. No names were given by the participants, and therefore the results were anonymous. All subjects signed an informed consent form (Appendix D and E) prior to their participation in either or both of the questionnaires.

Questionnaire Procedures

Pilot tests of the questionnaires (25 total) were distributed at the Carilion Community Hospital in Blacksburg, Virginia, prior to the beginning of the study to (1) familiarize researchers with the methodology, (2) identify potential problems with the wording or the instruction of the questionnaires, (3) to ensure participants would understand and be able to fill out the questionnaires with little assistance. After these problems were assessed and proper corrections were made, the study was conducted.

As participants arrived at the tables set up for the study, they were greeted, and asked if they would like to participate in a very short questionnaire and/or taste evaluation of soy and non-soy Food and Drug Administration (FDA) approved foods. If they chose to participate, they were asked to fill out the consent form and then were given a questionnaire at a side table so they were free from distractions. If someone chose to participate in the taste evaluation he/she also signed the consent form and then was guided to another table in the opposite direction from the table with the questionnaires on nutrition knowledge. This table was attended full-time by one of the Virginia Tech assistants. The assistants were responsible for distributing six food samples of soy and non-soy blueberry muffins, soy and non-soy cinnamon raisin bread, and soy and non-soy chocolate chip cookies. The participants in the study received the same soy and non-soy items to evaluate simultaneously. The foods were placed separately into small paper cups with plastic wrap on the lid and with a symbol on it so that they could easily understand which question they were currently working on without knowing which item was the soy or the non-soy food. The participants also received a cup of water so they could cleanse their palates between tastings. After filling out the questionnaire, they were invited back up to the main table for complimentary hot chocolate and a free soy sample of tofu cheese and crackers and they were also given brochures about the benefits of soy. They were not allowed to look at the brochures until after they had completed the questionnaires because the information on the brochures could have biased their opinions when the questionnaires were answered. Both questionnaires took approximately 5 minutes to complete.

Preparation of Soy Foods

The preparation of soy foods was conducted in a sanitary manner and in a sanitary environment. The location for preparation of the food and baking was at the Wallace Annex

located on the Virginia Tech campus. Two assistants helped to participate in the baking, and both took precautionary measures to ensure proper sanitation. For example, they washed hands before handling the food and washed hands after returning from the bathroom. All foods used were FDA approved. The foods were baked the night before the taste evaluations were distributed to ensure freshness of the products.

Materials used for this study included an oven, mixing bowls, mixers, spatula, cookie sheets, small bread pans ($\frac{1}{2} \times 1 \frac{1}{2}$ -inch loaf pans), and muffin pans. Other utensils included measuring spoons, cutting boards, measuring cups, a sink, refrigerator, and timer. Plastic wrap and airtight containers held the food fresh after baking and until consumption the following day. The actual recipes used for the six soy and non-soy foods are in Appendices F- K.

Data Analysis Procedures

All the questionnaires on nutrition knowledge and questionnaires on taste evaluations were gathered and assessed through statistical analysis on the Statistical Package for Social Science (SPSS), version 8.1 (Chicago, Illinois) and Minitab (State College, Pennsylvania) for Windows statistical software programs (Appendices L and M). Comparisons were assessed between questions 1-9 for the nutrition questionnaire. Any statistical significance over 95% confidence was considered significant for the results of this study. The taste evaluation questionnaire was also assessed for the differences in opinions found between similar and unsimilar soy and non-soy food products. The analyses of the taste evaluations were also compared with 95% confidence to the nutrition questionnaire. To increase the validity of the results, only participants who completed both the questionnaires were compared for this part of the study.

A statistician was consulted on the most proper method available for statistical analysis. The analysis of this data was studied to assess how nutritionally aware the public was regarding the use of soy foods and what target groups should be investigated for nutrition education in the future. In addition, the taste evaluations helped to assess how the general population regards the taste of soy foods. The taste of the food is the major priority when implementing a nutrition education program.

The results in this section pertain to all statistics gathered and assessed using both the SPSS and Minitab for Windows software programs. For the purpose of this study, correlations with a

P-value less than or equal to .05 were considered statistically significant. Correlations were assessed for all demographics as they related to nutrition and soy knowledge. Additionally, soy foods consumed and reasons for consuming or not consuming soy products were also correlated. In addition, P-values were assessed for the preferences of soy products given in the taste evaluation as they related to the age, race, sex, and education level. Two-tailed t-tests were used in the analysis of sources of information for both current nutrition and soy nutrition programs, for types of soy foods consumed, and for reasons why they were or were not consumed. Percentages and means were used as assessment tools in gathering data for all information provided in both the food questionnaire and the taste evaluation. No other tests or measurements were needed in this study to provide accurate statistical data.

In similarity to the results in the previous food questionnaire section, all statistics were gathered and assessed using both the Statistical Package for Social Science, version 8.1 (SPSS) and Minitab for Windows, 1998 software programs. For the purpose of proper taste evaluation analysis of 6 food products, correlations with a P-value less than or equal to .05 were considered statistically significant. Correlations were assessed for all demographics as they related to food preferences between soy and non-soy products. In addition, P-values were assessed for the preferences of soy products over similar non-soy products and Two-tailed t-tests were used in the analysis demographics as they related to soy and non-soy preferences. Percentages and means were used as assessment tools in gathering data for the taste evaluation. No other tests or measurements were needed in this study to provide accurate statistical data.

CHAPTER IV: RESULTS

FOOD QUESTIONNAIRE:

Demographics

Four main sections under the topic of demographics were assessed for the food questionnaire. The purpose of demographics in this study was to accurately determine if the population sample size was consistent with that of the population in Montgomery County, Virginia, where the study took place. Using demographics in a survey allows a researcher to determine if a particular population is more or less willing to partake in a survey. Therefore, the 1990 demographic census data for Montgomery County⁶⁶ was researched to compare the demographics in both the food questionnaire and the taste evaluation to the Southwestern Virginia population. The comparison of the total population of Montgomery County to the population sample was used to assess if there were any major differences in demographics between county residents and the people willing to participate in the study.

Sex

A total of 124 subjects participated in the food questionnaire, 69 (55.6%) of which were females and 55 (44.4%) were males. The goal of obtaining more than 100 subjects for this questionnaire was successful. In the 1990 Montgomery County census, a total of 73,913 people reside in this area and this is made up of 35,598 (48.2%) females and 38,315 (51.8%) males. Table 4.1 shows the breakdown between the population sample size and the overall population of Montgomery County. No statistical significance ($p > .05$) was determined between both populations. Therefore, both males and females in this study are a representative sample for the Southwest Virginia area.

Race

Five categories of races were listed on the food questionnaire (Table 4.2). From these, 8 Asian (6.5%), 8 Black (6.5%), 2 Hispanic (1.6%), 104 White (83.9%), and 2 Other (1.6%) participated in the study. The two ethnic populations that fit in the “Other” category were one Indian and one Asian-African. The white population sample had the largest amount of participants, but when compared to the breakdown of races for Montgomery County, the

population of whites is also large. The percentage of different races residing in Montgomery County were statistically similar except for whites. Out of 73,913 residents in Montgomery County, Virginia, 67,983 (92.0%) were whites. This population size is significantly higher than the population sample in the study ($p < .014$), however both populations have a majority of whites compared to other races. Further breakdown of races for Montgomery County consisted of 2,841 (3.8%) Blacks, 2,821 (3.8%) Asian or Pacific Islanders, and 268 (0.4%) Other. Hispanics were placed into the “Other” category for the 1990 census.

Age

The food questionnaire age groups between 18 and 65 years were broken down into three categories for a more condensed analysis. Each of the three groups were divided as closely as possible to about 1/3 of the sample population. The results were 18 to 29 years, 30 to 44 years, and 45 to 65 years of age, and out of the 124 total participants in the study the numbers broke down to 47 (37.9%), 37 (29.8%), and 40 (32.3%), respectively. To properly evaluate these data with that of Montgomery County, the age groups had to be broken down further into 6 categories of 18 to 20, 21 to 24, 25 to 44, 45 to 54, 55 to 59, and 60 to 65 years of age. Montgomery County also had additional data for residents who were below age 18 and above the age of 65 years that resulted in the 100% population sample. These age groups were dropped from the overall assessment and the new average with only age levels between 18 and 65 years were assessed to give an accurate representation of the sample size being studied in this project. The populations size for the ages in Montgomery County ($N = 73,913$) using these aforementioned age categories were 11,926 (16.1%), 10,987 (14.9%), 21,288 (28.8%), 6,091 (8.2%), 2,344 (3.2%), and 2,074 (2.8%), respectively. The comparisons between the food questionnaire and the census data for Montgomery County for age levels in Southwest Virginia are in Table 4.3. Two age groups from the food questionnaire differed significantly from the population sample. Both age groups of 25 to 44 and 45 to 54 years were significantly higher ($p < .003$ and $p < .001$, respectively) in the food questionnaire compared to Montgomery County. Therefore, a larger sample size between 25 and 54 years of age participated in this study compared to other age groups.

Table 4.1. Populations by Sex for Food Questionnaire and Montgomery County

	N	Males	Females
Food Questionnaire	124 100%	55 44.4%	69 55.6%
Montgomery County	73,913 100%	38,315 51.8%	35,598 48.2%

Table 4.2. Population by Race for Food Questionnaire and Montgomery County

	N	Asian	Black	Hispanic	White	Other
Food Questionnaire	124 100%	8 6.5%	8 6.5%	2 1.6%	104 83.9%	2 1.6%
Montgomery County	73,913 100%	2,821 3.8%	2,841 3.9%	N/A	67,983* 92%	268 0.4%

* Significantly larger population from whites than in food questionnaire ($p < .014$)

Table 4.3. Population by Age (in years) for Food Questionnaire and Montgomery County

	N	18-20	21-24	25-44	45-54	55-59	60-65
Food Questionnaire	124 100%	17 13.7%	15 12.1%	52 ¹ 41.9%	29 ² 23.4%	7 5.6%	4 3.2%
Montgomery County	73,913 74%*	11,926 16.1%	10,987 14.9%	21,288 28.8%	6,091 8.2%	2,344 3.2%	2,074 2.8%

* The other 26% represents ages levels below 18 and above 65 years

¹ Significantly larger age group than Montgomery County (p<.003)

² Significantly larger age group than Montgomery County (p<.001)

Education Level

Accurate assessment of education level required that the 7 main levels of education on the food questionnaire be narrowed down further into four categories to condense the population samples and to create a larger population size for each group. The end result was four educational categories consisting of “less than or some High School” education, “completed High School” or had “some college” education, “college graduate”, and “specialized or graduate level degrees” beyond a Bachelor’s degree. Compared to all other forms of demographics, education level had the most statistical significance when compared to Montgomery County’s average education level. Table 4.4 exhibits the differences found between the study and the average population size found in the Southwest Virginia area. The first category, “less than or some High School” education, had a statistically significant variation ($p < .001$) between population sizes with 4% (5 participants) from the study and 15.1% (11,181 residents) from Montgomery County. Therefore, Montgomery County has a much greater population size of “less than or some High School” educated residents than represented in this study. On the other hand, the study had a significantly larger population sample ($p < .009$) of “completed High School or some college” education levels compared to that of Montgomery County. 68 (54.8%) out of 124 participants fell into the completed High School or Some College group while 31,860 (43.2%) natives of Southwest Virginia fit into this category. This statistically larger population size compared to the data from Montgomery County could be swayed due to the fact that this Southwest Virginia area has a very large college student population who are not residents of Montgomery County. Again, the category for College graduates was also significantly higher in this study than in Montgomery County ($p < .001$). Out of 124 participants in the study, 34 (27.4%) people were at this education level while out of the 73,913 residents in Montgomery County, 8,578 (11.6%) were at this education level. As previously mentioned, this phenomenon of a larger education level could be strongly swayed due to the large population of non-resident college students that attend Virginia Polytechnic Institute and State University. The graduate or specialized degree option was not significantly different ($p > .05$) from the study compared to Montgomery County (11 participants at 17.7% and 6,348 residents at 8.6%, respectively).

Table 4.4. Population by Education Level for Food Questionnaire and Montgomery County

	N	< or Some High School	Completed High School or Some College	Completed College	Graduate or Professional degree
Food Questionnaire	124 100%	5 4%	68 54.8% ²	34 27.4% ³	17 13.7%
Montgomery County	73,913 78.5%*	11,181 15.1% ¹	31,860 43.2%	8,578 11.6%	6,348 8.6%

* The other 21.5% represents no education level, associate degrees, and other not specified

¹ Significantly larger education level compared to food questionnaire (p<.001)

² Significantly larger education level compared to Montgomery County (p<.009)

³ Significantly larger education level compared to Montgomery County (p<.001)

Current Nutrition Knowledge

Three specific questions were asked in the food questionnaire to evaluate the current knowledge of how nutrition is related to chronic disease risk. The three questions used are justifiable due to the fact that these are the three most current nutrition education programs that have received the most attention over the past 15 years.^{12,47,51} Therefore, usage of questions concerning the public's knowledge of these foods as they relate to chronic disease risk will enable a more accurate comparison of the population's current soy knowledge. This information will be useful in determining if a soy education program would be beneficial in the near future.

The data for the current nutrition knowledge section of the food questionnaire involved an overall 73.4% of the Southwest Virginia population sample who knew at least one of the three nutrition guidelines to promote better health and decrease the risk of developing a chronic disease. The three questions in the study asked if the participant had knowledge concerning the recommendations to consume less than 30% of daily calories as fat, eating between 20 and 30 grams of fiber a day, and at least 5 fruits and vegetables a day. The breakdown of all the nutrition programs is shown in Table 4.5. The program that was most familiar to participants in the study was the *National 5 A Day for Better Health Program* with 106 out of 124 subjects (85.5%) knowing of its existence. The 18 other participants did not know of the program or were not sure if they had heard of the program (9 subjects in each category for a total of 14.6%). The other two programs had very similar results for all three possible answers. Consuming less than 30% fat a day and 20-30 grams of fiber a day reached 86 (69.4%) and 81 (65.3%) people out of 124 total participants, respectively. People who had no knowledge of the two aforementioned programs were 24 (19.4%) for eating 5 fruits and vegetables a day and 25 (20.2%) for eating between 20-30 grams of fiber a day. In the "I'm not sure if I've heard" category, 14 (11.3%) participants answered for the 5 fruits and vegetables a day and 18 (14.5%) answered for the 20-30 grams of fiber a day.

There was no significant correlation found when comparing current nutrition knowledge in all three categories as it relates to education level. Similar results were found for sex and its role in current nutrition knowledge. For race, however, the white population was found to know significantly more ($p < .003$) than other minority races about consuming less than 30% of calories from fat a day. There was a trend toward significance ($p < .054$) for the white

Table 4.5. Nutrition Knowledge from Three Most Current Nutrition Education Programs

	N	Yes	No	I'm Not Sure
< 30% Fat Kcal a Day	124 100%	86* 69.4%	24 19.4%	14 11.3%
5-A-Day	124 100%	106 85.5%	9 7.3%	9 7.3%
20-30 grams Fiber a Day	124 100%	81 ¹ 65.3%	25 20.2%	18 14.5%

* Whites know significantly more about this program than the minority races (p<.003)

¹ 45-65 year old knew significantly more about this program than other age groups (p<.027)

population sample knowing more about consuming 5 fruits and vegetables a day. The Asian, black, and Hispanic population samples for this study were small, and therefore, the results could be skewed due to an inaccurate sample size for statistical analysis. In addition to race, a person's age (45 to 65 year-olds) carried significance ($p < .027$) in current nutrition knowledge for consuming 20-30 grams of fiber a day. This is similar to the results found Variyam's et al study.¹⁹

Sources of current nutrition information

Eleven sources of nutrition information were given as choices in the food questionnaire due to research showing that these sources were the most prevalent means for distributing nutrition information to the general public and special groups.⁴²⁻⁴⁵ In addition to the 11 possible choices, there were also sections for having never received nutrition information, not remembering where the information source came from, or for another source outside of the 11 options. Table 4.6 gives a breakdown from the 124 participants in the study and their sources of nutrition information in the prevention of chronic disease focusing on 5 fruits and vegetables a day, consuming less than 30% of calories from fat a day, and obtaining between 20 and 30 grams of fiber a day. All subjects could choose more than one source of information. 92.7% (115 out of 124 subjects) had received some source of current nutrition information on the three aforementioned topics. The significantly ($p < .001$) higher source of nutrition information came from magazines and newspapers, where in this study 57 people (49.6%) had received their information. The second highest sources of information were from the doctor's office (30 people, 26.1%), television program (31 people, 27%), and television ads (30 people, 26.1%). Many sources of nutrition information were significantly lower compared to this previously mentioned program source. The sources of information that were significantly lower ($p < .002$) were: the grocery store (12 people, 10.4%), pamphlets (14 people, 12.2%), radio (9 people, 7.8%), Registered Dietitian (11 people, 9.6%), workplace (6 people, 5.2%), "I don't remember" category, (11 people, 9.6%), and the "Other" category (11 people, 9.6%). The 11 sources of information in the "Other" category consisted of church (1), Student Dietetic Association (1), parents (7), friends (1), and son (1). The overall lowest source of information came from the workplace.

Table 4.6. Sources of Information for Current Nutrition Education Programs Reported by Participants in the Food Questionnaire

Information Source	N out of 124	%
Received no Nutrition Education	9	7.3
Doctor's Office	30	26.1
Magazine/Newspaper*	57	49.6
Journal Article	19	16.5
Grocery Store¹	12	16.5
Television Program	31	27
Television Ad	30	26.1
School	28	24.3
Pamphlet¹	14	12.2
Radio¹	9	7.8
Registered Dietitian¹	11	9.6
Work¹	6	5.2
I Don't Remember¹	11	9.6
Other Sources¹	11	9.6

* Significantly largest source of nutrition information (p<.001)

¹ Significantly lower sources of nutrition information (p<.022)

Current soy knowledge

The food questionnaire addressed four specific categories of how soy foods help to prevent chronic disease in osteoporosis, cancer, coronary heart disease (CHD), and problems associated with menopause. The 124 participants in the study could choose between “Yes”, “No”, or “I don’t know” for their current knowledge on how soy foods was related to the prevention of the aforementioned chronic diseases. An average of 37.1% of participants had received any nutrition information concerning soy products in the prevention of chronic disease. This percentage is approximately half as much compared to the 73.4% of the total sample size in the study that had received some source of current nutrition information related to the prevention of chronic disease by some method other than soy consumption. As seen in Table 4.7, the greatest knowledge on soy and chronic disease was associated with CHD (64 people, 51.6%), next was cancer (60 people, 48.4%), then osteoporosis (34 people, 27.4%), and lastly, menopause (26 people, 21%).

The comparison of demographics to current soy knowledge had no significance ($p>.05$) for education level, race, or age. Sex; however, when compared to knowledge of soy was significantly associated for all categories except for CHD (Figure 4.1). Women knew significantly more on how soy relates to osteoporosis ($p<.03$), cancer ($p<.04$), and menopause ($p<.038$). The data for CHD was very similar among how many men and how many women were aware of the benefits of how soy can prevent this chronic disease ($p>.05$). For these three categories; however, only 32.3% of the sample size knew anything about how soy affects these specific chronic diseases.

Table 4.7. Soy Knowledge Associated with Chronic Disease Risk

	N	Yes	No	I'm Not Sure
Osteoporosis*¹	124 100%	34 27.4%	65 52.4%	25 20.2%
Cancer*²	124 100%	60 48.4%	46 37.1%	18 14.5%
Cardiovascular Disease³	124 100%	64 51.6%	44 35.5%	16 12.9%
Menopause*	124 100%	26 21%	74 59.7%	24 19.4%

* Women knew significantly more than men ($p < .04$)

¹ Soy knowledge as it relates to osteoporosis lead to significantly greater soy consumption ($p < .03$)

² Soy knowledge as it relates to cancer lead to significantly greater soy consumption ($p < .018$)

³ Soy knowledge as it relates to cardiovascular disease lead to significantly greater soy consumption ($p < .007$)

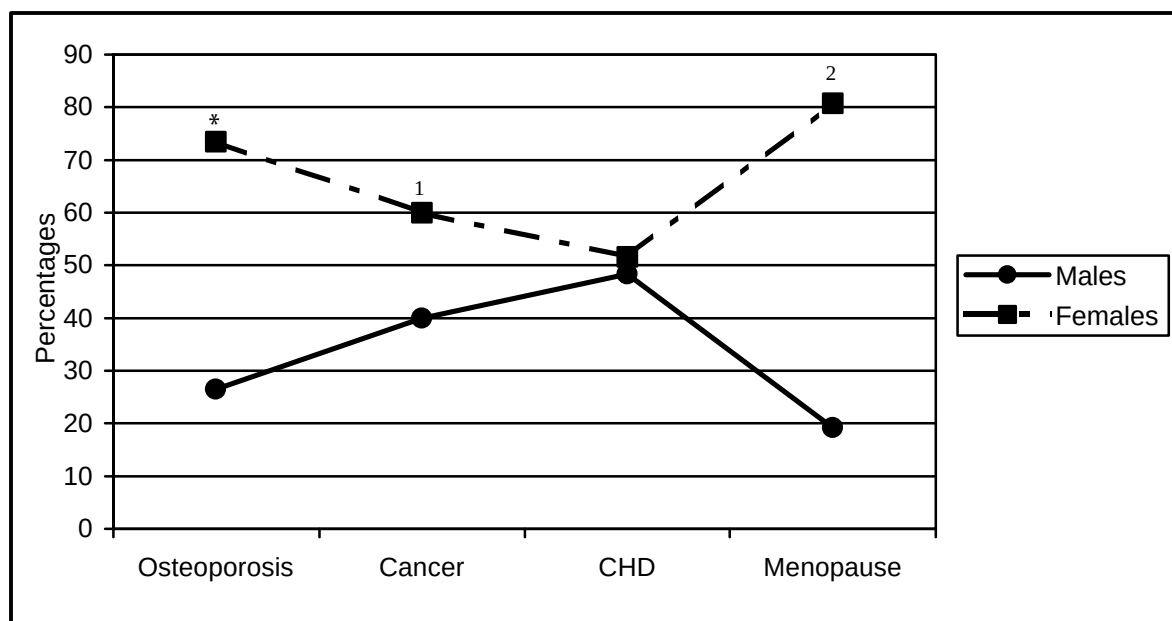


Fig. 4.1. Comparison of soy knowledge as it relates to chronic disease between males and females

* Females knew significantly more on how soy foods are related to Osteoporosis ($p < .03$)

¹ Females knew significantly more on how soy foods are related to cancer ($p < .041$)

² Females knew significantly more on how soy foods are related to Menopause ($p < .007$)

Current sources of soy information

The same 11 selections for sources of information were given for soy as were given for current nutrition sources. The three additional options were also given for not receiving soy information, not remembering the source, and other sources not provided. Only 39.5% (49 out of 124 participants) had received any soy information. Participants could choose more than one source of soy information if applicable. Table 4.8 shows the breakdown of the sources of information for soy with magazines and newspapers (34 people, 45.3%) along with television programs (28 people, 37.3%) being the most significant ($p < .006$) sources of information. Several sources of soy information were significantly lower ($p < .046$) than the previously mentioned sources, and they were: the grocery store (4 people, 5.3%), school (3 people, 4%), a pamphlet (6 people, 8%), Registered Dietitian (5 people, 6.7%), work (6 people, 8%), and “I don’t remember” (5 people, 6.7%). A total of 11 people (14.7%) received soy information from a source other than those provided. The sources of information were from friends (2), parents (2), health food store (2), church (1), Student Dietetic Association (1), wife (1), research project (1), and one stated no reason.

Figure 4.2 compares the sources of information for both current nutrition and soy programs, and both were significantly higher ($p < .001$ and $p < .006$, respectively) in their sources of information coming from magazines and newspapers. Similarly, both sources for current nutrition and soy information had many of the same significantly lower sources such as: grocery store, pamphlet, Registered Dietitian, work, and the “I don’t remember” category, which all had significance levels below .05. Lastly, a large significance ($p < .001$) was found between who received nutrition information compared to who had received soy information (74.3% and 37.1%, respectively).

Consumption and purchase of soy products

This part of the study focused on how many participants purchased soy products and if they had an overall preference for one soy product over another by assessing the percentages of each soy product purchased. As seen in Table 4.9, eight choices of soy products were available and participants could circle as many soy products they had purchased and consumed. In addition, there was a “I don’t know” and an “Other” category. Table 4.9 shows how out of the 124 participants in this study, exactly 50% (62 people) had never purchased a soy product. Figure 4.3 shows the two soy foods that had significantly ($p < .001$) higher purchases compared to

Table 4.8. Sources of Information for Soy as it Relates to Chronic Disease Risk Reported by Participants in the Food Questionnaire

Information Source	N out of 124	%
Received no Nutrition Education	75	60.5
Doctor's Office	14	18.7
Magazine/Newspaper*	34	45.3
Journal Article	13	17.3
Grocery Store¹	4	5.3
Television Program*	28	37.3
Television Ad	19	25.3
School¹	3	4
Pamphlet¹	6	8
Radio	10	13.3
Registered Dietitian¹	5	6.7
Work¹	6	8
I Don't Remember¹	5	6.7
Other Sources	11	14.7

* Significantly largest sources of nutrition information (p<.006)

¹ Significantly lower sources of nutrition information (p<.046)

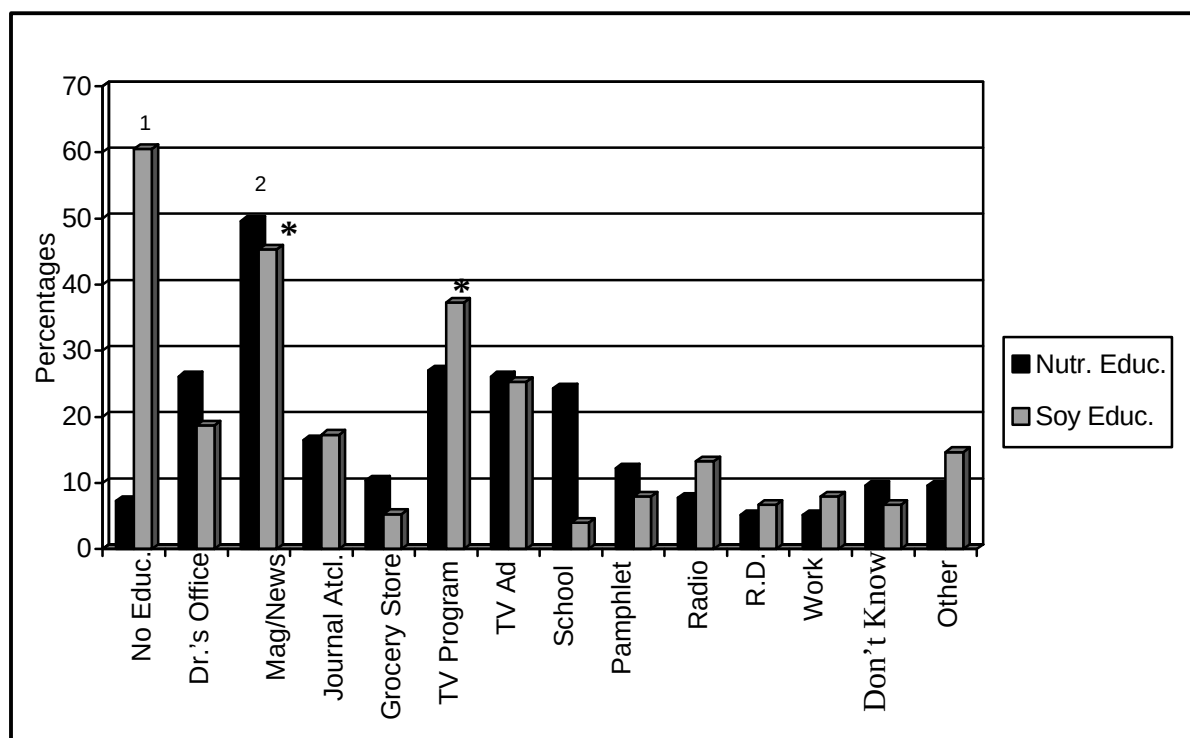


Fig. 4.2. Sources of information for three current nutrition education programs and soy education programs

* Statistically greater sources of soy education ($p < .006$)

¹ Soy education was significantly less than current nutrition education programs ($p < .001$)

² Significantly greatest source of current nutrition education ($p < .001$)

Table 4.9. Soy Products Previously Purchased in a Food Store or Specialty Shop

Soy Products	N out of 124	%
Have Not Purchased Soy Food^{2,4}	62	50
Tofu^{*,5}	32	51.6
Miso¹	4	6.5
Soy Yogurt^{1,3}	6	9.7
Soy Milk⁶	18	29
Soy Ice Cream^{1,6}	8	12.9
Tempeh^{1,5,6}	5	6.5
Soy Burgers[*]	33	53.2
Soy Cheese⁵	13	21
I Don't Know	9	14.5
Other¹	3	4.8

* Significantly greater purchases of these soy products compared to other soy foods (p<.001)

¹ Significantly less purchases of these soy products compared to other soy foods (p<.014)

² Significantly greater percentage of Asians purchased soy foods compared to other races (p<.03)

³ Significantly greater percentage of Asians purchased soy yogurt compared to other races (p<.001)

⁴ The High School and Some College education level purchased significantly less soy food (p<.001)

⁵ The highest education level bought significantly greater amounts of soy foods (p<.02)

⁶ Women purchased significantly greater amounts of soy food (p<.04)

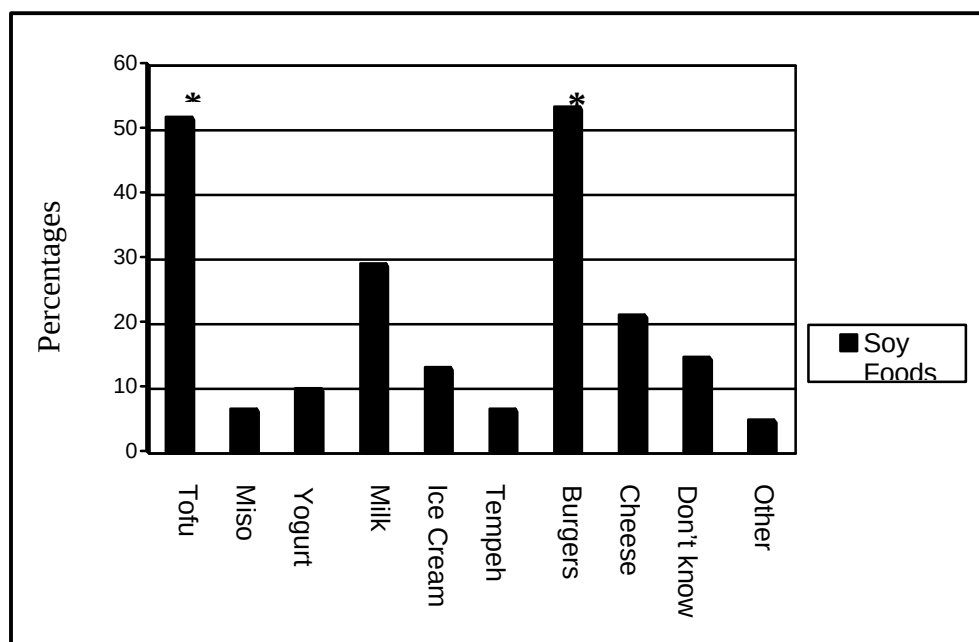


Fig. 4.3. Percentages of soy foods previously purchased and eaten

* Significantly greater purchases for these soy products compared to other purchases ($p < .001$)

the other choices and they were tofu (32 people, 51.6%) and soy burgers (33 people, 53.2%). soy products were purchased significantly ($p<.014$) lower than average and they were miso (4 people, 6.5%), soy yogurt (6 people, 9.7%), soy ice cream (8 people, 12.9%), tempeh (4 people, 6.5%), and other (3 people, 4.8%). The “Other” category consisted of soy protein powder (1), soy protein bars (1), and soy formula (1).

Soy consumption was positively correlated with soy knowledge in osteoporosis ($p<.035$), cancer ($p<.018$), and CHD ($p<.007$) as seen in Figure 4.4. The consumption of soy products was also demographically assessed with the population sample and all categories showed significance except for age. As seen in Table 4.9, soy purchases were influenced by race; Asians purchased significantly ($p<.001$) more soy yogurt and were significantly ($p<.033$) more likely to buy any soy product compared to other races. Education level also played a role in who purchased soy foods. “High School and some college” education levels were significantly ($p<.001$) less likely to purchase any soy products. The highest education level was significantly ($p<.02$) associated with purchasing more tofu, tempeh, soy cheese, and soy foods from the “Other” category. Lastly, sex was also a factor in who purchased soy foods. Women purchased significantly ($p<.035$) more soy milk, soy ice cream, and tempeh. Men, on the other hand, purchased significantly ($p<.018$) more soy foods from the “I don’t know” category.

Four choices were given in the food questionnaire as to why the participant purchased a soy product. The subjects could circle more than one option if they had multiple reasons. As shown in Figure 4.5, the most significant ($p<.001$) reason for purchasing soy foods was for health purposes (36 people, 66.%) and the significantly ($p<.006$) lower reasons for purchasing soy products were for the low cost of soy foods (4 people, 7.4%) and religion (2 people, 3.7%). In the “Other” category (11 people, 20.4%), the reasons stated were “Just to try” (4), “In a recipe” (2), “Only formula able to use for my baby” (1), and “I am a vegetarian” (2).

The other population sample who had never purchased soy foods answered another section of the questionnaire that focused on reasons why soy has not been consumed. Five choices were given and the participants could choose more than one answer if applicable. Figure 4.6 shows the breakdown of reasons why people have not purchased soy foods in the Southwest Virginia area. The most significant ($p<.017$) reason was they believed they would not like the taste of soy food

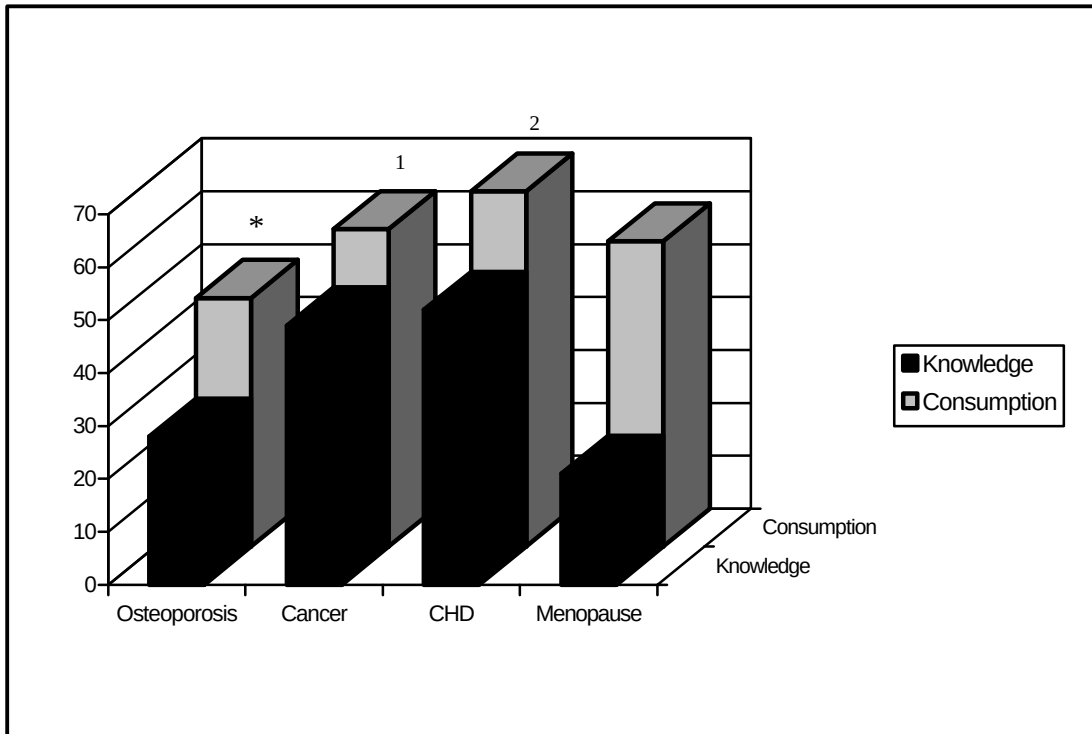


Fig. 4.4. Comparison of soy knowledge as it relates to influencing soy consumption

* Knowledge of soy as it relates to osteoporosis was significantly associated with soy consumption ($p < .035$)

¹ Knowledge of soy as it relates to cancer was significantly associated with soy consumption ($p < .018$)

² Knowledge of soy as it relates to CHD was significantly associated with soy consumption ($p < .007$)

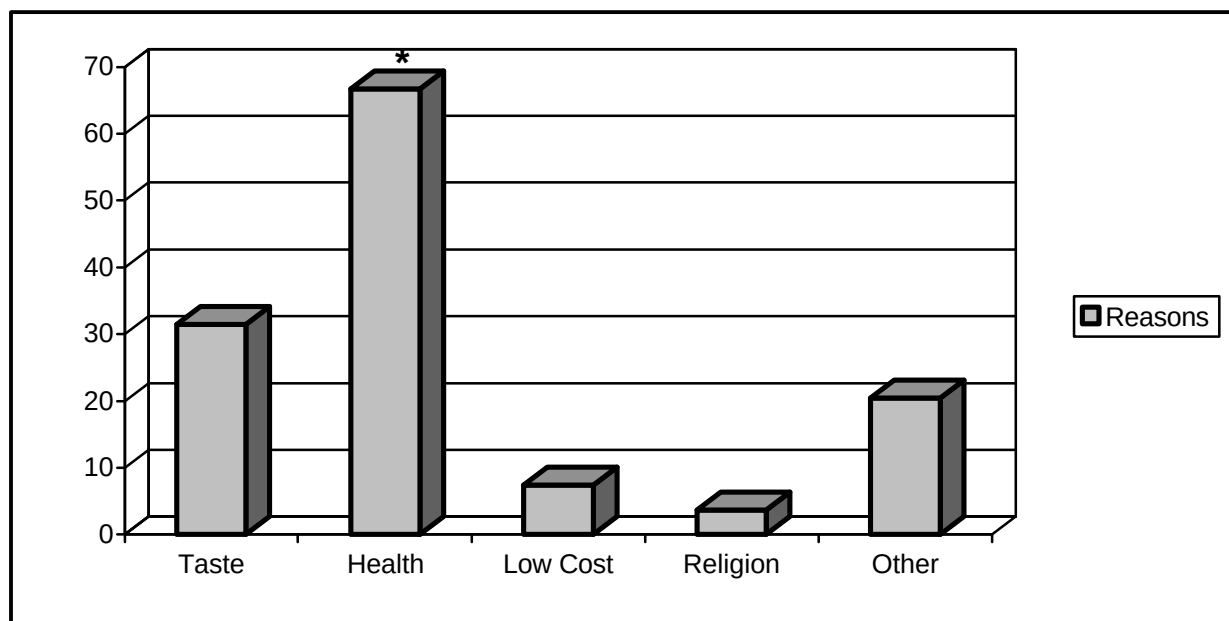


Fig. 4.5. Reasons stated for purchasing and consuming soy products

* Health was the most significant reason for consuming soy products ($p < .001$)

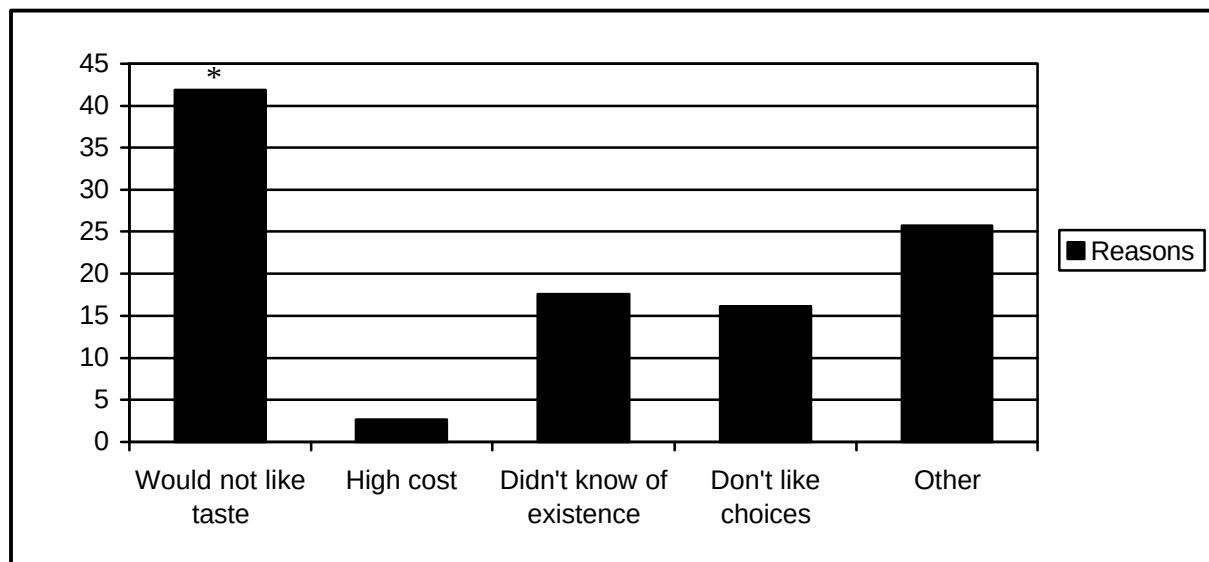


Fig. 4.6. Reasons for not purchasing/consuming soy products

* Not liking the taste of soy products was the most significant reason for not consuming soy foods ($p < .017$)

products (31 people, 41.9%). Although, this was the greatest stated reason, there was no significance ($p>.05$) found between people who chose this option and their willingness to try the soy taste evaluation. The least significant ($p<.002$) reason was due to the high cost of soy food (2 people, 2.7%). Many reasons were given under the “Other” category (19 people, 25.7%) such as: “Just didn’t want to try” (9), “Not exposed to soy food” (4), “Scared to try” (2), and 4 people did not state a reason.

TASTE EVALUATION:

Demographics

Four main sections under the topic of demographics were assessed for the taste evaluation. The purpose of demographics in this study were similar to the food questionnaire in that they were used to accurately measure whether the population sample size was comparable to the population in Montgomery County, Virginia. The use of demographics in this survey determined if a particular population is more or less likely to participate in a taste evaluation using foods that may be unfamiliar to a subject in the study. Therefore, 1990 demographic census data for Montgomery County⁶⁶ was evaluated along with the taste evaluation demographic data to provide a more valid scope of analysis in this part of the study.

Sex

A total of 62 (50%) subjects from the food questionnaire (124 total subjects) opted to take the additional taste evaluation survey. Out of 62 participants, 23 (37.1%) were males and 39 (62.9%) were females. Of those who participated in the food questionnaire, 56.5% of the females and 41.8% of the males also participated in the taste evaluation. Table 4.10 gives an assessment of the male and female ratios for the taste evaluation survey and for Montgomery County, Virginia. Out of the total residential population for Montgomery County (73,913), the male and female ratios were 38,315 (51.8%) and 35,598 (48.2%), respectively. A significantly ($p < .016$) larger proportion of females participated in the taste evaluation compared to the males.

Table 4.10. Populations by Sex for Taste Evaluation and Montgomery County

	N	Males	Females
Taste Evaluation	62 100%	23 37.1%	39 ¹ 62.9%
Montgomery County	73,913 100%	38,315* 51.8%	35,598 48.2%

* Significantly larger male population in Montgomery County ($p < .016$)

¹ Significantly larger female population in Taste Evaluation ($p < .016$)

Race

All races participated in the taste evaluation except for the two people in the “Other” category (1 Indian, 1 Asian-African). Table 4.11 shows how all Asians (8 people, 12.9%), 50% of the blacks (4 people, 6.5%), all Hispanics (2 people, 3.2%), and 46% of the whites (48 people, 77.4%) participated in the taste evaluation after completion of the food questionnaire. These data compared to the demographics for Montgomery county show how out of 73,913 residents, 67,983 (92%) are white, 2,841 (3.8%) are black, 2,821 (3.8%) are Asian, and 268 (0.4%) are “Other”. Comparing the data from the census and the taste evaluation show a significance for two of the four participating races. Montgomery County had a significantly ($p<.006$) larger population of whites compared to the study; however, the taste evaluations were attempted by a white majority. Asians attempting the taste evaluation were a significantly ($p<.033$) larger population sample of participants compared to the Montgomery County census. Due to small sample sizes for all minority groups in the taste evaluation, data could be skewed to inaccurately represent significance for these population samples.

Age

The percentages of the participant’s age levels in the taste evaluation were very similar to those who participated in the food questionnaire. Approximately 50% of all age groups chose to partake in both studies. Table 4.12 demonstrates the statistical assessment of age groups for both the taste evaluation and Montgomery County, Virginia. Participants in the taste evaluation compared to the Montgomery County 1990 census show the age groups were respectively divided into 18-20 years (4 people at 6.5%, 11,926 at 16.1%), 21-24 years (10 people at 16.1%, 10,987 at 14.9%), 25-44 years (26 people at 41.9%, 21,288 people at 28.8%), 45-54 years (14 people at 22.6%, 6,091 at 8.2%), 55-59 years (5 people at 8.1%, 2,344 at 3.2%), and 60-65 years (3 people at 4.8%, 2,074 at 2.8%) of age. Montgomery County had a significantly ($p<.002$) larger age group of 18-20 year-olds compared to the taste evaluation; however, the taste evaluation had a significantly larger population sample for both 25-44 year-olds ($p<.036$) and 45-54 year-olds ($p<.007$). All other age groups in the taste evaluation were accurately representative of Montgomery County.

Table 4.11. Population by Race for Taste Evaluation and Montgomery County

	N	Asian	Black	Hispanic	White	Other
Taste Evaluation	62 100%	8 ¹ 12.9%	4 6.5%	2 3.2%	48 77.4%	0 0%
Montgomery County	73,913 100%	2,821 3.8%	2,841 3.9%	N/A	67,983* 92%	204 0.3%

* Significantly larger population of whites in Montgomery County (p<.006)

1 Significantly larger participation of Asians in Taste Evaluation (p<.033)

Table 4.12. Population by Age (in years) for Taste Evaluation and Montgomery County

	N	18-20	21-24	25-44	45-54	55-59	60-65
Taste Evaluation	62 100%	4 6.5%	10 16.1%	26 ² 41.9%	14 ³ 22.6%	5 8.1%	3 4.8%
Montgomery County	73,913 74%*	11,926 ¹ 16.1%	10,987 14.9%	21,288 28.8%	6,091 8.2%	2,344 3.2%	2,074 2.8%

* The other 26% represents ages levels below 18 and above 65 years

¹ Significantly larger age group in Montgomery County (p<.002)

² Significantly larger age group in Taste Evaluation (p<.036)

³ Significantly larger age group in Taste Evaluation (p<.007)

Education level

The education levels of participants in the taste evaluation were similar to the percentages for participants in the food questionnaire. Table 4.13 shows the sample size population in comparison to the Montgomery County data. Out of the total of 62 participants in this part of the study, 3 (4.8%) had “less than or some High School” education, 31 (50%) “completed High School or some college”, 17 (27.4%) “completed college”, and 11 (17.7%) had obtained a “graduate or a professional degree.” The data for Montgomery county was 11,181 (15.1%) in the “less than or some High School” education group, 31,860 (43.2%) “completed High School or some college”, 8,578 (11.6%) “completed college”, and 6,348 (8.6%) had obtained a “graduate or a professional degree.” Montgomery County had a significantly ($p < .001$) larger population size of “less than or some High School” education compared to the sample size in the taste evaluation. The “completed college” education level; however, was significantly ($p < .005$) larger in the taste evaluation study compared to Montgomery County. There was also a trend toward significance ($p < .057$) for the “professional and specialized education” level in the taste evaluation compared to Montgomery County.

Preference scales for soy products

All six food products (3 soy and 3 non-soy grain products) were given to 62 participants in the taste evaluation. Each subject had to rate the food item from 1 to 9 (1 = dislike extremely to 9 = like extremely) for their preference. Table 4.14 provides the data for all six food products and their ratings for each. Comparisons for the soy chocolate chip cookie versus the regular chocolate chip cookie were as follows in respective order: dislike extremely (0 for both cookies), dislike very much (0, 2 people at 3.2%), dislike moderately (2 people at 3.2%, 3 people at 4.8%), dislike slightly (1 person at 1.6%, 2 people at 3.2%), neither like nor dislike (1 person at 1.6%, 0), like slightly (8 people at 12.9%, 5 people at 8.1%), like moderately (16 at 25.8%, 18 people at 29%), like very much (20 people at 32.3%, 21 people at 33.9%), and like extremely (14 people at 22.6%, 11 people at 17.7%). The “like very much” category was the most frequently rated for both the soy and the non-soy (mean rate was 7.44 and 7.16, respectively) chocolate chip cookies as shown in Figure 4.7. No significant ($p > .05$) difference was found between preferences for soy versus the non-soy cookies. The evaluation for the soy versus the non-soy blueberry muffins was conducted in the same manner as the cookies.

Table 4.13. Population by Education Level for Taste Evaluation and Montgomery County

	N	< or Some High School	Completed High School or Some College	Completed College	Graduate or Professional degree
Taste Evaluation	62 100%	3 4.8%	31 50%	17 ² 27.4%	11 ³ 17.7%
Montgomery County	73,913 78.5%*	11,181 ¹ 15.1%	31,860 43.2%	8,578 11.6%	6,348 8.6%

* The other 21.5% represents no education level, associate degrees, and other not specified

¹ Significantly larger education level compared to taste evaluation (p<.001)

² Significantly larger education level compared to Montgomery County (p<.005)

³ A trend toward Significance found in the larger education level compared to Montgomery County (p<.057)

Table 4.14. Preference Scale of Soy versus Non-soy Foods

Preference Scale	Soy Cookie	Regular Cookie	Soy Muffin	Regular Muffin	Soy Bread	Regular Bread ¹
Like Extremely = 9	14 22.6%	11 17.7%	9 14.5%	5 8.1%	4 6.5%	5 8.1%
Like Very Much = 8	20 32.3%	21 33.9%	9 14.5%	9 14.5%	4 6.5%	9 14.5%
Like Moderately = 7	16 25.8%	18 29%	20 32.3%	24 38.7%	8 12.9%	17 27.4%
Like Slightly = 6	8 12.9%	5 8.1%	13 21%	14 22.6%	14 22.6%	13 21%
Neither Like Nor Dislike = 5	1 1.6%	0 0%	5 8.1%	4 6.5%	7 11.3%	11 17.7%
Dislike Slightly = 4	1 1.6%	2 3.2%	2 3.2%	2 3.2%	11 17.7%	3 4.8%
Dislike Moderately = 3	2 3.2%	3 4.8%	2 3.2%	3 4.8%	7 11.3%	1 1.6%
Dislike Very Much = 2	0 0%	2 3.2%	1 1.6%	1 1.6%	6 9.7%	2 3.2%
Dislike Extremely = 1	0 0%	0 0%	1 1.6%	0 0%	1 1.6%	1 1.6%

¹ Preference for regular bread was significantly higher than soy bread (p<.001)

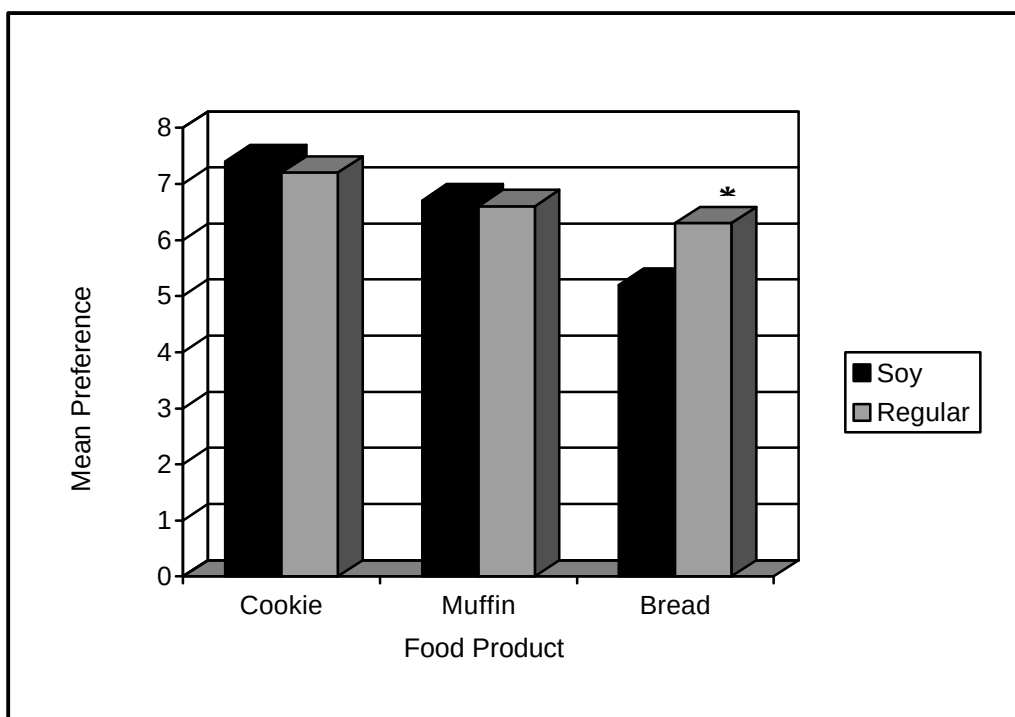


Fig. 4.7. Mean preference scale¹ for soy versus regular food products

* Regular bread was significantly preferred over soy bread ($p < .001$)

¹ Preference scale ranks from 1= Dislike Extremely to 9= Like Extremely

of the soy versus the regular blueberry muffin were as follows in respective order: dislike extremely (1 person at 1.6%, 0), dislike very much (both had 1 person at 1.6%), dislike moderately (2 people at 3.2%, 3 people at 4.8%), dislike slightly (both had 2 people at 3.2%), neither like nor dislike (5 people at 8.1%, 4 people at 6.5%), like slightly (13 people at 21%, 14 people at 22.6%), like moderately (20 people at 32.3%, 24 people at 38.7%), like very much (both had 9 people at 14.5%), and like extremely (9 people at 14.5%, 5 people at 8.1%). No significant ($p > .05$) difference was found between preferences for soy muffins compared to non-soy muffins. Figure 4.7 shows the mean likeness for the soy and the non-soy blueberry muffins (6.6 and 6.58, respectively).

Comparisons for the soy cinnamon raisin bread versus the regular cinnamon raisin bread were as follows in respective order: dislike extremely (1 person at 1.6% for both breads), dislike very much (6 people at 9.7%, 2 people at 3.2%), dislike moderately (7 people at 11.3%, 1 person at 1.6%), dislike slightly (11 people at 17.7%, 3 people at 4.8%), neither like nor dislike (7 people at 11.3%, 11 people at 17.7%), like slightly (14 people at 22.6%, 13 people at 21%), like moderately (8 people at 12.9%, 17 people at 27.4%), like very much (4 people at 6.5%, 9 people at 14.5%), and like extremely (4 people at 6.5%, 5 people at 8.1%). Significantly ($p < .001$) more people preferred the regular cinnamon raisin bread compared to the soy cinnamon raisin bread. Figure 4.7 shows the mean preferences for the soy and the non-soy cinnamon raisin breads (5.17 and 6.27, respectively).

Demographics were correlated for soy and non-soy food preferences. There was no significant ($p > .05$) difference for sex, race, or education level; however, age was highly significant in all foods except for the regular chocolate cookie. Figure 4.8 shows the percentages of age groups that preferred all six food products in the taste evaluation. The 45-65-year-olds group preferred all food products (except the regular chocolate chip cookie) significantly more than any other age group. The significance values are as follows: soy chocolate chip cookie ($p < .02$), soy blueberry muffin ($p < .012$), regular blueberry muffin ($p < .024$), soy cinnamon raisin bread ($p < .026$), and regular cinnamon raisin bread ($p < .034$). The younger age groups did not have any significant ($p > .05$) preference for any of the six baked items in the taste evaluation.

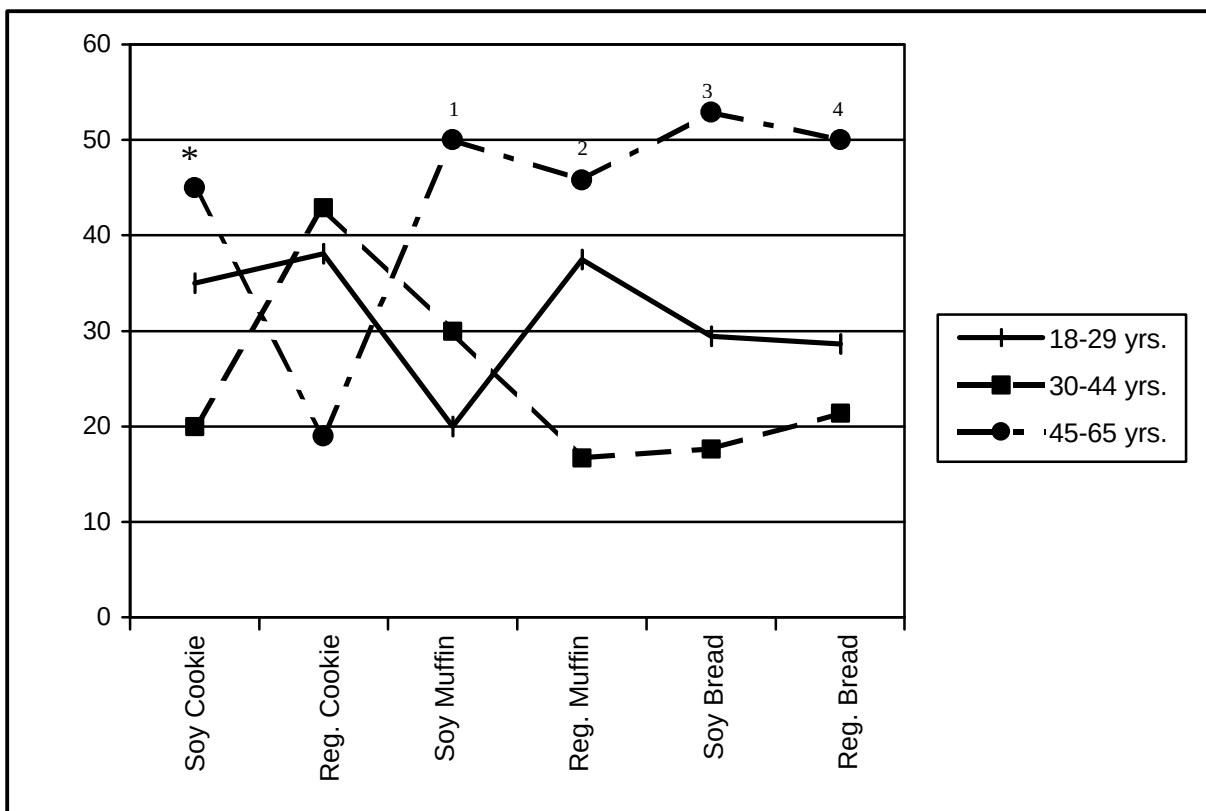


Fig. 4.8. The percentage of age groups who preferred soy foods versus regular foods

- * Soy cookie was preferred significantly more by 45-65 year-olds ($p < .02$)
¹ Soy muffin was preferred significantly more by 45-65 year-olds ($p < .012$)
² Regular muffin was preferred significantly more by 45-65 year-olds ($p < .024$)
³ Soy bread was preferred significantly more by 45-65 year-olds ($p < .026$)

CHAPTER V: DISCUSSION & RECOMMENDATIONS

DISCUSSION:

The purpose of this chapter is to elaborate on the results from Chapter IV of this thesis. An expansion on all raw data given in the results section as well as explanations of the importance of this data is supplied in this chapter.

Demographics

The four main types of demographics used for the purpose of this study were sex, race, age, and education level. Each of these four categories helped to provide an overall foundation of the types of people who receive basic nutrition and soy information. The use of demographics proves useful for assessing which types of people are more inclined to receive nutrition information as well as who is more or less willing or unable to receive information due to possible extraneous variables. Demographics were gathered for both the food questionnaire and the taste evaluation to determine an overall picture of the types of subjects involved in both parts of the study. Both of the demographics from the study were further compared to 1990 census data from Montgomery County to enable a more accurate assessment of the population sample in the study compared to the overall population in the area in which the study took place. If there was a significant ($p < .05$) deviation from Montgomery County statistics as compared to the study, then this issue should be addressed and evaluations should be made as to the possible reason for this occurrence.

Sex

Of the 124 total participants in the food questionnaire and the 62 total participants in the taste evaluation, both males and females were accurately represented for the food questionnaire but the percentages of males was lower and the percentages for females was significantly ($p < .016$) larger than compared to the Montgomery County data for the taste evaluation. Therefore, females were possibly more willing to try the soy and non-soy food products over the males in the study. This result corresponds to the previous research done by Fieldhouse³¹ that focused on how women have a 75% greater responsibility to food-related activities. A greater responsibility could result in a more willingness to try different types of food products in the hopes of incorporating them into family meals.

Race

In addition to sex playing an integral role in who participates in food studies, race also had an effect. Overall, the white population was not accurately representative of Southwest Virginia due to the fact that there was a significantly ($p < .014$) lower population of whites for both parts of the study. On the other hand, the white sample population had the largest percentage of participation compared to the other minority races in the study. 100% of the Asian and the Hispanic population samples agreed to partake in both parts of the study; however, due to their small sample sizes the results could have been skewed. Although Asians had a small sample size for both surveys, they had a significantly ($p < .033$) larger percentage of participation in the taste evaluation compared to other races. This could be due to an overall greater consumption of soy products in the Asian population compared to Western culture. Wakai et al assessed that the Japanese culture consumes 17 to 44 times greater the amount of soy products compared to its Western counterpart.⁶⁷ Consuming more soy foods in general may lead to a greater willingness to participate in a study that has similar foods as samples. In addition, Asians tend to have an overall greater knowledge, attitude, and behavior concerning health and food intake;³² therefore, they may be more willing to partake in a study related to health. Due to the small sample sizes in this study, it would have been better to increase the overall population sample and try to find a location that was more congruent to accessing all races as easily as possible. One possibility is to increase the area of study from Montgomery County, Virginia to rural and urban parts of Northern Virginia.

Age

The age groups in this study were limited to between 18 and 65 years due to the fact that over the age of 18 years is the starting point for receiving targeted nutrition information in the prevention of chronic disease. Any age level under 18 years would not be representative of the current nutrition education programs and their effectiveness at administering nutrition education to the general public. Both the food questionnaire and the taste evaluation had the most significant ($p < .036$) participation from the age groups of 25 to 44 and 45 to 54 years whereas the least significant ($p < .002$) participation was in the 18 to 20 age level for the taste evaluation. Possible explanations to this occurrence could be that older Americans tend to have a greater willingness to try healthier foods compared to younger adolescents. According to De Bourdeaudhuij, adolescents in general tend to be more picky when it comes to food choices

compared to older populations.⁶⁸ In addition, adolescents on average have poor dietary habits and are at a higher risk for developing a chronic disease in the future.³² This may aid in explaining why so few adolescents participated in the taste evaluation compared to other age groups.

Education level

The four main levels of education were skewed due to the location of where the study was conducted. Virginia Polytechnic Institute & State University makes up a large percentage of the population for the Montgomery County; however, many of the college students who attend this university are not residents of this county and therefore are not represented in the 1990 census for this area. The data gathered for education level reflects this fact since a significantly ($p < .009$) greater percentage of college students and college graduates participated in the study compared to the overall county percentage of college-educated people. A significantly ($p < .001$) lower proportion of “less than or some High School” educated subjects participated in the study compared to the overall population sample for Montgomery County. A possible explanation could be that education level is positively correlated with nutrition knowledge³⁷, and perhaps participants of lower education levels, who know less about good health, may be less willing to taste test a health food product or fill out a health food survey. If this hypothesis is correct, then a true population sample does not exist that would accurately represent the current knowledge of nutrition and soy as it relates to chronic disease. If perhaps lower education levels were unwilling or even embarrassed to fill out a health survey then that could mean that the majority of participants knew something about chronic disease and the overall knowledge from the sample population was positively skewed.

Perhaps a more accurate population sample for the Southwest Virginia area could have been assessed if the location of the study was in more than one county that had more ethnic and racially diverse groups that could balance out the existing higher education level, majority white, young population sample that is representative of the majority of college students in Montgomery County, Virginia. Additionally, the study should also be conducted in locations that offer easy access to lower income levels and therefore would incorporate possibly more races and ethnic backgrounds as well as lower education levels.

Current nutrition knowledge

An average of 73.4% of the 124 total participants in the food questionnaire had received at least one of the three nutrition education programs focusing on the prevention of chronic disease by consuming certain food products daily. In general, this is a high percentage that most likely is a direct result from the pro-active programs on preventative nutrition. These results reflect similar results found in the current nutrition education programs that follow the increase in knowledge over the course of the program.^{12,50-1} Specifically, this study found that a significant ($p<.003$) majority of whites knew about consuming less than 30% of fat calories a day compared to other minority races. This supports the assumption that whites usually have a greater access to nutrition information and therefore are able to acquire greater sources of nutrition information over a longer period of time.⁵² Not in accordance with previous literature that showed how the oldest adults in this age group had the least nutritional knowledge,⁵² the age group of 45-65 years knew significantly ($p<.027$) more than other age levels on how high intakes of fiber can decrease the risk of chronic disease.

Of the three nutrition education programs available in the study, the *National 5 A Day for Better Health Program* was the most popular (85.5%) compared to the other two programs. This result in the study positively represents the progress of pro-active nutrition education and how knowledge is gained from 8% knowing of its existence in 1992 to over 29% knowledge of the program in 1995.⁵⁰

An important note is to realize that assessing nutrition knowledge does not automatically assess nutrition understanding or nutrition habits due to knowledge. Although a person may be aware of a specific nutrition education program focusing on decreasing the risks of developing a chronic disease it does not necessarily mean that individual will *understand* the concept behind how food plays an integral role in someone's health. In addition, this also does not mean that a person will automatically change his or her eating habits once he or she has gained some nutrition knowledge.

Current soy knowledge

A total of 37.1% of the 124 participants in the food questionnaire knew something about the role of soy food in the prevention of chronic disease. This percentage is significantly ($p<.001$) lower than the population sample's current nutrition knowledge in the prevention of

chronic disease. This result accurately depicts how nutrition education programs can have a positive influence on a person's knowledge in the prevention of chronic disease. To date, there has not been a soy nutrition education program, and therefore available information regarding soy foods and chronic disease are quite limited to the general public. This statistic also represents a possible idea of what to expect if a nutrition education program involving soy products was to be implemented. Perhaps this low percentage of knowledge regarding soy foods could even double when a nutrition education program is begun. Due to the fact that there is no baseline data from previous studies to show if the population sample can accurately represent soy knowledge for the Southwest Virginia area, the statistics from the current nutrition education programs (which were representative of previous nutrition education programs) were used to provide an overall assessment of what the population for Southwest Virginia knows about soy foods.

The largest percentage of participants (from the original 37.1%) in the study, 51.6% knew that soy foods are related to the prevention of CHD and the least percentage (21%) of participants knew the role of soy food as it relates to helping with problems associated with menopause. Women knew significantly ($p < .04$) more than men about the effects of soy consumption on osteoporosis, cancer, and menopause. As previously mentioned, women tend to shop for groceries for the family more often than other family members and therefore they may have an advantage of being able to receive more nutrition information as it relates to chronic disease as they shop due to the fact that grocery stores have been used in the past as a resource for nutrition information.⁴² Another important note about this finding is that two out of the three chronic diseases that women know more about than men are directly associated with diseases found in women (osteoporosis and problems associated with menopause). Therefore, possible information on these diseases and treatment options could have been discussed with a doctor, and males would not necessarily benefit from this as much as females.

Knowledge on how soy foods affect osteoporosis, cancer, and CHD were significantly ($p < .03$) associated with an increase in soy consumption. This data is quite promising because it shows a direct correlation between how much a person knows and how this can possibly influence his or her intake of a particular food item, which is the purpose of nutrition education programs. A possible explanation for knowledge on soy's relationship to

menopause not positively correlating with soy consumption could be due to the fact that most women are still using prescription medication as their means of hormone replacement therapy.

Sources of nutrition and soy information

The significantly greater sources of information for both current nutrition programs and soy foods as they relate to the prevention of chronic disease was in magazines and newspapers ($p < .001$ and $p < .006$, respectively). In addition to this source for soy nutrition information, television programs was also significantly ($p < .006$) higher than other sources. The use of reading materials as a means of providing nutrition information is the least costly and time-consuming method;⁴⁴ therefore, the results for both categories would make sense due to the fact that it is the kind of program that can reach many people and cost very little to maintain. The significantly ($p < .05$) fewest sources of current nutrition or soy information were also similar between the two groups. Both groups had the fewest sources of nutrition and soy information come from the grocery store, pamphlet, Registered Dietitian, work, and the “I don’t know” category. These low results are not representative of statistics in previous studies.⁴²⁻⁴⁵ Perhaps programs do exist and are prevalent in these sources but the public is not aware of them or they are not successful. Specifically, such a low percentage of the population sample received any nutrition or soy information from a Registered Dietitian needs to be addressed. Due to the fact that one of the main goals of dietitians is to prevent the onset of chronic disease⁴⁵, and yet very little education is being administered to the public via this method brings the current practices of dietitians into question. If this population sample is representative of Southwest Virginia, then Registered Dietitians are having very little effect in the fight to prevent chronic disease in people at-risk in the Southwest Virginia area. On the other hand, the career of a dietitian may go unnoticed by the people being educated by him or her. A Registered Dietitian may be mistaken for another health professional and therefore would not be mentioned as a potential source of nutrition information.

Soy consumption

The consumption of soy products in this study was significantly ($p < .001$) higher for tofu and soy burgers. Tofu is one of the most traditional forms of soy food for the Japanese culture; however, soy burgers are a more recent and Westernized version of introducing soy

foods into the American diet.⁶⁷ In addition, both of these products are easily accessible in grocery stores and not just in specialty food shops. This convenience could lead to a higher amount of exposure to the product and ultimately result in an increased purchase of the product. As expected, the more specialized and less accessible forms of soy products resulted in the smallest amounts of soy foods purchased and they were: miso, soy yogurt, soy ice cream, and tempeh. Tempeh and miso are not regular ingredients introduced into the American diet and therefore have little exposure and are not frequently used in recipes, which is possibly why these soy products are purchased significantly ($p<.014$) less than other, more popular and more accessible soy foods.

Race was also a contributing factor to the purchase of soy foods. Asians were significantly ($p<.03$) more likely to purchase any type of soy food and especially soy yogurt ($p<.001$) compared to other races in this study. This data is representative of previous studies that have shown in general that the Asian diet consists of a large variety of soy products compared to the American diet.^{69,70} The sample size for the Asian population in this study; however, was low (8 people, 6.5%) and therefore all data from this analysis should be viewed with caution as to its overall validity in reference to the general population of Southwest Virginia.

Age did not seem to be an influencing factor in the purchase of soy products; however, education level did play a significant role. Overall, soy food was purchased significantly ($p<.001$) less by the “High School and some college” education level. If assuming that this education level is mostly comprised of young adults, then this data is representative of the previously mentioned phenomenon, that in general adolescents are more picky and do not usually consume food products that are unfamiliar to them.⁶⁸ Participants with the highest education level purchased the significantly ($p<.02$) higher amount of tofu, tempeh, and soy cheese. A possible explanation is that in this study there is a highly significant ($p<.001$) correlation between the Asian race and having a higher education level compared to other races. This result reflects the previous data of the frequent purchase of soy foods by Asians from another angle by using their significantly higher education level. Either race or education level or both could be a factor in assessing the population sample that is most likely to purchase soy foods.

Sex is another important factor in assessing the type of person most likely to purchase soy foods. Women purchase significantly ($p<.04$) more soy products compared to men, such as ice cream, tempeh, and soy milk. Men, on the other hand, did purchase significantly ($p<.018$) more soy food but it was from the “I don’t know” category. Therefore, data for the men in this group is difficult because no assessment can be made to figure out if the men were actually purchasing soy food or something they thought was soy food.

Of the five categories provided for reasons the participants have purchased soy foods in the past, health (66%) was significantly ($p<.001$) the greatest incentive. Similarly, a study conducted by Slaughter et al showed that 58% of all grocery shoppers were somewhat or very health conscious when purchasing foods.⁷¹ The second rated choice for consuming soy products was for the taste (31.5%). This data holds promise due to the fact that above all, taste of the food product is the main predictor for consumption regardless of the health benefits associated with it.⁵ Religion and low cost were the two significantly ($p<.006$) lower reasons for purchasing soy foods. Both subjects who chose the religion category were 7th Day Adventists, who focus on good health and eating habits as part of their Christian faith.

Five choices were given for why the participants in the study have never purchased a soy product. The most significant ($p<.017$) reason was due to the participants thinking that he or she would not like the taste of the soy product, but this had no affect on who was willing to participate in the taste evaluation. A finding such as this is important due to the fact that at least the population sample was willing to try soy products although they thought they wouldn’t like the taste. Therefore, perhaps giving away free soy samples in grocery stores or in malls may increase the awareness of soy products and perhaps sway the decisions of some people who previously adverted themselves from consuming soy products. Additionally, giving away free samples would most likely decrease the percentages of participants who chose “Didn’t know of existence” and “Don’t like the choices” due to receiving more exposure to soy products over time. The least significant ($p<.002$) reason for not purchasing soy food was due to high cost. This information also proved useful because neither low cost nor high cost was a significant factor in the purchasing or not purchasing of soy foods. This could possibly explain that most people do not know the cost of soy food but that it most likely is not so high that people just assume that it’s too costly to purchase on a regular basis.

Food preferences

Overall, the preferences for the soy versus the non-soy foods were very similar in results. The only significant ($p < .001$) difference was found between a larger dislike for the soy cinnamon raisin bread compared to the regular cinnamon raisin bread. This result was mainly due to poor baking of the breads. The recipe had not been perfected and both breads turned out to be dry and bland. The mean preference for soy versus non-soy bread was 5.17 and 6.27, respectively. The preference scale equates 5 with neither like nor dislike and 6 with like slightly. The other two soy and non-soy products had much higher ratings from the participants and there was no significant ($p > .05$) difference between the soy and the similar non-soy product. This is perhaps the most successful part of the study due to the fact that since taste is the most important predictor as to whether a person will consume a food, this means that most likely soy foods can be successfully sold and consumed once the population begins to be more aware of its existence and knows of its palatability. The mean preference for the soy and the non-soy chocolate chip cookies were 7.44 and 7.16, respectively. Translated on the preference scale, soy cookies were judged between the “like moderately” and the “like very much” category whereas the regular cookies were rated at the “like moderately” category. A possible explanation to the higher preference for soy cookies over regular cookies could be the overall preference for a softer cookie. Soy cookies are extremely soft and chewy whereas regular cookies have more texture and are most crisp. The preference for the soy and the non-soy blueberry muffins were very similar with the mean preference scores of 6.6 and 6.58, respectively. Both of these muffins were in the overall preference category between “like slightly” and “like moderately”.

All demographics were compared to preferences placed for all six food products, and only age level had any significant results. All food choices except for the regular chocolate chip cookie were liked significantly ($p < .04$) more by 45-65-year-olds compared to any other age level. The possible reason why regular chocolate chip cookie may have not been preferred by this age group is due to its harder texture compared to all other food products in the study. Another possible explanation as to why the older population preferred all food products above all other age groups was assessed by Schewe et al, who said that “older adults react more slowly and less accurately to sensory information.”⁷² This phenomenon could be used to explain that older adults perhaps have a decreased sensitivity to tasting food products and therefore they tend to assess many food products that are somewhat similar as tasting alike. Another explanation is

that when the older adult is compared to the adolescent, (who on average prefers less foods due to increased pickiness) the results become skewed and it begins to look as if older people prefer all food products when in all actuality it could be that so few adolescents preferred the food products that it created a significance level with the older population sample.

Summary

The reason for implementing this study was primarily to assess if there is a need for a nutrition education program for the prevention of chronic disease using soy foods. Current nutrition education programs and their sources of information were assessed for the most current successful methods of administering nutrition information. This data was compared to current soy knowledge to see if there was a significantly lower population sample who knew about soy and its relationship to the prevention of chronic disease compared to the current nutrition education programs. If so, then there is a need for a nutrition education program involving the increased awareness of the benefits of soy consumption in the prevention of chronic disease.

The first step in an overall assessment of the need of a soy education program was to compare the sources of nutrition information to sources of soy information. The overall greatest sources of nutrition and soy information were magazines and newspapers, and in addition, television programs were also a good source of soy information. Therefore, magazines and newspapers as well as television programs should then be used in the implementation of a soy education program.

The current consumption of soy foods was also needed to assess which soy products in the market are already being consumed and which ones are not. Knowing that tofu and soy burgers are the most popular types of soy foods to consume may indicate that they are the most tasty and most accessible. Therefore, these soy products should be implemented as part of the education program, but also this means that the other, less popular soy products should be introduced to the public in case they are not being consumed readily due to unawareness of their existence.

In addition, assessments need to accurately determine the main reason for why people choose to purchase and consume soy foods or choose not to. Health was the most significant ($p < .001$) reason to consume soy and not liking the taste was the most significant ($p < .017$) reason for not consuming soy foods. This information is useful in implementing a soy

education program because all kinds of soy foods can be implemented into every program to show participants that the food is not only healthy but is liked just as well as its non-soy counterpart.

In addition to assessing this data, an overall evaluation of the palatability of soy foods needed to be conducted to find out if people would like to consume soy products. Since the results showed that on average both soy and non-soy foods are preferred similarly - except for the cinnamon raisin bread that needs possible baking modification- this is a good indicator that soy foods may become successfully marketable to the public once awareness of these products and willingness to try soy products are both increased.

Another predictor associated with the possible success of a future soy education program was with race, sex, age, and education level. Each of the demographics needed to be assessed as to whether it would have an overall effect on the success of a nutrition program. Among races, differences were found between whites knowing more about the current nutrition education program that stresses decreasing fat calories to less than 30% a day and Asians consumed the greatest amount of soy foods compared to other races. These results could possibly mean that overall the white population has a greater access to nutrition information and that perhaps Asians are already aware of the benefits of soy for good health due to previous data that showed a positive correlation between soy knowledge and soy consumption (Figure 4.4). For future soy education, proper measurements would need to be assessed to incorporate all races equally and less emphasis may need to be placed on teaching soy nutrition to Asians.

In addition to race being a predictor to the success of a soy nutrition program, sex also plays a factor. Women knew more about how soy foods prevent chronic diseases, they were more likely to purchase soy foods, and they exhibited more willingness to participate in the taste evaluation. There is a need for soy nutrition programs to focus on males due to the fact that women tend to already know more about this area of information.

Age is another important determinant in the assessment of a successful nutrition program using soy products. On average, the age group between 25 and 54 years had the largest participation in both studies whereas 18 to 20 year-olds had the least. When considering the 25 to 54 years of age, this broad spectrum of age is beneficial because it shows the possibility that a wide range of age levels would be willing to learn about and consume soy products in the nutrition program. The older age level from 45 to 65 provided very useful information as well.

This age group knew significantly ($p<.027$) more on consuming 20 to 30 grams of fiber a day in the prevention of chronic disease. This data could possibly mean that the older populations tend to have a greater concern for chronic disease risk and therefore may consume foods higher in fiber as a preventative mechanism. The benefit this creates in a soy nutrition program is that if this is correct, then this age group will reap the benefits of soy foods due to its high fiber content. Lastly, the oldest age group exhibited the greatest preference for all soy foods in the study, and therefore they may be more willing to incorporate them into their diet. Upon the needs assessment for age levels, the 18 to 24-year-olds are in most need of nutrition education that strongly encourages soy consumption to provide as many options for them as possible that would possibly increase the chances of soy consumption over a long period of time.

Education level is the final demographic that needs assessment for developing a proper nutrition education program using soy foods. Due to the location of the study being in a county that has a large university, the education level for this data could have been positively skewed; however, the current data indicate that education levels did influence soy consumption. Lower education levels (Some college and less) purchased significantly ($p<.001$) fewer amounts of soy products compared to the “graduate and specialized degree” levels who purchased significantly ($p<.02$) more. Therefore, a nutrition education program using soy foods should try to encourage the purchase and consumption of soy foods to people with lower education levels who are least likely to currently consume soy products.

Conclusion

The remaining populations most in need of a soy nutrition program are the non-Asian race, males, age levels between 18 to 24 years, and people who have some college or less in formal education. Soy information should be provided to these target populations via magazines and newspapers, possible television programming, and with taste sample distributions of soy foods that are most popular to the public (tofu and soy burgers). The program’s educational materials should stress the health benefits and palatability of soy foods. Highly significant ($p<.001$) differences were found between knowledge from current nutrition education programs (73.4%) and current soy knowledge (37.1%); therefore, implementing a successful soy education program in the prevention of chronic disease is feasible, necessary, and cost-effective.

RECOMMENDATIONS:

1. A similar study should be conducted to assess the validity and accuracy of our study, and a new food questionnaire should have an additional section that asks food consumption questions that relate to current nutrition knowledge. These answers would give a more realistic picture of how nutrition knowledge affects food consumption.
2. A better way to conduct the study would be it in a location not close to a major university, where education levels tends to be positively skewed. Perhaps several locations in the more rural areas of Southwest Virginia would give better results.
3. I would be better and more accurate if a larger population sample was available (over 500) to gather a more homogenous group of races and education levels.
4. To assess more accurately current nutrition and soy knowledge, a questionnaire should be created that requires the participant to write down what he or she thinks the correct information is for each nutrition education program instead of just being able to circle a “Yes”, “No”, or “I don’t know” category. This will give an overall more accurate assessment of what the participant actually can retain over a period of time.
5. Since both magazines and newspapers as well as television programs were significant sources of nutrition information, a study comparing the effectiveness of each one would prove beneficial.
6. Further research should investigate the current nutrition programs conducted at schools and at work due to the fact that in contradiction to previous research, the data gathered in this study have shown that these two methods are poor sources of nutrition information.
7. Special consideration to Registered Dietitians should be given to determine whether their actual role in the prevention of chronic disease is comparable to the percentage of participants that said they heard their nutrition information from them.
8. Determine if there are additional cultural practices in the Asian population that would aid in promoting soy consumption in America. For example, introducing more soy recipe books into the American culture and assessing if the type of soy food consumed in the Asian population may be a predictor in overall health.
9. Create and research soy products that mimic more of the Western culture type of food. This could be the main reason soy burgers are such a success compared to more of the authentic forms of soy.

10. Implement a soy nutrition program using two types of subjects to assess the overall success of each group. The first group would consist of the population sample that requires the least amount of soy information due to their current knowledge: Asians, women, ages levels between 45 and 65 years, and a graduate or professional education level. These groups would be compared to the groups most in need of soy nutrition information: non-Asians, males, ages levels between 18-24 years, and with some college or less education. Both groups would need to start at the same baseline level of not having ever received any previous soy knowledge or education. The results would help to assess if demographically one target population is at an advantage over the other. For more accuracy, each demographic category should have separate subjects for a total of 8 groups being assessed.
11. The baking of the soy and non-soy cinnamon raisin bread needs to be perfected.

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APPENDIX A
TIMETABLE FOR THE STUDY

TIMETABLE FOR THE STUDY

Develop Plan	April – June 1998
Develop Questionnaires	June 1998
Pilot Tests	July- August 1998
Appointments with Statistician	September 1998
Prepare IRB Form	September 1998
Call Soy Companies for Donations	October 1998
Proposal Defense	November 5, 1998
Prepare and Bake Food Samples	November 13, 1998
Conduct Study	November 14-15, 1998
Analysis of Data	December 1998 - March 1999
1 st Draft of Report	June 1999
Final Draft of Report	July 1999
Thesis Defense	August 1999
Write Journal Article for Publication	August 1999

APPENDIX B
FOOD QUESTIONNAIRE

FOOD QUESTIONNAIRE

PLEASE CIRCLE AN ANSWER FOR EACH QUESTION:

1. Have you HEARD that eating soy foods can decrease the risk of certain conditions like:

- | | | | |
|--------------------------------|-----|----|------------------------|
| • Osteoporosis (Brittle bones) | YES | NO | NOT SURE IF I'VE HEARD |
| • Cancer | YES | NO | NOT SURE IF I'VE HEARD |
| • Heart Disease | YES | NO | NOT SURE IF I'VE HEARD |
| • Problems with Menopause | YES | NO | NOT SURE IF I'VE HEARD |

2. If yes for any of the answers, where did you hear this information?

Doctor's Office	Magazine / Newspaper	Journal Article	Grocery Store
TV Program	TV Ad	School	Pamphlet
Registered Dietician	Work	I Don't Remember	Radio
			Other: _____

3. Have you ever HEARD the following:

- | | | | |
|--|-----|----|------------------------|
| • Eat less than 30 % of fat calories a day | YES | NO | NOT SURE IF I'VE HEARD |
| • Eat between 20 - 30 grams of fiber a day | YES | NO | NOT SURE IF I'VE HEARD |
| • Eat at least 5 fruits and vegetables a day | YES | NO | NOT SURE IF I'VE HEARD |

4. If yes for any of the answers, where did you hear this information?

Doctor's Office	Magazine / Newspaper	Journal Article	Grocery Store
TV Program	TV Ad	School	Pamphlet
Registered Dietician	Work	I Don't Remember	Radio
			Other: _____

5. Circle ALL the soy products that you have previously purchased in a food store or specialty shop:

Tofu	Miso	Soy Yogurt	Soy Milk
Soy Ice Cream	Tempeh	Soy Burgers	Soy Cheese
I Don't Know	None	Other:_____	

- If so, why HAVE you purchased soy foods? (May circle more than one)

Taste Health Low Cost Religion Other:_____

- If not, why have you NOT purchased soy foods? (May circle more than one)

Wouldn't like the taste High cost Didn't know they existed

Don't like the food choices Other:_____

6. Age: _____(must be between 18 to 65 years)

7. Race: Asian Black Hispanic White Other:_____

8. Highest COMPLETED level of education:

Less Than High School Some High School High School Some College

College Master's Doctorate Other:_____

9. Sex: Female Male

APPENDIX C
TASTE EVALUATION

TASTE EVALUATION

PLEASE CHECK ONLY ONE LINE FOR EACH SYMBOL.

1. How much did you like the taste of:



Like Extremely
Like Very Much
Like Moderately
Like Slightly
Neither Like Nor Dislike
Dislike Slightly
Dislike Moderately
Dislike Very Much
Dislike Extremely

2. How much did you like the taste of:



Like Extremely
Like Very Much
Like Moderately
Like Slightly
Neither Like Nor Dislike
Dislike Slightly
Dislike Moderately
Dislike Very Much
Dislike Extremely

3. How much did you like the taste of:



Like Extremely
Like Very Much
Like Moderately
Like Slightly
Neither Like Nor Dislike
Dislike Slightly
Dislike Moderately
Dislike Very Much
Dislike Extremely

PLEASE CIRCLE CORRECT ANSWER.

4. Age: _____ (must be between 18 to 65 years)

5. Race: Asian Black Hispanic White Other: _____

6. Highest COMPLETED level of education:

Less Than High School Some High School High School Some College
College Master's Doctorate Other: _____

7. Sex: Female Male

APPENDIX D
CONSENT FORM FOR FOOD QUESTIONNAIRE

**VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY INFORMED
CONSENT FORM FOR PARTICIPANTS OF INVESTIGATIVE PROJECTS**

Project Title: Knowledge of General Nutrition, Soy Nutrition, and Consumption of Soy
Products: Assessment of a Sample Adult Population in Montgomery
County, Virginia

Principle Investigator: Raga Bakhit, Ph.D. and Lida C. Johnson

I. PURPOSE OF THE PROJECT

Researchers in the Department of Human Nutrition, Foods, and Exercise are studying how much nutrition knowledge men and women have between the ages of 18 and 65 years. You are invited to participate in the project. Your participation is voluntary.

II. PROCEDURES

You are asked to participate in a one-page questionnaire on nutrition knowledge. There will be approximately 100 questionnaires passed out to people between 18 and 65 years. An investigator and Virginia Tech assistants helping the investigator will be giving out the questionnaires. Filling out the questionnaire will take approximately 5 minutes.

III. RISKS

There are no risks involved in this study.

IV. BENEFITS OF THIS PROJECT

Your participation in the project will provide information that might be helpful in understanding food-related knowledge as it relates to chronic disease in men and women between 18 and 65 years of age. No guarantee to benefits has been made to encourage you to participate. When the research is completed, you may contact the investigator for a copy of the results.

V. EXTENT OF ANONYMITY AND CONFIDENTIALITY

The results of this project will be kept strictly confidential. Your name will be not be anywhere on the questionnaire, so it cannot be used in the project at anytime. The investigator and assistants will be available to pass out and retrieve questionnaires, but they will not at anytime ask your name to be used for the study.

VI. COMPENSATION

For your participation, you can choose to receive refreshments upon returning the questionnaire.

VII. FREEDOM TO WITHDRAW

You are free to withdraw from this project at any time without penalty. You also have the right to refuse to answer any questions from the questionnaire. If you choose not to answer any questions, you may still receive refreshments upon returning the incomplete questionnaire.

VIII. APPROVAL OF RESEARCH

This project has been approved, as required, by the Institutional Review Board for Research Involving Human Subjects at Virginia Polytechnic Institute and State University and by the Department of Human Nutrition, Foods, and Exercise.

IX. SUBJECT'S RESPONSIBILITIES

I know of no reason that I cannot participate in this study. I have the responsibility of participating in one questionnaire.

X. SUBJECT'S PERMISSION

I have read and understand the Informed Consent and conditions of this project. I have had all my questions answered. I hereby acknowledge the above and give my voluntary consent for participation in this project.

If I participate, I may withdraw at any time without penalty. I agree to abide by the rules of this project.

Signature

Date

Should I have any questions about this research or its conduct, I may contact:

Lida Johnson (540) 231-7708
Investigator
Graduate Assistant
Department of Human Nutrition, Foods, and Exercise
Virginia Tech

Raga Bakhit, Ph.D. (540) 231-6784
Faculty Advisor
Department of Human Nutrition, Foods, and Exercise
Virginia Tech

H. T. Hurd (540) 231-9359
Director, Sponsored Programs
Internal Review Board, Research Division
Virginia Tech

APPENDIX E
CONSENT FORM FOR TASTE EVALUATION

**VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY INFORMED
CONSENT FORM FOR PARTICIPATION IN SENSORY EVALUATION**

Project Title: Knowledge of General Nutrition, Soy Nutrition, and Consumption of Soy
Products: Assessment of a Sample Adult Population in Montgomery
County, Virginia

Principle Investigator: Raga Bakhit, Ph.D. and Lida C. Johnson

I. PURPOSE OF THE PROJECT

You are invited to participate on a sensory evaluation study. The purpose of the study is to evaluate the acceptability of soy and non-soy muffins, cookies, and breads. Your participation is voluntary.

II. PROCEDURES

You are asked to participate in a one-page taste evaluation form that will evaluate 6 samples of FDA approved foods. The foods are one soy and non-soy blueberry muffin, one soy and non-soy cinnamon raisin bread, and one soy and non-soy cookie. The test will take approximately 5-10 minutes to complete. Although you are required to taste all six samples, if you find a sample objectionable, you may choose to spit it out.

III. BENEFITS/RISKS OF THE PROJECT

Your participation in the project will provide information that might be helpful in understanding food-related attitudes and opinions of soy versus non-soy foods in men and women between 18 and 65 years of age. You may receive a summary of results of the sensory test when the project is completed. Certain individuals are sensitive to some foods such as milk, eggs, wheat, flour, blueberry, soy protein, sweeteners, etc. If you are aware of any food or drug allergies, please list them in the following space:

_____. There may be some risk involved if you have an unknown food allergy.

IV. EXTENT OF ANONYMITY AND CONFIDENTIALITY

The results of this taste evaluation will be kept strictly confidential. Your name will not be anywhere on the questionnaire, so it cannot be used in the project at anytime. The investigator and assistants will be available to pass out and retrieve questionnaires, but they will not at anytime ask your name to be used for the study.

V. COMPENSATION/ FREEDOM TO WITHDRAW

It is important to the project for you to complete the evaluation. If after becoming familiar with the project you decide not to participate, you may withdraw.

VI. APPROVAL OF RESEARCH

This project has been approved, as required, by the Institutional Review Board for Research Involving Human Subjects at Virginia Polytechnic Institute and State University, by the Department of Human Nutrition, Foods, and Exercise, and by the Department of Food Science and Technology.

VII. SUBJECT'S PERMISSION

I have read and understand the Informed Consent and conditions of this project. I have had all my questions answered regarding the sensory evaluation. I hereby acknowledge the above and give my voluntary consent for participation in this project.

If I participate, I may withdraw at any time without penalty. I agree to abide by the rules of this project.

Signature

Date

Should I have any questions about this research or its conduct, I may contact:

Lida Johnson (540) 231-7708
Investigator
Graduate Assistant
Department of Human Nutrition, Foods, and Exercise
Virginia Tech

Raga Bakhit, Ph.D. (540) 231-6784
Faculty Advisor
Department of Human Nutrition, Foods, and Exercise
Virginia Tech

H. T. Hurd (540) 231-9359
Director, Sponsored Programs
Internal Review Board, Research Division
Virginia Tech

APPENDIX F

RECIPE: SOY CINNAMON RAISIN BREAD

CINNAMON RAISIN YEAST BREAD MINI-LOAVES WITH SOY PROTEIN

(10 grams isolated soy protein per mini-loaf)

(Makes 8 mini-loaves)

1 Tbsp.	Soybean oil
1 tsp.	Salt
1 Tbsp.	Sugar
1 ½ c	Water
1 pkg.	Active dry yeast
3 ½ c	Bread flour, unsifted
1 ½ c	Isolated soy protein
1/8 c + 2 tsp.	Ground cinnamon
1 c	Raisins

1. Combine oil, salt, sugar and water and heat until sugar dissolves. Keep warm (110°F) and place in a large mixing bowl of an electric mixer. Add yeast and stir until dissolved.
2. Combine flour, isolated soy protein, and cinnamon and add to the mixture gradually, beating well at medium speed of an electric mixer. If dough becomes too stiff for mixer, add remaining flour by hand.
3. Turn the dough onto a floured board and knead in raisins until dispersed throughout dough and until dough is smooth (8 to 10 min.). Alternatively, a dough hook attachment for the mixer may be used to complete the kneading; beat for 3 to 5 minutes or until a smooth dough forms and clings to the hook in a solid mass.
4. Divide dough into 8 portions. Shape by flattening dough into a rectangle about 6 x 9 inches and rolling it up like a jellyroll from the 6-inch side. Fold the ends under to fit in greased 2 ½ x 4 and ½ x 1 ½-inch loaf pans. Let rise in a warm place (85-95°F) until double in volume (about 30 minutes). Preheat oven to 375°F.
5. Bake in a preheated oven at 375°F for 20-22 minutes. To prevent the crust from becoming too brown, cover loosely with foil after 15 minutes of baking.

APPENDIX G

RECIPE: REGULAR CINNAMON RAISIN BREAD

**CINNAMON RAISIN YEAST BREAD MINI-LOAVES –
REGULAR RECIPE
(Makes 8 mini-loaves)**

1 Tbsp.	Soybean oil
1 tsp.	Salt
1 Tbsp.	Sugar
1 ½ c	Water
1 pkg.	Active dry yeast
3 ½ c	Bread flour, unsifted
1/8 c + 2 tsp.	Ground cinnamon
1 c	Raisins

1. Combine oil, salt, sugar and water and heat until sugar dissolves. Keep warm (110°F) and place in a large mixing bowl of an electric mixer. Add yeast and stir until dissolved.
2. Combine flour and cinnamon and add to the mixture gradually, beating well at medium speed of an electric mixer. If dough becomes too stiff for mixer, add remaining flour by hand.
3. Turn the dough onto a floured board and knead in raisins until dispersed throughout dough and until dough is smooth (8 to 10 min.). Alternatively, a dough hook attachment for the mixer may be used to complete the kneading; beat for 3 to 5 minutes or until a smooth dough forms and clings to the hook in a solid mass.
4. Divide dough into 8 portions. Shape by flattening dough into a rectangle about 6 x 9 inches and rolling it up like a jellyroll from the 6-inch side. Fold the ends under to fit in greased 2 ½ x 4 and ½ x 1 ½-inch loaf pans. Let rise in a warm place (85-95°F) until double in volume (about 30 minutes). Preheat oven to 375°F.
5. Bake in a preheated oven at 375°F for 20-22 minutes. To prevent the crust from becoming too brown, cover loosely with foil after 15 minutes of baking.

APPENDIX H

RECIPE: SOY CHOCOLATE CHIP COOKIES

CHOCOLATE CHIP COOKIES
WITH SOY PROTEIN
(Makes 60 cookies)
(8.79 grams isolated soy protein per cookie)

2 c	Chocolate chips
¼ c	Crisco
½ c	Applesauce
2 c	Brown Sugar
3 Tbsp.	Milk (skim or 1%)
1 tsp.	Vanilla extract
1	Egg (slightly beaten)
2 tsp.	Baking soda
6 tsp.	Gluten
15 fl oz	Water
5 ½ c	Isolated Soy Protein

1. Preheat oven to 375°F.
2. Combine Crisco, brown sugar, milk, vanilla, water, and applesauce in a large mixing bowl. Beat at medium speed until well blended.
3. Add beaten egg and beat until blended.
4. Combine gluten, isolated soy protein, salt, baking soda, and chocolate chip cookies in a separate mixing bowl. Add to creamed mixture and blend until uniform.
5. Drop cookie dough by teaspoonfuls onto ungreased cookie sheet. Place cookies 2” apart.
6. Cook at 375°F for approximately 13.5 to 14 minutes or until golden brown.

APPENDIX I

RECIPE: REGULAR CHOCOLATE CHIP COOKIES

**CHOCOLATE CHIP COOKIES –
REGULAR RECIPE
(Makes 60 cookies)**

2 c	Chocolate chips
¼ c	Crisco
½ c	Applesauce
2 c	Brown Sugar
3 Tbsp.	Milk (skim or 1%)
1	Egg (slightly beaten)
2 tsp.	Baking soda
15 fl oz	Water
5 ½ c	All-purpose flour

1. Preheat oven to 375°F.
2. Combine Crisco, brown sugar, milk, vanilla, water, and applesauce in a large mixing bowl. Beat at medium speed until well blended.
3. Add beaten egg and beat until blended.
4. Combine flour, salt, baking soda, and chocolate chip cookies in a separate mixing bowl. Add to creamed mixture and blend until uniform.
5. Drop cookie dough by teaspoonfuls onto ungreased cookie sheet. Place cookies 2” apart.
6. Cook at 375°F for approximately 13.5 to 14 minutes or until golden brown.

APPENDIX J

RECIPE: SOY BLUEBERRY MUFFINS

**BLUEBERRY MUFFINS
WITH SOY PROTEIN**
(Makes 12 muffins)
(6 grams isolated soy protein per muffin)

1 2/3 c	All purpose flour
1 ¼ c	Isolated soy protein
2 ½ tsp.	Baking powder
¼ tsp.	Baking soda
½ tsp.	Salt
½ tsp.	Cream of Tartar
1/3 c	Granulated Sugar
1/3 c	Vegetable Butter flavored shortening
¾ c	Frozen blueberries (small sized)
4	Egg whites
1 c	Orange juice
2 tsp.	Vanilla extract
4 Tbsp.	Apple sauce

1. Preheat oven to 400°F.
2. Spray muffin pans for 12 muffins with non-stick aerosol spray.
3. In a large bowl combine the dry ingredients. Mix well until blended.
4. With a pastry blender, cut in shortening until evenly blended into dry ingredients.
5. In a small bowl, beat egg whites and orange juice until blended. Add applesauce and vanilla extract to mixture.
6. Add liquid mixture to dry mixture, and stir until mixture is moistened. DO NOT over mix!
7. Fold in blueberries and spoon the batter into prepared pans.
8. Bake at 400°F for 20 to 25 minutes.
9. Turn out of pan immediately after baked to prevent sogginess.
10. Cool right side up on a wire rack to prevent sogginess.

APPENDIX K

RECIPE: REGULAR BLUEBERRY MUFFINS

**BLUEBERRY MUFFINS –
REGULAR RECIPE
(Makes 12 muffins)**

2 ¾ c	All purpose flour
2 ½ tsp.	Baking powder
¼ tsp.	Baking soda
½ tsp.	Salt
½ tsp.	Cream of Tartar
1/3 c	Granulated Sugar
1/3 c	Vegetable Butter flavored shortening
¾ c	Frozen blueberries (small sized)
4	Egg whites
1 c	Orange juice
2 tsp.	Vanilla extract
4 Tbsp.	Apple sauce

1. Preheat oven to 400°F.
2. Spray muffin pans for 12 muffins with non-stick aerosol spray.
3. In a large bowl combine the dry ingredients. Mix well until blended.
4. With a pastry blender, cut in shortening until evenly blended into dry ingredients.
5. In a small bowl, beat egg whites and orange juice until blended. Add applesauce and vanilla extract to mixture.
6. Add liquid mixture to dry mixture, and stir until mixture is moistened. DO NOT over mix!
7. Fold in blueberries and spoon the batter into prepared pans.
8. Bake at 400°F for 20 to 25 minutes.
9. Turn out of pan immediately after baked to prevent sogginess.
10. Cool right side up on a wire rack to prevent sogginess.

APPENDIX L
RAW DATA FOR FOOD QUESTIONNAIRE

					Food Questionnaire Forms							
Sub.	T.Eval?	1Osteo.	1Can.	1CHD	1Meno.	2Non	2D.O.	2M/N	2J.A.	2G.S.	2TV.P	2TV.+
1	0	1	1	1	1	0	0	0	1	0	1	1
2	0	2	2	2	2	1	0	0	0	0	0	0
3	0	1	1	2	2	0	1	0	0	0	0	1
4	0	0	0	0	0	1	0	0	0	0	0	0
5	0	0	0	0	0	1	0	0	0	0	0	0
6	0	0	0	0	0	1	0	0	0	0	0	0
7	0	0	2	2	2	1	0	0	0	0	0	0
8	0	1	1	1	1	0	1	0	0	0	0	0
9	0	0	1	1	0	0	0	0	0	0	0	1
10	0	0	1	0	0	0	0	1	0	0	0	0
11	0	2	1	1	0	0	0	0	0	0	0	0
12	0	0	0	0	0	1	0	0	0	0	0	0
13	0	2	1	1	2	0	0	0	0	0	1	0
14	0	0	0	1	0	0	1	1	0	0	0	0
15	0	0	1	1	0	0	1	0	1	0	0	0
16	0	0	0	0	0	1	0	0	0	0	0	0
17	0	1	1	1	1	0	1	1	0	0	1	0
18	0	1	1	1	0	0	0	0	0	0	0	0
19	0	0	0	0	0	1	0	0	0	0	0	0
20	0	2	1	1	2	0	0	0	1	0	0	0
21	0	0	0	0	0	1	0	0	0	0	0	0
22	0	2	1	1	1	0	0	1	0	0	0	0
23	0	0	0	1	0	0	0	0	0	0	0	0
24	0	1	1	1	2	0	0	0	1	0	0	0
25	0	0	1	1	0	0	0	0	0	0	1	1
26	0	1	1	1	1	0	0	1	0	0	1	1
27	0	1	1	1	1	0	0	1	0	0	0	0
28	0	0	1	1	0	0	0	0	0	0	1	0
29	0	0	0	1	0	0	0	1	1	0	0	0
30	0	2	1	2	0	0	0	1	0	0	0	0
31	0	0	0	0	0	1	0	0	0	0	0	0
32	0	1	1	1	1	0	0	0	0	0	0	0
33	0	0	0	0	0	1	0	0	0	0	0	0
34	0	0	1	1	0	0	0	1	1	0	0	0
35	0	2	0	1	1	0	0	1	0	0	0	0

Key:

0 = No, 1 = Yes, 2 = Not Sure If I've Heard

T.Eval? = Did they conduct a taste evaluation?

1 Osteo. = Question 1: Osteoporosis

1 Can. = Question 1: Cancer

1 CHD = Question 1: Heart Disease

1 Meno. = Question 1: Problems with Menopause

2Non. = Question 2: Heard no information

2D.O. = Question 2: Heard at Dr.'s office

2M/N = Question 2: Heard in Magazine
or Newspaper

2J.A. = Question 2: Heard in journal article

2G.S. = Question 2: Heard at Grocery Store

2TV.P = Question 2: Heard on TV Program

2TV.+ = Question 2: Heard on TV Ad

					Food Questionnaire Forms							
Sub.	T.Eval?	1Osteo.	1Can.	1CHD	1Meno.	2Non	2D.O.	2M/N	2J.A.	2G.S.	2TV.P	2TV.+
36	0	2	2	2	2	1	0	0	0	0	0	0
37	0	1	1	1	0	0	0	0	0	0	0	1
38	0	1	1	1	1	0	0	0	0	0	1	1
39	0	0	2	0	0	1	0	0	0	0	0	0
40	0	0	0	0	0	1	0	0	0	0	0	0
41	0	1	1	1	1	0	0	1	0	0	0	0
42	0	2	1	1	2	0	0	1	0	0	1	1
43	0	2	2	2	2	1	0	0	0	0	0	0
44	0	2	1	1	0	0	0	1	0	0	0	1
45	0	2	1	1	2	0	0	0	0	0	0	0
46	0	0	1	1	0	0	0	0	1	0	0	0
47	0	1	1	1	1	0	0	1	0	1	1	0
48	0	0	0	0	0	1	0	0	0	0	0	0
49	0	0	0	0	0	1	0	0	0	0	0	0
50	0	2	2	2	2	1	0	0	0	0	0	0
51	0	0	2	0	0	1	0	0	0	0	0	0
52	0	1	1	0	0	0	0	1	0	0	0	0
53	0	0	1	1	2	0	0	0	1	0	0	0
54	0	0	0	0	0	1	0	0	0	0	0	0
55	0	0	0	2	0	1	0	0	0	0	0	0
56	0	0	1	1	0	0	1	0	0	1	1	0
57	0	0	0	0	0	1	0	0	0	0	0	0
58	0	0	0	0	0	1	0	0	0	0	0	0
59	0	0	0	0	1	0	0	0	0	0	0	0
60	1	0	0	1	0	0	0	1	0	1	0	1
61	1	0	0	0	0	1	0	0	0	0	0	0
62	1	0	0	0	0	1	0	0	0	0	0	0
63	1	2	1	1	1	0	0	1	0	0	0	0
64	1	0	0	0	0	1	0	0	0	0	0	0
65	1	1	1	1	1	0	1	0	0	1	1	1
66	1	1	1	1	1	0	0	1	1	0	0	0
67	1	1	1	1	1	0	0	1	1	0	0	0
68	1	0	0	0	0	1	0	0	0	0	0	0
69	1	0	0	1	0	0	0	0	0	0	1	0
70	1	0	2	1	0	0	0	0	0	0	1	0

Key:

0 = No, 1 = Yes, 2 = Not Sure If I've Heard

T.Eval? = Did they conduct a taste evaluation?

1 Osteo. = Question 1: Osteoporosis

1 Can. = Question 1: Cancer

1 CHD = Question 1: Heart Disease

1 Meno. = Question 1: Problems with Menopause

2Non. = Question 2: Heard no information

2D.O. = Question 2: Heard at Dr.'s office

2M/N = Question 2: Heard in Magazine or Newspaper

2J.A. = Question 2: Heard in journal article

2G.S. = Question 2: Heard at Grocery Store

2TV.P = Question 2: Heard on TV Program

2TV.+ = Question 2: Heard on TV Ad

					Food Questionnaire Forms							
Sub.	T.Eval?	1Osteo.	1Can.	1CHD	1Meno.	2Non	2D.O.	2M/N	2J.A.	2G.S.	2TV.P	2TV.+
71	1	2	2	2	2	1	0	0	0	0	0	0
72	1	1	1	1	1	0	1	1	1	0	1	0
73	1	0	0	0	0	1	0	0	0	0	0	0
74	1	0	0	0	0	1	0	0	0	0	0	0
75	1	0	1	1	0	0	1	1	0	0	1	1
76	1	0	1	1	0	0	0	1	0	0	1	1
77	1	0	0	0	0	1	0	0	0	0	0	0
78	1	0	1	1	0	0	0	1	0	0	0	0
79	1	0	0	0	0	1	0	0	0	0	0	0
80	1	0	2	2	0	1	0	0	0	0	0	0
81	1	0	0	0	0	1	0	0	0	0	0	0
82	1	1	1	1	1	0	0	1	0	0	1	0
83	0	1	1	1	0	0	0	1	1	0	0	1
84	0	1	1	1	0	0	1	0	0	0	1	0
85	0	0	0	0	0	1	0	0	0	0	0	0
86	1	1	2	2	2	0	0	0	0	0	0	0
87	1	1	1	1	1	0	0	0	0	0	0	0
88	1	1	1	1	1	0	0	0	0	0	1	1
89	1	0	0	0	0	1	0	0	0	0	0	0
90	1	2	1	2	2	0	0	0	0	0	1	0
91	1	0	0	0	0	1	0	0	0	0	0	0
92	1	0	1	1	0	0	0	1	0	0	0	1
93	1	0	0	0	0	1	0	0	0	0	0	0
94	1	1	0	0	0	0	1	0	0	0	0	0
95	1	0	0	0	0	1	0	0	0	0	0	0
96	1	1	0	0	0	0	0	1	0	0	0	1
97	1	2	2	2	2	1	0	0	0	0	0	0
98	1	1	1	1	1	0	0	0	0	0	0	0
99	1	1	1	1	0	0	0	0	0	0	1	0
100	1	2	2	2	2	1	0	0	0	0	0	0
101	1	1	2	1	0	0	1	0	0	0	0	0
102	1	2	1	1	2	0	0	1	0	0	0	0
103	1	1	1	1	1	0	0	0	0	0	1	0
104	1	2	1	1	0	0	0	1	0	0	0	0
105	1	0	0	0	0	1	0	0	0	0	0	0

Key:

0 = No, 1 = Yes, 2 = Not Sure If I've Heard

T.Eval? = Did they conduct a taste evaluation?

1 Osteo. = Question 1: Osteoporosis

1 Can. = Question 1: Cancer

1 CHD = Question 1: Heart Disease

1 Meno. = Question 1: Problems with Menopause

2Non. = Question 2: Heard no information

2D.O. = Question 2: Heard at Dr.'s office

2M/N = Question 2: Heard in Magazine or Newspaper

2J.A. = Question 2: Heard in journal article

2G.S. = Question 2: Heard at Grocery Store

2TV.P = Question 2: Heard on TV Program

2TV.+ = Question 2: Heard on TV Ad

					Food Questionnaire Forms							
Sub.	T.Eval?	1Osteo.	1Can.	1CHD	1Meno.	2Non	2D.O.	2M/N	2J.A.	2G.S.	2TV.P	2TV.+
106	1	2	1	1	2	0	0	1	0	0	1	1
107	1	1	1	1	0	0	0	1	0	0	1	0
108	1	2	2	1	2	0	0	1	0	0	0	0
109	1	1	1	1	0	0	1	0	0	0	0	0
110	1	0	1	0	0	0	0	0	1	0	0	0
111	1	0	0	0	0	1	0	0	0	0	0	0
112	1	1	1	1	1	0	0	1	0	0	0	0
113	1	0	0	0	0	1	0	0	0	0	0	0
114	1	2	2	2	2	1	0	0	0	0	0	0
115	1	0	1	1	0	0	0	0	0	0	1	0
116	1	0	0	0	0	1	0	0	0	0	0	0
117	1	2	1	1	2	0	0	0	0	0	0	0
118	1	0	0	0	0	1	0	0	0	0	0	0
119	1	0	1	1	2	0	0	0	0	0	1	1
120	1	2	2	2	2	1	0	0	0	0	0	0
121	1	0	1	1	1	0	0	0	0	0	0	0
122	1	0	0	0	1	0	0	0	0	0	1	0
123	1	0	0	0	0	1	0	0	0	0	0	0
124	1	1	2	1	1	0	1	1	0	0	1	0

Key:

0 = No, 1 = Yes, 2 = Not Sure If I've Heard

T.Eval? = Did they conduct a taste evaluation?

1 Osteo. = Question 1: Osteoporosis

1 Can. = Question 1: Cancer

1 CHD = Question 1: Heart Disease

1 Meno. = Question 1: Problems with Menopause

2Non. = Question 2: Heard no information

2D.O. = Question 2: Heard at Dr.'s office

2M/N = Question 2: Heard in Magazine or
Newspaper

2J.A. = Question 2: Heard in journal article

2G.S. = Question 2: Heard at Grocery Store

2TV.P = Question 2: Heard on TV Program

2TV.+ = Question 2: Heard on TV Ad

					Food Questionnaire Form							
Sub.	2Sch.	2Pam.	2Rad.	2R.D.	2Wk.	2IDR	2Oth.	3Fat	3Fib.	3F/V	4Non.	4D.O.
1	0	0	1	0	0	0	0	1	1	1	0	1
2	0	0	0	0	0	0	0	0	0	1	0	0
3	0	0	0	0	0	0	0	1	1	1	0	1
4	0	0	0	0	0	0	0	1	0	1	0	0
5	0	0	0	0	0	0	0	1	1	1	0	1
6	0	0	0	0	0	0	0	1	1	1	0	0
7	0	0	0	0	0	0	0	1	1	1	0	0
8	0	0	0	0	0	0	0	1	1	1	0	1
9	0	0	0	0	0	0	0	1	0	1	0	0
10	0	0	0	0	0	0	0	1	1	1	0	0
11	0	0	0	0	0	0	1	0	0	1	0	0
12	0	0	0	0	0	0	0	2	1	1	0	1
13	0	0	1	0	0	0	0	1	2	1	0	0
14	0	0	0	0	0	0	0	0	0	1	0	1
15	0	0	0	0	1	0	0	1	1	0	0	1
16	0	0	0	0	0	0	0	2	0	2	1	0
17	0	0	0	0	0	0	0	2	2	2	1	0
18	0	0	0	0	0	1	0	0	1	1	0	0
19	0	0	0	0	0	0	0	1	1	1	0	0
20	0	0	0	0	0	0	0	1	1	1	0	0
21	0	0	0	0	0	0	0	1	1	1	0	0
22	0	0	0	0	0	0	0	1	1	1	0	0
23	0	0	0	0	0	0	1	0	0	0	1	0
24	0	1	0	0	0	0	0	1	1	0	0	0
25	0	0	0	0	1	0	0	0	1	1	0	0
26	0	0	0	0	0	0	0	1	1	1	0	0
27	0	0	0	0	0	0	0	1	1	1	0	0
28	0	0	1	0	0	0	0	1	2	1	0	0
29	0	0	0	0	0	0	0	1	1	1	0	0
30	0	0	1	0	0	0	0	1	1	1	0	0
31	0	0	0	0	0	0	0	0	0	1	0	0
32	1	0	0	0	0	0	0	1	1	1	0	1
33	0	0	0	0	0	0	0	1	1	1	0	0
34	0	0	0	0	0	0	1	2	2	1	0	1
35	0	0	0	0	0	0	1	1	1	1	0	0

Key:

0 = No, 1 = Yes, 2 = Not Sure If I've Heard

2Sch. = Question 2: Heard at school

2Pam. = Question 2: Heard in a pamphlet

2Rad. = Question 2: Heard on radio

2R.D. = Question 2: Heard from Dietitian

2Wk. = Question 2: Heard at work

2IDR = Question 2: I don't remember

2Oth. = Question 2: Heard from other

3Fat. = Question 3: 30% Fat

3Fib. = Question 3: 20-30 grams fiber/day

3F/V = Question 3: 5 fruit & vegetables/day

4Non. = Question 4: Heard no information

4D.O. = Question 4: Heard at Dr.'s office

					Food Questionnaire Form							
Sub.	2Sch.	2Pam.	2Rad.	2R.D.	2Wk.	2IDR	2Oth.	3Fat	3Fib.	3F/V	4Non.	4D.O.
36	0	0	0	0	0	0	0	2	2	2	0	0
37	0	0	0	0	0	1	0	1	1	1	0	0
38	0	0	0	1	0	0	0	1	1	1	0	1
39	0	0	0	0	0	0	0	2	1	1	0	0
40	0	0	0	0	0	0	0	1	1	1	0	0
41	0	0	0	0	0	0	1	1	1	1	0	0
42	1	1	1	0	1	0	0	0	0	1	0	0
43	0	0	0	0	0	0	0	2	1	1	0	1
44	0	0	1	0	0	0	0	2	0	2	1	0
45	0	0	0	0	0	0	1	1	1	1	0	0
46	0	0	0	0	0	0	0	1	2	1	0	0
47	0	0	0	0	0	0	0	1	0	1	0	0
48	0	0	0	0	0	0	0	1	1	1	0	1
49	0	0	0	0	0	0	0	0	0	1	0	0
50	0	0	0	0	0	0	0	1	1	1	0	0
51	0	0	0	0	0	0	0	0	1	1	0	1
52	0	0	0	0	0	0	0	1	0	1	0	0
53	0	0	0	0	0	0	0	1	1	1	0	0
54	0	0	0	0	0	0	0	0	0	0	1	0
55	0	0	0	0	0	0	0	1	1	1	0	0
56	0	1	0	1	0	0	0	0	1	1	0	1
57	0	0	0	0	0	0	0	1	1	1	0	0
58	0	0	0	0	0	0	0	0	0	1	0	0
59	0	0	0	0	0	0	1	0	0	1	0	0
60	0	0	0	0	1	0	0	2	1	1	0	0
61	0	0	0	0	0	0	0	1	1	1	0	0
62	0	0	0	0	0	0	0	1	1	1	0	0
63	0	0	0	0	0	0	0	1	1	1	0	1
64	0	0	0	0	0	0	0	0	0	1	0	0
65	0	0	0	1	0	0	0	1	1	1	0	1
66	0	0	0	0	0	0	0	1	1	1	0	0
67	0	0	0	0	0	0	0	1	1	1	0	0
68	0	0	0	0	0	0	0	1	2	1	0	0
69	0	0	0	0	0	0	0	1	1	1	0	0
70	0	0	0	0	0	0	0	0	0	2	1	0

Key:

0 = No, 1 = Yes, 2 = Not Sure If I've Heard

2Sch. = Question 2: Heard at school

2Pam. = Question 2: Heard in a pamphlet

2Rad. = Question 2: Heard on radio

2R.D. = Question 2: Heard from Dietitian

2Wk. = Question 2: Heard at work

2IDR = Question 2: I don't remember

2Oth. = Question 2: Heard from other

3Fat. = Question 3: 30% Fat

3Fib. = Question 3: 20-30 grams fiber/day

3F/V = Question 3: 5 fruit & vegetables/day

4Non. = Question 4: Heard no information

4D.O. = Question 4: Heard at Dr.'s office

					Food Questionnaire Form							
Sub.	2Sch.	2Pam.	2Rad.	2R.D.	2Wk.	2IDR	2Oth.	3Fat	3Fib.	3F/V	4Non.	4D.O.
71	0	0	0	0	0	0	0	1	1	1	0	0
72	0	1	0	1	0	0	0	1	1	1	0	1
73	0	0	0	0	0	0	0	0	0	1	0	0
74	0	0	0	0	0	0	0	1	2	1	0	0
75	0	1	0	0	0	0	0	1	1	1	0	0
76	0	0	1	0	0	0	0	1	1	1	0	1
77	0	0	0	0	0	0	0	1	1	1	0	1
78	0	0	1	0	0	0	0	1	1	1	0	0
79	0	0	0	0	0	0	0	1	2	2	0	1
80	0	0	0	0	0	0	0	1	1	1	0	1
81	0	0	0	0	0	0	0	1	2	1	0	0
82	0	1	0	0	0	0	0	1	1	1	0	0
83	0	0	1	0	0	0	0	2	0	1	0	0
84	0	0	0	0	0	0	0	0	0	1	0	0
85	0	0	0	0	0	0	0	1	0	2	0	0
86	0	0	0	0	0	1	0	1	1	1	0	0
87	0	0	0	0	1	0	0	1	1	1	0	1
88	0	0	0	0	0	0	0	0	2	0	1	0
89	0	0	0	0	0	0	0	1	1	1	0	1
90	0	0	0	0	0	1	0	1	1	1	0	0
91	0	0	0	0	0	0	0	0	1	0	0	0
92	0	0	0	0	0	0	0	1	1	1	0	0
93	0	0	0	0	0	0	0	1	2	1	0	0
94	0	0	0	0	0	0	0	1	2	1	0	0
95	0	0	0	0	0	0	0	0	1	0	0	0
96	0	0	0	0	0	0	0	1	0	1	0	0
97	0	0	0	0	0	0	0	1	1	1	0	0
98	0	0	0	0	1	0	0	1	1	1	0	1
99	0	0	0	0	0	0	0	1	1	0	0	0
100	0	0	0	0	0	0	0	1	1	1	0	0
101	0	0	0	0	0	0	0	1	1	1	0	0
102	0	0	0	0	0	0	0	1	1	1	0	0
103	0	0	0	0	0	0	0	1	1	1	0	1
104	0	0	0	0	0	0	1	1	1	1	0	0
105	0	0	0	0	0	0	0	1	1	1	0	0

Key:

0 = No, 1 = Yes, 2 = Not Sure If I've Heard

2Sch. = Question 2: Heard at school

2Pam. = Question 2: Heard in a pamphlet

2Rad. = Question 2: Heard on radio

2R.D. = Question 2: Heard from Dietitian

2Wk. = Question 2: Heard at work

2IDR = Question 2: I don't remember

2Oth. = Question 2: Heard from other

3Fat. = Question 3: 30% Fat

3Fib. = Question 3: 20-30 grams fiber/day

3F/V = Question 3: 5 fruit & vegetables/day

4Non. = Question 4: Heard no information

4D.O. = Question 4: Heard at Dr.'s office

					Food Questionnaire Form							
Sub.	2Sch.	2Pam.	2Rad.	2R.D.	2Wk.	2IDR	2Oth.	3Fat	3Fib.	3F/V	4Non.	4D.O.
106	0	0	0	0	0	0	0	1	1	1	0	0
107	0	0	0	0	0	0	0	1	1	1	0	1
108	0	0	0	0	0	0	0	2	1	2	0	0
109	0	0	0	0	0	0	0	1	1	1	0	1
110	0	0	0	0	0	0	0	2	2	1	0	0
111	0	0	0	0	0	0	0	1	2	1	0	0
112	0	0	0	0	0	0	1	1	0	1	0	0
113	0	0	0	0	0	0	0	0	0	1	0	0
114	0	0	0	0	0	0	0	2	2	1	0	0
115	0	0	0	0	0	0	1	1	1	1	0	1
116	0	0	0	0	0	0	0	1	1	1	0	0
117	1	0	0	1	0	0	0	1	1	1	0	0
118	0	0	0	0	0	0	0	2	2	2	1	0
119	0	0	0	0	0	0	0	0	2	0	1	0
120	0	0	0	0	0	0	0	1	1	1	0	0
121	0	0	0	0	0	1	0	1	1	1	0	0
122	0	0	0	0	0	0	0	1	1	1	0	0
123	0	0	0	0	0	0	0	1	1	1	0	1
124	0	0	1	0	0	0	1	0	1	1	0	1

Key:

0 = No, 1 = Yes, 2 = Not Sure If I've Heard

2Sch. = Question 2: Heard at school

2Pam. = Question 2: Heard in a pamphlet

2Rad. = Question 2: Heard on radio

2R.D. = Question 2: Heard from Dietitian

2Wk. = Question 2: Heard at work

2IDR = Question 2: I don't remember

2Oth. = Question 2: Heard from other

3Fat. = Question 3: 30% Fat

3Fib. = Question 3: 20-30 grams fiber/day

3F/V = Question 3: 5 fruit & vegetables/day

4Non. = Question 4: Heard no information

4D.O. = Question 4: Heard at Dr.'s office

Food Questionnaire Forms												
Sub.	4M/N	4J.A.	4G.S.	4TV.P	4TV.+	4Sch.	4Pam.	4Rad.	4R.D.	4Wk.	4IDR	4Oth.
1	0	1	0	1	1	0	0	1	0	0	0	0
2	1	0	0	0	0	0	0	0	0	0	0	0
3	0	1	0	0	1	1	0	0	0	0	0	0
4	0	0	0	0	0	1	0	0	0	0	1	0
5	1	0	1	0	0	0	0	0	0	0	0	0
6	0	1	0	0	0	0	0	0	0	0	0	0
7	1	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0
9	1	0	0	0	0	0	0	0	0	0	0	0
10	1	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	1
12	0	0	0	0	0	1	0	0	0	0	0	1
13	0	0	0	0	1	0	0	0	0	1	0	0
14	1	0	0	0	0	0	0	0	0	0	0	0
15	0	1	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	1	1	0	1	1	0	0	0	0
19	1	1	0	1	0	0	0	0	0	0	0	0
20	1	1	0	0	0	0	0	0	1	0	0	0
21	1	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	1	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0
24	1	1	0	0	0	0	1	0	0	0	0	0
25	0	0	0	0	1	1	0	0	0	0	0	0
26	1	0	0	1	1	0	1	0	0	0	0	0
27	1	1	1	1	0	0	1	0	0	0	0	0
28	0	0	0	1	1	0	0	1	0	0	0	0
29	1	1	1	0	0	0	0	0	0	0	0	0
30	1	1	0	0	1	1	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	1	0
32	0	0	0	0	0	0	0	0	0	0	0	0
33	0	0	0	0	0	0	0	0	0	0	1	0
34	0	0	0	0	0	1	0	0	1	0	0	0
35	1	0	1	0	0	0	1	0	0	0	0	1

Key:

0 = No, 1 = Yes

4M/N = Question 4: Heard in Magazine/Newspaper

4J.A. = Question 4: Heard in journal article

4G.S. = Question 4: Heard at grocery store

4TV.P = Question 4: Heard on TV program

4TV.+ = Question 4: Heard on TV Ad

4Sch. = Question 4: Heard at school

4Pam. = Question 4: Heard in pamphlet

4Rad. = Question 4: Heard on the radio

4R.D. = Question 4: Heard by Dietitian

4Wk. = Question 4: Heard at work

4IDR = Question 4: I Don't Remember

4Oth. = Question 4: Other sources

	Food Questionnaire Forms											
Sub.	4M/N	4J.A.	4G.S.	4TV.P	4TV.+	4Sch.	4Pam.	4Rad.	4R.D.	4Wk.	4IDR	4Oth.
36	0	0	0	0	0	0	0	0	0	0	0	0
37	0	0	0	0	1	0	0	0	0	0	1	0
38	0	0	0	0	0	0	0	0	1	0	0	0
39	0	0	1	0	1	1	0	0	0	0	0	0
40	0	1	0	0	0	0	0	0	0	0	0	0
41	1	0	0	0	0	0	0	0	0	0	0	1
42	0	0	0	0	0	0	0	0	0	0	1	0
43	0	0	0	0	1	1	1	1	0	0	0	1
44	0	0	0	0	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0	0	0	0	0	1
46	1	0	0	0	0	0	0	0	0	0	0	0
47	1	0	0	1	0	0	0	0	0	0	0	0
48	0	0	0	0	0	1	0	0	0	0	0	0
49	0	0	0	0	1	0	0	0	0	0	0	0
50	1	1	0	1	1	1	1	0	0	0	0	0
51	0	0	0	0	0	0	0	0	0	0	0	0
52	1	0	0	0	0	0	0	0	0	0	0	0
53	1	0	0	1	0	0	0	0	0	0	0	0
54	0	0	0	0	0	0	0	0	0	0	0	0
55	0	0	0	0	0	1	0	0	0	0	0	0
56	0	0	1	1	0	1	1	1	1	0	0	0
57	0	0	0	0	0	1	0	0	0	0	0	1
58	0	0	0	0	0	0	0	0	0	0	1	0
59	0	0	0	1	1	0	0	0	0	0	0	0
60	1	0	1	0	1	0	0	0	0	1	0	0
61	1	1	0	1	1	0	0	0	0	0	0	0
62	1	0	0	0	0	0	0	0	0	0	1	1
63	1	0	0	1	0	0	0	0	0	0	0	0
64	0	0	0	0	0	1	0	0	0	0	0	0
65	0	0	1	1	1	0	0	0	1	0	0	0
66	1	1	0	0	0	0	0	0	0	0	0	0
67	1	1	0	0	0	0	0	0	0	0	0	0
68	1	0	0	0	1	1	1	0	0	0	1	0
69	0	0	0	1	0	0	0	0	0	0	0	0
70	0	0	0	0	0	0	0	0	0	0	0	0

Key:

0 = No, 1 = Yes

4M/N = Question 4: Heard in Magazine/Newspaper

4J.A. = Question 4: Heard in journal article

4G.S. = Question 4: Heard at grocery store

4TV.P = Question 4: Heard on TV program

4TV.+ = Question 4: Heard on TV Ad

4Sch. = Question 4: Heard at school

4Pam. = Question 4: Heard in pamphlet

4Rad. = Question 4: Heard on the radio

4R.D. = Question 4: Heard by Dietitian

4Wk. = Question 4: Heard at work

4IDR = Question 4: I Don't Remember

4Oth. = Question 4: Other sources

	Food Questionnaire Forms											
Sub.	4M/N	4J.A.	4G.S.	4TV.P	4TV.+	4Sch.	4Pam.	4Rad.	4R.D.	4Wk.	4IDR	4Oth.
71	0	0	0	1	0	0	0	0	0	0	0	0
72	1	0	0	1	0	0	1	0	1	0	0	0
73	0	0	0	0	0	0	1	0	0	0	0	0
74	0	0	0	0	0	0	0	0	0	1	0	0
75	1	0	0	0	1	0	0	0	0	0	0	0
76	1	0	0	1	1	0	0	0	0	0	0	0
77	1	0	0	1	1	0	0	0	0	0	0	0
78	1	0	0	0	0	0	0	1	1	1	0	0
79	0	0	0	0	0	0	0	0	1	0	1	0
80	1	0	1	0	0	0	1	0	0	0	0	0
81	1	0	0	1	0	0	0	0	0	0	0	0
82	1	0	0	1	0	0	0	0	0	0	0	0
83	1	0	1	0	0	1	0	1	0	0	0	0
84	0	0	0	0	0	1	0	0	0	0	0	0
85	0	0	0	1	1	1	0	0	0	0	0	0
86	0	0	0	0	0	1	0	0	0	0	0	0
87	0	0	0	0	0	0	0	0	0	0	0	0
88	0	0	0	0	0	0	0	0	0	0	0	0
89	0	0	0	0	0	1	0	0	0	0	0	0
90	1	0	0	1	1	0	0	0	0	0	0	0
91	0	0	0	0	0	0	0	0	0	0	0	1
92	1	0	0	0	1	1	0	0	0	0	0	0
93	1	0	0	0	1	0	0	0	0	0	0	0
94	0	0	0	0	0	1	0	0	0	0	0	0
95	0	0	0	1	0	0	0	0	0	0	0	0
96	1	0	0	0	0	0	0	0	0	0	0	0
97	1	0	0	0	1	0	0	0	0	0	0	0
98	0	0	0	0	0	0	0	0	0	0	0	0
99	1	1	0	0	0	0	0	0	0	0	0	0
100	1	0	0	0	0	0	0	0	0	0	0	0
101	1	0	0	0	0	0	0	0	0	0	0	0
102	1	0	0	0	0	0	0	0	0	0	0	0
103	0	0	0	0	0	1	0	0	0	0	0	0
104	1	1	0	0	0	0	0	0	0	0	0	0
105	0	0	0	1	0	0	0	0	0	1	0	0

Key:

0 = No, 1 = Yes

4M/N = Question 4: Heard in Magazine/Newspaper

4J.A. = Question 4: Heard in journal article

4G.S. = Question 4: Heard at grocery store

4TV.P = Question 4: Heard on TV program

4TV.+ = Question 4: Heard on TV Ad

4Sch. = Question 4: Heard at school

4Pam. = Question 4: Heard in pamphlet

4Rad. = Question 4: Heard on the radio

4R.D. = Question 4: Heard by Dietitian

4Wk. = Question 4: Heard at work

4IDR = Question 4: I Don't Remember

4Oth. = Question 4: Other sources

	Food Questionnaire Forms											
Sub.	4M/N	4J.A.	4G.S.	4TV.P	4TV.+	4Sch.	4Pam.	4Rad.	4R.D.	4Wk.	4IDR	4Oth.
106	1	0	0	1	1	0	0	0	0	0	0	1
107	1	0	0	1	0	0	0	0	1	0	0	0
108	1	0	0	0	0	0	0	0	0	0	0	0
109	0	0	0	0	0	0	0	0	0	0	0	0
110	1	0	0	0	0	0	0	0	0	0	0	0
111	0	0	0	1	0	0	0	0	0	0	0	0
112	1	0	0	0	0	0	0	0	0	0	0	1
113	1	0	0	0	1	0	0	0	0	0	0	0
114	0	0	0	0	0	0	0	0	0	0	1	0
115	1	1	1	1	1	1	1	1	1	1	1	0
116	0	0	0	0	0	1	0	0	0	0	0	0
117	0	0	0	0	0	0	0	0	1	0	0	0
118	0	0	0	0	0	0	0	0	0	0	0	0
119	0	0	0	0	0	0	0	0	0	0	0	0
120	1	0	0	1	0	0	0	0	0	0	0	0
121	0	0	0	0	1	0	0	0	0	0	0	0
122	0	0	0	0	0	1	0	0	0	0	0	0
123	1	1	1	0	0	1	1	0	0	0	0	0
124	1	0	0	1	0	0	0	1	0	0	0	0

Key:

0 = No, 1 = Yes

4M/N = Question 4: Heard in Magazine/Newspaper

4J.A. = Question 4: Heard in journal article

4G.S. = Question 4: Heard at grocery store

4TV.P = Question 4: Heard on TV program

4TV.+ = Question 4: Heard on TV Ad

4Sch. = Question 4: Heard at school

4Pam. = Question 4: Heard in pamphlet

4Rad. = Question 4: Heard on the radio

4R.D. = Question 4: Heard by Dietitian

4Wk. = Question 4: Heard at work

4IDR = Question 4: I Don't Remember

4Oth. = Question 4: Other sources

								Food Questionnaire Forms				
Sub.	5Non.	5Tof.	5Mis.	5S.Y.	5S.M.	5S.I.C.	5Tem.	5S.B.	5S.Ch.	5I.D.K.	5Oth.	6Non.
1	1	0	0	0	0	0	0	0	0	0	0	1
2	1	0	0	0	0	0	0	0	0	0	0	1
3	1	0	0	0	0	0	0	0	0	0	0	1
4	0	1	0	0	0	0	0	0	0	0	0	0
5	1	0	0	0	0	0	0	0	0	0	0	1
6	1	0	0	0	0	0	0	0	0	0	0	1
7	0	0	0	0	0	0	0	1	0	0	0	0
8	1	0	0	0	0	0	0	0	0	0	0	1
9	1	0	0	0	0	0	0	0	0	0	0	1
10	1	0	0	0	0	0	0	0	0	0	0	1
11	0	0	0	0	1	0	0	1	0	0	0	0
12	0	1	0	0	0	0	0	1	1	0	0	0
13	1	0	0	0	0	0	0	0	0	0	0	1
14	0	1	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	1	0	0	0	0
16	0	1	0	0	0	0	0	0	0	0	0	0
17	0	1	0	0	0	0	0	1	1	0	0	0
18	0	0	0	0	0	0	0	0	0	1	0	0
19	1	0	0	0	0	0	0	0	0	0	0	1
20	0	1	1	0	1	0	1	0	0	0	0	0
21	1	0	0	0	0	0	0	0	0	0	0	1
22	0	0	0	0	0	1	0	0	0	0	0	0
23	0	0	0	0	0	0	0	1	0	0	0	0
24	1	0	0	0	0	0	0	0	0	0	0	1
25	0	1	0	0	0	0	0	1	0	0	0	0
26	1	0	0	0	0	0	0	0	0	0	0	1
27	0	1	0	0	1	0	0	1	0	0	0	0
28	0	0	0	0	0	0	0	1	0	0	0	0
29	0	1	1	0	1	1	0	1	0	0	0	0
30	0	1	0	0	0	0	1	1	0	0	0	0
31	1	0	0	0	0	0	0	0	0	0	0	1
32	0	1	0	0	1	0	0	1	1	0	0	0
33	1	0	0	0	0	0	0	0	0	0	0	1
34	0	1	0	0	1	0	1	1	0	0	0	0
35	0	1	0	0	1	0	0	1	1	0	0	0

Key:

0 = No, 1 = Yes

5Non. = Question 5: Never purchased soy

5Tof. = Question 5: Tofu

5Mis. = Question 5: Miso

5S.Y. = Question 5: Soy yogurt

5S.M. = Question 5: Soy milk

5S.I.C. = Question 5: Soy ice cream

5Tem. = Question 5: Tempeh

5S.B. = Question 5: Soy burgers

5S.Ch. = Question 5: Soy cheese

5I.D.K. = Question 5: I don't know

5Oth. = Question 5: Other soy food

6Non. = Question 6: did not answer 6

								Food Questionnaire Forms				
Sub.	5Non.	5Tof.	5Mis.	5S.Y.	5S.M.	5S.I.C.	5Tem.	5S.B.	5S.Ch.	5I.D.K.	5Oth.	6Non.
36	1	0	0	0	0	0	0	0	0	0	0	1
37	0	0	0	0	0	0	0	0	0	1	0	1
38	0	1	0	0	0	0	0	1	0	0	0	0
39	1	0	0	0	0	0	0	0	0	0	0	1
40	1	0	0	0	0	0	0	0	0	0	0	1
41	0	1	0	1	1	1	0	1	1	0	0	0
42	1	0	0	0	0	0	0	0	0	0	0	1
43	1	0	0	0	0	0	0	0	0	0	0	1
44	1	0	0	0	0	0	0	0	0	0	0	1
45	0	0	0	0	0	0	0	1	1	0	0	0
46	1	0	0	0	0	0	0	0	0	0	0	1
47	1	0	0	0	0	0	0	0	0	0	0	1
48	1	0	0	0	0	0	0	0	0	0	0	1
49	1	0	0	0	0	0	0	0	0	0	0	1
50	1	0	0	0	0	0	0	0	0	0	0	1
51	0	0	0	0	0	0	0	0	0	0	1	0
52	1	0	0	0	0	0	0	0	0	0	0	1
53	1	0	0	0	0	0	0	0	0	0	0	1
54	1	0	0	0	0	0	0	0	0	0	0	1
55	1	0	0	0	0	0	0	0	0	0	0	1
56	1	0	0	0	0	0	0	0	0	0	0	1
57	1	0	0	0	0	0	0	0	0	0	0	1
58	1	0	0	0	0	0	0	0	0	0	0	1
59	1	0	0	0	0	0	0	0	0	0	0	1
60	0	0	0	0	0	0	0	0	0	1	0	1
61	0	0	0	0	0	0	0	0	0	0	1	0
62	0	1	0	0	0	0	0	0	0	0	0	0
63	0	0	0	0	0	1	0	1	0	0	0	0
64	1	0	0	0	0	0	0	0	0	0	0	1
65	1	0	0	0	0	0	0	0	0	0	0	1
66	0	1	0	1	1	0	0	1	0	0	0	0
67	1	0	0	0	0	0	0	0	0	0	0	1
68	1	0	0	0	0	0	0	0	0	0	0	1
69	0	0	0	0	0	0	0	0	0	1	0	1
70	0	0	0	0	0	0	0	1	1	0	0	0

Key:

0 = No, 1 = Yes

5Non. = Question 5: Never purchased soy

5Tof. = Question 5: Tofu

5Mis. = Question 5: Miso

5S.Y. = Question 5: Soy yogurt

5S.M. = Question 5: Soy milk

5S.I.C. = Question 5: Soy ice cream

5Tem. = Question 5: Tempeh

5S.B. = Question 5: Soy burgers

5S.Ch. = Question 5: Soy cheese

5I.D.K. = Question 5: I don't know

5Oth. = Question 5: Other soy food

6Non. = Question 6: did not answer 6

								Food Questionnaire Forms				
Sub.	5Non.	5Tof.	5Mis.	5S.Y.	5S.M.	5S.I.C.	5Tem.	5S.B.	5S.Ch.	5I.D.K.	5Oth.	6Non.
71	0	0	0	0	0	0	0	0	0	1	0	1
72	1	0	0	0	0	0	0	0	0	0	0	1
73	1	0	0	0	0	0	0	0	0	0	0	1
74	1	0	0	0	0	0	0	0	0	0	0	1
75	0	1	0	0	1	0	0	0	1	0	0	0
76	1	0	0	0	0	0	0	0	0	0	0	1
77	1	0	0	0	0	0	0	0	0	0	0	1
78	0	1	0	0	0	0	0	0	0	0	0	0
79	0	0	0	0	0	0	0	0	0	1	0	1
80	1	0	0	0	0	0	0	0	0	0	0	1
81	1	0	0	0	0	0	0	0	0	0	0	1
82	0	0	0	0	1	0	0	0	0	0	0	0
83	1	0	0	0	0	0	0	0	0	0	0	1
84	1	0	0	0	0	0	0	0	0	0	0	1
85	1	0	0	0	0	0	0	0	0	0	0	1
86	1	0	0	0	0	0	0	0	0	0	0	1
87	0	1	0	0	0	0	0	0	0	0	0	0
88	1	0	0	0	0	0	0	0	0	0	0	1
89	1	0	0	0	0	0	0	0	0	0	0	1
90	0	0	0	0	0	0	0	0	0	1	0	1
91	0	1	0	1	0	0	0	0	1	0	0	0
92	0	1	0	0	0	0	0	0	0	0	0	0
93	1	0	0	0	0	0	0	0	0	0	0	1
94	1	0	0	0	0	0	0	0	0	0	0	1
95	1	0	0	0	0	0	0	0	0	0	0	1
96	1	0	0	0	0	0	0	0	0	0	0	1
97	0	0	0	0	1	0	0	0	0	0	0	0
98	0	1	0	0	1	0	0	0	0	0	0	0
99	0	0	0	0	0	0	0	1	0	0	0	0
100	1	0	0	0	0	0	0	0	0	0	0	1
101	0	1	0	0	0	0	0	1	0	0	0	0
102	0	0	0	0	0	0	0	1	0	0	0	0
103	1	0	0	0	0	0	0	0	0	0	0	1
104	0	1	1	0	1	1	1	1	1	0	1	0
105	1	0	0	0	0	0	0	0	0	0	0	1

Key:

0 = No, 1 = Yes

5Non. = Question 5: Never purchased soy

5Tof. = Question 5: Tofu

5Mis. = Question 5: Miso

5S.Y. = Question 5: Soy yogurt

5S.M. = Question 5: Soy milk

5S.I.C. = Question 5: Soy ice cream

5Tem. = Question 5: Tempeh

5S.B. = Question 5: Soy burgers

5S.Ch. = Question 5: Soy cheese

5I.D.K. = Question 5: I don't know

5Oth. = Question 5: Other soy food

6Non. = Question 6: did not answer 6

								Food Questionnaire Forms				
Sub.	5Non.	5Tof.	5Mis.	5S.Y.	5S.M.	5S.I.C.	5Tem.	5S.B.	5S.Ch.	5I.D.K.	5Oth.	6Non.
106	0	0	0	0	0	0	0	1	1	0	0	0
107	0	1	0	0	0	1	0	1	0	0	0	0
108	0	1	0	0	0	0	0	0	0	0	0	0
109	1	0	0	0	0	0	0	0	0	0	0	1
110	0	1	0	0	0	0	0	1	0	0	0	0
111	0	0	0	0	0	0	0	1	0	0	0	0
112	0	1	1	0	1	0	0	1	1	0	0	0
113	1	0	0	0	0	0	0	0	0	0	0	1
114	0	0	0	0	0	0	0	0	0	1	0	1
115	0	1	0	1	1	0	0	1	1	0	0	0
116	1	0	0	0	0	0	0	0	0	0	0	1
117	0	1	0	0	0	0	0	1	0	0	0	0
118	0	0	0	0	0	1	0	1	0	0	0	0
119	0	1	0	1	0	0	0	0	0	0	0	0
120	0	0	0	0	1	0	0	0	0	0	0	0
121	0	0	0	0	0	0	0	1	0	0	0	0
122	1	0	0	0	0	0	0	0	0	0	0	1
123	0	0	0	0	0	0	0	0	0	1	0	1
124	0	0	0	1	1	1	0	0	0	0	0	0

Key:

0 = No, 1 = Yes

5Non. = Question 5: Never purchased soy

5Tof. = Question 5: Tofu

5Mis. = Question 5: Miso

5S.Y. = Question 5: Soy yogurt

5S.M. = Question 5: Soy milk

5S.I.C. = Question 5: Soy ice cream

5Tem. = Question 5: Tempeh

5S.B. = Question 5: Soy burgers

5S.Ch. = Question 5: Soy cheese

5I.D.K = Question 5: I don't know

5Oth. = Question 5: Other soy food

6Non. = Question 6: did not answer 6

							Food Questionnaire Forms				
Sub.	6Tas.	6Hea.	6L.C.	6Rel.	6Oth.	7Non.	7W.L.T.	7H.C.	7D.K.E.	7D.L.C.	7Oth.
1	0	0	0	0	0	0	1	0	0	0	0
2	0	0	0	0	0	0	1	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	1
4	0	0	0	0	1	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	1	0	0
6	0	0	0	0	0	0	0	0	0	1	0
7	0	1	0	0	0	1	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	1
9	0	0	0	0	0	0	0	1	0	0	0
10	0	0	0	0	0	0	0	0	0	0	1
11	0	1	0	0	0	1	0	0	0	0	0
12	0	0	0	0	1	1	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	1	0
14	0	1	0	0	0	1	0	0	0	0	0
15	0	1	0	0	0	1	0	0	0	0	0
16	1	0	0	0	0	1	0	0	0	0	0
17	0	0	0	0	1	1	0	0	0	0	0
18	1	0	0	0	0	0	0	0	1	0	0
19	0	0	0	0	0	0	0	0	0	0	1
20	1	1	0	0	0	1	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	1
22	1	0	0	0	0	1	0	0	0	0	0
23	0	0	1	0	0	1	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	1	0
25	0	1	0	0	0	0	1	1	0	0	0
26	0	0	0	0	0	0	1	0	0	1	0
27	0	1	0	0	0	1	0	0	0	0	0
28	0	1	0	0	0	1	0	0	0	0	0
29	0	1	0	0	0	1	0	0	0	0	0
30	1	0	1	0	0	1	0	0	0	0	0
31	0	0	0	0	0	0	1	0	0	0	0
32	0	0	0	0	1	1	0	0	0	0	0
33	0	0	0	0	0	0	1	0	0	0	0
34	1	1	0	0	0	1	0	0	0	0	0
35	1	1	0	0	0	1	0	0	0	0	0

Key:

0 = No, 1 = Yes

6Tas. = Question 6: Taste

6Hea. = Question 6: Health

6L.C. = Question 6: Low cost

6Rel. = Question 6: Religion

6Oth. = Question 6: Other

7W.L.T. = Question 7: Wouldn't like the taste

7H.C. = Question 7: High cost

7D.K.E. = Question 7: Didn't know they existed

7D.L.C. = Question 7: Don't like the food choices

7Oth. = Question 7: Other

							Food Questionnaire Forms				
Sub.	6Tas.	6Hea.	6L.C.	6Rel.	6Oth.	7Non.	7W.L.T.	7H.C.	7D.K.E.	7D.L.C.	7Oth.
36	0	0	0	0	0	0	0	0	0	1	0
37	0	0	0	0	0	0	0	0	0	0	1
38	1	1	0	1	0	1	0	0	0	0	0
39	0	0	0	0	0	0	0	0	0	1	0
40	0	0	0	0	0	0	0	0	0	0	1
41	0	1	0	1	1	1	0	0	0	0	0
42	0	0	0	0	0	0	0	0	1	0	0
43	0	0	0	0	0	0	0	0	0	1	0
44	0	0	0	0	0	0	1	0	0	0	0
45	0	1	1	0	0	1	0	0	0	0	0
46	0	0	0	0	0	0	1	0	0	0	0
47	0	0	0	0	0	0	1	0	0	0	0
48	0	0	0	0	0	0	1	0	0	0	0
49	0	0	0	0	0	0	0	0	0	0	1
50	0	0	0	0	0	0	0	0	0	0	1
51	0	0	0	0	1	1	0	0	0	0	0
52	0	0	0	0	0	0	1	0	0	0	0
53	0	0	0	0	0	0	0	0	0	1	0
54	0	0	0	0	0	0	1	0	0	0	0
55	0	0	0	0	0	0	1	0	0	0	0
56	0	0	0	0	0	0	1	0	0	0	0
57	0	0	0	0	0	0	0	0	0	0	1
58	0	0	0	0	0	0	0	0	0	0	1
59	0	0	0	0	0	0	0	0	0	0	1
60	0	0	0	0	0	0	0	0	0	0	1
61	1	0	0	0	0	1	0	0	0	0	0
62	0	0	0	0	1	1	0	0	0	0	0
63	0	1	0	0	0	1	0	0	0	0	0
64	0	0	0	0	0	0	0	0	1	0	0
65	0	0	0	0	0	0	0	0	0	1	0
66	1	1	0	0	0	1	0	0	0	0	0
67	0	0	0	0	0	0	1	0	0	0	0
68	0	0	0	0	0	0	1	0	0	0	0
69	0	0	0	0	0	0	0	0	0	1	0
70	1	0	0	0	0	1	0	0	0	0	0

Key:

0 = No, 1 = Yes

6Tas. = Question 6: Taste

6Hea. = Question 6: Health

6L.C. = Question 6: Low cost

6Rel. = Question 6: Religion

6Oth. = Question 6: Other

7W.L.T. = Question 7: Wouldn't like the taste

7H.C. = Question 7: High cost

7D.K.E. = Question 7: Didn't know they existed

7D.L.C. = Question 7: Don't like the food choices

7Oth. = Question 7: Other

							Food Questionnaire Forms				
Sub.	6Tas.	6Hea.	6L.C.	6Rel.	6Oth.	7Non.	7W.L.T.	7H.C.	7D.K.E.	7D.L.C.	7Oth.
71	0	0	0	0	0	0	1	0	0	0	0
72	0	0	0	0	0	0	1	0	0	0	0
73	0	0	0	0	0	0	0	0	1	0	0
74	0	0	0	0	0	0	0	0	1	0	0
75	0	1	0	0	0	1	0	0	0	0	0
76	0	0	0	0	0	0	0	0	0	1	0
77	0	0	0	0	0	0	1	0	0	0	0
78	0	1	0	0	0	1	0	0	0	0	0
79	0	0	0	0	0	0	0	0	0	0	1
80	0	0	0	0	0	0	1	0	0	0	1
81	0	0	0	0	0	0	0	0	0	0	1
82	0	1	0	0	0	1	0	0	0	0	0
83	0	0	0	0	0	0	0	0	1	0	0
84	0	0	0	0	0	0	0	0	0	0	1
85	0	0	0	0	0	0	1	0	0	0	0
86	0	0	0	0	0	0	1	0	0	0	0
87	0	1	0	0	0	1	0	0	0	0	0
88	0	0	0	0	0	0	0	0	0	1	0
89	0	0	0	0	0	0	1	0	0	0	0
90	0	0	0	0	0	0	1	0	1	0	0
91	1	0	0	0	0	1	0	0	0	0	0
92	0	1	0	0	0	1	0	0	0	0	0
93	0	0	0	0	0	0	1	0	0	0	0
94	0	0	0	0	0	0	1	0	0	0	0
95	0	0	0	0	0	0	1	0	0	0	0
96	0	0	0	0	0	0	1	0	0	0	0
97	0	1	0	0	0	1	0	0	0	0	0
98	0	1	0	0	0	1	0	0	0	0	0
99	0	1	0	0	0	1	0	0	0	0	0
100	0	0	0	0	0	0	0	0	1	0	0
101	0	1	0	0	0	1	0	0	0	0	0
102	0	0	0	0	1	1	0	0	0	0	0
103	0	0	0	0	0	0	1	0	0	0	0
104	1	1	0	0	0	1	0	0	0	0	0
105	0	0	0	0	0	0	0	0	0	0	1

Key:

0 = No, 1 = Yes

6Tas. = Question 6: Taste

6Hea. = Question 6: Health

6L.C. = Question 6: Low cost

6Rel. = Question 6: Religion

6Oth. = Question 6: Other

7W.L.T. = Question 7: Wouldn't like the taste

7H.C. = Question 7: High cost

7D.K.E. = Question 7: Didn't know they existed

7D.L.C. = Question 7: Don't like the food choices

7Oth. = Question 7: Other

							Food Questionnaire Forms				
Sub.	6Tas.	6Hea.	6L.C.	6Rel.	6Oth.	7Non.	7W.L.T.	7H.C.	7D.K.E.	7D.L.C.	7Oth.
106	0	1	1	0	0	1	0	0	0	0	0
107	1	1	0	0	0	1	0	0	0	0	0
108	0	1	0	0	0	1	0	0	0	0	0
109	0	0	0	0	0	0	0	0	1	0	0
110	0	1	0	0	0	1	0	0	0	0	0
111	0	0	0	0	1	1	0	0	0	0	0
112	1	1	0	0	0	1	0	0	0	0	0
113	0	0	0	0	0	0	0	0	1	0	0
114	0	0	0	0	0	0	0	0	1	0	0
115	0	1	0	0	0	1	0	0	0	0	0
116	0	0	0	0	0	0	0	0	0	0	1
117	0	1	0	0	0	1	0	0	0	0	0
118	0	0	0	0	1	1	0	0	0	0	0
119	1	1	0	0	0	1	0	0	0	0	0
120	0	1	0	0	0	1	0	0	0	0	0
121	0	0	0	0	1	0	1	0	0	0	0
122	0	0	0	0	0	0	1	0	0	0	0
123	0	0	0	0	0	0	0	0	1	0	0
124	1	1	0	0	0	1	0	0	0	0	0

Key:

0 = No, 1 = Yes

6Tas. = Question 6: Taste

6Hea. = Question 6: Health

6L.C. = Question 6: Low cost

6Rel. = Question 6: Religion

6Oth. = Question 6: Other

7W.L.T. = Question 7: Wouldn't like the taste

7H.C. = Question 7: High cost

7D.K.E. = Question 7: Didn't know they existed

7D.L.C. = Question 7: Don't like the food choices

7Oth. = Question 7: Other

Food Questionnaire Forms						
Sub.	Age	Race	Educ.	Sex	New Educ.	New Age
1	48	4	4	2	2	2
2	39	4	3	1	2	1
3	46	4	4	1	2	2
4	25	4	6	2	4	0
5	50	4	2	1	1	2
6	59	4	8	2	4	2
7	21	4	5	1	3	0
8	48	4	2	1	1	2
9	33	4	3	1	2	1
10	53	4	3	1	2	2
11	20	2	3	2	2	0
12	18	5	3	2	2	0
13	44	4	3	2	2	1
14	44	4	3	2	2	1
15	40	4	6	2	4	1
16	19	4	3	2	2	0
17	40	4	5	2	3	1
18	47	4	3	2	2	2
19	52	4	5	1	3	2
20	58	4	6	1	4	2
21	43	4	4	2	2	1
22	39	4	8	1	4	1
23	34	2	3	2	2	1
24	50	4	4	2	2	2
25	48	4	4	2	2	2
26	49	4	4	1	2	2
27	35	4	5	1	3	1
28	50	4	4	2	2	2
29	28	4	4	2	2	0
30	33	2	6	1	4	1
31	20	4	3	2	2	0
32	20	4	4	1	2	0
33	47	4	4	1	2	2
34	20	4	4	1	2	0
35	32	4	6	2	4	1

Key:

Age = any number between 18 and 65 years

Race = 1: Asian, 2: Black, 3: Hispanic, 4: White, 5: Other

Education = 1: < High School, 2: Some High School, 3: High School

4: Some College, 5: College, 6: Master's, 7: Doctorate, 8: Other

Sex = 1: Female, 2: Male

New Education = 1: < or some High School, 2: Completed High School or Some College

3: Completed College, 4: Completed Master's, Doctorate, or Other

New Age = 0: 18-29 years, 1: 30-44 years, 2: 45-65 years

Sub.	Age	Race	Educ.	Sex	New Educ.	New Age
36	50	4	5	1	3	2
37	52	4	5	2	3	2
38	45	4	5	1	3	2
39	21	4	4	1	2	0
40	65	4	5	1	3	2
41	29	4	3	1	2	0
42	20	4	3	1	2	0
43	20	4	4	2	2	0
44	19	4	4	2	2	0
45	34	5	5	2	3	1
46	43	2	5	2	3	1
47	31	4	5	1	3	1
48	31	4	5	2	3	1
49	19	4	4	2	2	0
50	19	4	4	2	2	0
51	29	4	4	1	2	0
52	41	4	3	1	2	1
53	26	4	3	2	2	0
54	19	4	4	2	2	0
55	32	4	3	1	2	1
56	22	4	3	1	2	0
57	27	4	3	1	2	0
58	21	4	5	1	3	0
59	29	4	5	1	3	0
60	52	4	4	2	2	2
61	45	4	7	1	4	2
62	44	4	5	1	3	1
63	37	4	5	1	3	1
64	40	4	6	2	4	1
65	29	4	3	1	2	0
66	56	4	4	1	2	2
67	37	4	5	1	3	1
68	21	4	4	2	2	0
69	36	1	5	2	3	1
70	32	1	5	2	3	1

Key:

Age = any number between 18 and 65 years

Race = 1: Asian, 2: Black, 3: Hispanic, 4: White, 5: Other

Education = 1: < High School, 2: Some High School, 3: High School

4: Some College, 5: College, 6: Master's, 7: Doctorate, 8: Other

Sex = 1: Female, 2: Male

New Education = 1: < or some High School, 2: Completed High School or Some College

3: Completed College, 4: Completed Master's, Doctorate, or Other

New Age = 0: 18-29 years, 1: 30-44 years, 2: 45-65 years

Sub.	Age	Race	Educ.	Sex	New Educ.	New Age
71	40	4	5	1	3	1
72	48	4	4	1	2	2
73	59	4	1	2	1	2
74	29	4	2	1	1	0
75	29	4	5	1	3	0
76	48	4	4	2	2	2
77	44	4	3	1	2	1
78	33	4	5	1	3	1
79	49	4	5	2	3	2
80	20	4	4	2	2	0
81	21	3	4	2	2	0
82	51	4	2	1	1	2
83	19	4	4	2	2	0
84	25	4	5	2	3	0
85	24	4	5	2	3	0
86	23	4	4	1	2	0
87	64	1	7	2	4	2
88	47	2	5	2	3	2
89	26	4	3	2	2	0
90	34	4	5	1	3	1
91	28	1	7	2	4	0
92	43	4	6	2	4	1
93	44	4	4	1	2	1
94	22	4	4	1	2	0
95	35	2	5	1	3	1
96	20	4	4	1	2	0
97	35	4	4	1	2	1
98	64	1	6	1	4	2
99	47	4	5	1	3	2
100	34	4	5	1	3	1
101	40	4	5	1	3	1
102	51	4	4	1	2	2
103	34	2	4	1	2	1
104	23	4	6	1	4	0
105	58	2	4	2	2	2

Key:

Age = any number between 18 and 65 years

Race = 1: Asian, 2: Black, 3: Hispanic, 4: White, 5: Other

Education = 1: < High School, 2: Some High School, 3: High School

4: Some College, 5: College, 6: Master's, 7: Doctorate, 8: Other

Sex = 1: Female, 2: Male

New Education = 1: < or some High School, 2: Completed High School or Some College

3: Completed College, 4: Completed Master's, Doctorate, or Other

New Age = 0: 18-29 years, 1: 30-44 years, 2: 45-65 years

Sub.	Age	Race	Educ.	Sex	New Educ.	New Age
106	59	4	3	2	2	2
107	46	4	4	1	2	2
108	23	1	5	2	3	0
109	51	4	3	1	2	2
110	52	4	5	2	3	2
111	18	4	4	1	2	0
112	18	4	4	1	2	0
113	63	4	3	1	2	2
114	40	4	6	2	4	1
115	53	4	6	2	4	2
116	55	4	3	1	2	2
117	21	4	4	1	2	0
118	27	4	3	1	2	0
119	24	1	6	2	4	0
120	36	4	4	1	2	1
121	47	4	4	1	2	2
122	22	4	4	1	2	0
123	25	3	5	2	3	0
124	23	1	6	1	4	0

Key:

Age = any number between 18 and 65 years

Race = 1: Asian, 2: Black, 3: Hispanic, 4: White, 5: Other

Education = 1: < High School, 2: Some High School, 3: High School

4: Some College, 5: College, 6: Master's, 7: Doctorate, 8: Other

Sex = 1: Female, 2: Male

New Education = 1: < or some High School, 2: Completed High School or Some College

3: Completed College, 4: Completed Master's, Doctorate, or Other

New Age = 0: 18-29 years, 1: 30-44 years, 2: 45-65 years

APPENDIX M
RAW DATA FOR TASTE EVALUATION

TASTE EVALUATION						
Subj	Sqr	Tri	Str	Arr	Cir	Dia
1	7	8	7	6	7	4
2	8	8	6	6	6	5
3	7	8	5	5	6	4
4	7	9	6	7	6	6
5	6	2	7	7	5	2
6	6	8	6	5	5	2
7	7	7	8	8	8	7
8	5	7	2	5	6	8
9	7	9	8	7	5	5
10	9	3	9	9	9	4
11	9	7	9	8	6	9
12	9	7	9	9	7	9
13	7	8	6	4	9	4
14	9	9	9	8	8	2
15	8	7	7	7	6	4
16	9	6	7	6	8	6
17	7	8	7	9	8	8
18	9	9	7	7	7	8
19	9	8	8	7	9	7
20	9	6	5	8	5	4
21	7	7	6	7	7	6
22	9	7	9	6	6	7
23	7	7	8	6	7	5
24	7	9	4	7	5	4
25	7	7	6	6	2	1
26	8	9	6	6	5	4
27	9	8	7	9	5	3
28	8	3	8	7	6	3
29	6	6	6	6	7	2
30	6	9	3	4	1	2

Key:

Sqr. = Square: soy cookie
 Str. = Star: soy muffin
 Cir. = Circle: regular bread

Tri. = Triangle: regular cookie
 Arr. = Arrow: regular muffin
 Dia. = Diamond: soy bread

1 = Dislike Extremely
 2 = Dislike Very Much
 3 = Dislike Moderately
 4 = Dislike Slightly
 5 = Neither Like nor Dislike

6 = Like Slightly
 7 = Like Moderately
 8 = Like Very Much
 9 = Like Extremely

TASTE EVALUATION						
Subj	Sqr	Tri	Str	Arr	Cir	Dia
31	7	8	5	2	5	4
32	6	4	7	6	7	4
33	9	9	7	5	6	3
34	6	7	5	6	5	5
35	9	9	9	7	8	7
36	4	7	7	7	4	6
37	8	8	6	8	9	6
38	7	8	7	7	7	6
39	8	3	9	9	8	6
40	8	7	7	6	7	6
41	8	9	9	8	9	9
42	8	7	7	7	5	6
43	9	6	6	7	7	6
44	8	7	8	7	7	6
45	8	8	8	7	8	7
46	8	8	9	7	8	9
47	8	7	7	7	6	7
48	6	8	7	6	6	6
49	8	8	7	7	7	5
50	7	6	6	8	8	6
51	8	8	8	7	7	8
52	6	2	6	7	7	5
53	8	8	7	8	7	6
54	8	9	7	7	7	7
55	8	7	8	7	6	3
56	7	4	7	6	4	3
57	3	7	3	3	4	3
58	7	8	5	7	6	5
59	9	8	7	8	7	7
60	8	8	6	6	5	3
61	3	7	1	3	2	4
62	8	8	4	3	3	2

Key:

Sqr. = Square: soy cookie

Str. = Star: soy muffin

Cir. = Circle: regular bread

Tri. = Triangle: regular cookie

Arr. = Arrow: regular muffin

Dia. = Diamond: soy bread

1 = Dislike Extremely

2 = Dislike Very Much

3 = Dislike Moderately

4 = Dislike Slightly

5 = Neither Like nor Dislike

6 = Like Slightly

7 = Like Moderately

8 = Like Very Much

9 = Like Extremely

Subj	Age	Race	Educ	Sex	New Educ.	New Age
1	44	4	5	1	3	1
2	37	4	5	1	3	1
3	40	4	6	2	4	1
4	29	4	3	1	2	0
5	56	4	4	1	2	2
6	37	4	5	1	3	1
7	21	4	4	2	2	0
8	36	1	4	2	2	1
9	32	1	5	2	3	1
10	40	4	5	1	3	1
11	48	4	4	1	2	2
12	59	4	1	2	1	2
13	29	4	2	1	1	0
14	29	4	5	1	3	0
15	48	4	4	2	2	2
16	44	4	3	1	2	1
17	33	4	5	1	3	1
18	49	4	5	2	3	2
19	51	4	2	1	1	2
20	23	4	4	1	2	0
21	64	1	7	2	4	2
22	47	2	5	2	3	2
23	26	4	3	2	2	0
24	34	4	5	1	3	1
25	28	1	7	2	4	0
26	43	4	6	2	4	1
27	44	4	4	1	2	1
28	22	4	4	1	2	0
29	35	2	5	1	3	1
30	20	4	4	1	2	0

Key:

Age = between 18 and 65 years

Race = 1: Asian, 2: Black, 3: Hispanic, 4: White, 5: Other

Education = 1: < High School, 2: Some High School, 3: High School, 4: Some College
5: College, 6: Master's, 7: Doctorate, 8: Other

Sex = 1: Female, 2: Male

New Education = 1: < or some High School, 2: Completed High School or Some College
3: Completed College, 4: Master's, Doctorate, or Other

New Age = 0: 18-29 years, 1: 30-44 years, 2: 45-65 years

Subj	Age	Race	Educ	Sex	New Educ.	New Age
31	35	4	4	1	2	1
32	64	1	6	1	4	2
33	47	4	5	1	3	2
34	34	4	5	1	3	1
35	40	4	5	1	3	1
36	51	4	4	1	2	2
37	34	2	4	1	2	1
38	23	4	6	1	4	0
39	58	2	4	2	2	2
40	59	4	3	2	2	2
41	46	4	4	1	2	2
42	23	1	5	2	3	0
43	51	4	3	1	2	2
44	52	4	5	2	3	2
45	18	4	4	1	2	0
46	18	4	4	1	2	0
47	63	4	3	1	2	2
48	40	4	6	2	4	1
49	53	4	6	2	4	2
50	55	4	3	1	2	2
51	21	4	4	1	2	0
52	27	4	3	1	2	0
53	24	1	6	2	4	0
54	36	4	4	1	2	1
55	47	4	4	1	2	2
56	22	4	4	1	2	0
57	25	3	5	2	3	0
58	23	1	6	1	4	0
59	52	4	4	2	2	2
60	45	4	7	1	4	2
61	20	4	4	2	2	0
62	21	3	4	2	2	0

Key:

Age = between 18 and 65 years

Race = 1: Asian, 2: Black, 3: Hispanic, 4: White, 5: Other

Education = 1: < High School, 2: Some High School, 3: High School, 4: Some College
5: College, 6: Master's, 7: Doctorate, 8: Other

Sex = 1: Female, 2: Male

New Education = 1: < or some High School, 2: Completed High School or Some College
3: Completed College, 4: Master's, Doctorate, or Other

New Age = 0: 18-29 years, 1: 30-44 years, 2: 45-65 years

VITA

Lida Catherine Johnson

Lida Johnson was born on November 7, 1974 in Atlanta, Georgia. In 1997, she received her Bachelor of Science degree in Psychology with a Minor in Biology from Georgia College and State University in Milledgeville, Georgia. Lida will receive her Master of Science degree in Human Nutrition, Foods, and Exercise from Virginia Polytechnic Institute and State University in August, 1999. Following completion of her Master's degree, Lida will begin a 9-month Dietetic Internship at Emory University Hospital in Atlanta, Georgia. Her plans in the near future include becoming a registered and licensed dietitian in May 2000 and pursuing a career in dietetics with emphasis on public education and private counseling for current nutrition-related issues. With a future goal of obtaining her Doctorate in Psychology, Lida hopes to focus mainly on providing a dual-centered approach to weight loss for obese individuals through nutritional counseling and psychotherapy.

