

ABSTRACT

WILLIAMS, JO ANN YOST. Evaluation of Nutritional Behavior Change: An Intervention Study of Rural Extension Clientele (Under the direction of R. David Mustian).

The primary purpose of this study was to determine the impact of an Extension program. The goal was to explore whether the intervention of an Extension program impacts health behavior change in program participants to a greater extent than in a control group.

A fifteen-week intervention study was used with quantitative methods to investigate health behavior change. The population for this study consisted of adults living in a rural southeastern North Carolina county. Participants were purposefully recruited and referred by a local family physician practice to participate in the intervention study and control groups. The intervention group entailed twenty-seven participants and the control group consisted of twenty-one participants. The sample was identified with previous "at risk" conditions of nutrition-related diseases or potential risk. Intervention and control groups were selected with variance in age, gender and ethnicity based on voluntary participation in the program. Comparison of means, distributions, and standard deviations and the student t-test distribution were the primary statistical procedures.

Major conclusions that emerged from the findings were: (1) Results from a nutrition education intervention to produce a change in program participants' health behavior were found to be inconclusive due to limitations within the study. (2) Program participants' health behaviors differing from non-program participants were inconclusive due to dosage levels. (3) Demographic variables do not influence behavior change. (4) Familial factors do not contribute to adoption of practices. Recommendations for the teaching profession and for further research are presented in the final chapter.

EVALUATION OF NUTRITIONAL BEHAVIOR CHANGE:
AN INTERVENTION STUDY OF RURAL EXTENSION CLIENTELE

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BIOGRAPHY

Jo Ann Yost Williams was born on May 22, 1961, in Waco, Texas, James Connelly Air Force Base. She is the second child of three children and only daughter of Franklin Monroe Yost and Joyce Carolyn Leazer Yost. At four years of age her family moved to their ancestral home in Salisbury, North Carolina.

After graduation from West Rowan High School, she enrolled at Meredith College and completed a B. S. degree in Home Economics in May of 1983. After teaching one year at South Rowan High School, she married Franklin Owen Williams in June of 1985 and moved to Wallace, North Carolina.

In May of 1987 the author accepted employment with the North Carolina Cooperative Extension Service as a Home Economics Extension Agent in Duplin County. She completed her Masters of Adult Education at North Carolina State University in 1994. While working for Extension and attending graduate school, she had two daughters. Laura Jane Williams was born in 1991 and Mary Elizabeth Williams was born in 1992. She was admitted to the doctoral program in Adult Education at North Carolina State University in the spring of 1995.

In January of 1999, she was named Extension Agent, Nutrition Programs Supervisor where she remained until August 2004. After moving with her family to Cedar Point, North Carolina in August of 2004, she accepted a position as Extension Agent, Family and Consumer Education in Pamlico County. Her purpose in life is just beginning.

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I never felt alone on this long trek and always believed it would one day come to an end. The reason is profoundly clear. There was always someone to show the way, give encouragement and believe in the purpose. Of this I am truly thankful.

First and foremost, I would like to thank my parents for instilling at an early age the value of education. My mother read to me as a small child and modeled reading as a pleasurable past time. I credit an early enthusiastic thirst and appreciation for learning to my mother. My father had the good sense to know that women need education to compete in the workforce. With both these parental pragmatic and visionary views of education, I was destined to lifelong learning.

Thank you to Dr. David Mustian. It was my good fortune to have Dr. Mustian as chair of my graduate committee. Dr. Mustian wore many hats throughout this process...advisor, counselor and most importantly, good friend. I will always be grateful for his encouraging words and tireless efforts to see this project through.

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Chapter 1. Introduction

Nutrition is a critical part of building healthy bodies and maintaining a positive status throughout life. That positive outcomes are not always achieved is evidenced by the high incidence of nutrition related chronic diseases in the United States.

Dietary factors are associated with the ten leading causes of death, including coronary heart disease, some types of cancer, stroke, noninsulin-dependent diabetes mellitus, and atherosclerosis. Currently, health professionals are more concerned with excess and imbalance of certain components in the diet than the dietary deficiency seen in former years.

Nutrition and Nutrition-related Disease

Obesity Trends. For more than 40 years, the Center for Disease Control and Prevention (CDC) has surveyed and compiled data on overweight and obesity in the United States. During the past 20 years there has been a dramatic increase in obesity in the United States. Today, 20 states have obesity prevalence rates of 15-19 percent, 29 states have rates of 20-24 percent; and one state reports a rate over 25 percent.(Mokdad, 2001) North Carolina's obesity rate increased 9 percent from 1991 to 2001. Obesity, defined as 120% of "healthy" weight, is a risk factor in all leading causes of death and disability. A most recent defined obesity rating is a Body Mass Index greater than 30. The risk factor affects an estimated 15% of adult males and 30% of adult females and 25% of adolescents with the highest rates observed among limited income and minority groups. Historically, Americans have never been more overweight and obese. Over consumption of high caloric foods and an inactive lifestyle promotes diseases and conditions that are nutrition and physical activity related. Results from the 1999-2000 National Health and Nutrition Examination

Survey (NHANES), using measured heights and weights, show an alarming 64 percent of adults in the United States are either overweight or obese.

A comparison of adults with normal weight and adults with BMI greater than 40 showed the obese adults are more likely to be diagnosed for diabetes, high blood pressure, high cholesterol, asthma, arthritis, and fair or poor health. As BMI increases, risk for some diseases also increases. (Mokdad, 2001).

Many women are dissatisfied with their bodies, have low self-esteem, and engage in phases of dieting throughout their life span. A 1994 Gallop poll indicated that 40 percent of women are dieting at any given time. (Lutter, 1994). Despite numerous attempts at weight loss, preoccupation with body and shape and weight, and billions of dollars spent annually on weight-reduction products and services, women continue to gain weight (Flegal et al, 1998). An article published by The National Task Force on the Prevention and Treatment of Obesity reflects studies indicating failure to maintain body weight has resulted in a pattern of repeated weight loss and regain, or weight cycling in women (1994).

Economic Consequences.

National costs attributed to both overweight (BMI 25-29.9) and obesity (BMI greater than 30) indicated medical expenses accounted for 9.1 percent of total United States medical expenditures in 1998. These figures may have reached as high as \$78.5 billion. (Finkelstein, Fiebelkorn, and Wang, 2003). Approximately half of these costs were paid by Medicaid and Medicare. In a more recent study, state-level obesity-attributable Medicare and Medicaid expenditures show North Carolina at \$2.1 billion. (Finkelstein, Fiebelkorn, and Wang, 2004). In addition, the estimated costs are directly related to medical costs and does not include indirect costs attributed to obesity such as absenteeism and decreased productivity.

Implications for the emotional, social and economic impact of chronic diseases are staggering. There are 42,802 residents of Duplin County. Currently, the top health concerns for Duplin County, as reported by Duplin County Health Services (2004), include cerebrovascular disease, heart disease and cancer. Cardiovascular disease is the leading cause of death in Duplin County. The number who are burdened with ill health from heart disease is much greater. Due to medical treatment more people survive heart disease, however the economic burden is substantial. The typical cost for coronary bypass surgery in 1996 was \$30,000 per patient.

As with heart disease, the highest stroke death rates are generally found in the eastern counties of North Carolina. Duplin County experienced an increase in stroke mortality during 1991-95. In 1995, 68 people died from stroke in Duplin County, costing approximately \$1,496,000 for stroke treatment. This figure does not include the cost of rehabilitation and care of stroke survivors. Stroke death rates are greater among the older population. Many lifestyles and dietary behaviors have been shown to lead to identified risks of stroke such as high blood pressure, lack of exercise and overweight. Cerebrovascular disease is a vital issue for Duplin County. Recent statistics show the county's average mortality rate of 112.4 per 100,000 population is well above the state rate of 72.8 (Duplin County Health Services, 2002)

Duplin County's cancer morbidity/mortality cause rates in 2002 yielded 196.7 as compared to the state rate of 194.8. Many of these were women with breast cancer. The cost per individual and family in lost productivity, emotional and physical stress, medical costs, loss of life and other costs are astronomical. Many of the risk factors for cancer that have been identified are dietary and lifestyle in nature.

Diabetes mellitus continues to be one of Duplin County's top health problems. In 1996-2000, the death rate per 100,000 was 36.9. The death rate for North Carolina was 25.3 in 1996-2000 (State Center for Health Statistics, 2000). Diabetes disproportionately affects minorities, women and the elderly. Diabetes poses an

economic burden on Duplin County. Hospitalization charges related to diabetes in this county were \$9,497,650 in just one year. The cost of hospitalization is \$222 for each resident of the county. Five percent of the total population of Duplin County have been told they have diabetes, and equally, others are thought to have diabetes but are unaware.

Health care for the indigent is a critical ongoing issue. The poverty level in Duplin County is 19.1%, which is significantly higher than the state average of 13%. With the increased rate, there are also increased challenges faced by the community. The result of a high poverty level is that a higher number of people have no health insurance and little access to medical care. Lack of health insurance creates a chain effect as individuals often delay seeking medical care because of the expense. Untreated chronic illnesses become medical disasters for patients who end up in expensive hospital emergency rooms for problems that could have been prevented by timely nutritional education.

Nutrition Education

Recent surveys show that many consumers are now reading food labels for information on ingredients and nutrition (Levy and Fein, 1998). However, label information can be confusing and is especially problematic for those with low literacy skills. Math skills required to understand “percentages” are lacking in a majority of audiences. With the new food labeling regulations, come the need for further consumer education.

Consumers continue to need help in using the Dietary Guidelines and the Food Guide Pyramid to incorporate balance, moderation and variety in their diets. Research has shown that consumers do not know the food groups, nor the number of servings they and their families should have from each food group. They also do not understand serving sizes and confuse a “serving” with a “helping” of food. Nutrition

education programs that address these needs continue to be imperative if consumers are to adapt behaviors that help optimize their health and possibly minimize the aging process (Baranowski, et al, 1997)

Inadequate nutrition can result in a negative impact upon health in later years (Belloc and Breslow, 1972; Belloc, 1973). Nutrition education could produce life long implications for individuals. Smith et al (1988) suggest diet and exercise are related to the prevention or delay of adult-onset diabetes, atherosclerosis, and osteoporosis.

Utilizing a cost-benefit analysis model, Lambur et al (1999) addressed ten nutrition-related diseases. The evidence revealed that for every \$1.00 spent by the Expanded Food and Nutrition Education Program (EFENP) for education in Virginia, a \$10.64 reduction in health care costs could be expected. Additional analyses were conducted to address uncertainties in assumptions. The research showed analysis ranging from \$2.66 to \$17.04 reductions in health care costs for every \$1 spent by the EFNEP program. The monetary impact of nutrition education is confirmed in Lambur's study.

The North Carolina Cooperative Extension Service (NCCES), a premiere educational network, is a dynamic, ever-changing organization pledged to meeting the state's needs for research, knowledge, and educational programs that will enable people to make proactive decisions. Its mission is to help people improve their lives through an educational process that uses scientific knowledge focused on issues and needs. To accomplish its vital mission, NCCES employs Family and Consumer Education Extension Agents with major responsibilities in nutrition and wellness. North Carolina citizens continue to demand nutritional education programming to reduce risks of chronic disease.

According to a study conducted by Kenner, Dunn, and Taylor (1997), family physicians indicated limited time with patients is the most often barrier to using

nutrition and wellness education materials. Ninety percent of family physicians surveyed do not ever use NCCES services in their practice and 79% do not recommend that patients contact NCCES. Nutrition education is preventive medicine, thus the need for nutrition education is essential to human prosperity.

Statement of the Problem

Nutrition educators face the challenge of teaching and motivating adults to change behaviors that lead to reduction of health risks. The problem is, in order to change behavior, adults need credible, researched based information to make sound decisions regarding nutrition. Behavioral and environmental factors are large contributors to overweight and obesity. Nutrition education can lead to positive outcomes in decreasing incidence of disease.

The number of obese persons in the United States has doubled since 1980. Thirty-one percent of adults, 20 years of age and over have a body mass index of 30 or greater compared to 23 percent in 1994. Overweight in adolescence has tripled since 1980. The percentage of obese adult women (33%) exceeds obesity in men (28%). In women, overweight and obesity rates are consistently higher among members of racial and minority populations than in non-Hispanic white women. There is minimal difference in obesity rates among men based on race or ethnicity. Individuals with less than a high school education had higher rates of obesity. (Surgeon General, 2001).

One of the possible causes of overweight and obesity rates is the increase in food portion sizes in both restaurants and at home. Nielson and Popkin, (2003) determined trends and patterns in portions sizes by type of food, where it was eaten and whether portion sizes

eaten outside the home were similar to those eaten at home. Nine key food items were studied. Between 1977 and 1996 the portion size (and calorie intake) increased for all but one of the key food items. The largest portion sizes were found in fast food restaurants. Smicikilas-Wright et al, (2003) compared portion sizes for 107 foods from national dietary data collected in 1989-91 and again in 1994-96. Portion sizes were significantly increased for about one-third of the foods researched. While excessive dietary fat can contribute to obesity, over consumption of carbohydrates will have the same effect. Thus limiting calories from all sources and increasing expenditure of calories by physical activity is emphasized.

This obesity epidemic has profound health implications. Obesity increases a person's risk for Type 2 diabetes, heart disease, stroke, high blood pressure and some types of cancer. Overweight and obesity can be addressed with lifestyle changes in diet and physical activity.

Nutrition educators can provide credible information to assist individuals in making lifestyle changes. If health risk trends continue to rise and are not addressed, the results will be devastating to the health of our country and the healthcare system.

Wlodkowski (1989) explains that educators should assist learners in valuing the process of learning as well as its intended benefits. By valuing the process of learning, students are motivated to integrate knowledge in ways to derive their own meaning from it. Likewise, by valuing the benefits of learning, participants learn the content and how the information can be utilized in their life. By keeping education meaningful we motivate learners to participate. "When students value both how they learn as well as what they learn, motivation has a unity which is more continuous and dynamic. Like a wonderful adventure, both the journey and destination have much to offer" Wlodkowski (1989 p. 8). Deci and Ryan (1985) see motivation in a different light. "The extrinsic needs for competence and

self-determination motivate an ongoing process of seeking and attempting to conquer optimal challenges. When people are free from the intrusion of drives and emotions, they seek situations that interest them and require the use of their creativity and resourcefulness. They seek challenges that are suited to their competencies that are neither too easy nor too difficult. In short, the needs for competence and self-determination keep people involved in ongoing cycles of seeking and conquering optimal challenges” (pp32-33).

Purpose of the Study

This study is designed to demonstrate the impact of nutrition education at the rural community level on health behaviors. This project conceptualized, evaluated and tested an intervention study model with rural Extension program participants to document behavioral changes. Participant’s diet and health records were used to ascertain an improved dietary intake following at least twelve weeks of instruction. This research is to determine conclusions of four different objectives as it relates to nutrition education and behavior change. Specifically, the purposes of this research are:

- Determine change in program participants’ health behavior through nutrition education intervention strategies.
- Determine differences in health behaviors of program participants and non-program participants.
- Determine whether socio-demographic variables contribute to behavior change.
- Determine whether familial factors contribute to adoption of positive nutritional practices.

There is a school of thought that adult learning is andragogy, defined by Knowles (1980) as “the art and science of helping adults learn” (p.43). Based on five assumptions, Knowles draws implications for the design, implementation, and evaluation of learning activities with adults. With maturation, self-concept transfers from dependent personality to self-directing. Adults accumulate a wealth of experiences and the readiness to learn is related to the development tasks in social roles. Adults are also more problem-centered than subject-centered in learning. Finally, adults are motivated to learn by internal factors rather than external ones (Knowles, 1984). Motivation is one variable in learning and has tremendous implications, especially when dealing with adult learners. The best strategies are to link life experiences of learners and demonstrate the realization that they are actively involving themselves in developing higher order thinking skills.

Research Objectives

Through this research, specific questions are as follows:

- 1) Do nutrition education intervention strategies produce a change in program participants' health behavior?
- 2) Do program participants' health behaviors differ from non-program participants?
- 3) Do socio-economic variables determine and contribute to behavior change?
- 4) Do familial factors contribute to adoption of practices?

Definitions

The following operational definitions were used for the purposes of this study:

Body Mass Index (BMI)- an index of a person's weight in relation to height, determined by dividing the weight (in kilograms) by the square of the height (in meters). A BMI greater than 25 for men or women indicates overweight.

Cholesterol - a soft, waxy substance. It is made in sufficient quantity by the body for normal body function, including the manufacture of hormones, bile acid, and vitamin D. It is present in all parts of the body, including the nervous system, muscle, skin, liver, intestines, and heart.

Blood cholesterol - Cholesterol that is manufactured in the liver and absorbed from the food you eat and is carried in the blood for use by all parts of the body. A high level of blood cholesterol leads to atherosclerosis and coronary heart disease.

Dietary cholesterol - Cholesterol that is in the food you eat. It is present only in foods of animal origin, not in foods of plant origin. Dietary cholesterol, like dietary saturated fat, tends to raise blood cholesterol, which increase the risk for heart disease.

Fat - One of the three nutrients that supply calories to the body. Fat provides 9 calories per gram, more than twice the number provided by carbohydrate or protein.

Saturated fat - A type of fat found in greatest amounts in foods from animals such as meat, poultry, and whole-milk dairy products.

Unsaturated fat - A type of fat that is usually liquid at refrigerator temperature.

Monounsaturated - A slightly unsaturated fat that is found in greatest amounts in foods from plants. Monounsaturated fat helps reduce blood cholesterol.

Polyunsaturated fat - A highly unsaturated fat that is found in greatest amounts in foods from plants. When substituted for saturated fat, polyunsaturated fat helps reduce blood cholesterol.

Gram (g) - A unit of weight. There are about 28 g in 1 ounce. Dietary fat, protein, and carbohydrate are measured in grams.

Hydrogenation - A chemical process that changes liquid vegetable oils (unsaturated fat) into a more solid saturated fat.

Lipids - Fatty substances, including cholesterol and triglycerides that are present in blood and body tissues.

Lipoproteins - protein-coated packages that carry fat and cholesterol through the blood. Lipoproteins are classified according to their density.

High density lipoproteins (HDL) - Lipoproteins that contain a small amount of cholesterol and carry cholesterol away from body cells and tissues to the liver for excretion from the body. Low levels of HDL are associated with an increased risk of coronary heart disease. Therefore the higher the HDL level, the better.

Low density lipoproteins (LDL) - Lipoproteins that contain the largest amount of cholesterol in the blood. LDL is responsible for depositing cholesterol in the artery walls. High levels of LDL are associated with an increased risk of coronary heart disease and are therefore referred to as "bad cholesterol."

Milligrams/deciliter (mg/dl) - A way of expressing concentration: in blood cholesterol measurements, the weight of cholesterol (in milligrams) in a deciliter of blood. A deciliter is about one-tenth of a quart.

Risk factor - A habit, trait, or condition in a person that is associated with an increased chance (or risk) of developing a disease.

Carbohydrate - One of the three nutrients that supply calories (energy) to the body. Carbohydrate provides 4 calories per gram - the same number of calories as pure protein and less than half the calories of fat.

Complex carbohydrate - Starch and fiber. Complex carbohydrate comes from plants. When complex carbohydrate is substituted for saturated fat, the saturated fat reduction lowers blood cholesterol.

Fiber - A nondigestible type of complex carbohydrate.

Protein - One of the three nutrients that supply calories to the body. Protein provides 4 calories per gram, which is less than half the calories of fat. Protein is an essential

nutrient that becomes a component of many parts of the body, including muscle, bone, skin, and blood.

Hypertension - High blood pressure.

Systolic Pressure - The first figure in a blood pressure reading which represents the arterial pressure caused by the contraction of the left ventricle of the heart.

Diastolic Pressure - The second figure in a blood pressure reading which represents the arterial pressure when the heart is between beats.

Chapter 2. Conceptual Schema and Review of Literature

A literature review of behavior change as related to nutrition revealed varied attempts to measure behavior and dietary change and provide guidelines for the proposed research. Variables such as objective measures, subjective measures, and reference points as well as theoretical concepts have been used in past research. The discussion below examines these variables, the various combinations of the variables utilized in past research, and the relationships among them. Further, the general measurement of behavior change is addressed.

Behavioral Change

According to Hellriegel, Slocum, and Woodman (2001), behavior change refers to processes and principles that are based on operant conditioning. Most individuals demonstrate behaviors that are neither desirable or undesirable, neither adding or detracting from achievement of personal or societal goals. Thus the first and foremost important step in applying behavioral modification principles is to identify the behaviors that have a significant impact on an individual or society. Pinpointing relevant behaviors consists of three activities:

- 1) observing the behaviors,
- 2) measuring the behaviors, and
- 3) describing the situation in which behaviors occur.

Once the behaviors are observed, measured and behavioral situations defined, two different theories of change can be acknowledged and practiced.

Operant Conditioning

Operant conditioning learning focuses on the effects of reinforcement on desirable and undesirable behaviors. (Hellriegel, et al., 2001). Changes in behavior result from the

consequences of previous behavior. People tend to repeat a behavior that leads to a pleasant result and not to repeat a behavior that leads to an unpleasant result. In short, a behavior is repeated when reinforced, and not repeated when punished or lacking in reinforcement. Although this practice of change may result in short term outcomes, the social cognitive theory reflects more long-term results and maintenance of change in nutrition education.

Transtheoretical Model of Change

Behavioral psychologists James O. Prochaska, John Norcross, and Carlo DiClemente (1994) contend there are six stages of change in the Transtheoretical Model of Change. The learner needs to understand which stage they are in to move forward effectively, because each one requires different strategies. Each stage is assessed with strategies for progressing through them.

1) Precontemplation - Precontemplators have no current intention of changing. Situations are perceived to be hopeless and they use denial and defensiveness to keep from going forward. Often learners in this stage have tried to change before without success.

Strategies may include intervention by others in the form of observations or confrontation. This strategy helps precontemplators view themselves as others do.

2) Contemplation - Contemplators accept or realize that they have a problem and begin to think seriously about changing it. Many adult learners remain in the contemplation stage longer than desired. Delusions include the search for absolute certainty; whereas nothing in life is guaranteed. Waiting for the opportune moment to begin the process of change, they have the hopeful belief of different consequences without changing behavior.

Strategies: contemplators accept or realize the obstacle and begin the cognitive process to change. Examples may be reading relative literature, seeking information via the Internet, and discussing their concerns with professionals. This consciousness raising allows the learner to focus on the negatives of their problem behavior and envision the future consequences if they don't change.

3)Preparation: Most adult learners in this stage are planning to take action within a month. They think more about the future than about the past, and the rewarding outcomes a new behavior would provide. They direct themselves more in a new direction more than they detach themselves from an old one.

Strategies: Preparers develop a firm, detailed plan of action. Many motivate themselves by publicly confirming their intended change. Social liberation continues to play a role as well as re-evaluation.

4)Action: This highly visible modifying of behavior is also the engaged stage of change.

Strategies: Learners in this stage need to apply their sense of commitment to the change. Regular attendance at educational meetings and practicing modification techniques away from the instructor are examples. Creating a "change-friendly" environment and countering old behaviors are extremely important at this stage. Supportive relationships with significant others who provide opportunities for the learner to practice change and applaud their efforts provide more motivation. "People who take action and fail within a month are twice as likely to succeed over the next 6 months as people who don't take any action at all."

5)Maintenance: This stage is far more difficult to achieve than action. Maintenance can continue six months or a lifetime. Educational programs that promise easy change usually fail to acknowledge that maintenance is a long, ongoing process. Three common internal challenges to maintenance are overconfidence, daily temptation, and self-blame for lapses.

Strategies: People in maintenance should apply the same strategies as those in the action stage: commitment, reward, countering, modification of the environment and supportive relationships.

6)Termination: The problem no longer presents any temptation. The cycle of change is exited. Some social scientists theorize termination never occurs, only that maintenance becomes less vigilant over time.

The Transtheoretical Model of Change is often examined by change agents. Nutrition professionals, Gay McDonell, David Roberts, and Christina Lee (1998), tested the stages of

change model of behavior change in reducing dietary fat intake while identifying attitudinal variables that might be relevant in the decision to change one's dietary habits. The data collected utilized a cross-sectional survey of 1081 university employees. The Precontemplation stage comprised the largest group of respondents (33%) while the Contemplation stage was the smallest group, containing only 6% of respondents. Twelve percent of respondents were in the Preparation stage while the Action and Maintenance groups comprised 22% and 27% of the total population, respectively. Dietary fat intake and barriers to reducing fat intake decreased significantly while the benefits to change increased significantly across the stages of change. The results of the study confirmed differences in stages of change in fat intake.

Increasing fruit and vegetable intake was also examined through a study conducted by Mary Ann S. Van Duyn. (1998). The study examined the applicability of the transtheoretical model of change to assess readiness to increase fruit and vegetable intake. Persons in the higher stages of maintenance reported intakes that met national dietary recommendations of five or more servings of fruit and vegetable daily and those in action reported intakes that approach this level. These findings suggest that stages are a successful predictor of fruit and vegetable consumption.

Barriers to Change

Improved health and longevity involves behavior change relevant to diet and lifestyles. There are three major reasons that people are resistant to change in their lives.

1) People resist change that threatens basic securities (life, job, home, family). Food is associated with basic security. Changes in lifestyle can seem threatening to the family environment.

2) People resist change that they don't see a need for or don't understand (psychology change, fear of the unknown). New cooking techniques to reduce fat may not seem practical, especially to those who have not yet experienced bypass surgery.

3) People resist changes that are being forced on them (new foods, new label information). Educators forcing information instead of incorporating ways for learners to buy into the change can hinder the process of behavioral change.

4) People resist change because they like to eat the foods and amounts they eat.

There are means to improve the chances of acceptance of change:

1) Directly involve those who are being affected by change. Asking input from learners provide a buy-in for a positive learning experience.

2) Provide the audience with as much information as possible. Many learners may not realize the benefits of sound nutrition and lifestyle management.

Reaching consumers and strengthening communication could mean reduction in chronic diseases.

3) If you can divide change into smaller increments often change will be more acceptable. Small dietary changes such as changing to 1% or skim milk, must be made gradually as not to overwhelm the learners.

4) Involve key leaders to develop trust and credibility with others in the target audience. Utilizing volunteers will show strength and shared vision.

5) If the change is seen as reversible people are more likely to give the change a chance. Each learner is responsible and has the freedom to choose foods they deem acceptable.

6) With passing of time people will accept change if they see a need for the change. Adult learners may all buy in to the change but at different stages in the process. Those who have suffered from a chronic disease may see the need before anyone, especially if they initiate the idea. Family members may be slower to change, until they begin to see the benefits of the change.

Although selection of appropriate delivery methods and content of educational programs influence how adults learn, there are barriers to participation that may also affect desired educational outcomes. Reasons why adults do not participate have been clustered by several researchers into types of barriers. Johnstone and Rivera (1965) first did this with

their list of ten potential barriers that were clustered into two categories: external or situational barriers and internal and dispositional barriers. These barriers were then linked to different sex, age, and socioeconomic categories. Older adults cited more dispositional barriers while younger people and women were more constrained by situational barriers. The researchers noted that "persons of socioeconomic circumstances face both kinds of obstacles".

Cross, using data from the Commission on Nontraditional Study, grouped twenty-four nonparticipation items into three different categories of barriers. These were: situational barriers relating to a person's situation at a given time; institutional barriers consisting of "all those practices and procedures that exclude or discourage working adults from participating in educational activities"; and dispositional barriers arising from a person's attitude toward self and learning (Cross, 1981).

Another typology of barriers is cited by Darkenwald and Merriam (1982). They have labeled barriers such as beliefs, values, attitudes, and perceptions about education or about oneself as a learner as "psychosocial". Darkenwald and Merriam have also added a fourth category, informational, which reflects the lack of awareness as to what educational opportunities are available.

Motivating a learner to change behavior can also be deterred by another barrier. That barrier may be defined as a level of self-esteem. An individual's need for self-esteem "motivates the individual for achievement, strength, confidence, independence, and freedom (Petri, 1981). As individuals meet those particular needs, they develop positive feelings toward themselves and a sense of personal accomplishment. If an individual is not able to achieve self-esteem needs, he or she feels a sense of disappointment and rejection. In both situations, future goals and activities can be affected by the past experiences an individual has faced.

Motivation to Change

The most widely recognized model of motivation is Abraham Maslow's needs hierarchy model. As suggested by Maslow (1970), people have a complex set of exceptionally strong needs, which can be arranged in a hierarchy. The following basic assumptions apply:

- 1) When a need is satisfied, the motivational role declines in importance. However, as one need is satisfied, another need emerges to take the place of the original need. Therefore, people are always striving to satisfy some need.
- 2) The network of needs, for most people, is so complex there may be several needs affecting behavior at any one time. When a need is dominant, that need stays dominant until it is gratified.
- 3) To drive behavior, lower level needs must be satisfied before higher level needs are activated.
- 4) There are more ways of satisfying higher level than lower level needs.

Maslow arranges the hierarchy in five needs categories: physiological, security, affiliation, esteem and self-actualization. Physiological needs are the lowest level in Maslow's hierarchy. People concentrate on satisfying these needs before turning to higher order needs. Like physiological needs, unsatisfied security needs cause people to be preoccupied with satisfying them. People who are motivated primarily by security needs, value safety and stability as defenses against the loss of basic needs satisfaction.

The need for friendship, love, and a feeling of belonging are all affiliation needs. When physiological and security needs have been satisfied, affiliation needs emerge. When affiliation needs are a primary source of motivation, people value opportunities for finding and establishing warm and friendly interpersonal relationships. Personal feelings of achievement and self-worth and recognition and respect from others meet esteem needs. People with esteem needs want others to accept them for what they are and to perceive them

as competent and able. Self-fulfillment comes from meeting self-actualization needs. People who strive for self-actualization seek to increase their problem-solving abilities.

Maslow states that the three lowest needs - physiological, safety, and social are also known as deficiency needs. Unless these needs are satisfied, an individual will fail to develop into a healthy person, both physically and psychologically. In contrast, esteem and self-actualization needs are known as growth needs. Satisfaction of these needs helps a person grow and develop as a human being.

This model implies that higher level needs are present in most people, even if they don't recognize or act to meet those needs. These higher level needs will motivate most people if nothing occurs to block their emergence.

Clay Alderfer (1972) describes a different model. The ERG model holds that the individual has three sets of basic needs: existence, relatedness, and growth. Alderfer describes them as:

- 1) Existence needs are satisfied by food, air, water.
- 2) Relatedness needs are met by establishing and maintaining interpersonal relationships.
- 3) Growth needs are attempts to find opportunities for unique personal development by making creative or productive contributions.

Alderfer's arrangement of these categories of needs is similar to Maslow's. However, the two differ in how people attempt to satisfy different sets of needs. Maslow states that unfulfilled needs are motivators and that the next higher level need isn't activated until the preceding lower level need is satisfied. In contrast, the ERG model suggests, in addition to the fulfillment-progression process, a frustration-regression process is at work. That is, if a person is continually frustrated in attempts to satisfy growth needs, relatedness needs will reemerge as a motivating force. People will return to satisfying this lower level need instead of attempting to satisfy growth needs, and frustration will lead to regression.

David McClelland (1976), developed a learned needs model of motivation, believed to be rooted in culture. His model identified three particularly important needs: achievement,

affiliation, and power. People who possess a strong power motive take action that affects the behavior of others and has a strong emotional appeal. Individuals who have a strong affiliation motive tend to establish, maintain, and restore close personal relationships with others. Those individuals who have a strong achievement motive, compete against standards of excellence against which they judge their behaviors and achievements. McClelland's achievement motivation model prescribes that people are motivated according to the strength of their desire either to perform in terms of excellence standards or to succeed in competitive situations.

Sagie, Elizur, and Yamauchi (1996) describe high achievers as having three distinct characteristics. First, they like to set their own goals. They are seldom content to drift and let life aimlessly happen to them. High achievers are always trying to accomplish something. They seek the challenge of making tough decisions and they are selective about the goals to which they commit themselves. High achievers prefer to work at a problem rather than leave the outcome to chance or to other people.

The second characteristic of a high achiever is the avoidance of selecting extremely difficult goals. They prefer moderate goals that are neither so easy that attaining them provides little satisfaction nor so difficult that attaining them is more of a matter of luck than ability.

High achievers display the third characteristic. They prefer tasks that provide immediate feedback. Because of the goal's importance to them, they like to know how well they're doing. There are a number of factors involved in motivating a learner to change behavior.

Self Esteem

Self-esteem is a segment of one motivational factor commonly referred to as self-evaluation. Self-esteem may also be referred to as self-worth or self-concept. The term can be defined as an appraisal of one's own value. How does a person feel about his or her life?

Is there evidence of value? These are ongoing mental questions answered by all individuals in formulating their own self-concepts. How an individual perceives his or her life has an influence on future life experiences.

An individual's need for self-esteem "motivates the individual to strive for achievement, strength, confidence, independence, and freedom (Petri, 1981). As individuals meet those particular needs, they develop positive feelings toward themselves and a sense of personal accomplishment. If an individual is not able to achieve self-esteem needs, he or she feels a sense of disappointment and rejection. In both situations, future goals and activities can be affected by the past experiences an individual has faced.

An adult utilizes four elements of attribution to analyze and predict the outcome of an achievement-related event. The four elements are ability, effort, task difficulty, and luck. (Weiner, 1974). The individual mentally assigns a value to each of the four elements. If an event is successful, the high self-esteem person may feel his or her ability and effort are the primary reasons for the outcome. However, the low self-esteem individual may credit success to luck or the ease of the task. For example, a person with a high self-esteem may credit a successful weight loss/nutritional program to her management of food intake and increased activity. The low self-esteem person may explain a successful weight loss on use of diuretics or fad diets, or loss of appetite due to some emotional factor. Individuals analyze themselves through their own actions and activities just as they analyze others through particular action and activities (Deci, 1975). Just as a person creates an impression of someone else, he or she develops a personal internal impression. This impression can change due to new life experiences but an individual's current perception of his or her self is based on experiences of the past.

The self-determining theory of motivation is also thought to be associated with the self and the development of self-esteem. The self-determining theory suggests that an individual performs a task because of personal satisfaction and not for extrinsic rewards. (Deci and Ryan, 1985). Individuals with high self-esteems are more likely to feel they are

performing a task because they gain personal satisfaction and grow from the experience. An extrinsic reward may be associated with the task but the primary reason the person agrees to perform the task is personal satisfaction.

Most people would suggest that they choose to change dietary behaviors for the health benefits associated with following dietary guidelines. Due to this description of self-determination, these individuals at first glance may be characterized as self-determined individuals. However, this may or may not be accurate. Participants under emotional stress may feel they are not changing dietary behavior for personal satisfaction and health benefits but for their physicians' approval. This attitude may lead to a feeling of inferiority and failure within the participant. Self-esteem may be adversely affected. Factors other than emotional stress can have a direct influence on a person's self-determination and self-esteem. Actual health complications, such as inability to exercise routinely, could alter self-esteem. Therefore, the degree of self-determination and self-esteem varies within the group of learners.

Factors other than self-determination have an influence on self-esteem. Autonomy or the sense of independence within oneself also affects an individual's self-esteem.(Deci and Ryan, 1985). Individuals who feel they are allowed to think for themselves and express those thoughts openly are more likely to develop a high sense of self-esteem and motivation. However, if an instructor or supervisor dictates an individual's every thought and action, that person will probably develop a sense of low self-esteem and achievement. The individual will feel he or she only acted out the thoughts and ideas of others similar to a robot. The individual is not able to add his or her personal touch to the task. Autonomy can be expressed when learners are given the opportunity to choose a variety of foods and to develop a healthy diet instead of following a strict and specific outline of allowed foods and restricted foods. This high sense of independence is not present in many structured dietary behavior change programs. This independence can be very useful for the learner in developing high self-esteem and motivation. As was mentioned earlier, however, an

emotionally stressed learner may not allow such freedom and could result in additional trauma to the individual's sense of identity and self-worth.

Self-esteem can be shown to affect motivation in other ways. An individual who has low self-esteem may not attempt particular tasks because he or she expects to fail. (Deci and Ryan, 1985). As long as this feeling exists, the person will not perform the task. Self-esteem has had a direct bearing on the motivation of that person. The person may wait for another individual to provide assistance. After the task is completed and success has been achieved, the low self-esteem individual may realize he or she could have performed the task alone if the other person allows the low self-esteem individual to perform major portions of the task. If so, the self-esteem of the individual may be raised. If the assistance person completes the task without the help of the low self-esteem individual, the low self-esteem individual will probably continue to analyze that task as one too difficult to achieve alone. The anticipated failure will not motivate the low self-esteem individual to perform the task.

For low self-esteem individuals, anxiety can interfere with the performances of tasks and recalling previously learned information.(Deci and Ryan, 1985). Anxiety may be present in the low self-esteem individual anytime the person feels his or her self-esteem is threatened. In a nutrition education program, anxiety may occur when individuals share their behavioral changes with the group, particularly when the individual does not have a significant change to report. Anytime the individual feels uncomfortable due to factors in the environment, anxiety may occur. Anxiety can occur in high self-esteem individuals but they normally are able to handle it in a positive and effective method. Anxiety is not viewed as an evil threat by the high self-esteem individual.

Why adults, especially those who might benefit the most, are not involved in adult education is one of the biggest mysteries in the field. This question has prompted research into why adults do not participate in adult education. A study by Hayes and Darkenwald (1988) with low-literate adults cites five factors that best describe reasons for

nonparticipation: 1) low self-confidence, 2) social disapproval, 3) situational barriers, 4) negative attitude to classes, and 5) low personal priority.

Martindale and Drake (1989) sampled Air Force enlisted personnel. Their analysis revealed eight factors related to nonparticipation of educational programs: 1) lack of course relevance, 2) lack of confidence, 3) cost, 4) time constraints, 5) lack of convenience, 6) lack of interest, 7) family problems, and 8) lack of encouragement.

In a study by Liles (1980), EFNEP clientele were surveyed to determine significant changes in attitude with specified demographics of respondents, and if participation of low-income adults would exert a significant effect on attitude changes in the Extension programming concept. For the concept of Extension, race and employment were not related to attitude change; but age, educational level, residential mobility, income, and organizational involvement were variables relating to change in attitude.

"The implication can be made on the basis of these findings that Agricultural Extension needs to direct programs toward specific audiences and that the programs should be tailored to fit the unique demographic characteristics of the audience. The inference can also be made that group methods for program delivery would be more effective if group formation were based on the clustering of individuals with the same relevant demographic characteristic." (Liles, 1980)

Program Development

Boone (1985) describes the programming process as a conceptually driven macro system. This system leads educators and organizations through engagement of facilitating and effecting planned change in the behavior of targeted adult learners. The programming process includes three inter-connected sub-processes:

- 1) planning
- 2) design and implementation
- 3) evaluation and accountability

Being conceptually driven, the programming process is considered a model of concepts derived from behavioral or social sciences. Proficiency of these concepts is critical to both understanding and implementing the programming process. Having a conceptual base distinguishes Boone's model from most other programming models in adult education. The programming process ascends beyond planning or needs assessment. This movement includes the translation of identified and analyzed needs of learner systems into a planned program, the implementation of the planned program, and the evaluation of the program. This conceptual model places primary emphasis on collaborating with and involving target learner systems and key stakeholders in all facets of the process.

The programming process includes thirty-four interconnected processual tasks. A processual task is a process in which the adult educator defines an outcome specific to a programmatic situation and then selects and implements conceptually driven actions leading to the achievement of that outcome. The concept of processual task is critical to understanding and implementing the programming process. Boone developed this processual task concept to elevate adult educators' thinking to a conceptual level where programmatic situations are regarded from a process orientation, rather than a mechanistic or step perspective. Boone further explains, "It might be said that, unless an adult learner is motivated, no learning will occur. Many adults are aware of their educational deficiencies, but they may not be aware that their deficiencies could be reduced or eliminated. Until there is a perceived need to change, desire to change, and belief that change is relevant and possible, the adult tends not to change." (pg. 153)

Planned Change

Lippitt, Watson and Westley (1958) state there are seven phases of planned change. These seven phases were derived from Kurt Lewin's pioneering analysis of the process of change in individual and group performances. Lewin suggests successful change includes three aspects: unfreezing (if necessary) the present level, moving to the new level, and freezing

group life on the new level. Thus Lippitt, Watson and Westley expanded Lewin's change theory to include the following seven stages of change:

Phase 1: The client discovers the need for help, sometimes stimulated by the change agent.

Phase 2: The helping relationship is established and defined.

Phase 3: The change problem is identified and clarified.

Phase 4: Alternative possibilities for change are examined; change goals or intentions are established.

Phase 5: Change efforts in the "reality situation" are attempted.

Phase 6: Change is generalized and stabilized.

Phase 7: The helping relationship ends or a different type of continuing relationship is defined.

This theory of change relies heavily on the expertise of the change agent to assist in the process of change with individuals and groups.

Learning Theories

Ralph W. Tyler (1949) illustrates this cognitive building through an outlined "learning system" with seven interrelated elements that must be present for optimum learning to take place. They are:

1) Clarity of objectives -- Are the learners clear on what they are to learn?

2) Motivation -- Do the learners have a personal interest or reason to learn what they are being taught?

3) Adequacy of learning activities Do the activities provided enable the learners to learn what is being taught?

4) Ample opportunity -- do the learners have a chance to practice, under supervision, what are they being taught?

5) Feedback -- Are the learners being told when they are doing something wrong or right?

When they are doing it wrong are they given additional instruction?

6)Opportunity to practice transferring -- Will the learners be able to transfer what they have learned in a controlled setting to their unique situations?

7)Coaching -- Are the learners receiving help when they are transferring the information to their own unique situation.

The self-directed learning theory, by many behaviorists, is directed toward individual control over their own learning. Educators should remember that teacher-directed learning and self-directed learning must co-exist to facilitate the learning process. Determining whether the guiding or managing forces for learning can be intrinsically (self), or extrinsically (educator) based. To facilitate learning: the learner must feel that he is contributing some control in the learning process through the content or material under study, which is controlled by himself or others (educators).

"One can think of two kinds of learning, one we call training and the other education. Training is that kind of learning where the learner follows precisely what has been taught. This we call narrowing the span of behavior of the learner so that he performs just like the teacher. Then there is education where the person is able to do many more things than he did before and to keep opening doors so he is learning all the time." (Tyler, 1988)

Another cognitive theorist, Gagne' (1970), cites a series of eight phases of learning. The phases represent an act of learning and the learning processes associated with them.

- 1) Motivation phase - Expectancy
- 2) Apprehending phase - Attention; selective perception
- 3) Acquisition phase - Coding; storage entry
- 4) Retention phase - Memory storage
- 5) Recall phase - Retrieval
- 6) Generalization phase - Transfer
- 7) Performance phase - Responding
- 8) Feedback - Reinforcement

According to Gage', adult learners code, store, and retrieve previous learning and life experiences through a process where new experiences and knowledge are filtered. Through a Prerequisite (Sequential) Learning System Model, Gage' establishes eight types of learning. Each type of learning builds on the previous learning the adult learner has stored for future reference. In this model the first five learning types are needed before a concept can be learned. Also a concept can not fully be learned without prior known associations.

Problem solving (type 8) which requires as prerequisites:

Principles (type 7) which requires as prerequisites:

Concept (type 6) which requires as prerequisites:

Multiple discriminations (type 5) which requires as prerequisites:

Verbal associations (type 4) or other chains (type 3) which requires as prerequisites:

Stimulus-response connections (type 2)

Signal learning (type 1) may or may not be required as a prerequisite to (type 2)

Learning outcomes, as described by Gage', are listed into five major categories:

- 1) verbal information
- 2) intellectual skills
- 3) cognitive strategies
- 4) attitudes
- 5) motor skills

These outcomes of learning portray what the adult learner is able to do, after instruction, he was unable to do before instruction.

Delivery Strategies

According to Rogers (1983), communicating through delivery methods involves five overlapping but distinct stages, involving a process which participants create and share information with one another in order to reach a mutual understanding.

The first stage of communication between the adult learner and the adult educator is the clientele's awareness of a new idea, product, or practice. This awareness can be affected by the clientele's previous experiences or beliefs, the life history of the individual, the social relationships in the setting, and the cultural values in the setting.

The second stage involves the clientele's development of interest in the new idea or practice, and is no longer merely satisfied with the knowledge that it exists. At this stage, the client actively seeks additional information more detailed than general interpretation.

At the evaluation stage, the individual accumulates detailed information; weighs the pros and cons of a new idea, and it relates mentally to his or her own situation. At this point the client must determine if the practice or idea would be beneficial to them.

In the trial stage, a person tries out the innovation. After an initial successful trial, the client may adopt the product or idea for continued use or, may not decide to adopt the idea at all.

At the adoption stage, the individual decides that the new product, idea, or practice is appropriate for continued use. At the adoption, the clientele relies heavily on direct experience and observation within the learning process.

The adult learner, in general, learns through experiences. One gradually changes one's behavior and possibly reflects one's action over time to better suit circumstances, and only later consciously recognizes the new belief or learned practice that has emerged.

Barriers to assessing, selecting, and preparing a health promoting diet include economics, skills, time, motivation, and food and nutrition knowledge. Reaching those in greatest need carries additional challenges of developing appropriate materials and delivery methods for target audiences who have varied literacy skills, cultures, and perceptions of foods' role in health promotion and disease prevention (Martin, Mader, Pederson, 1994). In a recent study by Harnack, Block and Lane (1997) taste preferences were cited as being a barrier to dietary change for many Americans. Many are confused by the current dietary recommendations and, for some, this perception may result in dietary

inaction. Time constraints in conjunction with the perception that eating a healthful diet is more difficult, appear to be significant barriers to dietary change for some. Data regarding the perceived cost of eating a healthful diet suggest that a notable proportion of Americans think that the costs for eating a healthful diet are higher. Nutrition knowledge and beliefs compete with a myriad of factors in determining the dietary behavior of Americans. Consequently, public health interventions to change the American diet likely need to be multi-faceted, with nutrition education occurring in conjunction with other intervention strategies.

Lionberger and Gwin (1982) have termed research involving the acceptance of innovations in technology as “diffusion research” or “diffusion-adoption research”. Most researchers agree that adoption decisions are the product of a sequence of events or influences operating through time. According to Rogers (1983), communicating through delivery methods involves five overlapping but distinct stages. These stages represent the process in which participants create and share information with one another in order to reach a mutual understanding.

An increasing amount of research has been conducted to determine clientele preferences for various program delivery methods utilized by the Extension Service. Traditionally, extension agents conduct or sponsor lectures or workshops as the main information delivery method. (Boone, 1992). Mechenich (1993) cites that Extension educators need to experiment with innovative delivery programs and conduct research into why certain audiences don't attend or utilize traditional Extension educational programs.

A study conducted by Dunn, Lackey, Kolasa and Mustian (1994) to determine nutrition education interests cited parents of young children were most interested in information about getting children to drink milk and what to do if children are overweight. Of greatest interest was how to prepare quick nutritious meals. Also noted in the study was delivery method preference. The delivery method that was clearly preferred was mail. Other suggested methods of delivery were workshop, parent group, and video store. The delivery

method least well received was telephone. Pestano-Binghay et al (1993) found similar results in their studies. More importantly, Crockett et al (1989) found that parents were more interested in mailed information than attending meetings or receiving phone calls. Other studies reveal mailed information successful in reaching remote or rural populations and suggest that more research is needed to strengthen mail interventions. (McGraw Hill, 1986).

Pisher and Harrison (1992) with Georgia Extension conducted a study via a telephone poll to determine the types of nutrition information needed and the source used to obtain this information. A random digit dialing procedure was used to select the sample for the interviews. A total of 527 interviews were completed. Media was most often cited as a source of information in all categories.

Keeping the learner's interest with games was cited as an excellent delivery method. Spitze (1975), in her research, states that "games can often be effective teaching techniques for adults if they're designed to preserve the structure of the subject matter to be taught and chosen to fit the teaching objectives".

A unique and innovative approach to disseminating research information to a target audience was used in Ashtabula County, Ohio (Syracuse, 1993). Traditional methods of group meetings and support were only reaching a limited number of people. The idea and system of distributing parenting information material through kids meals purchased at a national fast food chain was developed. Single topic cards that parents could read quickly and then take home for later referral were put in each kids' meal. Interviews showed that this nontraditional method of teaching parenting was having a desirable impact. Interviews totaling 547 showed 68% had read at least one card and 20% had used or tried some of the activities.

Research conducted by Richardson (1989) revealed that North Carolina farmers preferred the traditional and well-established methods such as: newsletters, meetings, farm visits, telephone calls, and on-farm tests. This research was reinforced in a 1993 study (Richardson, 1993), showing clientele who were diverse in background, had a preference for

learning opportunities provided through delivery methods which are familiar and provide a personalized, interactive opportunity between the agent and client.

All of the reviewed literature and relevant research highlight one tangible element. Adult educators must target audiences in order to select the appropriate learning strategies and choose delivery methods for a program delivery system that appropriately fits the educational objectives for that audience. Delivery methods should coincide with those which clientele prefer and consider relevant for meeting their needs (Richardson, 1993).

Although there exists a wealth of nutrition education research today, there remains a need for quality research to further determine what methods of nutrition education promote the greatest level of behavior change. Research needs to focus on consumer benefits and barriers to quality dietary intake. Research must focus on special subsets of the population as there is knowledge that nutrition education is not a one-size-fits-all model. Research must also focus on the best methods of reaching a highly diverse, upwardly mobile society.

Social Cognitive Theory Applications

Social learning strategies consider the importance of environmental, individual, and behavioral factors in influencing health behavior. Social cognitive theory (SCT) is the most frequently cited behavioral based theory used in nutrition education (Contento, 1995). Cognitive knowledge is seen as one element of many that will influence eating behavior. Behavioral skills, role models in the environment, and reinforcements and incentives are seen as equally, if not more, important in influencing behavior (Crockett, 1995).

The application of cognitive development theory and social learning theory in the design and evaluation of nutrition education materials is very important. Many, if not most, nutrition terms and nutrition messages are quite abstract. Such concepts such as lower fat, lower sodium, or high in vitamin C are abstract since one cannot usually see (or even taste, in some instances) fat, sodium, or vitamins in a food. In order for individuals to follow the advice "Eat a diet low in fat," they must be able to determine the fat content of a food,

determine some acceptable level, and then make dietary choices appropriate to the "low fat" message, a task that is difficult for adult learners. In addition, the environment must be supportive and the individual must possess the behavioral capacity to enact the healthful choice. In evaluating nutrition education programs, there is a danger that parroting the correct "learned" response may occur in the absence of understanding how to use that information to make healthful food choices. This occurrence may, in part, help explain the discrepancies seen between acquired nutrition knowledge and change in eating behavior. While there is some research that evaluates how learners understand concepts of health and the relationships of nutrition to health, (Lytle, 1995) and some research looking into how learners classify and choose foods, (Michela, 1986), there is little research that examines how learners interpret and use nutrition messages that they hear in their environment.

Nutrition Education

Limited Resource Audiences

The Expanded Food and Nutrition Education Program (EFNEP) is a federally funded nutrition program designed to educate limited resource audiences in acquiring knowledge, skills, attitudes, and changed behavior necessary for nutritionally sound diets, and to contribute to their personal development and the improvement of the total family diet and nutritional well-being.. A study conducted by Arnold and Sobal (2000) examined the benefits gained and maintained by participants in EFNEP in food practices, nutrition knowledge, nutrient intake, and other areas. Food budgeting, food preparation, food safety practices, and nutrition knowledge improved between entry and graduation of program. Ten nutrition-related diseases/conditions were addressed in the study: colorectal cancer, heart disease, stroke, hypertension, osteoporosis, Type 2 diabetes, obesity and food borne illness. As a whole, participation in EFNEP increased the nutrition knowledge and food management

skills of low-income women. Several of these proficiencies endured after completion of the program. The main barriers preventing limited resource families from adopting healthy practices is not ignorance but socio-cultural norms, lack of resources, financial instability, limited access to and availability of affordable healthy food, and lack of choice. (Low Income Project Team, 1996). The EFNEP program reports produce significant short- and long-term changes in knowledge, attitudes, and behavior in all ethnic groups (Chapman and Kendall, 1989).

Low income women have been found to consume the fewest fruits and vegetables. Patterson (1990) found that, over 4 days, 30% of women in the lowest income bracket (<131% of poverty) consumed no fruit, compared to 12% of high-income women. Patterson also observed similar patterns for women's consumption of vegetables.

Reducing the risk of cancer in low-income populations presents a particular challenge. Not only do low-income populations have a significantly greater risk of developing cancer than do higher income groups, they also have been slower to change behaviors that place them at increased risk. (Winkleby, 1992). Results from a study by Cox et al (1996) indicate that EFNEP program participants had substantial diet-related CVD risks, based on self-report, and those risks were reduced by the cancer intervention program at immediate post-course assessment.

Five focus groups discussions were conducted with 34 low-income Vietnamese mothers, ages 25 to 47, to assess their nutritional education needs related to dietary calcium. (Reed et al, 1998) Knowledge and attitudes related to calcium sources, barriers preventing recommended calcium intake, and preferred methods of receiving nutrition information were determined. Most participants did not consume the recommended number of dairy foods per day. Barriers to increasing dietary calcium intake were identified including taste, cost, time, unfamiliarity with dairy products and lactose intolerance. Low reading levels and limited access to culturally and literacy-appropriate education materials may also contribute to inadequate dietary intake (Tsriaki, 1994). Among minority groups,

Asian women are at highest risk for the development of osteoporosis (Miller, 1995). Dietary calcium intake is reported at lower levels in low income and minority women (Tong, 1991).

Marshak et al (1998) conducted a study to improve knowledge and skills related to healthy, low-cost eating among low-income residents in San Bernardino County, California. The measurable outcome variables were improvement in self-reported nutrition knowledge, attitudes, self-efficacy, and intention.

Ethnicity Factors and Nutrition Education

Ethnicity is one of the many factors that play a role in food choices. A research project conducted by Devine, et al (1999) examined how ethnicity was enacted in food choices among 86 adults in one U.S. city, purposively recruited to vary ethnic identity (Black, Latino, White). Qualitative research methods were used to conduct semi-structured depth interviews about participants' ethnic identity, food choices, and influences on food consumption. Analysis of these data produced a conceptualization of influences on food choices that spanned the different ethnic groups. Ideals, identities and roles, interacted with each other and the food and eating context in reciprocal and dynamic ways to influence food choice. Differences in ideals, identities and roles were related to ethnic group affiliation and were most apparent during times of personal transition and in contexts highlighting contrasts. This conceptualization can enhance the ability of nutrition educators working in a multi cultural society to identify processes underlying ethnic food choices and apply this understanding to research and practice.

Ethnic traditions and regional cuisines have been recognized as key sources of diversity in dietary patterns in the United States (Popkin, 1996). Health professionals interested in promoting dietary change can benefit from considering the roles that ethnicity plays in influencing food choices (Furst, 1996). Models of the food selection process have acknowledged the contribution of culture and food availability to food choice but have not

delved deeply into underlying mechanisms for making food choices that span cultural groups in complex societies (Wenkam, 1969). Investigation of ethnic diversity in food choices to date has focused primarily on intake patterns and on food practices typical of different ethnic groups (Brown and Mussell, 1984). The interaction of ethnicity with other social and environmental activities characteristics in influencing food practices has not been emphasized (Kumanyika, 1990). Differences in socioeconomic status and food availability among ethnic groups, for example, may contribute to variation in dietary patterns through access to food and resources.

Ethnicity has been conceptualized in many ways. Ethnic differences reflect a complex, multidimensional concept that represents differences among groups in a population that are associated with lineage and region. Different ethnic groups often have unequal access to social positions and resources due to prejudice and discrimination. Ethnicity is a dynamic and may be expressed situationally with ethnic group members following their ethnic traditions in some places and times but not in others.

(Rebovich et al, 1990) successfully implemented nutrition and physical fitness education with an elderly Black audience. Use of indigenous peer leaders such as cultural brokers to serve as a liaison between Black clientele and the health delivery systems (Ralston, 1993) and gatekeepers who are nontraditional referral sources trained to identify and locate high risk elderly (Raschko, 1993) may be a means of assisting with nutrition education efforts, yet there are very little data on the effectiveness of these programming strategies with Black elderly audiences. Among minority groups, Asian women are at highest risk for the development of osteoporosis (Miller, 1995) Dietary calcium intake is reported at lower levels in low income and minority women (Tong, 1991).

Consumption of fruits and vegetables is lower in blacks than in whites (Kreb-Smith, 1995). Hispanics also consume fewer fruits and vegetables than non-Hispanic whites (Subar, 1995). Several studies have demonstrated the link between low education and/or income and low fruit and vegetable intake.(Serdula, 1995).

Gender, Age and Education Factors

Hunt et al (1997) conducted research to measure demographic factors related to dietary behaviors. The research findings indicated that higher education, greater age, and female gender were associated with food choices closest to the recommendations to increase fiber, fruits, and vegetables and to reduce fat. An exception to the study was the recommendation to increase the consumption of beans and lentils, which was associated with lower education, greater age and male gender. The relationship of job status to the food choice variables was inconsistent across food and study centers and there were differences between study centers in the magnitude of associations between food choices and demographic characteristics.

Women are the primary gatekeepers for the purchase and preparation of food in the household (Schafer, 1989). Directing behavior change interventions to this population may ultimately improve the eating behaviors of other individuals in the household (e.g., spouses and children). Women who have developed good eating habits can serve as positive role models for their family members. (Shattuck, 1992).

A qualitative study conducted by Gemlo et al (1998) revealed food and nutrition-related educational needs of limited-income, urban fathers. The topics of greatest interest reported by participants were cooking, inexpensive ways to eat healthily, meal planning, healthy eating for children, and the effect and importance of food on the body. There is a need to look at fathers, not as extensions of mothers, but as a targeted audience (Levine et al, 1995). Men tend to feel uncomfortable in female-dominated situations, especially in parenting education. (Johnson, 1992) Use of male educators for predominantly male learners is recommended.

Barriers toward fruit and vegetable consumption were discovered in research presented by Cohen et al, (1998). This study involved a multiethnic worksite population and consumption of fruits and vegetables. Results showed general barriers scores decreased with

increasing age and the expense barrier score was higher with women. Other analysis revealed ethnicity, occupation, and age were no longer associated with the general barriers score when education and income were controlled.

Louk, Schafer, Schafer and Keith (1999) examined the similarities of dietary intakes of husbands and wives while investigating the relationship of the similarities to the life stage of the family. Energy-adjusted nutrient intakes of fiber, vitamins, and minerals, except for calcium, for both sexes had a tendency to be greater as the family life stage progressed. Calcium intake was lower in this research as the age of the subject increased. Past research indicates the influence the family has on the behaviors of its members. (Litman, 1974) People who are married or have children report less risky health behaviors than do other individuals (Umberson, 1992). Many educators use the family's influence when designing interventions to affect or change health behaviors involving the entire family (Knutsen, 1989). Participation in an intervention by one spouse appeared to affect the dietary behaviors of the other spouse (Zimmerman, 1988). Kolonel and Lee (1981) are one of the few research groups publishing data concerning the dietary assessment of husbands and wives.

One problem in all dietary intake studies involving recall is the accuracy of memory. Several studies have shown that current diet distorts memory of past diet (Dwyer et al, 1989). Research reveals that recall of body size in the past is poorer for men than for women (Krall, 1989) but accuracy of recalled physical activity does not differ by sex (Blair, 1991).

The need for health promotion among older adults has become increasingly important in light of their dramatic population growth rate (Centers for Disease Control and Prevention, 2001). Older adults, especially those with low income, are difficult to reach with nutrition education. McClelland et al (2002) conducted research to examine the feasibility of a Train-the Trainer approach using congregate nutrition site managers to deliver nutrition education. The study noted a positive cost effectiveness of using lay personnel to deliver nutrition

education in community settings as well as the comfort level of participants receiving nutrition education from their peers.

Social Factors and Nutrition Education

Through a nutrition education program designed to reach Canadian child care givers, Burden et al (2000) discovered two important impacts. The first impact involved improving menu planning skills and secondly, to increase self-efficacy for planning healthy meals and dealing with problem eating behaviors. The nutrition program was offered both by mail and workshops. Some care givers preferred the “hands-on” format and interaction with peers, and others preferred a more self-directed approach to learning. Both formats of the program resulted in greater menu planning knowledge and self-efficacy while accommodating different learning styles and needs.

The concept of self-efficacy, defined as one’s sense of his or her ability to successfully perform a specific task, was used because the child care providers expressed a lack of confidence in their ability to provide meals that were nutritious and appealing to children. Since self-efficacy levels predict behavior change, (Bandura, 1986) the researchers measured confidence in two areas: menu planning and dealing with problem eating behaviors. Results showed greater scores in both areas.

Schafer et al (1999) conducted a research to examine the relationship of self-esteem to dietary behaviors, specifically the intake of fruits and vegetables and their key nutrients. Women reported significantly more servings of fruit per week than men. After adjustment for age, education, income, and body mass index, self-esteem was a significant predictor of Vitamin C and folate intake among women and folate intake among men. No other dietary variables were associated with self-esteem. Previous research has linked self-esteem with dietary self-efficacy, the feeling that one is capable of making healthful food choices (Schafer et al, 1994). Self-efficacy has been linked to reducing fat intake (Sporny, 1995).

Higher self-esteem has been associated with successful weight loss and its maintenance (Nir, 1995). Adults with higher self esteem placed greater emphasis on self-care and reducing risks for disease (Hurst et al, 1997).

Blacks have been shown to have an interest in and motivation for learning that may help to reduce barriers to educational programming. In a study of elderly Blacks in a midwestern city, respondents, regardless of socioeconomic level, were substantially involved in self-directed learning projects (Ralston, 1983).

A mail survey was developed by Keim et al (1997) to determine the behaviors associated with eating vegetables and fruits. Respondents included 219 males and 289 females. The most frequently eaten fruits and vegetables were orange or grapefruit juice, French fries or fried potatoes, other potatoes, other fruit juice, and green salad. Only perceptions of social and sensory aspects of fruits and vegetables were related to intake. Perceptions of health aspects of fruits and vegetables did not have a consistent or significant relationship with intake. Social and sensory aspects of fruits and vegetables may be important messages to include in nutrition education programming for young adults.

Krummel et al (2002) examined rural women's perceptions about cardiovascular disease prevention and behavior change for cardiovascular health. The results indicated that rural women were unaware of their personal cardiovascular risks. Family preferences and cultural food pattern effects on women's food choices and the lack of support for adoption of a heart-healthy diet were noted influences. Self-efficacy for dietary change spanned the continuum from no confidence (younger women) to complete empowerment (older women).

Social factors associated with self-reported dietary change were revealed in a study conducted by Haslam et al (2000) The study investigated the reasons for dietary change and whether these self-reported changes resulted in health promoting dietary patterns. The two most common reasons for dietary change were to lose weight and because of an increased awareness of healthy diets. Younger people changed their diet following changes in personal relationships and for animal welfare considerations. Older respondents changed their diet in

response to medical advice. Falk et al (2000) found that personal factors such as cardiac surgery and diet history were influential in dietary change. Social relationships and situational contexts also were influences. Participants in this study reported that each of these influences either facilitated or complicated their dietary changes.

Motivations for healthful dietary change was the topic of a recent research conducted by Satia, Curry and Trudeau (2001). The objective was to describe scales that measure motivations for changing dietary behavior, and to examine associations of these scales with current diet and dietary change. The design involved a secondary analysis of a randomized trial of a self-help intervention to promote lower fat and higher fruit and vegetable consumption. Adult participants were selected at random from enrollees of a large Health Maintenance Organization. Baseline data was collected on motives for changing diet, fruit and vegetable intake, fat-related dietary habits, and demographic characteristics. Participants were randomized to receive intervention or none. After twelve months a follow-up survey was administered. Results concluded that intrinsic and extrinsic motivation scales were weakly associated with current diet and predicted response to dietary intervention. More research is needed to better characterize and measure motives for dietary change.

A study conducted by Kristal, et al.(2001) examined the predictors of self-initiated, healthful dietary change. Specifically, the objective examined demographic and psychosocial factors that predict healthful dietary change. A cohort study revealed how factors assessed at baseline predicted change in fat-related dietary habits and fruit and vegetable intakes two years later. The final sample included 336 men and 502 women. Fruit and vegetable intake and fat-related dietary patterns were measured by telephone-administered surveys. Results revealed fat intake (energy from fat) decreased by approximately two percentage points and fruit and vegetables intake increased by 0.17 servings per day. Changes were significantly larger among women and persons who were well educated. Persons in the maintenance stage of change and persons who believed there was a strong relationship between diet and cancer made the largest dietary change. Food

label use was strongly associated with fat reduction, but not with increases in fruits and vegetables. The results indicated that food labels are useful for helping people reduce fat intake, that interventions should target persons at all stages of dietary change, and that new efforts are needed to reach men and persons who are less educated.

Socio-demographic variations include perspectives on cardiovascular disease and associated risks. Nic Gabhainn et al.(1999) collected qualitative attitudinal data in focus group settings from 74 individuals across socio-demographic categories in order to assess knowledge of and attitudes to coronary heart disease and associated risk factors. Participants were derived from personnel lists of local government and a hospital. Eight groups were constructed according to three variables: age, gender and occupational group. Analysis revealed good knowledge levels about risk factors with participants, but participants exhibited low motivation to change behaviors. Men were less motivated to change than women; older men thought it too late and younger ones too soon. Overall, participants were skeptical about contradictory medical advice which undermined motivation to change. The data reflects preventative initiatives should be more focused.

Intervention Studies

The effects of nutrition education on intake of lipid-related nutrients was studied by Amano et al.(2002). Seventy-nine females, 40-64 years of age, who underwent a health examination for residents in Nara Prefecture and were found to have total serum cholesterol levels between 220 mg/dl and 300 mg/dl were divided into two groups. The first group received nutrition education during the first 24 weeks and no education was provided during the second 24 weeks as the self-control period. The second group received no education during the first 24 weeks as the waiting period, but received education during the last 24 weeks. During the education period, dietary intervention for individual subjects was performed 3 times at intervals of 8 weeks by dietitians. At the end of the education period,

the total energy adjusted intake of lipid, cholesterol and saturated fatty acid were significantly lower. In conclusion, the results indicate that the intake of lipid-related nutrients can be decreased by educating individuals about nutrition and the effects are maintained for at least 24 weeks.

A four-year project with a two-year intervention trial successfully increased fruit and vegetable consumption among rural African American adults for cancer and chronic disease prevention. (Campbell et al, 2000) The North Carolina Black Churches United for Better Health, a multi-component intervention, was based on an ecological model of change. Evaluation included participant surveys, church reports, and qualitative interviews. Approximately 3939 participants in 50 black churches in 10 counties were involved. Women, older individuals, and members of smaller churches reported higher impact of activities associated with fruit and vegetable intake.

A nutrition intervention study was conducted by Finckenor and Byrd (2000). The objective was to develop and evaluate the long-term effectiveness of an intervention program delivered in a group setting to help participants lower dietary fat intake. The sample consisted of nutrition undergraduate students who were assigned to experimental, pretest/post test control, and post test only control groups. The intervention program produced a significant reduction in mean dietary fat consumption and a significant progression in mean stage of change of subjects in the experimental group who were in the pre-action stage.

Dobs et al(1994) found evidence that a one-day intervention program, whether designed by the target population or experts, did not improve cardiovascular risk behaviors, suggesting more innovative methods are required to address health behaviors in this high risk group.

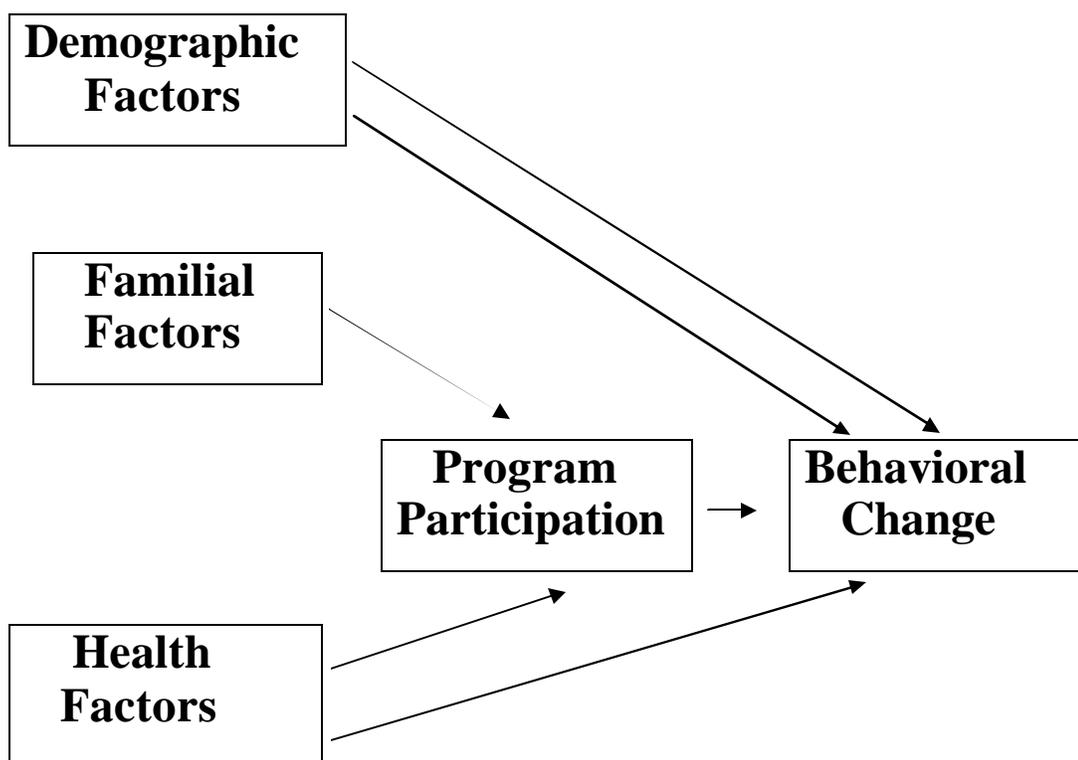
Results from a sustainable community intervention program promoted a health shift in cardiovascular risk in a high risk rural population. Weinehall et al. (2001) When evaluated for different social strata, there were no signs of an increasing health gap between socially

privileged and less privileged groups. Socially less-privileged groups benefited the most from the prevention program.

Clearly, the above studies indicate a profound need for further nutrition education programs to alleviate the negative health impact in today's society. Reduction of nutrition related disease remains the common goal with nutrition educators and health professionals.

Figure 1. Conceptual Schema Depicting Independent Factors That Impact Nutritional Education Program Participation and Behavioral Change.

CONCEPTUAL SCHEMA



Based on the literature, the researcher contends that nutrition educators must strive to create an environment that enhances optimal learning while alleviating barriers to consequently promote positive health behavior changes. By utilizing the most effective adult learning principles and research based curriculum, learners may adopt and practice skills for healthy living.

The elaboration of the conceptual schema on the previous page is based on the preceding and following review of concepts, literature and experiences. Although many of the relationships depicted in the conceptual schema have been acknowledged in previous and forthcoming discussions, in some cases it is necessary to propose what the expected relationships to be.

Demographic factors such as age, gender, education are significant because women with families have acquired the position of buying and preparing foods at home. They are the gatekeepers of the dietary intake and behavior change for most family members. Higher education and knowledge base contributes to self-confidence and the means to apply knowledge to practice. Higher education lessens barriers to participation because there has been a continuous bridge to gaining knowledge; particularly with informal education. Participants are eager to learn more about a topic of interest and value. Age reflects decision making as well. Younger participants may not feel participation in nutrition education is yet needed if no health factors are predominant; whereas, older participants may feel participation comes too late in the life cycle for overall health improvement. Health factors contribute to stage of readiness and adoption of healthy lifestyle practices. Evidence of high health risk factors may motivate

individuals to participate in nutrition education more readily. If participants perceive an opportunity to decrease weight, total cholesterol and blood pressure by participating in nutrition education interventions, the likelihood of participation is greater. The psychological factors also contribute to the learners' motivation and desire to change.

An educator balances the perceived needs of a learner with learner motivation. When educators believe students can succeed and learn a bridge is developed so that learners' can perceive positive change through creative delivery methods. Thus barriers to nutrition education are reduced, giving the students the confidence to participate in an informal educational setting, adopting new practices and thereby, creating positive behavioral change outcomes.

Chapter 3. Methodology

In this section the primary methods for this research are presented. The research design for the project, the population and sample, measurement of variables, reliability and validity, data collection techniques, and data analysis techniques are included.

Research Design

The basic design of this study was a quasi-experimental descriptive survey of rural Extension program participants referred by a local family physician. The primary focus was to determine the impact of an Extension program. The goal was to explore whether the intervention of an Extension program impacts health behavior change in program participants to a greater extent than in a control group. A fifteen-week intervention study was used with quantitative methods to investigate health behavior change.

Population and Sample

The population (n=48) for this study consists of adults living in a rural southeastern North Carolina county. Participants were purposefully recruited and referred by a local family physician practice to participate in the intervention study and control groups. The intervention group entailed twenty-seven participants and the control group consisted of twenty-one participants. The sample was identified with previous “at risk” conditions of nutrition-related diseases or potential risk. Intervention and control samples were selected with variance in age, gender and ethnicity based on voluntary participation in the program. The intervention study was conducted within the family physician practice office setting after business hours. Recruitment of intervention and control group participants was obtained

during the patients' physician office visit. To improve attendance, personal telephone calls were made to each potential participant prior to the initial meeting of the intervention group.

Instrumentation

A majority of variables conceptualized for this study were cognitive and affective behaviors of the sampled population. The dependent variable was behavior change resulting from participation in an Extension nutrition educational program. Independent variables included: demographic factors of the participants, familial factors of the participants, and health factors of the participants.

The pre and post questionnaire consisted of the following components. First, health information was collected. Factors were recorded for height, weight, body mass index and waist-hip ratio. Additionally, total blood cholesterol levels, low density cholesterol levels and high density cholesterol levels were collected. Blood pressure and health risk scores found in Appendix B were also determined.

Demographic information was included in the questionnaire design. Specifically, gender, race, date of birth, level of education, monthly household income, and family history of cardiovascular disease was obtained. Number of household occupants was also collected.

As part of the pretest, participants were asked to provide responses to multiple choice questions about food and nutrition practices and contributors to health behavior practices. Nutrition habits were collected through a five point Liker frequency scale. Data collection involving exercise frequency, tobacco usage and intake of fat contributed to the overall pre and posttest assessment and risk factors. Posttest was identical to the pretest. A copy of each of the instruments is included in the appendix.

Data Collection

Utilizing a pre and post survey, the validity and reliability components were addressed. A split halves correlation co-efficiency was used for reliability. Utilization of a panel established face validity and content validity.

The pretest for the intervention group (n=27) was administered at the initial nutrition education session. The posttest was likewise administered at the concluding nutrition education session after fifteen weeks of intervention education. For the control group (n=21), the pretest was administered during the patients' office visit. After fifteen weeks, the posttest was administered verbally by telephone.

Data Analysis

Descriptive and inferential statistics were utilized to analyze the data of this study. Descriptive techniques included frequency and percentage distributions, means, and standard deviations. The student t-test distribution was used to test for the differences between the study and control groups. In all statistical tests, a .05 level of significance was used.

Chapter 4. Findings

A profile of the participants in the study, tests of knowledge gained and behavior change, and the relationships between variables and program participation are presented in this chapter.

Table 1. Distribution of Respondents by Socio-demographic Characteristics

Factor	N	%
Gender		
Male	11	22.9
Female	37	77.1
Total	48	100.0
Ethnic Background	N	%
White	29	60.4
Non-white	19	39.6
Total	48	100.0
Age	N	%
Less than 50	16	33.3
50-64	17	35.4
65 and above	15	31.3
Total	48	100.0
Education	N	%
High School Graduate And Lower	17	36.2
Some College	23	48.9
College Graduate Or Higher	8	14.9
Total	48	100.0

Table 1, continued.

Household Size (persons)	N	%
1	9	26.5
2	11	32.4
3	7	20.6
4	6	17.6
5	1	2.9
Total	48	100.0

Yearly Household Income	N	%
\$15,000 or less	10	20.8
\$15,001 - \$35,000	10	20.8
\$35,001 - \$45,000	2	4.3
More than \$45,000	16	33.3
Do not care to answer	10	20.8
Total	48	100.0

Forty-eight respondents reported their gender with 11 males (22.9%) and 37 females (77.1%) more than 3 to 1. More than one half of the respondents (60.4%) were white; while the remaining respondents (39.6%) reported themselves as non-white. The mean age of respondents was 54.9 years. Approximately one-third of the respondents (33.3%) were less than 50 years of age, and approximately one-third were between the ages of 50 and 64 (35.4%). Respondents age 65 and over numbered fifteen or 31.3%.

Seventeen respondents (36.2%) had educational attainment levels of high school graduate or less. The largest group of respondents (48.9%) reported some college or technical training. Only eight (14.9%) had achieved college graduation or higher.

More than half (59.4%) of the respondents, when asked, indicated a total household income of \$45,000 or less. Interestingly, 10 respondents (31.3%) did not care to answer the question on income levels.

Table 2. Distribution of Respondents by Health Factors – Total

Factor	N	%		
Height				
62-63 inches	10	20.8		
64-65 inches	14	29.2		
66-67 inches	9	18.7		
68-70 inches	9	18.7		
71 or more	6	12.6		
Total	48	100.0		
<hr/>				
Weight	(Initial)		(Final)	
	N	%	N	%
Less than 150	10	20.8	8	17.0
150-170 lbs	10	20.8	12	25.6
171-190 lbs	11	22.9	10	21.2
191-210 lbs	7	14.7	5	10.7
211 and over	10	20.8	12	25.5
Total	48	100.0	48	100.0
<hr/>				
BMI	(Initial)		(Final)	
	N	%	N	%
18.1-23.7	7	14.6	6	12.5
23.8-27.3	14	29.2	15	33.3
27.4-30.3	10	20.8	10	20.9
30.4-40.0	11	22.9	11	22.9
More than 40	6	12.5	6	10.4
Total	48	100.0	48	100.0

Table 2, continued.

Waist-Hip Ratio	(Initial)		(Final)	
	N	%	N	%
.75 or less	8	19.1	5	13.9
.76-.80	10	23.8	11	30.5
.81-.85	10	23.8	6	16.7
.86-.89	5	11.9	6	16.7
.90 or higher	9	21.4	8	22.2
Total	42	100.0	36	100.0

Total Cholesterol	(Initial)		(Final)	
	N	%	N	%
200 or less	13	35.0	7	25.9
201-224	12	32.5	9	33.4
225 and over	12	32.5	11	40.7
Total	37	100.0	29	100.0

LDL	(Initial)		(Final)	
	N	%	N	%
Less than 81	0	00.0	1	10.0
81-104	7	26.9	2	20.0
105-134	9	34.6	2	20.0
135-149	6	23.1	1	10.0
150 and higher	4	15.4	4	40.0
Total	26	100.0	10	100.0

HDL	(Initial)		(Final)	
	N	%	N	%
Less than 45	5	19.2	0	0.0
45-50	7	27.0	2	22.2
51-55	6	23.0	3	33.4
56 and higher	8	30.8	4	44.4
Total	26	100.0	9	100.0

Table 2, continued.

Blood Pressure (Systolic)	(Initial)		(Final)	
	N	%	N	%
Less than 120	5	11.6	2	4.5
120-130	23	53.5	23	52.3
131-140	6	14.0	13	29.6
141 and higher	9	20.9	6	13.6
Total	43	100.0	44	100.0

Blood Pressure (Diastolic)	(Initial)		(Final)	
	N	%	N	%
70 or less	5	12.8	9	20.9
71-80	23	59.0	22	51.2
81 and higher	11	28.2	12	27.9
Total	39	100.0	43	100.0

Risk Score	(Initial)		(Final)	
	N	%	N	%
Less than 24	1	7.7	6	31.6
24 to 38	6	46.1	7	36.8
39-49	2	15.4	4	21.1
50 and higher	4	30.8	2	10.5
Total	13	100.0	19	100.0

Most respondents (68.7%) were less than 67 inches. (Table 2). Mean weight of participants initially is 188 pounds. The mean weight increased to 196 pounds at final reporting. Body Mass Index either remained the same in all categories from initial to final findings except in the range of BMI 18.1-23.7 and BMI 23.8-27.3, where it decreased and

increased, respectfully. Waist-hip ratios decreased from 10 (23.8%) to 6 (16.7%) respondents in the .81-.85 category of initial and final findings. Total cholesterol levels decreased in each category.

Table 3. Distribution of Respondents by Health Factors – Experimental and Control Groups

Weight	Experimental				Control			
	(Initial)		(Final)		(Initial)		(Final)	
	N	%	N	%	N	%	N	%
Less than 150	4	14.8	2	7.7	0	00.0	6	28.6
150-170 lbs	6	22.2	8	30.8	4	19.0	4	19.0
171-190 lbs	8	29.7	7	26.9	3	14.3	3	14.3
191-210 lbs	4	14.8	2	7.7	3	14.3	3	14.3
211 and over	5	18.5	7	26.9	5	23.8	5	23.8
Total	27	100.0	26	100.0	21	100.0	21	100.0

BMI	Experimental				Control			
	(Initial)		(Final)		(Initial)		(Final)	
	N	%	N	%	N	%	N	%
18.1-23.7	7	25.9	6	22.2	0	0.0	0	0.0
23.8-27.3	7	25.9	10	37.1	7	33.3	6	28.6
27.4-30.3	3	11.1	2	7.4	7	33.3	8	38.1
30.4-40.0	6	22.3	6	22.2	5	23.9	5	24.2
More than 40	4	14.8	3	11.1	2	9.5	2	9.5
Total	27	100.0	27	100.0	21	100.0	21	100.0

Table 3, continued.

Waist-Hip Ratio	Experimental				Control			
	(Initial)		(Final)		(Initial)		(Final)	
	N	%	N	%	N	%	N	%
.75 or less	1	4.5	1	6.3	7	35.0	4	20.0
.76-.80	8	36.4	6	37.5	2	10.0	5	25.0
.81-.85	5	22.7	4	25.0	5	25.0	2	10.0
.86-.89	2	9.1	1	6.2	3	15.0	5	25.0
.90 or higher	6	27.3	4	25.0	3	15.0	4	20.0
Total	22	100.0	16	100.0	20	100.0	20	100.0

Total Cholesterol	Experimental				Control			
	(Initial)		(Final)		(Initial)		(Final)	
	N	%	N	%	N	%	N	%
200 or less	6	30.0	3	20.0	7	41.2	4	33.3
201-224	9	45.0	4	26.7	3	17.6	5	41.7
225 and over	5	25.0	8	53.3	7	41.2	3	25.0
Total	20	100.0	15	100.0	17	100.0	12	100.0

Table 3, continued.

LDL	Experimental				Control			
	(Initial)		(Final)		(Initial)		(Final)	
	N	%	N	%	N	%	N	%
81 or less	0	0.0	1	12.5	0	0.0	1	16.7
81-104	1	10.0	1	12.5	6	37.5	0	00.0
105-134	5	50.0	2	25.0	4	25.0	1	16.7
135-149	3	30.0	1	12.5	3	18.8	1	16.7
150 and higher	1	10.0	3	37.5	3	18.7	3	49.9
Total	10	100.0	8	100.0	16	100.0	6	100.0

HDL	Experimental				Control			
	(Initial)		(Final)		(Initial)		(Final)	
	N	%	N	%	N	%	N	%
Less than 45	0	0.0	0	0.0	5	31.3	0	00.0
45-50	2	20.0	1	14.3	5	31.2	0	00.0
51-55	4	40.0	3	42.8	2	12.5	2	40.0
56 and higher	4	40.0	3	42.9	4	25.0	3	60.0
Total	10	100.0	7	100.0	16	100.0	5	100.0

Table 3, continued.

Blood Pressure (Systolic)	Experimental				Control			
	(Initial)		(Final)		(Initial)		(Final)	
	N	%	N	%	N	%	N	%
Less than 120	4	16.0	1	3.7	1	5.6	1	5.3
120-130	15	60.0	16	66.6	8	44.4	7	36.8
131-140	3	12.0	4	16.7	3	16.7	9	46.9
141 and higher	3	12.0	3	12.5	6	33.3	2	10.5
Total	25	100.0	24	100.0	18	100.0	19	100.0

Blood Pressure (Diastolic)	Experimental				Control			
	(Initial)		(Final)		(Initial)		(Final)	
	N	%	N	%	N	%	N	%
70 or less	2	9.1	6	24.0	3	17.6	3	16.7
71-80	18	81.8	9	36.0	5	29.5	13	72.2
81 and higher	2	9.1	10	40.0	9	52.9	2	11.1
Total	22	100.0	25	100.0	17	100.0	18	100.0

Table 3, continued.

Risk Score	Experimental				Control			
	(Initial)		(Final)		(Initial)		(Final)	
	N	%	N	%	N	%	N	%
Less than 24	0	0.0	1	25.0	1	10.0	5	33.3
24 to 38	0	0.0	2	75.0	6	60.0	5	33.4
39-49	2	66.7	0	0.0	0	0.0	4	26.6
50 and higher	1	33.3	1	25.0	3	30.0	1	6.7
Total	3	100.0	4	100.0	10	100.0	15	100.0

The frequency distributions of respondents by health factors in the experimental and control groups are displayed in Table 3. In the experimental group, the majority of respondents 18 (66.7%) had an initial weight of 190 pounds or less with a final report of 16 (65.1%) weighing 190 pounds or less. Comparatively, one-third (33.3%) of the control group reported weighing 190 pounds or less initially and 13 (61.9%) weighing 190 or less at the final report. Initial BMI for the experimental group revealed 13 (48.2%) greater than 27.4 and a final report of 11 (40.7%) having a BMI greater than 27.4. The control group reported 14 (66.7%) initially with a BMI greater than 27.4 and a final report of 15 (71.8%) with a BMI greater than 27.4. More than half (59.1%) had a waist-hip ratio of .81 or higher in the initial experimental group and (56.2%) in the final experimental group reading. The control group initially reported 11 (55%) having a waist-hip ratio of .81 or higher. The final report was equal at 11 (55%). Fourteen (70%) initially had total cholesterol levels of 200 or higher in the experimental group while 12 (80%) of the same group reported a final

cholesterol reading. The control group had 10 (58.8%) with a cholesterol level of 200 and higher initially, and 8 (66.7%) in the final total cholesterol reading. Low density levels of cholesterol in the experimental group revealed 9 (90%) at a level of 105 or higher initially. The final report indicated 6 (75%) having a low density level of 105 or higher. In comparison, 10 (62.5%) in the control group recorded low density levels of 105 or higher initially, while 5 (83.3%) indicated the same levels in the final reading. High density levels of cholesterol in the experimental group displayed additional information. Eight (80%) initially had high density levels 51 and higher and 6(85.7%) as a final report. The control group, 6 (37.5%), initially had a high density level of 51 or higher and 5(100%) were found to have a final reading of 51 and higher. Risk scores in the experimental group initially indicated 3 (100%) in the 39 and higher range and 1 (25%) in the same risk score range as a final record. In contrast, the control group indicated 3 (30%) initially having a risk score of 39 and higher, while 5 (33.3%) resulted with a risk score of 39 and higher post.

Table 4. Prevalence of Disease Among Respondents - Total

Have Cardiac Disease	N	%
Yes	4	8.9
No	41	91.1
Total	45	100.0
<hr/>		
Family Relative with Cardiac Disease	N	%
Yes	25	58.1
No	18	41.9
Total	43	100.0

Table 4, continued.

Family Relationship	N	%
Grandparent	5	19.2
Father	12	46.2
Mother	5	19.2
Sibling	4	15.4
Total	26	100.0

While 4 (8.9%) of 45 respondents reported having cardiac disease, 25 (58.1%) of 43 indicated heart disease prevalence in the immediate family. Specifically, less than half of the respondents, 12 (42.6%) of 26 reported their father as having heart disease.

Table 5. Distribution of Respondents by Level of Knowledge - Total

Question	Initial		Final	
	N	%	N	%
Best risk reduction				
less cholesterol	27	58.7	17	35.4
less total fat	15	32.6	23	47.9
fewer animal prod.	1	2.2	7	14.6
do not know	3	6.5	1	2.1
Total	46	100.0	48	100.0
What risk with 250 mg/dl				
none	2	4.3	1	2.1
moderate	13	27.1	14	29.2
high	24	52.2	29	60.4
do not know	7	15.2	4	8.3
Total	46	100.0	48	100.0

Table 5, continued.

Reduce intake of cholesterol to	N	%	N	%
100 mg/day	15	31.9	14	31.8
200 mg/day	5	10.6	18	40.9
300 mg/day	5	10.6	7	15.9
do not know	21	44.7	5	11.4
Total	47	100.0	44	100.0

Which contains cholesterol	N	%	N	%
chicken	7	15.2	23	47.9
margarine	21	45.7	13	27.1
peanut butter	12	26.1	7	14.6
do not know	6	13.0	5	10.4
Total	46	100.0	48	100.0

Reduce fat substitution	N	%	N	%
margarine for butter	17	38.6	26	55.3
skim for 2% milk	12	27.3	17	36.2
cottage for cream	7	14.6	4	8.5
do not know	7	14.6		
Total	44	100.0	47	100.0

Most healthy label	N	%	N	%
A	36	78.3	43	91.5
B	3	6.5	4	8.5
Do not know	7	15.2		
Total	46	100.0	47	100.0

Table 5, continued.

Best source of fiber	N	%	N	%
cream of wheat	11	23.9	12	25.5
lettuce	5	10.9	5	10.6
kidney beans	24	52.2	28	59.6
do not know	5	10.9	2	4.3
Total	46	100.0	47	100.0

Hydrogenation makes unsaturated fats	N	%	N	%
more saturated	6	13.6	18	37.5
more liquid	3	6.8	9	18.8
safer to eat	6	13.6	7	14.6
do not know	29	65.9	14	29.2
Total	44	100.0	48	100.0

Saturated fats are found in	N	%	N	%
all animal products	11	23.4	15	31.9
all vegetable oils	1	2.1	8	17.0
both a and b	27	57.4	22	46.8
do not know	8	17.0	2	4.3
Total	47	100.0	47	100.0

Mono- and poly-unsaturated fats except	N	%	N	%
helpful in lowering cholesterol	1	2.3	8	18.2
lowering calories	6	13.6	6	13.6
contained in animal	9	20.5	10	22.7
liquid at room temp	7	15.9	12	27.3
do not know	21	47.7	8	18.2
Total	44	100.0	44	100.0

Table 5, continued.

One serving of cooked cereal	N	%	N	%
1/3 cup	7	15.6	9	19.6
1/2 cup	26	57.8	33	71.7
3/4 cup	3	6.7	4	8.7
1 cup	9	20.0		
Total	45	100.0	46	100.0

One serving of fresh fruit	N	%	N	%
1/3 cup	2	4.5	4	8.9
1/2 cup	19	43.2	23	51.1
3/4 cup	6	13.6	1	2.2
1 cup	17	38.6	17	37.8
Total	44	100.0	45	100.0

Best choice when eating out to reduce fat	N	%	N	%
salad with oil and vinegar	28	60.9	19	41.3
pasta with marinara	10	21.7	19	41.3
creamed soup	4	8.7	5	10.9
do not know	4	8.7	3	6.5
Total	46	100.0	46	100.0

As depicted in Table 5, the frequency distribution of respondents by their level of knowledge indicates almost half (47.9%) choosing less total fat as a best risk reduction at post survey. Respondents moved from (52.2%) to (60.4%) in selecting 250 mg/dl as being a high blood cholesterol level. There was a (30%) increase in the correct answer of reducing dietary cholesterol to a healthy 200 mg/day. Post survey answers indicate respondents'

answer chicken containing cholesterol at (47.9%) compared to (15.2%) pre survey. While 17 (38.6%) surveyed indicated margarine for butter as a fat substitution initially, 26 (55.3%) made the same response post survey. Thirty-six (78.3%) chose the correct response in healthy labels initially and 43 (91.5%) as a final choice. Kidney beans as the best source of fiber remained the prominent choice for pre and post survey with 24 (52.2%) and 28 (59.6%) respectively. The term hydrogenation and definition showed pre and post 16 (13.6%) and 18 (37.5%) respectively. Although 27 (57.4%) respondents chose saturated fats as being found in both animal products and vegetable oils initially, only 22 (46.8%) chose the same response post survey. Post survey revealed 26 (57.8%) as choosing $\frac{1}{2}$ cup as the correct serving of cooked cereal. This choice increased to 33 (71.7%) post intervention. Although there was an increase in the correct answer of $\frac{1}{2}$ cup being a serving size of fruit, 43% to 51.1%, an incorrect answer of 1cup had the same number of responses, 17 (37.8%) pre and post. The incorrect answer of salad with oil and vinegar being best choice when eating out decreased pre and post at 28 (60.9%) and 19 (41.3%) respectively. The correct answer of pasta with marinara increased from 10 (21.7%) to 19 (41.3 %) pre and post survey.

Table 6. Distribution of Respondents by Level of Knowledge – Experimental and Control Groups

Question	Experimental				Control			
	(Initial)		(Final)		(Initial)		(Final)	
	N	%	N	%	N	%	N	%
Best risk reduction								
less cholesterol	14	51.9	9	34.6	11	57.9	8	38.1
less total fat	7	25.9	11	42.3	6	31.6	10	47.6
fewer animal prod.	3	11.1	5	19.2	0	0.0	3	14.3
do not know	3	11.1	1	3.9	2	10.5	0	0.0
Total	27	100.0	26	100.0	19	100.0	21	100.0

What risk with 250 mg/dl	Experimental				Control			
	(Initial)		(Final)		(Initial)		(Final)	
	N	%	N	%	N	%	N	%
none	1	3.8	1	3.7	2	10.5	1	4.8
moderate	7	26.9	9	33.3	6	31.6	6	28.5
high	13	50.0	15	55.6	7	36.8	13	61.9
do not know	5	19.3	2	7.4	4	21.1	1	4.8
Total	26	100.0	27	100.0	19	100.0	21	100.0

Table 6, continued.

Reduce intake of cholesterol to	Experimental				Control			
	(Initial)		(Final)		(Initial)		(Final)	
	N	%	N	%	N	%	N	%
100 mg/day	9	33.3	11	40.7	8	42.1	4	22.2
200 mg/day	5	18.6	8	29.6	2	10.5	10	55.6
300 mg/day	2	7.4	4	14.8	2	10.5	3	16.7
do not know	11	40.7	4	14.8	7	36.9	1	5.5
Total	27	100.0	27	100.0	19	100.0	18	100.0

Which contains cholesterol	Experimental				Control			
	(Initial)		(Final)		(Initial)		(Final)	
	N	%	N	%	N	%	N	%
chicken	4	16.0	9	34.6	3	17.6	12	57.1
margarine	7	28.0	5	19.2	10	58.8	8	38.1
peanut butter	10	40.0	6	23.1	2	11.8	1	4.8
do not know	4	16.0	6	23.1	2	11.8	0	0.0
Total	25	100.0	26	100.0	17	100.0	21	100.0

Table 6, continued.

Reduce fat substitution	Experimental				Control			
	(Initial)		(Final)		(Initial)		(Final)	
	N	%	N	%	N	%	N	%
margarine for butter	10	43.5	16	59.3	6	35.3	11	52.4
skim for 2% milk	6	26.1	9	33.3	5	29.4	7	33.3
cottage for cream	5	21.7	2	7.4	2	11.8	2	9.5
do not know	2	8.7	0	0.0	4	23.5	0	0.0
Total	23	100.0	27	100.0	17	100.0	20	100.0

Most healthy label	Experimental				Control			
	(Initial)		(Final)		(Initial)		(Final)	
	N	%	N	%	N	%	N	%
A	20	76.9	25	92.6	16	84.2	18	90.0
B	1	3.8	2	7.4	0	0.0	2	10.0
Do not know	4	15.3	0	0.0	2	10.5	0	0.0
Total	25	100.0	27	100.0	18	100.0	20	100.0

Best source of fiber	Experimental				Control			
	(Initial)		(Final)		(Initial)		(Final)	
	N	%	N	%	N	%	N	%
cream of wheat	7	26.9	12	44.5	4	22.2	1	5.0
lettuce	2	7.7	4	14.8	2	11.1	1	5.0
kidney beans	13	50.0	10	37.0	11	61.1	17	85.0
do not know	4	15.4	1	3.7	1	5.6	1	5.0
Total	26	100.0	27	100.0	18	100.0	20	100.0

Table 6, continued.

Hydrogenation makes unsaturated fats	Experimental				Control			
	(Initial)		(Final)		(Initial)		(Final)	
	N	%	N	%	N	%	N	%
more saturated	3	12.0	9	34.6	2	11.1	9	42.9
more liquid	1	4.0	3	11.5	2	11.1	6	28.6
safer to eat	5	20.0	5	19.2	1	5.6	2	9.5
do not know	16	64.0	9	34.7	13	72.2	4	19.0
Total	25	100.0	26	100.0	18	100.0	21	100.0

Saturated fats are found in	Experimental				Control			
	(Initial)		(Final)		(Initial)		(Final)	
	N	%	N	%	N	%	N	%
all animal products	9	36.0	5	18.5	4	21.1	9	45.0
all vegetable oils	0	00.0	5	18.5	1	5.3	3	15.0
both a and b	12	48.0	14	51.9	11	57.8	8	40.0
do not know	4	16.0	3	11.1	3	15.8	0	00.0
Total	25	100.0	27	100.0	19	100.0	20	100.0

Table 6, continued.

Mono- and poly- unsaturated fats except	Experimental				Control			
	(Initial)		(Final)		(Initial)		(Final)	
	N	%	N	%	N	%	N	%
helpful in lowering cholesterol	2	8.0	3	12.0	0	0.0	4	22.2
lower in calories	2	8.0	5	20.0	4	23.5	2	11.2
contained in animal	5	20.0	4	16.0	2	11.8	6	33.3
liquid at room temp	5	20.0	7	28.0	2	11.8	5	27.7
do not know	11	44.0	6	24.0	9	52.9	1	5.6
Total	25	100.0	25	100.0	17	100.0	18	100.0

One serving of cooked cereal	Experimental				Control			
	(Initial)		(Final)		(Initial)		(Final)	
	N	%	N	%	N	%	N	%
1/3 cup	7	25.9	2	8.3	3	16.7	6	31.6
1/2 cup	16	59.3	19	79.2	9	50.0	13	68.4
3/4 cup	1	3.7	0	0.0	1	5.6	0	0.0
1 cup	3	11.1	3	12.5	5	27.7	0	0.0
Total	27	100.0	24	100.0	18	100.0	19	100.0

Table 6, continued.

One serving of fresh fruit	Experimental				Control			
	(Initial)		(Final)		(Initial)		(Final)	
	N	%	N	%	N	%	N	%
1/3 cup	2	8.0	1	3.8	3	16.7	1	6.3
1/2 cup	14	56.0	13	50.0	3	16.7	9	56.3
3/4 cup	2	8.0	1	3.8	4	22.2	0	0.0
1 cup	7	28.0	11	42.4	8	44.4	6	37.4
Total	25	100.0	26	100.0	18	100.0	16	100.0

Best choice when eating out to reduce fat	Experimental				Control			
	(Initial)		(Final)		(Initial)		(Final)	
	N	%	N	%	N	%	N	%
salad with oil and vinegar	20	74.1	9	33.4	9	47.4	10	52.6
pasta with marinara	3	11.1	12	44.4	7	36.8	6	31.6
creamed soup	2	7.4	4	14.8	1	5.3	1	5.3
do not know	2	7.4	2	7.4	2	10.5	2	10.5
Total	27	100.0	27	100.0	19	100.0	19	100.0

The frequency distribution of respondents by their level of knowledge is displayed in Table 6. The correct choice of less total fat for best risk reduction had a similar response in pre and post for both the experimental and control groups with 7 (25.9%) to 11(42.3%) and 6 (31.6 %) to 10 (47.6%) respectively. The experimental group increased their correct answer regarding risk with 250 mg/dl by 5.6%, whereas the control group did likewise at 25.1%. Both the control and experimental groups increased their correct answer response pre and

post survey in reducing intake of cholesterol to 200 mg/day. The results were 5 (18.6%) initially and 8 (29.6%) final for the experimental group. The control group responded with 2 (10.5%) and 10 (55.6%) pre and post. Both experimental and control groups had an increase in the correct response pertaining to foods that contain cholesterol. The experimental group responded with 4 (16.0%) initially and 9 (34.6%) post survey. The control group responded with 10 (58.8%) initially and 8 (38.1%) post survey. Responses to substitute foods that reduce fat revealed both the experimental and control groups increased in the incorrect answer of margarine for butter. The experimental group responded with 10 (43.5%) initially and 16 (59.3%) post survey. The control group responded with 6 (35.3%) initially and 11 (52.4%) post survey. In the experimental group, 20 (76.9%) responded initially with the correct answer to most healthy label and 25 (92.6%) reported a correct answer after the intervention. The control group had a similar response with initially 16 (84.2%) and 18 (90.0%) in the final survey. Kidney beans as the best source of fiber was chosen by 13 (50%) initially and 10 (37.0%) post survey by the experimental group. The control group responded with 11 (61.1%) initially and 17 (85%) for the final. There was little difference in the responses of both the control and experimental groups for the question on the term hydrogenation and its function. Three (12.0%) of the experimental group responded with the correct answer of more saturated initially and 9 (34.6%) after intervention. The control group reported 2 (11.1%) initially and 9 (42.9%) post survey. Correct answers to sources of saturated fats increased in the experimental group from 12 (48.0%) initially to 14 (51.9%) post survey. The control group's responses were reversed with 11 (57.8%) initially and 8 (40.0%) post survey. One serving of cooked cereal equals $\frac{1}{2}$ cup as the correct answer was chosen by 16 (59.3%) initially and 19 (79.2%) after intervention by the experimental group.

(48.0%) initially to 14 (51.9%) post survey. The control group's responses were reversed with 11 (57.8%) initially and 8 (40.0%) post survey. One serving of cooked cereal equals $\frac{1}{2}$ cup as the correct answer was chosen by 16 (59.3%) initially and 19 (79.2%) after intervention by the experimental group. The control group's correct answer responses were 9 (50.0%) initially and 13 (68.4%) post survey. Fourteen (56.0%) respondents in the experimental group recorded the correct answer of $\frac{1}{2}$ cup fruit as a serving size initially and 13 (50.0%) after intervention. The control group responded with 3 (16.7%) initially and 9 (56.3%) post survey. Initially and finally, the experimental group's correct responses for the best choice when eating out was 3 (11.1%) and 12 (44.4%), respectively. The control group's correct answer responses dropped from 7 (36.8%) initially to 6 (31.6%) post survey.

Table 7. Distribution of Respondents' Health Behavior Change – Total – Initial

<u>Items</u>	<u>Always</u>		<u>Usually</u>		<u>Sometimes</u>		<u>Never</u>		<u>Total</u>	
	N	%	N	%	N	%	N	%	N	%
Use fat in sauces and gravies	0	0.0	9	22.5	18	45.0	13	32.5	40	100.0
Select smaller portions of high fat foods	5	10.4	12	25.0	23	47.9	8	16.7	48	100.0
Substitute dry beans or peas for meats.	6	12.8	9	19.1	13	27.7	19	40.4	47	100.0
Limit food high in cholesterol.	5	10.4	16	33.3	21	43.8	5	12.5	48	100.0
Limit foods high in fat.	7	14.6	18	37.5	17	35.4	6	12.5	48	100.0
Limit egg yolks.	4	8.5	14	29.8	15	31.9	14	29.8	47	100.0
Read food labels to select lower fat foods.	12	25.0	15	31.3	15	31.3	6	12.5	48	100.0
Reduce the amount of fat called for in a recipe Or added at the table	9	18.8	8	16.7	18	37.5	13	27.1	48	100.0
Trim all visible fat from meat before cooking or eating.	15	13.3	12	25.0	12	25.0	9	18.8	48	100.0
Remove skin from poultry before cooking or eating.	16	33.3	12	25.0	10	20.8	10	27.0	48	100.0

Table 7, continued

<u>Items</u>	<u>Always</u>		<u>Usually</u>		<u>Sometimes</u>		<u>Never</u>		<u>Total</u>	
	N	%	N	%	N	%	N	%	N	%
Use fat in seasoning vegetables.	0	0.0	11	29.7	16	43.2	10	20.8	37	100.0
Bake, broil, steam, or microwave food rather than fry.	13	27.1	12	25.0	14	29.2	9	18.8	48	100.0
Substitute low-fat or skim milk for whole milk when preparing food.	22	45.8	8	16.7	8	16.7	10	20.8	48	100.0
Use non-stick pans or non-stick coatings rather than fat to coat pans.	15	31.3	12	25.0	12	25.0	9	18.8	48	100.0
Substitute liquid vegetable oil for solid fat	24	51.1	7	14.9	11	23.4	5	10.6	47	100.0
Eat fried foods	0	0.0	6	14.6	22	53.7	13	31.7	41	100.0
Eat meats like sausage, cold cuts, bacon, or hot dogs.	0	0.0	13	31.7	20	48.8	8	19.5	41	100.0
Limit foods high in salt.	11	22.9	11	22.9	18	37.5	8	16.7	48	100.0
Add salt at the table.	1	2.4	19	46.3	14	34.1	7	17.1	41	100.0
Cut back on salt in food preparation	16	34.8	10	21.7	14	30.4	6	13.0	46	100.0

The frequency distribution of respondents by their initial level of health behavior change is displayed in Table 7. One fourth (25%) respondents indicated they always read food labels to select lower fat foods. Almost half (47.8%) seldom or never remove skin from poultry before cooking or eating. Twenty-nine ((61.7%) reported limiting egg yolks. Thirty-one (64.4%) sometimes or never reduce the amount of fat called for in a recipe or added at the table, while 26 (64.0%) seldom or never use fat in seasoning vegetables. More than half 28 (68.3) reported as seldom or never eating meats like sausage, cold cuts, bacon, or hot dogs. Slightly more than half 26 (54.2%) limit foods high in salt, while 20 (48.7%) respondents always or usually add salt at the table.

Table 8. Distribution of Respondents' Health Behavior Change – Total - Final

<u>Items</u>	<u>Always</u>		<u>Usually</u>		<u>Sometimes</u>		<u>Never</u>		<u>Total</u>	
	N	%	N	%	N	%	N	%	N	%
Use fat in sauces and gravies	0	0.0	11	22.9	33	70.2	3	6.4	47	100.0
Select smaller portions of high fat foods	7	14.9	25	53.2	14	29.8	1	2.1	47	100.0
Substitute dry beans or peas for meats.	4	8.5	3	6.4	20	42.6	20	42.6	47	100.0
Limit food high in cholesterol.	8	16.7	19	39.6	19	39.6	2	4.2	48	100.0
Limit foods high in fat.	13	27.1	20	41.7	13	27.1	2	4.2	48	100.0
Limit egg yolks.	12	25.0	15	31.3	8	16.7	13	27.1	48	100.0
Read food labels to select lower fat foods.	22	45.8	20	41.7	6	12.5	0	0.0	48	100.0
Reduce the amount of fat called for in a recipe Or added at the table	8	17.4	19	41.3	17	37.0	2	4.3	48	100.0
Trim all visible fat from meat before cooking or Eating.	18	37.5	20	41.7	8	16.7	2	4.2	48	100.0
Remove skin from poultry before cooking or eating.	19	39.6	14	29.2	10	20.8	5	10.4	48	100.0
Use fat in seasoning vegetables.	0	0.0	19	41.3	24	52.2	3	6.5	46	100.0

Table 8, continued.

<u>Items</u>	<u>Always</u>		<u>Usually</u>		<u>Sometimes</u>		<u>Never</u>		<u>Total</u>	
	N	%	N	%	N	%	N	%	N	%
Bake, broil, steam, or microwave food rather than fry.	15	31.3	15	31.3	17	35.4	1	2.1	48	100.0
Substitute low-fat or skim milk for whole milk when preparing food.	29	61.7	8	17.0	2	4.3	8	17.0	47	100.0
Use non-stick pans or non-stick coatings rather than fat to coat pans.	24	50.0	9	18.8	11	22.9	4	8.3	48	100.0
Substitute liquid vegetable oil for solid fat	31	64.6	8	16.7	8	16.7	1	2.1	48	100.0
Eat fried foods	0	0.0	13	27.1	30	62.5	5	10.4	48	100.0
Eat meats like sausage, cold cuts, bacon, or Hot dogs.	0	0.0	13	28.3	29	63.0	4	8.7	46	100.0
Limit foods high in salt.	12	25.0	18	37.5	12	25.0	5	10.6	47	100.0
Add salt at the table.	0	0.0	21	47.7	19	43.2	4	9.1	48	100.0
Cut back on salt in food preparation	10	21.3	20	42.6	12	25.5	5	10.6	47	100.0

The frequency distribution of respondents by their final level of health behavior change is displayed in Table 8. More than three- fourths (87.5%) respondents indicated they always read food labels to select lower fat foods. More than half (68.8%) seldom or never remove skin from poultry before cooking or eating. Twenty-seven (56.3%) reported limiting egg yolks. Nineteen (41.3%) sometimes or never reduce the amount of fat called for in a recipe or added at the table, while 27 (58.7%) seldom or never use fat in seasoning vegetables. More than half 33 (71.7%) reported as seldom or never eating meats like sausage, cold cuts, bacon, or hot dogs. Slightly more than half 30 (62.5%) limit foods high in salt, while 21 (47.7%) respondents usually add salt at the table.

Table 9. Distribution of Respondents' Health Behavior Change – Experimental - Initial

<u>Items</u>	<u>Always</u>		<u>Usually</u>		<u>Sometimes</u>		<u>Never</u>		<u>Total</u>	
	N	%	N	%	N	%	N	%	N	%
Use fat in sauces and gravies	0	0.0	4	19.0	10	47.6	7	33.3	21	100.0
Select smaller portions of high fat foods	2	7.4	9	33.3	10	37.0	6	22.2	27	100.0
Substitute dry beans or peas for meats.	3	11.1	8	29.6	8	29.6	8	29.6	27	100.0
Limit food high in cholesterol.	4	14.8	9	33.3	9	33.3	5	18.5	27	100.0
Limit foods high in fat.	4	14.8	11	40.7	9	33.3	3	11.1	27	100.0
Limit egg yolks.	3	11.5	10	38.5	6	23.1	7	26.9	26	100.0
Read food labels to select lower fat foods.	9	33.3	8	29.6	8	29.6	2	7.4	27	100.0
Reduce the amount of fat called for in a recipe Or added at the table	6	22.2	6	22.2	11	40.7	4	14.8	27	100.0
Trim all visible fat from meat before cooking or Eating.	8	29.6	6	51.9	9	85.2	4	14.8	27	100.0
Remove skin from poultry before cooking or eating.	10	37.0	5	18.5	6	22.2	6	22.2	27	100.0

Table 9, continued.

<u>Items</u>	<u>Always</u>		<u>Usually</u>		<u>Sometimes</u>		<u>Never</u>		<u>Total</u>	
	N	%	N	%	N	%	N	%	N	%
Use fat in seasoning vegetables.	0	0.0	5	25.0	9	45.0	6	30.0	20	100.0
Bake, broil, steam, or microwave food rather than fry.	9	33.3	4	14.8	9	33.3	5	18.5	27	100.0
Substitute low-fat or skim milk for whole milk when preparing food.	13	48.1	4	14.8	3	11.1	7	25.9	27	100.0
Use non-stick pans or non-stick coatings rather than fat to coat pans.	9	33.3	5	18.5	7	25.9	6	22.2	27	100.0
Substitute liquid vegetable oil for solid fat	15	55.6	3	11.1	7	25.9	2	7.4	27	100.0
Eat fried foods	0	0.0	2	8.7	12	52.2	9	39.1	27	100.0
Eat meats like sausage, cold cuts, bacon, or Hot dogs.	0	0.0	7	28.0	11	44.0	7	28.0	27	100.0
Limit foods high in salt.	6	22.2	7	25.9	10	37.0	4	14.8	27	100.0
Add salt at the table.	1	4.0	11	44.0	9	36.0	4	16.0	27	100.0
Cut back on salt in food preparation	9	34.6	5	19.2	9	34.6	3	11.5	26	100.0

The frequency of distribution of respondents by experimental group's initial level of health behavior change is displayed in Table 9. Seventeen (80.9%) respondents indicated the sometimes or never use fat in sauces and gravies. Only 11 (40.7%) respondents always or usually select smaller portions of high fat foods. About half, 13 (48.1%) respondents reported limiting food high in cholesterol. Whereas, 15 (55.5%) reported always or usually limit foods high in fat. More than half, 18 (66.7%) stated always or usually substituting liquid vegetable oil for solid fat. Only 7 (28.0%) indicated always or usually eating meats like sausage, cold cuts, bacon or hot dogs.

Table 10. Distribution of Respondents' Health Behavior Change – Experimental - Final

<u>Items</u>	<u>Always</u>		<u>Usually</u>		<u>Sometimes</u>		<u>Never</u>		<u>Total</u>	
	N	%	N	%	N	%	N	%	N	%
Use fat in sauces and gravies	0	0.0	3	11.1	22	81.5	2	7.4	27	100.0
Select smaller portions of high fat foods	2	7.4	13	48.1	12	44.4	0	0.0	27	100.0
Substitute dry beans or peas for meats.	2	7.4	1	3.7	11	40.7	13	48.1	27	100.0
Limit food high in cholesterol.	4	14.8	8	29.6	13	48.1	2	7.4	27	100.0
Limit foods high in fat.	5	18.5	12	44.4	9	33.3	1	3.7	27	100.0
Limit egg yolks.	4	14.8	8	29.6	4	14.8	11	40.7	27	100.0
Read food labels to select lower fat foods.	8	29.6	15	55.6	4	14.8	0	0.0	27	100.0
Reduce the amount of fat called for in a recipe Or added at the table	4	15.4	8	30.8	12	46.2	2	7.7	26	100.0
Trim all visible fat from meat before cooking or Eating.	9	33.3	12	44.4	4	14.8	2	7.4	27	100.0
Remove skin from poultry before cooking or eating.	11	40.7	8	29.6	6	22.2	2	7.4	27	100.0
Use fat in seasoning vegetables.	0	0.0	9	34.6	15	57.7	2	7.7	26	100.0

Table 10, continued.

<u>Items</u>	<u>Always</u>		<u>Usually</u>		<u>Sometimes</u>		<u>Never</u>		<u>Total</u>	
	N	%	N	%	N	%	N	%	N	%
Bake, broil, steam, or microwave food rather than fry.	6	22.2	9	33.3	11	40.7	1	3.7	27	100.0
Substitute low-fat or skim milk for whole milk when preparing food.	15	57.7	4	15.4	2	7.7	5	19.2	27	100.0
Use non-stick pans or non-stick coatings rather than fat to coat pans.	11	40.7	5	18.5	8	29.6	3	11.1	27	100.0
Substitute liquid vegetable oil for solid fat	15	55.6	4	14.8	7	25.9	1	3.7	27	100.0
Eat fried foods	0	0.0	3	11.1	21	77.8	3	11.1	27	100.0
Eat meats like sausage, cold cuts, bacon, or Hot dogs.	0	0.0	4	16.0	20	80.0	1	4.0	25	100.0
Limit foods high in salt.	5	18.5	10	37.0	7	25.9	5	18.5	27	100.0
Add salt at the table.	0	0.0	11	44.0	11	44.0	3	12.0	25	100.0
Cut back on salt in food preparation	3	11.5	12	46.2	8	30.8	3	11.5	26	100.0

The frequency of distribution of respondents by experimental group's final level of health behavior change is displayed in Table 10. Twenty-four (89%) respondents indicated they sometimes or never use fat in sauces and gravies, up from eighty-one percent. Fifteen (55.5%) respondents always or usually select smaller portions of high fat foods. Almost half, 12 (44.4%) respondents reported limiting food high in cholesterol. Whereas, 17 (62.9%) reported always or usually limit foods high in fat. More than half, 19 (70.4%) stated always or usually substituting liquid vegetable oil for solid fat. Only 4 (16.0%) indicated always or usually eating meats like sausage, cold cuts, bacon or hot dogs.

Table 11. Distribution of Respondents' Health Behavior Change – Control - Initial

<u>Items</u>	<u>Always</u>		<u>Usually</u>		<u>Sometimes</u>		<u>Never</u>		<u>Total</u>	
	N	%	N	%	N	%	N	%	N	%
Use fat in sauces and gravies	0	0.0	5	26.3	8	42.1	6	31.6	19	100.0
Select smaller portions of high fat foods	3	14.3	3	14.3	13	61.9	2	9.5	21	100.0
Substitute dry beans or peas for meats.	3	15.0	1	5.0	5	25.0	11	55.0	20	100.0
Limit food high in cholesterol.	1	4.8	7	33.3	12	57.1	1	4.8	21	100.0
Limit foods high in fat.	3	14.3	7	33.3	8	38.1	3	14.3	21	100.0
Limit egg yolks.	1	4.8	4	19.0	9	42.9	7	33.3	21	100.0
Read food labels to select lower fat foods.	3	14.3	7	33.3	7	33.3	4	19.0	21	100.0
Reduce the amount of fat called for in a recipe Or added at the table	3	14.3	2	9.5	7	33.3	9	42.9	21	100.0
Trim all visible fat from meat before cooking or Eating.	7	33.3	6	28.6	3	14.3	5	23.8	21	100.0
Remove skin from poultry before cooking or eating.	6	28.6	7	33.3	4	19.0	4	19.0	21	100.0
Use fat in seasoning vegetables.	0	0.0	6	35.3	7	41.2	4	23.5	17	100.0

Table 11, continued.

<u>Items</u>	<u>Always</u>		<u>Usually</u>		<u>Sometimes</u>		<u>Never</u>		<u>Total</u>	
	N	%	N	%	N	%	N	%	N	%
Bake, broil, steam, or microwave food rather than fry.	4	19.0	8	38.1	5	23.8	4	19.0	21	100.0
Substitute low-fat or skim milk for whole milk When preparing food.	9	42.9	4	19.0	5	23.8	3	14.3	21	100.0
Use non-stick pans or non-stick coatings rather than fat to coat pans.	6	28.6	7	33.3	5	23.8	3	14.3	21	100.0
Substitute liquid vegetable oil for solid fat	9	45.0	4	20.0	4	20.0	3	15.0	20	100.0
Eat fried foods	0	0.0	4	22.2	10	55.6	4	22.2	18	100.0
Eat meats like sausage, cold cuts, bacon, or Hot dogs.	0	0.0	6	37.5	9	56.3	1	6.3	16	100.0
Limit foods high in salt.	5	23.8	4	19.0	8	38.1	4	19.0	21	100.0
Add salt at the table.	0	0.0	8	50.0	5	31.3	3	18.8	21	100.0
Cut back on salt in food preparation	7	35.0	5	25.0	5	25.0	3	15.0	20	100.0

The frequency distribution of control respondents by their initial level of health behavior change is displayed in Table 11. Fourteen (73.7%) respondents indicated they sometimes or never use fat in sauces and gravies. Six (28.6%) respondents always or usually select smaller portions of high fat foods. Only 8 (38.1%) respondents reported limiting food high in cholesterol. Whereas, 10 (47.6%) reported always or usually limit foods high in fat. More than half, 13 (65.0%) stated always or usually substituting liquid vegetable oil for solid fat. Only 6 (22.2%) indicated always or usually eating meats like sausage, cold cuts, bacon or hot dogs.

Table 12. Distribution of Respondents' Health Behavior Change – Control - Final

<u>Items</u>	<u>Always</u>		<u>Usually</u>		<u>Sometimes</u>		<u>Never</u>		<u>Total</u>	
	N	%	N	%	N	%	N	%	N	%
Use fat in sauces and gravies	0	0.0	8	40.0	11	55.0	1	5.0	20	100.0
Select smaller portions of high fat foods	5	25.0	12	60.0	2	10.0	1	5.0	20	100.0
Substitute dry beans or peas for meats.	2	10.0	2	10.0	9	45.0	7	35.0	20	100.0
Limit food high in cholesterol.	4	19.0	11	52.4	6	28.6	0	0.0	21	100.0
Limit foods high in fat.	8	38.1	8	38.1	4	19.0	1	4.8	21	100.0
Limit egg yolks.	8	38.1	7	33.3	4	19.0	2	9.5	21	100.0
Read food labels to select lower fat foods.	14	66.7	5	23.8	2	9.5	0	0.0	21	100.0
Reduce the amount of fat called for in a recipe Or added at the table	4	20.0	11	55.0	5	25.0	0	0.0	21	100.0
Trim all visible fat from meat before cooking or Eating.	9	42.9	8	38.1	4	19.0	0	0.0	21	100.0
Remove skin from poultry before cooking or eating.	8	38.1	6	28.6	4	19.0	3	14.3	21	100.0

Table 12, continued.

<u>Items</u>	<u>Always</u>		<u>Usually</u>		<u>Sometimes</u>		<u>Never</u>		<u>Total</u>	
	N	%	N	%	N	%	N	%	N	%
Use fat in seasoning vegetables.	0	0.0	10	50.0	9	45.0	1	5.0	20	100.0
Bake, broil, steam, or microwave food rather than fry.	9	42.9	6	28.6	6	28.6	0	0.0	21	100.0
Substitute low-fat or skim milk for whole milk when preparing food.	14	66.7	4	19.0	0	0.0	3	14.3	21	100.0
Use non-stick pans or non-stick coatings rather than fat to coat pans.	13	61.9	4	19.0	3	14.3	1	4.8	21	100.0
Substitute liquid vegetable oil for solid fat	16	76.2	4	19.0	1	4.8	0	0.0	21	100.0
Eat fried foods	0	0.0	10	47.6	9	42.9	2	9.5	21	100.0
Eat meats like sausage, cold cuts, bacon, or Hot dogs.	0	0.0	9	42.9	9	42.9	3	14.3	21	100.0
Limit foods high in salt.	7	35.0	8	40.0	5	25.0	0	0.0	20	100.0
Add salt at the table.	0	0.0	10	52.6	8	42.1	1	5.3	19	100.0
Cut back on salt in food preparation	7	33.3	8	38.1	4	19.0	2	9.5	21	100.0

The frequency distribution of control respondents by their final level of health behavior change is displayed in Table 12. Twelve (60.0%) respondents indicated they sometimes or never use fat in sauces and gravies. Seventeen (85.0%) respondents always or usually select smaller portions of high fat foods. Fifteen (71.4%) respondents reported always or usually limiting food high in cholesterol. Whereas, 16 (76.2%) reported always or usually limit foods high in fat. Almost all, 20 (95.2%) stated always or usually substituting liquid vegetable oil for solid fat. Nine (42.9%) indicated always or usually eating meats like sausage, cold cuts, bacon or hot dogs.

Table 13. Difference in Knowledge of Health Factors

		Initial	Final	
Dietary choices to reduce heart disease	Experimental	.26	.33	
	Control	.29	.28	
Risk of 250 mg/dl of blood cholesterol	Experimental	.44	.11	
	Control	.38	.33	
Reduce intake of Cholesterol	Experimental	.07	.07	
	Control	.10	.24	
Food group containing Cholesterol	Experimental	.19	.56	*
	Control	.10	.57	*
Cannot substitute Margarine for butter	Experimental	.33	.89	*
	Control	.33	.90	*
More healthy label	Experimental	.11	.19	
	Control	.14	.38	
Best source of fiber	Experimental	.07	.33	*
	Control	.10	.19	
Role of hydrogenation	Experimental	.74	.33	
	Control	.76	.10	
Saturated fats found in Foods	Experimental	.48	.04	
	Control	.52	.10	
Foods high in sodium olives	Experimental	.26	.82	*
	Control	.29	.90	*
Foods high in sodium potato chips	Experimental	.52	.78	*
	Control	.62	.90	*
Foods high in sodium hot dogs	Experimental	.74	.85	
	Control	.81	.81	
Mono- and poly-unsaturated fats characteristics	Experimental	.07	.18	
	Control	.19	.09	

Table 13, continued.

One serving cooked cereal Rice or pasta	Experimental Control	0 .05	0 .48	*
One serving fruit	Experimental Control	0 0	0 0	
Risk factors for heart Disease – too much exercise	Experimental Control	.78 .76	.22 .67	
Risk factors for heart Disease – high HDL level	Experimental Control	.04 .05	.63 .81	* *
Risk factors for heart Disease – diabetic	Experimental Control	0 .10	0 1.00	*
Risk factors for heart Disease – family history	Experimental Control	.22 .19	.52 .05	* *
Risk factors for heart Disease – location of Body fat	Experimental Control	.11 .10	.70 .95	* *
Risk factors for heart Disease – high total Blood cholesterol	Experimental Control	.22 .19	.67 .71	* *
Best choice to limit Fat intake	Experimental Control	.30 .10	.41 .57	

* Significant at .05

The frequency of distribution of respondents by the experimental and control groups difference in knowledge of health factors is displayed in Table 13. The experimental group increased their dietary choices to reduce heart disease by .07 while the control group decreased by .01. Reduction of cholesterol intake by the experimental group remained the same. The control group had an increase in this area by .14. Both the experimental group and control group indicated an increase in identifying foods

containing cholesterol with .37 and .47 significance, respectively. Likewise, both control and experimental groups reported correct answers of margarine being a poor substitute for butter. The significant result was .56 for the experimental group and .57 for the control group. The experimental group made a significant improvement (.26) in choosing best source of fiber with an increase in correct answer chosen. Both groups increased knowledge in selecting food high in sodium with varying significance. Although there was no change in hot dogs containing sodium within the control group. There was no indication of knowledge gain in the experimental group pertaining to mono- and poly-unsaturated fats characteristics. However, the control group indicated a .57 increase in knowledge in this area. Again the experimental group reported no difference in selecting the correct answer for one serving of cooked cereal. The experimental group gained significance of .43 in reporting the correct answer. Both the control and experimental groups revealed significant increases in knowledge of HDL cholesterol and it's meaning. Identifying risk factors for heart disease and diabetes remained unchanged for the experimental group, but gained in significance (.90) in the control group. However, risk factors for heart disease and family history resulted in a significant change in the experimental group (.30) and decreased in the control group (.14). Both experimental and control groups had significant changes in understanding risk factors of heart disease regarding location of body fat and high total blood cholesterol. There was some change in both groups identifying the best choices to limit fat intake, but not significantly.

Chapter 5

SUMMARY, CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS

In this chapter there is a summary of the study, a presentation of the conclusions with their implications and recommendations for the profession and for further research.

Summary

Nutrition educators of people with diet related risks of disease face an ever-changing landscape. More than thirty years ago, poor nutrition was associated with the lack of accessible, healthy food choices. Presently, poor nutrition and prevalence of chronic diseases are caused more often by the increase in total calorie consumption, poor choice, of healthy foods and decrease in exercise. The focus of this research was to evaluate the nutritional behavior change of physician referred patients through participation in an Extension education program. The goal was to explore whether the intervention of an Extension program impacts health behavior change in program participants to a greater extent than in a control group. Personal characteristics, tests of knowledge gained, behavior change, and the relationship between variables and program participation were employed through a fifteen-week intervention study.

Data were collected by utilizing a pre and post survey instrument developed for the purpose of determining the effects of the variables in relation to the dependent variable participation in an Extension nutrition education program. Data analysis consisted of t-tests, frequency distributions and statistical means. The level of significance was .05 for all statistical tests.

Participation in an Extension nutritional education intervention program appeared to have no significant effect on health behavior change. The participants in the experimental group held no significant change in knowledge of health factors compared with participants in the control group.

Conclusions

Conclusion 1 Nutrition education intervention strategies to produce a change in program participants' health behavior was inconclusive due to limitations in the study. The research sustained missing data in both the control and intervention groups limiting the statistical analysis. Although there was evidence in knowledge gained by program participants, significant behavior change was determined inconclusive within the fifteen-week intervention period.

Conclusion 2 Program participants' health behaviors differing from non-program participants was inconclusive due to limitations of dosage levels. The number of initial contacts, participant dropouts and refusals to participate in the program were not recorded effectively for the study. A future study would require more precise dosage strategies. A major factor in the delivery of nutrition programs is the location in which these programs are conducted. Having held the nutrition lessons in the waiting room of their personal local physicians' office, one would speculate that it provides a good location with a "ready audience" that was identified as high risk for chronic disease. The learning environment was non-threatening and familiar to the experimental group. Perhaps participants felt a sense of forceful voluntary participation since they were strongly encouraged to attend the sessions by

the local physician, who is a perceived authority figure in a rural community. Morstain and Smart (1974) identified one of their six factors of participation as external expectations. These participants are complying with the wishes or directives of someone else with authority. There is some speculation by the author that indicates participants in the intervention and control groups did not fully understand the nutritional terms and answered questions through random guesswork. Although there were some positive behavior changes as indicated by correct responses, none were significant.

Conclusion 3 Demographic variables do not influence behavior change. The research showed no significant differences in behavior change based on the characteristics of age, gender and personal demographic data. This researcher postulates this result was due to a homogeneous sample of females (77.1%) and age (50 and above). The majority of respondents (85.1%) had educational attainments of some college or less. Less than half (45.9%) of the respondents, when asked, indicated a total household income of \$45,000 or less. In addition, 10 respondents (20.8%) did not care to answer the question on income levels, thus possibly increasing the percentage of household incomes \$45,000 or less.

Conclusion 4 Familial factors do not contribute to adoption of practices.

The research demonstrated no significant change in behavior or adoption of good health practices based on familial factors. Although more than half (58.1%) of respondents reported heart disease prevalence in the immediate family this did not influence their behavior change significantly within the fifteen week intervention study. While (46.2%) or 12 of 26 reporting indicated their father as having heart diseases, participants equally reported (19.2%) a

grandparent or mother as having heart disease. Although men have typically been the major target of heart disease for many years, recent statistics indicate an alarming increase of women having heart disease as well. Considering the majority of participants were women, the author speculates that participants may have felt distanced from the possibility of heart disease because of their gender. Their responses reveal that in their lifetime experiences a greater number of male family members have had heart disease.

Recommendations for the Profession

One of the hardest goals to accomplish in nutrition education is attaining, measurable, lasting behavior change. There exists a considerable amount of theory and empirical research which could give direction to program development in nutrition education for adults and children. However, few studies of nutrition education cite any theoretical basis. Many studies seem to assume that knowledge will influence attitudes which, in turn, changes behavior. Studies have shown, however, that this does not support nutrition behaviors (Sims, Shepard, Price, and Randell, 1995) The false perception of the nutrition educator would suggest that the use of the Health Belief Model alone would influence behavior change. The hope is, for some, just learning what would make participants healthy would cause them to change behavior. Interactive teaching methods and personal learning activities were used to build on each participant's knowledge base, skill and self-efficacy. More personalized nutritional information may have assisted in a higher result of behavior change.

Considering that one out of three adults in the United States is overweight and one out of four is more than 20 percent overweight, nutrition educators are needed now more than ever. And the demand will increase to meet the supply of inactive overweight populations.

Analysis of this research shows 35.5% respondents weighing more than 191 pounds pre survey and 36.2% weighing more than 191 pounds post survey. The preventive measures nutrition educators can deliver can make an impact over a long period of time. These preventive methods will inevitably reduce health care costs.

Some people do not have enough resources to acquire adequate nutrition. Particularly in the lower income sectors, nutritious foods are often not a priority in the household budgets. This is true particularly with older adults. They often are forced to make choices between food and medications. Many individuals lack the information and skills needed to select a nutritious diet. There are still those who do not know they need to make changes, while others simply choose to ignore current nutrition recommendations.

Research studies have shown that eating a high fat diet can lead to heart disease. Identifying this link produced convincing results that eating a low fat diet can reduce the risk of heart disease. As people became aware of these findings, they began to change their eating habits. Consumers are now buying and eating more reduced fat products than ever before. This thought is consistent with the analysis of this research. Almost half of the respondents (47.9%) at post survey revealed choosing less total fat as a best risk reduction to heart disease. However, on the average, consumers are now eating more total calories and they are more likely to be overweight. These factors have kept the overall risk of heart disease and other chronic disease from decreasing. Analysis of this research shows respondents were still unsure of serving sizes pre and post survey.

Recommendations for Further Research

The following recommendations are drawn from the findings and conclusions of this research, the review of literature and the personal experience of the author.

1. The main limitation of this study was the small sample size. The intervention group entailed twenty-seven participants and the control group consisted of twenty-one participants. Also the 3:1 ratio of women to men respondents may have skewed the results. Additional insight on the respondents' characteristics might have been gained with a greater response rate.
2. Fifteen weeks of intervention is not long enough to produce positive behavior change to the extent of reducing chronic diseases. Perhaps lengthier interventions would result in greater positive change. Other research suggest anywhere from sixteen to thirty-five weeks for intervention and positive behavior change.
3. One troubling view from this study was that many participants were the gatekeepers for food purchasing, preparation and serving food to their family members. Having more family members involved in the intervention process may result in a higher percentage of positive behavior change. Surely, a holistic familial approach may generate more enthusiasm and motivation to succeed. The author suggests a longitudinal study of two or more family members to assess reduction of risk factor associated with chronic disease.
4. Additional research should focus on what nutrition educators need to promote positive behavior change in participants. Why, after being shown quantitative and qualitative data pertaining to health risk factors, do people not change? External factors and internal factors influencing motivation to change would lend guidance to

future nutrition education programs. As suggested by Maslow (1970) when a need is satisfied, the motivational role declines in importance. However, as one need is satisfied, another need emerges to take the place of the original need. Therefore, people are always striving to satisfy some need.

5. Research-based nutrition education from Extension sources provide the basis for this study. One reason people give for disregarding nutrition recommendations is some nutrition messages are unclear or contradictory. Sources of nutrition information, based on some studies, contradict Extension's information. Analysis of where people are receiving information and, in fact, making changes based on this information, would help nutrition educators to zero in on misconceptions and beliefs about nutrition.

So how are we as a society going to commit our resources for the future? Providing people with a band-aid approach to chronic disease is reactive. It would prove to cost-effective to put more monetary and human resources into prevention of chronic disease. How will lawmakers, health professionals, business leaders, and educators work together to address overweight and inactivity that lead to chronic disease? Increasing positive behavior change through collaborative efforts of disseminating research-based nutrition information utilizing the best methods available is a lofty goal. All goals are achieved by taking the first small step.

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APPENDICES

Appendix A

GIVE YOUR HEART A HEALTHY BEAT!

Registration Form

Please complete this form and the attached "Rate Your Risk" form and bring to the first session.

Today's Date _____

Name _____ Phone (day) _____

Address _____

County I live in _____

Health Information (if available)

Height _____ Weight _____ BMI _____

Waist-Hip Ratio _____

Total Blood Cholesterol _____ LDL Cholesterol _____ HDL Cholesterol _____

Blood Pressure _____ Rate Your Risk Score _____

Please tell us about yourself

Gender: _____ Male _____ Female

Race: _____ Caucasian _____ African American
 _____ Asian _____ Hispanic
 _____ Native American _____ Other _____

Date of Birth (month/day/year): _____

My highest level of education is (select only one):

_____ Up to grade 8 _____ Some High School
 _____ High school diploma or GED _____ Technical or vocational College
 _____ Some college _____ Baccalaureate
 _____ Post-baccalaureate

Number of people who live in your household (including yourself): _____

What is your monthly household income (before taxes)?

- Less than \$600 (less than \$7,200 per year)
- \$601 to \$950 (\$7,201 to \$11,400 per year)
- \$951 to \$1,250 (\$11,401 to \$15,000 per year)
- \$1,251 to \$2,083 (\$15,001 to \$25,000 per year)
- \$2,084 to \$2,917 (\$25,110 to \$35,000 per year)
- \$2,918 to \$3,750 (\$35,001 to \$45,000 per year)
- \$3,751 to \$5,417 (\$45,001 to \$65,000 per year)
- \$5,418 to \$7,083 (\$65,001 to \$85,000 per year)
- More than \$7,083 (over \$85,000 per year)
- I do not care to answer

Do you have cardiovascular disease? Yes No

If so, name of the condition. _____

Has somebody close to you ever had cardiovascular disease? Yes No

If they are a relative, please tell us your relationship, such as father, mother _____

Please tell me what you hope to accomplish in this class.

How did you hear about the class?

GIVE YOUR HEART A HEALTHY BEAT!

What Do You Already Know?

Date of birth_____

Today's date_____

*Circle the **best** answer to each of the questions.*

1. Which of the following dietary choices would **best** reduce risk for heart disease/heart attack or stroke?

a. less cholesterol	c. fewer animal products
b. less total fat	d. I do not know.

2. A person who has a blood cholesterol level of 250 milligrams/deciliter (mg/dl) is at what risk for heart disease?

a. none	c. high
b. moderate	d. I do not know

3. Americans should reduce their intake of cholesterol to no more than:

a. 100 mg/day	c. 300 mg.day
b. 200 mg/day	d. I do not know

4. Which one of these food groups contains cholesterol?

a. chicken	c. peanut butter
b. margerine	d. I do not know

5. When substituted in equal amounts, all of the following will reduce fat content in a recipe **except**:

a. margerine for butter	c. skim milk for 2% milk
b. cottage cheese for cream cheese	d. I do not know.

6. Name three ways to cut down on sodium intake.
 - a.
 - b.
 - c.

7. From the following 2 labels (A & B) choose which one is more healthful.

23. Are you seriously thinking about avoiding fat and high-fat food sometime in the next 6 months?
- a. yes b. no c. I do not know
24. How much salt and salty food do you eat each day?
- a. Very little; I always try to avoid salt and salty food.
b. Some; I try to avoid salt and salty food.
c. The same as most people; I don't really try to avoid salt and salty food.
d. Probably too much; I don't like food that tastes "flat."
25. How long have you been eating this amount of salty food?
- a. less than 1 month c. 4 to 6 months
b. 1 to 3 months d. longer than 6 months
e. I do not know.
26. Are you seriously thinking about avoiding salt and salty food sometime in the next month?
- a. yes b. no c. I do not know
27. Are you seriously thinking about avoiding salt and salty food sometimes in the next 6 months?
- a. yes b. no c. I do not know

Please tell us your opinions about heart disease. Choose "yes" or "no" for each of the following:

28. yes no One cannot do anything to reduce their risk of heart disease.
29. yes no If a person has heart disease, it is his or her own fault.
30. yes no Most people with heart disease can enjoy life.
31. yes no People who do not take care of themselves may have a heart attack.

GIVE YOUR HEART A HEALTHY BEAT!

What Do You Do?

How often do you do the following? (Check the response that best describes your habits.)

<i>Habits</i>	<i>Almost Always</i>	<i>Usually</i>	<i>Sometimes</i>	<i>Rarely/ Never</i>	<i>Doesn't Apply</i>
Use fat in sauce and gravies					
Select smaller portions of high-fat food					
Substitute dry beans or peas for meats					
Limit foods high in cholesterol.					
Limit foods high in fat.					
Limit egg yolks.					
Read food labels to select lower fat foods					
Reduce the amount of fat called for in a recipe or added at the table					
Trim all visible fat from meat (beef, chicken, or pork) before cooking or eating.					
Remove skin from poultry before cooking or eating.					
Use fat in seasoning vegetables.					
Bake broil, steam, or microwave food rather than fry.					
Substitute low-fat or skim milk for whole milk when preparing food.					
Use non-stick pans or non-stick coatings rather than fat to coat pans..					
Substitute liquid vegetable oil for solid fat.					
Eat fried foods.					
Eat meats like sausage, cold cuts, bacon, or hot dogs.					
Limit foods high in salt.					
Add salt at the table.					
Cut back on salt in food preparation.					

Appendix B

A HEALTHY BEAT!

Rate Your Risk

Birthdate _____

Many factors affect cardiovascular disease, but you can use the following chart to get a rough estimate of your risk. Add your numbers from each category, and compare your total with the box on the next page.

Blood Cholesterol (mg/dl)	<input type="checkbox"/> Below 160	<input type="checkbox"/> 160-180	<input type="checkbox"/> 181-200	<input type="checkbox"/> 201-240	<input type="checkbox"/> 241 or higher
Blood Pressure (systolic-top number)	<input type="checkbox"/> Below 130	<input type="checkbox"/> 131-139	<input type="checkbox"/> 140-159	<input type="checkbox"/> 160-179	<input type="checkbox"/> 180 or higher
Waist-Hip Ratio	<input type="checkbox"/> Below 0.8 (female)	<input type="checkbox"/> Above 0.8 (female)	<input type="checkbox"/> Below 1.0 (male)	<input type="checkbox"/> Above 1.0 (male)	<input type="checkbox"/> N/A
Heredity	<input type="checkbox"/> No Known History of cardiovascular disease	<input type="checkbox"/> One relative with heart disease over 60 years	<input type="checkbox"/> Two relatives with heart disease over 60 years	<input type="checkbox"/> On relative with Heart disease under 60 years	<input type="checkbox"/> Two relatives heart disease under 60 years
Exercise	<input type="checkbox"/> Intensive exercise, work, and recreation	<input type="checkbox"/> Moderate exercise, work, and recreation exercise	<input type="checkbox"/> Sedentary work; intensive recreational exercise	<input type="checkbox"/> Sedentary work; moderate recreational exercise	<input type="checkbox"/> Sedentary work; light recreational exercise
Age	<input type="checkbox"/> 10-20	<input type="checkbox"/> 21-30	<input type="checkbox"/> 31-40	<input type="checkbox"/> 41-50	<input type="checkbox"/> 51 and older

Weight	<input type="checkbox"/> More than 5 pounds below standard weight	<input type="checkbox"/> Within 5 pounds of standard weight	<input type="checkbox"/> 6-20 pounds overweight	<input type="checkbox"/> 21-35 pounds overweight	<input type="checkbox"/> More than 35 overweight
Tobacco Usage	<input type="checkbox"/> None	<input type="checkbox"/> 1-9 cigarettes per day; Cigar or Pipe	<input type="checkbox"/> 10-19 cigarettes per day;	<input type="checkbox"/> 20-29 cigarettes per day	<input type="checkbox"/> More than 30 cigarettes per day
Intake of fat	<input type="checkbox"/> No animal or solid fats	<input type="checkbox"/> Very little animal or solid fats	<input type="checkbox"/> Little animal or solid fats	<input type="checkbox"/> Much animal or solid fats	<input type="checkbox"/> Very much animal or solid fats

(Chart adapted from Linda Loma School of Public Health – Linda Loma University)

*Scoring low does not ensure a long, disease-free life,
 And a high score doesn't mean you are sure to have a heart attack or stroke.
 But your score should help you to set some personal goals for a healthy cardiovascular system.
 Since other conditions can affect your cardiovascular health,
 Discuss your concerns with your doctor.*

What is your risk?

4-9	Remote Risk
10-15	Low Risk
16-20	Average Risk
21-25	Moderate Risk
26-30	High Risk
31-35	Very High Risk
Above 35	Extremely High Risk

Appendix C

Heart Disease Risk Reduction Program Release

This program is a heart disease risk reduction program consisting of healthy eating and walking, with an emphasis on your individual capabilities. There exists the possibility of certain biological changes occurring during your participation in the walking exercises. These changes include, but are not limited to: abnormal blood pressure, fainting, disorder of the heart beat and, in rare instances, heart attack or death. Thus, prior to participating in this program it is advisable that you consult a physician. If you choose not to consult a physician, the waiver form below must be executed.

Physician Approval/Waiver of Medical Exam

Please indicate that you have consulted a physician by signing and dating Paragraph A. If you have chosen not to consult a physician, Paragraph B must be executed.

A. Physician Approval

I hereby stipulate that I am physically sound and that I have medical approval to proceed with a normal routine of exercise and healthy eating in the *Give Your Heart A Healthy Beat* program.

Signature of Participant

Date

B. Waiver of Medical Examination

I hereby make a knowing and informed waiver of the suggested medical exam and certify

Appendix D

North Carolina State University Research Consent Form

I agree to participate in a North Carolina Cooperative Extension Service research study regarding nutritional behavioral change. I understand that my participation is voluntary.

I agree for the medical office to supply data from my medical records including height, weight, body mass index, waist-hip ratio, cholesterol and blood pressure.

Information about me will not be used as an individual, but included in group data and treated as confidential.

I understand that the group data will be part of Jo Ann Williams' graduate research project.

Signature_____

Address_____

Telephone_____