EFFECTS OF AN EDUCATION PROGRAM UTILIZING THE DIETARY GUIDELINES AND FOOD GUIDE PYRAMID ON DIET AND HEALTH

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1994

Submitted to the Faculty of the Graduate College of the Oklahoma State University in partial fulfillment of the requirements for the Degree of MASTER OF SCIENCE May, 1998

EFFECTS OF AN EDUCATION PROGRAM UTILIZING THE DIETARY GUIDELINES AND FOOD GUIDE PYRAMID ON DIET AND HEALTH

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ACKNOWLEDGMENTS

I wish to express my deepest appreciation to my major advisor, Dr. Janice Hermann, for her countless hours spent guiding me through every phase of this thesis. She was there every step of the way with encouragement, laughter, and advice and continues to be an inspiration for me. Sincere appreciation is also extended to my research committee members Dr. Lea Ebro and Dr. Barbara Brown. Dr. Ebro, I want to thank you for all your support throughout my dietetic internship and graduate school. Dr. Brown, it has been a pleasure working with you and I appreciate all your insights during the final revisions of this thesis.

Special thanks to Andrea Arquitt, Assistant Professor Nutritional Sciences, Mary Selk, Payne County Home Economist, Billie Johnson, Cooperative Extension Service Secretary, and Pam, Cooperative Extension Service Secretary.

This research thesis is dedicated to my parents, Jack & Shelby Morrison, my sister, Debbie Morrison, my brother, Mark Morrison, and my husband, David Heintz. I want to thank you for all your encouragement, support, unconditional love, and belief in me. Last but not least, I want to thank Ben for all of the warmhearted tail wags that greeted me after some very challenging days.

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NOMENCLATURE

ADA American Dietetic Association

FDA Food and Drug Administration

FMI Food Marketing Institute

HHS U.S. Department of Health and Human Services

IFIC International Food Information Council

IOM Institute of Medicine

NAS National Academy of Science

NCI National Cancer Institute

NHLBI National Heart, Lung, and Blood Institute

USDA United States Department of Agriculture

CHAPTER I

INTRODUCTION

The role of diet in the etiology and prevention of chronic disease has been well established (IOM, 1991). With an increased incidence of nutrition-related chronic diseases, there have been various coordinated efforts to improve America's diet and health. For example, the following federal publications address the need for improved and healthier lifestyles (IOM, 1991):

- Healthy People 2000: National Health Promotion and Disease Prevention Objectives
- The Surgeon General's Report on Nutrition and Health
- The Dietary Guidelines for Americans
- Diet and Health: Implications for Reducing Chronic Disease Risk

Despite increasing scientific understanding of the relationship between diet and disease, Americans still have misconceptions about healthy eating. This lack of understanding contributes to rising health care costs. An estimated \$2.3 billion is spent daily on health care in the United States. In 1992 alone, diet-related disease accounted for a large portion of the \$838.5 billion cost for the nation's health care ("Health Care Reform," 1993). Furthermore, the treatment of diet-related illness such as heart disease, high blood pressure, cancer, diabetes, and obesity is more than \$200 billion ("Health Care Reform," 1993).

Although the Dietary Guidelines for Americans and the Food Guide Pyramid have been established to assist Americans in food choices, they continue to have difficulty in interpreting and applying these guidelines (Schwartz, 1996; Hudnall & Wellman, 1992). This confusion hinders Americans from achieving healthy eating

behaviors that promote good health and reduce certain disease risk. To correct this, the Committee on Dietary Guidelines Implementation has developed goals for improving America's eating behaviors. The goals specifically apply to increasing consumer awareness, understanding, and compliance of dietary recommendations as well as creating legislative, regulatory, and educational environments that support dietary recommendations (IOM, 1991, p. 3).

The United States Department of Agriculture has the responsibility for providing Americans with current dietary information and providing nutrition education to improve dietary intake (Daniels, 1994). The goal is to help consumers make informed decisions on food selection, preparation, and intake that will improve nutritional health and well-being (Daniels, 1994). The United States Department of Agriculture has a total of 10 agencies, which coordinate nutrition education programs and activities. The Cooperative Extension Service is one of the agencies and is responsible for providing nutrition education and applied research on an individual basis or directly to the public (Daniels, 1994).

Oklahoma Cooperative Extension Service is committed to improving diet, health, nutritional status, food quality, and food safety by developing nutrition education programs. In response to the critical issues cited above, Oklahoma Cooperative Extension Service designed a five-year impact program where nutrition education efforts focused on diet, nutrition, and health. The first year includes the Healthy Living Program, which is an eight-week food and nutrition education program designed to help Oklahoman's apply the Dietary Guidelines for Americans and the Food Guide Pyramid to food selection, food preparation, and food safety.

Purpose and Objectives

The purpose of this study was to evaluate the effects of an eight-week Oklahoma Cooperative Extension Service nutrition education program, Healthy Living Program, in a rural county in Oklahoma on food selection, preparation, and food safety practices and behaviors, dietary intake, and anthropometric and biochemical health measures. Specific objectives included the following:

- 1. Payne County, Oklahoma, subjects will engage in healthy lifestyle practices that promote healthy living.
- 2. Payne County, Oklahoma, subjects will adopt the United States Department of Agriculture (USDA) Food Guide Pyramid dietary recommendations.
- 3. Payne County, Oklahoma, subjects will adopt the United States Department of Agriculture-Health & Human Service (USDA-HHS) dietary guidelines/dietary recommendations.
- 4. Payne County, Oklahoma, subjects will adopt safe food selection, food preparation, and storage practices.
- 5. Payne County, Oklahoma, subjects will improve personal health status indicators.

Null Hypotheses

Ho1: There will be no significant difference as a result of an eight-week Healthy
Living Program on changes in subjects' Food and Nutrition Behavior Questionnaire
Scores compared to controls for:

- a. Food Safety
- b. Food Selection and Preparation
- c. Food Intake

Ho2: There will be no significant difference as a result of an eight-week Healthy Living Program on changes in subjects' number of servings from the Food Guide Pyramid groups compared to controls for:

- a. Breads, Cereals, Rice, and Pasta group
- b. Vegetable group
- c. Fruit group
- d. Milk, Yogurt, and Cheese group
- e. Meat, Poultry, Fish, Dry beans, Eggs, and Nuts group
- f. Fats, Oils, and Sweets group

Ho3: There will be no significant difference as a result of an eight-week Healthy
Living Program on changes in subjects' percentage of calories compared to controls
for:

- a. Fat
- b. Protein
- c. Carbohydrates

Ho4: There will be no significant difference as a result of an eight-week Healthy
Living Program on changes in subjects' anthropometric and biochemical measures
compared to controls for:

- a. Total Body Weight
- b. Body Mass Index
- c. Blood Pressure
- d. Fasting Total Serum Cholesterol
- e. Fasting Serum LDL-Cholesterol
- f. Fasting Serum HDL-Cholesterol
- g. Fasting Serum Triglycerides
- h. Fasting Serum Glucose

Assumptions

In the study, researchers assume subjects will accurately report their dietary intake on the Health Habits and History Questionnaire and correctly indicate which box represents their food and nutrition behavior on the Healthy Living Program Survey. In addition, researchers will assume subjects will fast 12 hours prior to blood collection and complete the entire eight-week Healthy Living Program.

Limitations

A small sample size, lacking randomization, was a limitation of the Healthy
Living Program study. This could have resulted from a number of factors. At the
time of this study, the Healthy Living Program was in its first year of programming.
Although promotional posters, flyers, news releases, and video materials were

marketed, County Home Economists were responsible for recruiting subjects and many of the Healthy Living Program participants had attended other food and nutrition programs conducted by the County Home Economists. In addition, a small fee of \$20 was charged to cover the cost of the program.

Another limitation was the time of day the Healthy Living Program was conducted. The program was conducted in the morning, which could have limited the number of subjects who could have participated in the study. Finally, the size of the group that one person could teach effectively was also considered to be a limitation.

Definitions

- 1. Healthy Living Program: The Healthy Living Program (HLP) was developed by the Oklahoma Cooperative Extension Service in order to help Oklahomans apply recommendations from the USDA-HHS Dietary Guidelines and the USDA Food Guide Pyramid to food selection and preparation practices to improve dietary intake and reduce the risk for disease. In addition, the HLP included food safety principles for food selection and preparation. The HLP consists of eight sessions and were designed to follow the food groups within the Food Guide Pyramid and provide information on nutrition, label reading, food selection, food preparation, and food safety measures.
- 2. Healthy Living Program Survey: This is a Food and Nutrition Behavior

 Questionnaire that was adapted from the 1993 USDA Expanded Food and Nutrition

 Education Program (EFNEP) Survey. The questionnaire consisted of 18 questions

 on food safety, food selection and preparation, and food intake. Participants were

instructed to place a check in the appropriate box (never, seldom, sometimes, most of the time, and almost always) that best answered each of the questions.

- 3. Food and Nutrition Behavior Questionnaire Score: The Food and Nutrition Behavior Questionnaire Score is the total score obtained from answering 18 questions from the Food and Nutrition Behavior Questionnaire on food selection, preparation, and food safety practices and behaviors.
- 4. Food Safety Score: The Food Safety Score is the total score obtained from answering three food safety questions from the Food and Nutrition Behavior Questionnaire, using a 5-point Likert scale ranging from "never" to "almost always".
- 5. Food Selection and Preparation Score: The Food Selection and Preparation Score is the total score obtained from answering 10 food selection and preparation questions from the Food and Nutrition Behavior Questionnaire, using a 5-point Likert scale ranging from "never" to "almost always".
- 6. Food Intake Score: The Food Intake Score is the total score obtained from answering five food intake questions from the Food and Nutrition Behavior Questionnaire, using a 5-point Likert scale ranging from "never" to "almost always".
- 7. Health Habits and History Questionnaire: The Health Habits and History Questionnaire is a food frequency questionnaire and computer dietary analysis system developed by Block et al., (1986).

CHAPTER II

REVIEW OF LITERATURE

Introduction

There is an overwhelming amount of scientific evidence suggesting that diets high in total fat, saturated fat, and cholesterol and low in complex carbohydrates and fiber are linked to coronary heart disease, stroke, some cancers, and diabetes (HHS, 1990; ADA position paper, 1993; Rimm et al., 1996; Steinmetz & Potter, 1996). Designing, implementing, and evaluating different nutrition education intervention methods that effectively convey the Food Guide Pyramid's message of variety, balance, and moderation and applying the recommended Dietary Guidelines to appropriate food choices is challenging; however, the improvement in nutritional status could prevent nutrition-related mortality and diet-related health problems and reduce both direct and indirect health care costs. This chapter contains a review of the literature on the federal government as well as private and voluntary group efforts designed to improve America's diet and health status. In addition, this chapter will examine the nutritional status, nutrition knowledge, dietary behavior and practices, and safe food handling practices of individuals. This chapter will also define nutrition education and explore theoretical frameworks that seek to improve health and nutritional status. Finally, this chapter will review dietary assessment methods.

Nutrition Education Tools For Helping Americans Eat Healthy

Introduction

The Dietary Guidelines for Americans consist of seven principles based on the most current advise from experts to reduce the risk of disease. The challenge for nutrition education is to convey the Dietary Guidelines in a clear, concise, and easy-to-understand format. The Food Guide Pyramid, a visual representation of the Dietary Guidelines, can guide consumers in choosing a healthy diet. In addition, the "Nutrition Facts" label enables consumers to apply the Dietary Guidelines to appropriate food choices and compare different foods within the same group or among different groups within the Food Guide Pyramid.

The Dietary Guidelines for Americans

The Dietary Guidelines for Americans were developed by USDA and HHS to provide information on what individuals should eat to stay healthy. Specifically, the Dietary Guidelines represent the federal government's advise based on current scientific and medical knowledge about nutrition and dietary guidance for Americans two years of age and older to promote health and reduce the risk for chronic disease (Bialostosky & St Jeor, 1996).

The first Dietary Guidelines were published in 1980 and were revised in 1985 and again in 1990. The National Nutrition Monitoring and Related Research Act of 1990 required secretaries from both USDA and HHS to publish the Dietary Guidelines at least once every five years; however, in 1995, Congress mandated the Dietary Guidelines be reviewed and revised. In the 1995 Dietary Guidelines, more

emphasis was placed on total diet, rather than individual foods. In addition, emphasis was placed both on diet and physical activity. The 1995 Dietary Guidelines no longer have a higher weight category for older adults and include both weight maintenance and weight loss (Kennedy, Meyers & Layden, 1996).

The 1995 Dietary Guidelines for Americans are as follows (USDA, 1995):

- · Balance the food you eat with physical activity maintain or improve your weight
- Choose a diet with plenty of grain products, vegetables, and fruits
- Choose a diet low in fat, saturated fat, and cholesterol
- Eat a variety of foods
- Choose a diet moderate in salt and sodium
- Choose a diet moderate in sugars
- If you drink alcoholic beverages, do so in moderation

The Dietary Guidelines are an important document that serves as the basis for the federal government's nutrition policies and procedures (IOM, 1991, p. 2). "Each federal agency is required to promote these guidelines in carrying out any federal food, nutrition, or health program" (Bialostosky & St Jeor, 1996, p. 7).

The Dietary Guidelines for Americans focus on recommendations from nutrition experts that recognize the link between diet and health and understand that certain dietary practices can reduce the incidence of obesity and the chances of getting some types of diseases, such as heart disease, high blood pressure, stroke, diabetes, and some forms of cancer (USDA, 1990). Specifically, the Dietary Guidelines provide information on what Americans should be eating to stay healthy, the importance of diet and health, food components that affect health, physical activity, healthy food choices, and other tools to help achieve a healthy diet.

The Food Guide Pyramid

The Food Guide Pyramid was developed by USDA and supported by the Department of HHS. The Food Guide Pyramid represents a food guidance system based on extensive research about what and how much Americans should eat to achieve a healthy diet. The Food Guide Pyramid illustrates foods from the five major food groups and places them into sections within the pyramid (Figure 1). The base of the pyramid includes all foods from the grains. The first level includes foods from plants, the second level includes foods primarily from animals, and the tip represents sweets, fats, and oils (USDA, 1992).

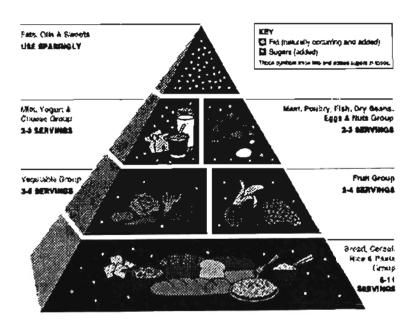


Figure 1. Food Guide Pyramid (USDA and HHS).

The pyramid illustrates the recommended servings by the amount of space given for each food group. Not only does the pyramid visually represent the food groups, but it also recommends the number of servings from each food group. For example, the Food Guide Pyramid recommends 6 to 11 daily servings of breads, cereals, rice, and pasta; 3 to 5 servings of vegetables; 2 to 4 servings of fruits; 2 to 3 servings of milk, yogurt, and cheese; and 2 to 3 servings of meats, poultry, fish, dry beans, eggs, and nuts. In addition, it recommends fats, oils, and sweets be consumed sparingly (USDA, 1992). The number of servings for an individual depends on their caloric needs. An individual's caloric needs are based on their age, sex, and activity level (Saltos, Welsh & Davis, 1994).

The Food Guide Pyramid conveys the key concepts of a healthy diet: proportion, variety, and moderation. Proportion can be defined as consuming more foods from the larger areas of the pyramid and less foods from the smaller areas of the pyramid. Variety can be described as eating a wide selection of foods both within each group and among other groups within the pyramid. Finally, moderation can be defined as consuming food portions according to recommended serving sizes and eating sweets, fats, and oils sparingly (Achterberg, McDonnell & Bagby, 1994).

Nutrition Facts Label

The goal of the new food label is to help consumers choose healthy diets in accordance with the Dietary Guidelines for Americans, encourage food companies to improve the nutritional value of their products, and eliminate consumer confusion (FDA Backgrounder, 1995). In the past, nutrition labeling focused on the avoidance of nutritional deficiencies like scurvy, pellagra, and beriberi (Foulke, 1992). In addition, nutrition labels lacked uniformity, displayed unclear descriptive terms, and contained misleading health claims. The American Dietetic Association (ADA) urged government agencies to reform food and nutrition labeling practices and announced in a position paper that "nutrition and ingredient information on food labels must be mandatory and uniform" (ADA position paper, 1990, p. 583).

Furthermore, ADA stated "health and nutrient content claims, whether on food labels or in advertising, must be based on scientific evidence" (ADA position paper, 1990, p. 583).

In 1990, the Nutrition Labeling and Education Act was signed into law and required nutrition labeling for most foods to be displayed in a new easy-to-read format, which included comprehensive ingredient listings, standardized serving sizes, and uniform definitions. The act also allowed the use of food or nutrient health claims that had been approved by the Food and Drug Administration (FDA) (Backgrounder, 1995). In the past, a food product carrying a health claim on the label was considered to be a drug unless the claim was supported by an authorized new drug application. Presently, the Nutrition Education Labeling Act allows food labels to display health claims describing the relationship between certain foods or nutrients in relation to health status (Foulke, 1992). Specifically, calcium and

osteoporosis; fat and cancer; saturated fat and cholesterol and heart disease; fiber and cancer; fiber and heart disease; sodium and high blood pressure; fruits and vegetables and cancer; and folic acid and neural tube defects (FDA backgrounder, 1995). In addition to health claims, FDA and USDA have defined eleven terms to describe a food's nutrient content. The terms are as follows: free, low, reduced, fewer, less, light, lean, extra lean, high, more, and good source (FDA, 1993).

In 1994, the new food labeling regulations took effect and the "Nutrition Facts" panel was delivered to the public on most packaged foods (Saltos, Welsh & Davis, 1994). The new food labeling changes were designed to provide consumers with accurate, useful, and complete information in order to help them make informed decisions about food selection (Kurtzweil, 1994).

The "Nutrition Facts" label (Figure 2) assists consumers when comparing food groups within the Food Guide Pyramid and emphasizes how all foods can fit into a healthy diet. With servings sizes based on standards set by the FDA and USDA, consumers can easily compare nutritional values of similar products (Saltos et al., 1994). The "Nutrition Facts" label must disclose the following components: total calories, calories from fat, total fat, saturated fat, cholesterol, sodium, total carbohydrate, dietary fiber, sugars, protein, vitamin A, vitamin C, calcium, and iron (FDA Backgrounder, 1995).

Nutritio	n Facts
Serving Size 1/2 cup	(114g)
Servings Per Conta	iner 4
Amount Per Berying	
Colorine 90 Cai	lories from Fet 30
	% Dudy Webser
Total Fet 3g	8%
Saturated Fet 0g	0 %
Cholesterol Orrg	0%
Bodium 300mg	13%
Total Carbonydra	
	12%
Distary Fiber 3g	12%
Sugare 3g	
Protein 3g	
10) (il - 0 000)
Vitamin A 80% -	Vitamin C 80%
Calcium 4%	Iron 4%
* Percent Delly Values and calorie diet. Your delly v	
or tower depending on y	
Calories:	
Total Fet Less than	
Cholesteral Lass from	
Sodium Less hen	2,400mg 2,400mg
Total Cartorychala	300g 575g
Dietary Fiber	25g 30g
Calories per gram.	4 Descript
Fall 9 - Carbohydrate 4	4 - 210006) 4

Figure 2. Nutrition Facts Label (FDA, 1994).

Few studies have been conducted to determine the effectiveness of the Dietary Guidelines, the Food Guide Pyramid, and the "Nutrition Facts" label as educational tools for improving diet and decreasing the risk for disease; however, Gambera, Schneeman & Davis (1995) examined whether the Food Guide Pyramid and the Dietary Guidelines coupled with an exercise component were effective in reducing the risk of cardiovascular disease. Thirty-two Air Force members consisting of twenty men and twelve women, who were participating in a ninety day fitness program, were randomly assigned to either an exercise-only group or an exercise-plus-diet group. Gambera and associates observed significant dietary effects on reducing risk factors associated with coronary heart disease. For instance, total cholesterol (9%), low-density lipoproteins (13%), and body mass index (2%) were

significantly lowered. Also, the percentage of total calories from total fat decreased from 39% to 23% along with saturated fat from 14% to 6%. Thus, weight loss was observed by researchers in the exercise-plus-diet groups. Additionally, dietary improvements were acknowledged and adhered with recommendations from the Food Guide Pyramid and the Dietary Guidelines for Americans. Gambera and associates concluded that the Food Guide Pyramid can be used as an educational tool that instructs a nutritionally-adequate diet with preventative measures for disease (Gambera et al., 1995).

Schuette, Song, & Hoerr (1996) evaluated whether the Food Guide Pyramid was an effective quantitative tool for assessing both nutritional adequacy and nutritional quality of 2,489 college students' food records. In the study, researchers determined nutritionally inadequate diets by examining whether students consumed the minimum number of recommended servings from the food groups within the Food Guide Pyramid along with one serving from each of the food groups. They also determined whether diets with the minimum number of recommended servings comprised 30% or less calories from fat and 10% or less calories from sugar. Researchers found 31% of students consumed less than 30% of calories from fat and 61% consumed 10% or less calories from sugar; however, only 4% reached both guidelines for fat and sugar. Of the 2,489 diets, 70% were nutritionally adequate. Researchers concluded the Food Guide Pyramid "can be used as a quantitative tool for screening nutritional inadequacy with high sensitivity (correctly classifying nutritionally inadequate diets), but with moderate to low specificity (correctly classifying nutritionally adequate diets)." Researchers concluded a good indicator for screening nutritionally inadequate diets is to determine whether the diet

included at least one serving from each of the five groups within the Food Guide Pyramid (Schuette et al., 1996).

Kennedy. Meyers, & Layden (1996) report that USDA and HHS are conducting focus group research "to better understand how to successfully communicate the concepts of the Dietary Guidelines." The focus groups consist of four target audiences that have potentially different viewpoints on the Dietary Guidelines. The target audiences, which include elderly, overweight individuals, African-Americans, and food stamp recipients, have different health and dietary needs, attitudes, and practices. Furthermore, these individuals provide helpful information for identifying perceived barriers to following the Dietary Guidelines and making healthy food choices. Kennedy and associates reported four findings from the focus groups: consumers want dietary guidance translated into specific behaviors; consumers want clear and understandable terms used when communicating nutrition information; consumers want meaningful or specific reasons to change their current dietary behavior; finally, consumers distinguish between nutrition promotion and dietary guidance (Kennedy et al., 1996).

A study by Meier & Straub (1993) compared the FDA's definitions of descriptive claims ("free", "no", "without", and "low") and relative claims ("fewer", "reduced", "light", "lite", and "less") with consumers perceptions. In the study, 192 subjects were administered twelve questions consisting of terms used to describe reduced amounts of energy, fat, or cholesterol found on food labels. Subjects were asked to place an X on a scale ranging from zero amounts to high amounts of energy, fat, or cholesterol. Meier & Straub (1993) concluded that their findings agreed with the FDA's definitions of both descriptive and relative claims.

Nutritional Status of Americans

Introduction

Although efforts have been made by various professional health organizations to inform the public about coronary heart disease and associated risk factors, coronary heart disease remains the major cause of death in the U.S. (Posner et al., 1995). Risk factors and lifestyle behaviors that may contribute to the development of coronary heart disease included: elevated blood pressure, elevated total blood cholesterol, cigarette smoking, diabetes mellitus, and a history of cardiovascular disease. In addition, obesity and physical inactivity are also risk factors for the development of coronary heart disease (Posner et al., 1995). A study looking at secular trends in diet and risk factors for cardiovascular disease using three periods of the Framingham Study (1957-1960, 1966-1969, and 1984-1988) revealed a decrease in total blood cholesterol concentration, systolic and diastolic blood pressures, and cigarette smoking during 1984-1988 compared to previous years whereas during the same time period, mean Body Mass Index, hypertension, and the prevalence of overweight were higher than previous years. Trends in both dietary intake and risk factors in the development of cardiovascular disease are important in the development and implementation of nutrition education programs (Posner et al., 1995). The following review will provide current information for blood pressure, weight, total blood cholesterol, and dietary intake.

Blood Pressure

An estimated 50 million, or one out of every four, adults have high blood pressure in the U.S. (HHS, 1993). High blood pressure is defined as a mean systolic blood pressure of ≥ 140 mm Hg and a mean diastolic blood pressure of ≥ 90 mm Hg (HHS, 1994). In 1990, 87% of adults in the U.S. had their blood pressure checked within the past year and approximately 16% of adults were informed on at least two occasions that they had high blood pressure (CDC, 1993). High blood pressure contributes to the development of cardiovascular disease, stroke, and renal failure (McCarron & Ruesser, 1996). The strongest indicator of blood pressure is body weight in association with age. It is estimated that about 50% of adults in the U.S. could alleviate high blood pressure being managed pharmacologically with only moderate reductions in body weight (McCarron & Reusser, 1996).

Weight

"Obesity is a condition in which excess fat may put a person at health risk" (ADA position paper, 1997, p. 71). Health risks associated with obesity include elevated blood pressure, elevated serum cholesterol levels, Type II diabetes, and coronary heart disease (HHS, 1990). In addition, obesity is associated with gallstones, osteoarthritis, sleep apnea, and cancers of the reproductive organs (Cummings et al., 1997). The estimated annual health care costs represented by obesity-related medical conditions in the U.S. is approximately \$70 billion (ADA position paper, 1997). As mentioned earlier, Healthy People 2000 has set national objectives for Americans in health promotion and disease prevention. Of the 21 nutrition objectives, overweight is addressed and states "reduce overweight to a prevalence of

no more than 20% among people aged 20 and older and no more than 15% among adolescents ages 12 through 19" (Danford & Stephenson, 1991; HHS, 1990, p. 30).

Studies indicate the prevalence of overweight in the U.S. has increased. For example, Kuczmarksi, Flegal, Campbell, & Johnson (1994), examined trends in the prevalence of overweight and body mass index of the U.S. adult population from phase I of the third National Health and Nutrition Examination Survey (NHANES) study. Results indicate for the period of 1988-1991, 33.4% of U.S. adults ages 20 years and older were estimated to be overweight with an increase of 8% since the second NHANES (1976-1980). The age-adjusted prevalence of overweight for men was 31% and for women 35%. Overweight was defined as Body Mass Index (BMI) >27.8 for men and >27.3 for women. Furthermore, mean body mass increased from 25.3 to 26.3 and mean body weight increased 3.6 kg. These data indicate that approximately one-third of adults in the U.S. are overweight.

In another study, Galuska, Serdula, Pamuk, Siegel, & Byers (1996) examined trends in overweight among U.S. adults from 1987-1993. Researchers analyzed data from the Behavioral Risk Factor Surveillance System (BRFSS) from the years 1987-1993 and found the prevalence of overweight among American adults has increased by 5%. In addition, the increased prevalence of overweight was observed in all subgroups of the population. Researchers hypothesized that changes in physical activity or smoking status may have contributed to the increase in prevalence of overweight; however, this could not provide an explanation for the increase in overweight.

Measures of obesity can be defined by Body Mass Index (BMI), waist-to-hip ratio, and waist measurement. BMI is defined as weight in kilograms divided by height in meters squared. A BMI > 27 represents obesity and the individual may be at health

risk. Waist-to-hip ratio is considered to be a measure of regional fat distribution. A waist-to-hip ratio > 1.0 for men and > 0.8 for women is associated with increased health risks. Finally, waist measurement can be associated with health risk if the measurement is > 40 inches for men and > 35 inches for women (ADA position paper, 1997).

The Expert Panel on Healthy Weight set forth to define healthy weight. The panel identified a healthy-weight target and a healthier-weight goal (Tables 1 and 2). A healthy-weight target was defined as "a reasonable upper limit for body weight that would offer a reduction in disease risk and be within reach for most overweight adults" (Meisler & St Jeor, 1996, p. 475S). The target healthy-weight is associated with a BMI of < 25 for adults, which is converted to a height-to-weight ratio in inches and pounds for the public. This does not include children, adolescents, or the elderly as they have special needs and research revealed insufficient data for making necessary recommendations. The target healthy-weight specifically avoids a weight range as the panel believed that emphasis should be placed on reducing the risk of disease rather than allowing attention to be focused on achieving the endpoint as an ideal weight. Thus, incurring large weight losses that are not achievable and maintainable (Meisler & St Jeor, 1996).

Table 1. Healthy-Weight Target (Meisler and St Jeor, 1996).

Table 2. Healthier-Weight Goal (Meisler and St Jeor, 1996).

Height lint	Weight maximum (lb)	Height (in)	Weight loss (Pb)
22,	119	58	10
59	124	59	10
60	128	60	10
61	132	6}	11
62	136	62	11
6.7	141	63	[1
61	J 45	64	12
6.<	150	65	12
66	155	66	12
67	159	67	1.3
68	(64	68	13
69	169	69	14
70	174	70	14
71	179	71	14
72	l 84	72	15
7.3	189	73	15
74	194	74	16
7.5	200	75	16
76	203	76	16

To convert values to \$1 units: height in inches × 2.54 = height in centimeters; weight in pounds × 0.4536 = weight in hilograms.

Since about one-third of the U.S. population exceeds the healthy-weight target, the panel developed the healthier-weight goal. The healthier-weight goal emphasizes weight loss at an amount that reduces disease risk and emphasizes that even moderate amounts of weight loss are considered to be sufficient. The healthier-weight goal is achieving a weight loss of about 4.5-7.3 kg (10-16 pounds) or the equivalent to approximately two BMI units. This is for individuals who exceed the healthy-weight goal, but have not been diagnosed with a weight-related disease or condition (Meisler & St Jeor, 1996).

The Expert Panel on Healthy Weight also emphasized the importance of stabilizing weight for a period of six months or more after weight loss has been achieved so that the new weight becomes the usual body weight. In addition, the panel recommended maintaining a constant body weight, adopting a healthy diet, and performing at least 30 minutes of moderate physical exercise daily (Meisler & St.

¹ To convert values to SI units: beight in suches × 2.34 = height in contimeters; weight loss in pounds × 0.4536 = weight loss in kilograms.

Jeor, 1996). This is in agreement with the goal of Healthy People 2000 objective 2.7 that states "increase to at least 50% the proportion of overweight people aged 12 and older who have adopted sound dietary practices combined with regular physical activity to attain an appropriate body weight" (HHS, 1990, p. 33). This is also consistent with the 1995 Dietary Guidelines that recommends balancing the food you eat with physical activity - maintain or improving your weight. Although experts agree that a weight loss of 5 to 10 pounds may help to lower blood pressure, blood lipids, glucose tolerance, insulin resistance, and protect heart muscle mass, 24% of American adults are sedentary and 54% spend inadequate time performing physical activity (USDA, 1995; Meisler & St Jeor, 1996; ADA position paper, 1997).

Obesity is complex in origin, but research has identified factors such as genetic, biochemical, metabolic, physiological, and psychological that may contribute to overweight (ADA position paper, 1997). Furthermore, environmental, socioeconomic, as well as cultural factors play a role in obesity (HHS, 1990). The treatment of obesity is centered around the concept of weight management or achieving the best weight possible for overall health. Weight management is defined as adopting and maintaining healthy eating and exercise behaviors that reduce the risks of disease (ADA position paper, 1997). The American Dietetic Association recommends that weight management programs focus on lifestyle changes with three goals in mind: gradual change in healthy eating patterns, a non-restrictive approach to eating with close attention to hunger and satiety cues, and a gradual increase to 30 minutes of physical activity per day (ADA position paper, 1997).

Approximately 40% of adult women and 20% of adult men are trying to lose weight at any one time (Heaton & Levy, 1995). Whether the weight loss is

successful depends on a number of factors. For example, the traditional weight loss approach is that a person can control their weight and redesign their body shapes regardless of genetics. Also, weight goals were set according to standardized tables and restrictive dieting was used to accomplish the unmaintainable goals. This approach to weight loss has failed to produce lasting weight loss as weight cycling and disordered binge eating may result from very-low-calorie diets (Cummings et al., 1997). According to the American Dietetic Association, successful weight management for adults requires a lifelong commitment to both a healthy lifestyle and healthy eating behaviors. Weight management interventions that are based on cognitive-behavioral methods, such as counseling about self-esteem and body image, coping with societal pressures of weight, and problem-solving approaches to weight maintenance, have been successful. Finally, a support system whether a group or a family member is important (ADA position paper, 1997).

Blood Cholesterol

A study looking at the prevalence of high blood pressure among U.S. adults was conducted based on guidelines from the second report of the National Cholesterol Education Program (NCEP) Adult Treatment Panel (Sempos et al., 1993). In this study, data from 7,775 participants ages 20 years and older were used from phase 1 of the third National Health and Nutrition Examinations Survey (NHANES III) and data from 9,797 participants ages 20-74 years were used from NHANES II. The data revealed that the proportion of adults with high blood cholesterol levels fell from 26% to 20% while the proportion with desirable levels rose from 44%-49% (Sempos et al., 1993). Furthermore, adults who have been informed that they have

high blood cholesterol are taking steps to lower it (Anderson & Waters, 1995). Blood cholesterol levels >240 mg/dL are considered to be high and < 200 mg/dL are considered to be desirable (U.S. Department of Health and Human Services, 1994). According to a Cholesterol Awareness Survey, improvements in blood cholesterol knowledge, attitudes, and practices have increased. For example, in 1986 only 46% of people responded yes when asked if they have ever had their blood cholesterol checked. In 1990, 65% of people surveyed responded yes when asked if they have ever had their blood cholesterol checked (Van Horn et al., 1995). High blood cholesterol levels contribute to coronary heart disease and experts suggest that a 10% reduction in serum blood cholesterol levels, achieved by diet alone, could decrease coronary heart disease rates of about 20% (AHA, 1990).

Dietary Intake

Objective 2.6 of Healthy People 2000 states "increase complex carbohydrate and fiber-containing foods in the diets of adults to five or more daily servings for vegetables (including legumes) and fruits, and to six or more daily servings for grain products" (HHS, 1990). The importance of consuming fruits and vegetables has been well documented. Steinmetz & Potter (1996) have conducted a review of vegetables, fruits, and cancer prevention. Not only does research indicate the protective effects of fruits and vegetables for cancers, but for cardiovascular disease, diabetes, obesity, stroke, cataracts, and diverticulosis as well. Despite this evidence, fewer than one-third of Americans consume the recommended daily intake of fruits and vegetables (Anderson & Waters, 1995). According to the Executive Summary from the Third Report on Nutrition Monitoring in the United States, between 1989-

1991, the average daily intake of fruits and vegetables is about 4 servings (Anderson & Waters, 1995). Similar findings were reported by Krebs-Smith et al. (1995), who examined Americans' fruit and vegetable intakes based on the Continuing Surveys of Food Intakes by Individuals from 1989-1991. They determined that the mean intake of fruits and vegetables was 4.3 servings per day. In particular, mean intake of fruits was 1.2 servings per day and mean intake of vegetables was 3.1 servings per day. Both studies suggest a need for identifying barriers to eating fruits and vegetables and furthermore, provide practical advice on how to consume more fruits and vegetables. Dittus, Hillers & Beerman (1995), conducted a study examining attitudes toward nutrition and reported fruit and vegetable intake of 1,069 subjects. In the study, attitudes relating to nutritional benefits, cancer-preventative characteristics of fruit and vegetable intake, and perceived barriers to fruit and vegetable intake where scored. Using a multiple regression analysis, results indicated 16% of the variance in fruit and vegetable intake accounted for attitude variables, while perceived barriers to fruit and vegetable intake accounted for the greater amount of variability in nutrition behavior. Researchers reported the likeliness of perceived barriers that prevent healthy behavior may decrease concern about health issues. Potential barriers to fruit and vegetable intake may include availability, preparation, cost, and concern about pesticides (Dittus et al., 1995).

A diet that emphasizes complex carbohydrates and fiber is recommended by several professional health care organizations because of their preventive and therapeutic properties (ADA position paper, 1993). Dietary fiber has been shown to be beneficial in the management of cardiovascular disease, diabetes, and obesity and health professionals recommend a diet containing 20-35 grams of dietary fiber from a variety of foods (ADA position paper, 1993). According to the Executive Summary

from the Third Report on Nutrition Monitoring in the U.S., median intakes of total carbohydrate and dietary fiber were lower than recommended values in 1989-1991 (Anderson & Waters, 1995). Furthermore, USDA's Healthy Eating Index revealed that <20% of Americans consumed the recommended daily servings of grains, fruits, and vegetables (USDA website, 1997).

Another objective of Healthy People 2000 is to increase the intake of calcium (HHS, 1990). Calcium is essential in the development and maintenance of bones and teeth and is one of the factors that affect peak bone mass (HHS, 1990; Fleming & Heimbach, 1994). Low calcium levels is just one factor in the development of osteoporosis; however, the optimal level of calcium intake for development of peak bone mass and how much calcium is needed to prevent osteoporosis is still being debated (HHS, 1990). Current recommendations suggest 800 mg for children 4 to 8 years of age, 1300 mg for youth 9 to 18 years of age, 1,000 mg for adults 19 to 50 years of age, and 1200 mg for adults over 50 years of age (NAS website, 1997). Fleming & Hembach (1990) conducted a study investigating the consumption of calcium in the U.S. revealed that mean daily intake of calcium for the total U.S. population was only 737 mg and varied by household income, ethnic group, sex, age, and region of the country. The study found that at least 50% of calcium was provided by milk and milk products and calcium intake generally decreased with age for both males and females. Furthermore, USDA's Healthy Eating Index found that fewer than one-third of Americans consumed the recommended number of daily servings of milk (USDA website, 1997).

The Recommended Dietary allowance (RDA) of protein for females and males is different depending on age as is shown Table 3 (National Research Council, 1989). The Dietary Pattern and Intake Report, commissioned by the National Live Stock

and Meat Board (1994), surveyed 2,000 households on their protein intake. The report found that Americans on the average are consuming about 67.5 grams of protein per day, with meat accounting for about 55% of intake. According to the Executive Summary from the Third Report on Nutrition Monitoring in the United States, the median intake of protein in the American diet is above Recommended Dietary Allowances (RDA) for most demographic groups (Anderson & Waters, 1995).

Another objective of Healthy People 2000 is to reduce both the intake of dietary fat to <30 % of calories and saturated fat to <10% of calories (HHS, 1990). Studies suggest that high levels of dietary fat intake increase risks of obesity, some types of cancer, and coronary heart disease (HHS, 1990). According to the Executive Summary from the Third Report on Nutrition Monitoring in the United States, total fat and saturated fat intakes have continued to stay above recommended levels and mean total fat, expressed as a percentage of calories, was 34% (Anderson & Waters, 1995). Similar findings are reported in USDA's Healthy Eating Index. The Healthy Index suggests that less than 20% of Americans consume 30% or less of calories from fat and less than 10% of calories from saturated fat (USDA website, 1997).

FOOD AND NUTRITION BOARD, NATIONAL ACADEMY OF SCIENCES—NATIONAL RESEARCH COUNCIL RECOMMENDED DIETARY ALLIDWANCES," Revised 1989

Designed for the maintenance of good nutrition of practically all healthy people in the United States

			Fai-Soluble Vicamins Water-Soluble Vicamins							Minerals														
Category	Age (years) or Condition	Weig (kg)	(lp)	Heij (cm)		Protein (g)	Vita- min A (µg nt)	Vica. سار باس (پیم)	Vita- min E (mg u-rs)"	Vita- mls: K (µg)	Vita- min C (erg)			Niacin (mg MA)	Vjca- min B _s (o·g)	For lace (µg)	Viumin B _{it} (µg)	(ing)	Phos- phorus (mg)	Mag- nesium (mg)	Iron (Mg)			Sele: nium (µg)
Infaret	0.0-0.5	6	13	60	24	13	375	75	3	5	30	0.5	0.4	5	U.3	25	6.0	4 0 0	300	40	6	5	40	10
	0.5-1.0	y	70	71	28	14	375	ŧO	4	10	35	0.∢	0.5	b	0.5	35	0.5	600	500	611	10	5	50	15
Oildren	1-3	15	29	90	35	16	400	10	ď	15	40	U, 7	8.0	9	1.0	50	U.7	800	404	HU	10	10	70	20
	46	ŹŪ	44	113	44	¥4	500	10	7	20	45	0.9	1.1	12	1.1	75	10	800	BO43	120	10	10	90	20
	7-10	24	68	132	52	28	700	10	ל	30	45	1.0	1.2	13	14	100	1.4	80 0	800	(70)	10	10	120	30
Malea	11~14	45	99	157	68	45	1,000	10	10	45	50	1.5	1.5	17	1,7	150	20	1.200	1,200	270	13	15	150	40
	15-18	88	145	176	69	59	1,000	10	10	65	60	1.5	L.B	20	9.0	200	2.0	1,200	1,200	400	12	15	150	50
	19-24	72	160	177	70 1	58	1,000	10	łu	70	60	1.5	1.7	19	2.0	200	9.0	1,200	1.200	35U	10	15	150	70
	25-50	79	174	176	70	65	1,000	5	ŧ٥	80	60	1.5	17	łg	2.0	200	20	800	600	350	10	15	150	70
	51+	77	170	175	66	63	1,000	5	10	80	60	1.2	1.4	15	2.0	200	2.0	800	600	550	10	35	150	70
Feenales	11-14	46	101	157	62	16	800	10	8	15	50	1.1	1.3	15	1.4	150	2.0	1,200	1.200	280	15	32	150	45
	15-18	55	170	163	b4	44	800	10	ಕ	55	60	Lì	1.3	15	1.5	180	9.0	002,1	1.200	\$00	15	12	150	50
	19-24	58	128	164	65	46	800	10	8	60	60	LI	1.3	13	1.6	180	2.0	009,1	1.200	089	15	12	150	55
	25-50	63	138	163	64	50	800	5	â	65	60	t.t	1.3	15	1.6	180	2.0	800	800	280	15	12	150	55
	51 ÷	65	143	160	65	วิป	800	5	8	65	60	1.0	1.2	13	1.6	180	2.0	800	800	280	10	12	150	55
Pregnant						60	800	(O	10	65	70	1.5	1.6	17	2.2	400	2.2	1,200	1.200	300	30	15	175	65
Lacuving	Jai 6 months					65	1,300	10	12	65	95	1.6	1.8	20	2. l	280	2.6	1,200	1.200	355	15	19	200	75
	2กป 6 ภาษาคร					65	1,200	10) [65	90	1.6	1.7	50	રા	260	2.6	1.200	1.200	340	15	16	200	75

The allowances, expressed as average duly intakes over time, are intended to provide for individual variations among most notinal persons as they live in the United States under usual environmental stresses. Diels should be based on a variety of common foods in order to provide other nutrients for which human requirements have been less well defined. See text for detailed discussion of allowances and of nutrients not tabulated.

Weights and heights of Reference Adults are actual medians for the U.S. population of the designated age, as reported by NHANES II. The median weights and heights of those under 19 years of age were taken from Hamill et al. (1979) (see pages 16-17). The use of these figures does not imply that the height-to-weight roots are ideal.

Kerinol equivalents, I reunul equivalent = 1 µg retinal or 6 µg B-carotene. See text for calculation of mamin A activity of dieta as reclinol equivalents.

As choleculciferol, 10 µg choleculciferol = 400 to of vitamin D.

a. Tocopherol equivalenti. I mg d-a tikopherol = 1 a-te. See text for variation in allowances and

Calculation of vitamin E activity of the diet as a-tocopheros equivalents

1) we (macin equivalent) is equal to 1 mg of nuction or 60 mg uf dietary tryptophan.

Subar et al., (1994) examined dietary patterns associated with either low or high fat intake. Data from the 1987 National Health Interview Survey were used and of 20,143 adults, the mean percentage intake of calories from fat was 38.4%. The study showed that the percentage of calories from fat in the diet was correlated with specific nutrients and food groups across demographic variables, such as sex, age, race, income, and education. A high positive correlation was found between the percentage of calories from fat and high fat food groups and negative correlations were found with folate, fiber, vitamin C, carotene, carbohydrate, and similar food groups. The study also found that a decrease in percentage of calories from fat was compensated with an increase in percentage of calories from carbohydrate rather than protein, since protein and fat occur together in foods (Subar et al., 1993).

Millen et al. (1997) conducted a study investigating nutrient intake levels and adherence to current dietary recommendations in 2,520 Framingham men and women for the years of 1991-1995. The study found that only 37% consumed < 30% of calories from fat and 43% met the recommendation for saturated fat intake. Participant's adherence to recommended amounts of carbohydrate was moderate (43%), while dietary fiber was low (28%). Furthermore, only one third of participants consumed the dietary recommendation for calcium while more than 75% met the recommendations for protein. In addition, 70% met the recommended intakes of polyunsaturated and monounsaturated fat, cholesterol, vitamins C and B-12, and folacin; however, about half or fewer met the recommendations for beta-carotene, vitamins A, E, and B-6 (Millen et al., 1997).

Cognitive and Behavioral Skills of Food and Nutrition

Introduction

The development of the Food Guide Pyramid, the Dietary Guidelines for Americans, and the passage of the Nutrition Labeling and Education Act are efforts to reduce the risk of chronic disease and enhance health. Diet is considered a key component in health promotion and disease prevention. It is critical to examine consumer's health attitudes, nutrition knowledge, dietary behavior, and safe food handling practices in order to promote healthy eating and lifestyles and to identify areas for improvement.

Health Attitudes

America's concern about health and interest in nutrition is growing. The American Dietetic Association (ADA, 1993) in joint sponsorship with Kraft General Foods, surveyed 1,000 adults ages 25 and older to determine their attitudes, knowledge, and behavior toward nutrition and diet. The results indicated that 82% of adults recognized the importance of good nutrition. In addition, 69% cited the reason for being concerned about diet and nutrition was the general desire for health maintenance.

The Food Marketing Institute (FMI, 1996) along with Prevention magazine also surveyed 1,000 adults to determine their understanding and concern about nutrition and health issues, and how these issues affected purchasing behavior. The survey found that 51% of consumers had changed their diets within the last three years because of health concerns. In addition, consumers cited "losing weight" as the primary reason for making dietary changes (32%), followed by "high cholesterol"

(17%), and "heart disease" (15%). Finally, 10% cited "high blood pressure" as a reason for making a change in their diet. Consumers are also becoming seemingly aware of the relationship between diet and overall health. For example, 96% viewed diet as a major factor for high blood cholesterol and 93% thought diet had a role in heart disease. In addition, consumers believed that high blood pressure (92%), stroke (81%), and diabetes (74%) were linked to diet (FMI, 1996).

Another survey (FMI, 1997) examined consumer attitudes and the supermarket. Ninety-three percent of 1,011 shoppers were concerned about the overall nutritional content of their food. Fifty-six percent of shoppers were concerned with fat, 23% were concerned with sodium, and 20% were concerned with cholesterol. Concern does not necessarily lead to action as 73% of shoppers believed their diets could be healthier.

Price, convenience, and taste are also important factors for consumers when shopping for healthier diets. The FMI (1996) reported that 83% of 1,000 shoppers agreed that nutrition is more important than price; however, 57% agreed with the statement that eating healthy foods costs more. Furthermore, 57% of shoppers disagreed with the statement taste is more important than nutritional quality. Finally, 29% believed healthy foods were not convenient to make. For the most part, consumers view taste, nutrition, product safety, and price as important factors when shopping for food, but perceive taste, time, and confusion as obstacles for good nutrition (FMI, 1997; ADA, 1993).

Today, shoppers have a wider variety of healthy products to choose from.

Manufacturers have expanded their product lines to include "low-calorie", "sugar-free", "reduced-fat", "fat-free", "low cholesterol", "cholesterol-free", "reduced-sodium", and "sodium-free." Consumers who opt for low-fat alternatives do so primarily for

health reasons. When making healthy food selections, consumers do not believe taste has to be compromised. For example, consumers "think that 'low-fat' or 'fat-free' products can taste as good as, if not better than, the regular variety" (FMI, 1996). In fact, consumers often select the lower-fat alternative when shopping. For instance, "low-fat" or "fat-free" products that consumers tend to choose include salad dressing (74%), ice-cream (57%), crackers (55%), mayonnaise (55%), cookies (51%), sour cream (51%), and cheeses (50%). Also, "low-fat" or "fat-free" chips and cakes were selected over the higher fat equivalents (FMI, 1996).

The terms "low-fat" or "fat-free" do not necessarily imply that shoppers can indulge entirely. Although 61% of the 1,000 shoppers agreed that a food labeled "low-fat" or "fat-free" does not mean that they can eat more, 34% felt that it was okay to do so. Furthermore, 14% admitted to eating more of the "low-fat" or "fat-free" foods rather than the original food (FMI, 1996). Although consumers' attitudes express concern about diet and bealth, accurate nutrition knowledge is also a factor in achieving a healthy diet.

Nutrition Knowledge

Although the public is concerned about diet and health, surveys show that consumers lack the knowledge and skills in applying dietary recommendations toward food choices and overall diet quality (IOM, 1991). The ADA (1993) revealed that 27% of 1,000 consumers rated themselves as being knowledgeable about dietary guidelines; however, only 9% could correctly identify the recommended guideline for the percent of calories from fat and only 6% of consumers could

correctly identify the recommended fat grams per day. In addition, no one could identify the recommended guideline for sodium or cholesterol.

The National Live Stock and Meat Board (1994) also revealed consumer confusion surrounding dietary recommendations. Although dietary guidelines recommend choosing a diet with no more than 30% of calories from fat, only 9% of consumers were able to recognize the false statement "No more than 30% of the calories in a food should come from fat." It appears that consumers are unclear about the dietary guideline for fat as it applies to the overall diet rather than one particular food. The results of this study indicate that consumers demonstrated low levels of knowledge when asked to identify specific dietary guidelines.

Similar findings were reported by the International Food Information Council (IFIC, 1993) for consumer's knowledge on diet and nutrition. Only 30% of 754 adults surveyed were familiar with the Food Guide Pyramid. Despite the lack of familiarity with the Food Guide Pyramid, 94% agreed that balance, variety, and moderation were important for healthy eating. In addition, 60% of those surveyed agreed that high-fat foods can be incorporated into a healthy diet as long as they are balanced with low-fat food choices, and 56% agreed that any food can be part of a healthy diet. Furthermore, 92% agreed that controlling serving size is important to maintain a healthy diet.

Consumers may seek nutrition advice from unreliable sources to increase their knowledge and understanding of diet and nutrition. According to FMI (1996), 64% of 1,00 consumers read magazines for information on food and nutrition while 58% of consumers referred to books. Other sources for information on food and nutrition included friends or family (55%), television (51%), newspapers (49%), and displays or handouts in grocery stores (47%). Unfortunately, a health professional (42%), was

the last source consumers turned to for nutrition information. Not using reliable sources for nutrition information can lead to consumer confusion and misinformation.

Although major health organizations agree on the general principles of healthy eating, consumers fail to grasp them clearly because of the overwhelming amount of information and seemingly conflicting advice (Hudnall & Wellman, 1992). According to the IFIC (1994), 27% of 754 adults surveyed reported feeling very or somewhat confused about how to eat a healthy diet. Consumers surveyed were most confused about "deciding what to eat" (14%), followed by "conflicting reports" on nutrition and health (11%) and "labeling of foods" (11%). Finally, 9% of consumers were confused about the "amount of fat in foods".

Not only are consumers confused with knowing how to eat a healthy diet, but they also have misconceptions about a healthy diet. For example, The National Live Stock and Meat Board (1994) reported that only 47% of 2,000 consumers agreed with the statement "All foods in moderation provide a healthy diet". Furthermore, only 32% disagreed with the statement "trying to eat healthy is too complicated and confusing".

Although consumers are aware of the basic concepts of balance, variety, and moderation, they are not putting them into practice (Hudnall & Wellman, 1992). Consumers still believe in the concept of "good" and "bad" foods and that in order to have a healthy diet, they must give up the foods they like (ADA, 1993). An individual's knowledge about diet and health alone is unlikely to change dietary behavior (IOM, 1991).

Dietary Behavior

Understanding human-nutrition related behavior guides in the development of models that demonstrate how consumers make decisions, why they decide on a particular course of action, and how they implement their action as sustained behavior change (Schwartz, 1996). There are many factors that influence the development, maintenance, and change of dietary patterns (O'Donnell & Harris, 1994). Health promotion strategies that are centered around factors that affect individual food choices have a greater chance of producing positive dietary change (Frankle & Owen, 1993). As Figure 3 illustrates, food intake behavior is based on the sociocultural environment, the ecological environment, and the biological environment (Parraga, 1990). The sociocultural environment includes societal variables, cultural variables, and individual variables. The societal variables involve national economy, technology, politics, and social organization. The cultural variables consist of values, beliefs, customs, and symbolisms. The individual variables are income, education, occupation, socialization, nutrition knowledge. attitudes, and food preferences. The ecological environment include geography, climate, topography, and soil. Finally, the biological environment includes nutrient requirements, life cycle, health status, genetic limitations, and taste physiology (Parraga, 1990).

BOCKOCHITURAL ENVIRONMENT SOCETAL YAPEABLES HAMMAN Economy Federating Publish Booled Organization CULTURAL YAPEABLES HORSE Broke Custome Bysikolishes Pysikolishes Broketon, Education, Docupation Anthrition Knowledge Astronom Federation FOOD CONSUMPTION BOCLOGIC ENVIRONMENT Geography Calenda Topography Red Currella Limits incre Trade Physiciany Tempography Red Currella Limits incre Trade Physiciany Tempography Tempography Red Currella Limits incre Trade Physiciany Tempography Red Currella Limits incre Trade Physiciany

Figure 3. Determinants of Food Intake Behavior (Parraga, 1990).

Although consumers are aware of the importance of nutrition and its impact on health, action to improve dietary patterns and behavior are not easy to achieve.

Food selection, food preparation, and food label reading can be considered measures of dietary behavior.

The ADA (1993) found that only 37% of 1,000 consumers are "highly" careful in food selection in their efforts to achieve an overall healthy diet. When asked to indicate what things they specifically did to achieve a healthy diet, consumers said they added more fruits and vegetables and monitored fat intake. In addition, consumers are most careful about the consumption of saturated fat, vitamins and minerals, cholesterol, and sodium.

Few studies evaluate food preparation techniques; however, the percentage of consumers who say they cook or prepare foods differently since 1985 has increased

(IOM, 1991). Consumers have reported eating less fried foods and red meat, using fewer fats and oils, and consuming less salt. In addition, consumers have indicated eating more fruits and vegetables and chicken (FMI, 1997).

Another measure of dietary behavior is the use of the "Nutrition Facts" Label. Nutrition labeling on food packages is an educational tool that can help consumers make informed choices on the product they are purchasing. By comparing the nutritional values of different brands or foods, the nutrition food label enables consumers to make more healthy food choices. The food label can also assist consumers in comparing new food products with more familiar ones (Bender & Derby, 1992). Food labels also provide information to assist consumers in counting calories or selecting certain foods for special diets.

Guthrie, Fox, Cleveland & Welsh (1995) conducted a study investigating characteristics of individuals who use the food label and the effect the food label has on overall diet quality. Researchers used a theoretical model of determinants influencing label use, shown in Figure 4. Determinants affecting label use included individual characteristics, situational variables, marketing environment, product importance, knowledge, and consumer decision-making strategy. In the study, individual characteristics were age, sex, and education. Situational variables accounted for employment, household type, and physical health concerns. The marketing environment was comprised of geographical regions and the level of urbanization. Product importance consisted of taste, nutrition, price, ease of preparation, product safety, and how well a food keeps. Knowledge was assessed by scoring responses to several nutrition knowledge questions. Finally, the consumer decision-making strategy included those individuals who displayed health-seeking values and attitudes, such as following the Dietary Guidelines for Americans

(Guthrie et al., 1995). Of the 1,901 respondents surveyed, 71% of meal planners/preparers were considered to be label users. Label users were defined as using the nutrition label "sometimes" or "always." The remaining 29% were considered to be nonusers who "rarely" or "never" used the "Nutrition Facts" label. Guthrie et al. (1995), found in their study that individuals most likely to use the nutrition label were the following: women who lived with others and had at least some college education; knowledgeable about nutrition, believed that nutrition and product safety were more important than taste when shopping for food; and displayed health-seeking values and attitudes, such as following the Dietary Guidelines for Americans. The researchers also found the food label had an effect on diet quality. In the study, "label users had a lower cholesterol intake per 1,000 calories." In addition, diets of label users were higher in vitamin C.

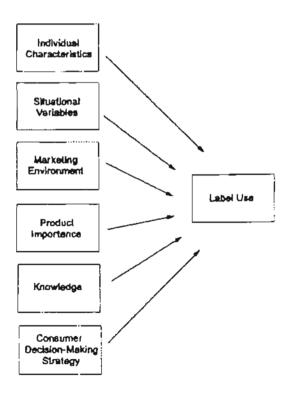


Figure 4. Determinants of Label Use (Guthrie, et al., 1995)

Bender & Derby (1992) observed similar findings when they compared several Food and Drug Health and Diet Surveys administered in 1982-1988 that identified consumers who said they read nutrition and ingredient information on food labels. They looked at variables such as demographics, measures of health status, nutrition knowledge, and adherence to special diets, in order to distinguish between label users and nonusers. They found that users of both nutrition and ingredient information on food labels were young educated women who were following a "self-initiated" or "doctor-prescribed" low sodium diet.

The FMI (1996) also reported that shoppers who changed their diets and eating habits for health reasons were more likely to read the food label and ingredient list before making a purchase. For instance, 58% of 1,000 shoppers "almost always" read the nutrition label when buying a product for the first time compared to 17% who "hardly ever" or "never" read the nutrition label before making a first-time purchase. Similar findings were reported with the ingredient label.

According to another survey (FMI, 1997), 90% of the 1,011 shoppers considered the nutrition label format and wording "very useful" and "somewhat useful." When shoppers were asked what they considered to be useful on the food label, 61% thought fat content was useful and 37% felt the list of ingredients was helpful. In addition, 30% felt the number of calories and the amount of sodium was useful on the food label and 61% of shoppers said they had "changed purchases because of information on the product nutrition label." The survey also revealed that shoppers were inclined to buy products labeled "low-fat", "low-cholesterol", and "low-sodium."

Food Safety

Safe food handling practices result from awareness and knowledge of food pathogens and methods of transmission. It is estimated that 12.6 million cases of foodborne illness occur in the U.S. each year incurring a substantial cost of \$8.4 billion (Todd, 1989). In the prevention of foodborne illness, consumers play an important role in food safety during acquisition, preparation, serving, storage, and proper handling of leftovers (Knabel, 1995).

Studies have been conducted to investigate consumer knowledge of foodborne hazards and safe food-handling practices. In a study by Altekruse, Street, Fein, and Levy (1996), 1,620 consumers at least 18 years of age were surveyed on their recognition of foodborne pathogens and foods at risk for transmission. In addition, consumers were surveyed about their awareness and knowledge of food safety principles and their food handling practices such as washing hands, cooking meat thoroughly, and taking precautions to prevent cross contamination.

The pathogens that consumers were most aware of were salmonella (80%) and botulism (75%). The pathogens that consumers were least aware of were listeria (10%) and campylobacter (5%). When consumers were asked what foods were specifically associated with the risk for transmission of foodborne pathogens, responses where highest for salmonella (54%), trichinosis (26%), and botulism (23%). Less than 15% surveyed knew foods associated with the risk for transmission of hepatitis, cholera, staphylococcus, listeria, and campylobacter (Altekruse et al., 1996).

According to Altekruse et al. (1996), consumers are aware of safe food handling practices. Eighty-six percent of the consumers surveyed were aware that hand

washing reduces the risk for food poisoning. Furthermore, 80% knew that serving meat on a plate that once held the raw meat increased the risk for food poisoning. Although consumers are aware of safe food handling practices, there is a disparity between knowledge and practice. For example, only 66% washed their hands after handling raw meat or poultry and only 67% cleaned their cutting board after contact with raw meat or poultry. Altekruse et al., (1996) found that gender, age, and frequent food preparation were related to safe food handling practices for both hand washing and taking precautions to prevent cross contamination; however, adequate cooking of meat or poultry was not associated with variables such as gender, age, and frequent food preparation. Researchers concluded that adequate cooking of meat or poultry may be seen as a type of behavior or a food preference instead of a food safety issue. In addition, researchers found that knowledge of food handling practices did not increase with age, but safe practices did.

Klontz, Timbo, Fein, & Levy (1995) assessed self-reported food consumption and preparation behaviors associated with increased risks of foodborne illness of 1,620 adults ages 18 years and older. Results indicate that certain high-risk food consumption practices and preparation behaviors are common. For example, 53% of the respondents reported eating foods that contained raw eggs. The most common foods that contained raw eggs were cookie batter (27%), homemade ice cream (19%), homemade eggnog (15%), Caesar salad (12%), and frosting (11%). Furthermore, 23% reported serving hamburgers "either rare or medium with some pink in the middle" and 17% reported eating raw clams or oysters. Researchers also found that 26% of those surveyed reported not cleaning the cutting board with soap or bleach after using it to cut raw meat or poultry. The study revealed that those who are

more likely to have reported eating raw animal food were males, people ages 18-39 years, and those with an education beyond high school (Klontz et al., 1995).

Fein, Lin, & Levy (1995) assessed the perceptions, experience, and preventive behaviors of 3,200 adults in 1988 and 1,620 adults in 1993 living in the U.S. Researchers administered a survey with questions about perceived foodborne illness, food-safety and food-handling practices, and consumption of raw animal protein. They reported that people who believed that they had experienced a foodborne illness were more likely to report unsafe food-handling practices and food consumption behaviors. Researchers also found in the study that people who believed that they had experienced a foodborne illness were more likely to express concern over food safety issues and identify foodborne microbes. Furthermore, Fein et al., (1995) found that younger adults ages 18 to 39 years of age were more likely to report if they had experienced a foodborne illness.

Knabel (1995) assessed factors related to foodborne pathogens and common causes of foodborne diseases in a Scientific Status Summary report. The report stated that demographics and lifestyles have increased the demand for quicker ways in food preparation. This means more convenience foods and minimally processed foods. Knabel (1995) also reported that in order to meet the demands for these types of foods, new processing, preservation, and packaging techniques have been implemented with new microbiological risks emerging. Additionally, Knabel (1995) identified changes in family structure, lack of knowledge in safe food handling and preparation practices, and convenience foods to be other factors of foodborne illness. Foodborne illness may result from pathogenic bacteria, viruses, protozoa, parasites, and toxins. Table 4 shows the most common foodborne illness caused by bacteria (Knabel, 1995). Although consumers believe that food manufacturing plants are the

most likely place for food safety problems, the home is by far more common (USDA website, 1997). For example, Table 5 represents the top 12 mishandling and/or mistreatment of foods resulting in foodborne illness outbreaks in the U.S. between the years of 1961-1982 that were reported to the Center of Disease Control (Knabel, 1995).

The FMI (1997) surveyed 1,011 consumers on their attitudes toward food safety. Consumers cited food spoilage as the greatest perceived threat to food safety (69%). Other perceived threats to food safety were improper handling and storage (34%), product freshness, shelf life and expiration date (20%), bacteria and germ contamination (17%), and lack of refrigeration (17%). Consumers were also asked if they were doing anything differently as a result of the safe-handling labels on poultry and meat products. Forty-five percent of those surveyed said they changed their behavior due to safe-handling labels. For example, 18% of those surveyed reported washing and disinfecting counters, cooking areas, and utensils after contact with meat. Another 13% reported washing their hands more often before and after handling meat, while 13% indicated cooking to appropriate temperatures. Finally, 10% did not leave meat out to thaw on a counter (FMI, 1997).

Table 4. Common Foodborne Illnesses Caused by Bacteria (Knabel, 1995).

Disease (causalire agent)	Littericy Period sursent	Principal Symptoms	Typical Foods	Mode of Contamination	Prevention of Disease		
(Bacelus cereus) food postoring, disarrheal	B-16 hr (12-24 ht)	Diamhea, cramps, eccasional vomiting	Ment products, soups sauces, vegetables	From soil or dust	Thorough heating and rapid cooling oil loods		
(Becilius cereus) food	1-5 hr (6-24 hr)	Nauses, vomiting, some- times diarries and crarrips	Cooked rice and pests	From soil or dust	Thorough healing and rapid cooling of loods		
Botulism, tood polsoning (heat-labile toxin of Costrictum botulinum)	12-36 h/ (months)	Fabigue, weekness, double vision, sturned speeds, respiratory failure, sometimes death	Types ASE: vegetab- les; fulls; meet, feh, and poultry products; condiments; Type E: fish and feh products	Types A&B: from soil or dust Type E: water and sediments	Thorough hasting and repid cooling of loods		
Bowlism; food poisoning intant infection	Unknown	Constipation, wealthest, respiratory bailure, sometimes death	Honey, soil	* .	Do not feed honey to infants —will not prevent all		
Campylobactanosis (Campiyobacter jejuni)	3-5 days (2-10 days)	Diarrhee, abdominal pain, lever, nauses, vombling	infected food- source anymals	Chicken, new milk	Cook children thoroughly, exce cross-contemnation; Impliets childrens; passacurize milk		
Cholera (Vibrio cholerae)	2-3 days hours to days	Proluse, watery stools; some- times vomiting, dehydration; often latel if unmested	Raw or undercooked septood	Human lecad in marine environment	Coak sested thoroughly; general sanitation		
(Clastralium perfringens) load poisoning	8-22 hr (12-24 hr)	Diambea, cramps, strely nausea and vomiting	Cooked meet and poultry	Soil, ranv loods	Thorough heating and rapid cooling of foods		
(Escherichia colf) (occitome intections enterohemorrhagic	12-60 hr (2-9 days)	Watery, bloody diarrhea	Purw or undercooked beel, raw milk	Intected cattle	Cook beef thoroughly passwurtee milk		
(Escherionia coll) toodborne intections entroinvasive	at least 18 hr (uncertain)	Cremps, diarrhes, lever, dysentery	Raw foods	Human lecal contermination, direct or via water	Cook loods thoroughly: general sanitation		
(Escherichia coli) foodborne infection enteroloxigenic	10-72 hr (3-5 days)	Profuse watery diarrhea; sometimes cramps, vorniting	Raw loods	Human fecel contamination, direct or visi water	Cook foods thoroughly; general sanisation		
Listenasis (Listena manacytogenes)	3-70 days	Meningoencephelitis; stillbirths; septicemin or meningitis in newborns	Raw milk, chaese and vegetables	Soil or intented envirable, directly or via manure	Pasteurzation of milic coolung		
Salmonellosis (Salmonella species)	5-72 hr (1-4 days)	Daintes, abdominal pain, chills, lever, voraling, dehydration	Raw, undercooked aggs, raw milk, meat and poultry	infected food- source animals; human feces	Cook eggs, meet and poutry thoroughly; pasteunze milic implicate chickens		
Strigetosis (Strigella species)	12-96 hy (4-7 days)	Diarrhee, lever, nausea; sometimes vorming, cramps	Raw loods	Human lecal contamination, direct or wa water	General estitation, took loods thoroughly		
Staphylococcel food possoning (heat-stable enterolopión of Staphy- lococcus auneus)	1-6 h: [6-24 hr)	Nausee, vornting, dianthes, cramps	Hem, meat, poultry products, cream-filed pastries, whipped butter, cheese	Handlers with coids, sore threats or infected cuts, food alicens	Thorough hassing and rapid cooling of boots		
Simplecessal foodborne infection (Streptococcus pyogenes)	1-3 days (varies)	Various, including sore throat, erysloelas, acadel feiver	Raw milk, deviled eggs	Handlers with sore throats, other "strep" intections	General sanitation, passeurza milk		
Vibrio perahaemolyscus (codoms infection	12-24 hr (4-7 days)	Diarrhea, cramps; sometimes neusea, vornéng, lever, headache	Fish and sealcods	Manne coastal environment	Cook lish and maloods thoroughly		
Vibro withfacts loodbarne intection	In persons with high serum iron: 1 day	Chills, lever, prostration, often death	Plaw bysters and clams	Marine coastal environment	Cook shellish thoroughly		
Yersiniosus (Yersinia enterocolitica)	3-7 days (2-3 weeks)	Darrhea, pains minuck- ing appendicitis, lever vomiting, etc.	Raw or undercooked pork and beef, lolu packed in apping water	intected animals especially swine; contaminated weter	Cook meats thoroughly, chlorinate water		

Table 5. Top 12 Mishandling Food Practices in Homes (Knabel, 1995).

Rank	Contributing Factor	Perceni'
1.	Contaminated raw food/ Ingredient	42.0
2.	Inadequate cooking/ canning/heat processing	31.3
3.	Obtained food from unsafe source	28.7
4.	improper cooling	22.3
5.	Lapse of 12 or more hours between preparing and eatin	12.8 g
5.	Colonized person handling implicated lood	9.9
7.	Mistaken for food	7.0
₿.	Improper fermentations	4.6
9.	Inadequate reheating	3.5
10.	Toxic containers	3.5
11.	Improper hat holding	3.2
12.	Cross-contamination	3.2

Preventing foodborne illness in the home requires educating consumers on food safety knowledge and safe handling practices. To inform consumers on safe handling practices, USDA has applied the Hazard Analysis and Critical Control Points (HACCP) concept in developing educational materials. The messages focus on areas least understood by consumers, but are critical in preventing foodborne illness (Knabel, 1995). In addition, USDA has required a safe food handling label that provides information on critical control points to be placed on packages of raw and partially-cooked meat and poultry products (Knabel, 1995) (Figure 5).



Figure 5. Safe Food Handling Label (Knabel, 1995)

Other efforts to inform consumers have been made by USDA and FDA. For example, a Foodborne Illness Education Information Center was established in 1994 as part of a national campaign to reduce the risk of foodborne illness and increase knowledge on food safety principles. The center is responsible for developing an educational database to assist with educational and training materials for consumers and food service workers. Also, USDA's Food Safety and Inspection Service has a Meat and Poultry Hotline for consumers to call if they have any questions on safe handling of meat and poultry. Likewise, the FDA has a Seafood Hotline for consumers to call about seafood safety (Knabel, 1995).

By exploring consumers' health attitudes, nutrition knowledge, dietary behavior, and safe food handling practices, nutrition educators can identify areas where consumers need to strengthen their existing practices or change their behavior to achieve or maintain optimal health. Changing nutrition-related behavior is difficult, but nutrition education programs can be effective by applying theoretical frameworks or models of health behavior to promote adherence to dietary recommendations and long-term compliance.

Improving the Health of Americans

Improving America's health status is a challenge to nutrition educators.

Unfortunately, adherence to a healthy diet that follows the recommendations of the Food Guide Pyramid and the Dietary Guidelines for Americans is difficult and progress has been slow. The following section will provide an overview of health promotion, nutrition education, and theories of behavioral change in nutrition education.

Health Promotion

There are many factors that influence the development, maintenance, and change of dietary patterns (O'Donnell & Harris, 1994). Health promotion strategies that are centered around factors that influence dietary patterns have a greater chance of producing positive dietary change (Frankle & Owen, 1993).

Traditionally, the approach to changing dietary behavior has been to focus on the individual's knowledge, attitudes, behavior, and practices (Glanz & Mullis, 1988); however, this approach often overlooked other variables that affect health-related behavior resulting in a "victim-blaming" approach (McLeroy, Bibeau, Steckler, & Glanz, 1988). According to McLeroy and associates, an ecological approach to health promotion focuses on health behavior of individuals and environmental situations. McLeroy states "the importance of ecological models in the social sciences is that they view behavior as being affected by, and affecting the social environment" (McLeroy et al., 1988, p. 355). The model, which McLeroy and associates mention consists of five components that are considered to influence health-related behavior. They include intrapersonal factors, interpersonal processes and primary groups,

Intrapersonal factors are characteristics of the individual such as attitudes, behavior, knowledge, and skills. Interpersonal processes and primary groups involve formal and informal social networks and social support systems like family, friends, and co-workers. Institutional factors can be described as being social institutions having organizational characteristics with formal and informal rules and regulations for operation. Community factors are considered to be the relationships among institutions, organizations, and informal networks within defined boundaries. Finally, public policy consists of national laws and policies of local, state, and national government (McLeroy et. al., 1988).

There are several federal government and national health organizations that recognize nutrition education as a key factor in health promotion and disease prevention and have implemented several programs to assist the public in reaching certain health goals. For instance, Healthy People 2000: National Health Promotion and Disease Prevention Objectives, The National Cholesterol Education Program, The National High Blood Pressure Education Program, The National 5-A-Day Program, National Nutrition Month®, and The Foodborne Illness Education Information Center.

Healthy People 2000, which began in the 1980's, is a national effort that seeks to improve the health and longevity of the American people within the next decade (Feinleib, 1995). The three goals of Healthy People 2000 for Americans are the following: (1) increase healthy life span, (2) reduce health disparities, and (3) provide access to preventative services (HHS, 1990). The U.S. Public Service in conjunction with the Institute of Medicine of the National Academy of Sciences/National Research Council developed measurable objectives in 22 priority

areas including health promotion, health protection, and preventive services (Danford & Stephenson, 1991; McGinnis & Lee, 1995). There are 21 nutrition objectives listed in the nutrition priority area and are classified according to health status, risk reduction, or services and protection objectives (HHS, 1990).

The National Cholesterol Education Program (NCEP) was initiated in 1985 by the National Heart, Lung, and Blood Institute (NHLBI). The goal of the NCEP is to reduce elevated blood cholesterol levels that contribute to death and disparity from coronary heart disease. The NCEP educates both professionals and the public to increase awareness and understanding of the relationship between high blood cholesterol and the risk of coronary heart disease. Not only does the program emphasize the importance of having blood cholesterol levels checked, but the importance of adopting healthy eating patterns that are low in saturated fat and cholesterol (NHLBI website, 1997).

The National High Blood Pressure Education Program (NHBPEP) was established in 1972 as a joint effort among professional and voluntary health agencies, State health departments, and many community groups. The goal of the NHBPEP, which is administered and coordinated by the National Heart, Lung, and Blood Institute (NHLBI), is to reduce death and disability related to high blood pressure by building public awareness through education programs aimed at the public and health professionals (NHLBI website, 1997).

The 5-A-Day for Better Health Program, initiated in 1992, is designed to promote public awareness of the importance of consuming 5 or more servings of fruits and vegetables a day and to provide information on how to increase fruit and vegetable intake as part of daily eating patterns. The program is jointly sponsored by the National Cancer Institute (NCI) and the Produce for Better Health Foundation, a

nonprofit foundation representing the fruit and vegetable industry. Several unique components make up the 5-A-Day for Better Health Program, such as the simple, positive message, industry participants, mass media, State health departments, and research to determine the effectiveness of interventions (NCI website, 1997).

The Foodborne Illness Education Information Center, established in 1994 by the USDA and the Food Safety and Inspection Service (FSIS) provides information on foodborne illness prevention. In order to help reduce the risk of foodborne illness, the center was established as part of a national campaign to increase knowledge of food-related risks. The center is also responsible for the development and maintenance of two databases: the Foodborne Illness Educational Materials Database and the Hazard Analysis Critical Control Points (HACCP) Training Programs and Resource Database (USDA website, 1996).

National Nutrition Month®, initiated in March of 1973, is sponsored annually by the National Center of Nutrition and Dietetics (NCND) of ADA. It is a nutrition education and information campaign designed to provide the public with nutrition knowledge that enables them to make informed decisions concerning food selection, preparation, and intake. To promote sound eating habits, a different slogan is developed each year and key messages are emphasized. For example, the slogan for 1997 was "All Foods Can Fit" and the message focused on the idea of total diet. Messages emphasized that all foods can be a part of healthy eating as long as they are consumed in moderation and balanced over one or more days (ADA website, 1997).

Nutrition Education

Nutrition education can range from providing nutrition information in newspapers or magazines to satisfy consumer interests to implementing nutrition intervention programs that incorporate behavior change strategies. Nutrition education can also involve nutrition communication (informing consumers about food and nutrition) and nutrition promotion (translating dietary guidance into clear messages). Ultimately, nutrition education should be viewed as the foundation for nutritional advances in public health (ADA position paper, 1996). Although there are several frameworks in which nutrition education takes place, the focus or message about food and food choices must be consistent.

Nutrition education can be defined as "any set of learning experiences designed to facilitate the voluntary adoption of eating and other nutrition-related behaviors conducive to health and well-being" (Contento et al., 1995, p. 279). Although there are science-based research studies that support the relationship between diet and chronic disease, there is little research in factors that influence the change in nutrition-related behavior.

Nutrition-related behavior can include nutrient intake, food intake, food selection and preparation, physical activity, weight, and other clinical measures (Schwartz, 1996). Understanding nutrition-related behavior involves looking at factors that influence behavior such as cognitive and behavioral skills (attitudes, beliefs, knowledge, and practices about nutrition, food selection and preparation). In addition, personal factors such as values, intent, and self-efficacy influence nutrition-related behavior. Finally, environment support can influence the ability to achieve and sustain nutrition related behavior (Schwartz, 1996).

Although nutrition education efforts have been made to promote healthy eating along with a healthy lifestyle, these efforts are challenged by nutrition misinformation. Nutrition misinformation can include health fraud quackery and nutrition-related misbeliefs (ADA position paper, 1995). According to the American Dietetic Association, nutrition misinformation has harmful effects both on consumer's health and economic status. The medical consequences of nutrition misinformation may result in the lack of seeking medical attention, nutrient deficiencies, nutrient toxicities, undesirable nutrient-drug interactions, and interference with sound nutrition education and practices (ADA position paper, 1995). Economic consequences of nutrition misinformation arise when the perceived health benefit does not take place resulting in needless buying of products.

In order to protect the nutritional well-being of individuals, nutrition education programs must be designed to meet the needs, behaviors, motivations, and desires of individuals and furthermore be presented in a form that individuals understand and can apply to their daily lives (ADA position paper, 1996).

The goal of nutrition education is to promote healthy eating behavior that reduces the risk of chronic disease (Frankle & Owen, 1993). The American Dietetic Association recommends that nutrition education for the public should include the following: focus on total diet rather than individual foods; have a positive approach toward foods and food choices; include messages of balance, variety, and moderation as part of a healthy diet; and finally, specify there are no good or bad foods (ADA position paper, 1996). In order to achieve and maintain optimal health, nutrition education should be an important component of all health promotion disease prevention and health maintenance programs (ADA position paper, 1996).

Contendo and associates (1995) reviewed 217 nutrition intervention studies and concluded that nutrition education programs can be effective if behavioral change is clearly stated as a goal, and both communication and educational strategies are centered on enhancing awareness and understanding motivations of the individual. For example, motivations and reinforcements include self-efficacy, social norms, social support, perceived benefits and barriers, perceived threat, and personal, social and cultural values (Contento et al., 1995). Thus, educational strategies that rely on dissemination of information alone may not result in dietary behavior change. Gambera et al. (1995) illustrates in their study how "nutrition information alone does not seem to be enough to cause changes in behavior" (p. 1271). Significant changes were observed in total cholesterol, LDL levels, and dietary intake when nutrition education was combined with individual dietary intervention compared to the control group who only received exposure to the Food Guide Pyramid posters without a nutrition education component.

Contento and associates (1995) also concluded nutrition education programs that specifically taught behavioral change strategies, actively involved both individuals and communities, and attempted to provide a health-promoting environment were more likely to be effective. According to ADA, effective nutrition education programs not only have a variety of behavioral, educational, communication, and environmental strategies, but they are developed with the appropriate use of theoretical frameworks (ADA Position paper, 1996).

Theories of Behavioral Change in Nutrition Education

Dietary change is complex and involves the interaction of several variables.

Nutrition education research is addressing the question as to whether the application of theory contributes to a program's success in nutrition education (Smith & Lopez, 1991). Diet and health-related behavior can be best understood by examining different approaches used in psychology to account for certain behaviors. For example, the behavioral approach emphasizes behavior and its environment determinants whereas the cognitive approach emphasizes thought processes (Santrock pp. 10-14).

Smith & Lopez (1991) define a theory as "a set of interrelated definitions, concepts and propositions that present an organized view or interpretation of phenomena" (p.59). In addition, they define a theoretical model as being a simplified representation of principles that make up a theory and can be easily applied to nutrition education. Several theories exist and have been documented in nutrition education research, but it is beyond the scope of this literature search to discuss each theory in detail. Instead, a brief description is provided on theoretical frameworks that Contento and associates (1995) identified as most often used in nutrition education research. The following provides a brief description of the knowledge-attitude behavior model, the Health Belief Model, Social Cognitive Theory, the Consumer Information Processing Model, the Social Marketing Model, Diffusion of Innovations theory, and the Stages of Change Theory.

The knowledge-attitude behavior model implies a gain in new knowledge will lead to changes in existing attitudes, which in turn, will result in improved dietary behaviors or practices. However, this applies only to those who are already

motivated and for those who are not motivated, the new knowledge is just information. In addition, the new knowledge must be motivational in changing attitudes and behaviors. According to Contento et al. (1995) most nutrition education programs have been in the form of dissemination of information rather than in the form of "how to" or "skills", which produce positive or negative consequences of behavior and have personal relevance. Consequently, the programs that use this model are not very effective in bringing about behavior change.

The Health Belief Model emphasizes perceived threat as a motivating force and perceived benefits as providing a preferred path to action. According to the Health Belief Model, the higher the perceived threat or the more vulnerable a person feels, the more motivated the person will be to take action to reduce the threat. Furthermore, if the person perceives the action as being effective and they believe they have the ability to successfully perform the action with few negative consequences, the more likely the action will occur (Contento et al., 1995).

Social Cognitive Theory is the "interactive nature of the effects of cognitive and other personal factors and environmental events on behavior" (Conento et al., 1995, p. 288). Furthermore, Social Cognitive Theory characterizes human behavior as being "reciprocally determined" or rather the person's behavior affects and is also affected by the environment. Social Cognitive Theory combines basic concepts of behavior modification with cognitive, interpersonal, and environmental influences on behavior and has developed concepts such as observational learning, reinforcements, self-control, and self-efficacy (Frankle & Owen, 1993, pp. 259-260). Self-efficacy is critical in the behavioral change process as it influences the choice of new behavior, the effort required to change existing behavior, and the thought and emotional reactions that follow (Baldwin & Falciglia, 1995).

The Consumer Information Processing Model was developed from earlier studies of consumer behavior and emphasizes how consumer's decision making is a multistage process of information acquisition and evaluation, decision making, use, and learning. Since consumers can only process a limited amount of information at a time, they develop rules of thumb to help make reasonable decisions quickly. Thus, consumers tend to seek enough information to make a satisfactory choice, but not necessarily the best choice (Frankle & Owen, 1993, p. 258).

The Social Marketing Model emphasizes marketing principles and techniques to increase the acceptability of social ideas and practices. Social Marketing involves the four P's of marketing: price, product (or service), placement, and promotion (or communication). Social marketing serves as a framework for focusing creative efforts on the design, implementation, and control of programs, which in turn, will affect the target audiences that marketers want to persuade (Conento et al., 1995).

The Diffusion of Innovations Theory suggests that if the innovation (idea, practice, or service) is compatible with current beliefs, values, and lifestyles; is flexible and viewed as more advantageous compared to current practices; is reversible or allows returning to previous practices; is minimal risk; and is cost effective or rather is perceived to have greater benefits than costs, then the adoption of the innovation is more likely (Frankle & Owen, 1993, pp. 262-263; Contento et al., 1995). The innovation will diffuse throughout the community from opinion leaders and early adopters to late adopters over time (Contento et al., 1995).

The Stages of Change Model implies that behavior change is a dynamic process involving several distinct stages and people may be at various stages along the continuum of change readiness: precontemplation (unaware and not interested in changing), contemplation (thinking about changing), decision (being determined to

change), action (actively modifying habits), and maintenance (maintaining new, healthier habits) (Frankle & Owen, 1993, p. 259; O'Donnell & Harris, 1994, p. 280). Furthermore, people may relapse and return to previous behavior and move through the stages of change in a straight line (O'Donnell & Harris, 1994, p. 280). Knowing where people are along the continuum can help nutrition educators focus on strategies that are specifically directed at each stage of change.

Glanz and Rudd (1993) also examined the use of theory by researchers and practitioners in both consumer behavior and nutrition education. A total of 284 professionals were surveyed on the importance of concepts from selected theories for explaining food choices, their familiarity with the selected theories, and their opinions on research and theory. Altogether, respondents agreed that theoretical based concepts are important in understanding how people make food choices; however, it is interesting that respondents were neutral or pessimistic about whether research and theory-based research was practical, useful, and timely in designing effective consumer nutrition education. The theories that were most familiar to more than half of respondents were social marketing (58%), consumer information processing (56%), and social learning (55%). In addition, Glanz & Rudd (1993) report a statistically significant difference in familiarity between professionals in nutrition education and consumer behavior respondents. Consumer behavior professionals were more familiar with the consumer information processing model and nutrition educator professionals were more familiar with the Health Belief Model.

Contento et al. (1995) found that nutrition education programs that use a combination of theoretical models that guide dietary change at the individual level, social level, and environmental level were effective. Furthermore, a variety of

to target audiences because it takes into consideration the complexity of food choices and dietary behavior change (ADA position paper, 1996). Nonetheless, Schwartz (1996) states that understanding human-nutrition related behavior guides in the development of models that demonstrate how consumers make decisions, why they decide on a particular course of action, and how they implement their action as sustained behavior change.

Achterberg & Clark (1992) conducted a review of nutrition education research to identify the use of theoretical frameworks and found that of the 346 research papers or abstracts, only 23.5 % cited a specific theory or model. The theories were from the psychological literature and classified as the following: 36% were cognitive, 33% were social psychological, 19% were behavioral, and 12% could not be classified as a combination of theories and models were used.

In another study, Smith & Lopez (1991) investigated whether there was an association between the use of theory and a nutrition education program's success. A program's success was defined as having measurable differences in knowledge, attitude, and behavior. Smith and associates (1991) reviewed 105 research reports, but only 63 qualified as measuring effectiveness. Of the 63 articles, 71% were theory based and 29% were method based. Smith and associates (1991) reported 60% of the studies that were theory-based used theories from one of three learning theories: Cognitive (27%), Social-psychological (22%), and behavioral (11%). The remaining 11% were a combination of the three. In addition, theory use was either explicit (27%), implicit (71%), or both (2%). Although there was no significant difference found between application of theory and program effectiveness, researchers associated it to implicit use of theory, inconsistencies in application of

theory, and inadequacies in the measurements of change. In addition, researchers noted that failure to examine use of theory vs. non-theory in nutrition education or to explore each theory separately may have accounted for the lack of association between theory use and nutrition education program effectiveness (Smith & Lopez, 1991).

Promoting healthy eating to Americans sounds easy enough; however, dietary behavior change is a complex issue that involves social, cultural, and economic factors as well as physiological and psychological factors. Furthermore, acquired food practices and knowledge are determinants of food intake (Glanz & Mullis, 1988). By understanding the multitude of factors involved in dietary behavior change, nutrition educators can implement strategies from theoretical frameworks that are tailored to the needs, values, behaviors, motivations, and desires of the target audience (ADA position paper, 1996). Some theoretical frameworks are more effective if directed at interventions at the individual level, while others are more effective at the social level or environmental level (Contento et al., 1995).

Nonetheless, nutrition educators that incorporate a variety of theoretical models of individual, social, and environmental change have been found to be effective (Contento et al., 1995).

Evaluating Dietary Intake

Dietary Assessment Methods

Dietary assessment methods are important for investigating relationships between diet and disease, nutrition monitoring, policy making, dietary intervention trials, and planning health promotion and disease prevention activities (Howat et al., 1994; Briefel et al., 1992). Methods for evaluating dietary assessment include

both quantitative and qualitative measures. Quantitative measures involve actual weighing of foods whereas qualitative measures include dietary histories (Howat et al., 1994). There is no ideal standard or method for evaluating dietary intake; however, a researcher can choose a method that best represents the purpose and objectives of the study (Howat et al., 1994). Furthermore, the validity and reliability of dietary methods are important issues as well. Validity describes how well a method or instrument measures what it intends to measure whereas reliability describes the overall consistency or reproducibility of the method or instrument in retests under the same conditions (Zulkifli & Yu, 1992; Howat et al., 1994). The most common instruments used to measure dietary intake include: dietary history, 24-hour recall, food records, and food frequency questionnaires (Howat et al., 1994) (Table 6).

A diet history is a dietary assessment in which a respondent reports their past diet. The diet history includes foods eaten and factors related to food intake (Wylie-Rosett, Wassertheil-Smoller & Elmer, 1990). In addition, amounts of foods and frequency of intake are obtained from the respondent (Thompson & Byers, 1994). The strengths and weaknesses of a diet history are included in Table 6.

In the 24-hour dietary recall, the most commonly used method, the individual is asked to recall and report all food and beverages consumed during the previous 24 hours (Wylie-Rosett et al., 1990). Professionals, who are experienced interviewers and have a knowledge about foods and preparation practices, are important in administering a 24-hour dietary recall because of the manner in which dietary information is collected (Thompson & Byers, 1994). For example, during the interview much of the dietary information is collected by asking probing questions to help respondents remember all foods they consumed within the previous 24 hours.

Probing is useful in collecting necessary details, such as how foods were prepared or in retrieving food items not originally reported (Thompson & Byers, 1994). The strengths and weaknesses of the 24-hour dietary recall are provided in Table 6.

A food record is a record of all foods and beverages, with exact amounts consumed over a period of days (Thompson & Byers, 1994). The amounts are measured by respondents using scales, household measuring cups or spoons, food models, or pictures at the time the food is consumed. Furthermore, the respondent must be responsible for important details, such as brand names, preparation methods, recipes for food mixtures, and serving sizes (Thompson & Byers, 1994). Table 6 includes the strengths and weaknesses of the food record as a dietary assessment tool.

For the food frequency questionnaire, a number of food items are listed and the respondent is asked how many times a day, week, month, or year each food item is consumed (Wylie-Rosett et al., 1990). Only information on frequency is collected, with little detail on other factors that relate to intake, such as preparation methods and food mixtures (Thompson & Byers, 1990). Estimations of nutrient intake are then calculated (nutrient estimate = food frequency x serving size x nutrient standard) (Zulkifli & Yu, 1992). Table 6 reports the strengths and weaknesses of the food frequency questionnaire as a dietary assessment tool.

Several studies have been conducted to determine the accuracy of diet histories and most question the reliability of self-reported food intake (Mertz, 1992). For example, the Beltsville Human Nutrition Research Center reported consistent discrepancies between self-reported food intake and the intake that was determined for weight maintenance. Of the 266 well-trained volunteers, 18% were below maintenance intake. Furthermore, 81% of the volunteers underestimated their

intake by 700 kcalories, 11% were within 100 kcalories, and 8% overestimated their intake by 400 kcalories (Mertz, 1992). Although researchers use quantitative methods to assess dietary intake, qualitative aspects of data collection cannot be overlooked (Mertz, 1992).

Studies have shown that individuals have difficulty in estimating portion sizes of foods and as a result underestimate amounts eaten (Thompson & Byers, 1994). To increase the accuracy of self-reporting, researchers have examined the effect of training sessions for estimating portion sizes (Slawson & Eck, 1997). When subjects were trained in portion size estimations, using actual foods, researchers reported increased validity of portion size estimation (Slawson & Eck, 1997).

Regardless of which method is used to evaluate dietary intake, it is important to realize that all dietary assessment tools are not equal and that they all have limitations. The decision as to which dietary assessment method to use depends on the goals of the assessment, the information needs of the study, the time frame, and the dimensions of diet (Thompson & Byers, 1994).

Table 6. Characteristics of Dietary Assessment Tools (Shils, Olson & Shike, 1994)

DISADVANTAGES METHODS AND ADVANTAGES Retrospective 24-hour recall Easy to administer Does not provide adequate data on nutrient intakes Time required to administer is short Individual diets vary daily, so that a single day's intake may Inexpensive not be representative Respondent burden is low An experienced interviewer is required Useful in clinical setting Relies heavily on memory, making it unsultable for certain More objective than diet history groups, such as the elderly Selective forgetting of foods such as liquids, high-calone Serial 24-hour recalls can provide estimates of usual intakes on snacks, alcohol, and fat occurs individuals Reported intake may not be actual intake, but rather what the Data obtained can be repeated with interviewer wants to hear reasonable accuracy Does not reflect differences in intake for weekday vs. Good reliability between interviewers weekend, season to season, or shift to shift Data may not accurately reflect nutrient intakes for population because of variations in food consumption from day to day May be a tendency to over-report intake at low levels and under-report intake at high levels of consumption, leading to "flat slope syndrome" with reports of group intakes Food frequency questionnaire May be either self-administered or Response rates may be lower if questionnaire is selfinterviewer-administered administered Inexpensive Incomplete responses may be given Quick to administer Lists compiled for the general population are not useful for Good at describing food intake patterns obtaining information on groups with different eating for diet and meal planning patterns (foods inappropriate) No observer bias Total consumption is difficult to obtain because not all foods Can be used for large population can be included in lists; underestimation can occur Respondent burden rises as the number of food items queried studies Useful when purpose is to study association of a specific food or a Analysis is difficult without use of computers and special small number of foods and disease such as alcohol and birth defects Reliability is lower for individual foods than for food groups Specific information about nutrients can Foods differ in extent to which they are over- and underbe obtained if food sources of reported (errors are not random) nutrients are confined to a few Each questionnaire need validation sources Translation of food groups to nutrient intakes requires that Can be analyzed rapidly for nutrients or many assumptions be made tood groups using a computer For assessing single nutrients, short lists are acceptable Foods can be ranked in relation to intakes of certain food items or groups of foods

Table 6. Characteristics of Dietary Assessment Tools continued (Shils, Olson & Shike, 1994)

METHODS AND ADVANTAGES

Burke-type dietary history

Produces a more complete and detailed description of both qualitative and quantitative aspects of food intake than do food records, 24-hour recalls, or food frequency questionnaires

Eliminates individual day-to-day variations

Takes into consideration seasonal variations

Good for longitudinal studies Provides good description of usual intake

Provides some data on previous diet before beginning prospective studies

Food diary

What is eaten is recorded (or should be recorded at time of consumption) Recording error can be minimized if subjects are given proper directions Does not rely heavily on memory, and thus may be good for the elderly Can be obtrusive

DISADVANTAGES

Highly-trained nutritionists are required to administer dietary histories

Difficult to standardize because of considerable variability among and within interviewers

Depends on subject's memory

Time-consuming (takes about 1 to 2 hours to administer) Diet histories overestimate intakes compared to food records collected over the same period because of bigger portion sizes and greater frequencies reported; also does not take into account for missed meals or sick days

Time frame actually used by subject for reporting intake history is uncertain, probably no longer than a few weeks Costs of analysis are high because records must be checked, coded, and entered appropriately

Food intake may be altered Respondent burden is great

Individual must be literate and physically able to write Respondent may not record intakes on assigned days

Difficult to estimate portion sizes Food models or pictures may help

Under-reporting is common

Number of sampled days must be sufficient to provide usual intake

Records must be checked and coded in standardized way Measured food intakes are more valid than records above Costs of coding an analysis are high

Sex difference exists (i.e., women are more competent than men in recording)

Number of days surveyed depends on the nutrient being studied

The very act of recording may change what is eaten

Summary

In order to achieve health-promoting and disease-preventing dietary practices, individuals must have adequate nutrition knowledge about diet and health and appropriate skills in food selection and preparation. The Oklahoma Cooperative Extension Service developed and implemented a Healthy Living Nutrition Education Program in order to improve dietary habits that were conducive with the Dietary Guidelines for Americans and the Food Guide Pyramid as well as improve personal health status indicators for disease risk. The following study is an effort to advance nutrition education toward the community level, where social support is high, and deliver the messages in an appropriate manner for adults.

CHAPTER III

RESEARCH PROCEDURE

Introduction

This chapter describes the procedure used in this study including the development of the Healthy Living Program, dietary assessment tools, subject recruitment, experimental study, and statistical analysis.

Nutrition plays an important part in health maintenance and the prevention of certain diseases, such as heart disease, stroke, arteriosclerosis, some cancers, and diabetes. (HHS, 1990) Although the Dietary Guidelines for Americans provide advise about healthy food choices that decrease the risk of chronic disease (Kennedy, Myers & Layden, 1996), there is a high prevalence of nutrition-related health problems. Coronary heart disease and strokes kill over 10,000 Oklahomans each year. Oklahoma also has the second highest death rate in the nation for coronary heart disease (Brandt et al., 1994; AHA, 1994). Oklahoma Cooperative Extension Service nutrition education efforts are focusing on improving the overall health status of Oklahomans through a five-year Healthy Living Program (HLP), which has been designed to promote appropriate diets and healthy lifestyles.

The purpose of this study was to evaluate the effects of an eight-week Oklahoma Cooperative Extension Service nutrition education program, HLP, in a rural county in Oklahoma on food selection, preparation, and food safety practices and behaviors, dietary intake, and anthropometric and biochemical health measures. The objectives of the study include: 1) Payne County subjects will engage in healthy lifestyle practices that promote healthy living, 2) Payne County subjects will adopt

the USDA Food Guide Pyramid Dietary Recommendations, 3) Payne County subjects will adopt the USDA-HHS Dietary Guidelines dietary recommendations, 4) Payne County subjects will adopt safe food selection, preparation, and storage practices, and 5) Payne County subjects will improve personal health status indicators.

The principal investigator and research assistants completed training sessions on laboratory safety and biological hazard disposal prior to the study. In addition, information was provided on Hepatitis B and the Human Immunodeficiency Virus. At this time, the research assistants signed a consent form for the Hepatitis B vaccine series. This study was approved by the Institutional Review Board (IRB) for human subjects research at Oklahoma State University (Appendix A).

Development of The Oklahoma Cooperative Extension Service Healthy Living Program

The HLP was developed by the Oklahoma Cooperative Extension Service to encourage lifestyle practices that would promote healthy living among Oklahomans. The HLP was an eight-week program that provided information on nutrition, label reading, food selection, food preparation, and food safety about specific food groups within the Food Guide Pyramid. The program consisted of eight 1 1/2 · 2 hour weekly sessions taught by the County Home Economists. The sessions are listed below along with additional information:

1) The Basics - Food Pyramid and Recipe Modification: An introduction to the Food Guide Pyramid along with the food label was provided in this session.

Emphasis was placed on where foods and combination foods are placed within the Food Guide Pyramid. Ethnic foods were also addressed.

- 2) Supermarket Tour: This session involved a trip to the local supermarket. The tour focused on the following areas: the produce section, the meat department, the dairy case, the breads and cereals section, and the pasta section. Participants received handouts on fruits and vegetables, potatoes, bread, muffins and other pastries, grains, cereals, pasta, dairy products, frozen desserts, meats, and fats (Appendix B).
- 3) Breads: Special emphasis was placed on whole grains and learning how to read bread labels in order to determine the healthiest choice. Furthermore, participants became familiar with the functions of ingredients in quick breads, yeast breads, and rolls.
- 4) Grains. Cereals, and Pasta: Participants were introduced to a variety of grains, such as couscous, bulgur, barley, and quinoa. Helpful hints for choosing and preparing grains, cereals, and pasta were also provided. In addition, there were suggestions on ways to reduce sodium and increase fiber in recipes.
- 5) Fruits and Vegetables: This session emphasized the National Cancer Institute's Five-a-Day logo and listed the type of fruits and vegetables available. Also, the differences between fresh fruit, frozen fruit, canned fruit and dried fruit were explored. In addition, cooking methods were described and a guide to using herbs and spices was provided.
- 6) Meat, Poultry, Fish, Dry Beans, Eggs, and Nuts: Participants learned about bacteria that cause foodborne illness along with safe-handling practices. Also, participants studied wholesale cuts and the length of time meat can be safely stored.

- 7) Dairy: Special emphasis was placed on the importance of calcium in this session. Participants became familiar with the types of milk and the classifications of cheese.
- 8) Fats, Oils, and Sweets: This session compared vegetable oils, explored claims on fats and sugars, and demonstrated how to lower the fat in baking. In addition, fat and sugar models (Appendix C) were provided to illustrate the amounts of sugar and fat in one serving of a particular food.

Each session contained specific lesson objectives (Appendix D), handouts, visuals, activities, and additional resources for the subjects. In addition, each session illustrated how to modify recipes to reduce fat, cholesterol, sodium, sugar, and increase fiber.

Marketing the HLP consisted of printed materials, a news release (Appendix E), and video materials, which included a 29 second broadcast television public service announcement and a two minute loop promotional tape. In addition, T-shirts were printed with the HLP logo.

A training session was also provided for counties that participated in the HLP. During the training session, information was provided on the eight-sessions and materials were distributed. In addition, assessment procedures were discussed. Assessment of the HLP included the Food and Nutrition Behavior Questionnaire, the Health Habits and History Questionnaire, and the Healthy Living Program Measurement Form.

The Healthy Living Program Assessment Forms

The evaluation of the HLP included questionnaires that assessed nutritional status, food and nutrition practices and behaviors, dietary intake, anthropometric, biochemical, and clinical measures.

The Food and Nutrition Behavior Questionnaire (Appendix F) was developed to assess food selection, preparation, and food safety practices and behaviors. The Food and Nutrition Behavior Questionnaire was adapted from the USDA Expanded Food and Nutrition Education Program (EFNEP) survey (1993), which has been validated and tested for reliability.

The Health Habits and History Questionnaire (HHQ) (Appendix G) was used to assess participants' dietary intake. The Health Habits and History Questionnaire is a quantitative food frequency questionnaire and computer analysis system developed by Block et al. (1986), which has been tested for validity and reliability (Block et al., 1990).

The Healthy Living Program Measurement Recording Form (Appendix H) was used to record subjects' anthropometric, biochemical, and clinical measurements.

Measurements included height, total body weight, and wrist circumference. In addition, sex, age, blood pressure, and total blood cholesterol was listed.

Subject Recruitment

After approval from the IRB for human subject research at Oklahoma State
University, subjects were solicited by the Payne County Home Economists using
flyers, mailing enclosures, news releases, and television public service
announcements. Subjects were instructed to contact their local county Extension

Office if they were interested in participating in the HLP. A telephone script was used to inform subjects about the HLP along with the purpose of the study. Subjects who would participate in the study were informed that the program consisted of taking blood samples at the beginning and end of the eight-week session to measure total serum cholesterol, LDL-cholesterol, HDL-cholesterol, glucose, and triglycerides. Subjects were also informed that in order for them to receive their blood values, a consent form would have to be read and signed before the first educational session. Subjects were required to pay a registration fee of \$20 to cover the cost of food demonstrations, program T-shirts, and educational materials.

Experimental Study

This research project evaluated the impact of the HLP in Payne County,

Oklahoma using a Pretest-Posttest Control Group experimental design as seen in

Figure 6 (Nieswiadomy, 1993).

R O₁ X₂ O (Experimental Group)

R O₁ O (Comparison Group)

Figure 6. Experimental Design

Data were collected at baseline and after eight-weeks of the HLP. A total of 22 subjects participated in the study.

Pre-data were collected at the first session of the HLP for Payne County subjects on February 13, 1996. During this session, subjects who were participating in the study were instructed to read and sign the consent form (Appendix I). Afterward,

subjects' physical measurements were obtained and recorded on the Healthy Living Program Measurement Form and blood was collected by a licensed phlebotomist. Subjects were then given instructions for filling out the Healthy Living Program Survey and the Health Habits and History Questionnaire, while a light snack consisting of juice and a carbohydrate was provided.

On each data collection form, subjects were instructed to check a box to indicate if they were beginning or completing the program. Subjects were instructed to enter a code on the evaluation forms. The code was the subjects' first, middle, and last initials with the last four digits of their phone number. This code was used to match beginning and ending data forms and to ensure data confidentiality. If a subject did not have a phone number, they were instructed to use any four digits as long as they could remember their code from the first and last session. The research assistants collected all completed evaluation forms and indicated which subjects were study controls.

Post-data were collected at the last HLP session eight-weeks later. At this time, subjects completed the Healthy Living Program Measurement Form, Food and Nutrition Behavior Questionnaire, and the Healthy Habits and History Questionnaire.

At both pre-data and post-data collections, the research assistants reviewed the Food and Nutrition Behavior Questionnaire and the Health Habits and History Questionnaire with each subject and answered any questions. In addition, the research assistants were available to clarify any questions and to verify that all forms were properly completed. At both pre and post data collections,

anthropometric, biochemical, clinical, and dietary indicators of nutritional status were obtained.

Anthropometric Measures

Anthropometric measurements obtained at the beginning and end of the HLP included total body weight and height. In addition, Body Mass Index (BMI) was also calculated.

Height

Subject's height was measured during the first session using a measuring stick affixed to the wall. The measuring stick was measured 36 inches (3 feet) from the floor allowing a total of 72 inches (6 feet). Subjects were measured standing erect, without shoes, with heels together. The measurement was read to the nearest 1/8 inch.

Weight

Subjects were weighed on a beam scale without shoes and dressed in light-weight clothing. Weight was measured in pounds to the nearest 1/4 pound.

Body Mass Index

BMI, an indicator of body fat, was calculated using the following formula (Basic Nutrition and Diet Therapy, 1993):

$$BMI = \frac{weight (kg)}{height (m^2)}$$

The following table defines the points ranging from underweight to morbidly obese:

Category	Women	Men	
Underweight	<19.1	<20.7	
Acceptable Weight	19.1 to 27.3	20.7 to 27.8	
Overweight	>27.3	>27.8	
Severe Overweight	>32.3	>31.1	
Morbid Obesity	>44.8	>45.4	

(Witney, Hamilton, & Rolfes, 1990)

Frame Size

Frame size was collected at the end of the eight-week program. Wrist circumference was obtained in order to estimate subjects' frame size. Frame size was determined using wrist circumference and height (Lee & Nieman, 1996). Subjects were instructed to position their right arm flexed at the elbow with the palm up. A narrow measuring tape was placed around the smallest part of the wrist distal to the styloid process of the radius and ulna (Figure 7). Measurements were recorded to the nearest 0.1 centimeter. The body frame size chart was consulted to determine subjects' frame size (Figure 8).

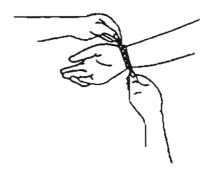


Figure 7. Wrist Circumference Measurement

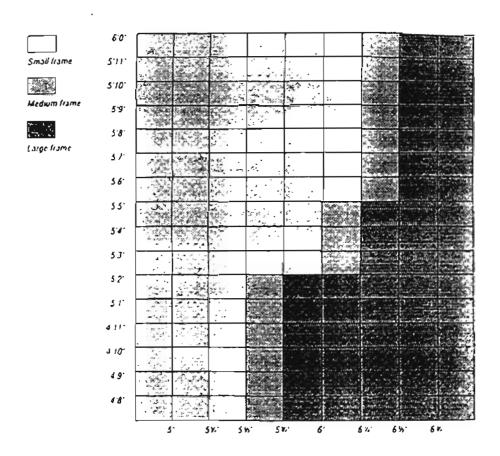


Figure 8. Body Frame Size Chart (Lee & Nieman, 1996)

Biochemical Measures

The following biochemical measures were obtained during the beginning and end of the HLP: Fasting total serum cholesterol, fasting serum LDL-cholesterol, fasting serum HDL-cholesterol, fasting serum triglycerides, and fasting serum blood glucose.

Blood Collection & Analysis

Subjects fasted for 12 hours prior to each blood collection. A licensed phlebotomist drew a 10 mL blood sample. Blood was placed on ice for no more than 2 hours. To obtain the serum, the Beckman Centrifuge model TJ-6 was used at maximum speed for 1 hour at 4° Celsius. The serum was frozen at 20° Celsius for later analysis of total cholesterol, HDL-cholesterol, triglyceride, and fasting serum glucose.

Biochemical values were obtained using Sigma Diagnostic Procedures adapted for the Fara Clinical Analyzer (Roche Cobra Fara, Somerville, N.J.):

- Total Cholesterol was obtained using Sigma Diagnostic Procedure kit No. 352.
- HDL-cholesterol was obtained using Sigma Diagnostic Procedure kit No. 352-3.
- Triglycerides were obtained using Sigma Diagnostic Procedure kit No. 337.
- LDL-cholesterol was calculated using the following formula:
 LDL = Total Cholesterol [HDL-Cholesterol + Triglycerides / 5].
- Fasting glucose was obtained using Sigma Diagnostic Procedure kit No. 16-UV.

Subjects received their individual blood values by mail (Appendix J). The following are the criteria used to evaluate serum lipids and glucose concentrations (Lee & Nieman, 1996).

Table 7. Concentration values used in Healthy Living Nutrition Education Program

Blood Component	Range	Value
	< 200 mg/dl	Desirable
Total Cholesterol	200 - 239 mg/dl	Borderline
	> 240 mg/dl	High
	< 130 mg/dl	Desirable
LDL-Cholesterol	130 - 159 mg/dl	Borderline
	> 160 mg/dl	High
HDL-Cholesterol	> 60 mg/dl	Desirable
	< 35 mg/dl	Low
Triglycerides	< 200 mg/dl	Desirable
	200 - 339 mg/dl	Borderline
	400 - 1000 mg/dl	High
	> 1000 mg/di	Very High
Fasting Blood Glucose	70 - 120 mg/dl	Desirable
	120 - 140 mg/dl	Borderline High
	>140 mg/dl	High
	< 70 mg/dl	Low

Clinical Measures

Clinical measurements obtained at the beginning and end of the HLP included both systolic blood pressure and diastolic blood pressure.

Blood Pressure

Blood pressure was measured by the principle researcher. The following are the criteria used to evaluate blood pressure (HHS, 1994).

Blood Pressure Level (mm Hg)

Category	Systolic	Diastolic		
Normal	< 130	< 85		
High Normal	130 - 139	85 - 89		

Dietary Measures

Dietary measures in the study included the Food and Nutrition Behavior

Questionnaire and the Health Habits and History Questionnaire. Both forms were self-administered and required about 20 minutes to complete.

The Food and Nutrition Behavior Questionnaire, which was used to evaluate dietary practices, consisted of 18 questions. Using a 5-point Likert scale format ranging from "never" to "almost always", subjects were asked to check which statement best represented their practices. The 18 questions in the Food and Nutrition Behavior Questionnaire were subdivided into the following categories for analysis:

Food Safety	3 guestions
Food Selection and Preparation	10 questions
Food Intake	5 questions

The Food and Nutrition Behavior Questionnaire Score was the total score obtained from answering all 18 questions. The Food Safety Score was the sum of the 3 food safety questions, the Food Selection and Preparation Score was the sum of the 10 food selection and preparation questions, and the Food Intake Score was the sum of the 5 food intake questions.

The Health Habits and History Questionnaire consisted of 99 questions and subjects were asked to report their serving size by placing a check in the box S (small), M (medium), or L (large). A medium serving size was defined on the form as an example. In order for subjects to visualize serving sizes, food models constructed of dried beans wrapped in colored netting were used. Subjects were instructed to look at the bean bags to visualize what a small, medium, or large serving represented. In addition, subjects were asked to report how often, on average, they had consumed specific food items. The frequency responses included daily, weekly, monthly, yearly, or rarely/never.

The categories of foods are listed below:

Fruits & Juices
Vegetables 23 questions
Meat, Fish, Poultry, & Mixed Dishes
Lunch Items 5 questions
Breads, Salty Snacks, & Spreads
Breakfast Foods 8 questions
Sweets 6 questions
Dairy Products 6 questions
Beverages

The Health Habits and History Questionnaire was coded and analyzed using the software provided by the National Cancer Institute (1987). This program calculated nutrient intakes based on frequency of consumption and portion sizes from the Health Habits and History Questionnaire (Appendix K). Data were used to determine the percentage of calories from fat, protein, and carbohydrate and mean servings from the Food Guide Pyramid food groups.

Data were analyzed using the Statistical Analysis System (SAS Inst. Inc., Cary NC, 1989) version 6.08. Mean values were compared between the control group and the education group using SAS analysis of variance to determine if the groups were similar. After participating in the eight-week HLP, changes in subjects' food and nutrition behavior, dietary intake, anthropometric measurements, and biochemical concentrations were compared to controls using the SAS General Linear Models procedure. Significant differences were determined using Least Squares Means. Significance level was set at 0.05.

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CHAPTER IV

RESULTS AND DISCUSSION

Introduction

The purpose of this study was to evaluate the effects of an eight week Oklahoma Cooperative Extension Service nutrition education program, HLP, in a rural county in Oklahoma on food selection, preparation, and food safety practices and behaviors, dietary intake, and anthropometric and biochemical health measures. The objectives of the study were: 1) Payne county subjects will engage in healthy lifestyle practices that promote healthy living, 2) Payne County subjects will adopt the USDA Food Guide Pyramid Dietary Recommendations, 3) Payne County subjects will adopt the USDA-HHS Dietary Guidelines/Dietary Recommendations, 4) Payne County subjects will adopt safe food selection, preparation, and storage practices, and 5) Payne County subjects will improve personal health status indicators.

Description of Subjects

The subjects in the study were independently living volunteers from the community of Stillwater (a town of Payne County), Oklahoma. A total of 22 subjects participated in the HLP and were part of the study; however, only 21 subjects were included in the data analysis because one subject forgot to fast prior to the post data collection period. The control group consisted of ten females with a mean age of 51 ± 10 years, mean beight of 65 ± 3 inches, mean weight of 164 ± 33 pounds, and a

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mean BMI of 27.5 ± 5.1 (wt/ht²) (Table 8). The education group consisted of 11 females with a mean age of 62 ± 16 years, mean height of 64 ± 2 inches, mean weight of 158 ± 27 pounds and a mean BMI of 27.6 ± 4.6 (wt/ht²) (Table 8). At baseline, the education group had a significantly higher mean age than the control group. Mean body weight for both the control group and the education group were considered to be above recommended ranges (Lee & Nieman, 1996); however, mean body mass index values were considered as overweight (Cummings, et al., 1997).

Table 8. Baseline Characteristics of Subjects

	Control Group n = 11	Education Group n = 10
Characteristics	Pre	Pre
Age (years)	51±10	62±16°
Height (inches)	65±3	64±2
Weight (pounds)	164±33	158±27
BMI (kg/m²)	27.5±5.1	27.6±4.6

¹Means ± SD.

Baseline Data on Food and Nutrition Behavior

The Food and Nutrition Behavior Questionnaire scores were analyzed using SAS analysis of variance (Table 9). Subject's mean total score, and subscores for safety

^eSignificant difference in measurements at baseline between groups, p≤0.05.

^{*}Change in pre to post measurements significantly different from control group, p≤0.05.

score, food selection and preparation score, and food intake score are reported in Table 9. At baseline, there were no significant differences in total scores, food safety scores, food selection and preparation scores, or food intake scores between the control group and the education group from the Food and Nutrition Behavior Questionnaire.

Table 9. Survey Score and Subscores Education Group.1

	Control Group n = 11		Education Group n = 10	
Survey Score	Pre Post		Pre	Post
Total Score:	68±9	59±21	61±19	74±5 *
Survey Subgroup Scores:				
Safety Selection/Preparation Food Intake	14±2 37±7 18±2	12±4 32±12 16±6	14±1 33±12 14±8	14±1 41±4* 19±3*

¹Means ± SD.

Effects of the HLP On Food And Nutrition Behavior

After the eight-week HLP, marked improvements in food and nutrition behavior were observed for the nutrition education group. A significant increase in the total Food and Nutrition Behavior Questionnaire score was observed within the education group compared to the control group (p=0.0163) (Table 9). Additionally, within the

^aSignificant difference in measurements at baseline between groups, p≤0.05.

^{*}Change in pre to post measurements significantly different from control group, p≤0.05.

education group, 82% had an increase in the total Food and Nutrition Behavior Questionnaire score.

No significant change in the food safety score was observed for the education group compared to the control group; however, it is interesting to note that the mean food safety score remained the same in the education group whereas the mean food safety score decreased in the control group. A significant increase in the food selection and preparation score was observed in the education group compared to the control group (p=0.0174) (Table 9). After completion of the HLP, 82% of the education group had an increase in their food selection and preparation score. A significant increase in the food intake score also was observed within the education group compared to the control group (p=0.0177) (Table 9). Within the education group, 73% had an increase in their food intake score.

Within the education group, there was a lack of change in the survey subgroup score of food safety. There are a number of possible explanations for this. The Health Belief Model, which attempts to explain preventive health behavior, emphasizes that a person's beliefs about health determine readiness to take action (Holli & Calabrese, 1991). According to the Health Belief Model, the higher the perceived threat, the more motivated the person will be to take necessary action to reduce the threat (Contento, et al., 1995). According to Food Marketing Institute (1997), there has been no increase in the number of people who have reported changing their behavior as a result of safe-handling labels placed on meat and poultry products. Of 1,011 surveyed, only 18% of people reported washing and disinfecting counters, cooking areas, and utensils after contact with meat.

Furthermore, only 13% reported washing their hands more often. It is obvious from

these surveys that most people do not view food safety as a personal threat, regardless of the recent outbreaks of E. coli. Perhaps another explanation is the fact that time was limited for teaching the HLP and many topics were covered during the one hour session. Food safety was covered last in both session six and session seven and there may not have been an adequate amount of time for teaching food safety lessons. Another possible explanation for the lack of change in food safety subscores could be that food safety problems often occur in the location where consumers are least likely to expect them. It may be that some people believe that threats to food safety occur in processing facilities or restaurants, instead of their own homes and disregard important food safety issues (Knabel, 1995). This is consistent with the findings from the Food Marketing Institute (1997) where 33% of 1,011 people surveyed thought that manufacturers and food processors were responsible for ensuring food safety and 31% of people thought that the government was primarily responsible. It is also noteworthy to mention the sample size was very small for the study and included older adults. As mentioned previously, Altekruse et al. (1996) found that gender, age, and frequent food preparation were related to safe food handling practices. Although knowledge of food handling practices did not increase with age, safe practices did.

Since 1995, the HLP has now reached 498 individuals and has continued to impact the overall nutritional status of Oklahomans. According to the two-year statewide evaluation summary, the food and nutrition behavior questionnaire data have been received from 344 participants. A significant increase was observed in the Food and Nutrition Behavior Questionnaire Score (p≤0.0001). Eighty-six percent of the HLP participants showed an increase in the Food and Nutrition

Behavior Questionnaire Scores. Not only has there been a significant increase in the overall Food and Nutrition Behavior Questionnaire Scores, but a significant increase was observed in food selection and preparation scores (p=≤0.0001), and food intake scores (p≤0.0001). Thus, 79% of the HLP participants are increasing their food selection and preparation scores, and 62% are increasing their food intake scores.

Baseline Data On Dietary Intake

Dietary intake estimates were calculated using the software developed by Block et al., (1986) and are provided in Table 10. At baseline, the education group had a significantly higher percent of calories from protein than the control group. No other significant differences were observed between the two groups for dietary intake variables at baseline.

Table 10. Dietary Intake By Education Group¹

Dietary Intake Variables	Control Group n = 11		Education Group n =10	
Percent of Calories From:	Pre	Post	Pre	Post
Fat Protein Carbohydrate	31±8 16±3° 53±9	32±6 17±2 51±8	30±7 19±3* 51±7	32±7 18±3 50±7
Servings from the Food Guide Pyramid				
Bread, Cereal, Rice and Pasta	4.4±3.1	3.4±1.4	3.2±1.9	3.2±0.9
Vegetable	3.5±1.6	3.0±0.7	3.2±1.5	3.5±1.9
Fruit	4.4±5.9	2.5±1.0	2.1±1.6	2.4 ± 2.3
Milk, Yogurt and Cheese	2.6 ± 2.3	1.7 ± 0.8	2.0±1.2	2.3 ± 1.0
Meat, Poultry, Fish, Dry Beans, Eggs and Nuts	1.9±0.8	1.7±0.7	1.8±0.8	2.0±0.6
Fats, Oils and Sweets	3.0±2.5	2.1±1.2	2.2±1.6	2.5±1.9

¹Means ± SD.

Effects of the HLP on Dietary Intake

No significant changes were observed from pre to post in the education group compared to the control group in the number of servings from the Food Guide Pyramid food groups; however, when the education group's dietary intake was compared to the recommended number of servings from the Food Guide Pyramid food groups (Table 11), it was observed that participants' initial dietary intakes closely resemble the recommended number of servings. With the exception of the

^aSignificant difference in measurements at baseline between groups, p≤0.05.

^{*}Change in pre to post measurements significantly different from control group, $p \le 0.05$.

breads, cereals, rice, and pasta group, the participants in the education group met the number of servings recommended by the Food Guide Pyramid prior to the HLP. This, in itself, could help clarify why significant changes were not observed from pre to post in the education group compared to the control group.

Although significant changes were not observed in the education group compared to the control group, changes in the daily servings for each major food group were noted. These changes reflected an increased number of daily servings of bread, cereal, rice, and pasta (45%), vegetables (45%), fruit (54%), meat, poultry, fish, dry beans, eggs, and nuts (45%), milk, yogurt, and cheese (54%), and a decreased number of daily servings of fats, oils, and sweets (64%). Changes in the number of daily servings of milk, yogurt, and cheese group approached significance (p≤0.088), with the control group having a slight decrease (-0.9) in the number of daily servings and the education group having a slight increase (+0.3).

No significant differences were observed in percent of calories from fat, protein, and carbohydrate in the education group compared to the control group; however, the education group already met dietary recommendations for percent of calories from fat prior to the HLP (Table 11). According to the dietary intake for percent of calories from protein and carbohydrate, participants were at the upper end of the dietary recommendations for protein and the lower end for carbohydrate (Table 11).

Table 11. Dietary Intake Compared to Recommended Daily Values

Dietary Intake	Mean	Goals
Percent of Calories From:		
Fat	30±7	≤30%
Protein	19±3°	10-20%
Carbohydrate	51±7	50-60%
Servings from the Food Guide Pyramid:		
Breads, Cereals, Rice, and Pasta	3.2±1.9	6 - 11
Vegetables	3.2±1.5	3 - 5
Fruits	2.1±1.6	2 - 4
Milk, Yogurt, and Cheese	2.0±1.2	2 - 3
Meat, Poultry, Fish, Dry Beans, Eggs, and Nuts	1.8±0.8	2 - 3
Fats, Oils, and Sweets	2.2±1.6	Moderation

¹Means ± SD.

^aSignificant difference in measurements at baseline between groups, p≤0.05.

^{*}Post values significantly different from pre measurements within a group, p≤0.05.

^{*}Change in pre to post measurements significantly different from control group, p≤0.05.

The researcher acknowledges the importance of increasing the number of servings of breads, cereals, rice, and pasta to at least 6 servings in the diet per day. If subjects were to increase their intake of breads, cereals, rice, and pasta, this may help bring the percent of calories from carbohydrate within the recommended intake. In order to maintain energy balance, low-fat choices along with physical activity is suggested. Albertson & Tobelmann (1995) observed similar findings in a study evaluating the frequency in which Americans reported consuming grain foods and whole-grain foods. Researchers concluded that consumption of grain and whole-grain foods were low among the U.S. population. Millen et al. (1997) also found dietary intake levels of carbohydrates to fall short of Dietary Guidelines and suggests designing promotional efforts to increase consumption of not only whole grains, but also legumes, fruits, and vegetables.

The HLP two-year statewide evaluation summary reported that food intake data has been received from 275 participants. Significant increases were observed in the number of daily servings of breads, cereals, rice, and pasta (p≤0.0001), vegetables (p≤0.0002), fruits (p≤0.001), milk, yogurt, and cheese (p≤0.0001), and meat, poultry, fish, dry beans, eggs, and nuts (p≤0.01). There was also a significant decrease in the number of daily servings of fats, oils, and sweets (p≤0.0001). These changes reflected an increase in daily servings of breads, cereals, rice, and pasta (4.0 to 4.7), vegetables (2.3 to 2.8), fruits (1.9 to 2.3), milk, yogurt, and cheese (1.6 to 2.1), and meat, poultry, fish, dry beans, eggs, and nuts (1.9 to 2.1). Also, the number of daily servings of fats, oils, and sweets decreased from 2.5 to 1.8. Although this data indicates significant increases in servings from each of the food groups to reflect current Dietary Guidelines, it still falls short in achieving the recommended daily servings for both the breads, cereals, rice, and pasta group and the vegetable group.

Baseline Data on Anthropometric and Biochemical Measures

Table 12 presents the data on anthropometric and biochemical measurements. At baseline, there was a significant difference in systolic blood pressure with the education group having a significantly higher systolic blood pressure than the control group. In addition, there was a significant difference in HDL-cholesterol concentration with the education group having significantly lower HDL-cholesterol level than the control group. It is noteworthy to mention that the control group was significantly younger, therefore making comparisons between the groups less reliable.

Effects of the HLP on Anthropometric and Biochemical Measures

Significant changes in anthropometric measurements were observed as a result of the HLP (Table 12). Within the education group, there was a significant difference in weight change compared to the control group (p=0.037). An average decrease in total body weight of 1.2 pounds was observed in the education group. On the other hand, an average increase in total body weight of 1.3 pounds was observed in the control group. Within the education group, 55% had a decrease in total body weight at post data collection. A significant difference in BMI within the education group compared to the control group was also observed (p=0.0471). The education group had an average decrease in BMI (-0.2) whereas the control group had a a decrease in BMI (+0.2). Fifty-five percent of the education group had a decrease in BMI.

Table 12. Anthropometric and Biochemical Measures By Education Group.¹

Measurements	Control Group n = 11		Education Group n = 10	
Anthropometric:	Pre	Post	Pre	Post
Total Body Weight (lb)	164±33	166±33	158±28	157±27*
BMI (kg/m²)	27.5±5.1	27.7±5.0	27.6±4.6	27.4±4.7*
Systolic Pressure (mmHg) Diastolic Pressure (mmHg)	124±10ª	128±26	139±9°	133±8
	85±7	86±10	86±9	81±10
Biochemical:				
Cholesterol (mg/dl)	236±33	231±28	240±28	239±20
LDL-Cholesterol (mg/dl) HDL-Cholesterol (mg/dl)	150±29	142±30	166±35	161±27
	64±16•	69±2 1	47±10 ⁴	50±8
Triglycerides (mg/dl) Glucose (mg/dl)	108±44	101±46	140±63	143±82
	95±22	114±13	107±31	141±34

¹Means ± SD.

Although not significant, a decrease in systolic blood pressure was observed in the education group compared to the control group and approached significance (p≤0.075). Mean systolic blood pressure in the education group decreased from 139 mm Hg to 133 mm Hg, while mean systolic blood pressure in the control group increased from 125 mm Hg to 128 mm Hg. Overall, within the education group, 55% had a decrease in systolic blood pressure. Other changes observed in the education group, though not significant from the control group, included the following: Fifty-five percent of the participants in the education group had a

^eSignificant difference in measurements at baseline between groups, p≤0.05.

^{*}Post values significantly different from pre measurements within a group, p≤0.05.

^{*}Change in pre to post measurements significantly different from control group, p≤0.05.

decrease in diastolic blood pressure, total cholesterol, LDL-cholesterol, and 55% had an increase in HDL-cholesterol. Furthermore, 46% of the participants in the education group had a decrease in triglycerides and 25% of the education group had a decrease in glucose. It is interesting to point out that although participants had a low mean fat intake (30%), mean fasting serum cholesterol concentrations were high (240 mg/dL).

Other studies have shown similar results. Gambera et al. (1995) reported significant reductions in cardiovascular disease risk factors in thirty-two Air Force members applying dietary modification, which focused on the Food Guide Pyramid and Dietary Guidelines, in combination with exercise training. Gambera et al. (1995) reported significant weight loss, a significant reduction in BMI, total cholesterol levels, and LDL-cholesterol. Marked improvements in dietary choices were also observed. Dahl & Read (1995) also observed a reduction in serum cholesterol levels in 68 Veterans Administration (VA) patients following a healthy heart class that covered risk factors associated with coronary heart disease. Hermann et al. (1990) also observed significant decreases in body weight, total serum cholesterol, LDL-cholesterol, triglycerides, systolic blood pressure, and diastolic blood pressure as a result of a Cooperative Extension Service nutrition and exercise program for older adults.

The HLP two-year statewide evaluation summary indicates that anthropometric and biochemical data have been received from 342 participants. Significant decreases have been reported in total body weight, BMI, total cholesterol, and LDL-cholesterol. Body weight was significantly reduced (p≤0.01) from 170 pounds to 166 pounds with 65% of participants exhibiting a reduction in body weight. Although

this does not represent a large number, the researcher points out that the HLP is an eight week program that acknowledges weight loss recommendations of 1/2 to 1 pound per week. BMI also significantly decreased (p≤0.001) from 29 to 28 with 65% of participants showing a decrease in BMI. A significant decrease in blood cholesterol was also observed (p≤0.0002). Average total cholesterol decreasing from 212 mg/dl to 202 mg/dl with 67% of participants having a decrease in blood cholesterol. Lastly, a significant decrease (≤0.02) was observed in LDL-cholesterol with a decrease from 141 mg/dl to 133 mg/dl. Sixty-three percent of the participants had a decrease in LDL cholesterol. Interesting, but not significant were decreases in both systolic and diastolic blood pressure, triglycerides, and glucose concentrations. Fifty-four percent of participants had a decrease in systolic blood pressure and 55% of participants had a decrease in diastolic blood pressure. According to the data, 53% of participants had a decrease in triglycerides with average triglycerides decreasing from 185 mg/dl to 180 mg/dl. Furthermore, average glucose concentrations decreased from 104 mg/dl to 92 mg/dl.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary of Findings

The purpose of this study was to evaluate the effects of an eight-week Oklahoma Cooperative Extension Service nutrition education program, HLP, in a rural county in Oklahoma on food selection, preparation, and food safety practices and behaviors, dietary intake, and anthropometric and biochemical health measures. This study also evaluated the impact of the HLP on food selection, food preparation and food safety behaviors, dietary intake, and anthropometric and biochemical measures.

The objectives of the Healthy Living Program were: 1) Payne County subjects will engage in healthy lifestyle practices that promote healthy living, 2) Payne County subjects will adopt the United States Department of Agriculture (USDA) Food Guide Pyramid dietary recommendations, 3) Payne County subjects will adopt the United States Department of Agriculture-Health & Human Service (USDA-HHS) dietary guidelines/dietary recommendations, 4) Payne County subjects will adopt safe food selection, preparation, and storage practices, and 5) Payne County subjects will improve personal health status indicators.

An eight-week nutrition education program was shown to have a significant impact on rural county Oklahomans' food and nutrition behavior, dietary intake, and important health status indicators.

Hypothesis one stated: There will be no significant difference as a result of an eight-week Healthy Living Program on changes in subjects' Food and Nutrition Behavior Questionnaire Scores compared to controls for:

- a. Food Safety
- b. Food Selection and Preparation
- c. Food Intake

As seen in Table 9, a significant difference was observed in food selection and preparation scores and in food intake scores; however, there was not a significant difference in food safety scores. Therefore, the researcher rejected the null hypothesis for food selection and preparation and food intake and failed to reject the null hypothesis for food safety.

Hypothesis two stated: There will be no significant difference as a result of an eight-week Healthy Living Program on changes in subjects' number of servings from the Food Guide Pyramid groups compared to controls for:

- a. Breads, Cereals, Rice, and Pasta group
- b. Vegetable group
- c. Fruit group
- d. Milk, Yogurt, and Cheese group
- e. Meat, Poultry, Fish, Dry beans, Eggs, and Nuts group
- f. Fats, Oils, and Sweets group

As indicated in Table 10, there was no significant difference observed in servings from each of the food groups within the Food Guide Pyramid. Therefore, the researcher failed to reject the second null hypothesis.

Hypothesis three stated: There will be no significant difference as a result of an eight-week Healthy Living Program on changes in subjects' percentage of calories compared to controls for:

- a. Fat
- b. Protein
- c. Carbohydrates

As revealed in Table 11, there was no significant differences in percent of calories from fat, protein, and carbohydrate. Therefore, the researcher failed to reject the third null hypothesis.

Hypothesis four stated: There will be no significant difference as a result of an eight-week Healthy Living Program on changes in subjects' anthropometric and biochemical measures compared to controls for:

- a. Total Body Weight
- b. Body Mass Index
- c. Blood Pressure
- d. Fasting Total Serum Cholesterol
- e. Fasting Serum LDL-Cholesterol
- f. Fasting Serum HDL-Cholesterol
- g. Fasting Serum Triglycerides
- h. Fasting Serum Glucose

As seen in Table 12, significant differences were observed in total body weight and BMI; however, there was no significant difference observed in both systolic and diastolic blood pressure, total serum cholesterol, LDL-cholesterol, HDL-cholesterol, triglycerides, and glucose. Therefore, the researcher rejected the null hypothesis for total body weight and BMI and failed to reject the fourth null hypothesis for blood pressure, fasting total serum cholesterol, fasting serum LDL-cholesterol, fasting serum HDL-cholesterol, fasting serum glucose.

The results observed in this study show that an eight-week Oklahoma

Cooperative Extension service nutrition education program can be effective in improving food selection and preparation scores, total body weight, and BMI.

Conclusions

Health promotion and disease prevention goals have focused on diet, while nutrition education goals have focused on the individual. Dietary behavior change is complex and there are several factors to consider. An ecological approach for nutrition education implies that an individual's behavior is influenced by a variety of factors such as intrapersonal, interpersonal, institutional, community, and public policy (McLeroy et al., 1988). Nutrition education research is vital in identifying food-related behaviors and motivations and selecting appropriate behavioral change strategies to achieve and maintain optimal nutritional health (ADA position paper, 1996). Behavioral change strategies involve a combination of theories to encourage the development of new behavior (Holli & Calabrese, 1991). Nutrition education is a significant factor for improving dietary behavior when goals include behavioral change strategies as well as educational strategies and are designed with that purpose in mind.

The HLP demonstrates how an eight-week Cooperative Extension nutrition education program can make an impact in a rural county in Oklahoma by combining resources from the community, such as the media, health professionals, professional organizations, and local supermarkets. In addition, the HLP was conducive to social networks and social support systems, such as friends, family, and co-workers. Changes in food and nutrition behavior, dietary intake, total body weight, BMI, blood pressure, and serum lipid concentrations were observed as a result of dietary

intervention strategies. Dietary intervention strategies included dietary educational tools, such as the Food Guide Pyramid and the Dietary Guidelines for Americans and education strategies such as recipe modification, supermarket tours, and cooking demonstrations.

Recommendations

In order for Oklahomans to achieve and maintain optimal nutritional health, it is imperative for Oklahoma Cooperative Extension to continue to assess food and nutrition concerns, behaviors, and practices within the community, design food and nutrition education programs based on current scientific research, and deliver them in a clear, simple, and motivating way. From the two-year state-wide summary, it is apparent that nutrition education efforts focus on promoting an increase in the breads, cereals, rice, and pasta group within the Food Guide Pyramid. Furthermore, from the recent outbreaks of foodborne illness in the U.S., it is clear that food safety education be provided to change current food behaviors and practices. Future recommendations for the development of a food and nutrition education program should consider a larger randomized sample size, a theoretical framework for understanding attitudes and beliefs, an exercise component, and methods introducing specific behavioral change strategies that focus on goal setting and modeling. Other considerations include increasing food safety questions on the Food and Nutrition Behavior Questionnaire and administering a food-frequency questionnaire of shorter length. In addition, a follow up evaluation after six months is recommended to determine if changes are permanent and easily maintained.

The costs to the American public for chronic diseases is astronomical. Coronary heart disease accounts for more than \$100 billion in direct care expenditure alone. The Oklahoma Cooperative Extension Service is a vital part in the continual process for improving Oklahomans' nutritional status by developing nutrition education programs that increase food and nutrition knowledge, food safety practices, and overall health status, which may reduce the number of deaths due to coronary heart disease.

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APPENDIX A

OKLAHOMA STATE UNIVERSITY INSTITUTIONAL REVIEW BOARD HUMAN SUBJECTS REVIEW

Date: 12-12-95 IRB#: HE-96-026

Proposal Title: EVALUATION OF AN EIGHT WEEK OKLAHOMA COOPERATIVE EXTENSION FOOD AND NUTRITION EDUCATION PROGRAM ON FOOD AND NUTRITION PRACTICES, DIETARY INTAKE AND HEALTH STATUS IN AN URBAN AND RURAL COUNTY

Principal Investigator(s): Janice Hermann

Reviewed and Processed as: Expedited

Approval Status Recommended by Reviewer(s): Approved

ALL APPROVALS MAY BE SUBJECT TO REVIEW BY FULL INSTITUTIONAL REVIEW BOARD AT NEXT MEETING.

APPROVAL STATUS PERIOD VALID FOR ONE CALENDAR YEAR AFTER WHICH A CONTINUATION OR RENEWAL REQUEST IS REQUIRED TO BE SUBMITTED FOR BOARD APPROVAL.

ANY MODIFICATIONS TO APPROVED PROJECT MUST ALSO BE SUBMITTED FOR APPROVAL.

Comments, Modifications/Conditions for Approval or Reasons for Deferral or Disapproval are as follows:

Signature:

air of Indinuional Paviau Bos

Date: January 29, 1996

APPENDIX B



FRUITS AND VEGETABLES

Fruits and Vegetables...

- ▲ are an essential part of your diet. Fruits and vegetables supply you with many important nutrients such as Vitamin A (Beta Carotene), Vitamin C, and fiber.
- ▲ are nutrient dense and are low in fat, sodium, and calories.

 However, when you add butter (margarine), salt, cheese, sauces, salad dressings, and whipped cream they become high in fat, sodium, and calories.
- ▲ provide dietary fiber, which aids in digestion and helps to keep you regular.
- provide protection against many diseases. Consuming 5 or more servings of fruits and vegetables per day may reduce your risks of cancer and heart disease.

Shopping Tips

- ▲ When in season, choose fresh produce over canned and frozen.
- ▲ Fresh vegetables contain small amounts of sodium compared to frozen and canned. For example, fresh green beans contain 0 mg sodium, frozen green beans contain 0 mg sodium and canned green beans contain 400 mg sodium.
- ▲ When trying to decide which fruits to buy, keep in mind that fresh fruits are your best choice. Frozen unsweetened fruits and fruits canned in their own juices are also a healthy selection.
- ▲ Fresh fruits are a better choice because canned fruits in heavy syrup and frozen sweetened fruits contain large amounts of sugar. Fruits in light syrup are a better option, but also contain added sugar.
- ▲ Dried fruits are more concentrated in nutrients therefore, the calorie and sugar contents are higher compared to fresh fruits.



FRUITS	Serving Size	Calories	Fiber gm	Sugar gm
FRESH	2		6	6
Apple	l each	80	5	
Banana	l each	120	3	
Peach	1 each	70	1	
Pineapole	1/2 cup	90	2	
CANNED	•			
Del Monte				
Pear Halves with Heavy Syrup	1/2 cup	100	1	23
Pear Halves with Light Syrup	1/2 cup	60	1	14
Peach Slices with Heavy Syrup	1/2 cup	100	1	23
Peach Slices with Light Syrup	1/2 cup	60	1	14
Pineapple (Sliced)	2 slices	60	Ł	14
Motts				
Apple Sauce	l/2 cup	100	1	23
Wilderness				
Country Apple Pie Filling	1/3 cup	100	2	22
Peach Pie Filling	l/3 cup	100	1	17
VEGETABLES	Serving	Total Fat	Fiber	Sodium
, 2021112222	Size	gm	gm	mg
				•
FRESH				
Broccoli	1 med stalk	1.0	5	75
Carrots	I med carrot	1,0	ì	40
Green Beans	3/4 cup	0.0	3	. 0
CANNED				
Del Monte				
Green Beans	1/2 cup	0.0	2	360
Mixed Vegetables	1/2 cup	0.0	2	360
Green Giant				
Cream Style Com	1/2 cup	0.5	1	430
Com Niblets	1/2 cup	0.0	2	230
Trappey's				
Okra	1/2 сир	0.0	3	400
FROZEN				
Birds Eye				
Broccoli with Cheese Sauce	1/2 cup	3.0	2	430
Broccoli	1/2 cup	0.0	3	30
Green Beans	1/2 cup	0.0	2	0
Picksweet				
Mixed Vegetables	2/3 cup	0.5	2	40
Okra	3/4 сир	0.0	3	35
	OCII			



POTATOES

- ▲ Potatoes are a good source of complex carbohydrates, although they are considered to be a vegetable.
- A Potatoes are rich sources of Vitamin C, Vitamin B6, potassium and fiber.
- A Potatoes can be prepared in a variety of different ways, including baked, mashed, stuffed, au gratin, and scalloped. By leaving the skins on, you can save time and add extra fiber and minerals.
- A Potatoes are low in fat, but can become high in fat with your choice of toppings. Top your potatoes with the lower fat versions of sour cream, cheese and margarine. Other low fat alternatives are low fat yogurt, low fat cottage cheese, picante sauce, and butter substitutes.
- ▲ Tater tots, french fries, hash browns, and potato chips are high in fat and sodium, along with other instant mixes. Be creative and find new ways to use the whole potato in a low fat way. For example, oven baked fries and oven roasted potatoes.

Handour 2.2



POTATOES	Serving Size	Total Fat	Sodium	Calorie
		gm	шg	
Plain Whole Russet	l medium	0.0	16	220
Canned New Potatoes	2 medium	0.0	36 0	60
Chips				
Lay's	20 chips	10.0	180	150
Lay's KC BBQ	19 chips	10.0	200	160
Louise's Fat Free	30 chips	0.0	300	100
Pringles Original	10 chips	11.0	150	160
Pringles Right Crisps	16 chips	7.0	135	140
Mixes				
Au Gratin - Betty Crocker	1/2 cup	6.0	620	150
Julienne - Betty Crocker	1/2 cup	6.0	670	140
Mashed - Idahoan	1/3 cup	2.0	310	100
Mashed - Ore Ida	2/3 cup	2.5	240	150
Scalloped - Betty Crocker	1/2 cup	7.0	620	160
Sruffed with Cheese - Oh Boys	l potato	5.0	320	160
Stuffed with Sour Cream & Chives -	l potato	8.0	520	150
Larry's	•			
Twice Baked Cheddar - Ore Ida	1 baker	9.0	440	200
Twice Baked Sour Cream & Chives -	l baker	7.0	360	190
Ore Ida				
Frozen Products				
Ore Ida				
Crispy Crown	3 ounces	11.0	450	190
Deep Fries Crinkle Cut	3 оппсез	7.0	15	160
Dinner Fries	3 ounces	3.0	20	110
Country Fries	3 ounces	3.5	280	120
Fast Fries	3 ounces	6.0	230	140
Hash Browns	3 ounces	0.0	25	70
Hot Tots	3 ounces	7.0	350	150
Potato Wedges	3 ounces	2.5	15	110
Shoe String	3 ounces	5.0	20	150
Steak Fries	3 ounces	3.0	20	110
Tater Tots	3 ounces	8.0	` 340	160
Texas Crispers	3 ounces	7.0	320	150
Waffle Fries	3 ounces	7.0	260	160
Zesties	3 ounces	9.0	370	160
Act II	5 Quices	2,0	3,0	100
French Fries Micro	1 box	12.0	125	230





BREAD

- ▲ 6 to 11 servings of bread, cereal, and grains are needed each day to provide energy.
- ▲ Bread is a low fat complex carbohydrate. Complex carbohydrates are our body's best source of time released, long term energy.
- ▲ Breads most commonly found in grocery stores are white, wheat, and whole wheat.
- ▲ Did you know that whole wheat bread and wheat bread are not the same?
 - ▲ Wheat bread usually contains 75% white flour, whereas whole wheat bread contains 100% whole wheat flour.
 - ▲ Whole wheat bread contains more protein, fiber, vitamins, and minerals compared to white and wheat bread.
 - Whole wheat bread provides 2.0 grams of fiber and white bread provides .5 grams of fiber
- ▲ Bread is a low fat food; however, what you choose to put on it can increase the amount of fat. For example, adding one teaspoon of regular margarine will increase the fat content by 38%.

Shopping Tips

- ▲ When shopping for bread it is important to read the label. Choose products that list whole wheat flour as the first ingredient.
- ▲ 'Light' bread refers to having at least one-third fewer calories per serving or no more than half the fat per serving compared to 'regular' bread.
- ▲ Be sure to read the label carefully since 'light' can also refer to the color or texture of the bread.



BREAD	Serving Size	Calories	Total Fat	Fiber
			$\mathbf{g}\mathbf{m}$	gm
Earth Grains				
English Muffins	1 each	140	1.5	4
French Rolls	1 each	220	2.5	2
Honeywheat Berry	1 slice	100	1.5	2
Jewish Rye	1 slice	80	1.0	ł
Pizza Rounds	l each	210	4.0	2
Whole Wheat 100%	I slice	100	2.0	3
Good Earth				
Honey Wheat Berry	l slice	60	1.0	1
Oat Bran Bread	l slice	60	1.0	<1
Stone Ground Wheat Bread	l slice	60	1.0	2
Mission				
Com Tortillas	l each	70	1.0	1
Flour Tortillas	l each	210	5.0	1
Four Tortillas Fat Free	l each	70	0.0	ì
Soft Wheat Tortillas	1 each	160	5.0	2
Orowheat		, , , ,	-11-	_
ВгаплоІа	l slice	90	1.0	2
English Muffins (Health Nut)	l each	180	4.0	2
Pita Bread	1 each	160	0.5	2
Pita Bread Whole Wheat	l each	160	1.0	3
Whole Wheat 100%	l slice	40	1.0	2
Rainbo	1 31100	40	1.0	_
Croissants	l each	260	17.0	2
Dinner Rolls	l each	90	3.0	1
	I slice	70	1.0	}
Enriched Bread (sliced) Grant's Farm Whole Wheat	1 slice	70 70	1.0	2
Grant's Farm 12 Grain	l slice	70 70		2
			1.0	
Hot Dog Buns	l each	110	1.5	1
Honey Buttered Wheat	l slice	70	1.0	Į
Rainbo Light	2 slices	80	1.0	5
Wheat Fields	, .	1.60	0.5	
Bagel Blueberry	l each	160	0.5	2
Bagel Plain	1 each	160	1.0	2
Wonder	a "	**	2 -	
Calcium Enriched Wheat	2 slices ·	80	0.5	6
Enriched White	1 slice	60	1.0	<1
Hamburger Buns	l each	170	2.5	1
Sour Dough San Francisco	1 slice	90	1.5	<1
Sour Dough Light	2 slices	80	1.0	5





MUFFINS AND OTHER PASTRIES

MYTH: all muffins are healthy and nutritious.

FACT: the most popular brands of muffins contain very large amounts fat and sugar and

contain very few nutrients.

FOOD FOR THOUGHT: be creative and develop a healthy homemade muffin with the

use of low fat and high fiber ingredients.

MYTH: bagels are high in fat.

FACT: bagels contain about 1 gram of fat.

FOOD FOR THOUGHT: what you add to the bagel can make it high in fat. For

example try fat free or low fat cream cheese instead of regular cream cheese.

MYTH: croissants are a healthy choice.

FACT: croissants are high in fat resulting in a light and flaky texture.

FOOD FOR THOUGHT: instead choose a slice of whole wheat bread or a bagel.

MYTH: donuts, cinnamon rolls, coffee cakes, and danishes are healthy breakfast items. FACT: all of these items are high in fat and sugar and contain very little nutritional

value.

FOOD FOR THOUGHT: some healthy breakfast options can include toast, bagels, cereal, homemade muffins, and English muffins.



MUFFINS	Serving size	Calories	Total Fat	Sugai
			gm	gm
Aunt Fanny's				_
Cinnamon Twirls	l each	110	4	7
Pecan Twirts	l each	100	4	8
Dolly Madison			,	
Cherry Sweet Rolls	l each	220	6	20
Cinnamon Rolls	l each	220	6	14
Danish Rollers Sweet Rolls	2 each	200	7	15
Donut/Cinnamon Sugar	1 each	220	11	15
Donut/Plain	l each	230	10	3
Donut/Sugar	1 each	230	12	<1
Dunkin Stix	1 each	170	9	14
Entenmann's				
Cinnamon Twist Fat Free	1/5 twist	150	0	19
Crunch Cake Fat Free	1/6 cake	220	0	35
Donut/Cinnamon	1 each	230	14	12
Donut/Crumb Topped	l each	260	13	19
Donut/Rich Frosted	1 each	300	23	14
Hostess				
Minimuffins/Banana Walnut	5 each	260	16	14
Minimuffins/Chocolate Chip	5 each	260	15	15
Otis Spunkmeyer				
Almond Poppy Seed	1/2 each	420	25	33
Banana Nut	l each	470	24	36
Chocolate Chocolate Chip	l each	460	24	38
Wild Blueberry	i each	410	23	35
Pillsbury				
Apple Cinnamon Rolls	l each	150	6	10
Apple Turnovers	2 each	350	17	23
Caramel Rolls/Grands	l each	310	10	15
Cherry Turnovers	2 each	360	17	25
Cinnamon Rolls	1 each	150	6	10
Cinnamon Rolls/Grands	l each	310	10	20
Orange Sweet Rolls	l each	170	7	10
Rainbo				
Apple Sweet Rolls	1 each	210	7	15
Cinnamon Sweet Rolls	l each	210	7	(5
Donuts/Gem Powder Sugar	4 each	240	12	16
Donut/Gem Chocolate	4 each	280	17	13
Sara Lee	, 52511	_30	• ′	10
Cheese Danish	1/8 danish	190	10	8
Choose Dainsii	175 Caipati	170	1.5	u





GRAINS

- ▲ Grains consist of wheat, oat, rice, corn, barley, rye, millet, amaranth, buckwheat, quinoa, and kamut.
- ▲ Grains are rich complex carbohydrates that fuel the body.
- ▲ Grains are a nutritious food that are low in calories, fat, sodium and cholesterol. Grains also contain fiber and many essential vitamins and minerals.
- ▲ The U.S. Department of Agriculture recommends that your diet consists of 6 to 11 servings of grains, breads, and cereals each day. Therefore, 50% or more of your calories per day should come from this group.

Rice...

- ▲ is the most widely used grain. It is inexpensive, easy to prepare, and can be used in a wide variety of dishes.
- ▲ is available in many different varieties. For example, white, brown, wild, long and short grain, instant, and converted.
- A either brown or white is nutritious. Since brown rice is a whole grain, it contains more fiber, vitamin E, phosphorus and calcium than white rice.
- is found in flavored or seasoned mixes. Although mixes are convenient, they contain high amounts of sodium and require the addition of fat in preparation.
- ▲ can be prepared in soups, entrees and desserts. It is important to follow instructions in rice preparation. The fat content can be decreased or eliminated. This can be done by preparing the recipe with half the fat or less.



		•		
RICE	Serving Size	Total Fat	Sodium	Calories
		gm	mg	
Comet		Ü	J	
Long Grain	l cup	0.0	0	160
Natural Brown	l cup	1.0	0	150
Minute Brand				
Boil in a Bag	l cup	0.0	10	190
Instant Brown	2/3 cup	1.5	10	170
Instant Enriched White	3/4 сър	0.0	5	170
Premium Long Grain	l cup	0.0	5	170
Lipton/Seasoned Mixes				
Beef Flavor	l cup	7.0	1010	230
Cajun Style	l cup	7.0	1000	230
Cheddar Broccoli	l cup	9.0	1010	300
Chicken Broth and Herb's	l cup	9.0	740	280
Creamy Chicken Flavor	l cup	11.0	840	310
Herb's and Seasoning	1 cup	9.0	1100	310
Oriental Style	1/2 cup	8.0	940	280
Red Beans and Rice	1 cup	7 0	1195	280
Savory Herb's Pilaf with Garlic	1 cup	8.5	940	270
Spanish	l cup	7.0	1010	290
Mahatma/Seasoned Mixes				
Black Beans and Rice	1 сир	10.5	930	200
Saffron Yellow Long Grain	l cup	0.0	970	190
Near East				
Rice Pilaf Mix	3/4 cup	4.0	865	200
Ranch Style (canned)				
Spanish Rice	1 cup	0.0	2070	180
Rice Select				
Jasmati	1/2 cup	0.0	0	150
Texmati	1/2 cup	1.0	0	170
Texmati Royal Blend	l cup	0.5	0	160
Rice-A-Roni/Seasoned Mixes				
Beef Flavor	l cup	9.5	1165	320
Broccoli Au Gratin	l cup	11	590	320
Chicken Flavor	l cup	9.5	1095	320
Spanish Rice	l cup	8.0	1210	270
Uncle Ben's/Seasoned Mixes	_		_	4.5.5
Converted Rice	l cup	0.0	0	170
Butter and Herb's	l cup	7.0	835	200
Chicken and Broccoli	l сир	6.0	815	240
Long Grain and Wild	1 cup	6.0	905	190





CEREALS

When choosing a dry cereal...

- ▲ look for a cereal that lists the grain as the first ingredient.
- ▲ look for a cereal that contains less than 5 grams of sugar per serving. However, if the cereal contains fruit, or is sweetened with fruit juice this number may be higher.
- ▲ consider the fiber content. A high fiber cereal is one that contains more than 7 grams of fiber per serving.
- ▲ check the label for the fat content. Cereals tend to be low in fat with the exception of granola. Granola is high in fat due to oils, nuts, and seeds. If you like granola, try the low fat varieties.

When choosing a hot cereal...

- ▲ experiment with different varieties such as cream of rice, cream of wheat, malt-o-meal, oatmeal, wheatena, grits, quinoa, and kamut.
- ▲ be aware of the individually packaged flavored oatmeal, which contains high amounts of sugar and salt.
- ▲ pay close attention to the cooking instructions. Most hot cereals say to add salt and butter (margarine) to the cooking water, but this is not necessary.
- ▲ by eliminating the salt and butter (margarine) you will reduce your fat intake by 21% and your sodium intake by 100%.
- ▲ for added flavor, try substituting fruit juice or skim milk instead of water.
- A how you top your cereal is important. Try topping cereal with fresh or dried fruits instead of butter or margarine.



CEREALS	Serving Size	Total Fat	Fiber	Sugai
		gm	gm	gm
General Mills				
Berry Berry Kix	3/4 cup	1.0	0	9
Cheerios	l cup	2.0	3	1
Cocoa Puffs	l cup	1.0	0	14
Golden Grahams	3/4 cup	1.0	1	11
Kix	1 1/3 cup	1.0	1	3
Lucky Charms	l cup	1.0	l	13
Total Com Flakes	1 1/3 cup	0.5	<1	3
Total Raisin Bran	l cup	1.0	5	20
Trix	l cup	1.5	0	[3
Wheaties	l cup	1.0	3	4
Kellogg's				
Apple Jacks	l cup	0.0]	14
Complete Bran Flakes	3/4 cup	0.5	5	6
Com Flakes	l cup	0.0	1	2
Cracklin' Oat Bran	3/4 cup	8.0	6	18
Crispix	l cup	0.0	1	4
Frosted Mini-Wheats	1 cup	1.0	6	12
Fruit Loops	l cup	1.0	Į	14
Low-Fat Granola	2/3 cup	3.0	3	16
Mueslix	2/3 cup	3.0	4	17
Multi-Grain Flakes	l cup	0.0	3	6
Raisin Bran	1 cup	1.0	7	18
Rice Krispies	1 1/4 cup	0.0	1	3
Nabisco		•		
100% Bran	1/3 cup	0.5	8	7
Instant Cream Of Wheat	l pkt	0.0	· 1	0
Original Shredded Wheat	l cup	0 5	5	0
Post				
Cocoa Pebbles	3/4 сър	0.1	<1	13
Fruit and Fibre	l cup	3.0	6	18
Grape Nuts	1/2 cup	1.0	5	7
Nabisco Shredded Wheat	2 biscuits	0.5	5	0
Quncker				
Cap'n Crunch	3/4 cup	1.5	1	11
Instant Grits	l pkt	0.0	1	0
Instant Oatmeal	1 pkt	2.0	3	0
Instant Oatmeal Flavored	1 pkt	2.0	3	13
Oat Life) cup	2.0	4	14
Oats & Honey	1/2 cup	8.0	4	12





PASTA

- ▲ 6 to 11 servings of pasta, breads and cereals are needed each day to provide energy.
- A Pasta is a complex carbohydrate that is a good source of protein and is low in fat. However, pasta is not a complete protein.
- ▲ When shopping for pasta, try to buy pasta made with whole grain flour.
- ▲ Complete proteins are foods that contain the necessary building blocks needed to build and repair the body. To make a complete protein, pasta should be combined with grains or legumes.
- A Pasta can also be served with complete protein sources such as meat, fish, poultry, eggs, and dairy products. When pasta is served with complete protein the need to combine is eliminated.
- ▲ Contrary to popular beliefs, pasta is not fattening! However, it can be fattening when topped with high fat ingredients such as cheese, butter, oil, high fat meats, and cream sauces.

Cooking Tips

- ▲ Be creative and use a wide variety of shapes and sizes. For example, try bow ties, wagon wheels, spirals, shells, and alphabets.
- ▲ When cooking pasta, it is not necessary to add salt or oil to the water.

 Try adding fresh lemon juice to the water to add flavor.
- ▲ Choose low-fat cheese, fat free cheese and skim milk in preparing your favorite dishes.
- ▲ When preparing boxed sauces or mixes, use skim milk and cut the amount of added fat.



			· · · -		
PASTA	Serving Size	Total Fat	Sodium	Calories	
:		gm	mg		
Pasta (all Brands)	l cup	1.0	0	210	
Contadina				213	
Fresh Pasta	1 1/4 cup	3.5	30	250	
Fresh Four Cheese Ravioli	l cup '	12.0	350	280	
NoYolks	•				
Egg Noodle Substitute	l cup	0.5	30	210	
R&F Borden	•				
Wide Egg Noodles	1 1/4 cup	3.0	15	220	
Betty Crocker/ Pasta Mixes	•				
Classic Suddenly Salad	3/4 cup	7.0	830	220	
Garden Italian Suddenly Salad	3/4 сир	1.0	520	130	
Ranch & Bacon Suddenly Salad	3/4 cup	19.0	450	320	
Chef Boyardee	•				
Beefaroni	l cup	7.0	950	240	
Cheese Ravioli	l cup	3.0	1280	220	
Spaghetti & Meat Balls	l cup	9.0	940	240	
X-Men Pasta in Tomato & Cheese	l cup	0.0	880	200	
Kraft/ Pasta Mixes	•				
Broccoli & Cheese Dinner	1 cup	16.0	1240	400	
Creamy Caesar Pasta Salad	3/4 cup	22.0	. 650	350	
Deluxe Macaroni & Cheese	l cup	10.0	730	320	
Italian Light Pasta Salad	3/4 cup	2.0	660	190	
Macaroni & Cheese	1 cup	16.5	730	390	
Mild White Cheddar Macaroni & Cheese	1 cup	18.0	610	170	
Lipton/ Pasta Mixes					
Garlic & Butter Linguini	1 cup	9.0	880	260	
Alfredo	1 cup	14.0	1000	340	
Butter & Herb	1 cup	13.0	930	300	
Chicken Broccoli	l cup	11.0	850	310	
Chicken Flavor	l cup	10.5	830	280	
Chicken Primavera	l cup	10.0	830	300	
Chicken & Pasta Angel Hair	1 cup	7.5	920	270	
Stroganoff	1 cup	11.0	950	300	
Three Cheese Rotini	l cup	12.0	970	330	
Rice-A-Roni Pasta Roini	-				
Fettucini with Alfredo Sauce	l cup	25.0	1110	470	
Lemon & Butter Sauce	l cup	15.5	975	360	
Parmesan Cheese Sauce	l cup	14.5	895	320	
Rigatoni with Tomato Basil Sauce) cup	9.0	700	240	
Vermicelli with Garlic & Olive Oil	l cup	15.5	1010	360	





DAIRY PRODUCTS

- ▲ 2 to 3 servings of dairy products are an essential part of the diet.
- ▲ Dairy products include milk, yogurt, and cheese. Dairy products are good sources of protein, calcium and other essential vitamins and minerals.
- ▲ When shopping for dairy products choose the nonfat or low fat products. The following are examples of available products:
 - ▲ skim or 1% milk
 - ▲ nonfat or low fat yogurt
 - nonfat or low fat cottage cheese
 - ▲ nonfat or low fat sour cream
 - ▲ nonfat, part skim or reduced fat cheeses
 - ▲ nonfat or low fat cream cheese
- ▲ It is especially important that women consume at least 2-3 servings per day to protect themselves against osteoporosis.



DAIRY PRODUCTS	Serving Size	Total Fat	Saturated Fat	Cholesterol
	3126	gm	gm	mg
Milk		8	6	8
Whole	l cup	8.0	5.0	35
2%	l cup	5.0	3.5	25
1%	1 cup	2.5	1.5	15
Skim	1 cup	0.0	0.0	5
Buttermilk	l cup	1.0	1.0	10
Chocolate	1 спр	8.0	5.0	35
Cream	•			
Heavy Whipping Cream	l tbsp	5.0	4.0	20
Half & Half	l tbsp	3.0	2.0	15
Sour Cream	•			
Regular	2 tbsp	5.0	3.5	20
Light	2 tbsp	2.5	2.0	10
Nonfat	2 tbsp	0.0	0.0	0
Cottage Cheese				
4% milk fat	1/2 cup	5.0	3.0	25
Low-fat	1/2 cup	1.0	1.0	10
Fat Free	1/2 cup	0.0	0.0	5
Cream Cheese				
Regular	2 tbsp	10.0	6.0	30
1/3 Less Fat	2 tbsp	6.0	4.0	20
Free	2 tbsp	0.0	0.0	<5
Cheese (Kraft)				
Free	l șlice	0.0	0.0	<5
Healthy Favorites Cheddar	l slice	0.0	0.0	<\$
Mild Cheddar	l ounce	9.0	6.0	30
Monterey Jack	l ounce	9.0	6.0	30
Part Skim Mozzarella	l ounce	5.0	3 5	15
Reduced Fat Colby	l ounce	5.0	3.0	20
Reduced Fat Milk Cheddar	l ounce	6.0	4.0	20
Reduced Fat Monterey Jack	l ounce	5.0	3.0	20
Singles American	1 slice	4.5	3.0	15
Singles 1/3 Less Fat	. 1 slice	3.0	2.0	10
Swiss	1 slice	13.0	9.0	45
Velveeta	1 ounce	6.0	4.0	20
Velveeta Light	l ounce	3.0	2.0	10
Yogurt				
Yoplait Custard Style	l container	2.5	1.5	10
Yoplait Original	1 container	1.5	1.0	10
Yoplait Light	l container	0.0	0.0	<5
Yoplait Fat Free	1 container	0.0	0.0	<5
-				





FROZEN DESSERTS

- ▲ Frozen desserts can be incorporated into a healthy diet using the following guidelines:
 - A Choose fat free or low fat ice cream and frozen yogurt.
 - A Choose sherbets and sorbets as they are low in fat.
 - A Choose popsicles made with fruit juices.
 - Premium ice cream products can be included occasionally; however, it is best to try to choose a product with less than 4 grams of fat per serving (1/2 cup).
 - ▲ Choose low fat topping such as fresh fruit, fat free cookies, and fat free hot fudge and butterscotch.



FROZEN DESSERTS	Serving Size	Total Fat	Saturated Fat	Sugar
		gm	\mathbf{gm}	gm
ICE CREAM PRODUCTS		-		
Blue Bell				
Bullets	l bar	0.0	0.0	L4
Bullets Sugar Free	l bar	0.0	0.0	0
Diet Chocolate	1/2 cup	0.0	0.0	5
Light Cookies n Cream	1/2 cup	3.0	2.5	18
Low-fat Yogurt Cookies n Cream	1/2 cup	2.5	2.0	23
Ice Cream Cookies n Cream	1/2 сир	10.0	7.0	17
Ice Cream Sandwich	1 sandwich	6.0	4.0	13
Rainbow Sherbet	1/2 cup	1.0	0,5	28
Eskimo Pie	•			
Butter Pecan Frozen Dessert	1/2 cup	9.0	4.0	5
Hnagen-Dazs	-			
Ice Cream Vanilla	1/2 cup	18.0	11.0	21
Vanilla & Almond Bars	l bar	22.0	12.0	19
Chocolate Sorbet	1/2 cup	0.0	0.0	22
Healthy Choice	•			
Triple Chocolate Chunk	1/2 сир	2.0	1.0	18
Yarnell's	•			
Ice Cream Death By Chocolate	1/2 cup	8.0	5.0	15
Low-fat Yogurt Vanilla	1/2 cup	2.0	1.0	20
Non-fat Ice Cream Vanilla	1/2 cup	0.0	0.0	6
Columbo	•			
Soft Serve White Chocolate Almond	1/2 cup	8.0	5.0	22
Low-fat Yogurt Caramel	1/2 cup	1.5	1.0	21
FROZEN DESSERT BARS	,			
Breyer's Viennetta Chocolate	1 slice	12.0	8.0	15
Dole Fruit Juice Bar	l bar	0.0	0.0	3
Dove Bar Milk Chocolate	l bar	17.0	11.0	23
Fudgsickle Original	l bar	0.5	0,0	10
Fudgsickle Sugar Free	l bar	0.5	0.0	0
Klondike Original	l bar	20.0	14.0	24
Klondike Light	l bar	5.0	4.0	5
Mama Tish's Italian Ice	4 oz	0.0	0.0	22
Nestle Drumstick Vanilla	1 each	20.0	11.0	21
Reese's Ice Cream Cups	l each	11.0	6.0	11
Snickers Ice Cream Bars	l bar	12.0	4.0	18
Starburst Fruit Juice Bars	l bar	0.0	0.0	12
	2 each	1.0	0.5	
Weight Watchers Mousse	2 each L sandwich	3.5	2.0	. 9 14





MEATS

- ▲ 5 to 7 ounces of meat per day make up a healthy diet.
- ▲ Meat is an excellent source of protein, vitamins and minerals, especially vitamin B-12, iron and zinc.
- ▲ When shopping for meats, choose lean cuts. Use the following table as a guideline.

LEAN CUTS OF MEAT

BEEF: top round, round tip, eye of round, top loin, tenderloin, sirloin

POULTRY: skinless chicken breast and leg, skinless dark and light turkey

PORK: center loin chop, tenderloin, boneless top loin chop, boneless ham (95% lean), Canadian

bacon

LAMB: leg, loin chop

VEAL: all cuts except ground

- ▲ When preparing meat, trim visible fat and choose a low fat cooking method. For example, grilling, broiling, baking, sautéing, roasting, stir frying, and steaming.
- ▲ Processed luncheon meats contain high amounts of sodium and fat. Look for the light or low fat varieties.
- ▲ Follow these guidelines for food-safety and handling procedures when preparing meats:
 - meats should always be refrigerated or frozen
 - ▲ place meat in refrigerator to thaw
 - A keep raw meats separate from other foods
 - ▲ after handling raw meats, wash hands, surface area, and utensils thoroughly
 - ▲ cook meats to proper temperature and refrigerate leftovers promptly



MEATS	Serving Size	Total Fat	Saturated Fat	Sodiur
		gm	gm	mg
Healthy Choice				
Нопеу Нат	6 slices	1.5	0 5	510
Low Fat Jumbo Franks	l each	1 5	0.5	530
Oven Roasted Turkey Breast	l slice	1.0	0.5	250
Hillshire Farm				
Oven Roasted Turkey Breast	6 slices	0.0	0.0	620
Pastrami	6 slices	0.5	0.0	560
Smoked Chicken Breast	6 slices	0.0	0.0	580
Smoked Sausage	2 ounces	17.0	8.0	460
Turkey Smoked Sausage	2 ounces	4.5	2.5	790
Hormel				
Bacon	2 pieces	7.0	2.5	330
Corned Beef Hash	l cup	24.0	0.01	930
Hot Smoked Sausage	6 each	11.0	5.0	380
Little Sizzlers Pork Saussage	3 each	20.0	7.0	570
Spam	2 ounces	16.0	6.0	750
Spam Lite	2 ounces	8.0	3.0	560
Louis Rich				
Baked Chicken Breast	2 slices	0 5	0.0	530
Baked Ham	2 slices	1.5	0.5	550
Grilled Chicken Breast	2 slices	0.5	0.0	530
Smoked Ham	2 slices	1.5	0.5	570
Turkey Bologna	l slice	4.0	1.0	250
Turkey Ham	1 slice	0.1	1.0	300
Turkey Smoked Sausage	2 ounces	5,0	1.5	500
Oscar Mayer				
Bacon	2 pieces	5.0	1.5	250
Central Cut Bacon	3 slices	7.0	2.5	380
Beef Cotto Salami	2 slices	7.0	3.0	590
Beef Bologna	1 slice	8.0	3.5	300
Beef Bologna Light	1 slice	4.0	1.5	310
Bologna Fat Free	1 slice	0.0	0.0	280
Braunschweiger	2 ounces	17.0	6.0	610
Boiled Ham	3 slices	2.5	0.1	820
Ham & Cheese Loaf	1 slice	5.0	2.5	350
Нопеу Нат	3 slices	2.5	1.0	760
Hard Salami	3 slices	9.0	3 0	510
Oven Roast Turkey Breast	4 slices	0.0	0.0	610
Wiener Original	l each	22.0	9.0	690
Wieners/Turkey, Pork, Beef	l each	9.0	3.0	-590





FATS

- ▲ Fats are believed to be the culprit of many chronic diseases; however, fat is an essential part of our diet.
- ▲ The functions of fat are the following:
 - ▲ to provide energy
 - ▲ to supply essential fatty acids needed for growth and development and healthy skin
 - ▲ to provide insulation and protection of vital organs
 - ▲ to assist in the absorption of the fat soluble vitamins A, D, E, and K.

According to the U.S. Dietary Guidelines, fat should be limited to 30% or less of total calories. When grocery shopping, the label can provide you with useful information about the fat content of the product. For instance, by dividing the fat calories into the calories, you can figure % of calories from fat.

Calculating % of Calories from Fat

- 1. Locate Fat Calories on the label
- 2. Locate the Calories on the label
- 3. Divide the Fat Calories into the Calories
- 4. This gives you the percent of calonies from fat
- ▲ When grocery shopping, check and compare labels in order to choose the lower fat option.

Handout 2 i I



APPENDIX C



VISUAL MODELS

The Healthy Living Program includes several visual models to assist you in your educational programs. Visual models include; fat models, sugar models, salt and sodium models, and unbiased food serving size models.

Fat Models

Each fat model represents one teaspoon, or approximately 5 grams fat. The fat model was made to represent a one teaspoon pat of butter or margarine. You can stack the fat models to represent 5, 10, 15 etc. grams of fat.

Sugar Models

The set of sugar models are test tubes with 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10 gm of sugar. The set also includes a test tube with 1 teaspoon sugar (approximately 4.5 gm sugar). You can combine the 10 gm and 2 gm test tubes to represent 12 gm sugar.

Salt and Sodium Models

A separate set of models were prepared for salt and sodium to help consumers understand the difference between salt and sodium. The set of test tube models containing white material (salt) represents salt, whereas the set of test tube models containing colored material (colored salt) represents sodium. Salt is approximately 40% sodium. This way you can demonstrate how much sodium is contained in a specific amount of salt. For exempt, I teaspoon of salt or 6000 mg salt (white test tube with 6000 mg salt or 1 t salt), contains approximately 2400 mg sodium (colored test tube with 2400 mg sodium).

The following is a list of the amounts of salt and sodium represented with the test tube models, and how they relate to each other...

Sodium	Salt
(test tubes containing colored material)	(test tubes containing white material)
35 mg sodium (35 mg/serving-very low sodium)	88 mg salt
140 mg sodium (140 mg/serving-low sodium)	350 mg salt
500 mg sodium	1250 mg salt
1000 mg sodium	2500 mg salt
2000 mg sodium	5000 mg salt
2400 mg sodium	6000 mg salt (1 teaspoon salt)

Unbiased Food Models

The following is a list of the bean bag serving size models:

Green bag 1 cup
Red bag 1/2 cup
Blue bag 1/4 cup

One of the Healthy Living Program, pre and post evaluation instruments is a blank pyramid in which participants will indicate the number of servings they consumed in each food group. This will require however, that the participants can accurately remember or visual the amount of a particular food they consumed. Participants often over or under estimate serving sizes. A consumer may under estimate how much they consumed because for example one cup sounds too large. On the other hand, a consumer may over estimate how much they consumed because they know they should have a serving and one serving is one cup. Using plastic food models can be helpful; however, most plastic food models represent a serving, and consumers tend to indicate they consumed the amount represented by the food model. Another method is to have 1, 1/2, 1/4 etc. measuring cups available; however, consumers are mislead by the height of measuring cups. One cup of spaghetti in a measuring cup looks different than one cup of spaghetti spread out on a plate.

The bean bag serving size models are more realistic to how food would look spread out on the plate. The green bag represents 1 cup, red bag represents 1/2 cup, blue bag represents 1/4 cup. When using the bean bag models do not tell the participant the green bag is one cup, just let the participant indicate which color of bag best represents how much they consumed of a food. This will hopefully let participants indicate the serving size without being biased by "oh, I didn't have a whole cup." or "a serving of vegetables is 1/2 cup, so I had 1/2 cup green beans."



APPENDIX D



SESSION 1: THE BASICS — THE FOOD PYRAMID AND RECIPE MODIFICATION

Teacher's Guide

Lesson Objectives

After completion of this lesson, Healthy Living Program participants will:

- learn which diet and lifestyle changes could improve their health
- understand the benefits of using the food pyramid as a guide for eating
- be aware that they can modify recipes to reduce total fat, saturated fat, sodium and sugar and to increase fiber, vitamins and mineral in foods prepared at home

Introduction

Note: Having one or more assistants at this lesson is advised to help with body measurements and data collection.

Visual 1.1: Healthy Living Program Logo

The Healthy Living Program is designed to help Oklahomans make lifestyle choices that will improve or maintain their health for as long as possible. We will focus on the things that you can change, modify, or continue to emphasize as you work for a healthy life. Those topics will include nutrition, making food choices, looking at healthful ways to prepare foods, food safety, and fitness.

Before we start into the lessons you need to know where you are at this point in your life as far as your health is concerned. We cannot give you a total physical, but we are going to take some critical measurements to get an idea where you are now and so you can see if you have made some healthy changes by the time the series of eight lessons has ended.

Activity 1.1: Body measurements and pretest

(Refer to Evaluation Section of Healthy Living Program Notebook.) Take weight and height measurements of program participants. Other measurements are optional. While completing those measurements have class complete pretest and fill out a food pyramid recall sheet. Use food models if available to help determine serving sizes. Then have each place the names of the foods and number of servings of each on a pyramid drawing. Collect pretests before continuing. Have participants keep their pyramid for use later in the lesson.





SESSION 2: SUPERMARKET TOUR

Teacher's Guide

Lesson Objectives

After completion of this lesson, Healthy Living Program participants will:

- know how to use food labels to choose foods that fit their nutritional needs
- understand some terms on food labels

Introduction

This lesson is a walking/teaching tour through the grocery store. You are the guide. Your job is to help participants learn to read food labels, cut through advertising "hype," learn to shop based on the food pyramid and dietary guidelines, and select lower-fat foods. You need to help them understand that a healthier diet begins at the grocery store.

You can probably handle a tour of ten or fewer people. If your Healthy Living enrollment is larger, you will need to have two or more tours at different times or other trained guides to assist you.

Setting Up A Supermarket Tour

Contact a supermarket/grocery store within the community several weeks ahead of the planned tour. Explain the Healthy Living Program and its objectives. Have available some of the promotion materials. Discuss how the store will benefit from participation. Potential benefits may include:

- Sponsor of the Healthy Living Program in promotion materials.
- Good will toward the community.
- Improved image of the store as a partner of shoppers in their search for good nutrition.
- Improved communication with consumers.





SESSION 3: BREADS

Teacher's Guide

Lesson Objectives

After completion of this lesson, Healthy Living School participants will be able to:

- increase the number of servings of whole grain breads eaten each day
- read product labels to choose whole grain breads
- modify recipes to reduce the fat and increase the fiber in homemade breads

Introduction

Visual 3.1: Food Guide Pyramid with Breads level highlighted

The base of the Food Guide Pyramid consists of the Bread, Cereals and Other Grains Group. Just as a pyramid's strength comes from its wide bottom layer, so too does a healthy diet benefit from eating 6 to 11 servings of breads, cereals or other grains every day. In the United States, the most common food in this group is bread.

Nutrition and Breads

Breads are made mostly of carbohydrates. These supply energy for body processes and physical activity. Carbohydrates allow the body to use protein for growth and to maintain its cells.

Visual 3.2: Graphic of wheat kernel

There are two forms of carbohydrates: simple and complex. The simple carbohydrates are sugars. It is common to find sugars in bread. They add flavor, tendemess, help bread brown, and can help retain moistness. The white flour used to make ordinary white bread is mainly starch, a complex carbohydrate. In the processing of white flour, the kernel of wheat is crushed. The outer layer of bran, which contains nondigestible fiber and B vitamins, is removed. The germ, which contains the oil and vitamin E, is also separated. White or refined wheat breads are





SESSION 4: GRAINS, CEREALS, AND PASTA

Teacher's Guide

Lesson Objectives

After completion of this lesson, Healthy Living School participants will be able to:

- increase the number of servings of whole grains, cereals, and pasta eaten each day
- read product labels to choose whole grain foods
- modify recipes to reduce fat and increase fiber in grain, cereal, and pasta dishes and to use unfamiliar grains

Introduction

Visual 4.1: Pyramid with highlighted base (same as Visual 3.1)

Whole grains, cereals and pastas are among the best sources of complex carbohydrates, yet despite advice from health professionals to increase complex carbohydrates in the diet, Oklahomans still fall two servings shy of the recommended six to eleven daily servings of grains or grain products.

Economic conditions are primarily responsible for differences in levels of grain consumption between countries. As a country becomes wealthier, its population can afford to use more of its grains for feeding livestock to provide meat; poorer countries on the other hand, are almost totally dependent upon their crops to feed people. This relationship can be seen in our own past. In 1910, when Americans had fewer material resources, our per capita consumption of wheat flour was about 210 pounds. This rate steadily declined as the nation grew wealthier, reaching a low in the early 1970s of about 110 pounds of wheat flour per person. During the same period, meat consumption increased to 170 pounds per person.

Affluent countries also rely more and more on convenience foods. In the case of grain products, many of these are now heavily refined, or processed to remove their outer layers, making them easier to chew and quicker to cook. The parts that are taken off, however, contain most of the fiber, B vitamins, and trace minerals found in the whole grain, along with a fair amount of protein. Today, most refined grains are "enriched" with the addition of key





SESSION 5: FRUITS AND VEGETABLES

Teacher's Guide

Lesson Objectives

After completion of this lesson, Healthy Living Program participants will:

- * understand the health benefits of eating five or more servings of fruits and vegetables daily.
- * increase the number of servings of fruits and vegetables eaten each day,
- * be able to read and understand labels of foods containing fruits and vegetables,
- * be able to modify recipes to reduce fat, cholesterol and/or sodium and to increase fiber, vitamins, minerals and/or flavor in fruit/vegetable recipes

Introduction

Visual 5.1: Pyramid with highlighted fruit/vegetable section

Eating more fruits and vegetables is a good idea year round. Eating at least five servings every day may help you reduce your risk of chronic diseases such as heart disease and cancer. The U.S. Surgeon General, the National Cancer Institute, the American Heart Association, the American Cancer Society and the American Dietetic Association all recommend that Americans should eat a diet low in fat and high in fiber which includes lots of fruits and vegetables.

There are literally hundreds of varieties to choose from. They can supply nearly all of the vitamins and minerals required for good health. Many contain complex carbohydrates and sugars which provide energy. Most also provide dietary fiber, and a few such as beans and potatoes, can contribute to your protein needs. At the same time they contain no cholesterol, most have very little fat, and are low in calories. Fruits and vegetables are "nutrient dense," which means they provide a lot of nutrition for the number of calories they supply. When you consider the inexpensive cost of most produce in comparison to meats and other animal foods, you get a nutrition bargain. Still, many Americans eat two or less servings per day. Children often report eating one or less servings and the one they eat is often a form of fried potato.

To get the greatest benefits from fruits and vegetables you need to prepare them in ways that add no fat. Many are good raw. Others can be steamed, boiled, baked,





SESSION 6: MEAT, POULTRY, FISH, DRY BEANS, EGGS, AND NUTS

Teacher's Guide

Lesson Objectives

After completion of this lesson, Healthy Living Program participants will:

- understand the health benefits of eating two to three servings of protein foods daily,
- · choose protein foods lower in fat more often
- be able to read and understand labels of protein foods
- be able to modify recipes to reduce fat, cholesterol and/or sodium and to increase fiber, vitamins, minerals and/or flavor in protein recipes,
- be aware of safe handling practices for protein foods.

Introduction

Visual 6.1: Pyramid with highlighted meat group

The foods in this section of the food pyramid are all high in protein. Dairy foods also provide excellent quality protein but because they are also high in calcium, they will be covered separately. Proteins are one of the essential nutrients. The body uses protein in more ways than it does any other nutrient. It is used as fuel, as part of tissues and body parts, in hormones, in enzymes, as antibodies, as a transportation system for other nutrients, in helping to maintain fluid balance, as part of mother's milk, and in forming blood clots and scar tissue.

Muscle meats are primary sources of protein in the diets of many Oklahomans. They can also be primary sources for fat and cholesterol. Some people now consider muscle meats, especially red meats, as "bad" foods. However, these foods are goods sources vitamins and minerals, especially iron, zinc, niacin, riboflavin, vitamin B₆, and vitamin B₁₂. As a result of these nutrients, lean meat can contribute to a balanced diet. Knowing how to choose lean muscle foods, how to keep the fat content low during cooking, and how to control portion size is important.





Session 7: Dairy Foods

Teacher's Guide

Lesson Objectives

After completion of this lesson, Healthy Living Program participants will:

- understand the health benefits of eating two to three servings of dairy foods daily,
- choose low-fat dairy foods more often
- be able to read and understand labels of dairy foods
- be able to modify recipes to reduce fat, cholesterol and/or sodium and to increase fiber, vitamins, minerals and/or flavor in dairy recipes
- be aware of safe handling practices for dairy foods

Introduction

Visual 7.1: Pyramid with highlighted dairy group

Milk is the leading source of calcium in the American diet. Just two cups of milk per day provides 75 percent of the adult RDA for calcium. Milk is high in vitamins A and D, riboflavin, other B vitamins, phosphorus, and magnesium. Milk provides high quality protein. If skim milk is chosen the protein is not accompanied by the fat found with some other protein foods. Two cups of skim milk provide 27 percent of the RDA for protein for men and 33 percent for women.

Dietary calcium is nearly as important for adults as it is for children. The body continues to replace bone all throughout life. While calcium is found in other foods such as green leafy vegetables, it is in its most usable form in milk. The phosphorus in milk works in balance with calcium to build bone. This is a good reason to get calcium from dairy foods rather than from supplements.

Visual 7.2: Nutrients in milk

Low-fat and skim milk are required by the Food and Drug Administration (FDA) to be fortified with vitamin A. Vitamin A is a fat soluble vitamin that is lost when the fat is removed. All milk is fortified with vitamin D, which is present naturally in milk in small





SESSION 8: FATS, OILS, AND SWEETS

Teacher's Guide

Lesson Objectives

After completion of this lesson, Healthy Living Program participants will:

- understand the healthy benefits of eating moderate amounts of fats and sweets
- better understand the different types of fats and oils and the functions of different levels of saturation in food products
- · choose low-fat foods more often
- be able to identify ingredients which add fat to foods on labels and use the terminology on food labels to make better nutrition choices
- be able to modify recipes to reduce total fat, saturated fat, and sugar content

Introduction

Visual 8.1: Pyramid with highlighted fats, oils and sweets group

The tip of the Pyramid may represent the majority of calories for many Oklahomans. Foods such as salad dressings and oils, cream, butter, margarine, sugars, soft drinks, candies, and sweet desserts provide calories but offer little else from a nutritional point of view. Fats may also be found in meats, dairy products, baked goods and cereals. Vegetables are often served with added fat. Elimination of these foods is not necessary, but moderation is.

Americans eat sugars in many forms. Sugars are carbohydrates. Dietary carbohydrates also include the complex carbohydrates starch and fiber. During digestion all carbohydrates except fiber break down into sugars. Sugars and starches occur naturally in many foods including milk, fruits, some vegetables, breads, cereals, and grains. Americans eat sugars in many forms. Sugars provide calories and most people like their taste. Some serve as natural preservatives, thickeners, and baking aids in foods. The body cannot tell the difference between naturally occurring and added sugars because they are identical chemically. The Dietary Guidelines for Americans cautions about eating sugars in large amounts and about frequently eating snacks of foods containing sugars and starches.



APPENDIX E

Oklahoma State University



Agricultural Communications · Oklahoma State University · Stillwater, OK 74078-0222 · 405-744-4081 · FAX 405-744-5739

NEWS RELEASE

EXTENSION SERVICE TO OFFER HEALTHY LIVING PROGRAM by Trisha Gedon

STILLWATER- There is growing concern about the link between nutrition, diet and health. Over the past few years, more and more evidence is coming to light about what we eat and how it affects our health.

The Oklahoma Cooperative Extension Service will soon be offering a new program to shed some light on the correlation between disease and diet.

Slated to kick off (fill in date)_____, the "Healthy Living Program" will feature eight sessions which cover a variety of topics concerning good health and a nutritious diet.

The lessons include The Food Pyramid and Recipe Modification;
Supermarket Tour: Breads: Quick, Yeast, Whole Grain: Grains, Cereals and Pasta; Fruits and Vegetables: Meats, Poultry, Fish, Dry Beans and Nuts;
Dairy Foods: and Fats, Oil and Sweets.

"Healthy Living Program" will include information on nutrition, label reading, recipe modification, food selection and preparation, and food safety. Each session also will feature a fitness segment.

Research has shown that the five leading causes of death due to diseases and diet include coronary heart disease, some types of cancer, stroke, diabetes mellitus and atherosclerosis.

In addition, obesity is a risk factor in all leading causes of death. It afflicts 30 percent of women, 15 percent of men and 25 percent of adolescents. The highest rate is among the poor and minority groups.

Consumers are seeking credible sources of information to overcome these problems and the "Healthy Living Program" is designed to provide accurate information and to help get individuals on the road to healthier living.

The "Healthy Living Program" is on a five year plan. The primary audience for the first year is adults. The programming will be adapted the second year for youth and 4-H audiences. The third year will feature a Master Shopper program. Special needs such as diabetes, heart disease and obesity will be the focus for the fourth and fifth years.

For more information about the "Healthy Living Program," contact the Oklahoma Cooperative Extension Service county office.

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APPENDIX F

Healthy Living Program S	survey			MONTA COO		_
Code	Digits Of Ho	ome Phone N	umber)	athV	Living	3
Check If Beginning Healthy Living P Check If Completing Healthy Living Check If Follow up	rogram			pros	T.	
Put a check in the box that best	Never	Seldom	Sometimes	Most Of	Almost	

Put a check in the box that best answers each question.	Never	Seldom	Sometimes	Most Of The Time	Almost Always
Do you compare food tabels before buying food?					
Do you think about healthy food choices when deciding what to feed your family?					
3. Do you let meat or dairy foods sit out for more than two hours?					
4. Do you thaw frozen foods at room temperature?					
5 Do you eat ground meat that still has some pink color to it?					
6. In the past two weeks, did you read food labels to select foods with less fat?					
7. In the past two weeks, did you read food labels to select foods with less salt or sodium?					
8. In the past two weeks, did you read food labels to select foods with less sugar?					

		-,	1		
Put a check in the box that best answers each question.	Never	Seldom	Sometimes	Most Of The Time	Almost Always
9. In the past two weeks, did you read food labels to select foods with more fiber?					
10. In the past two weeks, did you prepare foods with less fat?					
11. In the past two weeks, did you prepare foods with less salt?					
12. In the past two weeks, did you prepare foods with less sugar?					
13. In the past two weeks, did you prepare foods with more fiber?					
14. In the past week, did you eat six or more bread, cereal, rice or pasta servings daily?					
15 In the past week, did you eat five or more fruit and vegetable servings daily?					
16. In the past week, did you eat two or more dairy servings daily?					
17. In the past week, did you eat two or more servings of meat, poultry, fish, or dry beans daily?					
18. Do feel your family's nutritional needs are being met?					

Adapted from USDA EFNEP SURVEY, 1993

APPENDIX G

CODE (First, Middle, Last Initial-Last Four Digits Of Home Phone Number

(rirst, middle, Last Initial-Last Four Dig	ILE OF HOME	אץ	០ធ	e I	Nui	<u>lbe</u>				
Check If Beginning	Medium	- (You	ar UNB]		Ho ∣	w of I	1	ı
Check If Completing	Serving		Siz	•		_	4	Month	_	Rarely/
FRUITS & JUICES	1	_		Ī	!	<u>,</u>	Yes	۶	Year	Į.
EXAMPLE - Apples, applesauce, pears	(I) or ½ cup	Ť	1	·	i t		4		 	-
Apples, applesauce, pears	(1) or 1/2 cup	+	1	╁			1	 		
Bananas	1 medium	$^{+}$	Ĺ	\vdash	i		<u>'</u> I	1	\vdash	╁
Peaches, apricots (canned, frozen or dried, whole year)	(1) or 's cup	+	 -	\vdash	-				╁	╁
	1 medium	+	╁			_	├~	 	├	╂~~
Peaches, apricots, nectannes (fresh. in season)	V. medium	+	╁	Ļ.	lŀ		┢╌	├─	 	╁─
Cantaloupe (in season) Watermelon (in season)	+	╫	1	Н	l ⊦		├~-	_	-	
	1 slice	╀	+	Н	ĺĺ			 	-	-
Strawberries (fresh, in season)	1 cup	╁	<u> </u>	╁┤	\	-	_	 	 	⊢
Oranges	1 medium	⊢	\vdash	H	H	_	<u> </u>			├
Orange juice or grapefruit juice	6 oz. glass	는	⊢	Н	H	_		<u> </u>	├ −	-
Grapefruit	(%)	╀	\vdash	H	H	_		-		
Tang, Start breakfast drinks	6 oz. glass		 	\vdash	}			Í	<u> </u>	<u> </u>
Other fruit juices, fortified fruit drinks	6 oz. glass	+	Η,	Н	-	-		<u> </u>		H
Any other fruit, including bernes, fruit cocktail	үү спь	+		\vdash	-					
VEGETABLES		5	M	닏	Ľ	Da	Wk	Мο	Yr	N
String beans, green beans	_γ ν cπb	╀		Ц	ŀ	_	\Box			
Peas	1/4 cup	╄	Щ	Ш	ŀ	_				
Chili with beans	¼ cup	<u> </u>		Щ	Ĺ					
Other beans such as baked beans, pintos, kidney beans, limas		_	_	Щ	L]		
Com	Испр	╙		Ц		_				
Winter squash, baked squash	И сир	Ĺ	1		L					
Tomatoes, tomato juice	(1) or 6 oz.				Ĺ					
Red chili sauce, taco sauce, salsa picante	2 Tbisp. sauce				L]				
Broccoli	½ cup	L				1				
Cauliflower or brussel sprouts	יים כתוף	Ī	;		Ĺ	- 1	.]]		
Spinach (raw)	₩ cup	Π		П	Г	ī	\Box			
Spinach (cooked)	ls cup	Π	Πi	ī	Г	T	T			
Mustard greens, turrup greens, collards	15 cup	П			Г	\neg	\neg		i	
Cole slaw, cabbage, sauerkraut	15 cup			7	r		_	\neg		
Carrots, or mixed vegetables containing carross	74 CUP	\vdash	\Box	┪		┪	T	\neg	_	
Green salad	1 med. bowl	\vdash	H	\dashv	i	寸	\neg			
Salad dressing, mayonnaise (including on sandwiches)	2 Tolsp.	\vdash	H	\dashv		┪		_	~~	_
French fries and fried potatoes	% сир	1	- 1	\dashv	H	1	~+	~	\neg	
Sweet potatoes, yams	1/2 CUP	Í		⊣	\vdash	+	_		~~	
Other potatoes, including boiled, baked, potato salad	(1) or h cup		\vdash	\dashv	\vdash	\dashv	+	\dashv	-	
Rice	<u> </u>	Н	-	\dashv	\vdash	+	+		- 	
Any other vegetable, including cooked onions, summer equash	₩ cup	-	-	\dashv	\vdash	\dashv	\dashv	\dashv	\dashv	
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	2 pats		MI	-	-	7-1	W 1-1	Mod	↓	M.
MEA?, FISH, POULTRY & MIXED DISHES	(as a dissay	3	150	닉	-	"	** E	Jeres	111	144
Hamburgers, cheeseburgers, meat loaf	1 medium	\vdash	-	\dashv	\vdash	+	-		\dashv	
Beel—steaks, roasts	4 02.		-	\dashv	\vdash	+	-	-	_	
Beef stew or pot pie with carrols, other vegetables	1 cup	H	4	_	\vdash	_	\rightarrow		\dashv	
Livet, including chicken livers	4 oz.	Н	1	\dashv	L	1	\dashv	- {	<u>,</u>	
Pork, including chops, roasts	2 chops or 4 oz.	Ц	_		L	1	ļ	_	\dashv	
Fried chicken	2 san. or 1 lg. piece	_	4	\dashv	L	1		_¦	_ !	
	2 sm. or 1 lg. prece	Ц	_ļ	\Box	Ĺ	1	Ų			
Fried hish or fish sandwich	4 oz. or 1 sand.		4	\Box	Ļ	i			\bot	_
		[П						7	
Turia fish, runa salad, runa casserole	אי כעף					-				
Turia fish, runa salad, runa casserole Shell fish (shrimp, lobster, crab, ovsters, etc.)	(5) 4 cup or 3 oz.	j	_†		L	_				
			-† -†	\exists	-	į		\dashv		_
Shell fish (shrimp, lobster, crab, ovsters, etc.) Other fish, broiled, baked	(5) 1/4 cup or 3 oz.		- 		F	! !		1		
Shell fish (shrimp, lobster, crab, ovsters, etc.) Other fish, broiled, baked Spaghetti, lasagna, other pasta with tomato sauce	(5) ¼ cup or 3 oz. 4 oz.		- 1			! !	1			_

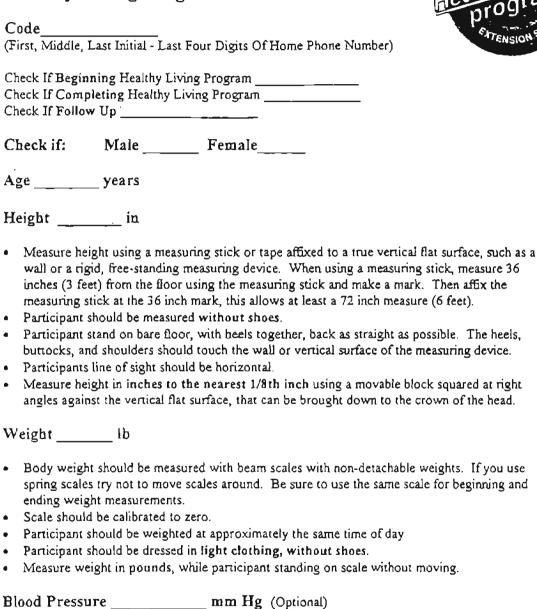
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	Serving		Sia		
LUNCH ITEMS	Ì	s	М		1
Liverwurst	2 slices	Ť	T	T	7
Hot dogs	2 dogs	Τ	i	T	1
Ham, lunch meats	2 slices	T	Ť	\top	٦
Vegetable soup, vegetable beel, minestrone, tomato soup	1 med. bowl	T	\top	Π	1
Other soups	1 med, bowl	T	Ť	Ť	1
BREADS / SALTY SNACKS / SPREADS	1111007 5007	t	м	ī	1
Bisquits, muffins, burger rolls (incl. last foods)	1 med. piece	۲	1144	+	1
	2 slices, 3 cracks	╁	+	╁	1
White bread (including sandwiches), bagels, etc., crackers	2 slices	┝	+	╀	┨
Dark bread, including whole wheat, rye, pumpernickel		╀	╁	╀	1
Com bread, com mulfins, com tortillas	1 med. piece	┝	╀	┼-	1
Salty snacks (such as chips, popcorn)	2 handfuls	-	1	<u> </u>	1
Peanuts, peanut butter	2 Tbisp.	┡	╄	-	1
Butter on bread or rolls	2 pats	L	丄	-	1
Margarine on bread or rolls	2 pars	L	上		1
Gravies made with meat drippings, or white sauce	2 Misp.	L			
BREAKFAST FOODS		S	М	L	ļ
High fiber, bran or granola cereals, shredded wheat	1 med. bowl		Ĺ	L	
Highly fortified cereals, such as Product 19, Total, or Most	I med. bowl				
Other cold cereals, such as Com Flakes. Rice Krispies	I med. bowl	Г]
Cooked cereals	1 med. bowl	Г	Π]
Sugar added 10 cereal	2 teaspn.	\lceil	1	Г	1
Eggs I egg = small.	2 eggs = medium	Г			1
Bacon	2 slices	Г		Г	١
Sausage	2 patties or links	-	_		١
SWEETS		-	М	L	ı
Ice cream	1 scoop	Ť	1	Ť	
Doughnuts, cookies, cakes, pastry	1 pc. or 3 cookies	\vdash	-	-	
Pumpkin pie, sweet potato pie	1 med. slice	H	-		
Other pies	1 med. slice	_	┝	H	
Chocolate candy	small bar, 1 oz.	-	H	H	l
Other candy, jelly, honey, brown sugar DAIRY PRODUCTS	3 pc. or 1 Tb/sp.	_	M	-	
	124	3	m	닏	
Cortage cheese	7/2 cup			Н	
Other cheeses and cheese spreads	2 slices or 2 oz.			Н	
Flavored yogun	1 cup		\vdash	Ц	
Whole milk and bevs. with whole milk (not incl. on cereal)	8 02. glass		L,	Щ	
2% milk and bevs. with 2% milk (not incl. on cereal)	8 oz. glass	_	Li	Ц	
Skun milk. 1% milk or buttermilk (not incl. on cereal)	8 oz. glass	-		Ц	
BEVERAGES		S	М	L	
Regular soft drinks	12 oz. can or bottle	Ш	Ш		
Diet soft drinks	12 oz: can or bottle				
B ee r	12 oz. can or bottle				
Wine	1 med, glass		П		
Liguor	1 shot	П	П		
Decalleinated coffee	1 med. cup	\neg	П	╗	
Coffee, not decaffernated	1 med. cup		ヿ	\neg	
Fea (hot or iced)	l med, cup	ᅥ		\dashv	
Lesmon in tea	1 teaspn.	\dashv	\dashv	\dashv	
Non-diary creamer in coffee or tea	1 Tolsp.	-{	-	\dashv	
		\dashv	\dashv	\dashv	
Wilk in coffee or tea	1 Tolsp.	4	-	\dashv	
Cream (real) or Half-and-Half in coffee or tea	1 Tolsp.	4	4	\dashv	
LUCKET IN COMMANDE OF LAS	2 teaspn.	- 1	J		
Sugar in coffee or tea Artifical sweetener in coffee or tea	l packet	_		_	

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APPENDIX H

Healthy Living Program Measurement Form

Blood Cholesterol ____mg/dl (Optional)



APPENDIX I

Healthy Living Program Informed Consent

"I,
program "Healthy Living Program" which is sponsored by Oklahoma Cooperative Extension Service.
I understand that:
(1) the purpose of the program evaluation is to measure the effect of the eight session "Healthy Living Program" on food selection and preparation practices, dietary intake, and health status measures of weight, blood pressure and blood lipids including total-cholesterol, HDL-cholesterol, LDL-cholesterol and triglycerides;
(2) I will attend eight "Healthy Living Program" educational sessions;
(5) at the first and last session I will have physical measurements of height, weight, and blood pressure;
(4) a licensed phlebotomist will draw a fasting blood sample of 10 ml (about 2 teaspoons) by venipuncture before and after the eight session Healthy Living Program, and that slight bruising or discomfort may result from the venipuncture;
(5) all records are confidential and that my name will not be associated with any reports or data records at the end of the evaluation
(6) Participation in the program evaluation is voluntary and that I have the right to withdraw from the program evaluation at any time and still participate in the Healthy Living Program educational sessions.
(7) the program evaluation will be beneficial to the public in that it will help to determine if the educational program helps consumers apply the Dietary Guidelines recommendations to food selection and preparation practices, and helps consumers eat the recommended number of servings from the Food Guide Pyramid food groups. This evaluation will also determine if making these types of selection, preparation and dietary changes results in healthy weight, blood pressure, and blood cholesterol which can reduce the risk of many types of diet related diseases including heart disease, hypertension, diabetes, and possibly certain types of cancer
(8) I may contact Dr. Janice Hermann at (405) 744-6824 should I wish further information. I may also contact the office of University Research Services, 001 Life Sciences East, Oklahoma State University, Stillwater, OK 74078 telephone (405) 744-5700.
I have read and fully understand the consent form. I sign freely and voluntarily. A copy has been given to me.
Date:(a.m./p.m.)
Signed:
Signature of Subject
I certify that I have personally explained all elements of this form to the subject or his/her representative before requesting the subject or his/her representative to sign it."
Signed:
Project Director of his/her authorized representative

APPENDIX J

HEALTHY LIVING PROGRAM

Fasting Blood Values

Suhi	iect	Code:		
O CD		Code.		

Blood Measurement	Your Values
Total Cholesterol Classification: Desirable < 200 mg/.dl Borderline 200 - 239 mg/dl High > 240 mg/dl	
LDL Cholesterol Classification: Desirable < 130 mg/.dl Borderline 130 - 159 mg/dl High > 160 mg/dl	
HDL Cholesterol Classification: Desirable > 60 mg/dl Low < 35 mg/dl	
Triglycerides Classification: Desirable < 200 mg/.dl Borderline 200 - 399 mg/dl High 400 - 1000 mg/dl Very High > 1000 mg/dl	
Głucose Expected Values: 70 - 105 mg/dl	

Source for blood values: Summary of the second report of the National Cholesterol Education Program Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults. Journal of the American Dietetic Association, 1993:269;3015-3023.

APPENDIX K

Respondent ID: DEMOXXXXXX Simpson Marge 8

The following nutrient values are estimates based on reported frequency of consumption and portion sizes on the diet questionnaire. Nutrients from vitamin supplements are reported separately.

AVERAGE DAILY NUTRIES	NTS	Recommended Ranges
TOTAL CALORIES CALORIES EXCLUDING ALCOHOLIC BEVERAGES		
PROTEIN TOTAL FAT CARBOHYDRATE	61.4 GRAMS 43.2 GRAMS 143.1 GRAMS	.36 grams per Lb Body Wt Under .034 x Non-Alcohol Cals .125150 x Non-Alcohol Cals
CALCIUM PHOSPHORUS IRON SODIUM POTASSIUM VITAMIN A (IU) VITAMIN A (RE) THIAMIN (B1) RIBOFLAVIN (B2) NIACIN VITAMIN C SATURATED FAT OLEIC ACID LINOLEIC ACID CHOLESTEROL DIETARY FIBER FOLATE VITAMIN E ZINC ZINC FROM ANIMAL VITAMIN B6 MAGNESIUM ALPHA-CAROTENE BETA-CAROTENE CRYPTOXANTHIN LUTEIN	1226.3 MG 1336.3 MG 7.4 MG 1590.3 MG 2510.3 MG 4699.0 I.U. 885.6 RE 1.1 MG 2.3 MG 12.9 MG 93.7 MG 13.6 GRAMS 14.1 GRAMS 14.1 GRAMS 14.6 GRAMS 242.9 MCG 9.7 a-TE 10.4 MG 6.0 MG 1.4 MG 1001.6 MG 273.5 MCG 311.2 MCG 311.2 MCG 469.4 MCG	Age 11-24 or pregnant: 1200. 25+:800 Age 11-24 or pregnant: 1200. 25+:800 Men: 10 mg Women: 15 mg 500-2400 mg 2000-3500 mg or more Men: 5000 I.U.; Women: 4000 I.U. Men: 1000; Women: 800 Men: 1.5 mg; Women: 1.1 mg Men: 1.7 mg; Women: 1.3 mg Men: 19 mg; Women: 15 mg 60 mg, more for optimum. Smoker 100+ Approx. 1/3 of fat Approx. 1/3 of fat Approx. 1/3 of fat Approx. 1/3 of fat Men: 200; Women: 15-50 yr:400. 51+ 180 Men: 15 mg; Women: 12 mg Men: 15 mg; Women: 12 mg Men: 15 mg; Women: 12 mg Men: 2 mg; Women: 1.6 mg Men: 350 mg; Women: 280 mg A carotenoid, no range set

Respondent ID: DEMOXXXXXX Simpson Marge B

% Calories Excluding Alcoholic Severages Recommended Ranges

From Fat: 33.2% LESS THAN 30 PERCENT From Protein: 20.8% 10-12% (more if over age 60)

From Carbonydrate: 47.2% 50-60%

Percent of Total Calories

From Fat: 31.5%
From Protein: 19.9%
From Carbohydrate: 46.4%
From Sweets: 6.8%
From Alcohol: 4.9%

GROUPED FOODS FREQUENCY (PER DAY) RECOMMENDED SERVINGS

Vegetable group 1.0 3-5 Servings
Fruit and fruit juice group 0.4 2-4 servings
Bread, cereal, rice & pasta 1.7 6-11 servings
Milk, yogurt and cheese group 2.9 2-3 servings
Meat, poultry, fish, beans, eggs 1.3 2-3 servings
Fats, oils, sweets, & snacks 1.8 Use sparingly
Alcoholic Beverages 0.4 In Moderation

Your reported weight is 150 pounds. The desirable weight for your height is approximately 128 - 142 pounds.

Average Daily Intake of Vitamins from Supplements:

Vitamin A: 5000.0 I.U. Vitamin C: 1060.0 mgs 400.0 I.U. 20.1 a-TE Vitamin D: Vitamin E: 18.0 mgs Iron: 130.0 mgs Calcium: Zinc: 15.0 mgs B-Carotene: 1200.0 mcgs* 1.5 mgs Thiamin: 2.0 mgs 6.0 mcgs 86: B12: Folate: 400.0 mcqs 2.0 mgs Copper:

Other Vitamin: None Stated

^{* -} Not all brands of multiple vitamins contain beta-carotene.

4

VITA

Starlette Lynn Heintz

Candidate for the Degree of

Master of Science

Thesis: EFFECTS OF AN EDUCATION PROGRAM UTILIZING THE DIETARY GUIDELINES AND FOOD GUIDE PYRAMID ON DIET AND HEALTH

Major Field: Nutritional Sciences

Biographical:

Personal Data: Born in Fort Collins, Colorado, September 24, 1967, the daughter of Jack R. and Shelby J. Morrison. Married David A. Heintz November 28, 1992.

Education: Graduated from Loveland High School, Loveland, Colorado in May 1986; received a Bachelor of Arts degree in Dietetics and a Bachelor of Arts degree in Psychology from University of Northern Colorado, Greeley, Colorado in May 1994; completed requirements for the AP4 Dietetic Internship at Oklahoma State University, May 1995; completed requirements for the Master of Science degree with a major in Nutritional Sciences at Oklahoma State University in May, 1998.

Professional Experience: Food Technologist for University of Northern Colorado; Test Kitchen Manager for University of Northern Colorado; completed Dietetic Internship at Midwest City Regional Hospital in May 1995; obtained R.D. status in November 1995; Graduate Research Assistant for Oklahoma State University, Department of Nutritional Sciences, 1995.

Professional Organizations: American Dietetic Association.