

ASSESSING CHANGE IN DECISION MAKING SKILLS
AND FOOD SELECTION OF STUDENTS EATING IN
UNIVERSITY RESIDENCE HALLS

By

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CHAPTER I

INTRODUCTION

"Today, most people have the unique luxury of choosing whether to improve or impair their health status. The leading causes of premature death and disability among adults, such as coronary heart disease, cancer, stroke, cirrhosis, and accidents, are intimately linked to a person's choice of lifestyle." (Zifferblatt, Wilbur, and Pinsky, 1980)

Five of the 10 leading causes of death for adults living in the United States are related to diet and nutrition. Coronary heart disease, diabetes mellitus, coronary artery disease, stroke, and some types of cancer all have been associated with the choices individuals make in the grocery store and at the table (National Center for Health Statistics, 1995). Because of these statistics, *Healthy People 2000: National Health Promotion and Disease Prevention Objectives* was proposed as a project of the United States Department of Health and Human Services, with the goal of helping Americans reduce their chances of developing chronic diseases or disabilities (U.S. Dept. of Health and Human Services, 1991). Modification of lifestyle is endorsed as a way to significantly improve not only present health status, but to ensure a higher quality of life as the population ages.

Overweight has been linked to several of the diet-related chronic diseases, and, unfortunately, it is a risk factor that continues to proliferate in the United States. According to the latest National Health and Nutrition Examination Survey (NHANES III) (Allred, 1995), one-third of all American adults are overweight. This is an increase of eight percent over the survey conducted from 1976-1980, NHANES II (p. 417). This information leads one to assume that, in spite of broad dissemination, nutrition information is falling on a disinterested public.

Formal programs addressing healthy changes in eating behaviors for the general population have been minimally successful (Zifferblatt, Wilbur, and Pinsky, 1980). The researchers state that "Most chronic diseases related to diet, such as atherosclerosis and obesity, develop slowly and painlessly over many years. During this asymptomatic period, when people are least likely to seek medical care, they are firmly establishing the very eating habits that will require change in the future" (p. 15). The need for influencing change in the eating habits of young people is clearly evident.

A key to bridging the gap between nutrition knowledge and application is the presentation of nutrition messages in believable, accessible, and usable forms. Godfrey M.

Hochbaum (1981) states that three areas must be addressed when evaluating the potential effectiveness of a nutrition education program: the cognitive and affective changes produced; the immediate behavioral changes; and, the long-term behavioral effects. Hochbaum further asserts that, while a need exists for people to have knowledge regarding sound nutrition, individuals will only act on that knowledge when they are ready to make a change. Education by itself does not bring about shifts in behavior (p. S60).

A need exists for programs that evaluate the joint application of knowledge and desire for change. Such a program would give justification for the need to rethink long-term food habits and would also present nutrient content information in a readily understandable and pleasing way.

Purpose and Objectives

The purpose of this project was to positively influence the food choices made by students in a residence hall cafeteria. Two types of intervention were utilized to address the problem: nutrition workshops targeting decision-making (individual education), and nutrition information labels and posters in the cafeteria (structural education).

The objectives formulated for this study were:

1. to teach decision-making skills to students living and eating in a university residence hall
2. to increase student awareness of the relationship between dietary habits and physical health
3. to increase student awareness of the nutrient content of food served in the residence hall cafeteria
4. to present the Food Guide Pyramid as a tool designed to assist students in choosing appropriate foods in the residence hall cafeteria, and
5. to measure food choices being made by students in the residence hall cafeteria during the education period.

Null Hypotheses

The following null hypotheses were postulated for this study:

H₀ 1: There will be no significant change in the food choices made by students in a residence hall cafeteria after vs. before the education program.

H₀ 2: There will be no significant change in the reasons students give for choosing to eat in the cafeteria after vs. before the education program.

H₀ 3: There will be no significant change in eating patterns and behaviors of students eating in a residence hall cafeteria after vs. before the education program.

Assumptions

It was assumed that participants in this study:

1. were representative of the university student population living in residence halls.
2. completed pre- and posttest information to the best of their ability.
3. were truthful in reporting attitudes and behaviors.

Limitations

Limitations of the study are as follows:

1. Student participation was voluntary.
2. The sample size was small.
3. Some participants in the education component completed a posttest, but did not complete a pretest.

Definitions of Terms

DECISION: The act of making up one's mind; resolution; firmness; determination (World Book Dictionary, 1974).

CHOICE: The power or chance to choose; emphasizes freedom in choosing, both in the way one chooses and in the number of possibilities from which to choose (World Book Dictionary, 1974).

ATTITUDE: Attitude measurement consists of the assessment of an individual's responses to a set of situations. "A belief becomes an attitude when it is accompanied by an affective component which reflects the evaluation of the preferability of the characteristics or existence of the object. The attitude would be the sum of such beliefs about the object" (Shaw and Wright, 1967).

CHAPTER II

REVIEW OF LITERATURE

This chapter includes information derived from a review of literature pertaining to the evaluation of nutrition education programs and the eating preferences and habits of college-aged students and others. A review of information pertaining to the USDA Food Guide Pyramid and its value as a nutrition education tool is also included.

Eating Preferences and Habits of University Students and Others

Westenhofer and Pudal (1993) explored the concept of pleasure as it relates to a number of social activities, including "a fine meal at home". Subjects were asked to rank various events in an effort to measure the amount of pleasure derived. Only family time, holidays, and time spent with friends were rated higher than eating a well-prepared meal. The authors further reported findings that associated various terms with pleasure and health. The keyword "eating" was associated with pleasure by 44.5% of respondents, while "nutrition" was tied to pleasure by only 25.9%. This research indicates that problems arise when health promotions seek to target diet, and that people do not associate eating (a pleasant thing) with nutrition (a health issue). Understanding the dichotomy between what people actually eat and what they know about nutrition seems to be very important to the successful communication of nutrition information to the public.

Norma Hinnen, in her 1950 thesis, reported on the eating habits of women residing in Willard residence hall at Oklahoma A&M University. Even though most of the students surveyed reported eating three meals daily, Ms. Hinnen recommended an increase in the availability of nutrition education materials in the dining hall to improve knowledge and eating habits. In a study done by Ridgway (1989), however, results indicated that students enrolled in Basic Human Nutrition classes were not any more knowledgeable about nutrition issues or healthy snacking than students who were not taking the classes.

Kahn (1982) reported that snack foods were a major source of energy and nutrients in a study that compared nutrition majors with non-majors. Non-nutrition students consumed significantly more calories than their counterparts, but, if it had not been for snacks, the recommended energy level for all subjects, the iron and calcium levels for women, and the vitamin A and thiamin levels for male nutrition majors would have been below the recommended dietary allowances (RDA) for these nutrients.

In a study that compared the eating habits of 195 female students at Cornell University with subjects of earlier studies (Jakobovits, Halstead, Kelly, Roe, and Young, 1977), 34% of the women took supplements and one-third took multiple preparations, so that vitamin intake was far in excess of the RDA, especially for vitamins A and C. Seven-day food records and questionnaires about eating patterns showed high intakes of protein and low iron consumption, a trend consistent with the earlier studies. A later study at Oklahoma State University (Ju, 1988) compared male and female students in relation to body image satisfaction and nutrient intake. In keeping with the Cornell data, Ju found that men ate a more adequate diet than women, and that women were at greater risk of deficiencies in B₆, folacin, iron, magnesium, and zinc. Both sexes expressed dissatisfaction with their body weight.

At Purdue University (Wise, 1974), 185 subjects were surveyed concerning food habits, nutrient intake, and blood nutrient levels. Results indicated no significant correlation between any major factors affecting food habits and intakes, but "males generally had a more adequate intake than females because the males consumed a larger total food intake and the females were concerned about becoming fat " (p. xi). It was concluded that multiple factors influence food habits and individual variations make food choices hard to predict and measure.

Chery, Sabry, and Woolcott (1987) assert that " the belief that one's knowledge is correct when in fact it is incorrect (a misconception) may result in failure to seek accurate information. It may also lead to erroneous decisions with regard to food choices or nutrition practices"(p. 251). Their study compared nutrition misconceptions between students questioned in 1971 and 1984. Four of the 5 highest ranking misconceptions were the same in both studies, indicating a lack of desire to correct misinformation. Their findings correspond with a study of college students by Melby, Femea, and Sciacca (1986) that found that the majority of respondents (n=1226) understood some basic nutritioconcepts, but also exhibited belief in misconceptions. Sixty-five percent of subjects reported eating high fat foods less than once per day, but 69% said they also fail to eat any fruit at least once per day. Forty-three percent did not eat a least one vegetable serving per day. The results indicated that a large number of students practiced unhealthy eating and exercise habits. In a study done to measure college student awareness of the United States Dietary Goals (USDG), 19 of 100 students knew what the USDG were, but their utilization of the goals indicated misconceptions about weight loss and healthy food choices (van den Reek and Keith, 1984). Only 24% of students were trying to increase their intake of complex carbohydrates while 31% were trying to decrease complex carbohydrate intake. Seventy-four percent of students were trying to control their weight, and of the students

using the USDG, the women did so to lose weight while the men were seeking to reduce their risk of cardiovascular disease.

In 1991 research, Rebecca Plato examined fruit and vegetable consumption by students in a residence hall at Oklahoma State University. While the majority of students surveyed displayed knowledge of the U.S. Dietary Guidelines, the intake of vegetables was limited to mainly French fries, mashed potatoes, salad, and carrots. Fruits most regularly consumed were oranges, bananas, and apple or orange juice. The author recommended that nutrition educators and other health professionals find innovative ways to encourage increased consumption of fruits and vegetables. Unfortunately, dietitians surveyed by Glanz (1979) indicated that they were reluctant to use more innovative strategies, such as those that would involve in-depth study and investigation of the problem or the client, in their education and counseling. Instead, they were more willing to rely on traditional methods of increasing client compliance, using food models or recommending diet scales, for instance, regardless of long-term effectiveness.

Further indication of this need for encouragement and education was presented in a study by Cotugna and Vickery (1994), which examined student awareness and application of the Food Guide Pyramid. Fifty-six percent of the 85 students questioned had not heard of the government's meal planning guide, a full year after its introduction. The authors asserted that "it is well known that information alone does not guarantee change but rather serves as a basis for decision making. Once the knowledge gaps have been assessed and addressed, further research should look at food decisions made based on pyramid education" (p. 419).

Evaluation of Nutrition Education

In an attempt to understand various strategies that can be used to communicate correct and effective nutrition information, Eden, Kamath, Kohrs, and Olson (1984) examined the perceived control people feel they have over their nutrition behaviors. Three orientations pertaining to locus of control were established: (1) internal locus of control—the conviction that an individual's own attitudes and behaviors can influence the attainment of goals and rewards; (2) external locus of control by powerful others—the perception that one has no control, but that powerful and significant outside events or people control rewards and other outcomes; and (3) external locus of control by chance—the belief that the attainment of goals or outcomes is a result of luck or fate, not personal control. The researchers concluded that "cognitive accumulation of nutrition facts plays only a minor role in the determination of food habits, which are primarily socially learned." This idea is

reinforced in a study by Haus, Hoerr, Mavis, and Robison (1994) where individual participants in a six-month worksite weight loss program were surveyed to determine factors which influence success or failure in maintaining program goals. Findings indicated that regular exercise and reduced dietary fat intake were predictive of long-term weight loss success. Koszewski, Newell, and Higgins (1990) reported the effect of nutrition education on attitudes and behaviors of college women in Nebraska and Kansas and found that education may play an important role in the prevention of eating disorders. The apparent interplay of education and social activities in the effort to modify eating behaviors will continue to be an area requiring extensive research.

A three-month study to measure the impact of in-store nutrition videos on consumer knowledge of dietary fat and cholesterol has been reported by Nichols and Schmidt (1995). Based on pre- and post-testing, knowledge was improved for those individuals who viewed the videos. Again the need for innovative educational tools was addressed by this research, in an effort to make information available to receptive audiences in nontraditional settings. In testing done by Muller (1985), who explored the different ways consumers use nutrition information, information format, variations among brands, nutrient importance, and amount of information were identified as factors which influence consumers as they choose food items. Thus, manufacturers and retailers, as well as educators, should determine and present the needed information in a form most appealing to the consumer. It must be easy to comprehend and incorporate into daily activities.

A major stumbling block to innovative and interesting behavior modification programs is the prohibitive cost of materials and personnel. Until the effectiveness and long term benefits of these programs are documented, they will continue to be difficult to maintain. In her 1982 thesis, Peggy Ann Smith explored the factors influencing nutrition education programs offered by college and university food services, and what methods are most frequently used to disseminate nutrition information. The reason most cited for not offering nutrition programs was the lack of qualified and available personnel. If the director viewed nutrition education as important, than a program was more likely to be offered, and of the food service directors surveyed who were registered dietitians, 83% offered education programs. Nutrition information was most frequently distributed via table tents, pamphlets, menu notes, and newsletters.

Dubbert, Johnson, Schlundt, and Montague (1984) labeled individual food items in a public cafeteria, using nutrition information. Sales were monitored to see if the printed information had any effect on individual food choices. Because total calorie counts per meal and total sales were not affected, the researchers concluded that labeling may not be the most effective way to influence individual food habits. A different cafeteria program

(Mayer, Heins, Vogel, Morrison, Lankester, Jacobs, 1986) included posters listing the benefits of a low fat diet and also listing the low fat entrees available in the cafeteria daily. Table tents were also used, offering the same information. The selection of low fat entrees increased significantly at the start of the intervention, but because the program was short-term, the success of the intervention could not be accurately assessed.

The effect of labeling and incentives was studied by Cinciripini (1984) in a university cafeteria during lunch hour. Students between the ages of 18 and 23 were observed over a 16-month period, and their food choices were evaluated and sorted by groups. The students' gender and body classifications, i.e., lean, normal, or obese, were also used as a means of identifying eating patterns. Foods were labeled and identified according to calories and fat content. Most healthful choices were identified by a green triangle symbol. Students were also given rebate cards. The card was stamped each time a student chose a selected food, and after 10 selections were made, the student received a one-dollar rebate. Measurements were done at three baselines, and after each intervention. It was found that the rebate card had the largest effect on food selection across all three body classification categories.

Students in two college cafeterias were surveyed to measure the effectiveness of nutrition information on the selection of food items (Davis-Chervin, Rogers, and Clark, 1985). In the first cafeteria, the students were provided with nutrition information and selection recommendations via signs, and also nutrition information cards for selected food items, indicating number of calories, percentage of fat calories, and milligrams of cholesterol. Students in the second cafeteria were provided with the nutrition cards only. The additional material provided to the first cafeteria was shown to be enough to affect a positive change in the food selections of the students involved. Reis and Schoon (1986) reported that an eight-week program using pamphlets and nutrition information appeared to increase student knowledge, but did not affect attitudes.

Perceived knowledge, what an individual thinks he knows, was compared with accuracy of knowledge and correct knowledge in a study by Dugdale, Chandler, and Baghurst (1979). The authors wanted to measure levels and accuracy of nutrition knowledge of both potential and practicing health professionals and a group of third-year seminary students with no background in nutrition. Perceived knowledge was high in all groups, but accuracy declined steadily as one compared doctors, medical students, student nurses, and theology students (the control group).

Measurements of Attitudes and Beliefs

The use and definition of the term 'attitude' vary widely among professionals (Shaw and Wright, 1967). What can be agreed upon is that attitude consists of a predisposition to respond to societal factors that govern the overt behavior of the individual. "Since an attitude is a hypothetical, or latent, variable rather than an immediately observable variable, attitude measurement consists of the assessment of an individual's responses to a set of situations." (p. 15).

The Likert scale was developed in 1932 as a means of measuring attitudes and interests. Subjects respond to statements based on individual levels of agreement. A five- or seven-point scale is generally used, with responses ranging from "strongly disagree" to "strongly agree" (Anastasi, 1976).

History of the Food Guide Pyramid and Other Eating Guides

The first attempt to establish a food guide was made by W.O. Atwater, a pioneer in nutrition investigation and early director in the United States Department of Agriculture (USDA) (Welsh, Davis, and Shaw, 1992a). Specific minerals and vitamins had not been identified at that time (1894), but levels for fat, protein, carbohydrates, and total calories were established. The first identifiable food guides were created by Caroline Hunt, a specialist from USDA's Bureau of Home Economics, in 1916. She devised five food groups: milk and meat; cereals; vegetables and fruits; fats and fat foods; and sugars and sugary foods. These groups served as the basis Hunt's books, *Food for Young Children* and *How to Select Foods*.

Hazel Steibeling used 12 food groups in her development in 1933 of a shopping guide for the public: milk; lean meat, poultry, and fish; dry mature beans, peas, and nuts; eggs; flours and cereals; leafy green and yellow vegetables; potatoes and sweet potatoes; other vegetables and fruit; tomatoes and citrus; butter; other fats; and sugars. Steibeling defined a difference between nutrient-dense foods and high-energy foods (Welsh, et al., 1992a). "Protective" foods provide essential nutrients such as calcium (from milk) and vitamins A and C, from fruits and vegetables. Fats and sugars were considered to be high-energy foods.

Food guides became increasingly popular in the early 1940s following the development of the Recommended Dietary Allowances (RDAs) in 1941. The National Nutrition Conference for Defense welcomed the Food and Nutrition Board of the National Academy of Sciences' recommendations for calories and nine important nutrients: protein,

calcium, iron, vitamins A and D, thiamin, riboflavin, niacin, and vitamin C. The need for public education and nutrition education materials addressed at the conference opened the floodgates for many private groups to introduce food guide plans.

The USDA introduced "The Basic Seven" food groups in a leaflet released in 1943 called "National Wartime Nutrition Guide". This pattern was revised and reissued as the "National Food Guide" in 1946, and consisted of green and yellow vegetables; oranges, tomatoes, and grapefruit; potatoes and other vegetables and fruit; milk and milk products; meat, poultry, fish, eggs, and dried peas and beans; bread, flour, and cereals; and butter and fortified margarine. It continued in use until 1956, when food groups were narrowed to include serving recommendations for milk and milk products (2 servings), meat, fish, poultry, eggs, beans and nuts (2), fruits and vegetables (4), and grain products (4).

The "Basic Four" food groups were used for 20 years, until 1977 when the U.S. Senate Select Committee on Nutrition and Human Needs released the *Dietary Goals for the United States*. Specific levels were identified for intakes of fat, carbohydrates, sugars, cholesterol, salt, and protein in an effort to assist the public in balancing intake with nutrient needs. But because the goals were hard to meet with common eating patterns, they were not adopted as a model for food guides and plans.

In 1980, through a joint effort of the USDA and the Department of Health and Human Services (DHHS), the *Dietary Guidelines for Americans* were issued (Welsh, Davis, and Shaw, 1992b). The guidelines have been revised and reissued twice, with the latest version introduced in 1995. The Food Guide Pyramid, introduced on April 28, 1992 by Secretary of Agriculture Edward Madigan, was in turn developed to help individuals use the dietary guidelines most effectively. The pyramid incorporates all issues addressed in the guidelines, including fat and sugar content of food, and balance and variety. With regular updates based on scientific advances, the Food Guide Pyramid is expected to be in use well into the future.

This review of literature demonstrates a need for further research of the nutrition concerns of college students. Determining the problems associated with the successful dissemination of useful information, and overcoming them, will encourage healthier food choices.

CHAPTER III

THE EFFECTS OF NUTRITION EDUCATION ON DECISION-MAKING SKILLS AND FOOD SELECTION IN A UNIVERSITY RESIDENCE HALL

Emily H. Joyce, Christa F. Hanson, Lea Ebro, Carolyn A. Fair, and William Warde

INTRODUCTION

Five of the 10 leading causes of death for adults living in the United States are related to diet and nutrition. Coronary heart disease, diabetes mellitus, coronary artery disease, stroke, and some types of cancer all have been associated with the choices individuals make in the grocery store and at the dining table (1). Because of these statistics, *Healthy People 2000: National Health Promotion and Disease Prevention Objectives* was proposed as a project of the United States Department of Health and Human Services, with the goal of helping Americans reduce their chances of developing chronic diseases or disabilities (2). Modification of lifestyle is endorsed as a way to significantly improve not only present health status, but to ensure a higher quality of life as the population ages.

Formal programs addressing healthy changes in eating behaviors for the general population have been minimally successful (3). Zifferblatt, et. al., state that "Most chronic diseases related to diet, such as atherosclerosis and obesity, develop slowly and painlessly over many years. During this asymptomatic period, when people are least likely to seek medical care, they are firmly establishing the very eating habits that will require change in the future" (3). The need for creative educational tools to influence change in the eating habits of young people is clearly evident.

This study, approved by the Oklahoma State University Institutional Review Board, was designed to measure the effect of classes offering nutrition education and point-of-choice nutrition information on the food selection decisions made by students living in a residence hall on the campus of Oklahoma State University.¹

The purpose of this project was to positively influence the food choices made by students in a residence hall cafeteria. Two types of intervention were utilized to address the problem: nutrition workshops targeting decision-making (individual education), and nutrition information labels and posters in the cafeteria (structural education).

¹ This project was funded by a NACUFS venture fund grant.

The objectives formulated for the study were to:

1. teach decision-making skills to students living and eating in a university residence hall
2. increase student awareness of the relationship between dietary habits and physical health
3. increase student awareness of the nutrient content of food served in the residence hall cafeteria
4. present the Food Guide Pyramid as a tool designed to assist students in choosing appropriate foods in the residence hall cafeteria, and
5. measure food choices being made by students in the residence hall cafeteria during the education period.

METHODOLOGY

Subjects

The subjects of this study were male and female students who voluntarily participated, living in a residence hall on the Oklahoma State University campus in Stillwater, Oklahoma, during the 1995-96 academic year. Two hundred eighty-two volunteers (172 men and 110 women) took the initial Basic Nutrition Pretest, 37 students attended the Nutrition Workshops (30 men and 7 women), and 96 students (64 men and 32 women) took the pre- and post-tests related to the nutrition education component.

Table I
Classification of Students Participating in Study

Classification	General Knowledge Test ^a		Nutrition Workshop ^b		Pre- and Post Test ^c		Post-Tested Only ^d	
	Male	Female	Male	Female	Male	Female	Male	Female
(n)	172	110	30	7	10	1	24	24
Freshman	117	78	18	6	6	1	10	16
Sophomore	31	24	7	0	3	0	8	3
Junior	16	4	3	1	0	0	3	3
Senior	7	3	2	0	1	0	3	1
Graduate	1	1	0	0	0	0	0	1

^a students who completed a General Nutrition Knowledge test

^b students who participated in Nutrition Workshops

^c students who completed pre- and post-tests in conjunction with Nutrition Workshops

^d students who completed post-tests, but were not instructed

For this study:

- Posters announcing the "Pyramid of Choices" program were displayed in the cafeteria throughout the school year.
- Recipe analysis of all entrees was done using the Mastercook II program for MS-DOS and the Mastercook Mac program for Macintosh.
- Table tents containing nutrition information and nutrient content labels were posted in the residence hall dining area.
- A test to evaluate basic nutrition knowledge of the student participants was administered in the Fall , and served to provide information about topics that needed to be covered in the Spring workshops.
- Students attended two one-hour classes during the Spring semester, designed to instruct and empower the students to make informed decisions about their food choices.
- A pre-test and post-test were used to measure and evaluate the behavioral and attitude changes occurring due to exposure to educational materials presented in the nutrition education segment of the program. The pretest was administered at the beginning of the first hour of class, and the posttest was given one month after the last class was given.
- A computer was available in the cafeteria, with diet analysis software, for students to use to evaluate their diets.
- Food consumption patterns were investigated based on kitchen production sheets and cooks' tallies. Servings per student per day were measured for entrees (breakfast, lunch, and dinner), vegetables, breads, and bakery items. Food items were also analyzed to determine the foods most popular as compared to other items on the menu.

General Nutrition Knowledge Test

During the 1995 fall semester, Resident Assistants on each of eleven floors in both Kerr and Drummond (duplex) residence halls were contacted about the study. They were encouraged to inform their respective floor occupants that they would take an active part in a nutrition education project being conducted by Kerr-Drummond Dining Services.

A program called "Wheel of Wellness" has been used for the past several years at Kerr-Drummond, as a way to encourage student residents to think about health matters and actively participate in wellness activities. Every floor in the residence halls is required to complete activities comprising 12 "spokes" in the Wheel of Wellness; "Pyramid of Choices" (the current study) was designed to fit into this pattern of activities.

To evaluate the basic nutrition knowledge level of the students in Kerr and Drummond residence halls, a test was developed by the researchers, based on information contained in table tents, which had been previously displayed in the dining hall. The test consisted of 25 questions, 16 multiple-choice, and nine true-false, covering 10 different topics. Fourteen of 22 floors participated in the testing, with a total of 282 valid tests returned.

Nutrition Workshops

Resident Assistants were contacted at the beginning of the Spring, 1996 semester, to encourage their floor residents to attend 2 one-hour nutrition education workshops that were held Monday through Thursday evenings, at the start of the Spring semester. Of the 22 floors, ten floors signed up and eight attended both the workshops. The classes were developed to educate students about:

- health risks related to diet
- making decisions pertaining to diet, health, and food selection
- what factors should influence their decisions regarding food selection
- the Food Guide Pyramid, serving sizes, and calorie recommendations

The information, consisting of graphic representations of the Food Guide Pyramid, charts depicting the fat content of various popular food items, charts, and cartoons that served to relate food behaviors and misconceptions in a humorous and non-threatening way, was presented using an overhead projector. Students were encouraged to ask questions and voice concerns regarding their diets and how to implement nutrition knowledge about their choices in the cafeteria. Class size ranged from 3 to 11 students, and were made up predominantly of males (see Table I, page 13).

Nutrition Education Pre-test/Post-test

The pretest/posttest instrument consisted of twenty-eight statements related to attitudes and behavior concerning food choices and attendance in the residence hall dining room. Students were asked to rate each statement according to a five-point Likert scale,

with the number 1 signifying "strongly disagree" and 5 signifying "strongly agree". The test was administered at the beginning of the first hour of education, and again, about 3 weeks after completing the last session.

Food Production and Service

A four-cycle menu plan was used, which was developed at the beginning of the Fall, 1995 semester. The recipes for the foods contained on these cycle menus were analyzed by computer, using Mastercook II software (Arion Software, Inc., Austin, TX, 1993) to establish values for fat content, calories, and percent of calories from fat. The results of this analysis led to the replacement of some foods due to high fat content, and the alteration of some recipes to reduce the amount of fat in them. There were also menu items added after the semester began, including ready-prepared (frozen) entrees that were identified as low-fat. Foods ultimately identified as "Pyramid Choices" on the serving line contained no more than 30% of calories from fat, and were labeled with colorful nutrition labels depicting the Food Guide Pyramid. Label information included serving size, calorie count, total fat in grams, total carbohydrates, and total protein (Appendix D). Bakery items, including doughnuts, cakes, cookies, pies, puddings, cobbler, and some breads, were prepared off-site at a central bakery, and delivered daily to the cafeteria. These items were on a six-week cycle menu.

No documentation was available pertaining to the consumption of salad bar items (fresh fruits and vegetables), dairy products (milk and ice cream), or whole fresh fruits (apples, oranges, and bananas), so servings of these food items could not be determined.

A computer, equipped with nutrition software, was available in the cafeteria, that allowed the students to evaluate their diets and make adjustments in their food selections as necessary or desired. For security reasons, it was necessary for students to obtain the computer's mouse from a cafeteria employee before use.

Data were tabulated on an Excel 4.0 (Microsoft, 1985-1992) spreadsheet and analyzed using the Statistical Analysis System 6.0 (SAS Inst., Inc., Cary, NC, 1987). Scores for the Basic Nutrition pretest were computed, comparing scores for males, females, and a combination of both. Chi square analysis was performed on tests taken during the nutrition workshops, comparing student scores for those only pretested, pretested and posttested, and posttested only. Significance level was set at $p < 0.05$. Lists of foods served in the cafeteria over the course of the 1996 spring semester were compiled using kitchen production sheets, and servings per student were computed based on meal ticket tallies.

RESULTS

General Nutrition Knowledge Test

Pre-test results (Table II) show that women answered approximately 57.5% of the questions correctly while men answered 49.6% correctly. Test results showed that 96% of students recognized the Food Guide Pyramid, which was displayed in various areas of the cafeteria, but 56% were unable to apply it to their daily food choices. Subjects had a poor understanding of good sources of nutrients, such as iron and calcium (93.5% and 80% incorrect answers, respectively). The need for iron in various stages of the life cycle was also misunderstood by a majority of respondents (96.5% incorrect answers). Healthful eating patterns were not recognized. For example, seventy-nine percent of students incorrectly identified as 'true' the following statement: "A balanced diet, proper exercise, and no snacking are the keys to healthy weight loss". Food sources of vitamin C were incorrectly identified by 75% of students. Average scores on the pre-test were similar across the range of classifications for men and women, except for the lone female graduate student, who scored 84% correct answers (Table II).

Table II
Average Scores, General Nutrition Knowledge Test by Class and Gender

Classification	n	Male		Female	
		% Correct Answers	n	% Correct Answers	n
Freshman	117	50	78	56	
Sophomore	31	48	24	61	
Junior	16	50	4	58	
Senior	7	53	3	56	
Graduate	1	48	1	84	
Overall	172	49.6	110	57.5	

Nutrition Education Pre-test and Post-test

A 5-point Likert scale was used by subjects to evaluate statements related to

1. attitudes and perceptions about the environment and food choices in the cafeteria and
2. behavior changes related to nutrition knowledge and the Food Guide Pyramid. Students were asked to respond to the pre-test at the start of their first nutrition workshop. The first 14 questions dealt with attitudes and beliefs about the cafeteria environment, and the last 12 statements pertained to lifestyle and health changes students had or had not made over the course of the school year. Two additional questions allowed students to write in comments

pertaining to reasons for choosing to eat in the dining hall and dietary or health changes made. The post-test was given one month after the last workshop was held, and was available to students as they entered or left the cafeteria.

Results showed that subjects were not very concerned about diet-health issues (10% strongly agree), and were not interested in reading about nutrition (79.8% not interested). While 76.8% reported noticing the pyramid tags on foods in the cafeteria, only 16.7% agreed or strongly agreed that they learned about nutrition in the cafeteria. Most students (96%) ate in the cafeteria because they had meal tickets. Fifty-seven percent of students stated they had begun to eat more vegetables, but only 30% cited variety as a reason to choose the cafeteria. Only 11.5% said that they were dieting (Tables III and IV).

Table III
Pre- and Post Test Responses to Questions About Dining Hall Experiences

Questions:	Response:		Strongly disagree		Disagree		Uncertain		Agree		Strongly Agree	
			PRETEST	POSTTEST	PRETEST	POSTTEST	PRETEST	POSTTEST	PRETEST	POSTTEST	PRETEST	POSTTEST
			n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
When I choose to eat in the cafeteria, I do so because:												
I have a meal ticket	1 (2.7%)	0 (0%)	1 (2.7%)	0 (0%)	0 (0%)	0 (0%)	6 (16%)	4 (36%)	29 (78%)	7 (64%)		
I will see my friends there	0 (0%)	2 (18%)	3 (8%)	1 (9%)	4 (11%)	2 (18%)	13 (35%)	4 (36%)	17 (46%)	2 (18%)		
I am in a hurry	3 (8%)	2 (18%)	5 (14%)	2 (18%)	9 (24%)	1 (9%)	13 (35%)	4 (36%)	7 (19%)	2 (18%)		
the weather is bad	8 (22%)	3 (27%)	7 (19%)	4 (36%)	9 (24%)	2 (18%)	7 (19%)	2 (18%)	6 (16%)	0 (0%)		
I have no money	5 (14%)	0 (0%)	5 (14%)	3 (27%)	2 (5%)	2 (18%)	8 (22%)	1 (9%)	17 (46%)	5 (45%)		
I like the variety of foods offered	6 (17%)	1 (9%)	7 (19%)	3 (27%)	10 (28%)	5 (45%)	11 (31%)	2 (18%)	2 (5%)	0 (0%)		
there is a specific food offered that I like	3 (8%)	1 (9%)	9 (24%)	3 (27%)	13 (35%)	3 (27%)	9 (24%)	4 (36%)	3 (8%)	0 (0%)		
I am on a diet	15 (41%)	7 (64%)	11 (30%)	3 (27%)	5 (14%)	0 (0%)	1 (3%)	1 (9%)	5 (14%)	0 (0%)		
I work there	31 (84%)	10 (91%)	4 (11%)	1 (9%)	1 (3%)	0 (0%)	0 (0%)	0 (0%)	1 (3%)	0 (0%)		
I like the atmosphere there	6 (16%)	1 (9%)	6 (16%)	3 (27%)	11 (30%)	5 (45%)	14 (38%)	2 (18%)	0 (0%)	0 (0%)		
I am trying to eat healthy foods	7 (19%)	2 (18%)	7 (19%)	5 (45%)	7 (19%)	2 (18%)	12 (32%)	2 (18%)	4 (11%)	0 (0%)		
I need to develop better food habits	6 (16%)	2 (18%)	5 (14%)	4 (36%)	6 (16%)	2 (18%)	12 (32%)	2 (18%)	8 (22%)	1 (9%)		
I learn about nutrition there	13 (35%)	2 (18%)	11 (30%)	3 (27%)	7 (19%)	2 (18%)	4 (11%)	2 (18%)	2 (5%)	0 (0%)		
I don't worry very much about what I eat	7 (19%)	1 (9%)	10 (28%)	3 (27%)	3 (8%)	3 (27%)	11 (31%)	3 (27%)	5 (14%)	1 (9%)		

Table IV
Pre- and Post Test Responses to Questions About Food Choices and Health Behaviors

Questions:	Response: Strongly disagree		Disagree		Uncertain		Agree		Strongly Agree	
	PRETEST POSTTEST		PRETEST POSTTEST		PRETEST POSTTEST		PRETEST POSTTEST		PRETEST POSTTEST	
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
In the past three months I have:										
increased the amount of low fat milk I drink	13 (35%)	4 (36%)	6 (16%)	2 (18%)	3 (8%)	2 (18%)	6 (16%)	2 (18%)	9 (24%)	1 (9%)
used food labels to make food choices	7 (19%)	4 (36%)	6 (16%)	0 (0%)	7 (19%)	1 (9%)	9 (24%)	5 (45%)	8 (22%)	1 (9%)
noticed "pyramid" tags on food items in the dining hall	2 (5%)	2 (18%)	3 (8%)	0 (0%)	2 (5%)	0 (0%)	16 (43%)	7 (64%)	14 (38%)	2 (18%)
begun to eat more fruit	2 (5%)	1 (9%)	6 (16%)	2 (18%)	9 (24%)	2 (18%)	12 (32%)	3 (27%)	8 (22%)	3 (27%)
begun to eat more vegetables	2 (5%)	0 (0%)	3 (8%)	2 (18%)	9 (24%)	2 (18%)	16 (43%)	5 (45%)	7 (19%)	2 (18%)
chosen lower fat foods	4 (11%)	0 (0%)	11 (30%)	1 (9%)	5 (14%)	1 (9%)	10 (27%)	7 (64%)	7 (19%)	2 (18%)
read a book or article about nutrition	19 (51%)	5 (45%)	11 (30%)	6 (55%)	4 (11%)	0 (0%)	1 (3%)	0 (0%)	2 (5%)	0 (0%)
tried to lose weight	12 (32%)	2 (18%)	5 (14%)	2 (18%)	4 (11%)	3 (27%)	10 (27%)	3 (27%)	6 (16%)	1 (9%)
studied a "table tent" in the dining hall	8 (22%)	3 (27%)	11 (30%)	3 (27%)	4 (11%)	1 (9%)	7 (19%)	4 (36%)	7 (19%)	0 (0%)
started to exercise regularly	6 (16%)	1 (9%)	6 (16%)	3 (27%)	7 (19%)	1 (9%)	9 (24%)	5 (45%)	9 (24%)	1 (9%)
learned about good sources of iron	14 (30%)	3 (27%)	10 (27%)	3 (27%)	8 (22%)	3 (27%)	3 (8%)	2 (18%)	2 (5%)	0 (0%)
found out about my family's health history	15 (41%)	3 (27%)	13 (35%)	5 (45%)	4 (11%)	1 (9%)	4 (11%)	2 (18%)	1 (3%)	0 (0%)

Pre- and post-tests were analyzed using chi-square analysis, comparing pre-test scores, scores of students who were pre-tested and post-tested, and those who answered a post-test but no pre-test. The distribution of these students can be found in Table 1 on page 13. No significant difference was observed, before and after the nutrition workshops, in student response to any of the statements contained in the test instrument. Results of the chi-square analysis are presented in Appendix F.

Additional reasons most cited by students for choosing to eat in the dining hall pertained to convenience. Health changes and dietary adjustments most cited were a decrease in the amount of food consumed and consuming fewer desserts (Appendix G).

Food Production and Service

The production sheets used for this study dated from January 8 to April 26, the entire Spring, 1996 semester. The production supervisor in the cafeteria kitchen maintained production sheets for all entrees and bakery items prepared or ordered daily. The cooks documented numbers of servings prepared and amounts left over after each meal. From this data, servings of cooked or baked foods offered to students were determined. Records were not kept for salad bar ingredients including raw vegetables, dairy products, or fresh whole fruits, thus no analysis could be done on these foods.

Students were counted as they entered the cafeteria, and daily tallies were documented. These tallies were used to calculate servings per student per day of the various food items on the production sheets. An average of 400 students ate breakfast, 461 ate lunch, and 360 ate dinner. No meals were served on Friday evenings, or all day Saturday and Sunday. An average of 7 food items were designated as "Pyramid Choices" daily, and were labeled with nutrition information on the serving line.

To simplify analysis, food items were grouped as follows: Meat (including eggs and broiled, grilled, baked, or non-breaded meats), Fried Meat (fat-added, processed meats, bacon, sausage, chicken-fried steak, fried chicken, fried fish), Cooked Vegetable (baked, mashed, and boiled potatoes, green vegetables, corn, dried beans, all other vegetables), Fried Vegetable (French fries, hash browns, fried okra and mushrooms, tator tots, all other fried vegetables), Fried Other (cheese sticks, fritters, hush puppies, apple sticks), Grain (bread, buns, biscuits, noodles, rice, pancakes, French toast), Combination (all casseroles and one-dish meals, sandwiches, pizza), Other (gravies), and Fried Combination (fried ravioli, egg rolls). These were totaled for the entire day, rather than for each meal, and for each month of the semester.

Analysis showed that consumption of foods varied very little over the course of the semester (Figure 1). Cooked Vegetables accounted for 11.4% of January's intake, 11.9%

for February and March, and 12.5% for April, an insignificant increase of 1.1%. Fried meats and fried vegetables comprised an average of 27% of the total diet, and fried meat consumption increased by 1.9%. Bakery products (doughnuts, cakes, cookies, pies, puddings), not included in Figure 1, contributed an average of 15% of daily intake.

As Figure 2 shows, intakes of all groups increased from January to April, with cooked vegetables showing the greatest increase, .25 servings. None of the measured groups met the recommended servings of the Food Guide Pyramid, but lack of data pertaining to dairy and salad bar ingredients makes commenting on the quality of food intake difficult.

Figure 1: Percent of Total Servings by Food Group

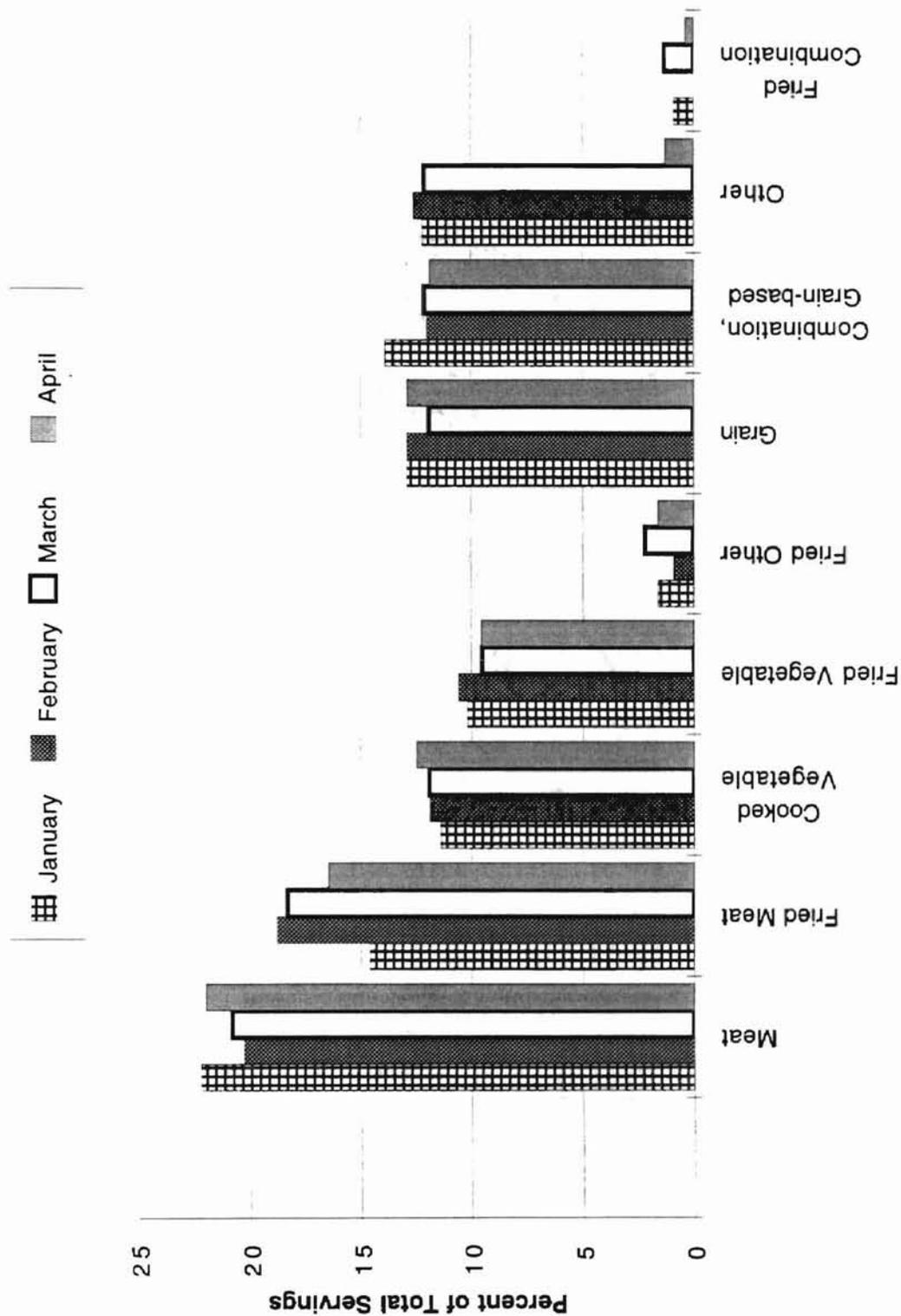
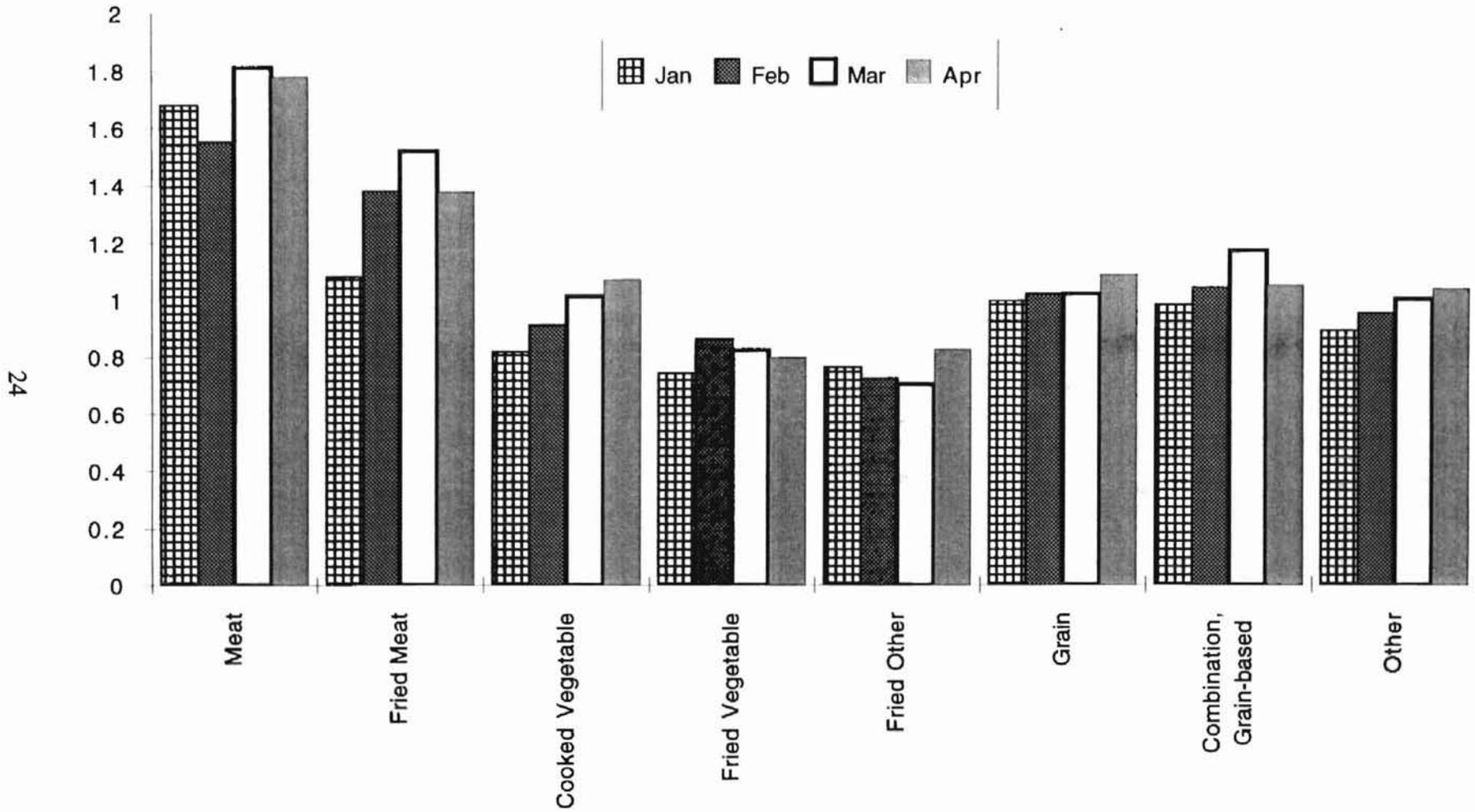


Figure 2: Average Servings Chosen by Students in Cafeteria, by Month



CONCLUSION

Discussion and Implications

Other researchers, including Cotugna and Vickery (4) found a lower (56%) rate of recognition of the Food Guide Pyramid. Their study was done one year after the introduction of the pyramid eating plan, suggesting that subsequent widespread use of the Food Guide Pyramid has increased exposure across the population. The researchers also found that none of the students surveyed who rated their diets as good or excellent, actually ate the minimum recommended servings from each food group (p. 417). This finding supports the data reported in the current study.

Kahn's study of snack habits of college students (5) indicated that the extra calories and nutrients gained by snacking helped students maintain the recommended levels of calcium, iron, vitamin A, and thiamin. This finding, coupled with the current research indicating lack of knowledge of good food sources of specific nutrients, suggests that, if students are consuming food in sufficient amounts and with enough variety, this may serve to substitute for specific knowledge about nutrient content.

Several studies (4, 6, 7) found that students enrolled in a college nutrition course did not fair any better than other students when selecting foods or exhibiting their nutrition knowledge. Cotugna and Vickery (4) asserted that information alone does not guarantee change but merely serves as a basis for making decisions. In the current study, the dissemination and display of nutrition information, both in and outside the dining facilities and in the popular media, has appeared to have little effect on the individual retention of nutrition facts or on behavior.

Cinciripini (8) found an increased consumption of vegetables, fruit, and soup, during the labeling phase of his study of college students, but the effect was reversed in the baseline phase that followed. The researcher indicated that labeling may not be as effective as other methods of behavior manipulation. Food labels also were used by Dubbert, et al. (9), and found to be ineffective. The current study also found no effect of either labeling or nutrition education on the food choices of students in the observed cafeteria. The study was hampered by low participation on the part of the students. Further research that includes a more widely-available schedule of nutrition education classes and interventions, including more attractive incentives as recommended by Cinciripini (8) may show more positive results and would encourage students to make better decisions about the foods they select. More widespread involvement of residence hall and cafeteria personnel also would be helpful.

While students performed only adequately on the General Nutrition Knowledge test (57.5% correct answers for females and 49.6% correct for males), results of this study

demonstrate students' inability, or lack of desire, to apply nutrition knowledge to behavior. The importance of developing healthy behaviors at an early age has been emphasized both in the popular media and by health professionals. The Food Guide Pyramid and Dietary Guidelines are readily available to the public via food packaging and television advertising. Thus there is little excuse for ignoring the health implications of overconsumption of nutrients and lack of exercise.

One of the key areas addressed in our nutrition workshops was the need for students to make food choices based on what is currently known about the relationship between diet and chronic disease. Because many of the symptoms of these diseases do not manifest themselves until later in life, it is difficult to convince people in this age group that they need to make changes now. The well-documented relationship between diet and chronic disease indicates a need to encourage young adults to make eating decisions that will reduce their risk of developing these diseases.

Recommendations include :

1. Incentives to encourage greater student participation.
2. Increased time spent educating students about the positive effects of a healthy diet.
3. Presence in the cafeteria of a qualified nutrition educator to encourage the students to select a healthier diet.
4. Positioning of education tools in the cafeteria to maximize student interest and usage.
5. More bold visual materials in the cafeteria that relate food choices to specific nutrients.
6. Nutrition training for foodservice personnel, to equip them with the information necessary to encourage students in their food selections.

Students participating in this study were exposed to educational materials that illustrated the need for dietary moderation and variety as keys to health and longevity. Nutrition information was readily available at all stages of the study and in all areas of the residence halls. That there was no difference in test responses between the students who attended the nutrition workshops and those who did not, indicates the lack of concern students appear to have regarding health and nutrition.

Because students, especially first-year attendees, spend so much time in the residence hall and dining hall during their university stay, it is important that those in positions of responsibility be aware of the nutrition needs and concerns of the students they serve. Results show that students are not inclined to read nutrition material such as books and articles (79.8% not interested). Although 76.8% of respondents reported awareness of

nutrition labels on foods in the dining hall, only 16.7% agreed or strongly agreed that they learn about nutrition in the dining hall. It is important that those responsible for preparing and serving food in the cafeteria be well-informed about current nutrition information, and that they are able to communicate that information to their customers.

The current research demonstrates a need for nutrition education materials with a strong visual, rather than textual, component that relates food choices to specific nutrient needs in an easily understandable way. One of the comments heard most often from the students involved in the study was that there was not enough time available to study table tents or nutrition labels. A strong component of the program was the impact of the colorful pyramid labels as compared to the labels used on other foods. These easily-identified labels should have made food selection more simple; however, additional aids might be to enlarge the food labels and identify the "Pyramid Choices" on the daily menu at the cafeteria entrance. The availability of a computer diet analysis program on site was expected to be an important part of the program, but low usage was due to lack of time, cited by students. Also, location and visibility of the computer in the cafeteria had a negative impact on its value to the students, coupled with the fact that students were required to obtain the mouse from cafeteria personnel in order to use the program. If students are to be encouraged to use educational tools like computers, then those tools must be easily accessible and ready to use.

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CHAPTER IV
STUDENT RESPONSES TO NUTRITION QUESTIONS AND PREVALENCE OF
MISINFORMATION

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Because 5 of the 10 leading causes of death in the United States can be related to diet and nutrition, modification of lifestyle has been endorsed as a way to improve present health status and ensure a higher quality of life as the population ages (1). However, a key to change is knowledge, and an effort must be made to offer nutrition information that the public understands and can use. According to the latest National Health and Nutrition Examination Survey (NHANES III, 1988-1994) (2,3), one-third of all American adults are overweight. This is an increase of eight percent over the previous survey, NHANES II, conducted from 1976-1980 (4).

As the focus of nutrition messages is to decrease fat intake, increase fruit and vegetable intake, and increase exercise, the fact that the incidence of obesity is increasing leads one to assume that, in spite of broad dissemination, nutrition information is falling on a disinterested public. Several studies (5-7) have investigated the problem of nutrition misinformation as a hindrance to change. Chery, Sabry, and Woolcott (5) reported that misconceptions about food can prevent individuals from seeking correct information. While information about food nutrients and their contributions to physical health are widely available, considerable misinformation also is available and it is difficult for the individual to sort out fact from fiction.

Methods

The subjects for this study were male and female volunteer students living in two residence halls on the Oklahoma State University campus during the 1995 Fall semester. Two hundred eighty-two volunteers (110 women and 172 men) participated (about 28% of the student population of the hall). There were no nutrition majors in the group, which was comprised mainly of freshmen (69%). Fourteen of 22 floors participated, but not all students on each floor took part in the study, as attendance at floor meetings was voluntary.

The survey was undertaken as part of a program called "Pyramid of Choices". This program grew out of an existing program called "Wheel of Wellness". All students residing in the residence halls used in this study are required to participate over the course of the school year in various events and meetings pertaining to health and wellness. Designated student volunteers are responsible for sponsoring and organizing 12 events,

comprising 12 "spokes" on the wheel. As a requisite "Wheel of Wellness" activity, the "Pyramid of Choices" program was designed to educate students about basic nutrition concepts and the relationship between diet and disease.

The "Pyramid of Choices" questionnaire served to establish a guideline about the nutrition knowledge of young adult students. The goal was to use it to identify misconceptions individuals may have about their food choices and nutrition habits. It consisted of 25 multiple-choice and true-false questions that covered topics ranging from the Food Guide Pyramid to eating disorders.

Results and Discussion

Responses to the general nutrition knowledge test are listed in Table V. Men and women achieved equivalent scores on the questionnaire, with men answering an average of 12 of the 25 questions correctly, and women responding correctly on about 15 questions. The greatest difficulty was with questions with multiple answers, with many students having difficulty choosing the correct responses. The highest percentage of correct responses from men and women were for questions dealing with the cause and identification of eating disorders, identification of the Food Guide Pyramid, the advisability of skipping breakfast after a large evening meal, and whether or not to eat before a holiday celebration. Those questions answered incorrectly most often pertained to need for and sources of iron, identification of simple carbohydrates, food sources of calcium, ways to avoid overeating at holiday celebrations, and keys to healthy weight loss.

All of the women and 94% of the men correctly identified as false the statements "To compensate for a large meal, you should skip breakfast", and "you should never eat before a holiday party" (95% of women and 92% of men), but only 17% of the men and 40% of the women identified planning ahead and using a small plate as ways to avoid overeating at holiday parties. This indicates that the subjects know that overeating can be a problem, but they do not know how to avoid it. The Food Guide Pyramid was widely familiar, with 99% of women and 93% of men correctly calling it a guide to good eating. The fewest correct responses were given to questions about dietary iron. Only 25% of men and women recognized red meat and spinach as good sources, and only 3% of men and 6% of women knew that raisins are also good food sources of iron. Food sources of calcium were also misidentified, with 19% of men and 20% of women choosing ice cream and salmon. There also seems to be a misunderstanding about simple carbohydrates, with only 11% of women and 19% of men correctly identifying food sources. Although the Food Guide Pyramid is widely visible, it is not being applied to food selection in an effective way by a large number of students.

Eating disorders seem to be well understood by most of the students, with 99% of women and 94% of men aware that appearance is not the only indicator of disordered eating. Also, 95% of women and 85% of men were aware that body image alone does not determine a person's susceptibility to eating disorders. Responses to these questions would indicate a greater awareness of the psychological dynamics of food choice when compared to student understanding of nutrient intake and physical needs

Table V
Student Responses to General Nutrition Knowledge Test

Question	Response ^a	% of Females (n=110)	% of Males (n=172)	Multiple Correct Answers ^b
Fat calories should make up _____% or less of the total calories in one's diet	a—5%	15%	20%	
	b—15%	47	47	
	c—30%	36	27	
	d—45%	0	5	
	0—no response	2	2	
To avoid overeating at holiday celebrations, you should (Choose all that apply):	a— <u>plan ahead</u>	35	45	a & d correct, 40% (F) 17% (M)#
	b—drink alcoholic beverages instead of eating	0	10	
	c—sit near the buffet	0	3	
	d— <u>use a small plate</u>	25	23	
	0—no response	1	0.6	
To lose weight safely, lose _____ pounds per week.	a— <u>1/2-2</u>	85	68	
	b—2-5	15	28	
	c—3-6	0	3	
	0—no response	0	0.6	
Simple carbohydrates are found in such foods as:	a—rice, potato, bread, corn	86	72	
	b— <u>fruits, candy, soft drinks</u>	11#	19#	
	c—meats, beans, eggs	2	10	
	0—no response	1	0	
Which of these foods are sources of calcium? (Choose all that apply)	a— <u>ice cream</u>	59	60	a & c correct, 20% (F)# 19% (M)#
	b—soft drinks	0	3	
	c— <u>salmon</u>	4	6	
	d—red meats	3	2	
	0—no response	1	0.6	

How much calcium should be taken in daily by people aged 18-24?	a—1500 milligrams	25	23	
	<u>b—1200 milligrams</u>	34	32	
	c—30 milligrams	5	10	
	d—700 to 800 milligrams	32	35	
	0—no response	4	0	
Which is often referred to as "good" cholesterol?	<u>a—HDL</u>	58	37	
	b—LDL	36	52	
	c—VLDL	5	10	
	0—no response	1	0.6	
What is the Food Guide Pyramid?	a—a recipe	0	0.6	
	<u>b—a guide to good eating</u>	99*	93*	
	c—a weight loss diet	0	0	
	d—a mandatory eating pattern	1	11	
	0—no response	0	0	
What is the minimum number of servings of dairy products recommended for adults?	a—1	2	5	
	<u>b—2</u>	57	38	
	c—4	39	49	
	d—6	1	9	
	0—no response	1	0	
Which Pyramid food group should be the foundation of your diet?	a—meat and protein	16	38	
	b—fats, oils, and sweets	0	2	
	c—milk and dairy	7	3	
	<u>d—breads and cereals</u>	76	56	
	0—no response	0	0	
How many servings from the meat group should be consumed daily?	a—3-4	5	9	
	<u>b—2-3</u>	64	58	
	c—less than 2	30	23	
	d—3-5	1	10	
	0—no response	0	1	
Iron needs increase during:	<u>a—pregnancy</u>	15	17	a, c, & d correct,
	b—menopause	14	15	4% (F)#
	<u>c—adolescence</u>	15	26	3% (M)#
	<u>d—infancy</u>	1	5	
	0—no response	0	0.6	
If you are consuming less than _____ calories daily, you are most likely not getting adequate nutrient intake.	a—900	40	31	
	<u>b—1200</u>	40	30	
	c—2000	18	35	
	d—2750	1	3	
	0—no response	1	0.6	
Which of these foods can be consumed to increase levels of vitamin C?	<u>a—broccoli</u>	0	0.6	a & b correct, 25%
	<u>b—citrus fruits</u>	65	74	
	c—pasta	0	0.6	
	d—none of the above	1	2	
	0—no response	0	1	

Which of these foods can be consumed to increase levels of iron?	<u>a—spinach</u>	23	28	a,b. & c correct, 8% (F)# 5% (M)#
	<u>b—raisins</u>	6	3	
	<u>c—red meat</u>	20	22	
	d—none of the above	5	12	
	0—no response	1	0.6	
All of the following desserts except _____ provide a lowfat alternative to high fat desserts.	a—frozen yogurt	3	5	
	<u>b—vanilla ice cream</u>	75	62	
	c—fresh fruit	6	12	
	d—sherbet	7	10	
	0—no response	0	0	
To compensate for a large meal, you should skip breakfast the next day.	T	0	6	
	<u>F</u>	100*	94*	
Eating plenty of fruits and vegetables will relieve symptoms of stress	<u>T</u>	84	78	
	F	16	22	
It is easy to identify a person with an eating disorder because he/she appears skinny	T	1	6	
	<u>F</u>	99*	94*	
Food/calorie consumption is the only consideration one needs to be aware of when deciding to lose weight	T	6	15	
	<u>F</u>	94	85	
A balanced diet, proper exercise, and no snacking are the keys to healthy weight loss	T	72	83	
	<u>F</u>	28#	16#	
You should never eat before a holiday party	T	5	8	
	<u>F</u>	95*	92*	
Stress can play a positive role in our lives	<u>T</u>	46	58	
	F	52	42	
Everyone should take supplements to ensure adequate intake	T	41	42	
	<u>F</u>	59	57	
Concern with one's body image is the only cause of eating disorders	T	5	15	
	<u>F</u>	95*	85*	

^a correct response(s) is/are underlined.

^b some questions have multiple answers. The answer given here is the correct combination of responses

* five highest scores for men and women

five lowest scores for women and men

Application

With the abundance of nutrition information potentially available to the public, it is important that accessibility to the information be increased to young adults who are developing health and food habits that will affect them for the rest of their lives. Questionnaire results show a need for more widespread application of the nutrition education resources available. While the public is exposed to countless nutrition theories and opinions, they may not be given information in a way that makes application feasible or desirable. Future research needs to focus on developing strategies that will encourage students to apply the information they accumulate to their lifestyle and food selections.

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CHAPTER V

CONCLUSION, RECOMMENDATIONS, AND IMPLICATIONS

The purpose of this study was to measure the effects of nutrition education and nutrition labeling on the food choices made by students in a residence hall cafeteria, based on a grant from the National Association of College and University Food Service (NACUFS). The study was conducted during the fall and spring semesters of the 1995-96 academic year, and included male and female students who voluntarily participated in a program called "Pyramid of Choices".

Two hundred eighty-two students participated in the initial Basic Nutrition Pretest, with 37 students attending the nutrition workshops, and 96 students responding to pre- and post-testing.

Student attitudes about the cafeteria setting and about food and nutrition were measured using a five-point Likert scale. These attitudes were measured before and after two 1-hour nutrition education workshops developed to encourage students to make more informed decisions about their food selections. Food consumption patterns over the four months of the spring semester were examined based on production sheets and ticket counts. Nutrition labels incorporating Food Guide Pyramid recommendations were used to identify "Pyramid Choices" on the serving line. A computer equipped with diet analysis software was available in the cafeteria for students to use to analyze their food intake.

Results of the study indicated that students did not exhibit change in attitude or food selection patterns over the semester. Computer use was low, based on observation, and student voluntary participation was only 28% of students living in the residence complex studied.

CONCLUSIONS

The well-documented relationship between diet and chronic disease indicates a need to encourage young adults to establish eating patterns that will reduce their risk of developing these diseases.

Hypothesis 1 stated that there would no significant change in food choices made by students in a residence hall cafeteria after vs. before the education program. No difference in food selection was observed (Figure 2), with cooked vegetable intake increasing insignificantly by only 1.1%; therefore, the authors failed to reject hypothesis 1.

Hypothesis 2 stated that there would be no significant difference in the reasons students gave for choosing to eat in the cafeteria after vs. before the education program.

Chi square analysis of pre- and posttests showed no difference; therefore, the author failed to reject hypothesis 2.

Hypothesis 3 stated that there would be no significant difference in eating patterns and behaviors of students eating in a residence hall cafeteria after vs. before the education program. Analysis of production sheets and student servings indicated no change in patterns before and after intervention; therefore, the author failed to reject hypothesis 3.

RECOMMENDATIONS AND IMPLICATIONS

One of the key areas addressed in our nutrition workshops was the need for students to make food choices based on what is currently known about the relationship between diet and chronic disease. Because many of the symptoms of these diseases do not manifest themselves until later in life, it is difficult to convince people in this age group that they need to make changes now. Hochbaum (1981) recognized that individuals will act on what they know, only when they are ready to change. Further research is needed to address the concept of transforming knowledge into behavior.

Recommendations include:

- Incentives to encourage greater student participation.
Students perform more effectively when they are given rewards for that performance (Cinciripini, 1984). If the goal is to increase student awareness of the relationship between diet and health, and thereby reduce risk of chronic disease, there may be a need to provide incentives to increase participation in nutrition education programs targeting the university student population.
- Increased time spent educating students about the positive effects of a healthy diet.

The residence hall dining area appears to be an ideal place to disseminate nutrition information because of the high participation rate of students. It is apparent that instruction is essential to the successful application of nutrition information, possibly the availability of more or longer classes such as the one included in this study could greatly improve health behaviors of university students.

- Presence in the cafeteria of a qualified nutrition educator to encourage the students to select a healthier diet.

Students, especially those who are away from home for the first time, are bewildered by the many choices available to them, including foods served in the

dining hall. While their parents may or may not have provided nutritious meals for them in the past, there may be a strong tendency to ignore health issues once the students arrive on campus. A nutrition expert on staff in the dining hall could provide the authority and advice necessary to encourage students to remember what they have learned about healthy eating, and apply that knowledge to their food choices in the dining hall.

- Positioning of education tools in the cafeteria to maximize student interest and usage.

The availability of a computerized diet analysis program in the cafeteria could have been a strong part of this study, especially if the computer had held a more prominent place in the dining hall. Student usage may have increased if the computer was more visible, and if that qualified professional mentioned previously had been available to aid students in the use of the program.

- More bold visual materials in the cafeteria that relate food choices to specific nutrients.

Because students participating in the study expressed lack of desire to read nutrition education materials, it is important that the nutrition messages used to impact student behavior be bold and have visual appeal. There is a great deal of nutrition education material available to the public, some of which is very eye catching. Visual demonstrations of fat or sugar content in foods or posters depicting the relationship between food intake and physical appearance can make a strong impression on college students who are concerned with appearance and performance. These kinds of materials are needed to convey the nutrition messages that will affect the public in a positive way.

- Nutrition training for foodservice personnel, to equip them with the information necessary to encourage students in their food selections.

The importance of studies such as this one, that can positively influence health outcomes for large numbers of people, must be conveyed to all involved personnel, from administrators down to the dishwasher. When employees feel empowered to participate in nutrition programs, they will not only influence the students, but may also use the information to change their own behaviors.

Also, the reinforcement of nutrition messages by all employees will encourage students to make good decisions about their food choices and health behaviors.

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APPENDICES

APPENDIX A

APPROVAL FORM FOR OKLAHOMA STATE UNIVERSITY INSTITUTIONAL
REVIEW BOARD FOR HUMAN SUBJECT RESEARCH

OKLAHOMA STATE UNIVERSITY
INSTITUTIONAL REVIEW BOARD
HUMAN SUBJECTS REVIEW

Date: 10-17-95

IRB#: HE-96-014

Proposal Title: THE EFFECT OF NUTRITION EDUCATION ON THE DECISION-
MAKING SKILLS OF STUDENTS EATING IN A UNIVERSITY RESIDENCE HALL

Principal Investigator(s): Christa F. Hanson, Carolyn Fair, Emily H. Joyce

Reviewed and Processed as: Exempt

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:



Chair of Institutional Review Board

Date: October 27, 1995

APPENDIX B
TABLE TENTS

FEATURED**Baked Pork Chops**

These spicy and moist pork chops are made with egg whites, evaporated skim milk and a lively herb mixture that contains no salt or added fat.

FACTS

Per Serving (serving size = 1)
Calories: 186

	Total Fat	5g
	Cholesterol	31mg
	Sodium	393mg

**Pyramid of Choice****Kerr-Drummond
Dining Services**

This innovative program is designed for the students at Kerr-Drummond and funded by a grant from the National Association of College and University Food Services. Nutritional information both in living group meetings and in dining services will enable students to make better decisions about eating healthier.

**EAT RIGHT, ENJOY FOOD AND
FEEL BETTER!**

**health
check****Facts about Fats
and Heart Disease****IQ TEST**

Answer each question true or false.

1. Our food consumption affects our health.
2. The recommended percentage fat intake is 30 percent or more.
3. Low-fat intake decreases risks of heart attack and stroke.

ANSWERS: 1. true 2. false 3. true

MENU FEATURED

Red Hot Fuscilli

This spicy fuscilli pasta dish is made with several cheeses, a homemade tomato marinara sauce and chicken. When the KD students tested this recipe they loved it!

NUTRITIONAL FACTS

Per Serving (serving size = 1)

Calories: 412.2

69	Total Fat:	12.8g
68	Carbohydrates	50.0g
68	Protein	25.0g



Pyramid of Choice

Heart-Healthy Eating Plan

To figure out the calories you need, you first need to know your Ideal Body Weight.

FEMALES: 100# for the first 5 feet;
5# for each inch over 5 feet (+/- 10%)

MALES: 106# for the first 5 feet;
6# for each inch over 5 feet (+/- 10%)

Caloric need per day is:
IBW x 10 Basal Metabolic Rate (BMR)
IBW x 12 BMR + sedentary lifestyle
IBW x 15 BMR + moderate exercise



health check

Calculating Caloric Intake

IQ TEST

Answer each question.

If a woman is 5'2" tall, what would be her:

1. Ideal Body Weight;
2. Basal Metabolic Rate (BMR);
3. caloric needs with a sedentary lifestyle; and
4. caloric needs with a lifestyle of moderate exercise?

ANSWERS: 1. IBW=99-121 2. BMR=990-1210
3. sedentary=1199-1452 4. moderate=1485-1815

MENU FEATURED

Chicken Creole on Rice

This dish is a spicy vegetable creole sauce with strips of chicken simmered over rice. Reminiscent of the Byou, this dish brings a little Cajun into Oklahoma.

NUTRITION FACTS

Per Serving (serving size = 1)
Calories: 332.8

 Total Fat:	10.6g
 Carbohydrates	35.7g
 Protein	22.5g



Pyramid of Choice

Heart-Healthy Eating Plan

The heart-healthy eating plan is a way of eating in which the individual chooses foods lower in fat. You can help yourself to live longer and healthier if you choose foods such as fruits, vegetables and whole grains. These foods are naturally high in fiber and starch and low in total fat.

Kerr-Drummond Dining Services is a partner with the National Heart, Lung and Blood Institute in presenting this program to our students.



health check

Facts about Cholesterol

IQ TEST

Answer each question true or false.

1. Foods high in starch and fiber are good sources of vitamins and minerals.
2. A diet high in starch and fiber may help to lower blood cholesterol.
3. Dietary cholesterol is found in foods from both animals and plants.
4. Women don't have to worry about blood cholesterol and heart disease.

ANSWERS: 1. true 2. true 3. false 4. false

MENU FEATURED

Mediterranean Baked Fish

This recipe smothers cod fillets with olive oil, tomatoes, peppers, onions and bread crumbs. Enjoy a taste of the sun-drenched isles of Greece tonight.

NEUTRITION FACTS

Per Serving (serving size = 1)
Calories: 204.1

	Total Fat:	3.7g
	Carbohydrates	12.4g
	Protein	22.2g



Pyramid of Choice

Kerr-Drummond Dining Services

This innovative program is designed for the students at Kerr-Drummond and funded by a grant from the National Association of College and University Food Services. Nutritional information both in living group meetings and in dining services will enable students to make better decisions about eating healthier.
**EAT RIGHT, ENJOY FOOD AND
FEEL BETTER!**



health check

Dietary Guidelines

A healthy eating plan consists of a number of good foods low in fat, sugar and sodium. The United States Dietary Guidelines are:

30% Fat
58% Carbohydrates
12% Protein

By consuming a variety of foods consistent with the above, you are likely to meet your nutritional needs and decrease the likelihood of chronic disease.

MINIATURED **BBQ Chicken on a Bun**

This sandwich is served warm and features cubed chicken smothered in western style BBQ sauce on a soft sesame seed bun.

NUTRITION FACTS

Per Serving (serving size = 1)
Calories: 259.3

 Total Fat:	5.0g
 Carbohydrates	35.9g
 Protein	16.3g



Pyramid of Choice **Heart-Healthy Eating Plan**

We are beginning to have the seminars on making healthy choices through use of the Pyramid of Choice. Please look on your elevator landing for the day, time and place for the seminar. We appreciate the time you are taking to learn about making healthy decisions. You are important to us because you are special and because you are part of a nationally funded grant program to help university dining services present a painless way toward healthy eating.



Facts about High Blood Pressure

IQ TEST

Answer each question true or false.

1. Young adults don't get high blood pressure.
2. High blood pressure has no symptoms.
3. Drinking alcohol lowers blood pressure.
4. Tests and papers don't cause high blood pressure.

ANSWERS: 1. false 2. true 3. false 4. true

MENU FEATURED
Yosemite Chicken Stew
with Dumplings

A dynamite stew with cubed young chickens and fresh vegetables and seasoned by Yosemite Sam to perfection. Dumplings add the final touch to this round-up favorite.

NUTRITION FACTS

Per Serving (serving size = 1)

Calories: 307

 Total Fat:	5.0g
 Carbohydrates	51.6g
 Protein	26.6g



Pyramid of Choice

Now that you have learned about the Pyramid of Choices, are you making better nutritional decisions so you are able to feed your body as well as your mind? If you have any questions about the program please do not hesitate to call Carolyn Fair at 744-5306. Your comments about the program and its positive effects on you are always welcome, as are those comments which will help the program to improve. There are also response cards in the dining room. Please let us know what you think of the program being a part of the regular cycle menu.



**health
check**

**Dairy Products
and Meat and Protein**

Choose these more often:

nonfat milk, nonfat yogurt, ice milk (soft serve); lowfat cottage cheese, dried beans and lentils, cod, sole, tuna packed in water, bass, chicken and turkey, and top round steak

Choose these less often:

ice cream, whole milk, butter, sour cream, cheeses, pastrami, nuts, seeds, spareribs, bacon, cold cuts, hot dogs, sausage, corned beef and ham

UNUSUALLY***Sutton Special***

Envision a 4 ounce boneless chicken breast with Sonoma Seasoning grilled over a mesquite fire and lovingly placed on a whole wheat bun. Top it with no-fat mayonnaise, lettuce and tomato. What a winner!

NUMEROUS FACTS

Per Serving (serving size = 1)

Calories: 269.2

 Total Fat:	4.0g
 Carbohydrates	26.9g
 Protein	30.8g

**Pyramid of Choice*****Heart-Healthy Eating Test***

Did you know that of the students who took the nutritional pretest there were 182 males and only 110 females?

Only one question was answered correctly by 100 percent of the students, and this was by females.

At least 90 percent of all students answered 4 questions correctly.

Men scored better than women on only 2 questions.

**health
check****Breads
and their Fats**

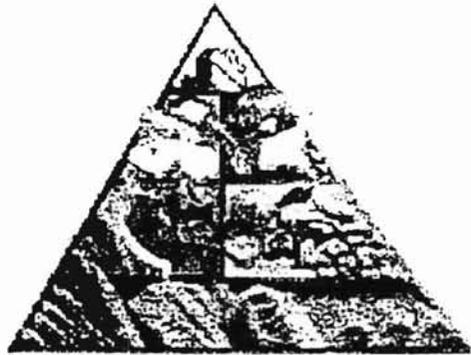
Choose these more often:

bagels, rice, pasta, corn, rye and wheat breads, air popped corn, grits, most breakfast cereals, oatmeal, flour tortillas, cornbread and plain crackers

Choose these less often:

biscuits, muffins, granola cereals and bars, pancakes, snack crackers, chips, croissants, danishes, donuts and butter crackers

APPENDIX C
FLYERS



Pyramid of Choices

Find the power in the Pyramid of Choices through nutritional decision making. Learn how to make sound nutritional choices for a healthier lifestyle.

Pyramid of Choices will enable you to balance your food intake with your lifestyle, your food preference with the nutritional needs of you body, and your calorie intake with your metabolic and exercise level.

Tap the Power of the Pyramid today!

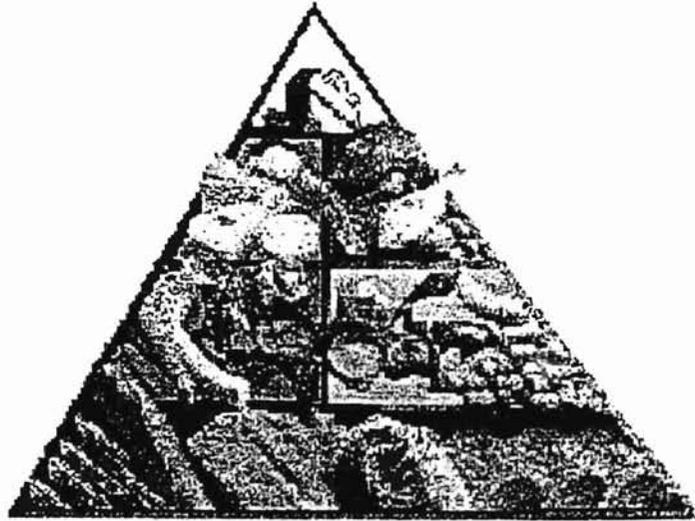
Meet with Emily Joice on your floors to find out how to tap the power of the pyramid.

FLOOR:

DATE:

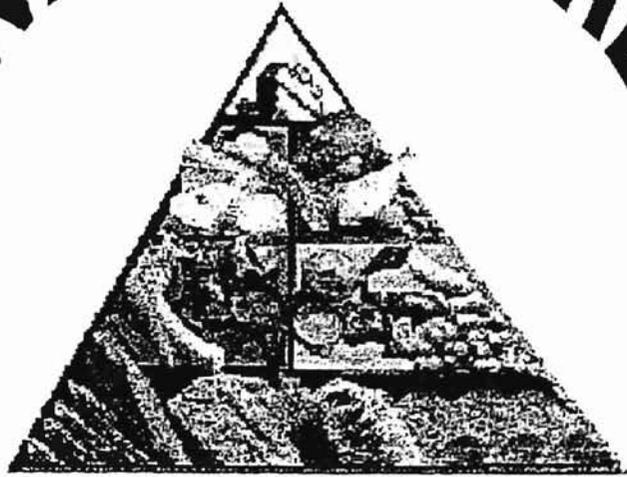
TIME:

UNIVERSITY OF CALIFORNIA



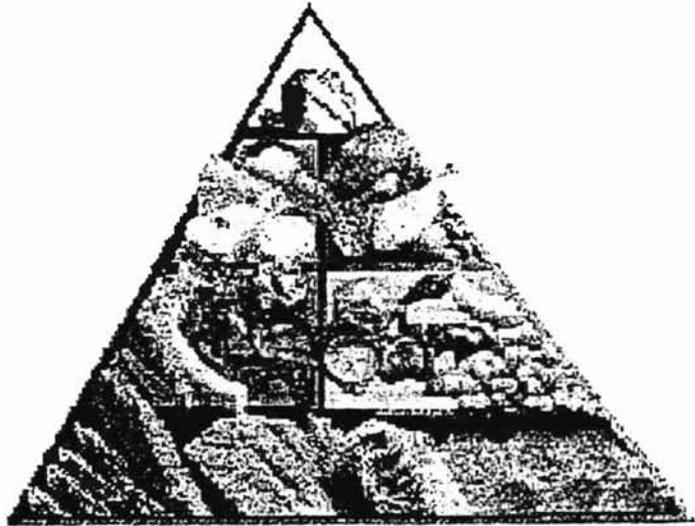
Pyramid of Choices
IS
COMING TO
KERR-DRUMMOND
SOON

WATCH FOR THE



Pyramid of Choices

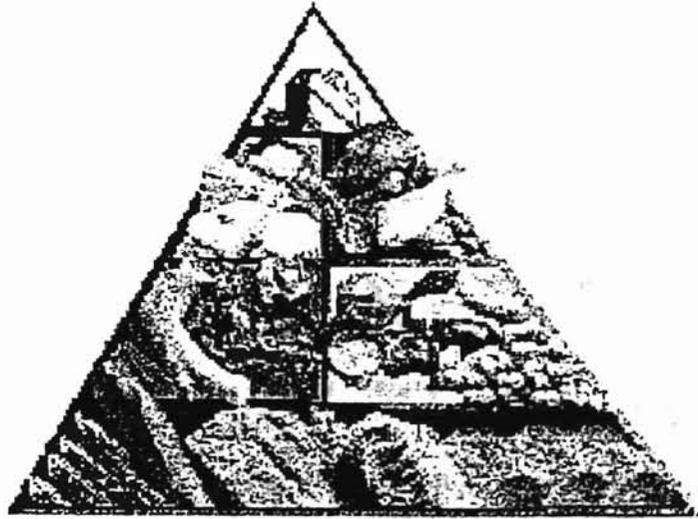
**IT CAN HELP YOU
MAKE BETTER
FOOD CHOICES**



Pyramid of Choices

*The nutritionally
sound approach
to eating . . .*

MAKE THE CHOICE TO PARTICIPATE



Pyramid of Choices

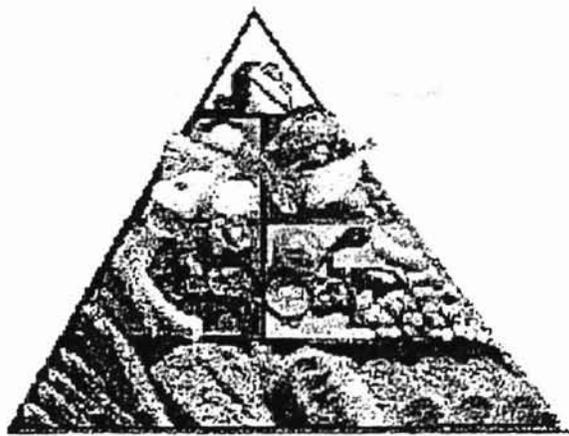
*a partner with
the Heart-Healthy
Eating Plan*

LIVE LONGER BY EATING RIGHT

FROM THE NATIONAL HEART, LUNG, AND BLOOD INSTITUTE

DECISIONS ? DECISIONS

**WONDERING WHAT
TO EAT TODAY?
HUNT FOR THE**

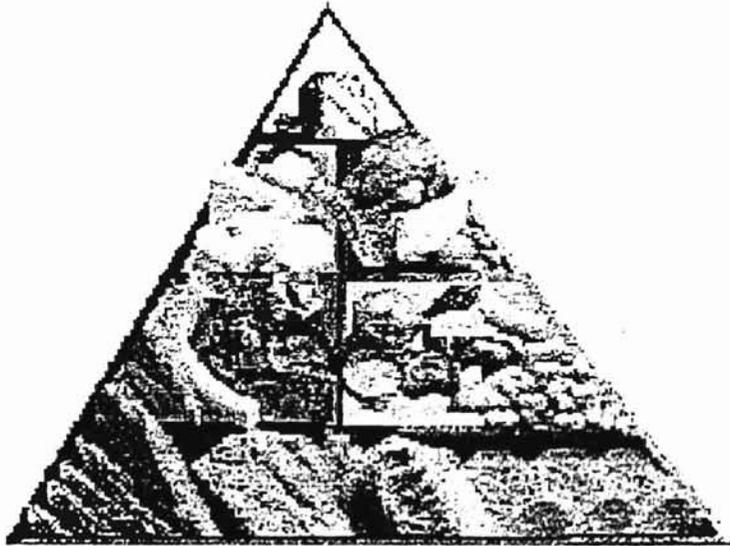


Pyramid of Choices

IT COULD BE ANYWHERE

© 1997 A T E N P U B L I S H I N G

**HAVE
YOU HAD YOUR**



Pyramid of Choices

TODAY!

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APPENDIX D
FOOD LABELS

APPENDIX D FOOD LABELS

Pyramid of Choices



Menu Item:
Serving Size:
Calorie Count:
Total Fat:
Total Carbohydrates:
Total Protein:

Pyramid of Choices



Menu Item:
Serving Size:
Calorie Count:
Total Fat:
Total Carbohydrates:
Total Protein:

Pyramid of Choices



Menu Item:
Serving Size:
Calorie Count:
Total Fat:
Total Carbohydrates:
Total Protein:

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APPENDIX E
LESSON PLAN FOR EDUCATION COMPONENT

MAJORITY BOARD CASE 1 2005/06

Nutrition Decisions Lesson Plan-Session One

- I. Introduction
 - A. Personal
 - B. About the study "Pyramid of Choices"
 1. purpose of study
 2. results of previous tests
 - a. conclusions to be drawn
 - C. Administration of pretest
- II. Decision-making
 - A. Basic definitions (overhead #1)
 - B. Reasons for deciding to change the way we eat
 1. family history (overhead #2)
 - a. most of us make food choices out of habit, or because that's the way we ate as a family
 - b. how many students eat the way their parents did at home?
 2. risk factors
 - a. sex, age, ethnicity, etc.
 3. chronic diseases related to diet.
 - a. 5 of 10 major causes of death in US are diet-related
 - b. how many students have relatives with any of these diseases? (Type II DM, CHD, colon cancer, osteoporosis, HTN, etc.)
 4. medical research
 - a. most of us don't make changes unless we have to, and even then, we resist and often fail. What are good reasons?
 - b. talk about constructing a medical family tree
 - c. health care costs, changes in delivery of health care, availability of money
- III. Food Guide Pyramid
 - A. What it is (overhead #3)
 - B. Why we use it (overhead #4, 5)
 - C. How it works
 1. talk about different calorie levels (overhead #6, 7, 8) and how to incorporate the pyramid into daily life.
 - a. 1600 cal, 53 g fat, 6 tsp. sugar
 - 2200 cal, 73 g fat, 12 tsp. sugar

- 2800 cal, 93 g fat, 18 tsp. sugar
2. what are student feelings about pyramid recommendation?
 - a. is it realistic for students to eat according to pyramid?

ASK FOR QUESTIONS
END OF SESSION ONE

Nutrition Decisions- Session Two

- I. Specific nutrients related to the FGP
 - A. Fat
 1. Dietary Goals-30% of calories from fat
 2. Fat related to overweight related to chronic disease
 3. Overheads related to fat-explain these
 - B. Carbohydrates
 1. Complex vs. simple CHO
 2. Need
 3. Dietary Goals-48% complex, 10% simple
 - C. Protein
 1. Need
 2. Goal-10-12%
 - D. Iron
 1. Purpose in body
 - a. component of hemoglobin which carries oxygen in the cells or myoglobin, which carries oxygen in muscle. Only about 10% is absorbed.
 - b. iron losses are greatest when blood is lost (ie., menstruation)
 - c. if iron stores are depleted, the body can't make enough hemoglobin for RBC. (Under a microscope, these depleted cells are lighter in color and are smaller.) The undersized cells cannot carry enough oxygen from the lungs to the rest of the body, so energy release in the cells is lessened. The results are fatigue, weakness, headache, and apathy.

d. dangers of supplementation w/out doctor's order: masking of more serious condition.

2. Good food sources, ways to increase absorption (overhead #14)

- a. vit. C foods tend to increase 2-3X
- b. coffee and tea interfere with absorption
- c. red meats, plus fish and poultry
- d. dried peas and beans, legumes
- e. fortified breads and cereals
- f. dried fruits (raisins, prunes, apricots)
- g. dark green, leafy vegetables

E. Calcium

1. needs/sources

IV. Pyramid of Choices

A. How it works in the cafeteria

1. tags, table tents

B. How it works over time

C. How to calculate % of calories from fat

1. $\text{g of fat in food} \times 9 \text{ calories/g of fat} = \text{calories from fat}$

$\text{fat calories} / \text{total calories} = \% \text{ of calories from fat}$

ASK FOR QUESTIONS
END OF SESSION TWO

APPENDIX F
RESULTS OF CHI SQUARE ANALYSIS

TABLE OF CODE BY REAS1

CODE	REAS1					Total
Frequency	1	2	3	4	5	
Expected						
Cell Chi-Square						
Percent						
Row Pct						
Col Pct						
PRE	1	1	0	6	29	37
	0.7708	0.7708	0.3854	6.1667	28.906	
	0.0681	0.0681	0.3854	0.0045	0.0003	
	1.04	1.04	0.00	6.25	30.21	38.54
	2.70	2.70	0.00	16.22	78.38	
	50.00	50.00	0.00	37.50	38.67	
POST1	0	0	0	4	7	11
	0.2292	0.2292	0.1146	1.8333	8.5937	
	0.2292	0.2292	0.1146	2.5606	0.2956	
	0.00	0.00	0.00	4.17	7.29	11.46
	0.00	0.00	0.00	36.36	63.64	
	0.00	0.00	0.00	25.00	9.33	
POST2	1	1	1	6	39	48
	1	1	0.5	8	37.5	
	0	0	0.5	0.5	0.06	
	1.04	1.04	1.04	6.25	40.63	50.00
	2.08	2.08	2.08	12.50	81.25	
	50.00	50.00	100.00	37.50	52.00	
Total	2	2	1	16	75	96
	2.08	2.08	1.04	16.67	78.12	100.00

STATISTICS FOR TABLE OF CODE BY REAS1

Statistic	DF	Value	Prob
Chi-Square	8	5.016	0.756
Likelihood Ratio Chi-Square	8	5.263	0.729
Mantel-Haenszel Chi-Square	1	0.053	0.818
Phi Coefficient		0.229	
Contingency Coefficient		0.223	
Cramer's V		0.162	

Sample Size = 96

WARNING: 67% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

TABLE OF CODE BY REAS2

CODE	REAS2					Total
Frequency	1	2	3	4	5	
Expected						
Cell Chi-Square						
Percent						
Row Pct						
Col Pct						
PRE	0	3	4	13	17	37
	2.3125	2.6979	6.9375	11.948	13.104	
	2.3125	0.0338	1.2438	0.0926	1.1582	
	0.00	3.12	4.17	13.54	17.71	38.54
	0.00	8.11	10.81	35.14	45.95	
	0.00	42.86	22.22	41.94	50.00	
POST1	2	1	2	4	2	11
	0.6875	0.8021	2.0625	3.5521	3.8958	
	2.5057	0.0488	0.0019	0.0565	0.9226	
	2.08	1.04	2.08	4.17	2.08	11.46
	18.18	9.09	18.18	36.36	18.18	
	33.33	14.29	11.11	12.90	5.88	
POST2	4	3	12	14	15	48
	3	3.5	9	15.5	17	
	0.3333	0.0714	1	0.1452	0.2353	
	4.17	3.12	12.50	14.58	15.63	50.00
	8.33	6.25	25.00	29.17	31.25	
	66.67	42.86	66.67	45.16	44.12	
Total	6	7	18	31	34	96
	6.25	7.29	18.75	32.29	35.42	100.00

STATISTICS FOR TABLE OF CODE BY REAS2

Statistic	DF	Value	Prob
Chi-Square	8	10.162	0.254
Likelihood Ratio Chi-Square	8	11.824	0.159
Mantel-Haenszel Chi-Square	1	3.513	0.061
Phi Coefficient		0.325	
Contingency Coefficient		0.309	
Cramer's V		0.230	

Sample Size = 96

WARNING: 60% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

TABLE OF CODE BY REAS3

CODE	REAS3					Total
Frequency	1	2	3	4	5	
Expected						
Cell Chi-Square						
Percent						
Row Pct						
Col Pct						
PRE	3	5	9	13	7	37
	3.4687	7.3229	6.1667	13.104	6.9375	
	0.0633	0.7369	1.3018	0.0008	0.0006	
	3.12	5.21	9.38	13.54	7.29	38.54
	8.11	13.51	24.32	35.14	18.92	
	33.33	26.32	56.25	38.24	38.89	
POST1	2	2	1	4	2	11
	1.0313	2.1771	1.8333	3.8958	2.0625	
	0.91	0.0144	0.3788	0.0028	0.0019	
	2.08	2.08	1.04	4.17	2.08	11.46
	18.18	18.18	9.09	36.36	18.18	
	22.22	10.53	6.25	11.76	11.11	
POST2	4	12	6	17	9	48
	4.5	9.5	8	17	9	
	0.0556	0.6579	0.5	0	0	
	4.17	12.50	6.25	17.71	9.38	50.00
	8.33	25.00	12.50	35.42	18.75	
	44.44	63.16	37.50	50.00	50.00	
Total	9	19	16	34	18	96
	9.38	19.79	16.67	35.42	18.75	100.00

STATISTICS FOR TABLE OF CODE BY REAS3

Statistic	DF	Value	Prob
Chi-Square	8	4.625	0.797
Likelihood Ratio Chi-Square	8	4.435	0.816
Mantel-Haenszel Chi-Square	1	0.173	0.677
Phi Coefficient		0.219	
Contingency Coefficient		0.214	
Cramer's V		0.155	

Sample Size = 96

WARNING: 47% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

TABLE OF CODE BY REAS4

CODE	REAS4					Total
	1	2	3	4	5	
Frequency						
Expected						
Cell Chi-Square						
Percent						
Row Pct						
Col Pct						
PRE	8	7	9	7	6	37
	7.7083	7.3229	7.3229	8.8646	5.7812	
	0.011	0.0142	0.3841	0.3922	0.0083	
	8.33	7.29	9.38	7.29	6.25	38.54
	21.62	18.92	24.32	18.92	16.22	
	40.00	36.84	47.37	30.43	40.00	
POST1	3	4	2	2	0	11
	2.2917	2.1771	2.1771	2.6354	1.7188	
	0.2189	1.5264	0.0144	0.1532	1.7188	
	3.12	4.17	2.08	2.08	0.00	11.46
	27.27	36.36	18.18	18.18	0.00	
	15.00	21.05	10.53	8.70	0.00	
POST2	9	8	8	14	9	48
	10	9.5	9.5	11.5	7.5	
	0.1	0.2368	0.2368	0.5435	0.3	
	9.38	8.33	8.33	14.58	9.38	50.00
	18.75	16.67	16.67	29.17	18.75	
	45.00	42.11	42.11	60.87	60.00	
Total	20	19	19	23	15	96
	20.83	19.79	19.79	23.96	15.63	100.00

STATISTICS FOR TABLE OF CODE BY REAS4

Statistic	DF	Value	Prob
Chi-Square	8	5.859	0.663
Likelihood Ratio Chi-Square	8	7.248	0.510
Mantel-Haenszel Chi-Square	1	0.713	0.398
Phi Coefficient		0.247	
Contingency Coefficient		0.240	
Cramer's V		0.175	

Sample Size = 96

WARNING: 33% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

TABLE OF CODE BY REAS5

CODE	REAS5					Total
	1	2	3	4	5	
PRE	5	5	2	8	17	37
Frequency	4.2396	4.2396	2.3125	6.9375	19.271	
Expected	0.1364	0.1364	0.0422	0.1627	0.2676	
Cell Chi-Square	5.21	5.21	2.08	8.33	17.71	38.54
Percent	13.51	13.51	5.41	21.62	45.95	
Row Pct	45.45	45.45	33.33	44.44	34.00	
Col Pct						
POST1	0	3	2	1	5	11
Frequency	1.2604	1.2604	0.6875	2.0625	5.7292	
Expected	1.2604	2.4009	2.5057	0.5473	0.0928	
Cell Chi-Square	0.00	3.12	2.08	1.04	5.21	11.46
Percent	0.00	27.27	18.18	9.09	45.45	
Row Pct	0.00	27.27	33.33	5.56	10.00	
Col Pct						
POST2	6	3	2	9	28	48
Frequency	5.5	5.5	3	9	25	
Expected	0.0455	1.1364	0.3333	0	0.36	
Cell Chi-Square	6.25	3.12	2.08	9.38	29.17	50.00
Percent	12.50	6.25	4.17	18.75	58.33	
Row Pct	54.55	27.27	33.33	50.00	56.00	
Col Pct						
Total	11	11	6	18	50	96
	11.46	11.46	6.25	18.75	52.08	100.00

STATISTICS FOR TABLE OF CODE BY REAS5

Statistic	DF	Value	Prob
Chi-Square	8	9.428	0.308
Likelihood Ratio Chi-Square	8	9.533	0.299
Mantel-Haenszel Chi-Square	1	1.009	0.315
Phi Coefficient		0.313	
Contingency Coefficient		0.299	
Cramer's V		0.222	

Sample Size = 96

WARNING: 53% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

TABLE OF CODE BY REAS6

CODE	REAS6					Total
Frequency	1	2	3	4	5	
Expected						
Cell Chi-Square						
Percent						
Row Pct						
Col Pct						
PRE	6	7	10	11	2	36
	6.4421	7.5789	10.989	8.3368	2.6526	
	0.0303	0.0442	0.0891	0.8507	0.1606	
	6.32	7.37	10.53	11.58	2.11	37.89
	16.67	19.44	27.78	30.56	5.56	
	35.29	35.00	34.48	50.00	28.57	
POST1	1	3	5	2	0	11
	1.9684	2.3158	3.3579	2.5474	0.8105	
	0.4764	0.2022	0.803	0.1176	0.8105	
	1.05	3.16	5.26	2.11	0.00	11.58
	9.09	27.27	45.45	18.18	0.00	
	5.88	15.00	17.24	9.09	0.00	
POST2	10	10	14	9	5	48
	8.5895	10.105	14.653	11.116	3.5368	
	0.2316	0.0011	0.0291	0.4027	0.6053	
	10.53	10.53	14.74	9.47	5.26	50.53
	20.83	20.83	29.17	18.75	10.42	
	58.82	50.00	48.28	40.91	71.43	
Total	17	20	29	22	7	95
	17.89	21.05	30.53	23.16	7.37	100.00

Frequency Missing = 1

STATISTICS FOR TABLE OF CODE BY REAS6

Statistic	DF	Value	Prob
Chi-Square	8	4.855	0.773
Likelihood Ratio Chi-Square	8	5.546	0.698
Mantel-Haenszel Chi-Square	1	0.189	0.664
Phi Coefficient		0.226	
Contingency Coefficient		0.220	
Cramer's V		0.160	

Effective Sample Size = 95

Frequency Missing = 1

WARNING: 47% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

TABLE OF CODE BY REAS7

CODE	REAS7					Total
Frequency	1	2	3	4	5	
Expected						
Cell Chi-Square						
Percent						
Row Pct						
Col Pct						
PRE	3	9	13	9	3	37
	4.6737	10.905	8.9579	8.9579	3.5053	
	0.5994	0.3329	1.8239	0.0002	0.0728	
	3.16	9.47	13.68	9.47	3.16	38.95
	8.11	24.32	35.14	24.32	8.11	
	25.00	32.14	56.52	39.13	33.33	
POST1	1	3	3	4	0	11
	1.3895	3.2421	2.6632	2.6632	1.0421	
	0.1092	0.0181	0.0426	0.6711	1.0421	
	1.05	3.16	3.16	4.21	0.00	11.58
	9.09	27.27	27.27	36.36	0.00	
	8.33	10.71	13.04	17.39	0.00	
POST2	8	16	7	10	6	47
	5.9368	13.853	11.379	11.379	4.4526	
	0.717	0.3329	1.6851	0.1671	0.5377	
	8.42	16.84	7.37	10.53	6.32	49.47
	17.02	34.04	14.89	21.28	12.77	
	66.67	57.14	30.43	43.48	66.67	
Total	12	28	23	23	9	95
	12.63	29.47	24.21	24.21	9.47	100.00

Frequency Missing = 1

STATISTICS FOR TABLE OF CODE BY REAS7

Statistic	DF	Value	Prob
Chi-Square	8	8.152	0.419
Likelihood Ratio Chi-Square	8	9.140	0.331
Mantel-Haenszel Chi-Square	1	0.663	0.416
Phi Coefficient		0.293	
Contingency Coefficient		0.281	
Cramer's V		0.207	

Effective Sample Size = 95

Frequency Missing = 1

WARNING: 53% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

TABLE OF CODE BY REAS8

CODE	REAS8					Total
	1	2	3	4	5	
Frequency						
Expected						
Cell Chi-Square						
Percent						
Row Pct						
Col Pct						
PRE	15	11	5	1	5	37
	17.729	10.021	4.2396	1.9271	3.0833	
	0.4201	0.0957	0.1364	0.446	1.1914	
	15.63	11.46	5.21	1.04	5.21	38.54
	40.54	29.73	13.51	2.70	13.51	
	32.61	42.31	45.45	20.00	62.50	
POST1	7	3	0	1	0	11
	5.2708	2.9792	1.2604	0.5729	0.9167	
	0.5673	0.0001	1.2604	0.3184	0.9167	
	7.29	3.12	0.00	1.04	0.00	11.46
	63.64	27.27	0.00	9.09	0.00	
	15.22	11.54	0.00	20.00	0.00	
POST2	24	12	6	3	3	48
	23	13	5.5	2.5	4	
	0.0435	0.0769	0.0455	0.1	0.25	
	25.00	12.50	6.25	3.12	3.12	50.00
	50.00	25.00	12.50	6.25	6.25	
	52.17	46.15	54.55	60.00	37.50	
Total	46	26	11	5	8	96
	47.92	27.08	11.46	5.21	8.33	100.00

STATISTICS FOR TABLE OF CODE BY REAS8

Statistic	DF	Value	Prob
Chi-Square	8	5.868	0.662
Likelihood Ratio Chi-Square	8	7.870	0.446
Mantel-Haenszel Chi-Square	1	0.744	0.388
Phi Coefficient		0.247	
Contingency Coefficient		0.240	
Cramer's V		0.175	

Sample Size = 96

WARNING: 60% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

TABLE OF CODE BY REAS9

CODE	REAS9					Total
Frequency	1	2	3	4	5	
Expected						
Cell Chi-Square						
Percent						
Row Pct						
Col Pct						
PRE	31	4	1	0	1	37
	30.062	3.0833	0.7708	0.3854	2.6979	
	0.0292	0.2725	0.0681	0.3854	1.0686	
	32.29	4.17	1.04	0.00	1.04	38.54
	83.78	10.81	2.70	0.00	2.70	
	39.74	50.00	50.00	0.00	14.29	
POST1	10	1	0	0	0	11
	8.9375	0.9167	0.2292	0.1146	0.8021	
	0.1263	0.0076	0.2292	0.1146	0.8021	
	10.42	1.04	0.00	0.00	0.00	11.46
	90.91	9.09	0.00	0.00	0.00	
	12.82	12.50	0.00	0.00	0.00	
POST2	37	3	1	1	6	48
	39	4	1	0.5	3.5	
	0.1026	0.25	0	0.5	1.7857	
	38.54	3.12	1.04	1.04	6.25	50.00
	77.08	6.25	2.08	2.08	12.50	
	47.44	37.50	50.00	100.00	85.71	
Total	78	8	2	1	7	96
	81.25	8.33	2.08	1.04	7.29	100.00

STATISTICS FOR TABLE OF CODE BY REAS9

Statistic	DF	Value	Prob
Chi-Square	8	5.742	0.676
Likelihood Ratio Chi-Square	8	7.175	0.518
Mantel-Haenszel Chi-Square	1	2.809	0.094
Phi Coefficient		0.245	
Contingency Coefficient		0.238	
Cramer's V		0.173	

Sample Size = 96

WARNING: 80% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

TABLE OF CODE BY REAS10

CODE	REAS10					
Frequency						
Expected						
Cell Chi-Square						
Percent						
Row Pct						
Col Pct	1	2	3	4	5	Total
PRE	6	6	11	14	0	37
	6.9375	5.7812	12.719	10.021	1.5417	
	0.1267	0.0083	0.2323	1.5801	1.5417	
	6.25	6.25	11.46	14.58	0.00	38.54
	16.22	16.22	29.73	37.84	0.00	
	33.33	40.00	33.33	53.85	0.00	
POST1	1	3	5	2	0	11
	2.0625	1.7188	3.7812	2.9792	0.4583	
	0.5473	0.9551	0.3928	0.3218	0.4583	
	1.04	3.12	5.21	2.08	0.00	11.46
	9.09	27.27	45.45	18.18	0.00	
	5.56	20.00	15.15	7.69	0.00	
POST2	11	6	17	10	4	48
	9	7.5	16.5	13	2	
	0.4444	0.3	0.0152	0.6923	2	
	11.46	6.25	17.71	10.42	4.17	50.00
	22.92	12.50	35.42	20.83	8.33	
	61.11	40.00	51.52	38.46	100.00	
Total	18	15	33	26	4	96
	18.75	15.63	34.38	27.08	4.17	100.00

STATISTICS FOR TABLE OF CODE BY REAS10

Statistic	DF	Value	Prob
Chi-Square	8	9.616	0.293
Likelihood Ratio Chi-Square	8	11.016	0.201
Mantel-Haenszel Chi-Square	1	0.148	0.701
Phi Coefficient		0.316	
Contingency Coefficient		0.302	
Cramer's V		0.224	

Sample Size = 96

WARNING: 47% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

TABLE OF CODE BY REAS11

CODE	REAS11					
Frequency						
Expected						
Cell Chi-Square						
Percent						
Row Pct						
Col Pct	1	2	3	4	5	Total
PRE	7	7	7	12	4	37
	6.9375	8.8646	9.25	8.4792	3.4687	
	0.0006	0.3922	0.5473	1.462	0.0814	
	7.29	7.29	7.29	12.50	4.17	38.54
	18.92	18.92	18.92	32.43	10.81	
	38.89	30.43	29.17	54.55	44.44	
POST1	2	5	2	2	0	11
	2.0625	2.6354	2.75	2.5208	1.0313	
	0.0019	2.1216	0.2045	0.1076	1.0313	
	2.08	5.21	2.08	2.08	0.00	11.46
	18.18	45.45	18.18	18.18	0.00	
	11.11	21.74	8.33	9.09	0.00	
POST2	9	11	15	8	5	48
	9	11.5	12	11	4.5	
	0	0.0217	0.75	0.8182	0.0556	
	9.38	11.46	15.63	8.33	5.21	50.00
	18.75	22.92	31.25	16.67	10.42	
	50.00	47.83	62.50	36.36	55.56	
Total	18	23	24	22	9	96
	18.75	23.96	25.00	22.92	9.38	100.00

STATISTICS FOR TABLE OF CODE BY REAS11

Statistic	DF	Value	Prob
Chi-Square	8	7.596	0.474
Likelihood Ratio Chi-Square	8	8.148	0.419
Mantel-Haenszel Chi-Square	1	0.465	0.495
Phi Coefficient		0.281	
Contingency Coefficient		0.271	
Cramer's V		0.199	

Sample Size = 96

WARNING: 47% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

TABLE OF CODE BY REAS12

CODE	REAS12					
Frequency						
Expected						
Cell Chi-Square						
Percent						
Row Pct						
Col Pct	1	2	3	4	5	Total
PRE	6	5	6	12	8	37
	5.7812	6.5521	6.5521	11.948	6.1667	
	0.0083	0.3677	0.0465	0.0002	0.545	
	6.25	5.21	6.25	12.50	8.33	38.54
	16.22	13.51	16.22	32.43	21.62	
	40.00	29.41	35.29	38.71	50.00	
POST1	2	4	2	2	1	11
	1.7188	1.9479	1.9479	3.5521	1.8333	
	0.046	2.1618	0.0014	0.6782	0.3788	
	2.08	4.17	2.08	2.08	1.04	11.46
	18.18	36.36	18.18	18.18	9.09	
	13.33	23.53	11.76	6.45	6.25	
POST2	7	8	9	17	7	48
	7.5	8.5	8.5	15.5	8	
	0.0333	0.0294	0.0294	0.1452	0.125	
	7.29	8.33	9.38	17.71	7.29	50.00
	14.58	16.67	18.75	35.42	14.58	
	46.67	47.06	52.94	54.84	43.75	
Total	15	17	17	31	16	96
	15.63	17.71	17.71	32.29	16.67	100.00

STATISTICS FOR TABLE OF CODE BY REAS12

Statistic	DF	Value	Prob
Chi-Square	8	4.596	0.800
Likelihood Ratio Chi-Square	8	4.277	0.831
Mantel-Haenszel Chi-Square	1	0.098	0.754
Phi Coefficient		0.219	
Contingency Coefficient		0.214	
Cramer's V		0.155	

Sample Size = 96

WARNING: 33% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

TABLE OF CODE BY REAS13

CODE	REAS13					Total
Frequency	1	2	3	4	5	
Expected						
Cell Chi-Square						
Percent						
Row Pct						
Col Pct						
PRE	13	11	7	4	2	37
Expected	12.719	11.563	6.5521	4.625	1.5417	
Cell Chi-Square	0.0062	0.0274	0.0306	0.0845	0.1363	
Percent	13.54	11.46	7.29	4.17	2.08	38.54
Row Pct	35.14	29.73	18.92	10.81	5.41	
Col Pct	39.39	36.67	41.18	33.33	50.00	
POST1.	4	3	2	2	0	11
Expected	3.7812	3.4375	1.9479	1.375	0.4583	
Cell Chi-Square	0.0127	0.0557	0.0014	0.2841	0.4583	
Percent	4.17	3.12	2.08	2.08	0.00	11.46
Row Pct	36.36	27.27	18.18	18.18	0.00	
Col Pct	12.12	10.00	11.76	16.67	0.00	
POST2	16	16	8	6	2	48
Expected	16.5	15	8.5	6	2	
Cell Chi-Square	0.0152	0.0667	0.0294	0	0	
Percent	16.67	16.67	8.33	6.25	2.08	50.00
Row Pct	33.33	33.33	16.67	12.50	4.17	
Col Pct	48.48	53.33	47.06	50.00	50.00	
Total	33	30	17	12	4	96
Expected	34.38	31.25	17.71	12.50	4.17	100.00

STATISTICS FOR TABLE OF CODE BY REAS13

Statistic	DF	Value	Prob
Chi-Square	8	1.208	0.997
Likelihood Ratio Chi-Square	8	1.625	0.990
Mantel-Haenszel Chi-Square	1	0.001	0.978
Phi Coefficient		0.112	
Contingency Coefficient		0.111	
Cramer's V		0.079	

Sample Size = 96

WARNING: 53% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

TABLE OF CODE BY REAS14

CODE	REAS14					Total
Frequency	1	2	3	4	5	
Expected						
Cell Chi-Square						
Percent						
Row Pct						
Col Pct						
PRE	7	10	3	11	5	36
	6.8211	8.3368	6.8211	10.611	3.4105	
	0.0047	0.3318	2.1405	0.0143	0.7408	
	7.37	10.53	3.16	11.58	5.26	37.89
	19.44	27.78	8.33	30.56	13.89	
	38.89	45.45	16.67	39.29	55.56	
POST1.	1	3	3	3	1	11
	2.0842	2.5474	2.0842	3.2421	1.0421	
	0.564	0.0804	0.4024	0.0181	0.0017	
	1.05	3.16	3.16	3.16	1.05	11.58
	9.09	27.27	27.27	27.27	9.09	
	5.56	13.64	16.67	10.71	11.11	
POST2	10	9	12	14	3	48
	9.0947	11.116	9.0947	14.147	4.5474	
	0.0901	0.4027	0.9281	0.0015	0.5265	
	10.53	9.47	12.63	14.74	3.16	50.53
	20.83	18.75	25.00	29.17	6.25	
	55.56	40.91	66.67	50.00	33.33	
Total	18	22	18	28	9	95
	18.95	23.16	18.95	29.47	9.47	100.00

Frequency Missing = 1

STATISTICS FOR TABLE OF CODE BY REAS14

Statistic	DF	Value	Prob
Chi-Square	8	6.248	0.620
Likelihood Ratio Chi-Square	8	6.802	0.558
Mantel-Haenszel Chi-Square	1	0.146	0.702
Phi Coefficient		0.256	
Contingency Coefficient		0.248	
Cramer's V		0.181	

Effective Sample Size = 95

Frequency Missing = 1

WARNING: 47% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

TABLE OF CODE BY MON1

CODE	MON1					Total
	1	2	3	4	5	
Frequency						
Expected						
Cell Chi-Square						
Percent						
Row Pct						
Col Pct						
PRE	13	6	3	6	9	37
	12.463	5.8421	4.2842	5.4526	8.9579	
	0.0231	0.0043	0.3849	0.0549	0.0002	
	13.68	6.32	3.16	6.32	9.47	38.95
	35.14	16.22	8.11	16.22	24.32	
	40.63	40.00	27.27	42.86	39.13	
POST1.	4	2	2	2	1	11
	3.7053	1.7368	1.2737	1.6211	2.6632	
	0.0234	0.0399	0.4142	0.0886	1.0387	
	4.21	2.11	2.11	2.11	1.05	11.58
	36.36	18.18	18.18	18.18	9.09	
	12.50	13.33	18.18	14.29	4.35	
POST2	15	7	6	6	13	47
	15.832	7.4211	5.4421	6.9263	11.379	
	0.0437	0.0239	0.0572	0.1239	0.2309	
	15.79	7.37	6.32	6.32	13.68	49.47
	31.91	14.89	12.77	12.77	27.66	
	46.88	46.67	54.55	42.86	56.52	
Total	32	15	11	14	23	95
	33.68	15.79	11.58	14.74	24.21	100.00

Frequency Missing = 1

STATISTICS FOR TABLE OF CODE BY MON1

Statistic	DF	Value	Prob
Chi-Square	8	2.552	0.959
Likelihood Ratio Chi-Square	8	2.848	0.944
Mantel-Haenszel Chi-Square	1	0.116	0.734
Phi Coefficient		0.164	
Contingency Coefficient		0.162	
Cramer's V		0.116	

Effective Sample Size = 95

Frequency Missing = 1

WARNING: 40% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

TABLE OF CODE BY MON2

CODE	MON2					Total
Frequency	1	2	3	4	5	
Expected						
Cell Chi-Square						
Percent						
Row Pct						
Col Pct						
PRE	7	6	7	9	8	37
	8.1789	5.4526	4.6737	11.295	7.4	
	0.1699	0.0549	1.1579	0.4662	0.0486	
	7.37	6.32	7.37	9.47	8.42	38.95
	18.92	16.22	18.92	24.32	21.62	
	33.33	42.86	58.33	31.03	42.11	
POST1.	4	0	1	5	1	11
	2.4316	1.6211	1.3895	3.3579	2.2	
	1.0117	1.6211	0.1092	0.803	0.6545	
	4.21	0.00	1.05	5.26	1.05	11.58
	36.36	0.00	9.09	45.45	9.09	
	19.05	0.00	8.33	17.24	5.26	
POST2	10	8	4	15	10	47
	10.389	6.9263	5.9368	14.347	9.4	
	0.0146	0.1664	0.6319	0.0297	0.0383	
	10.53	8.42	4.21	15.79	10.53	49.47
	21.28	17.02	8.51	31.91	21.28	
	47.62	57.14	33.33	51.72	52.63	
Total	21	14	12	29	19	95
	22.11	14.74	12.63	30.53	20.00	100.00

Frequency Missing = 1

STATISTICS FOR TABLE OF CODE BY MON2

Statistic	DF	Value	Prob
Chi-Square	8	6.978	0.539
Likelihood Ratio Chi-Square	8	8.467	0.389
Mantel-Haenszel Chi-Square	1	0.004	0.950
Phi Coefficient		0.271	
Contingency Coefficient		0.262	
Cramer's V		0.192	

Effective Sample Size = 95

Frequency Missing = 1

WARNING: 40% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

TABLE OF CODE BY MON3

CODE	MON3					Total
Frequency	1	2	3	4	5	
Expected						
Cell Chi-Square						
Percent						
Row Pct						
Col Pct						
PRE	2	3	2	16	14	37
	3.5053	1.9474	3.1158	16.358	12.074	
	0.6464	0.569	0.3996	0.0078	0.3073	
	2.11	3.16	2.11	16.84	14.74	38.95
	5.41	8.11	5.41	43.24	37.84	
	22.22	60.00	25.00	38.10	45.16	
POST1	2	0	0	7	2	11
	1.0421	0.5789	0.9263	4.8632	3.5895	
	0.8805	0.5789	0.9263	0.9389	0.7038	
	2.11	0.00	0.00	7.37	2.11	11.58
	18.18	0.00	0.00	63.64	18.18	
	22.22	0.00	0.00	16.67	6.45	
POST2	5	2	6	19	15	47
	4.4526	2.4737	3.9579	20.779	15.337	
	0.0673	0.0907	1.0536	0.1523	0.0074	
	5.26	2.11	6.32	20.00	15.79	49.47
	10.64	4.26	12.77	40.43	31.91	
	55.56	40.00	75.00	45.24	48.39	
Total	9	5	8	42	31	95
	9.47	5.26	8.42	44.21	32.63	100.00

Frequency Missing = 1

STATISTICS FOR TABLE OF CODE BY MON3

Statistic	DF	Value	Prob
Chi-Square	8	7.330	0.501
Likelihood Ratio Chi-Square	8	8.614	0.376
Mantel-Haenszel Chi-Square	1	0.597	0.440
Phi Coefficient		0.278	
Contingency Coefficient		0.268	
Cramer's V		0.196	

Effective Sample Size = 95

Frequency Missing = 1

WARNING: 73% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

TABLE OF CODE BY MON4

CODE	MON4					Total
Frequency	1	2	3	4	5	
Expected						
Cell Chi-Square						
Percent						
Row Pct						
Col Pct						
PRE	2	6	9	12	8	37
	3.9785	6.7634	7.1613	12.333	6.7634	
	0.9839	0.0862	0.4721	0.009	0.2261	
	2.15	6.45	9.68	12.90	8.60	39.78
	5.41	16.22	24.32	32.43	21.62	
	20.00	35.29	50.00	38.71	47.06	
POST1.	1	2	2	3	3	11
	1.1828	2.0108	2.129	3.6667	2.0108	
	0.0283	575E-7	0.0078	0.1212	0.4867	
	1.08	2.15	2.15	3.23	3.23	11.83
	9.09	18.18	18.18	27.27	27.27	
	10.00	11.76	11.11	9.68	17.65	
POST2	7	9	7	16	6	45
	4.8387	8.2258	8.7097	15	8.2258	
	0.9654	0.0729	0.3356	0.0667	0.6023	
	7.53	9.68	7.53	17.20	6.45	48.39
	15.56	20.00	15.56	35.56	13.33	
	70.00	52.94	38.89	51.61	35.29	
Total	10	17	18	31	17	93
	10.75	18.28	19.35	33.33	18.28	100.00

Frequency Missing = 3

STATISTICS FOR TABLE OF CODE BY MON4

Statistic	DF	Value	Prob
Chi-Square	8	4.464	0.813
Likelihood Ratio Chi-Square	8	4.552	0.804
Mantel-Haenszel Chi-Square	1	1.820	0.177
Phi Coefficient		0.219	
Contingency Coefficient		0.214	
Cramer's V		0.155	

Effective Sample Size = 93

Frequency Missing = 3

WARNING: 47% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

TABLE OF CODE BY MON5

CODE	MON5					Total
Frequency	1	2	3	4	5	
Expected						
Cell Chi-Square						
Percent						
Row Pct						
Col Pct						
PRE	2	3	9	16	7	37
	3.8947	5.0632	7.0105	15.579	5.4526	
	0.9218	0.8407	0.5646	0.0114	0.4391	
	2.11	3.16	9.47	16.84	7.37	38.95
	5.41	8.11	24.32	43.24	18.92	
	20.00	23.08	50.00	40.00	50.00	
POST1	0	2	2	5	2	11
	1.1579	1.5053	2.0842	4.6316	1.6211	
	1.1579	0.1626	0.0034	0.0293	0.0886	
	0.00	2.11	2.11	5.26	2.11	11.58
	0.00	18.18	18.18	45.45	18.18	
	0.00	15.38	11.11	12.50	14.29	
POST2	8	8	7	19	5	47
	4.9474	6.4316	8.9053	19.789	6.9263	
	1.8835	0.3825	0.4076	0.0315	0.5357	
	8.42	8.42	7.37	20.00	5.26	49.47
	17.02	17.02	14.89	40.43	10.64	
	80.00	61.54	38.89	47.50	35.71	
Total	10	13	18	40	14	95
	10.53	13.68	18.95	42.11	14.74	100.00

Frequency Missing = 1

STATISTICS FOR TABLE OF CODE BY MON5

Statistic	DF	Value	Prob
Chi-Square	8	7.460	0.488
Likelihood Ratio Chi-Square	8	8.623	0.375
Mantel-Haenszel Chi-Square	1	3.915	0.048
Phi Coefficient		0.280	
Contingency Coefficient		0.270	
Cramer's V		0.198	

Effective Sample Size = 95

Frequency Missing = 1

WARNING: 47% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

TABLE OF CODE BY MON6

CODE	MON6					Total
Frequency	1	2	3	4	5	
Expected						
Cell Chi-Square						
Percent						
Row Pct						
Col Pct						
PRE	4	11	5	10	7	37
	4.2842	7.7895	6.2316	11.295	7.4	
	0.0189	1.3233	0.2434	0.1484	0.0216	
	4.21	11.58	5.26	10.53	7.37	38.95
	10.81	29.73	13.51	27.03	18.92	
	36.36	55.00	31.25	34.48	36.84	
POST1	0	1	1	7	2	11
	1.2737	2.3158	1.8526	3.3579	2.2	
	1.2737	0.7476	0.3924	3.9504	0.0182	
	0.00	1.05	1.05	7.37	2.11	11.58
	0.00	9.09	9.09	63.64	18.18	
	0.00	5.00	6.25	24.14	10.53	
POST2	7	8	10	12	10	47
	5.4421	9.8947	7.9158	14.347	9.4	
	0.446	0.3628	0.5488	0.3841	0.0383	
	7.37	8.42	10.53	12.63	10.53	49.47
	14.89	17.02	21.28	25.53	21.28	
	63.64	40.00	62.50	41.38	52.63	
Total	11	20	16	29	19	95
	11.58	21.05	16.84	30.53	20.00	100.00

Frequency Missing = 1

STATISTICS FOR TABLE OF CODE BY MON6

Statistic	DF	Value	Prob
Chi-Square	8	9.918	0.271
Likelihood Ratio Chi-Square	8	10.367	0.240
Mantel-Haenszel Chi-Square	1	0.039	0.843
Phi Coefficient		0.323	
Contingency Coefficient		0.307	
Cramer's V		0.228	

Effective Sample Size = 95

Frequency Missing = 1

WARNING: 40% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

TABLE OF CODE BY MON7

CODE	MON7					Total
Frequency	1	2	3	4	5	
Expected						
Cell Chi-Square						
Percent						
Row Pct						
Col Pct						
PRE	19	11	4	1	2	37
	17.319	12.202	3.9362	1.9681	1.5745	
	0.1631	0.1184	0.001	0.4762	0.115	
	20.21	11.70	4.26	1.06	2.13	39.36
	51.35	29.73	10.81	2.70	5.41	
	43.18	35.48	40.00	20.00	50.00	
POST1	5	6	0	0	0	11
	5.1489	3.6277	1.1702	0.5851	0.4681	
	0.0043	1.5514	1.1702	0.5851	0.4681	
	5.32	6.38	0.00	0.00	0.00	11.70
	45.45	54.55	0.00	0.00	0.00	
	11.36	19.35	0.00	0.00	0.00	
POST2	20	14	6	4	2	46
	21.532	15.17	4.8936	2.4468	1.9574	
	0.109	0.0903	0.2501	0.9859	0.0009	
	21.28	14.89	6.38	4.26	2.13	48.94
	43.48	30.43	13.04	8.70	4.35	
	45.45	45.16	60.00	80.00	50.00	
Total	44	31	10	5	4	94
	46.81	32.98	10.64	5.32	4.26	100.00

Frequency Missing = 2

STATISTICS FOR TABLE OF CODE BY MON7

Statistic	DF	Value	Prob
Chi-Square	8	6.089	0.637
Likelihood Ratio Chi-Square	8	7.978	0.436
Mantel-Haenszel Chi-Square	1	0.693	0.405
Phi Coefficient		0.255	
Contingency Coefficient		0.247	
Cramer's V		0.180	

Effective Sample Size = 94

Frequency Missing = 2

WARNING: 67% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

TABLE OF CODE BY MON8

CODE	MON8					Total
Frequency	1	2	3	4	5	
PRE	12	5	4	10	6	37
Expected	10.905	5.4526	4.6737	10.905	5.0632	
Cell Chi-Square	0.1099	0.0376	0.0971	0.0751	0.1733	
Percent	12.63	5.26	4.21	10.53	6.32	38.95
Row Pct	32.43	13.51	10.81	27.03	16.22	
Col Pct	42.86	35.71	33.33	35.71	46.15	
POST1.	2	2	3	3	1	11
Expected	3.2421	1.6211	1.3895	3.2421	1.5053	
Cell Chi-Square	0.4759	0.0886	1.8667	0.0181	0.1696	
Percent	2.11	2.11	3.16	3.16	1.05	11.58
Row Pct	18.18	18.18	27.27	27.27	9.09	
Col Pct	7.14	14.29	25.00	10.71	7.69	
POST2	14	7	5	15	6	47
Expected	13.853	6.9263	5.9368	13.853	6.4316	
Cell Chi-Square	0.0016	0.0008	0.1478	0.095	0.029	
Percent	14.74	7.37	5.26	15.79	6.32	49.47
Row Pct	29.79	14.89	10.64	31.91	12.77	
Col Pct	50.00	50.00	41.67	53.57	46.15	
Total	28	14	12	28	13	95
	29.47	14.74	12.63	29.47	13.68	100.00

Frequency Missing = 1

STATISTICS FOR TABLE OF CODE BY MON8

Statistic	DF	Value	Prob
Chi-Square	8	3.386	0.908
Likelihood Ratio Chi-Square	8	3.011	0.934
Mantel-Haenszel Chi-Square	1	0.003	0.959
Phi Coefficient		0.189	
Contingency Coefficient		0.186	
Cramer's V		0.133	

Effective Sample Size = 95

Frequency Missing = 1

WARNING: 40% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

TABLE OF CODE BY MON9

CODE	MON9					Total
	1	2	3	4	5	
Frequency						
Expected						
Cell Chi-Square						
Percent						
Row Pct						
Col Pct						
PRE	8	11	4	7	7	37
	10.628	9.8404	4.7234	7.4787	4.3298	
	0.6497	0.1366	0.1108	0.0306	1.6467	
	8.51	11.70	4.26	7.45	7.45	39.36
	21.62	29.73	10.81	18.92	18.92	
	29.63	44.00	33.33	36.84	63.64	
POST1	3	3	1	4	0	11
	3.1596	2.9255	1.4043	2.2234	1.2872	
	0.0081	0.0019	0.1164	1.4196	1.2872	
	3.19	3.19	1.06	4.26	0.00	11.70
	27.27	27.27	9.09	36.36	0.00	
	11.11	12.00	8.33	21.05	0.00	
POST2	16	11	7	8	4	46
	13.213	12.234	5.8723	9.2979	5.383	
	0.588	0.1245	0.2165	0.1812	0.3553	
	17.02	11.70	7.45	8.51	4.26	48.94
	34.78	23.91	15.22	17.39	8.70	
	59.26	44.00	58.33	42.11	36.36	
Total	27	25	12	19	11	94
	28.72	26.60	12.77	20.21	11.70	100.00

Frequency Missing = 2

STATISTICS FOR TABLE OF CODE BY MON9

Statistic	DF	Value	Prob
Chi-Square	8	6.873	0.550
Likelihood Ratio Chi-Square	8	7.699	0.463
Mantel-Haenszel Chi-Square	1	1.889	0.169
Phi Coefficient		0.270	
Contingency Coefficient		0.261	
Cramer's V		0.191	

Effective Sample Size = 94

Frequency Missing = 2

WARNING: 47% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

TABLE OF CODE BY MON10

CODE	MON10					Total
Frequency	1	2	3	4	5	
Expected						
Cell Chi-Square						
Percent						
Row Pct						
Col Pct						
PRE	6	6	7	9	9	37
	4.3298	7.4787	8.266	10.234	6.6915	
	0.6443	0.2924	0.1939	0.1488	0.7964	
	6.38	6.38	7.45	9.57	9.57	39.36
	16.22	16.22	18.92	24.32	24.32	
	54.55	31.58	33.33	34.62	52.94	
POST1.	1	3	1	5	1	11
	1.2872	2.2234	2.4574	3.0426	1.9894	
	0.0641	0.2713	0.8644	1.2593	0.492	
	1.06	3.19	1.06	5.32	1.06	11.70
	9.09	27.27	9.09	45.45	9.09	
	9.09	15.79	4.76	19.23	5.88	
POST2	4	10	13	12	7	46
	5.383	9.2979	10.277	12.723	8.3191	
	0.3553	0.053	0.7217	0.0411	0.2092	
	4.26	10.64	13.83	12.77	7.45	48.94
	8.70	21.74	28.26	26.09	15.22	
	36.36	52.63	61.90	46.15	41.18	
Total	11	19	21	26	17	94
	11.70	20.21	22.34	27.66	18.09	100.00

Frequency Missing = 2

STATISTICS FOR TABLE OF CODE BY MON10

Statistic	DF	Value	Prob
Chi-Square	8	6.407	0.602
Likelihood Ratio Chi-Square	8	6.423	0.600
Mantel-Haenszel Chi-Square	1	0.059	0.808
Phi Coefficient		0.261	
Contingency Coefficient		0.253	
Cramer's V		0.185	

Effective Sample Size = 94

Frequency Missing = 2

WARNING: 40% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

TABLE OF CODE BY MON11

CODE	MON11					Total
Frequency	1	2	3	4	5	
Expected						
Cell Chi-Square						
Percent						
Row Pct						
Col Pct						
PRE	14	10	8	3	2	37
	12.074	12.074	6.6211	4.2842	1.9474	
	0.3073	0.3562	0.2872	0.3849	0.0014	
	14.74	10.53	8.42	3.16	2.11	38.95
	37.84	27.03	21.62	8.11	5.41	
	45.16	32.26	47.06	27.27	40.00	
POST1	3	3	3	2	0	11
	3.5895	3.5895	1.9684	1.2737	0.5789	
	0.0968	0.0968	0.5406	0.4142	0.5789	
	3.16	3.16	3.16	2.11	0.00	11.58
	27.27	27.27	27.27	18.18	0.00	
	9.68	9.68	17.65	18.18	0.00	
POST2	14	18	6	6	3	47
	15.337	15.337	8.4105	5.4421	2.4737	
	0.1165	0.4624	0.6909	0.0572	0.112	
	14.74	18.95	6.32	6.32	3.16	49.47
	29.79	38.30	12.77	12.77	6.38	
	45.16	58.06	35.29	54.55	60.00	
Total	31	31	17	11	5	95
	32.63	32.63	17.89	11.58	5.26	100.00

Frequency Missing = 1

STATISTICS FOR TABLE OF CODE BY MON11

Statistic	DF	Value	Prob
Chi-Square	8	4.503	0.809
Likelihood Ratio Chi-Square	8	5.039	0.753
Mantel-Haenszel Chi-Square	1	0.181	0.671
Phi Coefficient		0.218	
Contingency Coefficient		0.213	
Cramer's V		0.154	

Effective Sample Size = 95

Frequency Missing = 1

WARNING: 53% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

TABLE OF CODE BY MON12

CODE	MON12					Total
Frequency	1	2	3	4	5	
Expected						
Cell Chi-Square						
Percent						
Row Pct						
Col Pct						
PRE	15	13	4	4	1	37
	14.411	12.853	4.6737	3.8947	1.1684	
	0.0241	0.0017	0.0971	0.0028	0.0243	
	15.79	13.68	4.21	4.21	1.05	38.95
	40.54	35.14	10.81	10.81	2.70	
	40.54	39.39	33.33	40.00	33.33	
POST1.	3	5	1	2	0	11
	4.2842	3.8211	1.3895	1.1579	0.3474	
	0.3849	0.3638	0.1092	0.6124	0.3474	
	3.16	5.26	1.05	2.11	0.00	11.58
	27.27	45.45	9.09	18.18	0.00	
	8.11	15.15	8.33	20.00	0.00	
POST2	19	15	7	4	2	47
	18.305	16.326	5.9368	4.9474	1.4842	
	0.0264	0.1077	0.1904	0.1814	0.1792	
	20.00	15.79	7.37	4.21	2.11	49.47
	40.43	31.91	14.89	8.51	4.26	
	51.35	45.45	58.33	40.00	66.67	
Total	37	33	12	10	3	95
	38.95	34.74	12.63	10.53	3.16	100.00

Frequency Missing = 1

STATISTICS FOR TABLE OF CODE BY MON12

Statistic	DF	Value	Prob
Chi-Square	8	2.653	0.954
Likelihood Ratio Chi-Square	8	2.908	0.940
Mantel-Haenszel Chi-Square	1	0.024	0.876
Phi Coefficient		0.167	
Contingency Coefficient		0.165	
Cramer's V		0.118	

Effective Sample Size = 95

Frequency Missing = 1

WARNING: 67% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

APPENDIX G
STUDENT COMMENTS—PRE-TEST/ POST-TEST

Additional reasons I choose to eat in the cafeteria:

- "nice babes showing up"
- "make new friends"
- "only place where I can eat as there is no one to cook for me"
- "I am hungry"
- "nowhere better to eat"
- "because there is nowhere to eat that is closer"
- "convenient"
- "I live in dorms"
- "chicken-fried steak, ice cream"
- "chicken-fried steak"
- "chicken-fried steak"
- "don't have to leave campus"
- "it is the nearest place"
- "it is the only thing open"
- "I have to eat here because I have a meal ticket, but I am eating healthier"
- "because it's there"
- "it's there"
- "escape from John, and the chicks"
- "saving from having cook (sic)"
- "convenient"
- "convenient"
- "my roommate likes to come alot"
- "I had to buy a meal ticket because I live in the dorms"
- "there's no other place to go on campus"
- "have to"
- "it is close. Health Food line at Willham"
- "lazy"

Additional changes I have made in my eating patterns over the past 3 months:

- "decrease in food intake"
- "eat a lot of chicken and turkey"
- "I try to eat food which is healthy and drink juices"
- "always ate pretty good"
- "more liquids"
- "eat more often and less at each sitting"
- "gained 20 pounds since college started"
- "ate more low fat food"
- "I used to drink only skim milk but now I have to drink low fat. I eat alot more desserts. I eat less frequently here. Not an eating thing, but I've lost 10 pounds this year"
- "tried to stop eating so many desserts"
- "stopped drinking carbonated and caffeine drinks"
- "I don't eat as much"
- "I chew faster. I learned to stay away from Mexican food"
- "I eat a lot less meat"
- "I have gained 5 pounds here"
- "eating less times a day (sic)"

APPENDIX H
ARTICLE SUBMITTED FOR PUBLICATION
IN *NEWS WAVE* MAGAZINE

"Pyramid of Choices" Targets Student Food Habits

Emily H. Joyce, Master's Candidate
Carolyn A. Fair, MS, Manager, Dining Services
Oklahoma State University, Stillwater, Oklahoma

Students living in the Kerr and Drummond residence halls on the Oklahoma State University campus are learning from a pilot program funded by the National Association of College and University Food Service. Designed to increase nutrition awareness and to positively influence decision-making, "Pyramid of Choices" includes nutrition education workshops in the residence halls and nutrient content information for individual food items served in the cafeteria.

Carolyn Fair, manager of dining services in the Kerr-Drummond complex. Amjad Ayoubi, residence hall coordinator, and Elizabeth Lohrman, senior nutritionist at the OSU Wellness Center, are chief investigators in a study based on similar research done at Texas A&M. Emily Joyce, a Nutritional Sciences graduate student, has worked with Fair in the residence halls, analyzing recipes by computer and conducting the education workshops. Although participation is voluntary, students have expressed interest in the project and response has been mostly favorable, as evidenced by comments made by those who have participated.

The project began last fall, when a pretest was given to students at their regularly-scheduled floor meetings. The test was developed to measure student understanding of diet and health, and also their awareness of the USDA Food Guide Pyramid. Fourteen of twenty-two floors participated, with two hundred eighty-two tests given. Results of the testing showed that at least 50% of the students have a basic knowledge of health issues and of the Pyramid, but are unsure of food sources of important nutrients such as calcium and iron.

During the 1996 Spring semester, students have been able to choose foods in the cafeteria based on nutrient content including fat grams. Food Guide Pyramid symbols identify the foods that are good choices for meeting daily needs. Higher fat items are also identified with a different-colored card. Table tents are also being used, with topics changing weekly. Various food items are showcased, and nutrition facts are provided by the American Heart Association. A computer is available in the cafeteria with an analysis program that enables students to examine their daily food consumption so they can plan ahead and make healthier choices.

Students have also voluntarily participated in nutrition education workshops, with pre- and post-testing used to identify trends in attitudes and behaviors related to food choices and health habits. Test results show that this age group is not very concerned about diet-related issues (10% strongly agree) and is not interested in reading about nutrition (79.8%). This study demonstrates a need for nutrition education materials with a strong visual component that relates food choices to specific nutrient needs.

The program will probably continue into the next school year. It is hoped that awareness will increase, and that students will be enabled to make healthier food choices. While other residence halls offer healthy food choices, the "Pyramid of Choices" at the Kerr-Drummond complex is the only one that allows the students to make their own decisions regarding the foods they eat.

APPENDIX I

GUIDE FOR AUTHORS, *NACUFS JOURNAL*



NACUFS JOURNAL

PURPOSE

The purpose of the NACUFS Journal is to provide a means through which NACUFS members and others may share research and the results of other original and creative work which would benefit and be of interest to the general membership. Articles are welcome which address issues related but not limited to such subjects as foodservice management, human relations, energy, nutrition, computers, higher education, student concerns, and government regulation.

PREPARATION OF MANUSCRIPTS

1. Typing. Articles should be submitted in the original with clear copies typed (double-spaced) on standard 8 1/2 x 11 bond paper.
2. Tables and charts. Number in Roman numerals with the word TABLE or CHART centered and in capital letters, e.g., TABLE I. If charts or tables exceed one-third page in length, please submit on a separate page. Indicate the preferred position for tables and/or charts within the text by inserting at the relevant location the statement: (insert Table I here).
3. Footnotes. Number them consecutively throughout the manuscript. List the footnotes with identifying numbers on a separate page at the end of the manuscript. An effort should be made to keep footnotes to a minimum. The author assumes the responsibility for the accuracy of references.
4. Spelling and style. Follow conventional usage. Direct quotations must, of course, conform to the original. Consider Webster's New Collegiate Dictionary an adequate guide if questions arise. The New Collegiate is recommended because of its widespread usage and ready availability.
5. Quotations. Obtaining permission is the author's responsibility. Cite source in manuscript and attach authorization. Manuscripts relying upon extensive quotations for content normally would not be adaptable to the NACUFS Journal.
6. Author's identification. On a cover sheet or in your letter of transmittal, provide full name, position of employment, location of employment, mailing address and phone number.

ADDITIONAL NOTES FOR AUTHORS

1. Articles must be well-organized and develop ideas in a concise and logical manner. Correct spelling is essential. Articles will be received and evaluated as submitted. The committee will not take the responsibility for editing a manuscript.
2. Articles will be accepted, returned to the author for revision, or not accepted. The author will be informed in writing if the manuscript is or is not accepted for publication.

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The Best in The Business

APPENDIX J
GUIDE FOR AUTHORS, *JOURNAL OF THE AMERICAN DIETETIC ASSOCIATION*

GUIDELINES FOR AUTHORS

The *Journal of The American Dietetic Association* is the official research publication of The American Dietetic Association. Its purpose, as expressed in its mission statement, is "To be the premier peer-reviewed journal in the field of nutrition and dietetics and to embody the mission of The American Dietetic Association." As such, the *Journal* publishes manuscripts that advance knowledge across the range of research and practice issues in nutrition and dietetics and that support the professional growth of Association members. We invite contributions of original research, review, and application in such areas as nutritional science, medical nutrition therapy, public health nutrition, food science and biotechnology, foodservice systems, leadership and management, and dietetics education.

ARTICLE CATEGORIES

The *Journal* typically accepts manuscripts in four categories. The structural requirements of each category are described below. Manuscript components are discussed in the section "Manuscript Preparation."

Research

Manuscripts reporting original research should include (1) structured abstract; (2) introduction stating the purpose and relevance of the study; (3) clear and full description of materials and methods, including criteria for subject selection; (4) report of results (for clarity, this should follow the same order presented under "methods"); (5) discussion (for greatest value, results should be compared with other published data of a similar nature); and (6) applications. Research manuscripts, in general, should not exceed 3,000 words. Word count does not include abstract, tables, illustrations, and references necessary to support the data and their interpretation.

Perspectives in Practice or Review

Manuscripts presenting practical applications or reviews should include (1) conventional abstract, (2) introduction; (3) body, which develops the subject in logical order using appropriate subheads; and (4) applications. These manuscripts should not exceed 2,000 words (review articles on topics that have an extensive body of literature may be allowed to exceed this word limit). Word count does not include abstract, relevant tables, illustrations, and references.

Research and Professional Briefs

Short reports of research findings, case studies, or professional observations should include (1) introduction; (2) body, which develops the subject in logical order using appropriate subheads (research briefs should include "methods," "results," and "applications" subheads; professional reports may use descriptive subheads); and (3) applications. Research and Professional Briefs do not have abstracts. These manuscripts must not exceed 1,000 words and can include a maximum of two illustrations (tables or figures) and pertinent references. Word count does not include tables, figures, and references.

HOW TO SUBMIT A MANUSCRIPT

Authors must submit four copies of their manuscript, one set of original art, a cover letter of submission, and the authorship and copyright statements described in the section "Author Responsibilities." Each copy of the manuscript should be complete in itself, that is, contain all the manuscript components described in the

section "Manuscript Preparation." The accompanying cover letter should identify the manuscript by title, specify the article category for which it is intended, and include pertinent disclosure information, as specified in the "Author Responsibilities" section. The cover letter should also identify one author who will handle correspondence regarding the manuscript and provide a complete address, telephone number, and facsimile (fax) number for this author. Manuscripts should be sent to:

Elaine R. Monsen, PhD, RD
Editor, *Journal of The American Dietetic Association*
University of Washington, Mailstop DL-10
Seattle, WA 98195

Authors will receive written acknowledgment of the initial receipt of their manuscript. All submitted manuscripts are then sent to peer reviewers who are experts in their fields. The identities of both the peer reviewers and the authors are kept confidential. The reviewers evaluate each manuscript on the basis of content, originality, scientific accuracy, clarity, and contribution to the field of nutrition and dietetics. After peer review (usually 10 to 12 weeks after the date of the initial acknowledgment letter), the corresponding author will be notified whether the manuscript has been accepted with revision or rejected. Manuscripts are accepted at the discretion of the reviewers and the *Journal* editors.

AUTHOR RESPONSIBILITIES

Manuscripts must be submitted solely to the *Journal*. All manuscripts are considered for publication with the understanding that they have not been published previously in print or electronic form and are not under consideration by another publication or electronic medium. Findings previously presented in an oral report or in an abstract in conjunction with a scientific or professional conference may be submitted for consideration. However, the author(s) must inform the Editor of any previous disclosure of information contained in a submitted manuscript, including reports of the information in technical papers or newsletters.

Authors must submit several disclosure statements with their manuscript; the requirements of each are detailed below. The statements regarding authorship and copyright should be submitted on separate sheets of paper; therefore, each statement should also include the title of the manuscript. Statements regarding acknowledgments and potential conflicts of interest can be incorporated into the cover letter.

Authorship

All persons designated as authors must meet the criteria for authorship detailed in the statement below. Authors must sign, date, and submit a copy of this statement with their manuscript.

We (or substitute "I") certify that we have participated substantially in the conception and design of this work and the analysis of the data (when applicable) as well as the writing of the manuscript. We have reviewed the final version of the manuscript submitted for publication, approve it for publication, and take public responsibility for its content. Neither this manuscript nor one with substantially similar content under our authorship has been published or is being considered for publication elsewhere, except as described in an attachment.

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The American Dietetic Association holds the copyright on all material published in the *Journal*. Therefore, all authors must sign and date a statement that transfers their article's copyright to the Association. Suggested wording follows:

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MANUSCRIPT PREPARATION

Type manuscripts on one side of standard-sized (8 1/2" by 11") white bond paper; leave at least a 1-inch margin on all sides. Use standard 10- or 12-pitch type size and double-space type throughout, including the title page, abstract, text, acknowledgments, references, tables, and legends for figures. Start each of these manuscript sections on a new page, and number each page consecutively in the upper right-hand corner of the page. A description of the various components of a manuscript follows.

Authors' Page

All manuscripts must include a separate authors' page that lists: (1) the title of the manuscript; (2) two to four key words or descriptive phrases; (3) word counts for the abstract and the text; (4) full names, academic degrees, and affiliations (position title, organization, address, telephone number, and fax number) for all authors both at the time the work was completed and at the present time if affiliations have changed since the work was

finished; (5) name and contact information for corresponding author (address, telephone number, and fax number); and (6) name and address of author who will handle reader requests for reprints, if this is different from the corresponding author. Type authors' names in the order they should appear in the published article. The authors' page must be submitted as a separate sheet so that it can be detached from the manuscript when the Editor sends the manuscript for anonymous peer review.

Title

The manuscript title should be specific and informative, conveying the findings of the research (eg, "Dietary fiber lowers serum cholesterol" rather than "Effects of dietary fiber on serum cholesterol"). The manuscript title should appear on the abstract, the first page of the manuscript text, the authors' page, and all correspondence and disclosure statements.

Abstracts

Authors should prepare a structured abstract for manuscripts submitted to *Research* and a conventional (unstructured) abstract for manuscripts submitted to the *Perspectives in Practice* or the *Review* categories. Abstracts are not required for manuscripts submitted to *Research* and *Professional Briefs*. Abstracts should be self-contained and understandable without reference to the main text and should be written for a general journal readership. The two forms of abstract are described below.

Structured abstracts provide a focused overview of a study's design and outcomes by organizing information with descriptive headings. Suggested headings, and the information each heading should elicit, are described below. Structured abstracts should not exceed 250 words.

- **Objective** Describe the question or problem addressed.
- **Design** Identify the design of the study (eg, intervention, randomized controlled trial, case-control, cohort, survey, factorial design, or cost-effectiveness analysis); define the duration of follow-up; describe the criterion standard used for comparison; define and describe methodology used to collect data.
- **Subjects/Setting** Describe criteria used to select subjects, the number of subjects involved in the analysis, and the attrition rate. Describe where the study was conducted and how the setting might relate to the selection of subjects (eg, community-based or hospitalized subjects) or the study's applicability to a specialty practice situation.
- **Intervention** Describe the essential features of the treatment or intervention in studies that use an experimental design. (This heading, as well as "Main outcome measures," should be omitted in descriptive research (eg, studies that use surveys).)
- **Main outcome measures** Note the primary outcome measure as planned before data collection began; if the hypothesis being reported was formulated during or after data collection, this information should be clearly stated.
- **Statistical analyses performed** Indicate statistical tests used in data analyses (eg, χ^2 , analysis of variance, or confidence intervals). Note procedures used to adjust for confounding factors, such as age and gender.
- **Results** Describe the key findings of the study. No data should be reported in the abstract that do not appear in the main text.
- **Applications/Conclusions** Offer key conclusions on the basis of evidence provided by the study and relate these findings to clinical or practice applications.

Conventional abstracts are written in paragraph style and should provide a brief overview of the study and its findings. Abstracts should be organized to identify the problem being addressed, how the study was organized and implemented, the

main findings, and the authors' conclusions. The last sentence should focus the findings for the dietetics practitioner; it may begin "We conclude that..." or "The findings indicate that...". Conventional abstracts should not exceed 200 words.

Tables and Figures

Tables and figures should be limited to those required to clarify an article. Each table or figure should be understandable by itself and not require the reader to refer to the text. Present data only once, either in tabular or graphic form or in the text. Authors should list the title and number of each table and figure on a separate page submitted with their manuscript. More detailed guidance regarding *Journal* style for tables and figures is provided in the sections "Numbers," "Abbreviations," and "Laboratory Values."

Tables Type each table double-space on a separate sheet of paper. Number tables consecutively (in relation to citation in the text) with Arabic numbers and supply a brief title for each. Give each column a short or abbreviated heading. Place explanatory matter in footnotes, not in the column headings or table title. Be sure to include the unit of measure (eg, "No.," "%," "g," or "year") under the appropriate column heading. Tables may not contain more than 14 columns. Do not put more than one unit of information in a single cell of the table.

For numerals less than 1.00, insert a zero to the left of the decimal point (eg, 0.95). Use a hyphen to indicate ranges (eg, 75-100). Identify statistical measures of variations (eg, standard deviation or standard error of the mean). When the designation line at the left-hand side of a table (stub) requires two lines, values in that horizontal row should align with the second line of the designation. Align columns vertically on decimal points, hyphens, or "="). Use superscript letters to indicate footnotes (eg, ^a, ^b, ^c); however, use the standard * for $P < .05$, ** for $P < .01$, and *** for $P < .001$. The order of footnotes is determined by the first appearance of footnoted material in a horizontal row.

Authors who incorporate data from another published or unpublished source in a table must cite the original source in a reference or footnote.

Figures Authors should include copies of all figures in each copy of their manuscript submitted for consideration. In addition, authors must provide original art for each figure included in a manuscript. Original art should be placed in a separate, protective envelope (add cardboard to protect art from bending) marked with the name of the manuscript and the notation "original art."

Original art must be "camera-ready"; that is, clear, clear, and legible. (If a figure is dirty or blurry, has broken letters, or is hard to read, it will not be used.) Glossy black-and-white prints are preferred, but computer-generated figures or graphs produced by a high-quality laser printer (600 to 1,200 dpi for tone art and 300 dpi for line art) are acceptable. Photocopies are not acceptable. Symbols, letters, and numbers that appear in a figure or graph must be large enough to remain legible when the figure is reduced to fit the width of a single *Journal* column (approximately 3.7 inches). Photographs must be 8- by 10-inch glossy black-and-white prints; polaroid pictures are unacceptable.

Number figures consecutively according to the order they are cited in the text. Affix a label that shows the figure number, name of first author, short form of the manuscript title, and an arrow indicating the "top" to the back of the original art. Do not glue, staple, or write anything directly on the original art.

To ensure consistency between text and figures, follow *Journal* style when creating the lettering in figures; eg, avoid use of all-capital letters, omit periods in abbreviations, and use Systeme International (SI) values. See recent issues of the *Journal* for examples of lettering style.

Figure Legends

Figure legends should be brief yet make an illustration fully intelligible by itself. Define all acronyms or abbreviations used in the figure in the legend. Each legend should be numbered to correspond to the illustration and typed double-space on a separate sheet of paper (if legends are short, more than one legend can be typed on a single sheet of paper). If a figure is reproduced from another source, the appropriate credit line should be incorporated into the figure legend.

Software Citations

Cite software developers parenthetically in the text (not in the list of references) after the first mention of a software package. Software citations should include the name, version number, and release date of the software as well as the name and headquarters location (city and state) of the software developer. If software incorporates a nutrient database, provide information in the text about the database. This information should include the release date for the database, a description of substantial modifications made to the database, and an explanation of how missing nutrient data for foods were handled (ie, indicate whether values were extrapolated and evaluate the effect of any missing values on dietary totals for the nutrients of interest).

Footnotes in Text

Footnotes should be kept to a minimum and numbered consecutively, with superscript numerals, throughout the text. Double-space footnotes on a separate sheet of paper. If a brand name or type of equipment is mentioned, cite the name and headquarters location (city and state) of the manufacturer parenthetically in the text (not in a footnote) after the first mention of the item; however, generic names should be used whenever possible.

References

Number references consecutively in the order in which they are mentioned in the text. Identify references in text, tables, and figure legends by Arabic numerals in parentheses; do not use superscript numbers. References cited only in a table or legend should be numbered after all references cited in the text are assigned numbers; then, references cited in tables or legends should be numbered in the order in which a table or figure is presented in the manuscript. Double-space references on pages separate from the main text of a manuscript.

Authors should use relevant, current citations from the professional and scientific literature. No matter how well known a book or source material (eg, *Recommended Dietary Allowances*), it must be included in the list of references if it is mentioned in the manuscript. Avoid using abstracts as references, but theses and dissertations may be used as references. Personal communications may not be cited as references but may be noted parenthetically in the text. Use the following format: "In a letter (November 1994), Jane Smith, RD, reported...". All personal communications should be dated, and authors must secure the approval of the person quoted. Unpublished data, such as an article submitted for publication but not yet accepted, should be cited parenthetically in the text with a date and the notation "unpublished data." Articles accepted for publication but not yet published can be included in the list of references with the notation "In press." Inclusive page numbers must be provided for all periodical articles cited. Page numbers are not required when an entire book is cited, but specific page numbers are needed when only a chapter or section of a book is cited. Provide a page number for all material quoted directly from any source.

Authors are responsible for the accuracy and adequacy of all references cited in their manuscript. For more information on references, see the section "Reference Style" below.

JOURNAL STYLE

Numbers

Spell out numbers from one to nine, except for units of measure or statistical data (eg, nine men, 9 years, 9 g). Numbers that begin a sentence are always spelled out, as are any accompanying units of measure. The number of significant digits reported should be realistic and should be supported by the original data (eg, 2,125 kcal *not* 2,124.8 kcal). For sample sizes less than 100, frequency should be given (eg, 2 of 7, *not* 28%). Percent may also be provided if necessary.

Abbreviations

Abbreviate units of measure when used with numerals (5 g, 1,000 kcal). Chemical formulas should be written out, unless they are used to economize space in the column headings of a table; however, the formulas should be expanded in the legend or footnotes. Avoid acronyms unless they are commonly accepted. Always provide the complete form of an acronym the first time it is mentioned in the text.

Laboratory Values

All clinical laboratory values must be expressed in Systeme International (SI) units; authors must also provide the conversion factor to traditional units in a footnote. The exception to this is the use of kilocalories: the *Journal* will continue to use kilocalories instead of kilojoules. Pounds (lb) and inches (in) are also acceptable. A table of normal values in both traditional and SI units and the appropriate conversion factors appears in the March 1987 *Journal* on page 356. Authors should refer to this table when converting data and use it as a guide for choosing the appropriate number of significant digits.

To help readers become familiar with SI, the *Journal* will provide a footnote that shows the conversion factors and presents an equivalent value in the normal range expressed in both SI and traditional units. (These footnotes will contain rounded conversion factors; authors must use precise conversion factors when generating data.) The footnote will appear when an SI value is first mentioned in a manuscript's text, table, or figure. Therefore, authors must provide a comparative footnote for each clinical value presented in their manuscript worded as in the following example: "To convert mmol/L cholesterol to mg/dL, multiply mmol/L by 38.9. To convert mg/dL cholesterol to mmol/L, multiply mg/dL by 0.026. Cholesterol of 5.00 mmol/L = 193 mg/dL."

Reference Style

The *Journal* follows the American Medical Association style for references. One exception is that reference citations in the *Journal* must list all authors' names; use of "et al" is not acceptable. Abbreviate periodical titles according to *Index Medicus*; if a title does not appear in *Index Medicus*, provide the complete title. Examples of common types of references follow:

- *Article in a periodical*: Gottschlich MM, Mayes T, Khoury JC, Warden GD. Significance of obesity on nutritional, immunologic, hormonal, and clinical outcome parameters in burns. *J Am Diet Assoc* 1993;93:1261-1268.
- *Book*: Wardlaw GM, Insel PM, Seyler MR. *Contemporary Nutrition: Issues and Insights*. 2nd ed. St. Louis, Mo: Mosby-Year Book; 1994.
- *Book written by a committee*: Food and Nutrition Board. *Recommended Dietary Allowances*. 10th ed. Washington, DC: National Academy Press; 1989.
- *Chapter in a book*: Delahanty L. Implications of the Diabetes Control and Complications Trial (DCCT) in nutrition intervention. In: Pastors JG, Holter H, eds. *Meal Planning Approaches for Diabetes Management*. 2nd ed. Chicago, Ill: American Dietetic Association; 1994:11-13.

- *Letter to the editor*: Bari SI. Questions about influences of eating patterns. *J Am Diet Assoc* 1994;94:250. Letter.
- *Abstract*: Samour PQ, St Peter MJ, Harry MR, Gibbons G, Bistran BR. Continuous quality improvement: patients with pressure ulcers in an acute care teaching hospital. *J Am Diet Assoc* 1994;94(suppl):A-70. Abstract.
- *Thesis or dissertation*: Snuth SB. *Weight Control for Low-Income Black and Hispanic Women*. Denton, Tex: Texas Woman's University; 1990. Dissertation.
- *Federal register*: National school lunch program and school breakfast program: nutrition objectives for school meals (7 CFR 210.220). *Federal Register*. June 10, 1994;59:30218-30251.
- *Government bulletin*: The following information should be included in the order given: (1) name of author (if given); (2) title of bulletin; (3) place of publication; (4) name of issuing bureau, agency, department, or other governmental division; (5) date of publication; (6) page numbers, if specified; (7) publication number, if any; and (8) series number, if given. For example:
 - *The Surgeon General's Report on Nutrition and Health*. Washington, DC: US Dept of Health and Human Services; 1988. DHHS (PHS) publication 88-50211.
 - *Food Guide Pyramid: A Guide to Daily Food Choices*. Washington, DC: US Dept of Agriculture, Human Nutrition Information Service; 1992. Home and Garden Bulletin No. 252.
 - *Nutrition and Your Health: Dietary Guidelines for Americans*. 3rd ed. Washington, DC: US Depts of Agriculture and Health and Human Services; 1990. Home and Garden Bulletin No. 232.
 - *Healthy People 2000: National Health Promotion and Disease Prevention Objectives*. Washington, DC: US Dept of Health and Human Services; 1990. DHHS (PHS) publication 91-50213.

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RESOURCES FOR WRITING MANUSCRIPTS

- For authoritative decisions on style, usage, and spelling, the *Journal* uses the following resources: *American Medical Association Manual of Style*, 8th ed; *Dorland's Illustrated Medical Dictionary*, 28th ed; and *Merriam Webster's Collegiate Dictionary*, 10th ed. A list of additional helpful resources follows:
- Chernoff R, ed. *Communicating as Professionals*. 2nd ed. Chicago, Ill: American Dietetic Association; 1994.
 - Day RA. *How to Write and Publish a Scientific Paper*. 4th ed. Phoenix, Ariz: Oryx Press; 1994.
 - Huttl EJ. *Scientific Style and Format: The CBE Manual for Authors, Editors, and Publishers*. 6th ed. New York, NY: Cambridge University Press; 1994.
 - Monsen ER, ed. *Research: Successful Approaches*. Chicago, Ill: American Dietetic Association; 1992.
 - Ross-Larson BC. *Edit Yourself: A Manual for Everyone Who Works With Words*. New York, NY: WW Norton and Co; 1985.
 - Strunk W Jr, White EB. *The Elements of Style*. 3rd ed. New York, NY: Macmillan Publishing Co; 1979.

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