EVALUATION OF A NUTRITION EDUCATION PROGRAM FOR CANCER RISK REDUCTION IN WOMEN

A THESIS

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To the Dean for Graduate Studies and Research:

I am submitting herewith a thesis written by Heidi Whitman entitled "Evaluation of a Nutrition education program for Cancer Risk Reduction in Women." I have examined the final copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Arts, with a major in Community Health Education.

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DEDICATION

This thesis is dedicated to . . .

my parents, Al and Barbara Hoffman, who have always encouraged me to reach my goals;

and to my husband, Larry, for his support, understanding, and patience.

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I wish to express my appreciation for the time, guidance, and encouragement given me from the professors who served on my committee--Dr. Roger Shipley, Dr. Judith Baker, and Dr. Ruth Tandy.

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The purpose of the research was to evaluate the effectiveness of affective versus traditional nutrition education techniques in improving knowledge, attitudes and behavior. The 44 voluntary subjects participated in one of three courses: (a) experimental (three attitude-oriented sessions), (b) standard (one 1-hour lecture), or (c) control (no education). Sixteen subjects comprised the experimental group; 13 subjects, the standard group; and 15 subjects, the control group. All subjects were pre- and posttested using an objective knowledge test, two validated attitude scales, and 3-day dietary records. The data were analyzed using SPSSx, including t-tests and MANOVA to test the null hypotheses at the .05 level of significance. There were significant improvements from pre- and posttest in knowledge and attitudes within the experimental and standard groups, and in kcalorie intake within the experimental group. Only in knowledge did the experimental and standard

participants improve significantly more than the control participants.

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CHAPTER I

INTRODUCTION

Cancer is the second most common cause of mortality for all people in the United States, accounting for more than 20% of deaths in 1985 (Silverberg & Lubera, 1986). The National Cancer Institute (NCI) has estimated from research data that lifestyle and environmental factors contribute to the development of roughly 90% of cancer incidence (Greenwald, Sondik, & Lynch, 1986). Population studies indicate that as much as 25 to 35% of cancer mortality is related to dietary factors. Obesity, excess dietary fat, and lack of sufficient dietary fiber have been associated with cancers of the gastrointestinal tract and sex hormone-specific sites (Greenwald et al., 1986). Epidemiological studies further indicate that low intake of vitamins A and C is associated with greater risk of cancer (Greenwald et al., 1986).

Evidently, the potential for primary prevention and control of many cancers is largely untapped, and can be explored since the National Academy of Sciences Committee on Diet, Nutrition and Cancer (1982) has

published recommendations based on the epidemiological and experimental evidence relating dietary factors to the etiology and prevention of cancer. These dietary guidelines include the following:

1. Reduce intake of both saturated and unsaturated fats from approximately 40% to approximately 30% of total calories.

2. Include fruits, vegetables, and whole-grain cereal products in daily diet; especially citrus fruits, dark green, and deep yellow vegetables, and carotene-rich and cruciferous vegetables. Avoid high doses of dietary supplements.

3. Minimize consumption of cured, pickled, and smoked foods.

4. Use alcohol in moderation (p. 5).

Traditionally, nutrition education programs for adults have relied on cognitive educational strategies, assuming that gains in knowledge would logically cause positive dietary changes (Brush, Woolcott, & Kawash, 1986). In fact, knowledge functions as a tool only if and when people are ready to make changes (Hochbaum, 1981). An attitude change, that is, an "emotional readiness" to shift to a different behavior, must precede the acceptance of facts and the occurrence of

behavior change (Brush et al., 1986; Hochbaum, 1981). An affective educational approach has proven successful in nutrition programs (Brush et al., 1986; Rosander & Sims, 1981). This approach focuses on the learner's self-awareness, interpersonal relationships in the learning environment, and recognition of learner needs, perceptions, and competencies (Thayer, 1976).

Purpose of Study

The primary purpose of this study was to evaluate the effectiveness of the traditional versus affective nutrition education methods as applied to cancer risk reduction. This program was sponsored by the Texas College of Osteopathic Medicine (TCOM) in Fort Worth, Texas. The evaluation focused on changes in knowledge about the dietary causes of cancer, attitudes toward changing eating habits, and the actual changes in dietary behavior.

Statement of the Problem

The following investigation was designed to: (1) determine the extent of nutrition knowledge and attitudes toward dietary causes of cancer, and (2) to evaluate the effectiveness of various nutrition education techniques

in changing knowledge, attitudes and behavior. Voluntary subjects elected to be a member in either an experimental group, who attended three one-hour nutrition education sessions, a standard group, who attended a one-hour lecture, or a control group who attended no sessions. All subjects were pre- and posttested for their knowledge, attitudes, and dietary behavior.

Hypotheses

The following null hypotheses were tested at the .05 level of significance:

1. There is no significant difference between pre- and posttest levels of knowledge of the dietary causes of cancer within the experimental, standard, and control groups.

2. There is no significant difference in the change from pre- to posttest levels of knowledge of the dietary causes of cancer among the experimental, standard, and control groups.

3. There is no significant difference between pre- and posttest attitudes toward foods and nutrition within the experimental, standard, and control groups.

4. There is no significant difference in the change from pre- to posttest attitudes toward foods and

nutrition among the experimental, standard, and control groups.

5. There is no significant difference between pre- and posttest self-reported dietary patterns within the experimental, standard, and control groups.

6. There is no significant difference in the change from pre- to posttest self-reported dietary patterns among the experimental, standard, and control groups.

Delimitations

The research was delimited by the following factors:

1. Participants were recruited through local advertisements of the classes in the Fort Worth Star-Telegram and the biweekly Dateline newsletter, published by TCOM, and through personal contacts with community or corporate groups.

2. Participants were required to give informed consent following a complete description of the research procedures.

3. Data from experimental participants who did not attend all three classes or from any participants who did not complete the posttest were eliminated from the analyses.

Limitations

The research was limited by the following factors:

1. The participants were self-selected; therefore, those who chose to be involved in the experimental group may be more highly motivated than those who chose to be involved in the standard or control group.

2. The investigator was unable to randomize the participants into the treatment groups.

3. The size of the sample was smaller than expected, and may be too small to provide statistically significant results.

CHAPTER II

REVIEW OF LITERATURE

The purpose of this investigation was to evaluate the effectiveness of the traditional versus affective nutrition education methods as applied to cancer risk reduction. A survey of literature indicated that nutrition and cancer risk are indeed related, and that this study is progressive in addressing nutrition education for cancer risk reduction, as well as in its affective approach. The review of literature will be organized under the following major headings: (a) Diet, Nutrition, and Cancer, (b) Nutrition Education, and (c) Instrumentation.

Diet, Nutrition, and Cancer

The scientific literature is replete with publications concerning the relationship of diet and nutrition to cancer risk reduction. The following is a review of epidemiological evidence concerning the major factors of obesity, fat intake, fiber intake, and the micronutrients.

Obesity

Epidemiological studies of obesity and cancer risk have indicated a strong correlation between the two factors. Data from life insurance companies have repeatedly shown that overweight and obesity are associated with increased risk of cancer (Simopoulos, 1987). The American Cancer Society (ACS) conducted a long-term prospective study during 1959-72; the results indicated that mortality from cancer was elevated among those people who were 40% or more above average weight. Cancers of the colon and rectum were the principal causes of excess cancer mortality among men, while cancers of the gallbladder and biliary passages, breast, cervix, endometrium, uterus, and ovary were the most common causes of excess cancer mortality among women. Cancer mortality was 166% higher in obese women, but only 33-50% higher in obese men, when compared to persons of average weight, same age, and gender (Lew & Garfinkel, 1979).

A number of smaller studies have shown an association between overweight and cancer of the breast and endometrium (Simopoulos, 1987). For example, the difference in breast cancer incidence among Dutch women versus that among Japanese women was highly correlated with the difference in body weight and height

distribution. Another study reported a significantly elevated risk for breast cancer in women over 50 years of age weighing more than 5% above the national average. Furthermore, studies of women athletes who are lean and exercise frequently have shown that they have much less cancer of the reproductive system than non-athletes. This strong correlation between obesity and cancer may be due to the increased levels of prolactin, androgens, estrogens, and cortisol in obese individuals (Simopoulos, 1987).

As a result of the evidence implicating obesity as a risk factor for cancer, the ACS included in its dietary guidelines for the general public a warning to avoid obesity (American Cancer Society, 1984). The National Cancer Institute (1986), however, did not include such a recommendation.

Dietary Fat Intake

Dietary fat is more highly correlated with calorie intake than protein or carbohydrate, simply because fat contributes 9 kcal/g, whereas protein and carbohydrate provide only 4 kcal/g each. The epidemiological research on dietary fat and cancer shows some inconsistencies, which may be secondary to the correlation of fat and total calories. With regard to cancers of the

reproductive organs, fats have been hypothesized to increase levels of estrogen and androgens, thereby enhancing risk (Graham, 1987). Lubin et al. (1981) did find an increase in relative risk of breast cancer with increased ingestion of meats and fish, beef, and pork, and total animal fat. Marshall, Graham, Byers, Swanson, & Brasure (1983) reported increased risk of cervical cancer associated with ingestion of animal fat, and increased risk of prostate cancer with increased total fats. However, a higher fat diet may actually be protective against esophageal cancer. A study in Calvados, France indicated that high ingestion of meats and vegetable oil reduced risk of cancer of the esophagus (Graham, 1987). Similarly, a study by Ziegler et al. (1981) found an increased risk of esophageal cancer for low ingestion of meat, dairy products, and eggs.

With regard to colon cancer, fats have been hypothesized to increase fecal bile acids, neutral steroids, and bacteria that can metabolize them into carcinogens (Graham, 1987). Several studies have correlated the per capita consumption of fats in various countries with corresponding rates of incidence and mortality for colon cancer. Other studies, however, have found no association between per capita fat consumption

by state in the United States or by region in Great Britain and colorectal cancer mortality (Kolonel, 1987). Analytic studies of cases and controls, based on frequency of consumption of selected foods, are difficult to interpret, due to partially quantified fat intakes. For example, a Canadian study (Jain et al., 1980) found a strong association between colon cancer and fat, especially saturated fat. Garland et al. (1985), however, reported no association between fat intake and risk of colon cancer in a male prospective cohort. Dales, Friedman, Ury, Grossman, & Williams (1979) found a significantly increased risk for subjects with a high-fat, low-fiber intake relative to those with a low-fat, high-fiber intake. This finding suggests a synergistic interaction between fat and fiber on the concentration and/or metabolism of bile acids in the colon (Kolonel, 1987).

The National Cancer Institute (1986) and the American Cancer Society (1984), after reviewing the available literature, both recommended that the American public reduce their intake of fat to 30% or less of total calories. Neither organization made a distinction between saturated, monounsaturated, and polyunsaturated fatty acids.

Dietary Fiber Intake

Dietary fiber is defined as the material from plant cell walls that is resistant to digestion in human digestive enzymes (Gorman & Bowman, 1988). The two basic categories of fibers are water-insoluble and water-soluble. Water-insoluble fibers include lignin, cellulose, and the hemicelluloses, found primarily in wheat bran, fruits and vegetables (Gorman & Bowman, 1988). Water-soluble fibers include pectins and gums, as well as some commercial supplements, such as Metamucil and psyllium fiber (Jacobs, 1986).

The scientific evidence concerning the relationship of fiber to colon cancer belies a complex, poorly understood mechanism of carcinogenesis. Most studies of laboratory rodents show that cellulose and lignin tend to inhibit tumor formation, while the soluble fibers tend to enhance the process (Jacobs, 1986). Furthermore, international correlation studies most consistently show that availability or intake of cereal fiber is inversely correlated with colon cancer. Legume consumption is inversely associated with colon cancer in about 60% of reported studies, while fruit and vegetable consumption is inversely associated in less than 25% of reports (Jacobs, 1986). Case control studies, however, more

strongly confirm the role of fruits and vegetables rather than cereals and legumes in reducing colon cancer risk (Jacobs, 1986).

In light of this conflicting evidence, the American Cancer Society (1984) recommended 30 g of fiber daily, stating that even if fiber does not prove to have a protective effect against cancer, fruits, vegetables and whole-grain products are commendable alternatives to fatty foods. The National Cancer Institute (1986) also recommended an average intake of 20-30 g of fiber daily, not to exceed 35 g.

Micronutrient Intake

Several micronutrients, that is, vitamins and minerals, have been hypothesized to play a role in the development of cancer. The following is a brief review of the most well-researched micronutrients with a possible relationship to cancer risk reduction.

Vitamin A: retinol and beta-carotene. Retinol and the other retinoids are derived from animal sources, such as dairy products and organ meats, and have been shown to have potent, hormone-like effects on cell growth and differentiation. In contrast, the caretenoids are plant pigments, some of which can be converted to retinol. The most important caretenoid appears to be

beta-carotene; its anti-cancer activity may be due to its conversion to retinol or to its inherent antioxidant activity (Hennekens, Mayrent, & Willett, 1986).

Epidemiological studies usually have not differentiated between dietary intakes of retinol or beta-carotene, but rather measured total vitamin A intake. All of the cohort studies and the great majority of case-control studies have found a protective effect against cancers of the lung, oral cavity, larynx, esophagus, stomach, pancreas, bladder, breast, cervix, and ovary (Bertram, Kolonel, & Meyskens, 1987). Case-control investigations determining blood levels of retinol and/or beta-carotene have also found an inverse association with cancers of the lung, esophagus, bladder, stomach, and breast (Bertram et al., 1987). The protective effect seems to be stronger for beta-carotene, which supports the theory that it may prevent damage due to oxidation (Hennekens et al., 1986).

Vitamin C. Ascorbic acid, commonly called vitamin C, has been shown experimentally to prevent the formation of nitrosamine and other nitrosated carcinogens, through its antioxidant activity (Birt, 1986). Epidemiologic studies also suggest that fruits and vegetables containing vitamin C may offer specific protection for

the esophagus, stomach, and lung (Greenwald et al., 1986). For example, studies in northern Iran suggest that diets low in fruits and vegetables may have contributed to the high incidence there of cancer of the the esophagus (Greenwald et al., 1986). Kolonel (1981) reported that low vitamin C intake was associated with an increased risk of stomach cancer in groups of men in Hawaii. Hirayama (1977) found that Japanese who eat yellow and green vegetables daily appear to have a lower risk of lung cancer than Japanese who rarely eat these types of vegetables, an association which was significant for both smokers and nonsmokers.

Non-nutritive components. Non-nutritive components in cruciferous vegetables, which belong to the cabbage family, may also reduce the risk of cancer. Some epidemiological as well as experimental studies have indicated an inverse association with gastrointestinal and respiratory cancers (American Cancer Society, 1984).

In view of the available data, both the NCI and the ACS have published recommendations for the general public to eat more fruits and vegetables, especially cruciferous vegetables and those that are rich in vitamins A and C. Neither organization has recommended

supplementation of vitamins A or C (National Cancer Institute, 1986; American Cancer Society, 1984).

Alcohol Consumption

Epidemiological studies show that excessive beer drinking is directly associated with colorectal cancer among populations in some parts of the world, including the United States. Excessive alcohol consumption of any kind, especially when combined with cigarette smoking, appears to synergistically increase the risk of cancers of the mouth, larynx, esophagus, and respiratory tract (Palmer & Bakshi, 1983). Although animal studies do not indicate the same risk, both the NCI and the ACS recommend use of alcoholic beverages only in moderation (National Cancer Institute, 1986; American Cancer Society, 1984).

Salt-cured, Pickled, and Smoked Foods

Nitrates and nitrites, present in cured meats, are not directly carcinogenic; however, nitrite is mutagenic in mammalian systems, and both nitrate and nitrite are converted to nitrosated compounds in living systems (Palmer & Bakshi, 1983). Over 90% of the approximately 300 nitrosated compounds tested to date are carcinogenic and/or mutagenic in multiple animal species. Also, polycyclic aromatic hydrocarbons, present in certain

smoked food, charcoal broiled meats and fish, especially fatty meats, have been found to induce cancers of multiple sites in animals and are strongly mutagenic (Palmer & Bakshi, 1983).

Many epidemiological studies have reported that frequent or greater consumption of cured, pickled, or smoked foods is directly associated with the incidence of cancer of the esophagus or stomach. These reports have come from such diverse cultures as China, Japan, U.S.S.R., Norway, Iceland, Hungary, and particular regions of the United States (Palmer & Bakshi, 1983).

Based on the strong epidemiological evidence and supporting laboratory evidence, the National Academy of Science (NAS) included in their Interim Dietary Guidelines a recommendation to minimize intake of cured, pickled, and smoked foods (National Academy of Sciences, 1982). However, the Council for Agricultural Science and Technology ("Diet, Nutrition, and Cancer", 1982) criticized this guideline as unnecessary, noting that only a very small fraction of the cured foods available in the U.S. are processed using techniques of salt-curing or smoking similar to those that have been linked with increased cancer risk in populations in other countries. The ACS repeated the warning of the NAS guideline in

their recommendations to the public, but noted that most U.S. manufacturers have found new ways of processing meats (American Cancer Society, 1984).

Summary

Obesity, excess dietary fat, lack of sufficient dietary fiber, excessive alcohol consumption and frequent consumption of cured, pickled, or smoked foods have been associated with cancers of the digestive tract and sex hormone-specific sites. Epidemiologic studies further indicate that low intake of vitamins A and C, as well as cruciferous vegetables, is associated with greater risk of cancer. Both the NCI and ACS have published recommendations for the general public to eat less fat, more fiber, more vitamins A and C rich foods, more cruciferous vegetables, and to drink alcohol only in moderation. The ACS has also recommended avoidance of obesity and moderate intake of salt-cured, smoked, and nitrite-cured foods.

Nutrition Education

The following material reviews the published literature on the current status of dietary habits among women, American attitudes toward cancer and nutrition, and research in nutrition education methodology.

Although a great need for nutrition education exists, apparently little has been done to determine the most effective methods.

Dietary Habits Among Women

Cancer, although the second leading cause of death for all Americans, is the primary cause of death for women aged 35 to 54 (Silverberg & Lubera, 1986). As stated previously, 25 to 35% of cancer mortality can be attributed to diet (Greenwald et al., 1986). Since long-term dietary patterns are likely to be most significant, nutrition education is needed for women of all ages.

The United States Department of Agriculture conducted two surveys of food intake of women aged 19 to 50, in 1977 and 1985 (Peterkin, 1986). Mean dietary fat as a percentage of total calories had decreased from 41% to 37% from 1977 to 1985. Mean dietary fiber intake in 1985 was estimated to be 11.8 g daily. Comparison with the recommendations of 25-30% of calories from fat and 20-30 g of fiber daily indicates further need for improvement. The average intake of vitamin A and vitamin C were above the Recommended Daily Allowances (RDAs) in 1985, and were as high or higher than those of 1977 (Peterkin, 1986). It is unknown what level of these nutrients may help prevent cancer.

The average energy intake by women in 1985 was 1,660 calories, which is near the bottom of the Recommended Energy Intake (REI) range of 1,600 to 2,400 kcalories for women of this age range (Peterkin, 1986). Other studies, however, have noted a prevalence of overweight women in the United States (Abraham, 1983). This incongruence may have occurred because the REI is higher than the actual calorie needs of the women surveyed and/or because the women surveyed may not have reported all they ate and drank, especially of alcoholic beverages (Peterkin, 1986). Only 15% of women surveyed in 1985 reported having had an alcoholic beverage, a statistic only slightly higher than that in 1977. However, the average intake of alcoholic beverages by women in 1985 had increased by 53% over the average intake in 1977, to the level of 84 g, or 35% of total calories (Peterkin, 1986). Obesity and overindulgence in alcoholic beverages are thus probably common problems for American women.

American Attitudes Toward Cancer and Nutrition

The NCI conducted a Cancer Prevention Awareness Survey in 1983 to develop quantitative data concerning public knowledge, attitudes, and behavior related to cancer prevention and risk (National Cancer Institute, 1984). When asked which behaviors would reduce a

person's risk of cancer, the response of "changes in food/diet" was given 46% of the time; however, most people could not identify which changes in diet were important (National Cancer Institute, 1984). The NCI survey also measured perceptions of susceptibility, seriousness, and benefits of preventive practices against cancer. When asked what their chances were of getting cancer, the majority responded "very" or "somewhat" likely. Not surprisingly, cancer was deemed the most serious health problem by 70% of the respondents. Lastly, almost half the respondents agreed with the statements "It seems like everything causes cancer" and "There is not much a person can do to prevent cancer" (National Cancer Institute, 1984).

Perceived barriers to eating a nutritious diet include the poor taste, inconvenience of preparation and costliness of such (Hochbaum, 1981). However, other influences may override these barriers; more than 90% of people are at least somewhat likely to follow a doctor's advice concerning ways to reduce cancer risk (National Cancer Institute, 1984). Support from family and friends may also play a role, since about 40% of Americans stated they had acquired information about cancer prevention from these sources (National Cancer Institute, 1984).

Research in Nutrition Education Methodology

According to Hochbaum (1981), nutrition education has historically been guided by three generally invalid philosophies: a) that informed awareness of the health effects is in itself a strong motivator for people to watch what they eat; b) that lack of nutrition knowledge is the most important element that prevents people from eating more rationally; and c) that informed people will eat more rationally, provided that they can afford and have access to the proper foods. However, educational studies have demonstrated time and time again that gains in nutrition knowledge in various population groups are not necessarily or even frequently accompanied by corresponding improvements in the kinds of foods purchased and consumed (Hochbaum, 1981). Indeed, psychosocial research has found that knowledge, in and of itself, is not the stimulus for change. Rather, facts are generally used to justify a decision to change, rather than to stimulate it. In the absence of an emotional readiness to change behavior, facts are either ignored or altered to rationalize the current behavior (Hochbaum, 1981). Therefore, nutrition educators should be concerned with how to encourage people to be emotionally ready to change their eating habits.

The Health Belief Model (Becker, 1974) proposes that individuals must perceive that they are likely to be affected by the disease, and that the disease is serious, threatening their physical, social, personal, and/or economic well-being, before they are likely to take action. Too often, nutrition educators focus only on health concerns, believing that prevention of disease is a natural motivator for people (Iverson & Portnoy, 1984). In reality, health tends to become a motivator only when a person loses it; or, as Hochbaum (1979) stated: "Health is what helps me be what I want to be, and to do what I want to do...[and to] live the way I would like to live" (p.199). Hochbaum (1981) stresses that since taste, economy, and convenience are among the prime motivators of people's food choices, why not focus on them as motivational factors, rather than health benefits? A nutritious diet does not have to be bland, expensive and time-consuming to prepare. Iverson & Portnoy (1984) also emphasize that the perceived barriers to changing behavior must be reduced or eliminated.

Affective education is that approach to education which focuses on changing learners' attitudes before attempting behavioral change. The learners become aware of their own personal values and needs, and develop

interpersonal relationships with each other which encourage further change (Thayer, 1976). Iverson & Portnoy (1984), in their guidelines for health promotion programs, stress that (a) participants should be able to set individual, realistic goals; (b) participants should be able to make a number of small changes, thus experiencing success and gaining confidence; (c) participants should make a specific commitment to change; and (d) the family, peers, and friends of participants should be involved as much as possible. A similar approach has proved successful in nutrition education programs (Brush et al., 1986; Rosander & Sims, 1981).

Summary

Dietary patterns of American women show a definite need for change, especially in the areas of fat and fiber intake. The American people as a whole consider cancer a very serious threat to health that is often inevitable, and lack knowledge of what dietary changes might reduce their risk of cancer. Nutrition knowledge alone, however, is not sufficient to change behavior; persons must be emotionally ready to make changes in eating habits. Affective education, an approach focusing on attitudinal change as the basis for behavioral change, has been effective in nutrition education programs.

Instrumentation

The following is a review of current literature concerning measurement of nutrition knowledge, attitudes, and behavior. Measurement of knowledge is the most refined and objective, whereas measurement of attitudes toward foods and nutrition is more subjective. Measurement of dietary behavior, at least in a free-living population, is approximate at best.

Measurement of Nutrition Knowledge

The level of cognitive learning to be achieved in the nutrition education program is on the knowledge level, including the ability to identify and recall specific facts and information. To test this knowledge, a pre- and posttest should be objective, including multiple-choice and true-false items. According to Gronlund (1982), a multiple-choice item consists of a stem, which presents a problem situation, and several alternatives, which provide possible solutions to the problem; one answer is correct, and the others plausible distracting wrong answers. Gronlund (1982) also stated that each item should be designed to measure an important learning outcome. Furthermore, the stem should be a single clearly formulated problem, in simple language. As much wording as possible should be in the stem, which

should be stated in a positive form wherever possible; negative wording should be emphasized if used. The test constructor must also make certain that the intended answer is correct or clearly best, that all alternatives are grammatically consistent with the stem of the item and parallel in form, and that no verbal clues are given. The wrong alternative answers should be plausible and attractive to the uninformed, the alternative "all of the above," and "none of the above" should be used with extreme caution, and the position of the correct answer should be varied in a random manner. Lastly, the test constructor must check that each item is independent of the other items in the test (Gronlund, 1982). A true-false item, likewise, should include only one central, significant idea, worded simply, briefly, and so precisely that it can be unequivocally judged true or false. Negative statements should again be used sparingly, especially double negatives. Statements of opinion should be attributed to a specific source, and extraneous clues, such as the absolute modifiers--"always", "never", "only", "all", and "none"--should be avoided (Gronlund, 1982). Lastly, the validity of the constructed questions should be evaluated prior to

administration by a panel of judges who are experts in nutrition (Brush et al., 1986).

Measurement of Attitudes Toward Nutrition

An "attitude" has been defined by modern social science as "a disposition (positive, negative, or somewhere in between) toward objects, situations, actions, ideas, or other stimuli" (Foley, Hertzler, & Anderson, 1979, p. 13). Furthermore, an individual's attitude consists of complex relationships between several components: information and the individual's evaluation of it, an emotional reaction to the information, and the resultant tendency toward action (Foley et al., 1979). Attitudes have been reported to influence dietary behavior independently of the individual's knowledge of nutritional concepts and practices (Carruth & Anderson, 1977). Furthermore, the level of nutritional knowledge by itself is not predictive of, or necessarily sufficient to change eating habits (Carruth & Anderson, 1977). Therefore, the measurement of attitudes toward nutrition is an essential, albeit difficult, aspect of evaluating the effectiveness of nutrition education.

In reviewing studies of attitudes and food habits, Foley et al. (1979) classified attitude measurements as

measurements of (a) preferences, likes or dislikes, and feelings; (b) food behavior; (c) flexibility versus rigidity; (d) similarity of attitudes within families; and (e) complexity of meanings. The first classification has historically been useful in determining which foods people prefer to eat, given a choice, in school or military cafeterias. This type of measurement, however, does not take into consideration factors other than preferred taste, such as cost and convenience, which are important when people have to pay for and prepare their own meals. The second classification assumes that only actual food habits accurately indicate attitudes toward nutrition; however, attitudes toward particular foods cannot be inferred directly from dietary records. The fourth classification, measurements of similarity of attitudes within families, is primarily important when the surveyed individuals are children whose food choices are strongly affected by the parents' choices (Foley et al., 1979).

Jalso, Burns, & Rivers (1965) were the first to study the personality trait of flexibility/rigidity in relationship to nutritional practices, using the Rokeach Dogmatism Scale. They found that flexibility was positively associated with better nutritional practices

and higher opinion scores. Carruth, Mangel & Anderson (1977) developed a scale of 40 statements to measure flexibility/rigidity toward nutritional practices. They reported that flexibility in attitude and personality was a more potent predictor of nutrition-related behaviors than nutritional knowledge. Boren, Dixon, & Reed (1983) further refined this scale so that it measured only the evaluative dimension best described as "openness/closedness toward change" in nutritional practices. The results of this Attitude Toward Nutrition Scale (ATNS), composed of 18 statements in a Likert format, were found to be positively correlated with simultaneous results of the Rokeach Dogmatism Scale, thereby establishing its criterion-related validity. Boren et al. (1983) showed the instrument to be reliable through use of split-half reliability, Cronbach's Alpha reliability, and factor analysis using principal axis varimax oblique rotation. Content validity was assessed by review by a panel of 22 external judges who were experts in nutrition, education, or instrument development. Statements were selected on the basis of agreement of 75% or more of the judges. Brush et al. (1986) also used the instrument in their evaluation of an

affective-based adult nutrition education program, given in public health units in Canada.

The fifth classification of attitude measurement, complexity of meanings, is proposed to measure other perceptions of foods, such as the economic cost, and convenience, as well as the aesthetic-sensory perception. Fewster, Bostian, & Powers (1973) developed an instrument to measure the connotative meanings of foods, which includes all the ideas, feeling, and attitudes that an individual associates with a word/concept. The semantic differential scales consist of a pair of polar adjectives, separated by seven blank spaces. The central position (4) is classed as neutral/undecided. Fewster et al. (1973) showed that their semantic differential instrument had test-retest reliability, as well as construct validity, in their study of female homemakers in Wisconsin.

Measurement of Dietary Behavior

Obtaining valid information about the food intake of individuals is, at best, a very difficult and tedious task, rarely free from error. The most accurate approach is to analyze for nutrient content exact duplicates of what people ate; the logistic and administrative problems of this method, however, make it unfeasible for most

situations (Beal, 1967). The most common methods include recording food intakes for varying lengths of time, then using tables of nutrient data for the foods to calculate average intakes. Computer data bases of nutrient values for foods have made nutrient analysis somewhat easier, since sums and averages of nutrient values no longer have to be manually calculated. Calculation of nutrient content from tables of food values, however, is only accurate if the foods eaten match previously analyzed and recorded foods, and if the subject accurately records the amounts eaten. Due to the many errors that can occur, calculated nutrient composition of diets is at best approximate, even if computerized. Fortunately, for many research purposes, an approximate measure of nutrients is useful and acceptable (Block, 1982).

Several different methods of recording food intake for nutrient calculation have been developed in the past fifty years. To assess "usual" intake over a long period of time, the most commonly used methods are the diet history and food frequency questionnaire. The diet history consists of an extensive interview designed to to quantify on a daily, weekly, or monthly basis the frequency of consumption of different foods (Block, 1982). The food frequency is similar, with the primary

difference being that it is usually self-administered. Another approach to dietary assessment is to have subjects simply record the food consumed over a "representative" 24 hours, 3 days, or 7 days. Presumably, the longer the time period, the more representative the record will be. A 24-hour recall, especially without advance warning to the subject, is little more than a simple test of memory and is usually highly inaccurate (Beal, 1967). The 3-day record (3DR), however, has been shown to be strongly correlated with the 7-day record (7DR) for intake of calories, protein, fat, carbohydrate, calcium, phosphorus, and iron (Stuff et al, 1983). Several (Sorenson, Calkins, Connolly, & Diamond, 1983; Stuff, Garza, Smith, Nichols, & Montandon, 1983), but not all (Jain et al., 1980; Mahalko, Johnson, Gallagher, & Milne, 1985) studies have found that the longer-term assessments, such as the food frequency and dietary history methods, tend to yield higher values for nutrient intake than the 1-, 3- or 7-day records. Agreement between two dietary assessment methods does not necessarily indicate validity, but perhaps only similar errors. However, if the two methods are shown to be substantially different, one may conclude that at least

one of them fails to measure the long-term dietary intake (Mahalko et al., 1985).

Summary

An objective test, using both multiple-choice and true-false items, is the best method for measuring achievement at the cognitive level. The test should be carefully prepared, following established guidelines. Two instruments, to measure flexibility/rigidity in attitudes toward nutrition and the connotative meanings of different food groups, have been developed. Obtaining valid and reliable information about the food intake of individuals is most feasibly done by calculation of self-reported diets. Subjects are asked to either keep a record of what and how much they eat for a given number of days, or to give a history of the frequency of eating certain foods. Both methods have their advantages and disadvantages, and often the results yielded from the two methods are significantly different. The 3DR is an acceptable compromise between burden on the subject and representation of usual diet.

CHAPTER III

METHODOLOGY

The purpose of the study was to evaluate the effectiveness of the traditional versus affective nutrition education methods as applied to cancer risk reduction. The evaluation included measurements of nutrition knowledge, attitudes toward foods and nutrition, and dietary behavior. The procedures used were organized under the following headings: (a) Preliminary Procedures, (b) The Setting and Sample, (c) Research Instruments, (d) Course Objectives, (e) Lesson Plans, (f) Treatment of the Data, and (g) Preparation of the Final Report.

Preliminary Procedures

The literature relating to the study was reviewed, critiqued, and analyzed prior to undertaking the study. In conjunction with the related literature, a tentative outline for the proposed study was developed and, following suggestions from a thesis committee, appropriate revisions were made. Permission was

obtained from the appropriate administrative personnel within the Texas College of Osteopathic Medicine (see Appendix A). A prospectus of the study was filed in the Office of the Provost of the Graduate School at Texas Woman's University.

The Setting and Sample

This study was a quasi-experimental research design. Class participants were recruited through local advertisements of the classes in the Fort Worth Star Telegram and the biweekly Dateline newsletter, published by TCOM, and through personal contacts with church and corporate groups. Five 3-session (experimental method) courses were offered in May and June, 1988, at times convenient to the participants, with sessions held one week apart. Four of these five courses were held at TCOM, whereas the last was held in Crowley, Texas, at the home of one of the participants. A 1-hour session (standard method) class was offered at six separate times in June and July, 1988: thrice at TCOM, once at a church meeting place, once in a home of a participant, and once at the Hulen Towers location of General Dynamics/Fort Worth Division. Control subjects were recruited in July and August, 1988, primarily at

TCOM or at the main plant location of General Dynamics/Fort Worth Division. The necessary method of recruiting did not allow randomization of the subjects, for several reasons: (a) the initial advertisements attracted only about 20 women who wanted to participate in the experimental course; (b) women who signed up for the experimental course but did not attend were contacted for participation in the standard or control group; (c) the investigator had to use all known contacts to recruit enough subjects for at least 15 women to remain in each group, after accounting for attrition. Initial projected size for each of the groups--experimental, standard, and control--was 30 subjects. The projected age range was 25-65 years. The criteria used for the selection of the subjects stipulated that all subjects must not have current or past diagnoses of cancer of any type, and that they must not be pregnant or lactating. Lastly, participants were required to give informed consent following a complete description of the research procedures.

Research Instruments

The following instruments were administered as a pretest (required completion before the first session),

and as a posttest (required completion within a month of the last session).

Nutrition Knowledge Test

The knowledge test was constructed following the guidelines established by Gronlund (1982) (see Appendix D). The questions were primarily developed from statements in the educational pamphlets, Diet, Nutrition, & Cancer Prevention: The Good News" (National Cancer Institute, 1986) and Nutrition, Common Sense & Cancer (American Cancer Society, 1984). One question was taken verbatim from the knowledge test used by Brush et al. (1986) in their nutrition education program, and one question was derived from nutrient data (Pennington & Church, 1980). The test was reviewed and critiqued for validity by Ann Blankenship, Ph.D., R.D., of the Texas College of Osteopathic Medicine, Mary Ann Gorman, Ph.D., R.D., of Texas Christian University, and Andie Hsueh, Ph.D., R.D., of Texas Woman's University (see Appendix B). Suggested changes were made before administration.

Attitude Scales

The semantic differential scale measuring the connotative meanings of foods, as developed by Fewster et al. (1973) was adapted for use in this study. Three scales were chosen to measure the evaluative (sensory)

factor, two scales to measure the economic factor, and one to measure the convenience factor. Each scale was listed under ten food groups selected as important in cancer risk reduction (see Appendix E). Written permission to use the instrument was obtained from one of the original authors, Richard D. Powers, Ph.D., of the University of Wisconsin (see Appendix C).

The Attitude Toward Nutrition Scale (ATNS) was administered as originally published by Boren et al. (1983) with the exception of the omission of one question which was irrelevant to the population of this study (see Appendix E). Written permission to use the instrument was obtained from the original author, Angela R. Boren, R.D. (see Appendix C).

Dietary Behavior Instruments

To measure dietary behavior, two instruments were initially planned for administration. A food frequency questionnaire, originally developed by the Health and Human Fitness Division of TCOM, was adapted for coding into the Nutritionist III software program (see Appendix F). This questionnaire, like other food frequency methods, was developed to measure usual nutrient intake. As a crosscheck against this method, the participants were also instructed to keep a record of what they ate

for 3 days. They were given explicit written instructions on how to record their food intake and forms for doing so (see Appendix G). The dietary records were also coded; then, the Nutritionist III software program was used to calculate nutrient intake from both instruments. Often, information given on the food frequency questionnaire clarified the food records for individual participants.

However, the burden of completing both these instruments for the posttest as well as the pretest was too much for most of the participants. Furthermore, for most of the nutrients important in cancer risk reduction (kcalories, fat, fiber, vitamin A, vitamin C, alcohol and smoked/cured foods), the two instruments yielded similar data. In order to increase posttest return, completion of the food frequency questionnaire was not required for the posttest. Also, most of the control subjects were not asked to complete the food frequency questionnaire on either the pre- or posttest, but simply to be very specific on their food record.

Course Objectives

The National Cancer Institute has established specific dietary objectives for cancer risk reduction

(Greenwald et al., 1986). For the year 1990, these goals include: (a) an increase in per capita consumption of fiber to 15 g or more per day, from the 1976-1980 level of 8-12 g per day; and (b) a decrease in the per capita consumption of fat to 30% or less of total calories, from the 1976-80 level of 40%. The NCI also seeks to raise public awareness by 1990: (a) More than 75% of the adult population should be able to identify the principal dietary factors known or strongly suspected to be related to cancer; (b) 70% of the adult population should be able to identify foods that are low in fat and high in dietary fiber; and (c) more than 75% of the adult population should be aware of the added risk of head and neck cancer from excessive alcohol consumption. By the year 2000, NCI seeks to further decrease the daily intake of fat to 25% or less of total calories and increase the daily intake of fiber to 20-30 g (Greenwald et al., 1986).

Based partially on the NCI national goals, overall course objectives were planned for the experimental and standard subjects. The cognitive objectives for posttest results include: (a) Identification of the principle dietary factors known or strongly suspected to be related to cancer; (b) identification of foods that are low in

fat and calories, high in dietary fiber and/or high in vitamin A and C; and (c) identification of the added risk of head and neck cancers from excessive alcohol consumption. The affective objectives for posttest results included: (a) Increased perception that recommended foods can be appetizing, economical, and convenient to prepare; and (b) increased flexibility in attitude toward changing diets. The behavioral objectives for posttest results included: (a) Increased consumption of fiber to 15 g or more daily; (b) decreased intake of fat to 30% or less of total calories; (c) meeting or exceeding the RDA for vitamins A and C, without supplementation; (d) calorie intake within requirements for weight maintenance or reduction (if needed); e) alcohol consumption of 10% or less of total calories; and (f) an average of 1 ounce or less of smoked/cured foods daily.

Lesson Plans

The experimental course was designed to emphasize understanding of the attitudes and values which affect food choices, and to promote awareness that a healthful diet does not have to be unappetizing, expensive, and time-consuming to prepare. Furthermore, the participants had opportunity for practical experience

in learning how to buy and prepare low-fat, high-fiber foods. Lesson plans for the class sessions follow.

Session 1

Objectives

1. Each participant will discover how she can comfortably participate in the program, contribute to the learning of others, and utilize others as a resource for herself.

2. Each participant will become more aware of her own fundamental values that influence her decision-making behavior.

   a. Reasons for participation in program

   b. Reasons for eating habits

3. Each participant will become aware of the basic principles and guidelines for cancer risk reduction through dietary practices.

4. Each participant will become aware of the correct answers on the nutrition knowledge pretest.

5. Each participant will set her personal objectives for changing her eating behavior.

6. Participants will receive information about next week's class and homework assignments.

Activities

1. Each participant introduces herself and tells a little about herself, e.g. work, family, hobbies.

2. Values Orientation Exercise

a. Facilitator explains and gives examples of intrinsic value, such as faith, family, and health.

b. Participants list and rank-order values according to significance in their own lives.

c. Subgroups of 5 participants will share list and ranking of instrinsic values with each other and discuss commonality/difference.

d. Facilitator leads discussion on the relationship between values and behavior, emphasizing the values which motivated participants to volunteer for program and values which affect eating behavior.

3. Facilitator presents ACS film on diet and cancer, and provides NCI and ACS pamphlets.

4. Facilitator reviews nutrition knowledge pretest.

5. Facilitator provides diet analysis results, to give participants an idea of their current eating habits.

6. Participants set goals for changing eating habits in terms of:

a. decreasing number of servings of high fat meats, dairy products, nuts, seeds, pastries, and

deep-fried foods, and added fats, such as salad dressings, butter, and margarine.

b. increasing number of servings of whole grain breads and cereals, fresh fruits and vegetables.

c. increasing number of servings of fruits and vegetables high in Vitamins A & C

7. Facilitator assigns homework: to bring in one nutrition information label of a food usually eaten and a favorite recipe either to adapt or that already meets the recommendations.

Session 2

Objectives

1. Each participant will become aware of nutrition labeling on processed foods.

2. Each participant will calculate the percent of calories from fat from a food label.

3. Each participant will become aware of ways to modify her diet by substituting low-fat or high fiber alternatives.

4. Each participant will become aware of fruits and vegetables high in vitamins A & C.

5. Each participant will practice altering a recipe to make it lower in fat and higher in fiber.

Activities

1. Food label exercise

a. How to calculate per cent calories from fat

g fat X 9 kcal/g = kcal from fat

kcal from fat/total kcal X 100 = % kcal from fat

b. Other essential elements of label

1. Ingredients are listed in descending order.

2. U.S. RDA is the maximum value for that nutrient specified for adults and children at least four years old in RDA tables. This value is used as a standard for statements on food labels, in order to simplify nutrition information. For Vitamin A, the RDA for women is only 4000 IU, whereas the U.S. RDA is 5000 IU (RDA for adult males). For protein, the RDA for women is 44 g, but the U.S. RDA may be either 45 or 65 g, depending on the quality of protein.

2. Tips for a healthier diet

a. Facilatator reviews handout list

1. Ways to reduce fat .

2. Ways to increase fiber

3. High vitamin A & C fruits and vegetables

b. Facilitator demonstrates differences achieved when altering recipes to decrease fat, and explains a sample recipe, Seashell-Provolone Casserole.

c. Participants alter specific recipes to decrease fat, increase fiber, and increase vitamins A & C. Sample recipes are provided; participants work together in pairs.

d. Facilitator gives participants copies of healthy recipes.

3. Facilitator assigns homework: to bring sample dish and copy of restaurant menu, if possible, and to be thinking of home menus.

Session 3

Objectives

1. Each participant who brought a home-made sample recipe will explain how she modified it to be low-fat, high-fiber, and/or high in vitamin A or C.

2. Each participant will have opportunity to taste others' recipes.

3. Each participant will choose a healthy meal from a restaurant menu.

4. Each participant will devise a home menu for breakfast, lunch or dinner which is both healthy and will fit into her lifestyle.

Activities

1. Participants present their home-made sample for taste-testing and explain either how and why they altered

the recipe, or why they thought it was a good recipe already (and where they found it, if not in last week's handouts).

2. Restaurant Menu Exercise

a. Facilitator provides menus, if needed.

b. Facilitator asks each participant to choose what she would order, considering guidelines.

c. Participants share and discuss choices.

3. Home Menu Exercise

a. Facilitator asks each participant to devise a home menu for breakfast, lunch or dinner.

b. Participants share and discuss menus.

c. Facilitators provides copies of NCI menus.

4. Facilitator provides post-test and asks participants to please mail them back, completed, in two weeks; postage-paid envelope is included.

(Appendix G contains copies of all participant materials for the experimental 3-session course.)

The standard, or 1-session class, was designed to give participants the basic recommendations for cancer risk reduction through diet, with the assumption that this new knowledge will motivate them to change their diets. The facilitator did not discuss attitudes and values which influence food choices, nor did she give

them the same detailed information and practical experience in reading food labels, altering recipes, ordering at restaurants, and devising home menus. The objectives and activities for the standard nutrition class were as follows:

Objectives

1. Each participant will become aware of the basic principles and guidelines for cancer risk reduction through dietary practices.

2. Each participant will become aware of the correct answers on the nutrition knowledge pretest.

Activities

1. Participants sign roll sheet and check whether they have turned in completed pretest.

2. Facilitator introduces herself and tells about research project, explaining the reasons for the pre- and posttest. Facilitator shows example of computer dietary analysis, and explains that participants will receive their own individual dietary analysis after completion of the posttest.

3. Facilitator hands out pamphlets and presents ACS film.

4. Facilitator reviews guidelines.

5. Facilitator reviews nutrition knowledge test.

6. Participants have opportunity to ask questions.

7. Facilitator reminds participants that they will receive a posttest with the same questionnaires in three weeks, emphasizing importance of returning posttest and value of dietary analysis.

Treatment of the Data

The raw data were organized for presentation and for treatment by the computer. Descriptive statistics (ranges, means, standard deviations, and the standard error of the means) were calculated using the Statistical Program for the Social Sciences (SPSSx) at Texas Woman's University ("SPSSx: Basics", 1984; Norusis, 1985). Analyses of variance were used to test each of the hypotheses at the 95% confidence level.

Preparation of the Final Report

Following completion of the statistical treatment of the data, the investigator presented the findings in tabular and narrative form. The content was organized into five chapters and presented to the thesis committee for suggestions and/or revisions. The findings were interpreted, and conclusions were drawn for the study.

Recommendations were made for further studies, and references and appendices were developed for the study.

CHAPTER IV

PRESENTATION OF THE FINDINGS

This investigation was designed to determine the extent of nutrition knowledge and attitudes toward the dietary causes of cancer, and to evaluate the effectiveness of affective versus traditional nutrition education techniques in changing knowledge, attitudes and behavior. The 44 voluntary subjects participated in one of three courses: (a) the experimental course, consisting of three sessions, (b) the standard course, a one-hour lecture, or (c) the control course, which provided no education until after the posttest. Sixteen subjects comprised the experimental group; 13 subjects comprised the standard group; and 15 subjects comprised the control group. Twenty-three additional subjects began, but did not complete the study for various reasons. Ten of these 23 were in the experimental group, and did not complete the study because of missing one of the sessions (7 subjects) or incompletion of the posttest (3 subjects). Three of the standard course participants did not complete the posttest, while only

one of the control group did not complete the posttest. The remaining 9 subjects, although they completed a pretest, were disqualified because they were (a) pregnant or lactating (5 subjects), (b) on a special diet (2 subjects), (c) did not complete the pretest properly (1 subject), or (d) were already experts in nutrition (1 subject). All subjects who were included in the analyses were pre- and posttested for their knowledge, attitudes, and dietary behavior, using the instruments previously described. The findings are presented under the following major headings: (a) Description of the Subjects, and (b) Analysis of the Data.

Description of the Subjects

The subjects are described in Table 1 according to their age and number of years of formal education. The standard group was the oldest and least educated; they differed significantly from the control group in age ($p = .025$) and from both the experimental and control groups in number of years of education ($p = .001$).

Table 1

Descriptive Statistics Related to Subject Age and Education

Variable	Group	n	Range (Low-High)	M	SD	SEM
Age (years)	1	16	29 (24.0-53.0)	35.75	8.282	2.071
	2	13	38 (22.0-60.0)	42.62	11.493	3.188
	3	15	24 (23.0-47.0)	32.73	8.293	2.141
Education (years)	1	16	7 (13.0-20.0)	17.00	1.932	.483
	2	13	10 (10.0-20.0)	14.23	2.619	.726
	3	14	4 (14.0-18.0)	16.64	1.216	.325

Note. 1 = experimental group, 2 = standard group, 3 = control group.

Table 2 describes the subjects in terms of their race, of which there were only two represented, white and Hispanic. According to chi-square analysis, there were no significant differences in race distribution among the three groups.

Table 2

Descriptive Statistics Related to Subject Race

Group	n	White	%	Hispanic	%
1	16	15	93.8	1	6.3
2	13	11	84.6	2	15.4
3	15	14	93.3	1	6.7

Note. 1 = experimental group, 2 = standard group, 3 = control group.

Table 3 describes the subjects according to marital status. According to chi-square analysis, there were no significant differences in marital status among the groups.

Table 3

Descriptive Statistics Related to Subject Marital Status

Group	n	Never Married	%	Married	%	Divorced/ Separated	%
1	16	3	18.8	13	81.3	0	0
2	13	3	23.1	10	76.9	0	0
3	15	8	53.3	6	40.0	1	6.7

Note. 1 = experimental group, 2 = standard group, 3 = control group.

Table 4 describes the subjects by weight classification, either normal, overweight, or

underweight, as determined by the Metropolitan Life Insurance Company Ideal Weight Table (Whitney & Hamilton, 1981). According to chi-square analysis, there were no significant differences in weight classification between the groups.

Table 4

Descriptive Statistics Related to Subject Weight Classification

Group	n	Normal	%	Overweight	%	Underweight	%
1	16	9	56.3	7	43.8	0	0
2	13	8	61.5	4	30.8	1	7.7
3	15	10	66.7	5	33.3	0	0

Note. 1 = experimental group, 2 = standard group, 3 = control group.

Analysis of the Data

Statistical analysis of the data was performed using SPSSx on the TWU mainframe computer, with the aid of Dr. David Marshall, Associate Professor of Computer Science. The differences between results from the food frequency instrument (FF) and 3-day record were analyzed by t-test. To compare pre- and posttest results within groups, t-tests were performed for each group separately, for all dependent variables. Finally, a MANOVA was performed to compare the changes among

groups, taking into consideration interaction of the dependent variables and covariables (demographic characteristics).

Comparison of Food Frequency and 3-Day Record Results

Table 5 displays the t-test results of the pretest 3DR compared with the results of the FF. Thirty-three of the 44 subjects completed both instruments as part of their pretest. Only for fiber and alcohol intakes were the calculations from the FF significantly higher than that from the 3DR ($p \leq 0.01$). The participants also tended to estimate other nutrients somewhat higher on the FF, with the exception of vitamin A.

Table 5

Paired t-test Results for Nutrient Consumption

Variable	df	Mean Difference	t	p
Energy, kcalories	32	-82.606	-1.05	.301
Fat, % of total kcalories	32	-1.424	-1.00	.325
Fiber, g	32	-5.206	-4.30	.000*
Vitamin A, IU	32	1085.879	-0.74	.465
Vitamin C, mg	32	-7.030	-0.44	.666
Alcohol, % of total kcalories	32	-0.606	-2.85	.008*
Smoked/cured foods, ounces	32	-0.048	-0.37	.713

*$p \leq 0.01$.
Note. IU = International Units.

The differences in levels of the above nutrients were also tested by Pearson correlation and ANOVA to determine whether the demographic variables had any effect on the consistency of results from the two instruments. The only significant ($p \leq 0.05$) results were a positive correlation between age and the difference in reported alcohol intake, and a greater difference in fiber intake reported by overweight participants than by normal participants. There were no significant differences between the groups in consistency of levels of nutrients as determined by the two instruments.

Comparison of Results Within Groups

The pre- and post 3-day records were used as the measurement of behavior, along with the semantic differential and ATNS survey as measurements of attitude, and the objective test as measurement of knowledge. To determine whether the groups were significantly different in any area at the time of the pretest, one-way ANOVAs were calculated for each of the variables. There were no significant differences in pretest scores or levels of nutrients between the groups.

Experimental group. Table 6 shows the results of the t-tests for the experimental group. This group

significantly improved their overall knowledge score, primarily due to a significant increase in the subscore for identification of foods important in cancer risk reduction. The average overall percent correct on the knowlege posttest was 94.9%, with an average of 95.3% for identification of the principal dietary factors, 99.1% for identification of the foods, and 66.6% for identification of the risk of cancer associated with alcohol. The experimental participants also significantly improved their overall score on the Connotative Meanings of Foods (CMF) semantic differential. When the total score for the CMF was split into subscores for the different factors of economy, convenience, and appeal, the change was shown to be concentrated in their scores for economy and appeal. The only one of the nutrient levels which significantly changed was that of energy: The participants ate significantly less total kcalories. Although the changes were not statistically significant, they also decreased slightly their percentage of kcalories from fat, and increased somewhat their fiber intake. Their intakes of both vitamin A and C decreased, although not significantly. Their

consumption of alcoholic beverages and smoked/cured foods did not change significantly.

Table 6

Paired t-test Results for the Experimental Group

Variable	df	Mean Difference	t	p
KN, total, % correct	14	-15.200	-4.18	.001**
KN, principles, % correct	14	-10.468	-2.05	.060
KN, foods, % correct	14	-18.133	-6.06	.000**
KN, alcohol, % correct	14	-20.000	-0.90	.384
CMF, total	15	11.125	2.36	.032*
CMF, economy	15	2.812	2.31	.036*
CMF, convenience	15	1.312	1.04	.314
CMF, appeal	15	8.875	2.15	.048*
ATNS, total	15	1.812	1.03	.321
Energy, kcalories	15	397.812	4.72	.000**
Fat, % of total kcalories	15	3.125	1.70	.110
Fiber, g	15	-6.231	-1.40	.183
Vitamin A, IU	15	2350.961	1.45	.168
Vitamin C, mg	15	21.700	1.62	.126
Alcohol, % of total kcalories	15	0.312	0.89	.386
Smoked/cured foods, ounces	15	-0.006	-0.03	.975

*$p \leq 0.05$
**$p \leq 0.001$
Note. Mean Difference = average of pre minus post; KN = knowledge test; IU = International Units.

Table 7 displays the comparison of the posttest averages of nutrient levels with the behavioral

objectives. Although the experimental group significantly decreased only their energy level, they did meet or exceed all the behavioral objectives, except percentage of kcalories from fat, which came very close.

Table 7

Behavioral Posttest Averages Compared with Behavioral Objectives for the Experimental Group

Variable	Objective	Posttest *M*
Energy, total kcalories	1600-2000	1377
Fat, % of total kcalories	≤30	31.7
Fiber, g	15	21.3
Vitamin A, IU	4000	6429.4
Vitamin C, mg	60	83.7
Alcohol, % of total kcalories	≤10	0.7
Smoked/cured foods, ounces	≤1	0.5

Standard group. Table 8 displays the results of paired t-tests for the standard group of participants. This group did not significantly improve their overall knowledge scores, although they did improve their subscore on foods. The average overall percent correct on the knowledge posttest was 88.1%, with an average of 88.1% for identification of the principal dietary factors, 94.1% for identification of the foods, and 91.6% for identification of the risk of cancer

associated with alcohol. Their total CMF score also improved significantly, as did the separate factors of economy and convenience. Nutrient levels, however, were not significantly changed from pretest levels.

Table 8

Paired t-test Results for the Standard Group

Variable	df	Mean Difference	t	p
KN, total, % correct	11[a]	-6.083	-1.33	.211
KN, principles, % correct	11	-5.833	-1.02	.330
KN, food, % correct	11	-11.917	-2.40	.035*
KN, alcohol, % correct	11	-25.000	-1.91	.082
CMF, total	12	11.385	2.91	.013*
CMF, economy	12	3.153	2.34	.037*
CMF, convenience	12	4.769	2.81	.016*
CMF, appeal	12	4.231	1.99	.069
ATNS, total	12[b]	1.692	1.09	.298
Energy, kcalories	12	60.462	0.72	.487
Fat, % of total kcalories	12	-1.000	-0.30	.767
Fiber, g	12	2.530	1.17	.264
Vitamin A, IU	12	2183.615	1.02	.326
Vitamin C, mg	12	29.215	1.14	.275
Alcohol, % of total kcalories	12	-0.308	-1.48	.165
Smoked/cured foods, ounces	12	-0.062	-0.25	.807

*$p \leq 0.05$

[a]One participant did not complete a knowledge pre-test.

[b]One participant completed only a FF for the pretest, which was used in place of her 3DR.

Note. Mean Difference = average of pre minus post; KN = knowledge test; IU = International Units.

Table 9 displays the comparison of the posttest averages of nutrient levels with the behavioral objectives. Although their nutrient levels did not change significantly, the standard group met or exceeded nearly all the behavioral objectives, except percentage of kcalories from fat and fiber intake.

Table 9

Behavioral Posttest Averages Compared with Behavioral Objectives for the Standard Group

Variable	Objective	Posttest *M*
Energy, total kcalories	1600-2000	1414
Fat, % of total kcalories	≤30	33.8
Fiber, g	15	13.3
Vitamin A, IU	4000	9324
Vitamin C, mg	60	110.8
Alcohol, % of total kcalories	≤10	0.5
Smoked/cured foods, ounces	≤1	0.5

Control group. Table 10 displays the results of paired t-tests from the control group of participants. This group did not change significantly on any of the variables, with the exception of worsening their score on the CMF appeal factor.

Table 10

Paired t-test Results for the Control Group

Variable	df	Mean Difference	t	p
KN, total, % correct	14	0.467	0.21	.834
KN, principles, % correct	14	-2.267	0.64	.532
KN, food, % correct	14	1.133	0.32	.754
KN, alcohol, % correct	14	6.667	0.43	.670
CMF, total	14	-7.200	-1.40	.182
CMF, economy	14	0.733	0.28	.783
CMF, convenience	14	-2.400	-1.35	.198
CMF, appeal	14	-5.533	-2.30	.038*
ATNS, total	14	0.133	0.08	.939
Energy, kcalories	14	94.933	0.71	.490
Fat, % of total kcalories	14	0.000	0.00	1.000
Fiber, g	14	1.707	0.84	.414
Vitamin A, IU	14	744.933	0.42	.691
Vitamin C, mg	14	-8.300	-0.69	.504
Alcohol, % of total kcalories	14	-0.200	-0.36	.723
Smoked/cured foods, ounces	14	-0.093	-0.33	.745

*$p \leq 0.05$
Note. Mean Difference = average of pre minus post; KN = knowledge test; IU = International Units.

Results of MANOVA

A Multivariate Analysis of Variance (MANOVA) was performed using SPSSx, taking into consideration interaction of the dependent variables and covariates of dependent variables. The dependent variables were all

the paired differences between pre- and posttest scores and levels of nutrients; the covariates were all the demographic variables, namely age, years of education, race, weight classification, and marital status. Table 11 illustrates the results of the multivariate tests of significance. Taking all the dependent variables together, there were no significant differences between the groups.

Table 11

Results of Multivariate Tests of Significance

Test Name	Value	Approximate F	Error df	p
Pillais	1.515	1.300	20	.265
Hotellings	10.114	1.686	16	.127
Wilks	0.040	1.498	18	.175

However, univariate (one-way) ANOVAs between the groups revealed that for the knowledge test, there were significant differences between changes in total knowledge scores ($p = .001$) and in knowledge of the recommended foods ($p = .001$) among both the experimental and standard groups when compared to the control group, but not when compared to each other. The experimental

group also made a significantly greater improvement than the control group, but not the standard group, in their knowledge of the principal dietary causes of cancer ($p = .049$).

Regression analyses for each covariable with each dependent variable were also performed, to determine whether any of the demographic characteristics had a significant effect on the change from pre- to posttest. The results indicated that (a) weight classification had a significant effect on the changes on the total CMF score ($p = .025$) and the appeal subscore of the CMF ($p = .025$); (b) educational level had a significant effect on the change in total knowledge score ($p = .027$) and the change in vitamin C level ($p = 0.021$); and that race had a significant effect on the change in vitamin C level ($p = 0.45$).

CHAPTER V

SUMMARY, RESULTS, DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The purpose of this investigation was to determine the extent of nutrition knowledge and attitudes toward the dietary causes of cancer, and to evaluate the effectiveness of affective versus traditional nutrition education techniques in changing knowledge, attitudes and behavior. The 44 voluntary subjects participated in one of three courses: (a) the experimental course, consisting of three sessions, (b) the standard course, a one-hour lecture, or (c) the control course, which provided no education until after the posttest. Sixteen subjects comprised the experimental group; 13 subjects comprised the standard group; and 15 subjects comprised the control group. All subjects were pre- and posttested for their knowledge, attitudes, and dietary behavior, using the instruments previously described. The data were analyzed using the SPSSx statistical package, and included descriptive statistics.

Results

The null hypotheses were tested at a .05 level of significance using t-tests, MANOVA, and ANOVA. The results were as follows:

1. There is no significant difference between pre- and posttest levels of knowledge of the dietary causes of cancer within the experimental, standard, and control groups. REJECTED

2. There is no significant difference in the change from pre- to posttest levels of knowledge of the dietary causes of cancer between the experimental, standard, and control groups. REJECTED

3. There is no significant difference between pre- and posttest attitudes toward foods and nutrition within the experimental, standard, and control groups. REJECTED

4. There is no significant difference in the change from pre- to posttest attitudes toward foods and nutrition between the experimental, standard, and control groups. ACCEPTED

5. There is no significant difference between pre- and posttest self-reported dietary patterns within the experimental, standard, and control groups. REJECTED

6. There is no significant difference in the change from pre- to posttest self-reported dietary

patterns between the experimental, standard, and control groups. ACCEPTED

Discussion

The level of overall knowledge about nutrition and cancer significantly increased in the experimental group, but not in the standard or control group. As stated in Chapter III, the cognitive objectives included: (a) identification of the principle dietary factors known or strongly suspected to be related to cancer; (b) identification of foods that are low in fat and calories, high in dietary fiber and/or high in vitamin A and C; and (c) identification of the added risk of head and neck cancers from excessive alcohol consumption. The overall scores were divided into subscores to reflect achievement of each of these objectives. Neither the experimental nor standard groups significantly increased their ability to identify the principle dietary factors, although the scores of the experimental group came close to statistical significance ($p = .06$). Both the experimental and standard groups significantly increased their ability to identify risk-reducing foods, with the experimental group's score having a slightly greater increase than

that of the standard group. Several of the subjects in the standard group were also involved in a health promotion program at General Dynamics, which may have helped them to retain their knowledge of foods. Both the experimental and standard classes achieved the cognitive objectives of at least a 75% posttest average in these two knowledge subscores. Lastly, neither the experimental group nor the standard group significantly increased their ability to identify the cancer risk from alcohol. The experimental group, in fact, improved their score less in this area than did the standard group; this may reflect the lack of emphasis on alcohol in the additional sessions of the experimental course. Only 66% of the experimental group retained the information on alcohol and cancer risk, whereas the standard group easily met the 75% objective; the health promotion program at General Dynamics may have reinforced this information. Despite the positive effect of a higher educational level on total knowledge improvement, the experimental group did not increase its total knowledge or any of the knowledge subscores to a significantly greater amount than the standard group. This circumstance suggests the additional learning periods in the experimental course may have been of

little cognitive value, or that simply more subjects would be necessary to reveal a difference.

The total CMF attitude scores improved significantly for both the experimental and standard groups, but not for the control group. The degree of change in the experimental group was not significantly different from that of the standard group. This lack of difference may again reflect the influence of the health promotion program at General Dynamics, which strongly encourages a healthy diet. Furthermore, when the total score was divided into subscores to reflect the factors of economy, convenience, and appeal, the experimental group improved significantly in the factors of economy and appeal, whereas the standard group improved significantly on the factors of economy and convenience. This varied response may reflect differences in lifestyle; the majority of the women in the experimental group were homemakers, who already were putting effort into food preparation, in contrast to the women in the standard group, who generally worked outside the home. Furthermore, the experimental group had the opportunity to actually taste modified recipes. The control group actually worsened significantly their score on the appeal factor, the cause of which is unknown. The

effect of weight classification on the total CMF score and the appeal subscore should not have confounded the differences between the groups, since the chi-square analysis showed no significant differences between the groups in weight classification.

The ATNS attitude scores did not improve significantly for any of the three groups, although they did improve slightly more for the experimental and standard groups than they did for the control group. The similarity in degree of change between the experimental and standard groups may again reflect the health promotion program at General Dynamics. Brush et al. (1986), in her study of a 5-session affective nutrition education program, also reported no significant change in either treatment or control groups. They speculated that individuals who volunteer to participate in nutrition programs may tend to already have more flexible attitudes toward nutrition than the general public, and thus they cannot improve much.

The analysis of nutrient levels showed that only for the experimental group was a significant change made, that being a decrease in total energy intake. The changes in total energy intake, percentage of kcalories from fat, and fiber intake were somewhat greater for the

experimental than for the standard group. This finding suggests that the group discussion of practical ways to decrease fat and increase fiber, as well as the opportunity to actually taste modified recipes, had greater impact than the one-hour lecture. Furthermore, the experimental group more nearly met the behavioral objectives than did the standard group. The decrease in vitamins A and C intake in both the experimental and standard groups may reflect the lowered overall kcalorie intake. The effects of educational level and race on vitamin C intake are somewhat surprising, but probably did not confound the differences between the groups. Neither the experimental nor standard group demonstrated a significant decrease in intake of alcoholic beverages or smoked/cured foods. These two points were not highly stressed in the classes.

The MANOVA indicated that there was no significant difference between the groups when all the dependent variables were considered together. As stated above, for three of the four knowledge scores, the experimental and standard groups did improve significantly more than the control group. The MANOVA also indicated that there were no significant differences in the overall scores for either the CMF or ATNS. Furthermore, although the

dietary changes were somewhat greater for the experimental group than for the standard or control groups, the MANOVA indicated no significant difference between them for any of the changes in nutrient levels. These disappointing results from the MANOVA point to the need for a larger sample and possibly more class sessions for the experimental group. An alternative method for the MANOVA, in which posttest scores and nutrient levels would be the dependent variables and pretest levels would be additional covariates, might also give different results. However, none of the pretest scores and nutrient levels were significantly different among any of the groups when tested by ANOVA.

The attrition rate from the classes, not including those who started to participate before the investigator knew that they had some disqualifying characteristic, was a discouraging 25%. If the women who merely enrolled but did not even complete the pretest were included, the attrition rate would be approximately 50%. Therefore, in order to have the expected 30 women in each group, 180 women would have to initially sign up. The target market for this type of project should probably be at least 1800 to 2000 women, even if the marketing methods were personalized to each potential

participant. The wide variety of places from which women were recruited also presented administrative problems in distributing and retrieving tests. These problems would be greatly alleviated if all the subjects were from a common worksite or community group with which the investigator has direct communication. Unfortunately, the investigator did not have the capacity to specifically target the recruitment to a large number of women in a common group, and thus the sample size suffered.

The lack of random selection of the participants caused the results of this study to be non-generalizable to the public at large. Ethical considerations restrict this type of research to voluntary participation; however, the ideal circumstance would be random assignment of the subjects to the experimental, standard or control groups. The recruitment for this study conceivably could have resulted in the experimental group being more internally motivated to change their eating habits than the standard or control groups. However, the ATNS pretest scores were not significantly different among any of the groups when tested by ANOVA, which suggests that all participants were similar in their flexibility/rigidity toward dietary change.

The changes in class settings, from a conference room at TCOM to church parlors to homes, may have had a confounding effect on the courses. Unfortunately, these arrangements were often necessary to persuade women to participate. More of the experimental subjects were taught in the less formal setting of a home or church than were standard subjects. This may have reduced the cognitive retention of the experimental subjects, as the relaxed home setting often allowed distracting extraneous conversation to develop among the women. They also may have tended to regard the class less seriously, which could have lessened positive changes in attitude and behavior. However, the participants in less formal settings may have been more comfortable and thus more open to attitude and behavioral changes. Further research should be directed toward an assessment of the type of setting which is most conducive to improvements in knowledge, attitudes and behavior.

Lastly, investigation of the correlations between knowledge, attitudes, and behavior within the treatment groups in future studies would provide greatly needed insights, assuming that the sample was large, random, and homogeneous. Preliminary calculations of Pearson correlation coefficients for all groups together in this

sample indicated that total CMF and knowledge scores were positively correlated for both pre- and posttests, although ATNS scores were not significantly correlated. Further research into this area would provide much-needed insight into the relationships of the three domains of learning.

Conclusions

The affective method of teaching used for the experimental group was more effective than the traditional method in improving: (a) overall knowledge of diet, nutrition and cancer, b) knowledge of the principal dietary factors related to cancer risk reduction, and (c) ability to identify foods which are low-fat, high-fiber, and/or rich in vitamins A and C.

Recommendations

As a result of the study, the investigator makes the following recommendations for further research, especially replications of this study:

1. A larger, more homogenous sample, preferably at least 30 subjects per group, should be used, and subjects should be randomly assigned to groups.

2. All the subjects should be from a common worksite or community group, rather than from the public at large.

3. A MANOVA using posttest scores as dependent variables, paired with pretest scores and demographic variables as covariates, should be performed.

4. If possible, comparisons should be made between groups taught in formal versus informal settings.

5. Correlations should be performed between the changes in knowledge, attitude and behavior within each group.

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cancer among black men in Washington, DC. II. Role of nutrition. Journal of the National Cancer Institute, 67, 1199-1206.

APPENDIX A

Permission from the Texas College of Osteopathic Medicine

TCOM

June 2, 1988

Dr. Leslie M. Thompson
Dean for Graduate Studies and Research
Texas Woman's University
The Graduate School
P. O. Box 22479
Denton, TX 76204

Dear Dr. Thompson:

Ms. Heidi Whitman, a graduate student at Texas Woman's University, has been approved to collect her research data at the Texas College of Osteopathic Medicine. Please feel free to call our office if you have further questions regarding her research project.

Sincerely,

John C. Licciardone D.O.

John C. Licciardone, D.O.
Department of Public Health
and Preventive Medicine

JCL/hl

cc: Ms. Heidi Whitman
9104 Windswept Dr., #1605
Fort Worth, TX 76116

APPENDIX B

Content Validation of Knowledge Tests

TCOM

October 11, 1988

TO WHOM IT MAY CONCERN:

The 15 item Nutrition Knowledge Questionnaire developed by Heidi Whitman and administered to the subjects in her thesis research project has been reviewed by me. In my opinion, the questions contained therein are valid and appropriate for the population under study.

Yours very truly,

Ann Blankenship, Ph.D., R.D., L.D.
Department of Public Health
and Preventive Medicine

a

Texas College of Osteopathic Medicine

Camp Bowie at Montgomery
Fort Worth, Texas 76107

817/735 2000
Metro 429 9120

Under the direction of the
North Texas State University
Board of Regents

March 10, 1988

Roger Shipley, Ed.D.
Department of Health Education
Texas Woman's University
Denton, TX 76204

Dear Dr. Shipley,

I have reviewed the questionnaire developed by Heidi Whitman. Based on the revision that was acceptable to both Heidi and me, I find the questionnaire to be valid from a nutritional standpoint.

Please let me know if I may be of further help.

Sincerely,

Mary Anne Gorman

Mary Anne Gorman, Ph.D., R.D., L.D.

TEXAS WOMAN'S UNIVERSITY
DENTON DALLAS HOUSTON

DEPARTMENT OF NUTRITION AND FOOD SCIENCES
P.O. Box 24134, Denton, Texas 76204 (817) 898-2636

March 11, 1988

To: Dr. Roger Shipley
Department of Health Education

From: Andie H. Hsueh, Sc.D.
Associate Professor of Nutritio

This is to state that the questionnaire on nutrition and cancer prevention knowledge formulated by Heidi S. Whitman represents valid test.

APPENDIX C

Permission for Use of Attitude Instruments

University of Wisconsin-Madison

Department of Agricultural Journalism
440 Henry Mall
Madison, WI 53706

College of Agricultural and Life Sciences

June 7, 1988

Heidi S. Whitman
9104 Windswept Dr. #1605
Ft. Worth, TX 76116

Dear Ms. Whitman:

I and my coauthors would be delighted if you can use the semantic differential scales we published in Connotative Meaning of Foods in the 1973 volume of the Home Economics Research Journal.

Sincerely,

Richard D. Powers,
Professor

Heidi S. Whitman
2104 Windswept Dr. #1605
Fort Worth, TX 76116

June 3, 1988

Angela R. Boren, R.D.
4502 22nd Street
Lubbock, TX 79407

Dear Ms. Boren:

As a candidate for the Master of Arts degree in community health education at Texas Woman's University, my thesis research involves a nutrition and cancer risk reduction education program. I would like to use your Attitude Toward Nutrition Scale, published in the Journal of the American Dietetic Association (1983) 82, 251-253, as part of my pretest and posttest. May I please have your written permission to use this instrument, as such is required to publish with my thesis? Thank you very much for your help.

Sincerely,

Heidi S. Whitman

Heidi S. Whitman

Dear Ms Whitman -
I will be happy for you to use the Attitude Toward Nutrition Scale in your research -
Best wishes -
Angela R. Boren

APPENDIX D

Knowledge Test

NUTRITION KNOWLEDGE TEST

For each of the following questions indicate whether you believe the statement is true or false by circling T or F.

	True	False
1. There is evidence today that excesses or deficiencies of certain nutrients in our diet may increase the risk of cancer.	T	F
2. According to nutrition experts, most Americans eat too little fat in their daily diets.	T	F
3. The National Cancer Institute recommends that you eat 25-35 grams of fiber a day.	T	F
4. Scientists who study the foods eaten by people in other countries have found that diets low in vitamin C are linked with reduced risk for stomach and esophagus cancers.	T	F

For each of the following questions circle the letter beside the statement that best answers the question being asked. It is important that you answer each question. Even if you are unsure of the correct answer, choose the one you think is the closest. Be sure to give only one answer for each question.

5. A diet low in total fat may reduce your risk for cancers of the:
    a. stomach, pancreas, and liver.
    b. colon, rectum, prostate, breast, and lining of the uterus.
    c. lung and larynx.
    d. kidney and bladder.

6. One of the advantages of a high-fiber diet is that it may:
    a. increase the absorption of calcium.
    b. decrease the risk of stomach cancer.
    c. prevent the formation of excessive gas.
    d. reduce the risk of colon and rectal cancers.

7. Increased risk of cancers of the mouth, throat, esophagus, liver, and bladder have beem associated with:
    a. heavy drinking of alcoholic beverages.
    b. a high-fat diet.
    c. a diet low in vitamin C.
    d. a low-fiber diet.

8. A diet high in the following nutrient may reduce the risk of cancers of the lung, bladder, and larynx:
    a. vitamin D.
    b. Iron.
    c. vitamin A.
    d. thiamin.

9. Which of the following cheeses is lower in total fat?
    a. cheddar cheese.
    b. American cheese.
    c. cream cheese.
    d. mozzarella cheese.

10. To reduce intake of fats in the diet, one method of cooking to avoid is:
    a. deep frying
    b. boiling
    c. baking
    d. broiling

11. An example of a lean cut of beef is:
    a. ground hamburger meat.
    b. eye of round.
    c. beef brisket.
    d. beef bologna.

12. The best way to add extra fiber to your diet is to:
    a. take a fiber supplement.
    b. eat more breads and cereals made from white flour.
    c. eat more fruits, vegetables, peas and beans, and breads and cereals made from whole grains.
    d. drink more fruit and vegetable juices.

13. Which of the following provides the most vitamin A in an average serving?
    a. dark green and yellow vegetables.
    b. whole grain breads and cereals.
    c. potatoes.
    d. meat, fish and poultry.

14. Which of the following fruits provides more vitamin C in an average serving?
    a. strawberries.
    b. pear.
    c. white grapes.
    d. grapefruit.

15. Vegetables which belong to the cruciferous family, and which may reduce cancer risk, include:
    a. mushrooms, onions, lettuce and beets.
    b. broccoli, Brussels sprouts, cabbage and cauliflower.
    c. tomatoes, okra, and green beans.
    d. carrots, sweet potatoes, pumpkins and winter squash.

APPENDIX E

Attitude Instruments

ATTITUDE TOWARD FOODS AND NUTRITION QUESTIONNAIRE

The following questions are asking about your thoughts and feelings toward particular foods. Please mark the space above the number with which you most closely agree. There are no right or wrong answers.

1. Whole grain crackers, breads, muffins, and cereals

high cost--+--+--+--+--+--+--low cost
1 2 3 4 5 6 7

easy to prepare--+--+--+--+--+--+--difficult to prepare
1 2 3 4 5 6 7

high food value low food value
for the money--+--+--+--+--+--+--for the money
1 2 3 4 5 6 7

appetizing--+--+--+--+--+--+--unappetizing
1 2 3 4 5 6 7

satisfying--+--+--+--+--+--+--unsatisfying
1 2 3 4 5 6 7

I like I dislike
these foods--+--+--+--+--+--+--these foods
1 2 3 4 5 6 7

2. All fresh fruits and vegetables, and juices from them

high cost--+--+--+--+--+--+--low cost
1 2 3 4 5 6 7

easy to prepare--+--+--+--+--+--+--difficult to prepare
1 2 3 4 5 6 7

high food value low food value
for the money--+--+--+--+--+--+--for the money
1 2 3 4 5 6 7

appetizing--+--+--+--+--+--+--unappetizing
1 2 3 4 5 6 7

satisfying--+--+--+--+--+--+--unsatisfying
1 2 3 4 5 6 7

I like I dislike
these foods--+--+--+--+--+--+--these foods
1 2 3 4 5 6 7

3. Foods made with dry peas and beans

high cost--+--+--+--+--+--+--low cost
1 2 3 4 5 6 7

easy to prepare--+--+--+--+--+--+--difficult to prepare
1 2 3 4 5 6 7

high food value — low food value
for the money — for the money
1 2 3 4 5 6 7

appetizing — unappetizing
1 2 3 4 5 6 7

satisfying — unsatisfying
1 2 3 4 5 6 7

I like — I dislike
these foods — these foods
1 2 3 4 5 6 7

4. Chicken and turkey cooked without the skin

high cost — low cost
1 2 3 4 5 6 7

easy to prepare — difficult to prepare
1 2 3 4 5 6 7

high food value — low food value
for the money — for the money
1 2 3 4 5 6 7

appetizing — unappetizing
1 2 3 4 5 6 7

satisfying — unsatisfying
1 2 3 4 5 6 7

I like — I dislike
these foods — these foods
1 2 3 4 5 6 7

5. Fresh, frozen, or water-packed canned fish and shellfish

high cost — low cost
1 2 3 4 5 6 7

easy to prepare — difficult to prepare
1 2 3 4 5 6 7

high food value — low food value
for the money — for the money
1 2 3 4 5 6 7

appetizing — unappetizing
1 2 3 4 5 6 7

satisfying — unsatisfying
1 2 3 4 5 6 7

I like — I dislike
these foods — these foods
1 2 3 4 5 6 7

6. Reduced fat luncheon meats, such as sliced ham, turkey or chicken breast, roast beef

high cost--+--+--+--+--+--+--low cost
1 2 3 4 5 6 7

easy to prepare--+--+--+--+--+--+--difficult to prepare
1 2 3 4 5 6 7

high food value low food value
for the money--+--+--+--+--+--+--for the money
1 2 3 4 5 6 7

appetizing--+--+--+--+--+--+--unappetizing
1 2 3 4 5 6 7

satisfying--+--+--+--+--+--+--unsatisfying
1 2 3 4 5 6 7

I like I dislike
these foods--+--+--+--+--+--+--these foods
1 2 3 4 5 6 7

7. Beef, veal, lamb, and pork cuts with little or no marbling and trimmed of all fat

high cost--+--+--+--+--+--+--low cost
1 2 3 4 5 6 7

easy to prepare--+--+--+--+--+--+--difficult to prepare
1 2 3 4 5 6 7

high food value low food value
for the money--+--+--+--+--+--+--for the money
1 2 3 4 5 6 7

appetizing--+--+--+--+--+--+--unappetizing
1 2 3 4 5 6 7

satisfying--+--+--+--+--+--+--unsatisfying
1 2 3 4 5 6 7

I like I dislike
these foods--+--+--+--+--+--+--these foods
1 2 3 4 5 6 7

8. Lowfat and nonfat milk and dairy products

high cost--+--+--+--+--+--+--low cost
1 2 3 4 5 6 7

easy to prepare--+--+--+--+--+--+--difficult to prepare
1 2 3 4 5 6 7

high food value low food value
for the money--+--+--+--+--+--+--for the money
1 2 3 4 5 6 7

appetizing--+--+--+--+--+--+--unappetizing
1 2 3 4 5 6 7

satisfying--+--+--+--+--+--+--unsatisfying
1 2 3 4 5 6 7

I like I dislike
these foods--+--+--+--+--+--+--these foods
1 2 3 4 5 6 7

9. Lowfat ("diet") salad dressings and margarine
high cost--+--+--+--+--+--+--low cost
1 2 3 4 5 6 7
easy to prepare--+--+--+--+--+--+--difficult to prepare
1 2 3 4 5 6 7
high food value low food value
for the money--+--+--+--+--+--+--for the money
1 2 3 4 5 6 7
appetizing--+--+--+--+--+--+--unappetizing
1 2 3 4 5 6 7
satisfying--+--+--+--+--+--+--unsatisfying
1 2 3 4 5 6 7
I like I dislike
these foods--+--+--+--+--+--+--these foods
1 2 3 4 5 6 7

10. Non-alcoholic beverages, e.g. tea, coffee, bottled mineral water, fruit drinks, carbonated beverages
high cost--+--+--+--+--+--+--low cost
1 2 3 4 5 6 7
easy to prepare--+--+--+--+--+--+--difficult to prepare
1 2 3 4 5 6 7
high food value low food value
for the money--+--+--+--+--+--+--for the money
1 2 3 4 5 6 7
appetizing--+--+--+--+--+--+--unappetizing
1 2 3 4 5 6 7
satisfying--+--+--+--+--+--+--unsatisfying
1 2 3 4 5 6 7
I like I dislike
these foods--+--+--+--+--+--+--these foods
1 2 3 4 5 6 7

The following questions are asking about your thoughts and feelings toward nutrition. Please mark the space above the number which most closely describes your feelings about the statement. There are no right or wrong answers.

11. I usually will not taste a food if its appearance is similar to something I dislike.

strongly agree	moderately agree	slightly agree	slightly disagree	moderately disagree	strongly disagree
1	2	3	4	5	6

12. Exploring several methods of food preparation is desirable.

strongly agree	moderately agree	slightly agree	slightly disagree	moderately disagree	strongly disagree
1	2	3	4	5	6

13. I think that food habits should be flexible enough to vary with a new situation.

strongly agree	moderately agree	slightly agree	slightly disagree	moderately disagree	strongly disagree
1	2	3	4	5	6

14. I like for my family to stick to the old favorite meals, rather than mess them up with new and different kinds of foods.

strongly agree	moderately agree	slightly agree	slightly disagree	moderately disagree	strongly disagree
1	2	3	4	5	6

15. Unfamiliar foods often interest me.

strongly agree	moderately agree	slightly agree	slightly disagree	moderately disagree	strongly disagree
1	2	3	4	5	6

16. If I am satisfied with food I eat, I see no reason for me to change.

strongly agree	moderately agree	slightly agree	slightly disagree	moderately disagree	strongly disagree
1	2	3	4	5	6

17. If my diet were poor, I would probably take vitamin pills rather than vary the foods that I choose.

strongly agree	moderately agree	slightly agree	slightly disagree	moderately disagree	strongly disagree
1	2	3	4	5	6

18. I could learn to eat fruit for dessert rather than a pastry.

strongly agree	moderately agree	slightly agree	slightly disagree	moderately disagree	strongly disagree
1	2	3	4	5	6

19. I believe that the person who gets the most satisfaction out of eating is the one who sticks to the foods that are familiar.

strongly agree	moderately agree	slightly agree	slightly disagree	moderately disagree	strongly disagree
1	2	3	4	5	6

20. In actual practice my nutrition knowledge has little influence on what I select to eat.

strongly agree	moderately agree	slightly agree	slightly disagree	moderately disagree	strongly disagree
1	2	3	4	5	6

21. Trying new and different foods appeals to me.

strongly agree	moderately agree	slightly agree	slightly disagree	moderately disagree	strongly disagree
1	2	3	4	5	6

22. I would be willing to spend time in making nutritious foods available for myself and/or family instead of eating convenience foods of low nutritional quality.

strongly agree	moderately agree	slightly agree	slightly disagree	moderately disagree	strongly disagree
1	2	3	4	5	6

24. I would be willing to try an unfamiliar food at least once.

strongly agree	moderately agree	slightly agree	slightly disagree	moderately disagree	strongly disagree
1	2	3	4	5	6

25. Teaching calorie control and food selection to a fat person is a waste of time.

strongly agree	moderately agree	slightly agree	slightly disagree	moderately disagree	strongly disagree
1	2	3	4	5	6

26. I would fix more nutritious meals if I knew what to prepare.

strongly agree	moderately agree	slightly agree	slightly disagree	moderately disagree	strongly disagree
1	2	3	4	5	6

27. For better health, I would be willing to try a food I hadn't eaten before or several foods over a period of time.

strongly agree	moderately agree	slightly agree	slightly disagree	moderately disagree	strongly disagree
1	2	3	4	5	6

28. If I didn't like a food prepared in a certain way, I would not try it prepared a different way.

strongly agree	moderately agree	slightly agree	slightly disagree	moderately disagree	strongly disagree
1	2	3	4	5	6

APPENDIX F

Food Frequency Instrument

Name _____ Date _____

Nutrition History

Food is necessary to sustain life. Nutritional habits are an important factor in the overall health status of every individual and an adequate intake of all required nutrients provides the basis for an optimal lifestyle. For this reason, thoughtful and complete answers to all questions in the Nutrition History are important. They will serve as an initial basis for your nutritional assessment. The more accurate your nutrition history, the more accurate your nutritional evaluation can be. Please feel free to provide additional information or add comments to any portion of your nutrition history.

I. Weight History

Height _____ What do you weigh on your scales? _____ lbs. How much would you like to weigh? _____lbs. How much did you weigh one year ago? _____ lbs.

Have you gained or lost weight recently? _____ yes _____ no

How much? Gained _____lbs. Lost _____lbs.

Over what period of time? _____ weeks _____ month(s) _____ whole year

Have you recently changed your usual food intake or eating habits/patterns? _____ yes _____ no
If so, please specify _____

Lowest adult weight _____ lbs. at _____ yrs. of age

Highest adult weight _____ lbs. at _____ yrs. of age

Did you have a weight problem as a child or teenager? _____ yes _____ no
If so, were you _____ underweight _____ overweight

Summarize your weight loss/dieting history (if applicable)

Type of Diet	Source of Diet (Dietitian, Physician, Self-selected, Weight Watchers, etc.)	Inclusive Dates	No. lbs. Lost

Did you regain the weight you lost? _____ How long did it take? _____

II. Dietary Practices

Which meals do you usually eat? (Be sure to include approximate time at which meals are normally eaten)

Breakfast _____ a.m./p.m. Lunch _____ a.m./p.m. Dinner _____ a.m./p.m. Snacks _____ (times)

Indicate the number and places of meals/snacks you usually eat at home or away from home:

Breakfast _____ times per week Where eaten? _____

Lunch _____ times per week Where eaten? _____

Dinner _____ times per week Where eaten? _____

Snacks _____ times per day Where eaten? _____

How many meals during a typical week do you eat away from home? _____
Where do you eat out most frequently? _____ fast food _____ cafeteria _____ restaurant _____ other (specify)

How would you describe your eating pace? _____ Fast _____ Moderate _____ Slow

Are your meals consumed in a calm and peaceful environment? _____ Rarely _____ Occasionally _____ Frequently _____ Always

Does your daily schedule allow you to select and prepare nutritious, home cooked meals? _____ Rarely _____ Occasionally _____ Frequently _____ Always

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If "rarely" or "occasionally", please state why _____

Who is responsible for your food purchases? _____

Who usually prepares your food? _____

For how many persons is your food usually prepared? (Indicate their relationship to you and age (example-family members)) _____

Check any special situations which may affect your dietary selections:

_____ food intolerances or food allergies
_____ chewing or swallowing problems
_____ cultural, religious, philosophical dietary practices
_____ unusual work schedule (example-working nights)
_____ lack of refrigeration or freezer space
_____ lack of functioning or adequate oven/broiler
_____ budgetary restrictions
_____ other

Comments: _____

Describe your usual bowel movements: _____ normal _____ constipated _____ diarrhea _____ mixed

Do you take a vitamin/mineral/dietary supplement? _____ yes _____ no
Types, amounts and frequency of use _____

At what hour do you usually go to sleep? _____ Usually arise? _____

Do you get up in the middle of the night and snack? _____ never _____ sometimes _____ nightly

If you do snack during the night, give examples of what you choose to eat _____

Additional nutritional comments or questions _____

III. Food Intake Frequency

Nutrients in foods fit together like pieces of a puzzle to help achieve optimal health. The kinds and amounts of foods regularly eaten, however, also depend upon your individual eating style and personal environment. The food frequency record will be used to assess your dietary status and to provide direction for nutritional counseling. For this reason, complete and accurate information is necessary. Please read the directions carefully and note that this section asks for the number of servings both per week and per day of various foods. Please also note that the serving size is listed for each food. This serving size is not necessarily the size portion which many persons consume. For example the stated serving size for beef is 3 ounces. A 9 ounce steak (average steak house size) would therefore be listed as "3" servings rather than "1" serving. To further help visualize portions and serving sizes, it might be helpful to know that a standard cafeteria serving of mashed potatoes is ½ cup and that a small juice glass holds 4 ounces or ½ cup. As you complete the food frequency record, please make a note in the "Comments" section if you would like assistance with any answer.

Indicate the number of times per week you eat the following foods. If less than one time per week, state less than one (<1) or 0

Milk and Dairy Products

	Serving Size	Number of Servings Per Week	Comments Circle types *most* frequently consumed or provide additional information concerning method of preparation
Milk	8 oz (1 cup)		Whole, 2%, 1%, ½%, skim, chocolate, buttermilk
Yogurt	8 oz (1 cup)		skim lowfat whole flavored

Meats and Other Protein Sources

	Serving Size (Cooked Weight)	Number of Servings Per Week	Most Frequent Preparation Or Other Comments
Beef	3 oz.	_____	How prepared? fried broiled baked boiled breaded & fried
Hamburger	3 oz.	_____	How prepared? fried broiled baked breaded & fried
Pork (ham, chops)	3 oz.	_____	How prepared? fried broiled baked boiled
Bacon, sausage	1 piece	_____	
Luncheon meat, hot dogs	2 oz.	_____	Usual type? bologna salami turkey pork beef other
Chicken/Turkey	3 oz.	_____	How prepared? fried broiled baked boiled casserole with skin? without skin?
Cheese (do not include cream cheese)	1 oz.	_____	Type?
Fish	3 oz.	_____	How prepared? fried broiled baked boiled breaded & fried
Tuna/Salmon	3 oz.	_____	Oil-pack Water-pack salad casserole croquettes
Shellfish	3 oz.	_____	What type? How prepared? fried broiled baked boiled stuffed
Liver, organ meats	3 oz.	_____	What type? How prepared? fried broiled baked boiled
Veal/Lamb	3 oz.	_____	How prepared? fried broiled baked
Eggs (not used in cooking/baking	1	_____	How prepared? fried boiled poached scrambled deviled
Eggs (used in cooking/ baking)	1	_____	
Nuts, seeds	1 oz.	_____	Type?
Beans/Peas (pinto, red, navy, lima, English, blackeye, etc.)	½ cup	_____	Type? fresh canned frozen dried
Peanut Butter	1 tablespoon	_____	Salt added? Sugar added?

Do you trim off visible fat from meats? ____yes ____no

Desserts and Sweets

	Serving Size	Number of Servings Per Week	Comments
Pastries, sweet rolls, donuts	1 each	_____	Type?
Cake	1 slice	_____	Type?

Cookies	1 each	_____	Type?
Fruit Ice	½ cup	_____	Flavor
Malts, Shakes	1 cup	_____	Flavor
Ice Cream	½ cup	_____	Usual Brand
Ice Milk	½ cup	_____	Usual Brand
Jello	½ cup	_____	Plain fruit-filled
Pie	1 piece	_____	Type?
Pudding, Custard	½ cup	_____	Type?
Sherbet	½ cup	_____	Usual Brand
Candy, Chocolate Bars	1 bar/piece	_____	Type?
Jam, Jelly, Honey, Preserves, Sugar	1 teaspoon	_____	Which one?

For the next food groups, indicate the number of times per day you eat the following foods.

Fats

(Include amounts used in cooking)	Serving Size	Number of Servings Per Day	Comments
Butter	1 teaspoon	_____	Usual Brand
Margarine	1 teaspoon or 1 pat	_____	Type? Stick Tub Diet Usual Brand
Cooking/Salad Oil	1 tablespoon	_____	Type? corn sunflower safflower vegetable Usual Brand
Shortening, Lard, Bacon Fat	1 tablespoon	_____	Kind used most frequently?
Gravies, Sauces	1 tablespoon	_____	Type? Brown Cream Broth-based
Sandwich Spread/Salad Dressing/Mayonnaise/ Tartar Sauce	1 tablespoon	_____	Type?
Dressings Used on Salad	1 tablespoon	_____	Type? french milk or yogurt base mayonnaise oil & vinegar ranch style 1000 island blue cheese roquefort diet other
Cream (sour or sweet or cream cheese)	1 tablespoon	_____	Type?

Fruits

	Serving Size	Number of Servings Per Day	Comments
Fruit	1 each or ½ cup	_____	Type? raw frozen dried canned-water or juice pack canned-syrup pack
Fruit Juice	4 oz. (½ cup) (small glass)	_____	Type? fresh frozen canned

Circle the fruits you consume most frequently:

apple	dates	orange	Other
applesauce	figs	peach	_____
apricots	grapefruit	pear	_____
banana	grapes	pineapple	_____
berries	melon	raisins	_____
cherries	nectarine	tangerine	_____

Do you include a food source of Vitamin C daily (citrus fruit or juice; tomato; broccoli; potatoes, etc.) ___yes ___no

Are there any fruits which you avoid? ___ yes ___ no Which ones and why? _____

Vegetables

	Serving Size	Number of Servings Per Day	Most Frequent Preparation Or Other Comments
Vegetable (include salads)	½ cup	_____	How prepared? fried steamed boiled raw casseroles breaded & fried stir fried Usual type? fresh frozen canned dried

Circle the vegetables you consume most frequently:

asparagus	carrots	okra	tomatoes
bean sprouts	cauliflower	peas	turnips
beans/peas	celery	potatoes	zucchini
(pinto, red, navy, etc)	corn	radishes	Other:
beets	cucumber	rutabaga	_____
broccoli	eggplant	spinach	_____
Brussel sprouts	green beans	squash	_____
cabbage	lettuce	sweet potatoes	_____
greens			

Do you include a green or yellow vegetable 3 or 4 times per week (broccoli, carrots, spinach, greens, squash) ___yes ___no

Are there any vegetables which you avoid ___yes ___no Which ones and why? _____

For the next food groups, indicate the number of times per week you eat the following foods.

Breads, Starches, Grain Products

	Serving Size	Number of Servings Per Week	Comments
Bread, roll, bun, bagel, Enlish muffin, cornbread	1 slice	_____	Type? wheat rye white sourdough other
Macaroni, noodles, spaghetti, pasta	½ cup	_____	Type? enriched whole wheat
Muffin	1 each	_____	Type?
Potatoes	½ cup, 1 small, 10 french fries	_____	How prepared? boiled baked mashed french fried casserole cream sauce salad
Popcorn	3 cups	_____	With butter margarine salt caramel flavored (i.e. cheese)
Pancakes, waffles	1 average	_____	With butter margarine syrup honey
Sweet potatoes, yams	½ cup	_____	How prepared? baked mashed candied
Corn	½ cup	_____	How prepared?

Green Peas	½ cup	_____	
Cereal, dry breakfast-type, ready to eat	¾ cup	_____	Type?
Cereal, cooked	½ cup	_____	Type?
Rice	½ cup	_____	Brown White
Tortillas, corn	6" diameter	_____	How prepared? fried steamed baked
Tortillas, flour	6" diameter	_____	How prepared? fried steamed baked
Crackers	4 each	_____	rye wheat cheese sesame snack other

Combination Foods

	Serving Size	Number of Servings Per Week	Comments
Pizza	1 piece	_____	Usual Type? frozen homemade restaurant Usual Kind? cheese sausage pepperoni vegetarian combination
Burrito, Enchilada	1 average	_____	Type?
Taco	1 average	_____	
Frozen TV dinner	1 dinner	_____	Usual Type? Usual Brand?
Spaghetti with meat balls/ sauce; lasagna	1 cup	_____	Usual Type? frozen homemade restaurant
Other mixed dishes, casseroles or frozen prepared foods	½ cup	_____	Usual Type? Usual Brand?

Non-Alcoholic Beverages

	Serving Size	Number of Servings Per Week	Comments
Hot chocolate, cocoa	1 cup	_____	Instant homemade
Regular soft drinks	12 oz. can	_____	Usual Brand?
Diet soft drinks	12 oz. can	_____	Usual Brand?
Fruit drinks and other beverages (tang, kool-ade, gatorade, fruit punch)	1 cup	_____	Usual Type?
Dietary Supplements (instant breakfast, nutrament, etc.)	8 oz.	_____	Usual Type?
Water	8 oz.	_____	
Coffee, tea	1 cup	_____	instant brewed drip decaf herbal cereal flavored-type
Tea	1 cup	_____	decaf herbal

Do you add ___ milk ___ cream ___ non-dairy creamer ___ sugar or honey ___ artificial sweetner

Alcoholic Beverages

	Serving Size	Number of Servings Per Week	Comments
Beer	12 oz.	_____	Regular Lite or Low-calorie Usual Brand
Wine	4 oz.	_____	White Red Low-Calorie Usual Brand?
Liquor	(1½ oz.) 1 jigger	_____	Usual Type? How served? Straight Mixed Usual Mixer?

Miscellaneous

	Serving Size	Number of Servings Per Week	Comments
Chips (potato, corn, snack)	8 chips	_____	Usual Type?
Soups	½ cup	_____	Usual Type? Broth Cream Water added Instant Homemade
Dips	1 tablespoon	_____	Usual Type?
"Hot" Sauce	1 teaspoon	_____	Usual Type?
Pretzels	½ cup or 8 pieces	_____	Usual Type?

How many times per week do you eat fried foods? ____

Do you salt during cooking? ____ At the table? ____ Prior to tasting? ____

Do you add bran to your food ____yes ____no (amount normally used _____).

Do you add wheat germ to your food ____yes ____no (amount normally used _____)

Circle your most frequent snack choices:

soft drink	beef, fish, poultry	crackers	dip
chips	candy	fruit	vegetables
milk	cheese	yogurt	nuts, seeds
fruit drink	coffee, tea	peanut butter	Other_____

List any other foods regularly consumed, but not listed in the nutrition history: _____

_____

_____

_____

How would you rate your nutritional dietary habits?

Poor Fair Good Excellent

APPENDIX G

Dietary Record Forms

INSTRUCTIONS FOR KEEPING DIETARY RECORD

Remember, the more detail you use when you record your foods, the less I will have to guess at what you ate; therefore the more accurate your computer printout will be. Please be as careful and precise as possible in recording your diet.

1. Write down everything you eat, from the time you get up to when you go to bed, for three days. Do this on two weekdays and one weekend day; for example, Thursday, Friday and Saturday.
2. Describe foods in detail; for instance, write "whole milk", rather than just "milk", or "whole wheat bread", rather than just "bread". If you use low-calorie foods, please write that down, too (such as low-cal dressing).
3. Estimate amounts of food you eat in household measures, such as cups and ounces. A normal serving of a sidedish, such as vegetables or rice, is usually about 1/2 cup. A serving of meat three inches in diameter and 1/2 inch thick (the size of a woman's palm) is about 3 ounces. Estimate beverages in fluid ounces; this will be easier if you measure how much is in your most commonly used glass or cup. Your estimates will be more accurate if you measure your foods for the first day to get an idea of how much you usually eat.
4. If you use convenience foods, such as frozen entrees, state the brand name and what is in them. For instance, write "Le Menu Chicken Cacciatore-chicken breast with tomato sauce and mushrooms". Sometimes the computer program has the exact food, whereas other times I may have to substitute something similar.
5. For any homemade dishes, such as casseroles, breads, cookies, and desserts, write down the recipe (on the back, if necessary) and then record how much of that recipe you ate.
6. After you have finished the 3-day diet journal, fill out the nutrition history questionnaire. This will give us a broader look at your usual dietary habits. Be sure to indicate what type of food items you eat, such as white or wheat bread, whole or skim milk. Be particularly careful when estimating how much fats and oils you eat daily, as this will drastically affect your calorie count. Looking back at your diet journal may help you figure out how much you eat of a particular food in one week.

THANK YOU VERY MUCH FOR YOUR EFFORTS!

NAME:_____
DATE:_____
DAY OF WEEK:_____

FOOD INTAKE RECORD

Time	Food/Beverage Description	Amount Consumed	Where Eaten

APPENDIX H

Experimental Class Handouts

TIPS FOR A LOW-FAT DIET

1. Substitute lowfat (2%) or skim milk for whole milk or cream (real or non-dairy), when used as a beverage, added to coffee or as an ingredient in recipes.

2. Use reduced-fat sour cream (Daisy Lite or Lean Cream) or lowfat/nonfat yogurt for regular sour cream as a condiment or in recipes. May also add lowfat cottage cheese (1:1) and lemon juice, whirl in blender: less sour taste.

3. Try ice milk, sherbet, or lowfat frozen yogurt in place of rich ice cream (both Braum's and Blue Bell have good products).

4. Choose more often from the low and moderately fat cheeses and less often from the high fat cheeses.

Fat Content of Cheese (% of Calories)

Very high fat (70%+)			
American	Cheddar	Feta	Gouda
Bleu	Colby	Muenster	Gruyere
Camembert	Cream	Neufchatel	Monterey Jack
Moderately high (50-70%)			
Provolone	Ricotta (part-skim)		Parmesan
Romano	Mozzarella (part-skim)		Edam
Gjetost	Swiss		
Low (20-35%)			
Cottage	Reduced fat (Lite-line, Weight Watcher's)		
Farmer	Mysost (Scandinavian, made from whey)		

5. Use "diet" mayonnaise, salad dressings, and margarines; these have reduced fat content, yet still provide enough essential fatty acids.

Homemade no-oil dressing:

Mix 1 T. cornstarch and 1/2 tsp. dry mustard in a small saucepan. Gradually stir in 1 c. cold water. Cook over medium heat, stirring constantly, till mixture thickens; cool. Add 1/4 c. vinegar and spices to your liking, such as paprika, oregano, garlic, basil, chives, poppy seeds (w/sugar), tomato sauce, Worcestershire sauce, wine, etc.

6. Keep meat servings moderate, 5-7 ounces per day of lean meat, poultry or fish.

7. Select lean cuts of meat which are closely trimmed and have little marbling. Some of the leanest cuts of beef are:

Top round (steak or roast)	Eye of round
Flank steak (fajita meat)	Sirloin
Round tip	Tenderloin

Very young veal and lamb, and most pork cuts are also low fat. Some hams with only 4-8% fat are currently available.

8. Take the skin off poultry before cooking.

9. Avoid pre-fried frozen fish sticks and tuna/salmon packed in oil.

10. Select reduced-fat luncheon meats and sausages (made from turkey or lowfat ham).

11. Roast, broil, bake or pan-broil meats, and discard drippings. Skim fat off gravy by cooling it first.

12. Use peanut butter and other nuts and seeds sparingly.

13. Allow yourself only occasional servings (once a week at most) of high fat desserts, baked goods and snacks, such as raised donuts, pies, pastries, croissants, chips, and snack crackers.

14. Choose more often to prepare food by baking, oven-broiling, boiling, poaching, stirfrying, and steaming. Allow yourself only occasional (once a week at most) servings of deep-fat fried or sauteed foods.

TIPS FOR ADDING MORE FIBER TO YOUR DIET

Only foods from plant sources contain fiber. There is no dietary fiber in meat, fish, poultry, eggs or milk.

Choose More Often	Choose Less Often
Whole grain breads, made with whole wheat, rye, oats, or corn; also pumpernickel	Breads, muffins, rolls and cereals made with refined (white) flour

Choose More Often	Choose Less Often
Bran-enriched breads, muffins, and cereals	
Whole wheat crackers and corn chips, muffins, bagels and pasta	Regular snack crackers and chips, English muffins, bagels and pasta
Quickbreads made with whole wheat flour, such as waffles, pancakes, biscuits, cookies	Quickbreads made with refined flour
Brown and wild rice	White rice
All fruits and vegetables, especially with skins intact	Peeled or pureed fruits or vegetables and their juices
All dry peas and beans	
Popcorn, unbuttered	

When you are cooking at home, you can add fiber to the recipe by:

1. Substituting whole wheat flour for 1/2 the white flour.

2. Adding 1/4 to 1/2 cup of wheat bran, oat bran or high fiber cereal to quick breads, yeast breads, pancake batter, cookie dough or ground beef (for meatloaf, burgers).

3. Adding fresh or dried fruits, such as apples or raisins.

4. Substituting finely crushed high-fiber cereal for part or all of the crumbs in a graham-cracker crumb crust recipe, or in recipes calling for breadcrumbs.

TIPS FOR GETTING MORE VITAMINS A & C IN YOUR DIET

The ideal diet includes 4 servings of fruits and vegetables daily, with at least one serving which is high in vitamin A and one serving that is high in vitamin C. The following lists of fruits and vegetables will help you plan your daily menus to meet these requirements.

High Vitamin A Fruits and Vegetables

Alfalfa sprouts, raw
Asparagus, green
Beans, green
Brussels sprouts
Carrots
Chard
Endive
Grapefruit, pink and red
Kale
Kumquat, raw
Mango, raw
Okra
Papaya
Peach
Peppers, chili & green
Prunes, dried
Rutabaga
Squash, all types
Tangerine
Watermelon
Apricots
Avocado
Broccoli
Canteloupe
Cherries, sour
Corn, yellow
Escarole
Greens: beet, chicory, turnip, mustard
Lettuce, all types
Nectarine
Orange
Parsley
Peas
Persimmon
Pumpkin
Spinach
Sweet potatoes
Tomato

High Vitamin C Fruits and Vegetables

Vitamin C is soluble in water and destroyed by heat, so cook in a small amount of water for a short time, preferably either steaming or microwaving.

Asparagus
Brussels sprouts
Canteloupe
Chard
Grapefruit
Guava
Kale
Kumquats
Lemon
Orange
Parsley
Persimmon
Radish
Rutabaga
Squash, all types
Sweet potato, baked
Tangerine
Watermelon
Broccoli
Cabbage
Cauliflower
Currants
Greens: beet, collard, mustard, turnip
Honeydew melon
Kohlrabi
Lime
Okra
Papaya
Peppers, chili & green
Potato, baked
Raspberries
Spinach
Strawberries
Tangelo
Tomato