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Communication strategy to change nutritional practices

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by

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CHAPTER I. INTRODUCTION

Need for Nutrition Education

There is a need for nutrition education in the United States. Philip White (1976, p. 151) said:

> The U.S. has been called a nation of nutritional illiterates....The state of knowledge of Americans is out of phase with the advanced state of knowledge in the science of nutrition. Obviously much more is known about nutrition and human needs than is manifest by the current practices of our population.

There is ample evidence of the need for improved nutritional practices among the U.S. population. The problem involves overconsumption as well as underconsumption. Due to overconsumption of sources of energy coupled with too little exercise, obesity is a major problem. At the same time, especially among certain segments of the population, underconsumption of certain vitamins and minerals is a concern. The report of the White House Conference on Food, Nutrition and Health (1969, p. 162) concluded that:

> Among the affluent it is clear that we have developed a society that is characterized by: 1) overconsumption of calories with food choices that are not necessarily the wisest on the basis of available nutritional information, 2) underexercising and failure to develop lifelong habits to combat the ills of sedentary life.

The report also notes that "Malnutrition is not just a problem for the poor. It may be found in all socio-economic levels and all age groups." In his testimony to the Senate Select Committee on Nutrition and Health, Mark Hegsted (1977)

said:

> I wish to stress that there is a great deal of evidence, and it continues to accumulate, which strongly implicates and, in some instances, proves that the major causes of death and disability in the United States are related to the diet we eat. I include coronary artery disease which accounts for nearly half of the deaths in the United States, several of the most important forms of cancer, hypertension, diabetes and obesity as well as other chronic diseases.

In the statement regarding the Dietary Goals, the American Dietetic Association (1977, p. 228) stated:

> Because eating habits are based on cultural, social, and economic factors, as well as nutrient content of foods, we believe that such changes cannot be brought about by legislation or governmental regulation alone. The American Dietetic Association believes that acceptance of a prescribed way of eating by the American public will be attained only if a suitable variety of foods is available; if people are well informed and motivated to change; and if qualified professional educators, such as registered dietitians, are available to provide counseling and support....Nutrition education for the public is urgently needed.

The American Dietetic Association (ADA), in its position paper on "the scope and thrust of nutrition education" (1978, p. 302), reiterated the need for nutrition education:

> It [nutrition education] is needed, regardless of income, location, or cultural, social or economic practices, or level of education. Nutrition education must be a continuing process throughout the life cycle as new research brings additional knowledge.

Inherent Difficulties in Nutrition Education

Effective communication of nutrition information is not easy. Nutrition is inherently more difficult to teach to the general population than some other fields. Many nutritionists and educators have commented on the difficulties. Helen Guthrie (1978, p. 57) has summarized them as follows:

> 1) Information alone is often not enough to cause or enable a person to improve her/his eating habits and thus her/his nutritional state.
>
> 2) The benefits of improved nutrition habits are delayed in the case of weight reduction or are not directly experienced, as in the case of illness averted. We do not immediately recognize a close connection between changed dietary practices and increased resistance to infection, decreased dental problems, or even weight changes.
>
> 3) It is difficult to offer a sound nutritional alternative to combat the conflicting and often highly emotional claims that immediate benefits can be achieved through the use of specific foods or food patterns.
>
> 4) Our goal is to promote variety in food selection and to be sensitive to the range of acceptable choices associated with ethnic, economic, geographic, and age variations in our society.[1] It is difficult to maintain this orientation in the face of commercial and cultist messages which promote a limited number of food items which are claimed to meet all or a significant part of one's nutritional needs.

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[1] In addition, individual variations within these groups must be considered.

Need for Research in Nutrition Education

Awareness of the need for research in nutrition education is not as great as is awareness of the need for nutrition education. Many assume that we know how to communicate information about nutrition and we just need to do it. This is simply not the case. There are inadequate data about approaches which are effective in changing nutritional practices. Nutrition education has been more an art than a science. It must be both to achieve its objectives.

Recently, awareness that nutrition education efforts are inadequate has been increasing. In recommendations for nutrition teaching and nutrition education, White House Conference participants pointed to:

> Poor nutritional status and eating habits of large numbers of people--at all age levels and in all socioeconomic strata as ample evidence that there are serious inadequacies in the total nutrition education effort to date (White House Conference, 1969).

The ADA position paper (1978) also supports the need for research in mass communication of nutrition information:

> Research is needed to determine ways to use media more effectively in nutrition education and to integrate its use into the comprehensive nutrition education system.

Some national legislators are also becoming aware of the inadequacy of current nutrition education efforts and the need for research in nutrition communication. Representative

Fred Richmond from New York has been a leader in this area. In an article (1977, p. 151) describing the hearings of the U.S. House of Representatives Subcommittee on Domestic Marketing, Consumer Relations, and Nutrition of the Committee of Agriculture he made the following comments:

> We need a research effort which will tell us how to design information and deliver it so that it is useful, appealing and motivating to individuals of different income and educational backgrounds. We need to be both more businesslike and creative in the organizational arrangements we make for providing nutrition guidance at the community level. The lecture, group discussion, recipe demonstration and health fair route may be useful but will not make a ripple on the pond in a country of 220 million.

Regarding evaluation, Richmond goes on to say:

> They [agencies of the Federal Government] need to be able to justify their programs on the basis of logic, research and feedback. The old numbers game of counting prints that leave the shelves, and faces encountered in meeting rooms is pointless. If Congress is to provide the dollars and the policy initiatives to fuel a national nutriton education program, we must be assured that it will accomplish significant improvement in the health and well-being of citizens.

Two areas deserve consideration in attempts to improve the record of nutrition education:

1. Nutrition knowledge, although necessary, is not sufficient to bring about desired food behavior changes; thus, effective intervention must also take into account personal and social factors related to food behavior.
2. Nutrition knowledge and comprehension are necessary for effective, long-term behavior change and appropriate

adaptability to a changing food environment. Often educators have attempted to tell people what to do without adequately explaining why. We need to make nutrition understandable for the specific audience with which we are communicating.

Gilbert Leveille (1978, p. 5) has addressed the problem as follows:

> Advancements in nutrition research are comforting. We are indeed expanding our knowledge at a rapid rate. Yet as satisfying and important as this is, the ultimate value of the information lies in its application to the betterment of the lives of people. This requires an understanding of how to communicate the available information and, additionally, an understanding of what motivates people to develop and change particular eating patterns.
>
> Will we have the foresight to support and encourage research in these important and closely allied areas of nutrition behavior and nutrition education? The increasing research interest in these areas is encouraging and, hopefully, support will be forthcoming to permit the continuation and expansion of this work. Our ultimate success in implementing nutrition knowledge will depend upon the concomitant increase in our "knowledge of nutrition behavior and education."

The goal of this dissertation is to add to the knowledge of nutrition behavior and of educational strategies to change food practices.

Statement of the Problem

In order to develop a scientific body of knowledge about intervention to change nutritional practices, a systematic approach is needed. Therefore, one aspect of this research

has been to develop a framework and model to guide planning and evaluation of nutrition intervention programs. The model was based on a mass communication model which focused on the dispositions of the intended audience (Yarbrough, 1968) and a previous application of this model to a nutrition communication program (Gillespie, 1975). The model was then used as a guide for planning and evaluating a mass communication program for young families.

The audience

Although many groups are ill-informed about nutrition, to be effective, communication programs must be designed for one group on the basis of specific, well-defined characteristics. In this study, families with young children were selected to be the target audience for the following reasons:

1. Families influence development of food habits of children.
2. Good nutrition is especially important to allow optimal growth and development during the early years of life.
3. Young families have greater potential for change in food behavior than families in other stages of the life cycle because they are already in the process of adjusting their food patterns. Mother and father are adjusting their previous food habits to achieve a common set of practices. As each child joins the family and as children's food preferences and needs change, additional

changes are necessary. If intervention can cause change, the chances of success are best at a time when food habits are already in flux.

For this experiment, the intended audience was young parents who could read and who had some interest in nutrition. The communications were aimed at those who were aware of the many nutrition messages in mass media channels and who might be misled or confused by the information they were receiving in popular media. Messages were aimed at fathers as well as mothers.

The approach

In this study, nutrition education has been viewed primarily as a problem of persuasive communication. Communication theory incorporates relevant aspects of sociology, education, psychology and other related disciplines. The goal of persuasive communication is to gain acceptance of ideas, behaviors, etc. Because the term "nutrition education" has so many different connotations, it will be defined as nutrition communication[1] (except when references have been made to other studies which have dealt with nutrition education).

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[1]Persuasive communication about nutrition with the intent of changing attitudes, knowledge and/or behavior with respect to nutrition and food practices.

The White House Conference (1969) recommended that innovative apprcaches in nutrition education be developed. For this dissertation, a three-way interactive communication system via mass media (Gillespie, 1975) was used; interaction within the family and between the family and the nutrition communicator was expected to enhance the probability of changes in food practices. This system used mail as the channel for communication. A pretest of this system suggested that it was feasible because families did discuss the information with each other and did send feedback to the nutritionist.

The BARR report on the World Food and Nutrition Study (NRC, 1975) concluded that present nutrition education programs are not only fragmented, but also appear to be ineffective. This researcher agrees with John Quelch's statement in Nutrition Reviews (1977):

> The appropriate objective is not to simplify nutrition information but to insure that groups of consumers with varying information needs and capacities receive nutrition information which is presented at the appropriate level of complexity.

This nutrition communication program was a "holistic"[1] approach to nutrition information. The messages included

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[1]A holistic approach integrates various concepts and generalizations to give the receiver a total picture rather than only isolated facts which serve to answer specific questions but may not be very useful for making decisions in different situations.

basic nutrition concepts (what nutrients are and how they function) and application of these concepts (recommended allowances, food composition, and selection of food). The messages were written to help receivers understand the reasons for suggested dietary modifications and why they are important.

In order to communicate a holistic concept of nutrition, including food composition, an effective learning guide was necessary. Hill (1972) noted that:

> Some nutritionists are convinced that food selection should be taught in terms of nutrients....No tested research based tool has been developed for this purpose.

A Nutrient Guide was developed as part of the study to help integrate generalizations and concepts as well as to serve as a guide for food selection and evaluation. Some of the basic concepts for this guide were developed in a previous study (Gillespie, 1975).

Research In Nutrition Communication

Because research in nutrition education is a relatively new field of research, some of its special challenges will be presented. Features which distinguish communication research from laboratory research in nutrition include the following: 1) Research is usually carried out in the field in a real-life situation; therefore, many variables cannot be con-

trolled.[1] 2) Several facets of a project must be carried on simultaneously (assessment of what is happening and why, development of objectives and strategies for producing change, and testing for change).

Although many variables cannot be controlled, they must be considered. Because research in nutrition communication has been undertaken only recently, we know little about many variables such as how complex messages should be, what treatment is best for what audiences, or what channel should be used. Variables cannot be studied in the absence of an educational program and an educational program cannot be carried out without making decisions concerning the variables. For example, although data about the amount of information audiences are willing to read or to watch are incomplete, the quantity of information to be included in a program must be chosen.

In a multi-faceted study, inherent conflicts may occur within an experiment. Experimental requirements may interfere with communication goals because the process of gathering data to evaluate a communication program is likely to interfere with the communication process. If collection of pretest data is a requirement for participation in a pro-

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[1]Lack of control is by no means unique to communications research, but applies as well to sociology and other disciplines where the laboratory is the "real world".

gram, some receivers who might otherwise participate may not respond. Up to a point, the more data gathered, the more interpretation is possible. On the other hand, the more data gathered, the more the experiment interferes with the communication goals.

Few studies have measured changes in behavior due to nutrition education because it is not only very difficult to change behavior, but it is even more difficult to measure change. Because of the nature of nutrition, goals of nutrition education are usually (and should be) comprehensive in scope. Only specific changes, however, can be measured rigorously. Improved evaluation instruments are needed to measure nutrition knowledge, attitudes related to nutrition, and food practices.

In addition to these unique problems, field research also shares certain problems of laboratory research. Changes are produced slowly when human subjects are involved, tools for measuring changes in behavior are inadequate, and cooperation from subjects may be difficult to obtain.

Research in nutrition communication is in its early stages and the scope is analogous to trying to determine requirements for all nutrients in one experiment. Great advances, therefore, in a short time or with one experiment cannot be expected. Researchers and funding agencies as well as the public who pays for research must recognize that a

great deal of research over a considerable period of time will be necessary to learn as much about variables that affect change due to nutrition communication as we know about the variables that affect human requirements for specific nutrients.[1]

Leveille's (1978) challenge can be extended one step further, will we have the foresight to recognize that achieving significant advances in nutrition education research requires considerable time, effort and the patience to nurture that research in its early stages to allow it the chance to develcp and produce visible results?

Experimental Objectives

The present research was undertaken as part of the North Central Regional Projects NC-108 "Changes in Food Practices for Better Nutrition" and NC-146 "Communication Strategies to Improve Nutritional Practices of Families." It was designed to:

1. Develop a Nutrition Communication Model for planning and evaluating nutrition intervention programs.
2. Design a nutrition intervention program to improve food practices of young families based on the communication

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[1]Although nutritionists have been studying nutritional requirements for over 50 years, many questions are still unanswered.

model. This included:

-revision of communication strategy developed and pretested in a previous study (Gillespie, 1975).

-identification of subject matter content for nutrition messages.

3. Develop a food selection and evaluation guide[1] which:

-groups food according to specific combinations of nutrients.

-is a useful tool for learning food composition and for food selection.

-can aid in selecting foods to meet appropriate Recommended Dietary Allowances.

-reflects food habits of the U.S. population and deals specifically with major problems of U.S. diets (e.g. excessive caloric intake).

-is flexible enough to fit different life styles and eating patterns.

-incorporates a wide variety of convenience and processed foods as well as "traditional" foods.

4. Test the effectiveness of the nutrition intervention program in terms of the receivers' attention and cognitive, affective and behavioral responses.

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[1]Some of the basic concepts for the "Nutrient Guide" were developed in a previous study (Gillespie, 1975).

5. Analyze relationships among variables in the communication model.
6. Test the food selection and evaluation guide as part of an intervention program.

The Experimental Plan for This Dissertation

A nutrition communication program was developed and tested through the following steps:

1. Review past attempts in nutrition education (including a pretest of a nutrition communication program for young families; Gillespie, 1975) for data on which to base program decisions;
2. Based on existing data, develop a communication strategy most likely to be successful with the selected target audience of young families;
3. Translate the strategy into program materials;
4. Develop an experimental design to test the effectiveness of the strategy and the program;
5. Prepare instruments for measuring the outcomes of the communication;
6. Implement the strategy and the program with young families;
7. Evaluate changes brought about by the program and make recommendations for improvements in both strategy and materials.

This dissertation has been organized to describe these steps. Chapter II is a review of the previous attempts at persuasive communication of nutrition and related information via mass media. Chapter III presents the communication model which was developed for planning and evaluating strategies for nutrition intervention programs. In Chapter III, the application of this model to develop the communication strategy used in this experiment is also described. The development of a "Nutrient Guide" which served as the major focus for the messages is described in Chapter IV. Translation of strategy into program materials and design of the study are presented in Chapter V together with development of the measurement instruments. Chapter VI summarizes the results of the study and includes recommendations for future nutrition intervention programs.

CHAPTER II. PREVIOUS ATTEMPTS TO CHANGE NUTRITION AND HEALTH BEHAVIOR

Three types of intervention have been used to improve people's diets: fortifying or enriching specific foods, feeding programs, and persuasion.

Fortification and enrichment of foods have been used extensively in the United States; addition of vitamin D to milk; enrichment of cereal-grain products with thiamin, riboflavin, niacin, and iron; and addition of vitamin A to margarine and skim milk are examples. These methods have been quite effective in alleviating specific deficiencies of certain vitamins and minerals. The National School Lunch Program is an example of an attempt to improve food intake by institutional control of foods available to individuals.

Although fortification and feeding programs are important kinds of intervention,[1] this dissertation focuses on a third alternative, persuasion.

Persuasion is the approach of both food advertisers and nutrition educators to cause people to believe, feel, or act in the manner desired by the persuader. Persuasive communication will be discussed, studies of mass media programs on nutrition and health will be reviewed, and some tentative

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[1]For a more detailed discussion of fortification and institutional control, see Gillespie, 1975, p.7-11.

conclusions about effective persuasive communication will be drawn in this chapter.

Persuasive Communication and Nutrition Education

The term "nutrition education" means different things to different people and includes everything from answering specific questions such as "How long should I process green beans?" to attempts to change food practices of an entire society. To some people, nutrition education means teaching nutritional concepts in a classroom; to others, it is a friendly visit between a Family Food Aide and a homemaker, or a television advertising campaign or brochures distributed to customers in a shopping center. In this dissertation, the term nutrition communication will be used instead of nutrition education because its meaning is not as varied and because it does not have the negative connotation that nutrition education may have for some people. Nutrition communication is defined here as the application of persuasive communication about nutrition with the intent of changing knowledge, attitudes, and/or behavior with respect to nutrition and food practices.

The role of advertising techniques in nutrition communication

Advertising not only has been blamed for the deterioration of the nutritional quality of U.S. diets, but also has been heralded as the hope for improving them. Richard Manoff (1973, p. 267) has said:

> ...mass media--particularly radio, television and the ingenious technique we know as advertising--are perhaps the most forceful instruments you can employ today for attacking nutrition education problems of pressing priority and for reaching target populations en masse in the shortest time possible.

At the 1976 annual meeting of the Society for Nutrition Education, Manoff reiterated his belief in the power of advertising for nutrition education but pointed out that some nutritionists were skeptical. The author is among the skeptics for two reasons: 1) It has not been demonstrated that advertising alone can change nutrition behavior; in fact, much of the existing data support the conclusion that behavior is unlikely to change due to a mass media campaign alone (Rogers and Shoemaker, 1971).[1] "Mass media channels[2] are relatively more important at the knowledge function, and interpersonal channels[3] are relatively more important at the persuasion function in the innovation-decision process"

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[1]Manoff et al. (1977) has reported some success with radio campaigns to change very specific practices related to infant feeding.

[2]Mass media channels are all those means of transmitting messages that involve a mass medium, such as radio, television, film, newspapers, magazines, and the like, which enable a source of one or a few individuals to reach an audience of many" (Rogers and Shoemaker, 1971).

[3]Interpersonal channels are those that involve a face-to-face exchange between two or more individuals" (Rogers and Shoemaker, 1971).

(Rogers and Shoemaker, 1971, p. 255). 2) Selling a brand of toothpaste is quite different from selling changes in eating practices based on rational decision-making.

Usually nutrition communicators are trying to do much more than sell a specific product. They are trying to change patterns of eating behavior which are integrated into other aspects of the lives of people. Particular eating patterns are part of social custom. Deviations from such customs may expose persons to social disapproval. Food patterns are also related to basic goals and values which are difficult to change. Thus, objectives of nutrition communication require much more from the receivers than do objectives of advertisements.

Advertisers deal primarily with peripheral beliefs, i.e., those which are primarily a matter of taste (Rokeach, 1970). Should I use Ultra-Brite or Colgate or some other brand of toothpaste? Beliefs about a brand of toothpaste are not as important as whether or not one should brush his/her teeth and so are much easier to influence. An Ultra-Brite advertisement is not intended to sell people the idea of using toothpaste; it is intended only to persuade listeners to buy Ultra-Brite instead of Colgate or Pepsodent or other brands of toothpaste. Furthermore, the cost of changing may be small. On the other hand, nutrition communicators deal primarily with primitive and authority beliefs, i.e., those

which are central to the belief system; these are much more difficult to change because change would affect other beliefs. For example, a belief about the amount of meat one should eat is not only based on the amount needed nutritionally, but may also be related to beliefs about the importance of meat to a "macho" image. As a status symbol, meat serves to indicate economic achievement. To decide to decrease the amount of meat one eats, therefore, could touch on an individual's beliefs about other aspects of life. Nutrition communicators, however, desire to bring about change in a larger portion of their audience. Although advertising may be useful and should be considered for a potential role in nutrition communication programs, advertising alone is unlikely to bring about desired changes in established habits.

Evaluation of programs

Many educational programs have been based on the assumption that if a program provides information to an audience, communication has been accomplished. Increasingly, nutrition communicators are becoming aware that "presenting a program" does not necessarily cause changes in food practices, nor even in nutrition knowledge. As a result, programs are more often being evaluated for their effectiveness in achieving specific objectives. To be evaluated, objectives must be clearly stated; new techniques are needed to measure the

degree to which objectives are met. Variables must be manipulated systematically and measured with precision.

An extensive review of nutrition education programs (Gillespie, 1975) concluded that few have been evaluated rigorously. Programmers often make a subjective evaluation of the effects of programs. This evaluation may or may not be supplemented with audience comments about the program. The "grin test" is an appropriate label for this evaluation. If everyone liked the program, it was considered successful although nothing was learned about its effectiveness. In a study of the change due to "Mulligan Stew", a televised series on nutrition (Olien et al., 1975), how well children liked the program did not correlate with an improvement in their nutrition knowledge or food practices.

More meanirgful evaluations considered whether goals of programs were achieved. Usually goals include more than pleasing an audience. According to the model discussed in Chapter III, receivers may respond to messages at the following three stages: 1) attention, 2) comprehension, and 3) acceptance which may be cognitive, affective, or behavioral. When evaluations were available, little behavior change was demonstrated. Few studies have examined effective approaches for changing nutrition knowledge, attitudes and behavior of young families. Research, therefore, is needed to create more effective nutrition communication programs.

Mass Communication Programs

Studies of mass media programs relevant to this dissertation include communications on nutrition, health, or related subjects. Because a campaign to change knowledge and attitudes regarding mental retardation (Douglas et al., 1970) was one of the few studies which was successful in changing attitudes, it is reviewed also. The studies reviewed have been grouped according to the medium employed: print, television, and multi-media.

Communication programs using print media

Print media include pamphlets, newspapers, and magazines and require that the audience is able to read. Print media can be designed for a more specialized audience than television.

Comic books were the medium for a nutrition program aimed at teen-agers (Mapes, 1977). Content was based on data from a preliminary survey of the nutritional concerns of teen-agers. A 24-page comic "Gulp" was disseminated through schools and 4-H groups to 721 teen-agers (eight- to eighteen-year-olds). Comprehension of the messages was measured by responses to questions about the main points of each segment. Mean comprehension scores for the three segments varied from 63 to 78 percent. It was higher (from 70 to 88 percent) for fourteen- to eighteen-year-olds than for younger students. Subjective evaluations were solicited from

both students and teachers. Although there were some negative comments about using a comic book to present nutritional concepts, in general, the reactions were positive.

Greenburg et al. (1953) evaluated the effect of a carefully planned and designed series of health pamphlets. The pamphlets about child rearing were sent to parents once a month during the period between their child's birth and first birthday. The pamphlets were developed to be suitable for all socio-economic strata in North Carolina. They were written at a sixth-grade reading level and included illustrations.

Mothers selected from different socio-economic strata were interviewed when their children were 14 to 15 months of age. The interviewers asked questions designed to evaluate how the mother handled such issues as refusal of food by the child, adherence to feeding schedule and bottle feeding. Those who received the pamphlets were no more likely to follow suggested procedures than those who did not receive them with one exception. Among non-white mothers, those who received pamphlets were more likely to foster independent eating (one of five issues studied) by their children than those who did nct receive pamphlets.

Groves (1973) studied effects of a series of four newsletters sent to low income homemakers who were participating in the Expanded Food and Nutrition Program of

the Cooperative Extension Service. She found that newsletters were effective in gaining attention, and that the concepts included in them were generally understood. Little new information, however, was gained by the homemakers, i.e., the homemakers who did not receive the newsletters understood the concepts as well as those who did. Reactions to the newsletters were favorable, but they had no measurable impact on nutrition knowledge, attitudes or food practices. When Groves varied the apparent source of information she found no differences in responses whether the newsletters came from the County Extension Home Economist (a distant expert) or from the Family Food Aide (an individual with similar social characteristics).

Aronow et al. (1975) conducted a "by mail" education program which was part of a mass program to screen for coronary risk factors. In Long Beach, California, 2,524 adults with no history of coronary disease were assessed for several factors associated with coronary risk. Participants were recruited by contacting various employers in the Long Beach area and asking them to notify their employees that a free screening test was available. The first 1250 volunteers were assigned tc an educational program intended to reduce coronary risk factors. The educational program consisted of four separate mailings of literature from the American Heart Association and an invitation to attend four evening

lectures. The pamphlets included "Diet and Heart Disease," "Reduce Your Risk of Heart Attack," "Why Risk Heart Attack?," "What Everyone Should Know About Smoking and Heart Disease," "Cigarette Quiz," "Heart Attack: How to Reduce Your Risk," and "High Blood Pressure." Attempts were made to send information pertinent to an individual's particular risk factors. The one-hour lectures about coronary risk factors were followed by question-answer sessions in small groups with a cardiologist.

Of the 1250 adults assigned to the educational group, 872 returned for follow-up screening. Pre- and posttest data for these 872 were analyzed. Only 71 (8.1 percent) had attended one or more lectures. No data were reported on the participants' attention to (how much they read) the mailed pamphlets. The measured characteristics (age, sex, racial composition, years of education, serum cholesterol, serum triglycerides, blood pressure, fasting blood sugar, and weight) of those in the educational group were similar to the other subjects in the study.

The program did not reduce any of the following coronary risk factors: hypercholesterolemia, hypertriglyceridemia, hypertension, smoking, hyperglycemia, and obesity. In fact, the number of persons who had hypertriglyceridemia and hypertension increased significantly both in the educational group and the control group. The researchers did not attempt

to explain the cause for the increases; they only stated that it was more than could be attributed to normal aging during the 10 to 11 months between the two screening tests.

The educational program failed to reach its objective of decreasing coronary risk factors most likely because receivers did not pay enough attention. Few people attended the lectures and no data were reported on the number of subjects who read all or part of the pamphlets.

Significantly fewer individuals in the educational group returned for the second sceening than those in the group not provided with educational materials. The researchers wondered if the program had alienated some individuals.

The following three possibilities may account for low participation of those in the educational group: 1) the pamphlets created too much fear among the recipients; 2) the educational group was different from the control group because it had not been selected at random; 3) the prescreening experience for the educational group was so stressful that they had little motivation for a repeat performance.

Hovland and his associates (1953) have demonstrated that arousal of fear may have a negative effect on acceptance of a message. Janis and Fishbein (reported in Hovland et al., 1953) compared three messages that created minimal, moderate or strong degrees of fear with respect to dental hygiene

practices. Those who received the least fearful messages adopted recommended dental hygienic practices to the greatest extent. The group experiencing the most fear did not differ significantly from a control group who received no messages.

Two interfering reactions may be caused by messages arousing fear, according to Hovland et al. (1953), and could have been operating in the program to reduce coronary risk factors. The first is "aggression toward the communicator", i.e., the sender has caused distress or pain elicited by a message. In the coronary risk study (Aronow et al., 1975), receivers may have rejected the information sent to them. In addition, they may also have rejected the communicator's messages inviting them to return for post-screening. A second interfering reaction according to Hovland et al. (1953) is "defensive avoidance." If the fear aroused is strong and not adequately relieved by assurances in the same message, the receiver may choose to ignore or minimize the importance of the threat. The receiver may also ignore subsequent messages, in this case, an invitation to appear for post-screening tests.

Interpretation of the data from the Aronow et al.(1975) study is complicated because the educational group was selected from those who came to the pre-screening first. Although the educational and non-educational groups were quite similar in the characteristics measured, their

predispositions related to coronary risk factors were not measured and may have been different. Because the educational group was screened first, something about the procedure itself may have discouraged returning for screening after the program had been completed. Perhaps pre-screening techniques were improved with practice and the tests were less stressful to those tested later. Information reported was not sufficient to determine why the educational program had no effect except (apparently) to discourage participants from returning for post-screening.

Forty-two percent of young families in Iowa who were contacted by mail were recruited into a mailed nutrition communication program (Gillespie, 1975). Although a mass channel was employed, approaches to make messages personal and individualized were used. Audience predispositions were considered when the channel, message content and treatment, and apparent source of the messages were determined. Families were encouraged to discuss the information in the messages and a two-way communication was established between the families and the nutrition communicator. Effectiveness of the program was measured by comparing responses of participants to a posttest questionnaire with those of a randomly selected control group (who had not been offered the program) and with those of families who had been contacted but had elected not to enroll in the program (Gillespie et

al., 1976).

Forty-eight percent of the fathers and 92 percent of the mothers read half or more of the first program message. Readership declined to 19.2 percent for men and 67.1 percent for women for the last message. Sixty percent of the families discussed the first program message. Discussion decreased to 12 percent for the last message. No difference in knowledge of nutrition was demonstrated between participants and those in the control group. On the other hand, there was a positive change in attitudes toward nutrition and health. Participants placed a higher value on health goals after the messages had been received than did those who did not receive the messages.

Communication programs using television

In 1968 and 1969 the Iowa State University Extension Service sponsored a series of televised nutrition lessons called "Families On The Grow" (Pauline Mairs, Cooperative Extension Service, Iowa State University, personal communication, Ames, Iowa, 1975). Program materials were requested by 10,836 young homemakers. Of those requesting materials, 2,716 homemakers (26 percent) completed the series by returning answer sheets included in each of four booklets. Changes in food behavior, however, were not evaluated.

In California, television spots were used to reach a mixed population of elderly, minority, and low income people

(Brent, 1974). The spots were broadcast by several television stations. The impact of the program was evaluated by offering a food guide to listeners in one of the spots. Within two months, 5,000 guides were requested. To evaluate the attention response, however, the number of people in the listening audience and their characteristics must be known. Additionally, the effect of the program on nutrition knowledge or food behavior was not measured.

After a series of nutrition programs was presented on television by the Ohio Cooperative Extension Service, its effectiveness was measured by an objective knowledge test (Medved, 1966). The mean posttest score of 39.05 (out of a possible score of 44) was significantly higher than the pretest score of 35.58 and the standard deviation of the posttest scores was reduced. The audience had increased its ability to plan meals, but the nutritive quality of meals actually eaten was not evaluated.

Fitzgibbons and Garcia (1977) tested television spots for elderly in Iowa. Four different public service announcements (PSA's) were shown on four television stations (three commercial and one educational) over a period of six weeks. In all, the four spots were shown 112 times. A volunteer sample of 65 men and women 60 years of age or older were interviewed. Awareness was determined by the number who recalled having seen each of the PSA's. Between 3 and 26

percent definitely recalled one or more particular messages, i.e., could give some specific information about a PSA; an additional 9 to 16 percent thought they remembered seeing the messages, but could not recall any information in them. Posttest scores were not significantly different from those on a pretest; therefore, it was concluded that nutrition knowledge had not changed due to the PSA's. Food intake measured by recall of foods eaten during a 24-hour period also had not changed.

A television series about nutrition, "Mulligan Stew", was developed and implemented by the Cooperative Extension Service and evaluated by a group of researchers outside the Extension Service (Olien et al., 1975). The series which included six half-hour color television films was intended to improve nutrition knowledge and food behavior of children nine- through twelve-years-old. Video tapes were supplemented with supporting materials including a comic book version of the six films, a guidebook for group exercises, promotional posters, and a song book.

Schools in Minnesota were selected to serve as control or as experimental schools depending on whether the materials were available or not. The experimental groups varied according to the number of supporting materials used. The knowledge test assessed the ability to recognize what constitutes a balanced diet and characteristics of nutrients and

the understanding of digestion processes.

Three experimental groups, all of whom saw the video tapes and used supporting materials, showed a significant increase in knowledge. The number of students who reported having eaten a balanced diet increased also, but there was no significant change in their participation in preparing family meals. The more supporting materials used, the better was nutrition knowledge and eating behavior. The degree to which the children liked the program, however, was unrelated to changes that had occurred. This last finding is important because audience reaction is often used as the major element in evaluation.

Communication programs using more than one medium

A breakfast campaign in Flint, Michigan consisted of a program combining three mass media (television, radio, and newspapers) with person-to-person contact. Trained local leaders gave demonstrations to community groups and special lessons were presented to students in the school system in a widespread effort to increase the number of people eating breakfasts (Hay, 1961). Unfortunately the only evaluation data were comments from mothers indicating that their children had an increased interest in breakfast. No evaluation of change in the number or quality of breakfasts eaten was reported.

Axelson and DelCampo (1978) used television, radio, and brochures to test the effectiveness of mass media to improve nutrition knowledge of teen-agers. Four hundred ninth-grade students were selected randomly from high school lists in Florida. About half were within the designated broadcast and newspaper circulation area and they served as the experimental group. They were compared with those who lived outside the area of the campaign.

Ten questions, designed to measure nutrition knowledge, were administered to both experimental and control groups before the campaign and after it. The intervention program consisted of: (a) three spot announcements televised three times per week for eight weeks, during prime viewing time, (b) radio spots broadcast periodically for several weeks, and (c) brochures distributed through the experimental schools. The TV spots invited teen-agers to telephone and ask questions about nutrition. The radio station cooperated by organizing a contest in which students who called in with correct answers to questions about the nutrition information presented in the campaign won five-dollar prizes. The campaign lasted ten weeks.

The average net gain in nutrition knowledge for the experimental group was 0.86 which was significantly higher than the net gain of 0.45 by the control group. Prizes for the call-in contest may have been an important incentive--one not

often used in nutrition programs.

Mass media efforts were used to improve food practices in Korea (Higgins and Montague, 1972). Radio spots were broadcast, posters were put in public locations, and calendars, comic books, and pamphlets were distributed. Interviews with a sample of the population revealed that 90 percent had heard the broadcasts, 63 percent still had the calendar, and 52 percent had retained the comic book. In terms of comprehension, 70 percent knew the printed messages dealt with food, 53 percent remembered that they stressed a balanced diet, but only 2 percent could name any specific nutrients. Sixty-eight percent recalled that radio messages advocated eating a balanced diet. Although awareness appeared to be quite good, comprehension of specific information was poor. The effect of the program on behavior was not measured.

Douglas et al. (1970) reported that a community-wide mass media campaign to influence attitudes about mental health was successful. The attitudes of people in the town where the campaign occurred (the experimental town) were compared with those in another town where no such campaign took place (control town). Attitudes were measured by 21 Likert-type items. The researchers gathered data in the experimental town before as well as after a six-month campaign consisting of 20 news stories, five feature stories and an

advertisement for Mental Retardation Week in the local paper; in addition posters and articles made by trainable retardates were displayed, news items were broadcast over local radio, and special speakers were scheduled at a variety of meetings. Thus, the mass media channels were supplemented by face-to-face channels. Attitudes toward mental retardation in the experimental community changed significantly in the direction desired, but attitudes in the control community did not change. Knowledge of specific information covered in the campaign was learned, but general knowledge about mental retardation did not change.

The campaign apparently activated interpersonal channels. As sources of information on mental retardation, friends were cited twice as often in the experimental as in the control group.

A multi-media advertising effort in four U.S. cities encouraged people to use contraceptives effectively (Udry et al., 1972). Although a high level of awareness was achieved, the messages did not persuade the audience to take action. Advertisements, prepared by a professional advertising agency, were broadcast by radio and television; advertisements also appeared in regional editions of "Life" and "Look" magazines, and in local daily, ethnic, and community newspapers over a period of six months.

Each week 100 women were interviewed at shopping centers to determine awareness of the campaign to encourage use of contraceptives. Behavioral acceptance was measured by the number attending family planning clinics in the area and by sales of contraceptives in drug stores.

The campaign achieved a very high degree of awareness--virtually every person in the target population had been reached three or four times per week for six months. Televised advertisements created the greatest awareness; fewer respondents recalled radio advertisements (the range was from 40 to 80 percent in the four cities). Advertisements in the print media affected awareness the least.

In spite of the high degree of awareness, attendance at family planning clinics and sales of contraceptives in the four cities changed minimally during the campaign. Use of contraceptives is probably similar to improvement in nutritional practices because changes deemed desirable by the communicator require some changes in lifestyles. This study illustrates very well, that television, and to some extent other mass communication channels, is effective for increasing awareness, but has little effect on behavior.

The objective of an extensive intervention program in northern California was to reduce the risk of coronary disease (Farquhar et al., 1977). Three similar communities

were selected to assess the effects of mass media campaigns and also the effects of individual face-to-face counseling linked with mass communication programs. The two-year campaign involved only mass media in one community. A second community received a similar mass media campaign plus face-to-face counseling for a small sub-set of high risk people. The third community served as the control, i.e., no intervention was attempted.

Randomly selected men and women, 35 to 59 years old, in each community were interviewed at three intervals to assess their knowledge and behavior related to cardiovascular disease. Each subject was also examined for physiological indicators of coronary risk. Three annual interviews were conducted before the campaign began, one year later, and two years later. The first and third interviews were complete for 72 to 74 percent of potential participants in each of the three communities.

Knowledge of factors associated with coronary heart disease was measured by responses to 25 items on a written test. Behavior was measured by estimating daily intake of cholesterol, saturated and polyunsaturated fats, sugar, and alcohol; smoking of cigarettes, pipes, and cigars was recorded daily. The physiological responses to behavioral changes were examined by measuring plasma total cholesterol and triglyceride concentrations, blood pressure, and body weight.

The mass media campaign included 50 television spots, three hours of television programs, more than 100 radio spots, several hours of radio programming, weekly newspaper columns, newspaper advertisements and stories, billboards, posters, and printed materials mailed to participants. The program began with the pre-campaign interview. The first nine-month segment of the mass media campaign began two months after the interview had been completed. The second interview occurred shortly after the close of the first mass media campaign. Two months after the second interview, a second nine-month media campaign was carried out; this was followed by the third interview.

The strategy of the mass media and counseling programs was (Farquhar et al., 1977):

> ...to produce awareness of the probable causes of coronary disease and of the specific measures which may reduce risk and provide the knowledge and skills necessary to accomplish and maintain recommended behavior changes.

The programs stressed the need to change dietary habits by reduced intake of saturated fat, cholesterol, salt, sugar, and alcohol and total energy; to increase physical activity; and to reduce cigarette smoking.

In the community in which mass media was accompanied by counseling, two-thirds (113) of the participants who ranked in the top quartile of those at risk of coronary heart disease were selected randomly for counseling. Of the 113

selected, 107 attended the counseling sessions. Of these, 77 completed all three interviews. Counseling began six months after the initial interview and a second less intense counseling program was conducted the second year.

Both media alone and media plus counseling increased knowledge about risk factors, and reduced saturated intake, cigarette smoking, plasma cholesterol and systolic blood-pressure. Relative body weight was not affected by either treatment. Counseling in addition to mass media had significantly greater effect than mass media alone on these parameters at the end of the first year. Differences between treatments, however, had narrowed after the second year.

Farquhar et al. (1977), therefore, have demonstrated that knowledge and behavior can be changed by an extensive mass media campaign. The researchers (Farquhar et al., 1977, p. 1194) concluded that:

> Our results show that mass media can increase knowledge and change various health habits, but we believe that the power of this instrument could be considerably enhanced if we can find ways to use mass media to stimulate and coordinate programs of interpersonal instruction in natural communities (such as towns and factories) and to deliver forms of specialized training and counseling about weight-loss and smoking avoidance.

Summary of Research on Nutrition Communication

Relatively few studies of nutrition communication via mass media have been reported. Evaluation data are generally inadequate. Published studies are summarized in Table 1. Well-tested instruments do not exist for measuring changes in behavior and attitude. Considerable cooperation of respondents is necessary for evaluative procedures and many people are not willing to spend the time required. One central problem in studying food behavior is that behavior cannot be observed without temporarily influencing that behavior at the same time and thus biasing results.

There are not enough commonalities in design and variables among studies to draw strongly supported generalizations. Communication programs reviewed here were aimed at different audiences, had different objectives, and content as well as treatment of messages varied from study to study. Different channels and combinations of channels were employed--print, television, and radio. The extent to which receivers' predispositions were considered in program planning was reported infrequently and no doubt varied greatly. For example, in the coronary screening program in Long Beach (Aronow et al., 1975), no consideration of receivers' attitudes, values, or other predispositions were reported. On the other hand, in the program reported by Farquhar et al. (1977), messages were carefully planned ac-

Table 1. Summary of mass media program evaluations

Study	Intervening process responses: Attention	Comprehension
Print medium		
Mapes, 1977 Comic Books for Teens	S.E.[a]	On follow-up questionnaire 63-78% could identify main point of each lesson
Greenberg et al., 1953 Pamphlets about feeding infants - for young parents	N.E.R.[b]	N.E.R.
Groves, 1973 ENP Newsletter	88% read 1 or more issues	Nutrition knowledge showed no change pre- to post test
Aronow et al., 1975 Pamphlets about coronary risk factors	N.E.R.	N.E.R.
Gillespie et al., 1977 Mail program for young families	Recruited 44.2% read half or more	N.E.R.
Television		
I.S.U. Extension, 1968 Series for young homemakers[c]	26% of those who requested program returned feedback	N.E.R.
Brent, 1974 Low Income	5,000 requests for Food Guide (potential unknown)	N.E.R.
Medved, 1966 Ohio Extension	N.E.R.	N.E.R.
Fitzgibbons and Garcia, 1977 PSA's for elderly	3-26% definitely recalled information 9-16% may be recalled information	N.E.R.

[a]S.E. = subjective evaluation only.

[b]N.E.R. = no evaluation reported.

[c]Personal communication.

Acceptance/Rejection Responses		
Cognitive	Affective	Behavioral
N.E.R.	N.E.R.	N.E.R.
N.E.R.	N.E.R.	No difference in feeding children between experimental and control groups
No impact on general nutrition knowledge	No impact	No impact
N.E.R.	N.E.R.	No decrease in coronary risk factors
No change	Increased value placed on health goals	41% reported change in eating practices
N.E.R.	N.E.R.	N.E.R.
N.E.R.	N.E.R.	N.E.R.
Pretest knowledge 35.58/44 Posttest knowledge 39.05/44	N.E.R.	N.E.R.
No change	N.E.R.	No change

Table 1. (Continued)

Study	Intervening process responses: Attention	Comprehension
Olien et al., 1975 "Mulligan Stew"		N.E.R.
More than one medium		
Hay, 1961 Breakfast campaign TV, radio, newspaper	N.E.R.	N.E.R.
Axelson & DelCampo, 1978 TV, radio, brochures for teen-agers	N.E.R.	N.E.R.
Higgins & Montague, 1972 radio, posters, publications	90% aware 68% recall	53%-70% recalled about food, diet, etc.
Douglas et al., 1970 Mental retardation Radio, newspaper, posters, group meetings	N.E.R.	N.E.R.
Udry et al., 1972 Contraceptives TV, radio, magazines, newspapers	Vertually 100% TV radio print	N.E.R.
Farquhar et al., 1977 Coronary risk factors TV, radio, newspaper, posters, etc.	N.E.R.	N.E.R.

Acceptance/Rejection Responses		
Cognitive	Affective	Behavioral
Nutrition knowledge increased significantly	N.E.R.	Reported improved dietary intake No change in participation in family meals
N.E.R.	S.E.	N.E.R.
exper control	N.E.R.	N.E.R.
N.E.R.		N.E.R.
Improvement in specific but no improvement in general knowledge	Significant improvement in attitude toward mentally retarded	Not a goal of the program
N.E.R.	N.E.R.	No change in attendance of family planning clinic nor in contraceptive sales
Significant increase	N.E.R.	Decrease in incidence and severity of coronary risk factors

cording to the information available about individuals in the audience.

Farquhar et al. (1977) demonstrated that it is possible to change at least some food practices of large numbers of people. What were the characteristics which accounted for the success of this program when others failed? Probably one advantage was that it dealt with a salient health topic, coronary disease. For this topic, specific benefits (although long term) could be identified and quite specific prescriptions could be given. The campaign lasted much longer than most programs designed to bring about change. Three media were used extensively. For example, three hours of television programming is expensive and beyond the means of most educational efforts. Because behavioral changes usually occur in small increments over time, a program continued for two years had a better chance to produce measurable changes. Perhaps the most outstanding feature, however, was the excellent planning that preceded implementation. Specific objectives (outcome) were defined, audience predispositions were examined carefully, and the strategy was based on these two elements.

In general, interpersonal communication has been shown to be a positive factor in decision-making. However, the study by Farquhar et al. (1977) only partially supported this finding. Counseling in addition to messages via mass media

did increase adoption of desired practices during the first year, but by the end of the second year, the difference between the effects of mass media only and mass media plus counseling had nearly disappeared. Gillespie et al. (1976) observed that discussion within a reference group was positively related to acceptance of a nutrition program.

Programs based on receiver predispositions, i.e., attitudes, habits, values and other characteristics of the receivers, appear to be more successful than those which were not.

In conclusion, few generalizations can be drawn from existing studies about communication of nutrition information. Too few well-controlled and well-evaluated programs have been reported. This statement is not a criticism of those studies which have been reported, but rather an assessment of the state of the science. An organizing framework is needed so that studies can be compared and contribute to building a theory of nutrition communication. The next chapter presents such a framework.

CHAPTER III. THEORETICAL FRAMEWORK

Well-intentioned planners often do not have the conceptual tools for effective planning and evaluation of communications. Planners usually know something about their audience, but their objectives may be vague and unrealistically ambitious. Some are comfortable with commonly used methods such as presentations at meetings, while others want to experiment with a "new approach" such as spots on television. Planning communication programs all too often begins with selection of method (channel, presentation form and perhaps message) before specific goals are defined or specific audiences identified.

The Nutrition Communication Model developed in this chapter provides a framework for organizing available information and for planning and evaluating a theoretically sound communication strategy. The model has been applied to a particular nutrition communication problem later in this dissertation.

Nutrition Communication Model

Human communication is defined in this dissertation as the process by which one individual attempts to relate to another through the use of symbols. Communication may serve many purposes. Of concern in this study is communication which attempts to persuade. Persuasive communication is

defined as the process whereby one individual attempts to influence ideas, emotions, or behaviors of others in a specified direction.

A variety of models exist to guide the planning of a communication program. Probably the most widely accepted is the "SMCR" model. This model includes the source (sender) of the message carried over a particular channel to a receiver or audience. This model helps explain the system within which the act of communication takes place. To understand how communication occurs, an understanding of each of these four elements is necessary.

Most research has focused on one element at a time. Predispositional theory focuses on the receiver. According to predispositional theory, receivers' responses to messages will be affected by their existing values, beliefs, attitudes, and previous experiences (Yarbrough, 1968). Using predispositional theory, Yarbrough (1968) developed a "Model for the Analysis of Receiver Responses to Communication." This model is rooted in the models of several others, mainly that of Hovland et al. (1953). The focus of Yarbrough's (1968) model is useful for the present problem for two reasons: 1) Our objective was to influence the receiver, so the communication was designed taking into account known characteristics of the intended receivers. 2) The receiver plays an important role in the communication process through

his/her response to specific messages.

The communication process as conceptualized in the present model (based on Yarbrough's original model) includes three major components--"input", "intervening process", and "outcome" (Figure 1). In the following paragraphs, each of these components is defined and interrelationships among them discussed.

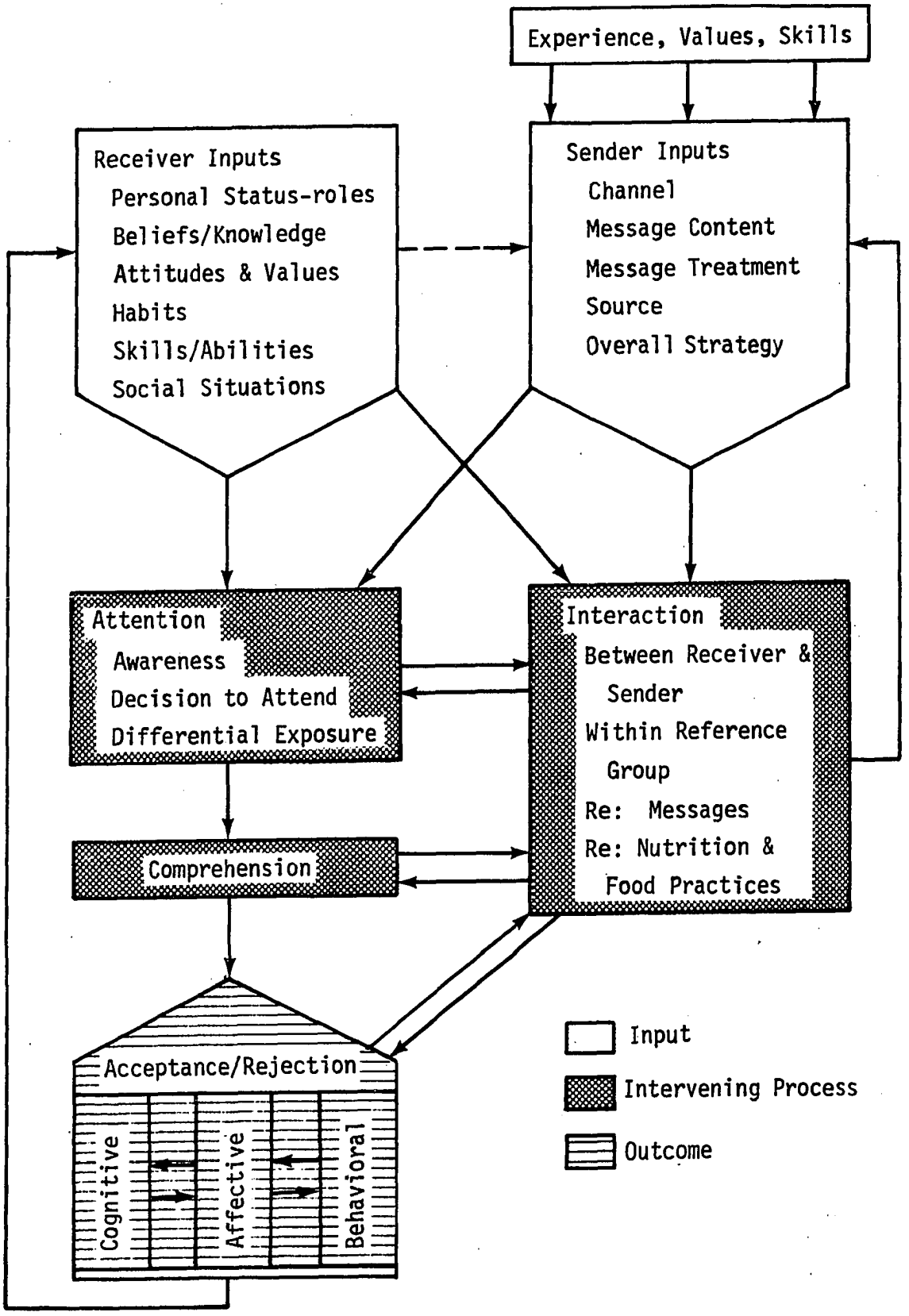
Inputs

Inputs are factors which enter into the communication process via the participants. Inputs include the sender's decisions about the communication strategy and predispositions of the receivers.

Sender inputs Senders make decisions about the communication strategy. These inputs are based on assumptions about what people know and will accept as well as how receivers will interpret the words, pictures, or sounds that convey the messages.

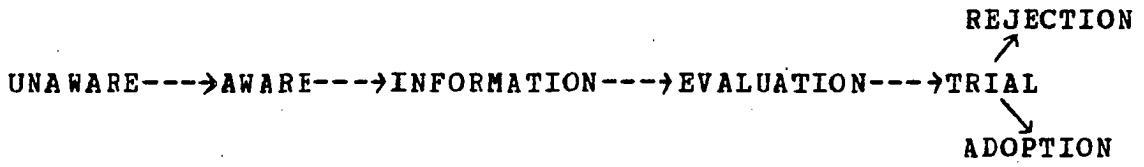
When a sender attempts to communicate with an audience, s/he must make a number of decisions which should influence receivers' responses. The sender determines the channels through which the message is conveyed and chooses the content and treatment of the message. S/he identifies the apparent source (sender) of the information.

Figure 1. Nutrition Communication Model


Experience, Values, Skills
Receiver Inputs
Personal Status-roles
Beliefs/Knowledge
Attitudes & Values
Habits
Skills/Abilities
Social Situations
Sender Inputs
Channel
Message Content
Message Treatment
Source
Overall Strategy
Attention
Awareness
Decision to Attend
Differential Exposure
Interaction
Between Receiver & Sender
Within Reference Group
Re: Messages
Re: Nutrition & Food Practices
Comprehension
Acceptance/Rejection
Cognitive
Affective
Behavioral
Input
Intervening Process
Outcome

Channels Messages can be sent through mass channels or interpersonal channels. Mass channels are defined here as radio, television, telephone, mail, newspaper, and printed bulletins, i.e., the ways in which senders can reach many receivers. Because mass channels have the potential for reaching large numbers of people with moderate expenditure of resources, they have great potential for those who wish to carry out mass educational programs.

Interpersonal communication is conducted one-to-one or from one to a few in private conversations and small conferences. Although the audience reached using interpersonal communication is small, the evidence is overwhelming that face-to-face channels are more persuasive than those of mass media. Adoption-diffusion research has demonstrated that mass channels are useful for increasing awareness of ideas, but that interpersonal channels are much more effective in persuading people to adopt ideas (Beal and Bohlen, 1962; Rogers and Shoemaker, 1971). Engel et al. (cited in Chaffee, 1972, p. 100) found that interpersonal channels predominate when individuals seek information before making a purchase. The best channel depends upon the stage of the adoption process which has been summarized by Yarbrough and Klonglan (1974) in the following diagram:



The process begins when a person who is unaware of an idea or practice sees or hears something about it. Next, the person seeks and evaluates information before deciding whether or not s/he will try the idea or practice. Depending on the results of trials, a person either adopts or rejects the idea or practice altogether or may choose to adopt certain aspects of it. These stages describe the process when the idea or practice involves a major change in a person's existing routines. For minor changes, however, one or more stages may be skipped.

In summary, mass channels allow one communicator to convey information to many people. Mass channels, however, are not as effective in bringing about adoption or acceptance as interpersonal channels (Katz and Lazarsfeld, 1964). The challenge to the communicator who wants to change behavior and reach large numbers of people is to link interpersonal communication to a mass channel so that mass media channels have some of the same characteristics of interpersonal channels. The proposition tested in this study, which is an extrapolation of adoption diffusion theory, is that the effectiveness of mass communication in the later stages of adoption of new ideas can be increased by using mass messages

to initiate interpersonal communication. If the messages include items to discuss or complete, receivers are more likely to talk about the messages and, in turn, are more likely to test and adopt the idea.

Considerations in selecting a mass channel for a communication program include receiver predispositions related to the channel, stage in the adoption process, and structural constraints. Channel-related, receiver predispositions are discussed later in this chapter. If one's objective is to change food practices (i.e., move beyond evaluation to adoption), interpersonal links will be more important than if one's objective is to increase awareness of the importance of vitamin C in the diet (i.e., move from unaware to aware). Structural constraints would include lack of access to particular channels by the sender and competing messages via the same channel.

Message content The concepts and ideas included in a message must provide enough information for decision-making and, at the same time, be manageable in length and complexity. The sender must decide what concepts to include, how to organize them, and whether they should be presented at a relatively low or high level of abstraction (e.g., specif-

ics vs. universals).[1] To choose concepts and the manner of presentation, the sender must consider carefully what information the receiver needs in order to make an appropriate response. Receivers' predispositions within a specified audience should be considered when selecting message content. Predispositions relevant to this communication program include such things as previous nutrition knowledge; ability to comprehend complex concepts; attitudes about food, nutrition, and health; and current eating practices.

Message treatment Treatment of a message includes its length and detail (synopsis vs. elaboration); ideas may be individualized so that they relate closely to the particular situation of the receiver. The concepts may be treated seriously, humorously, or satirically. The number, format and style of messages may vary depending on characteristics of the receiver.

Source The apparent source is the person or institution whose name accompanies the message. The credibility of the sender as well as his/her similarity to the receivers may affect a receiver's response to messages

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[1]Specifics are isolatable bits of information, "They are for the most part at a relatively low level of abstraction." (Blcom, 1956). On the other hand, universals are "knowledge of the major ideas, themes, and patterns by which phenomena and ideas are organized....These are the highest level of abstraction and complexity" (Bloom, 1956).

(Rogers and Shoemaker, 1971). However, in a study of nutrition newsletters written for homemakers participating in the Extension Service Expanded Nutrition Program, Groves (1973) found that homemaker's responded similarly whether the source of newsletters were perceived to be Family Food Aides or County Extension Home Economists.

Overall communication strategy The overall communication strategy includes the time and place for receiving messages. Feedback may be allowed or required; the kind of feedback may be directed and may involve others in the reference group. The setting in which communications are received may influence responses. If an individual is "feeling good" about his/her situation, s/he may be more likely to respond positively to a communication. When the sender makes chcices among the options for sender inputs, s/he should also consider receiver inputs.

Receiver inputs Receivers have a set of predispositions (psychological and social factors) which will affect their response to messages. The beliefs, attitudes, values, assumptions, etc. which receivers have before communication begins will affect the way messages are perceived and interpreted. Yarbrough (1968, p.16) stated that:

> Individuals are "predisposed"--through their experience, through what they perceive to be their "interest", through their habits and skills-- to react to a given message in a predictable manner.

One of the most discouraging propositions of predisposition

theory is that mass communications are more likely to reinforce previous attitudes, beliefs, and behavior than to change them.

Predispositions can be divided into two categories--"communication-free predispositions" and "communication-related predispositions" (Yarbrough, 1968). Communication-related predispositions are those which vary according to the topic, channel, etc., whereas communication-free predispositions such as general susceptibility to persuasion do not depend upon the particular communication. A sender is likely to be more successful in influencing the communication-related predispositions, than those that are communication-free. S/he has some control over the messages, but little control of the receivers' general attitudes and behavior.

Based on Hovland and associates' (1953) classification scheme, Yarbrough (1968) delineated four classes of communication-related predispositions: message-related, sender-related, channel-related, and reception-environment-related. Message-related predispositions are those related to the ideational content and those related to message treatment. Yarbrough (1968) delineated four social-psychological subclasses of communication-bound predispositions of an individual: 1) values and beliefs (including knowledge and sentiments), 2) habits, 3) skills (including intelligence and

abilities), and 4) social situation. His system allows for 20 subclasses (4X5) of predispositions (Figure 2). He defined five subclasses: attitudes about content, decoding skills, relevance of content to receiver's role, similarity of sender and receiver status-roles, and concurrent actions. The definitions of these subclasses have been modified and expanded in this dissertation and are presented in Table 2. The modifications were developed to describe subclasses with regard to communications about nutrition. The subclasses will be discussed in terms of questions which identify predispositions of receivers.

A. Nutrition-related predispositions

1. What are attitudes, values, beliefs and knowledge related to nutrition?

    a. What is the receiver's knowledge of nutrition?

    b. What are the receiver's attitudes about nutrition and food?

    c. What are the receiver's values regarding health?

    d. What are the receiver's attitudes (e.g. level of satisfaction) toward his/her current food practices?

    e. What are the receiver's attitudes (e.g. level of satisfaction) toward his/her current weight status?

2. What are habits related to nutrition?

    a. What are the receiver's current food practices?

    b. Do receivers habitually attend to nutrition information?

3. What are skills and abilities related to nutrition?

Classes of Communication Stimuli	Classes of Predispositions			
	Values	Habits	Skills	Social Situation
Message Content	Attitudes About Content			Relevance of Content to Receiver's Role
Message Treatment			Decoding Skills	
Sender				Similarity of Sender and Receiver Status-Roles
Channel				
Reception Environment				Concurrent Actions

Figure 2. Selected interrelationship of classes of predispositions and classes of communication stimuli (from Yarbrough, 1968).

Table 2. Interrelationship of classes of predispositions and classes of communication stimuli for nutrition communication

Classes of communication stimuli	Classes of Predispositions	
	Values, beliefs/knowledge sentiments	Habits
Message content (nutrition) related	Previous nutrition knowledge Attitudes about nutrition and food Health values Satisfaction with current food practices Satisfaction with current weight status	Current food practices Attention to nutrition messages
Message treatment related	Attitude toward humor, satire, straight factual presentation Attitude about appropriate kind of treatment for nutrition	Habitual response to humor, satire, and other forms of presentation
Sender related	Attitude toward sender (nutritionist, extension agent etc.) and toward institution represented (credibility, trustworthiness, legitimacy, etc.)	Usual source of nutrition information
Channel related	Perceived legitimacy of channel Expectation about kind of information appropriate for channel (serious/humorous; personal/impersonal)	Channel attention habits
Reception environment related	Attitude toward learning in the reception environment Valuation of learning	Reference group interaction patterns

Skills, intelligence ability	Social situation
Ability to comprehend complex concepts Ability to draw generalization Ability to apply concepts to individual situations	Latent and manifest role expectations regarding food selection and preparation Interaction within reference group regarding nutrition and food practices Reference group food practices, mores, taboos
Ability to decode style e.g. satire, humor Ability to decode symbols (complexity of presentation) Attention span (long vs. short message)	Reference group norm toward treatment Time constraint - competition from other roles
Ability to identify competent sources of nutrition information	Reference group attitudes toward sender Similarity of social attributes of sender a receiver
Ability to receive and decode stimuli	Access to channels
Ability to filter competing messages	Responses of others Number and strength of competing messages in the environment

a. What is the ability of receivers to comprehend complex concepts?

b. What is the ability of receivers to draw generalizations?

c. What is the ability of receivers to apply concepts to individual food practices?

4. What is the social situation related to nutrition?

a. What are the manifest and latent role expectations regarding food selection and preparation?

b. Who constitutes the reference group for food behavior?

c. Is there interaction within the reference group regarding nutrition and food practices?

d. What are the reference group food practices, mores, and taboos?

B. Message-treatment-related predispositions

1. What are attitudes, values, beliefs and knowledge related to the treatment of the message?

a. What are the receiver's attitudes toward humor, satire, straightforward factual presentation and other styles?

b. What are the receivers' attitudes about the kinds of treatment appropriate for nutrition?

2. What are habits related to the treatment of the message?

a. What are the receivers' habitual responses to satire, humor, and other styles?

3. What are skills and abilities related to the treatment of the message?

a. What are the receivers' abilities to decode styles such as humor, satire, jargon, etc.?

b. What are the receivers' abilities to decode symbols?

c. What is the attention span of the receivers?

4. What is the social situation related to the treatment of the message?

a. What are the reference group norms toward treatment of nutrition information?

b. What are the time constraints under which the receiver is operating?

C. Sender-related predispositions

1. What are attitudes, values, beliefs and knowledge related to the sender?

a. What are the receivers' attitudes toward nutritionists, extension personnel or other potential senders?

b. What are the receivers' attitudes toward the institution represented (government, university, industry)?

c. How credible is the sender to the receiver?

d. How trustworthy is the sender to the receiver?

e. What does "nutritionist" mean to receivers? Do they know that some who call themselves nutritionists are not trained in nutrition?

2. What are the receivers' habits related to the sender?

a. What are the receivers' usual sources of nutrition information?

3. What are skills and abilities related to the sender?

a. Are the receivers able to identify competent sources of nutrition information?

4. What is the social situation related to the sender?

a. What are the attitudes of others in the reference group toward the sender?

b. How similar are the social attributes of the

sender to those of the receiver?

D. Channel-related predispositions

1. What are attitudes, values, beliefs and knowledge related to the channel?

   a. What is the perceived legitimacy of the channel?

   b. What are the receivers' attitudes about the kind of information appropriate for the channel? Do they use it for information or only for entertainment?

2. What are habits related to the channel?

   a. What channels do the receivers normally attend to?

3. What are skills and abilities related to the channel?

   a. What are the receivers' abilities for decoding? Can they read? How well do they listen? What are their observation skills?

4. What is the social situation related to the channel?

   a. Do the receivers have access to the channel? Is it available in the community and can they receive messages in their home?

E. Reception-environment-related predispositions

1. What are attitudes, values, beliefs and knowledge related to the reception environment?

   a. What are the receivers' attitudes toward learning within the reception environment?

   b. How much does the receiver value learning?

2. What are habits related to the reception environment?

   a. What is the usual reference group interaction pattern?

3. What are skills and abilities related to the reception environment?

a. What are the receivers' abilities to filter competing messages?

4. What is the social situation related to the reception environment?

a. How much competition is there for attention in the environment?

b. What are the responses of other reference group members?

Differential responses by receivers are not random, but are predictable to the extent that we understand their predispositions. Senders cannot control predispositions, but they can plan strategies that take them into account and, thus, make the predispositions enhance rather than detract from the goals of the communication program.

Each individual receiver has predispositions in common with others and predispositions that are unique. The more specifically an audience is defined, i.e., the more homogeneous it is, the more predispositions will be shared by the receivers. Because not all members of an audience will share exactly the same predispositions, some individualization of the message may increase its effectiveness.

Individualization may be accomplished by including parts in the program that can be adapted for each individual receiver. If an audience can be selected so that it shares most of the predispositions relevant to an intervention, a single general message will suffice. Examples of individualized message treatment are discussed in Chapter VI.

Intervening Process

In order to achieve the desired outcome, something must happen after the message is sent. The intervening process requires the recipient's active (mental) participation in terms of attention, comprehension, and interaction.

Attention Individuals are bombarded daily by thousands of stimuli or messages and, because they cannot pay attention and act on all of them, they must choose those to which they will give their attention. People are very selective in choosing stimuli on which to focus. Robinson (1972, p. 74) portrays the situation in this way:

> It has been estimated that the average American is exposed to hundreds of messages just by advertising on an average day. Add to this all the "bad news" messages propagated by the news media and it is not difficult to imagine why the audience is highly selective....

There are three sub-stages of attention through which the receiver must pass: awareness, decision to attend, and differential exposure (degree and quality of attention). Attention may be interrupted at any one of these sub-stages.

The first of the sub-stages, awareness, depends upon the message and the predispositions of receivers. A receiver must realize that a message is being offered. Through cues provided by the sender, such as headlines, titles and musical themes, a receiver notices a message. The processes of screening cues at the awareness sub-stage are primarily unconscious and depend partly on habit. A communicator can

increase the chances that intended receivers will become aware of a message by sending it through the channels which the receivers are most likely to use. A receiver may be unaware of a message because s/he chooses not to attend: to the media channel, to the category content, or to the specific content. The choice of media, which is usually under the control of the sender, is the most critical choice. No matter what the cues, a receiver will not see a message in a magazine which s/he never opens.

A receiver's decision to pay attention to a message once s/he beccmes aware of it is heavily influenced by the receiver's predispositions. Does a receiver perceive that a message is too long for the time s/he has available? Is the message appealing? Thus, both content and style of a message interact with predispositions of receivers. In general, a receiver will nct attend if s/he perceives that s/he does not need the information. In addition, if a receiver is not interested in nutrition information, s/he will likely not take time for messages about nutrition. This decision is usually a conscious one.

A communicator may attract a receiver through some cue that the message will be useful to him/her. In addition to gaining awareness, headlines, titles, music themes, pictures, etc. serve as cues about the message itself. Intended receivers, especially those not involved in food planning and

preparation, may not perceive that they can use nutrition information. Therefore, some indication of its importance to the receiver should precede or accompany the message. These cues must be designed to capture the attention of intended receivers who otherwise might ignore the message. Sender inputs are important at the "differential exposure" stage. Receivers will pay attention to the extent to which a message meets some perceived need. Thus, the treatment and content of the message at this point are very important to gain and maintain attention.

Comprehension To comprehend, the receiver transforms sensory stimuli into meaning. From a sender's viewpoint, success is measured by the extent to which receivers comprehend the intended meanings. This objective is difficult to achieve because receivers usually see or hear messages in light of previous experiences that may differ from those of the sender. By focusing on some details and ignoring others, "there is a tendency for the receiver to recast the message to fit the world as he knows it" (Yarbrough, 1968).

A sender can control factors in ways that may improve the accuracy of interpretation, however. Usually the message should be as simple as possible, i.e., use the 'KISS' rule (Keep It Simple Stupid). Keeping the message simple does not

mean it has to be simplistic.[1] In some instances, quite complex concepts are necessary to achieve the desired goals. In this research, for example, the objective was to teach basic concepts of nutrition, some of which were relatively complex. Even complex concepts can be presented in simple language.

In addition to simplicity, it is important to differentiate between what receivers need to know and what senders want to tell. Senders may be experts who know a great deal about their fields. While this knowledge is important to them, much of it may not be relevant or important to receivers who wish to know only that which is necessary to apply the information in their own situations.

Interaction Communication systems which allow interaction, both between receivers and their peers and between receivers and sender, are more likely to gain attention and achieve acceptance. Lugo-Nasser (1971, p.19) found that:

> [The] extent of conversations, who becomes involved, for what reasons they become involved and the consequences of their talking varies with: 1) the nature of the mass mediated message, 2) the situation wherein the mass-mediated event occurs, and 3) the characteristics which actors (potential receivers and conversers) bring to the communication event.

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[1]Although there may be some disagreement on this, a premise of this research is that in-depth knowledge is necessary for making wise selections of food and also important in the persuasive process. The presentations should not exceed the comprehension capacity of the audience, however.

In a previous study (Gillespie et al., 1977) the amount of interaction was related to continued participation in a nutrition program and also to acceptance of the message content.

One effect of receivers discussing a mass media message is to spread its impact to others. Another effect might be to influence the responses of receivers to a communication. In a study of the effect of civil defense messages, Yarbrough et al. (1972) found that families who completed their own questionnaire were more likely to discuss the fallout shelter and to be persuaded to do something about it than those who answered questions for an interviewer. In a series of studies, Lewin (1943) found that group decision was superior to the request method, to the lecture method, and to the individual counseling method for changing specific food practices.[1]

Research indicates that response to a communication is a social phenomenon which involves not only a receiver's own evaluations, but also the evaluations of others s/he trusts such as close friends, co-workers, or family members. Katz and Lazarzfeld (1964) discuss empirical support for their hypothesis that primary groups "actively influence and sup-

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[1]For a discussion and analysis of these studies see Gillespie (1975, p. 29-32).

port most of an individual's opinions, attitudes, and actions." According to Katz and Lazarsfeld (1964), there are benefits (called instrumental values) derived from sharing opinions and attitudes with a primary group; this sharing also provides a basis for making decisions. One explanation of this influence has been labeled social reality (Lewin and Grabbe, cited in Katz and Lazarsfeld, 1964):

> Experiments dealing with memory and group pressure on the individual show that what exists as "reality" for the individual is to a high degree determined by what is socially accepted as reality. This holds even in the field of physical fact: to the South Sea Islander the world may be flat; to the European it is round. "Reality," therefore, is not an absolute. It differs with the group to which the individual belongs.

Based on empirical evidence from the classical Sherif study (1969), Katz and Lazarsfeld (1964) posit:

> First, that individuals turn to and depend on others, when they have to form opinions or make decisions in unclear situations--this we have called the "social reality" function of groups: and secondly, that individuals interacting with each other relative to a particular problem which concerns all, will develop a collective approach to that problem and thus create an opinion, an attitude, a decision, or an action which they then will grasp in common.

Through conversations, receivers learn the opinions of those whom they value. Responses to mass media messages then are mediated by receivers' evaluations of what others will think of their opinions and actions. Therefore, by talking to others a receiver sometimes convinces him/herself.

The hypothesis that those with similar attributes talk to each other has been supported by Katz and Lazarsfeld (1964) among others. This has been called the "principle of equivalence." It has been shown also to be true within families (Chaffee, 1972). Husbands and wives were more likely to discuss local school issues if they were of about the same ages and the same educational background. This observation leads to the question, "Is a similar amount of nutrition knowledge within a reference group important for discussion of nutrition?" If it is important, then it may be important to teach nutrition to all members of a food reference group rather than just the main food preparer.

Not only interaction within the primary reference group, but also interaction between receivers and sender, will influence acceptance of new information. A major limitation of mass channels is that they usually involve only one-way communication. On the other hand, face-to-face communication allows feedback from receiver to sender. Although feedback can be built into mass channels, it is not as easy nor as personal as is the case in face-to-face communication.

Letters to the editor and call-in radio programs have provided two-way communication for quite a long while. An important limitation of these activities is that a small percent of the audience tends to participate while most (perhaps those whom a communicator might desire to reach) do not.

These types of feedback are general in nature and represent biased or narrow points of view; therefore, they may not give the communicator adequate information for further responses or messages to an audience.

Feedback can be built into a mailed communication program. Presinger (1975) tested a two-way mailed communication program on pollution with farmers. His objective was to help farmers adopt farming practices to control pollution. In a study involving a nutrition communication program, Gillespie (1975) asked for feedback from those who received messages by mail. The feedback became input for the next mailed message. Some receivers did return feedback as desired in these experiments.

Receiver-sender interaction personalizes a mass channel and provides the sender information about receiver inputs so that s/he can alter subsequent messages to increase their effectiveness. Various interaction elements and their relationships to the Nutrition Communication Model are illustrated in Figure 3. Established interactions within reference groups are considered to be inputs. In other cases interaction related to the message itself or to other nutrition information may be an intervening variable.

If one posits that interaction regarding nutrition and food practices enhances desired behaviors, then increased interaction may be a goal (desired outcome) of a program.

	Between Receiver-Sender	Within Reference Group
Communication Free Input	Established Interaction With Experts	Established Interaction Patterns
Communication Related Input	Established Interaction re: Nutrition and Food Practices	Established Interaction re: Nutrition and Food Practices
Intervening Process	Interaction re: Messages re: Nutrition & Food Practices	Interaction re: Messages
Outcome	Increased Interaction re: Nutrition and Food Practices	Increased Interaction re: Nutrition and Food Practices

Figure 3. Interaction effects on the communication process.

Desired outcome could include interaction with experts. If the goal of a communication program is to increase rational decision-making regarding food selection, preparation and consumption, then one way to attain this goal would be to increase interaction about the relationship of nutrition to food behavior within the food reference group.

Outcome: Acceptance/Rejection Responses

Achieving acceptance of a message is very difficult--unless, of course, the message is consistent with a receiver's previous knowledge, attitudes, and practices. In this case, the message will serve the function most often served by mass communications--to reinforce existing attitudes, beliefs, and patterns of behavior.

A receiver may accept or reject a single message or an entire program on three different bases. These are cognitive acceptance/rejection, affective acceptance/rejection, and behavioral acceptance/rejection. Each response is not an "either/or" proposition, but rather ranges from complete acceptance including desired change in behavior to complete rejection with no change in attitude, beliefs or behavior. The responses of receivers may not necessarily be consistent with the sender's intent.

Cognitive acceptance Cognitive acceptance implies a belief level acceptance. Does the receiver believe what the sender is saying? Does s/he accept it as valid, factual, correct, or true? Knowledge of the roles of nutrients and food composition are examples of cognitive acceptance. If a message explains how a father plays an important role in developing his child's food habits and the receiver believes it, this is also cognitive acceptance. Bloom (1956) has delineated six levels in the cognitive domain: knowledge, comprehension, application, analysis, synthesis, and evaluation. The first three categories are most relevant to consumer education.

It is important to distinguish understanding (or comprehension) from cognitive acceptance. A receiver may comprehend a message and remember it but, at the same time, not accept it as credible.

Affective acceptance Affective acceptance occurs when a receiver accepts a sender's conclusions or proposed changes as not only true, but also desirable. Although cognitive acceptance (believing it) often precedes affective acceptance (feeling it is desirable), cognitive acceptance is not a necessary prerequisite. In fact, the two responses might be in conflict. For example, an overweight person might believe that decreasing the intake of food sources of energy will reduce body weight, but s/he may not feel that it

is important or desirable to decrease intake of certain foods.

Affective acceptance is a relative matter, a matter of degree; conflicting goals may be more important. For example, a short-term goal of hunger satisfaction, social acceptance, or economics may take precedence over a longer-term goal such as weight control or a more abstract goal such as "better health".

For both cognitive and affective acceptance, reinforcement of previously held beliefs and attitudes is the most likely situation. When change does occur, it is generally in relatively small increments and in a manner consistent with the receiver's previously held beliefs and attitudes. When change is the goal, therefore, we need to set realistic expectations of change and find ways to measure the degrees of change likely to occur during the time span of an intervention program.

Behavioral change Changes in the actual behavior of receivers is often a goal of communicators, i.e., they usually want people not only to believe what they say and to accept it as desirable, but they also want them to take specific action.

Adoption-diffusion research (see Rogers and Shoemaker, 1971) indicates that, although an individual can be persuaded to change, s/he is very resistant to change--particularly in

the short run. Adoption-diffusion theorists seem to view this resistance as an aversion to change itself, but Spicer (cited in Lauer, 1973) suggested that it is not change itself that is resisted because people are always changing in some way. Rather under certain circumstances, people will resist change.[1] In either case the net result is resistance to change--especially that change imposed or suggested by a change agent.[2] If accomplished at all, change in behavior is a result of efforts over time and occurs through the impact of many messages from a variety of sources. Thus a small change in the position in the decision making process may be the most a communicator can expect from a single message or even from a series of messages.

Normally, changes in behavior are linked to changes in cognitive and affective elements.

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[1]According to Spicer (cited in Lauer, 1973) people will resist change under three circumstances: "...when the change is perceived to be a threat to basic securities; when the change is not understood; and when the change is imposed upon them." Lauer (1973) added two more circumstances: "...because a rational calculation of the risks involved seems to make the new direction highly foolish" and "...because that change would interfere with other, more highly valued, change."

[2]"A change agent is a professional who influences innovation decisions in a direction deemed desirable by a change agency. He usually seeks to obtain the adoption of new ideas, but he may also attempt to slow down diffusion and prevent the adoption of what he believes are undesirable innovations" (Rogers and Shoemaker, 1971).

Interrelations within the model

Relationships within the communication model primarily flow from top tc bottom, i.e., from "input" to "intervening process" to "outcome". There are also interrelationships within each component.

Receiver inputs (predispositions) are "givens", i.e., factors which are least changeable by the sender. However, these inputs can be influenced by outcomes of a previous message. As illustrated in Figure 1, receiver inputs affect the attention given to any message, comprehension of the message, and interaction with the sender and with others in the primary reference group. Receiver predispositions also affect acceptance/rejection responses, i.e., whether they accept or reject the message and to what degree. Receiver inputs should also influence a sender's inputs. Thus, receiver inputs affect the entire process.

Sender inputs affect attention and comprehension as well as interaction responses. They influence acceptance/rejection responses via the intervening process.

Within the intervening process, the flow is downward from attention to comprehension. Without attention, there can be no comprehension. Interaction may affect both attention and comprehension. For example, through discussion with others or interaction with the sender, attention may be increased.

Acceptance/rejection responses are influenced by elements in the intervening process. They may also serve as inputs into a subsequent message. Acceptance/rejection responses are alsc related to each other. Some argue that it is necessary for the receiver to follow through the types of acceptance in the following order:

COGNITIVE------→AFFECTIVE------→BEHAVIOR
ACCEPTANCE ACCEPTANCE CHANGE

However, data suggest that the order of this sequence may differ frcm time to time. For example, it may be possible to change behavior without first changing attitudes or cognitions. Consistency theory (Brown, 1965) suggests that if one of these three elements changes, a strain toward change in the others is created. Hence, if an individual is induced to change his/her behavior, s/he is more likely to change his/her attitude so that it is consistent with the behavior.

A basic premise of Festinger's (1957) theory of cognitive dissonance is that individuals strive for consistency. Inconsistencies creating dissonance may arise within an individual when there is change in one of the three elements--cognitions, attitudes, or behavior--relating to a salient feature of the person's life. One route for resolving the inconsistency is to change other element(s) so that the three are again consistent. Implied in consistency theory are two strategies which the nutrition communicator may use to bring

about change. The first is to change one of the elements, e.g., increase salience of good nutrition. The second is to bring to the consciousness of the receiver inconsistencies that are already present, e.g., that good health is an important goal, but that this conflicts with the desire for high fat foods such as beef or with a dislike for certain kinds of foods such as green vegetables which provide needed nutrients. By changing one element, the communicator may be able to bring about change in other elements.

Changing behavior is difficult; therefore, it is important to be realistic in our expectations and put more effort into carefully planned communication strategies. The next section discusses application of the Nutrition Communication Model to develop a specific communication program for a particular audience.

Application of the Model

The application of the Nutrition Communication Model (Figure 1) to young families has two purposes: 1) to illustrate use of the model and 2) to show the development of the communication strategy used and tested in the present study.

Application of the model involved: 1) selecting and describing the intended receivers, 2) defining objectives of the program, i.e., desired outcome, 3) devising a strategy to obtain maximum effect from intervening processes, 4) assessing possible receiver inputs of the target audience and

5) based on the other elements in the model, choosing sender inputs.

Families with young children were designated as the target audience. The family was considered the primary reference group for food practices. To change a family's food behavior, it was hypothesized that the entire family must be invclved because each family member makes many individual food choices and also influences other family members. Support for these assumptions will be discussed later in this chapter.

Desired outcome

The ultimate goal of this nutrition communication was to improve nutritional well-being. This goal, however, is general and long-term, so intermediate goals were set. They were based on existing information about factors which can affect nutrient intake. Then specific behavioral objectives were developed.

Yetley (1974), in an earlier phase of this research project, developed a causal model to identify factors which affected nutrient intake of young husbands and wives. Data had been obtained from a sample of young families in Iowa.

She related frame-of-reference variables[1] and food-behavior variables[2] to nutrient intake and weight status.

Frame-of-Reference Variables ⟶ Food-Behavior Variables ⟶ Nutrient Intake and Weight Status

Her model accounted for 53 percent of the variation in the husbands' overall diet quality and 59 percent of the wives' overall diet quality.

The two variables having the most effect on the overall diet quality for both husbands and wives according to the

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[1]The frame-of-reference variables considered were divided into internal and external factors. Internal factors were: educational level; nutrition knowledge; social, economic, and health goal orientations; and value-attitude orientations which measured the relative rationality of the behavior of individuals. External factors were: family income; social class rating; nutrition knowledge of spouse; social, economic, and health goal orientations of spouse; spouse weight-reduction dieting pattern; number of meals eaten per week by spouse; number of snacks eaten per day by spouse; frequency of consuming "empty calorie" foods by spouse; variety of nutritious foods consumed by spouse; and quantity of nutritious foods consumed by spouse (Yetley, 1974, p. 10-11).

[2]Food-behavior variables considered were: weight-reduction dieting patterns; number of meals eaten per week; number of snacks eaten per day; frequency of consuming "empty calorie" foods; variety of nutritious foods consumed; quantity of nutritious foods consumed; and per person food expenditures (Yetley, 1974, p. 11).

Yetley model were the variety of nutritious foods consumed[1] and the quantity of nutritious foods consumed.[2] The number of meals eaten per week also showed a relatively strong causal relationship to diet quality.

Because quantity was based on the number of servings of foods in the Basic Four food groups (which are based on nutrient needs), it was logical for this variable to have a direct positive effect on overall diet quality. Yetley's model supported the concept that the greater the variety of foods consumed, the more likely the diet quality would be good.

Having identified three behavior variables (variety of nutritious foods consumed, quantity of nutritious foods consumed, and number of meals eaten), the next step was to select the factors which had the most influence on these three variables. Behavior variables may affect each other as well as being affected by frame-of-reference variables.

The effects of the number of meals and snacks eaten per day were not straightforward. Both positive and negative relationships with other variables existed; some were direct,

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[1]This variable was calculated by counting the number of foods, from a list of 58, which were consumed at least once per month.

[2]This variable was based on the total number of standard-sized servings of the Basic Four food groups that were eaten per day.

others were indirect.

A frame-of-reference variable, nutrition knowledge of both husbands and wives, appeared to be important. In fact, the husband's knowledge seemed especially important because it directly influenced both his own intake and that of his wife. On the other hand, the wife's nutrition knowledge did not affect her husband's intake, only her own.

Based on this information, desirable intermediate goals for the present experiment included increasing the salience of health and nutrition goals and improving nutrition knowledge (especially of fathers).

The desired outcome (goals) for the communication program included cognitive, affective, and behavioral changes. To make it possible to measure change due to the program, the objectives were stated in terms of specific, directly-observable, desired behaviors. The behavioral objectives are listed in Appendix B.

Based on the objectives of the intervention, the following general hypotheses[1] about outcomes of the program were tested.

G.H. 1: After participating in the intervention program, the receivers will have a better knowledge of nutrition.

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[1]The abbreviation "G.H." is used for the term general hypothesis.

G.H. 2: After participating in the intervention program, the receivers will place a higher value on health and nutrition goals when compared to economic and social goals.

G.H. 3: After participating in the intervention program, the receivers will have more nutritious food practices.

G.H. 4: After participating in the intervention program, the receivers will more often discuss food and nutrition with their families.

Intervening process

The intervening process refers to the events that take place during the communication program itself. This process is influenced by the inputs and in turn influences the eventual outcomes of the program. The intervening process includes attention, comprehension, and interaction. According to the Nutrition Communication Model (Figure 1), these must be increased to increase outcome.

Attention Attention includes awareness of a message and willingness to attend to it. The primary strategy to increase awareness was a three-stage contact process. It included two mailings of the recruitment message plus a postcard reminder. This approach is an adaptation of Dillman and associates' (1974) strategy for increasing response to mailed questionnaires.

To increase attention several cues were included in the recruitment letter sent to families. Cues were based on findings of previous research (Gillespie, 1975; Yetley, 1974) The cues indicated why the nutrition program was important

for them--special emphasis was placed on the father's importance in determining family food patterns.

The recruitment message also appealed to the parents by emphasizing the importance of helping children develop good food habits. Another plan for increasing attention for the program messages was to discuss nutrition topics of current interest.

Comprehension Several current issues which have been given widespread publicity were used to illustrate concepts in order to increase comprehension. Receivers comprehend information more easily if they can see its application to specific and immediate situations. Receivers were also encouraged to ask questions to clear up confusion or misunderstandings.

Interaction Because interaction between receiver and sender was considered an important element in bringing about behavior change, receivers were encouraged to send feedback or responses to the messages. Specific feedback sheets were included to prompt receivers to ask questions about the message or other questions about nutrition, to make comments about the program and to request additional information. A business reply envelope was provided for mailing responses.

The general proposition suggested here is that the intervening process variables will affect outcomes. From

this proposition emerge three general hypotheses which were tested in this study. The present study focused on these:

G.H. 5: The greater the receivers' attention to the messages, the more likely they are to accept the program objectives.

G.H. 6: The more the receivers discuss the messages, the more likely they are to accept the program objectives.

G.H. 7: The more the receiver discusses nutrition and food practices with his/her family, the more likely s/he will accept the other program objectives.

Receiver inputs

The target audience was identified as parents of young children. Some predispositions were defined because data on similar groups were available (Yetley, 1974; Gillespie et al., 1976). Other predispositions vary within the group.

In the present experiment, additional predispositional data were gathered in the pretest questionnaire.

Communication-free predispositions Predispositions not directly related to the message include socio-economic status, education, general orientation toward learning, and developmental tasks of young families.

Based on data from a similar sample of Iowa young families (Gillespie et al., 1976) most of the audience was expected to have at least a high school education. They were

primarily middle-class families from both rural and non-farm areas.

Havighurst (1972, p. 83) pointed out that "of all the periods of life, early adulthood is the fullest of teachable moments and the emptiest of efforts to teach." Young adults are receptive to learning because they are experiencing many new adult tasks such as marriage, child rearing, and a first job. These tasks and the mastery of them will affect each family's responses to a communication program.

Developmental tasks of young families have been discussed by Havighurst (1972), Cavan (1969) and DuVall (1967). Some tasks were related to food behavior. According to DuVall (1967), the developmental tasks include:

1) Meeting the costs of child bearing and rearing including food costs. The cost of living increases rapidly at a time when the family income is relatively low. The mother may no lcnger be employed and the father may be near the beginning of a vocational ladder with less income than he will have later. Thus, an economic "squeeze" may affect the family's attitudes, habits and decisions relative to food.

2) Reworking patterns of mutual responsibility and acccuntability. DuVall (1967, p. 211) suggested that "usually the allocation is automatic for the father as primary breadwinnner, and the mother nursing the baby. Everything else may become the responsibility of either parent." Who

takes the responsibility of grocery shopping, meal planning, and food preparation may influence the foods consumed by the family. In a majority of families the mother still takes the major responsibility for these tasks. Increasingly, however, the husband and children are becoming involved in grocery shopping, decision-making with respect to menu planning, and other aspects of the total process of feeding the family--or at least feeding him/herself.

3) Refining intellectual and emotional communication systems within the family. For each child added to the family, new patterns of communication are needed. Parents must alter communication patterns so they can continue to communicate effectively with each other as well as with their children. As each new child begins to eat with the family, his/her food likes and dislikes and responses of other family members to the food served become part of the communication network. The new child is also influenced by the eating behavior of other family members and by the fact that food may be used as a reward, punishment, or compensation within the family.

4) Attempting to fit into the community successfully and to develop contacts outside the family. For Americans, eating together and offering food are social customs which may influence food behavior.

The way in which a family deals with the above developmental tasks will affect eating patterns and their willingness and ability to change them. These predispositions may be somewhat related to a particular mass communication, but not as directly as the following predispositions.

Communication-related predispositions Although data do not exist to answer all the questions posed in the previous discussion of communication-free predispositions, there are many data on communication-related predispositions, especially those related to content.

Content-related predispositions Yetley (1974) reported data on nutrition knowledge and salience of health goals for young husbands and wives living in Iowa. She found little difference between nutrition knowledge of husbands and wives although the wives scored slightly better. The mean composite scores were 5.4 for husbands and 5.9 for wives (i.e., out of 11 items, approximately 50 percent were answered correctly). Husbands and wives had the same "serious misconceptions"[1] about nutritional value per dollar, fortification of margarine with vitamin A, and energy per ounce in foods (Yetley, 1974). Other studies in Iowa have

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[1]A question was considered to represent a serious misconception if less than 25 percent of the respondents answered the question correctly.

reported that food composition is the aspect of nutrition knowledge that is least understood (Eppright et al., 1970; Hinton et al., 1962; Pearson, 1969).

Because nutrition knowledge has been related to intake and can be increased through educational programs (Zimmerman and Munro, 1972; Baker, 1972), increasing knowledge should be one objective of an intervention program to change food habits. It may be possible to effect a behavior change through knowledge without necessarily changing related attitudes. However, an increase in nutrition knowledge does not necessarily result in behavior change (Baker, 1972; Poolton, 1972).

According to Yetley's model (1974), the most influential factor affecting nutrition knowledge was years in school. Because this factor can not be changed with one short education program, other factors must be manipulated to increase nutrition knowledge; for example, one could increase the amount of exposure to nutrition information.

When economic, social and health goals were compared, economic goals were much more important to both husbands and wives than the other two. On a scale of 1 to 12, the mean for economic goals of husbands was 6.95 and of wives, 7.22 (Yetley, 1974). Husbands ranked social and health goals about the same (social=4.65, health=4.62). Their wives rated health (5.68) somewhat higher than social goals (4.90).

Husbands ranked the individual goal of "increased production" as more important than did the wives (fifth for husbands and tenth for wives). In general, husbands were more production-oriented and wives were more consumer-oriented, perhaps reflecting traditional roles.

Also discouraging, in terms of nutrition education programs, was the fact that the lowest goal for husbands was "maintain or improve quality of diet." It was also the lowest health goal for wives. The most important health goal for both was "maintain or improve my physical fitness" and the second most important health goal was "learn and practice preventive techniques for heart disease."

The fact that economic goals were rated high suggested that appealing to economic goals would be appropriate. For some individuals, however, health and possibly social goals would be more relevant.

Although fifteen percent of the men and 31 percent of the women in the Iowa sample were on a weight-reduction diet, maintaining desirable weight was ranked higher by men as a group than by women. In a study of the food consumption activity of families relative to stages in the life cycle, Coughenour (1972) found that satisfaction with food consumption (goal gratification) was lowest at stage II in his life cycle scheme, a time which coincides with the category of the young family in the Yetley study and in the

present study. If young families are already dissatisfied with their behavior, they should be more open to trying different food patterns

Twenty-four percent of the husbands and 32 percent of the wives in the Iowa study (Yetley, 1974) ate three meals per day (21 per week). The mean was 16.4 meals per week for both husbands and wives. Breakfast was the most frequently skipped meal. Thirty-five percent of husbands and 55 percent of wives reported they ate all their meals at home. Only five percent of husbands ate more than 50 percent of their meals away from home. The mean percentage of meals eaten at home was 83.6 for husbands and 94.1 for wives. Accordingly, changing eating habits at home is supported as the best emphasis in a strategy to change food practices.

Also important in understanding eating patterns is the fact that snacking contributed significantly to the food intake of the Iowa sample. At least one snack was consumed per day by most respondents (95.7 percent of the husbands and 91.4 percent of the wives). Men consumed, on the average, 2.7 snacks per day and women 2.3. Interventions which encourage planning within an existing pattern of snacking may be more effective than one which promotes "three meals a day". Nearly half of the women (46.5 percent) and nearly three-fourths of the men (73.4 percent) reported consuming

three or more "empty calorie" foods[1] per day.

Educators have long accepted that mothers have the greatest influence on family food behavior. Lewin (1943) proposed that the mother/wife was the "gatekeeper" who controlled channels through which food was placed on the family dinner table. Although he acknowledged that other family members had some influence on her decisions as "gatekeeper", later research indicated that her influence was not as great as Lewin had assumed. Several studies have shown that fathers also influence food behavior of families. Yetley (1974) found that the husband's knowledge had more influence on his own and his wife's food intake than did her knowledge. This observation may be partly explained by Bryan and Lowenberg's (1958) finding that 89 percent of homemakers they interviewed did not serve certain foods because the foods were disliked by their husbands. They concluded, therefore, that fathers could influence food behavior of children by limiting the variety of foods served. They also found that vegetables liked by the father were correlated weakly with those liked by his children. Two-fifths of the homemakers interviewed in an Expanded Food and Nutrition Educational Program in Kentucky reported that husbands affected what

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[1]Foods which serve as a source of energy, but have little nutrient value.

foods and how much were purchased for the family (Anon., N.D.). In the North Central Region of the U.S.A., 81 percent of a sample of mothers indicated that husband's likes influenced meals planned (Eppright et al., 1969).

Sixty-two men and 41 women (N= 116 men and 116 women) were considered overweight (105 to 124 percent of recommended weights).[1] Nineteen men and nineteen women were obese, i.e., were more than 25 percent above recommended weights. Therefore, weight control would be a relevant topic for about half of the women and two-thirds of the men.

Channel-related predispositions Channel-related predispositions are those which are related to the particular channel through which the message is conveyed. For this program receivers must have the ability to read (by definition) and be accessible by mail. Because they are parents of young children, their child care responsibilities may limit the usefulness of certain channels. For example, attending meetings would require baby-sitting arrangements. Attention to television or radio could be interrupted by child care needs.

A previous study using mail as the channel revealed some data about the usefulness of mail as a channel for this audience (Gillespie, 1975). It was possible to recruit families

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[1]According to USDA tables (Hathaway and Foard, 1960).

into a program by mail; 44 percent of the families contacted enrolled. Retaining attention of the fathers through mail was not as successful, however. By the fifth and last message attention had decreased to 67.1 percent for mothers and 19.5 percent for fathers. Data from a follow-up questionnaire also suggested that fathers may be more likely to discuss information with their wives than to read it. According to a follow-up study, more fathers discussed the information than read it (Gillespie et al., 1977). Both fathers and mothers were more likely to read and discuss than to respond.

When asked why they did not respond to the recruitment message (did not enroll in the program), the most usual response of nonparticipants was that they "planned to, but didn't get it done." Some had even completed the dietary history information, but did not mail it. Even though two reminders were sent, it was not enough for some. Reminders did increase the response considerably, so it was concluded that they were very important.

Reception-environment-related predispositions

Because the family had been identified as the primary food reference group and because most of the meals are eaten at home, the reception environment selected was that of the family's home. In this setting it was possible to involve both father and mother without child care concerns.

The father's involvement as a legitimizer[1] is important in terms of adoption-diffusion theory. "The rate of adoption of a collective innovation is positively related to the degree to which the social system's legitimizers are involved in the decision making process" (Rogers and Shoemaker, 1971, p. 281). Although the wife is still the main food preparer (Schafer et al., 1976), fathers exert influence in other ways. Types of power used by husbands and wives to influence foods that wives prepare were studied in Iowa. Both husbands and wives perceived that the wife would yield to the husbands' preferences. The wives said, and the husbands agreed, that they would use neither their expert power[2] nor their referent power[3], but would rather yield to the husband's wishes. Both the husbands and wives perceived that referent power would be used most often by husbands. Some

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[1]One who approves or sanctions a collective innovation (Rogers and Shoemaker, 1971).

[2]From French and Raven's definition: "Based on the perception that the other person has some special knowledge or expertise" (Schafer et al., 1976).

[3]From French and Raven's definition: "Based on the person's (emotional) identification with the other person" (Schafer et al., 1976).

husbands also used coercive[1] and legitimate[2] power. Clearly, any nutrition education program for families must involve the fathers.

Research has indicated that the father may be willing to participate in nutrition education programs if he is convinced that his participation is important. Data from an Iowa sample of men showed that 47 percent of them ranked their role as father as their most important.[3] An additional 37 percent ranked the father role second (Schafer et al., 1976). Hawkins (1974) reported that fathers of first grade children were interested in knowing about their growth and development. In a previous study (Gillespie, 1975) fathers were recruited into a nutrition communication program by appealing to them as important influencers of their family's food habits.

Children also influence foods served by their mothers, according to Eppright et al. (1969). They also noted that vegetable dislikes of preschool children were more closely

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[1]From French and Raven's definition: "Based on a person's perception that the other person has the ability to mediate punishment for him/her" (Schafer et al., 1976).

[2]From French and Raven's definition: "Based on the perception of a person that the other person has a legitimate right to prescribe behavior for that person (Schafer et al., 1976).

[3]Roles were: wage earner, parent, sex partner, companion, homemaker.

associated with those of older siblings than with those of either parent. By five to six years of age, about one-third were making these choices. In addition, thirteen percent of the four- to six-year-olds were selecting foods for the noon meal. Thus the father's and the children's preferences as well as the mother's have an impact on food patterns in the family.

Because other family members influence what is served and eaten at family meals, their involvement and concurrence are necessary for acceptance of new patterns by a family.

In addition to the importance of individual family members, the family as a group may also influence the likelihood of changes in food behavior. Data from an Iowa study (Schafer et al., 1976) support the hypothesis that both husbands and wives view personal preference and family preference as more influential in determining the food they eat than outside factors, including other social groups.[1]

Interaction and discussion with personal referents are

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[1]Groups were: personal preference; family preference; cost; your health; health of other family members; dietary restrictions based upon religous faith; information gathered from newspapers, magazines, radio, and television; advertisements in newspapers, magazines, radio, and television; classes, short courses, or other training in food purchasing and preparation; government regulation and information regarding consumable food (USDA or extension pamphlets or bulletins); social groups outside family (friends and neighbors).

important for adoption of new ideas (Yarbrough et al., 1972).

Acceptance of decisions by members of any group (in this case, family) is positively related to their participation in making the decisions (Rogers and Shoemaker, 1971).

Considering the above theories and evidence, an intervention program that involves the entire family and that initiates interaction and discussion within the family would be expected to be effective in changing food behavior. The father's involvement in the program is particularly important because of his influence on family eating patterns, yet the father has been omitted from most nutrition education programs in the past. Usual programs offered also may not be relevant to fathers' interests.

Sender inputs: Decisions about the program

Decisions regarding a communication program should be directed toward the desired outcome and should consider the predispositions of the intended audience.

Overall communication strategy The overall communication strategy in this study was adapted from that in an earlier study (Gillespie, 1975) in which a major strategy was to encourage interaction between receiver and sender and interaction among family members. The importance of the father's participation was emphasized. Feedback was required after each message for a family to continue in the program. This requirement was counter-productive because data from a

follow-up questionnaire indicated that some families had read the material even though they had not returned feedback. Some goals of a nutrition communication program, therefore, may be accomplished without an active response from family members. In the present study feedback was encouraged, but not required. All families who enrolled were sent the complete program whether or not they sent feedback after each message. Because feedback did serve as input for subsequent messages, the program had to be flexible enough that it could be adjusted to take feedback into account.

Channel Mail was selected as the channel for this nutrition communication program because it can most easily be given some of the qualities of a personal channel. It allows response from receiver to sender so that two-way communication can take place. Mailed messages can be altered relatively easily and individualized for specific families. On the other hand, television requires long advance planning and the message must be the same for all receivers.

Each message[1] of the current program included a personalized letter addressing both the father and mother by name (when this information was available). These letters were typed on a computer in their entirety (not a "fill in the

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[1]As used in this dissertation, message refers to one mailing which in most cases included several pieces.

blank" letter associated with mail advertising and soliciting campaigns). Each message was personally signed by the sender (university nutritionist). The first message after receivers had submitted a record of their usual dietary intakes included a nutrient analysis of the intakes separately for mother and father. The subsequent message included an individual diet guide ("Personal Guide to Good Nutrition") for each family member with his/her name on it. For those who sent feedback, each message included an individualized hand written response to their questions and/or comments.

Because the target audience had responsibilities for young children, mailed messages allowed them to choose a convenient time to read the materials and permitted interruptions without loss of subject matter. Television and radio require receivers to tune in at fixed times and control the rate at which receivers progress through the messages. If receivers who are listening to radio or watching television are interrupted, then that part of the message is lost.

Message content The aim of the communication program was to teach holistic concepts[1] and aid families to apply these concepts to their particular situations. A Nutrient Guide was developed as a learning tool to achieve

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[1]Holistic concepts are higher level, general concepts as differentiated from specific facts which do not build toward a total understanding of the underlying generalizations.

this aim. The guide was presented as a device to evaluate and to plan food intake. It was used to illustrate a number of the generalizations in the program. The development and content of the guide is discussed in detail in chapter IV.

The communication strategy was to teach basic nutrition concepts by relating them to topics of especial interest to the receivers. Current topics of interest were determined from three perspectives: the researcher's experience, local Extension Home Economists' perceptions of interests, and questions asked on a toll-free, call-in answer service operated by the Iowa State University Extension Service. First, the researcher identified tentative topics based on media coverage. Second, questions asked on food and nutrition over the Extension Service "Answer Line" were identified, categorized and counted. Third, Extension Home Economists (from the target audience area) were asked to make a list of topics based on their interaction with the audience and on requests for information. General agreement on these topics among the information sources was noted. The topics that emerged were: cholesterol, saturated and unsaturated fat, food additives, and fiber.

A list of generalizations and facts important for the target audience was then compiled.

Generalizations Lists developed at the White House Conference on Food, Nutrition, and Health (1969) and those published by the American Home Economics Association (1978) were reviewed. Some generalizations were adapted from these sources and additional generalizations and facts were then added. Some were added because of their particular importance to young families; they were related to food habits and interpretation of current research in nutrition.[1] A complete list of generalizations and supporting facts is contained in Appendix E. The major generalizations are summarized here.

A. Physiological Aspects of Nutrition

1. The body utilizes nutrients from food for many different functions.

2. Nutrient intake affects appearance, vigor, work output, and long-term health.

3. Each nutrient performs specific, necessary functions which interrelate with the functions of other nutrients.

4. Although a certain amount of each nutrient is necessary for optimum body functioning, additional intake is not necessarily better and may be harmful.

5. Nutrition is a relatively new science and there is still much to be learned about the body's needs for nutrients, and about the beneficial and harmful effects of nutrients.

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[1]Discussions with Marie Corey, Iowa State University faculty member, were most helpful in the beginning stages of the process of developing these generalizations.

6. Individual nutrient needs vary from person to person and from time to time for the same person. They depend upon heredity, sex, age, size, activity, environment, and state of health.

7. Fat and total energy intake are of particular concern to many in the U.S. because of reduced energy expenditure.

B. Food Habits and Eating Patterns

1. Food habits are a product of interactions among physiolcgical and psychological satisfactions associated with food, beliefs about foods, sociological and cultural influences and economic resources.

2. In order to insure an adequate diet, each individual must assume some responsibility for his or her own food behavior and nutrient intake.

3. The family or peer groups, by direction or example, help individuals develop food habits and attitudes toward nutrition.

4. Eating patterns that are equally nutritious may vary considerably among individuals and groups.

5. Food habits, like other behavior patterns, are subject to deliberate modification by those who are motivated to change but are highly resistant to direct intervention.

C. Foods As Sources of Nutrients

1. No food in itself is good or bad.

2. No one food is a good source of all nutrients.

3. Some foods are especially good sources of one or more nutrients. Many foods are high in water content. Energy value (measured in kilocalories) is low when the water content of a food is high.

4. Foods vary considerably in the type and amount of fat and in cholesterol content.

5. Variety of foods in the diet is important to meet needs for all nutrients and to avoid excesses of potentially toxic substances. Moderation is also a good

guide for almost all food selection.

6. Variety alone may not insure an adequate nutrient intake. By classifying foods according to key nutrient content, the groups can be used as guides for selecting foods to meet nutrient needs and to evaluate nutrient intake.

7. Information about nutrient content of many packaged foods is available on the labels.

8. Additives are sometimes included in foods to improve color, flavor, texture, nutritional value and keeping qualities of the food product. Some additives have been shown to have both detrimental and beneficial effects. A risk/benefit ratio is one way to evaluate desirability of additives.

D. Sources of Nutrition Information

1. Much inaccurate and/or misleading information about nutrition is presented in the media.

2. Competent nutritionists base their conclusions on research data.

3. To recognize accurate information, the content and source must be evaluated critically.

Message treatment A straightforward, but conversational, presentation of nutritional concepts was written in cooperation with a journalist. Text and illustrations were printed on 8-1/2 X 11 inch pages. A loose leaf cover was provided each family and the pages of the lessons were punched so that all lessons could be compiled in the notebook. In addition to the lesson itself, each message included a feedback sheet so that the family could ask questions and make comments by mail to the sender. Each question was answered individually by the researcher and answers were written on a special sheet designed for this purpose. The

lessons, feedback sheets and answer sheets were color-coded and consistent throughout the series.

Reception environment Messages were sent through the mail to the home addresses of the receivers. Thus it was intended to reach individuals in the food reference group within the setting of the reference group.

The recruitment period was October and November, 1977. The planned time for delivery of the messages was January through March. However, because of delays in message preparation, the third message was not sent until May. An attempt was made to mail messages so that families would receive them prior to the week-end because families in a previous study (Gillespie, 1975) were most likely to read and react to the messages on week-ends.

Interrelationships within the model

The implied relationships in the communication model lead to the general hypotheses:

G.H. 8: Personal status-roles are related to outcome directly and also indirectly through the intervening process and mental dispositions.

G.H. 9: Mental dispositions are related to outcome directly and also indirectly through the intervening process.

G.H. 10: Intervening process is related to outcome directly only.

CHAPTER IV. DEVELOPMENT OF A NUTRIENT GUIDE

The Nutrient Guide was developed to be used for food selection and/or diet evaluation as well as as a tool to learn food composition and related nutrition concepts.

Food Guides--A Background

A brief history of food guides

Since Atwater introduced the first dietary standards in the 1890's, nutritionists and educators have been developing food selection guides to teach nutrition and to help individuals select food to meet their nutrient needs. In all cases foods were classified in groups more or less similar in composition with respect to several nutrients.

In 1916, C.F. Langworthy, suggested five food groups: 1) protein, 2) starch and similar carbohydrates, 3) fat, 4) mineral substances and organic acids, and 5) simple sweets.

Carolyn Hunt (1916) translated these into 'homemakers' terms as: 1) milk, meat, fish, poultry, eggs, and meat substitutes, 2) bread and other cereal foods, 3) butter and wholesome fats, 4) vegetables and fruits, and 5) simple sweets. Langworthy felt that there was not yet enough evidence available about the recently discovered fat-soluble A and water soluble B vitamins to classify the foods with respect to these nutrients (Hertzler and Anderson, 1974). He

suggested that they would be present in several of the identified groups.

The first attempt to accompany food groups with suggested quantities was in the 1923 Farmer's Bulletin No. 1313 (Hunt, 1923) which illustrated a weeks' supply of food for an average family. Energy needs were the basis of recommended amounts.

By 1941 the Bureau of Home Economics, the Committee on Dietary Allowances of the Food and Nutrition Board, and the National Dairy Council each had developed a food guide (Hertzler and Anderson, 1974). All three had several food groups in common and all recommended the number of servings for each group. From seven to ten food groups were included in the guides:

Bureau of Home Economics: 1) milk, 2) lean meat, poultry, and fish, 3) eggs, 4) leafy green or yellow vegetables, 5) tomatoes, oranges, grapefruit, green cabbage, raw salad greens, 6) other fruits and vegetables, 7) cereals and breads, 8) fats, 9) sweets, and 10) water.

Committee on Dietary Allowances, Food and Nutrition Board: 1) milk, 2) lean meat, poultry, and fish, 3) eggs, 4) vegetables, 5) potato, 6) fruit, 7) whole grain or enriched cereal and bread, 8) butter or fortified oleo, 9) sugar and fat.

National Dairy Council: 1) milk, 2) meat, cheese, fish or legumes, 3) eggs, 4) vegetables, 5) fruit, 6) cereals and breads, and 7) butter.

In 1942, the 10 groups of the Bureau of Home Economics was reduced to eight groups by eliminating sweets and water.

When the Basic Seven was published in the National Wartime Nutrition Guide, it eliminated an additional group by combining eggs with meat (Hertzler and Anderson, 1974). The number of servings was added to the guide in 1946.

In 1954, four food groups based on the 1953 Recommended Dietary Allowances (RDA's) were introduced. Fat was dropped from the basic seven and three groups of fruits and vegetables were combined into three subgroups. The minimum number of servings for each group and serving sizes for all foods were defined in "Essentials of An Adequate Diet" (Page and Phipard, 1957). Foods containing protein, iron, calcium and vitamins A,B, and C were emphasized (Page and Phipard, 1957). The most recent revisions were made after the 1968 revision of Recommended Allowances were published. The current version is available in "Food for Fitness: A Daily Food Guide" (U.S.D.A., 1971).

Guides similar to the Basic Four food groups have been designed for use by individuals with special dietary needs. Probably the most widely recognized are

the Exchange Lists for the person with diabetes (American Dietetic Association and American and American Diabetes Association, 1050). Its most recent revision is "Exchange Lists for Menu Planning" (American Diabetes Association and American Dietetics Association, 1976). It has also been recommended for those planning weight reduction diets. The revised guide for persons with diabetes recommended that it be used only under the supervision of a dietitian. Similar exchange lists for weight control have been published by Stuart and Davis (1972) and Better Homes and Gardens (1968).

Guidelines for other special diets such as the sodium-controlled diet also have used the concept of exchanges. Thus, the concept of "exchange" is not new, but it has been used primarily for special diets.

The Basic Four Food Groups: Development

"Essentials of an Adequate Diet," published by USDA in 1957, introduced four food groups (Page and Phipard, 1957). The authors stated that, "The basic scheme here--A Daily Food Plan--was developed in response to many requests fcr up-to-date material to use in nutrition education programs."

Reducing the number of food groups from seven to four was an attempt to simplify the earlier guide. Although three fruit and vegetable groups were combined

into one, three subgroups were identified. Thus individuals must continue to identify fruits and vegetables which are good sources of vitamin A and of vitamin C to use the guide effectively. The Basic Four food groups included more specific definitions of serving sizes than did the basic seven guide.

The "Daily Food Plan" was:

> ...designed as source material for nutritionists, extension workers, and others who are teaching the principles of good food selection. The aim has been to provide enough basic facts about food values to promote flexibility in food choices with reasonable assurance that a good diet will be obtained day by day, week by week. Many workers no doubt wish to adapt this material to their own teaching needs. For example, some may wish to use the information on food sources of vitamins to strengthen their use of other food guides (Page and Phipard, 1957).

The plan was based on actual food consumption data in 1948 and amounts of food in the national food supply during 1953-54 (Hertzler and Anderson, 1974). Because dietary intakes were generally inadequate in calcium, vitamin A, and vitamin C, food sources of these nutrients were emphasized in the plan. Protein continued to be emphasized also. Recommended servings were based on 1953 Recommended Dietary Allowances. Thus the guide was based on existing information about nutritional needs, food composition, and food consumption patterns.

The daily food plan recommended the minimum number of servings in each of four food groups plus additional servings from the food groups or from other foods (fats, sugars, unenriched refined grain products) to "round out" the diet. Unfortunately "rounding out" has lead to obesity for many U.S. citizens and the Basic Four does not address maxiumum intakes.

According to Page and Phipard (1957), the four food groups furnished all or a major share of calcium, protein, iron, vitamin A and vitamin C and the B vitamins reccmmeded in 1953.

Individuals can, however, meet the Basic Four food group recommendations and still not meet the RDA for iron. This is especially true if fish and chicken are selected to a large extent for the meat group. Page and Phipard (1957) suggest the need for emphasizing iron sources. The groups also provide vitamins and minerals as well as carbchydrate and fat. However, the authors emphasize that whether or not other dietary needs are met depends on choices made within food groups and also on the kinds of foods selected to provide the remaining calcric needs.

The Basic Four guide was revised slightly after the 1968 RDA's were established. It is still the most widely used guide in nutrition education.

The Basic Four food groups: uses and abuses

The successful application of the "Guide to Good Eating" like other guides depends upon the user's understanding of it.

> The use of the food guide is controversial. It may be merely a simple sheet of paper, or it can be an educator with many hidden talents. If understood and applied with know-how, it can become an extremely flexible and versatile teaching tool--truly a guide for all reasons (Winarski, 1976, p. 227).

Leverton (1971) stated that, "...the basic four is a guide; it is not a precise tool for the selection -- or evaluation of diets." Too often it has been presented as simple as 4-4-3-2. And of course neither the Basic Four nor selecting a good diet is that simple. In fact, perhaps one of the worst misconceptions produced by the use of the Basic Four is the implication that food selection is so simple that one does not need to spend time and effort to select a nutritious diet. When one examines the information necessary for adequate use of the "Basic Four" it is really quite complex.

Some have suggested that the Basic Four food groups be abandoned or at least that alternative approaches be considered. In regard to its use in elementary education, Barbara Hicks (1977) said...

> If we are going to affect change in America's eating habits, we must change the way nutrition is taught...by the food groups. There is a place for

> a food grouping system for certain audiences under specific circumstances. But the food groups should not be the foundation for nutrition education in the elementary grades.

She also believes,

> So much emphasis has been placed on the Basic Four to the exclusion of other more relevant areas of nutrition content that teachers believe the food groups are the "ten commandments" of nutrition. As a result, this tool has been perpetuated beyond its usefulness.

Among the criticism of the Basic Four is that many processed foods do not fit into the four food groups. Leverton said in 1971, that only six percent (based on cost) of foods purchased in grocery stores did not fit into one of the four food groups. Foods purchased ready to eat in restaurants and from vending machines as well as mixtures of foods prepared at home, however, may not be easy to classify in the food groups.

Shortcomings of the Basic Four Food Guide

The concern about the usefulness of the Basic Four has been great enough that the U.S.D.A. has recently re-evaluated its usefulness.

> After careful review, USDA has decided to retain the "Basic Four" as one of its tools for teaching the principles of food selection for good nutrition (Leverton, 1971).

Because food composition varies considerably from food to food and even in the same food from time to time, and be-

cause there are limitations to our knowledge of nutrient needs, no perfect food guide is possible. The Basic Four has some shortcomings that are commonly agreed upon and others that are controversial; some can be improved upon, others cannot.

-The four groups do not adequately identify vitamin A and vitamin C rich fruits and vegetables.

-Nutrient needs can be met without meeting the Basic Four groups--especially since the RDA's were revised in 1974. For example, vitamin A intake may be adequate without eating a serving of dark green or deep yellow vegetables every other day (Yetley, 1974). Fortification of 2% and skim milk with vitamin A partly accounts for this observation.

-Simplification can lead to misconceptions. For example, the generalization that dark green and deep yellow vegetables are good sources of vitamin A has led to misconceptions that green beans and corn are also good sources.

-Although RDA's for some nutrients vary with sex and age, the Basic Four does not recognize differences in needs due to sex and makes only small adjustments for age.

-The amount of iron per serving can vary considerably within the meat group. Two ounces of beef supplies 2 mg of iron compared with less than 1 mg of iron in two ounces of fish or chicken.

-In its simplest form, Basic Four does not give enough information to be very useful for food selection. When all the specific information is included, it is no longer simple.

-It does not provide for adequate evaluation of the energy value of food intake the incidence of overweight makes this shortcoming especially serious.

-It does not provide information regarding trace minerals and vitamins other than the major ones.

-It is not an adequate tool for teaching food composi-

tion.

A dietary guide which uses nutrition labeling has been developed by a group at Colorado State. This method has been tested with homemakers (Jansen et al., 1977) and with fifth grade students (Meyers and Jansen, 1977). Homemakers responded favorably to the guide and the researchers concluded that "stressing nutrients more may help to increase the knowledge of consumers about food composition and prove to be useful in helping consumers understand the basis for menu planning based on food groupings" (Jansen et al., 1977, p. 162). Meyers and Jansen (1977) reported a significant improvement in nutrition knowledge among fifth graders who were exposed to a nutrition unit which included their Menu Planner handbook.

Although the Colorado guide has been used in educational programs, in a discussion of the latest revision, "Nutriguide and Menu Planner," Guen Brown (1978) stressed that the guide was developed as an evaluation guide and not as a teaching tool.

A dietary guide based on the concept of index nutrients has been developed by Jean Pennington (1976). The seven index nutrients were vitamin B-6, magnesium, pantothenic acid, vitamin A, folacin, iron and calcium. It has been used in California by students and by hospital dietitians for evaluating food intake.

Some have attempted to simplify nutrient evaluation of foods by assigning points or scores to foods. A diet is evaluated by totaling points or scores. Michael Jacobson's "Nutrition Scoreboard" (1973) is an example. His formula gives positive credit to protein, unsaturated fat, starch, and naturally occurring sugars, vitamins and minerals and fiber. Credits are lost for saturated fat, high fat and added sugar or corn syrup. Probably the most serious shortcoming of this approach is that it does not account for a proper balance of nutrients. Excess intake of some nutrients can compensate for low amounts of others with this scoring system. Of course these substitutions are not physiologically meaningful. This type of scoring also does not help the user identify nutrient composition of foods.

Is there need for another guide?

The purpose of all food guides has been to translate dietary standards into reliable and easy-to-use guides for the lay person. Changes in guides have occurred as knowledge of new nutrients and of nutrient requirements has become available, as the nutritional status of the U.S. population has changed, and as the foods in the market place have altered dietary habits. These areas continue to change over time and new guides are necessary periodically. Overconsumption, i.e. overweight, continues to be a concern of nutritionists and health professionals and fabricated and

highly fortified foods are becoming increasingly common in grocery stores.

Another guide would not necessarily replace the Basic Four but could be used for different purposes. Because nutrition communicators need to communicate with diverse audiences, they need more than one tool. For effective communication, messages must be devloped to meet the needs of each different audience.

The Basic Four guide is designed to be simple, however, some individuals want more information. According to Leverton (1971):

> Perhaps we need to recognize that an answer including some of the complexities of what we don't know may be more acceptable than no answer or an oversimplified one. "Eat a variety" could be misleading and does not satisfy a person with concern for a specific vitamin or mineral.

The Basic Four as usually presented differ greatly in complexity from food composition tables as guides for food selection and evaluation. Therefore, a guide that provides more information than the Basic Four would be desirable if it is easier to use than food composition tables and if it can serve to teach food composition and to evaluate food intake.

Even those who defend the Basic Four do not claim it should necessarily be the <u>only</u> guide. Leverton (1971) said that although the U.S.D.A. had decided that Basic Four would continue to be used as <u>one</u> tool for teaching nutrition... "There is plenty of room for more than one guide."

In the original publication of four food groups as a daily food plan, Page and Phipard (1957) noted that it was one guide and that "There are many possible ways of presenting the essentials of an adequate diet. Some are suitable for one purpose, some for another."

"Some nutritionists are convinced that food selection should be taught in terms of nutrients" (Hill, 1972) yet the Basic Four plan is based on foods.

> To date no tested research based tool has been developed for this purpose....Therefore, until a practical research based tool is developed to teach food selection in terms of nutrients, the food guide remains an excellent tool to assure a good nutritional foundation and does not necessarily include the use of fabricated foods (Hill, 1972).

The purpose of the present research is not to devise a replacement for the Basic Four. Rather, it attempts to develop an alternative which may meet the needs of certain individuals and which meets some of the objections to the Basic Four.

Development of An Alternative Food Guide

Inherent problems in developing a Food Guide

Foods are not easily classified by nutrient composition. The combinations and amounts of nutrients in various foods are so diverse that neat, precise categories are impossible.

There are trade-offs that must be considered--primarily precision vs. simplification. The more general (and thus simple) the categories, the less precise they are and the

less information they give. The most useful guide would be as complex as the learner is willing to take the time and effort to understand.

Highly fortified fruit drinks are difficult to classify because, while they contain added vitamin C, they do not have the other nutrients that natural fruit juices do. Highly fortified cereals present even more problems. Information about the availability of some of the additives e.g. iron, is incomplete (Olszon et al., 1978).

Purpose of the Nutrient Guide

A new guide for selecting foods and evaluating their nutrient content was developed to:

-teach food composition and food selection.

-reflect food habits of the U.S. population and take into consideration major problems with U.S. diets.

-be flexible enough to fit different lifestyles and eating patterns.

Excess energy intake (coupled with too little energy expenditure) leads to obesity which is the number one nutritional problem in the U.S. Recently, fiber has re-emerged as an important factor in nutrition. Consequently, the Nutrient Guide has included information on the energy value and fiber content of foods.

Development of the Nutrient Guide

To develop the guide, food composition data were reviewed, possible nutrient combinations were selected, and computer programs written to sort and categorize foods. The process was a combination of precise sorting by computer and judgments about reasonable serving sizes, availability of certain foods and appropriate energy categories.

A preliminary sorting of foods according to food composition per serving (Home and Garden Bulletin #72, U.S.D.A, 1971) explored groupings by different nutrient combinations for commonly used foods. Protein, calcium, iron, vitamin A, thiamin, riboflavin, niacin, and vitamin C were considered initially. Different amounts of nutrients per exchange as well as various combinations were examined. Eventually five groups which contained significant numbers of interchangeable foods in each list emerged. Vitamin A sources and vitamin C sources were each quite clearly single nutrient groups. The concurrent presence in foods of protein, calcium, iron, and the B vitamins caused difficulty in arranging lists which were similar in composition. They were formed into protein-iron, protein-iron-thiamin, and protein-calcium lists. Thus five groups formed the basis of the initial nutrient exchange plan (Gillespie, 1975).

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[1]The Statistical Package for the Social Sciences was used.

Because iron, thiamin, and calcium are the nutrients most often below and protein most often above the RDA's, iron thiamin, and calcium were chosen as a primary base for sorting instead of protein.

Computer programs in PL/C (Conway et al., 1972) were written to adjust food quantities and sort foods according to one or more nutrients sequentially.

For the vitamin C list, the amount of vitamin C was specified as 20 to 40 mg and then foods were sorted by their energy values. Items with less than 5 mg per serving were dropped from the list. When foods contained between 5 mg and 20 mg vitamin C, the serving size was multiplied by integers (1, 2, or 3) until the amount of vitamin C was between 20 and 40 mg. When food contained more than 40 mg of vitamin C, the size of the serving was reduced until it provided less than 40 mg vitamin C.

Energy values were tested after the quantity of food had been adjusted on the basis of its vitamin C content. If the energy value of the adjusted serving size was greater than 425 kcal, the food was dropped from the list. Otherwise it was given an energy rating as follows:

0 to 24 kcal = 0
25 to 74 kcal = 1
75 to 124 kcal = 2
125 to 174 kcal = 3
175 to 224 kcal = 4
225 to 274 kcal = 5
275 to 324 kcal = 6
325 to 374 kcal = 7
375 to 424 kcal = 8

This procedure allowed numerical ratings for the energy value of foods which when multiplied by 50 gave an estimate of its actual caloric value. No foods with energy:vitamin C ratio greater than 425 kcal per exchange of vitamin C were included. Figure 4 illustrates the stepwise sorting process that resulted in a list of exchanges. The list was reviewed and items that were present because amounts had been increased to quantities unlikely to be consumed at one time, such as 3 cups of canned beets, were eliminated.

A similar procedure was used to obtain the vitamin A list. The criterion for the amount of vitamin A for an exchange on the list was 800 to 1600 International Units (I.U.). Items which contained at least 200 I.U. of vitamin A but less than 800 I.U. were increased in amount. The same energy categories were applied to foods on the vitamin A list as for foods in the vitamin C list. See Figure 5 for the steps in the sorting procedure for vitamin A exchanges.

The same basic procedure was used to sort exchanges for the three iron lists (IRON+protein, IRON+protein+THIAMIN, IRON+B-VIT+fiber). However, because more than one nutrient

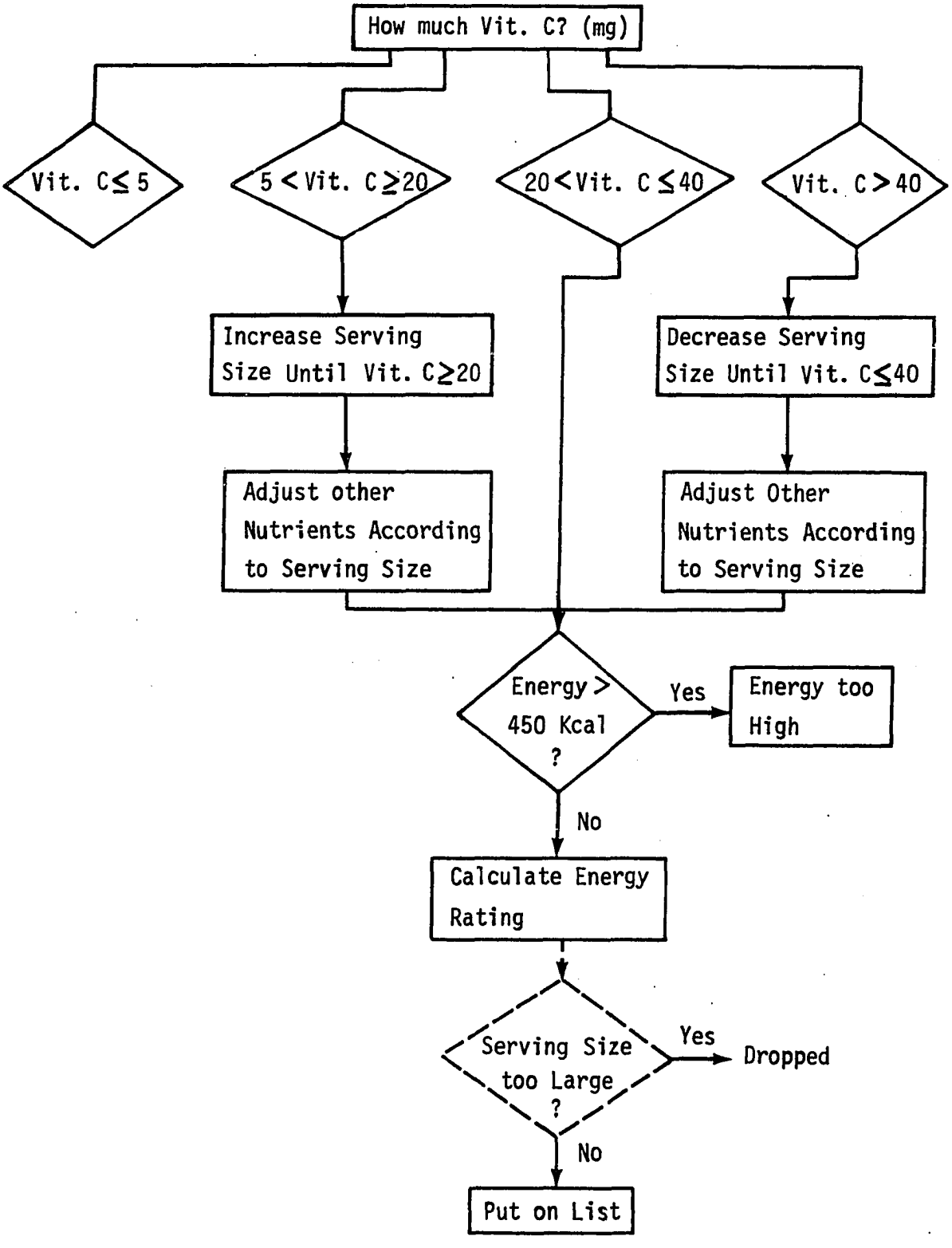

Figure 4. Procedure for selecting foods for vitamin C list

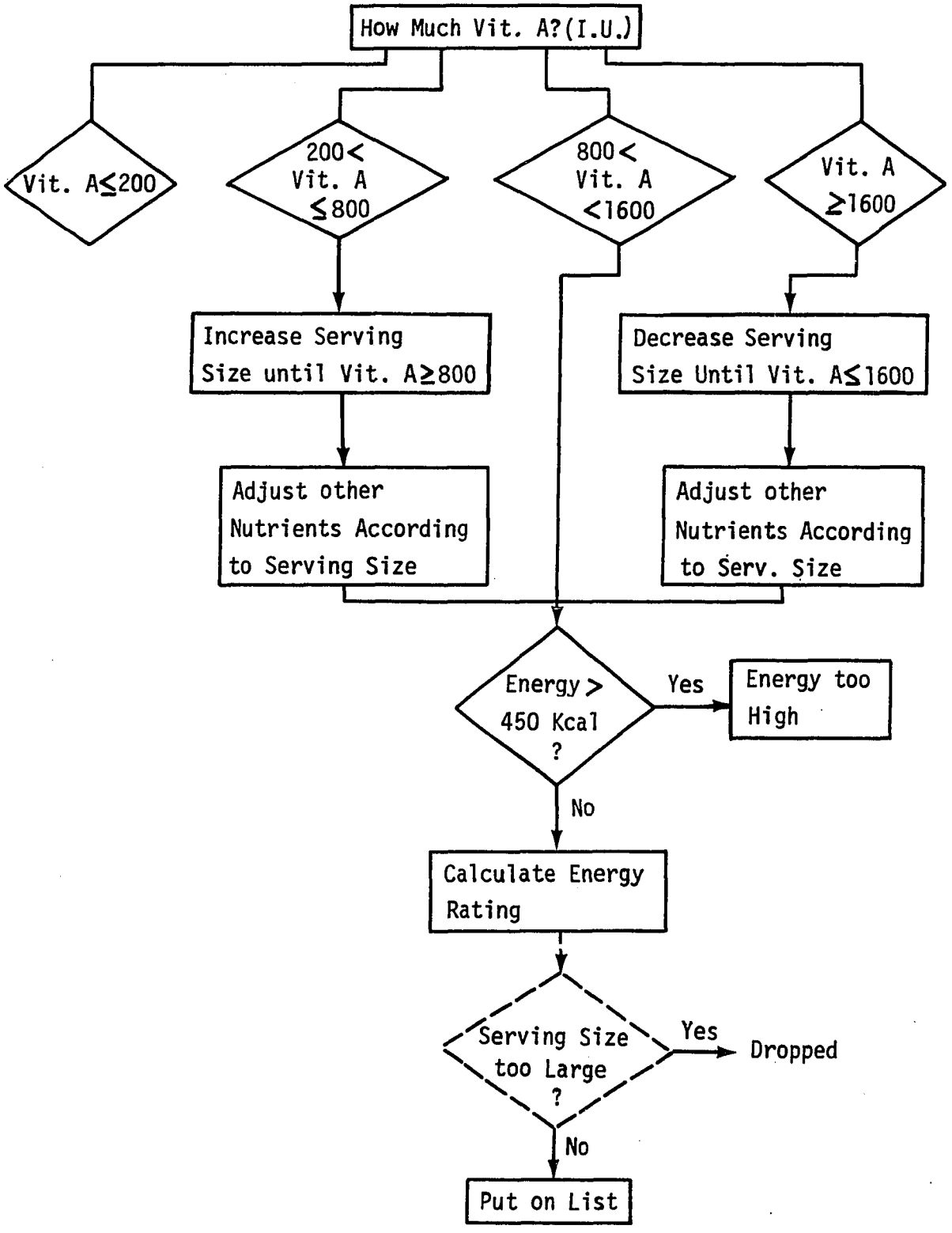

Figure 5. Procedure for selecting foods for vitamin A list

was involved in these lists, the sorting was more complex. The items were first sorted for iron content within the range of 0.7 to 1.4 mg (Figure 6).

Next, protein content of the adjusted serving sizes was examined and foods were divided into two groups, one with 5 gm or more protein and the other less than 5 gm protein. The third sorting of these foods was based on thiamin content. If the amount of thiamin was at least 0.12 mg and protein was less than 5 gm, it was included on the IRON+B-VIT[1] list. The group of foods which contained at least 5 gm of protein were further divided according to thiamin content. Those with at least .12 mg thiamin were put on the IRON+protein+THIAMIN list and those with less than .12 mg thiamin onto the IRON+protein list. In summary, three lists of foods containing 0.7 to 1.4 mg iron emerged: IRON+protein, IRON+protein+THIAMIN, and IRON+B-VIT+fiber. The last group also contained foods that are good sources of riboflavin and niacin and that are sources of fiber.[2]

The procedure used to obtain the CALCIUM+protein list is

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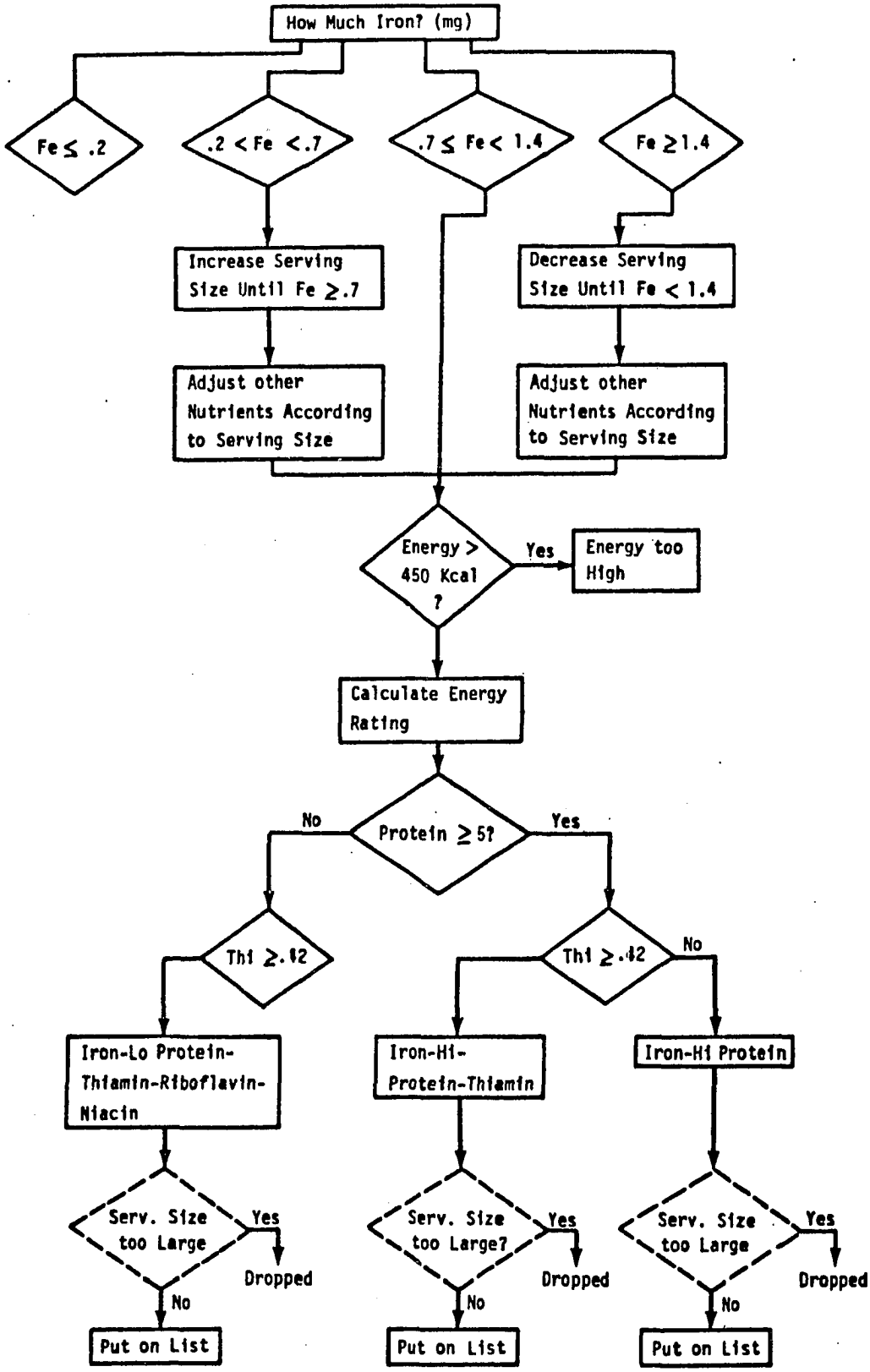
[1] Foods were examined and it was determined that if thiamin was present in this amount, enough riboflavin and niacin were also present.

[2] Because of the dearth of data on fiber content (and the absence of agreement on the analytical procedure for measuring fiber), no attempt was made to quantify fiber. However, fiber is included because of the current interest in natural sources of fiber.

Figure 6. Procedure for selecting foods for iron lists


How Much Iron? (mg)
Fe ≤ .2
.2 < Fe < .7
.7 ≤ Fe < 1.4
Fe ≥ 1.4
Increase Serving Size Until Fe ≥ .7
Decrease Serving Size Until Fe < 1.4
Adjust other Nutrients According to Serving Size
Adjust other Nutrients According to Serving Size
Energy > 450 Kcal ?
Yes
Energy too High
Calculate Energy Rating
No
Protein ≥ 5?
Yes
Thi ≥ .42
Thi ≥ .42
No
Iron-Lo Protein-Thiamin-Riboflavin-Niacin
Iron-Hi-Protein-Thiamin
Iron-Hi Protein
Serv. Size too Large
Yes
Dropped
No
Put on List
Serv. Size too Large?
Yes
Dropped
No
Put on List
Serv. Size too Large
Yes
Dropped
No
Put on List

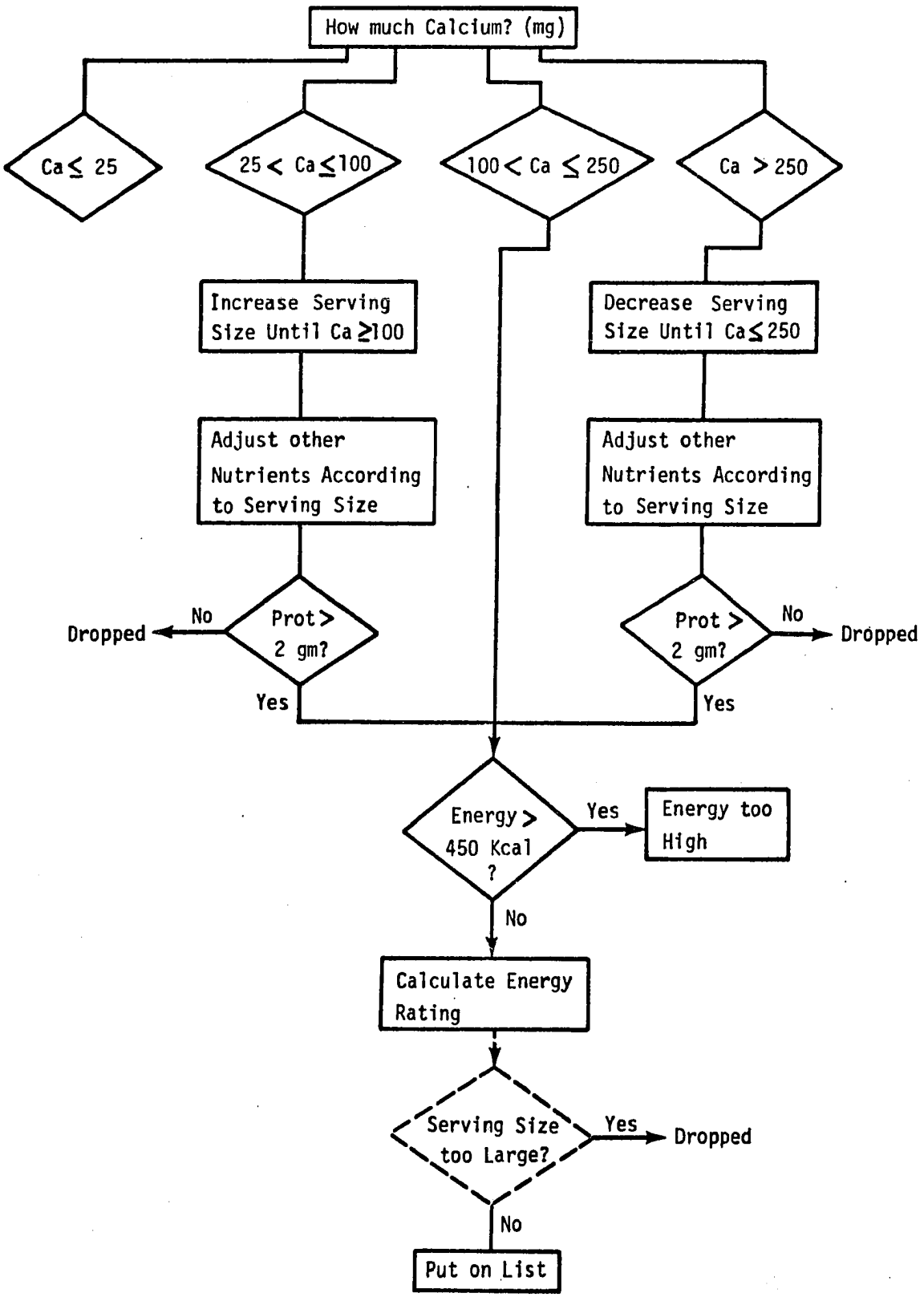


Figure 7. Procedure for selecting foods for calcium list

shown in Figure 7. From 100 mg to 250 mg calcium was chosen for exchanges on this list.

A list of foods providing relatively large amounts of energy in relationship to nutrients was added. Foods that were too low in any nutrient(s) to fit into one of the nutrient lists, that were not concentrated sources of energy and contained fiber were put onto a fiber list.

The Nutrient Guide was reviewed by a panel of experts in the field of nutrition, Dr. Wilma Brewer, Ms. Marie Corey, Dr. Charlotte Roderuck of Iowa State University and Dr. Elizabeth Yetley of Texas A. and M. University. Some changes were made in terminology based on commments from the panel. The major concern expressed by the experts was whether or not consumers would be able to understand and use the guide.

Characteristics of the Nutrient Guide

The exchange lists are not mutually exclusive, that is, the same food may appear on more than one list. This arrangement has some advantages. It emphasizes foods which are good sources of several nutrients and it allows classification of mixed foods. If a mixed food met the criteria for the amount of nutrient(s) in any group and did not exceed the allowable energy value, then it was included on the list.

Fortified, fabricated foods such as breakfast drinks appear as a vitamin C and in some cases as a vitamin A ex-

change as does orange juice. However, they do not appear on the IRON+B-VIT list even though orange juice does. This illustrates that these fabricated substitutes do not contain as many different nutrients as orange juice does.

The duplication of foods did present some problems. For example, some foods appeared on both the CALCIUM-protein and on either the IRON+protein or the IRON+protein+THIAMIN lists. In such cases, if the amounts of protein from both lists were added together, the estimate of protein intake would be incorrect. This problem was solved by making the following adjustments: 1) Some foods were high enough in protein so that when divided by two, the protein was at least 5 gm per exchange (e.g. custard, turkey-noodle casserole, pizza, custard pie, tuna-rice casserole). 2) Some foods were shifted from the IRON+protein+THIAMIN to the IRON+BVIT list and also left on the CALCIUM-protein list (e.g. lasagna, scalloped potatoes, waffle). 3) Some were elimimated from the IRON list altogether and noted as a source of iron on the CALCIUM-protein list (e.g. chocolate milk, chocolate milkshake, pudding). 4) Some were eliminated from the CALCIUM-protein list altogether and noted as sources of calcium on the IRON-protein list (e.g. French toast).

The Nutrient Guide considers energy value in addition to nutrient needs. Each exchange is given an energy rating which can easily be converted into an approximate number of

kilocalories.

The recommended number of exchanges was calculated on the basis of the Recommended Dietary Allowances for individuals by sex and age as shown in Table 3.

Instructions for use

The exchange lists plus the suggested number of exchanges for a particular individual serve as a guide for selecting or evaluating an individual's food intake. To plan food intake use the following steps:

1. Select meal and snack pattern desired.
2. Determine the recommended number of exchanges (Table 3). A usual serving probably will include several exchanges fcr many foods.
3. Organize exchanges into the selected meal and snack pattern.

To evaluate food intake:

1. Record food intake.
2. Identify foods eaten according to exchanges.
3. Estimate number of exchanges of each food.
3. Compare number of exchanges to number recommended (see Table 3).
5. Calculate energy by adding all energy ratings and multiplying by 50. Count rating for any one food only once if the food appears on more than one exchange list.

Table 3. Recommended number of exchanges by age and sex

	IRON +prot	IRON +prot +THI	IRON +B-VIT +fiber	CALCIUM +prot	VIT A	VIT C
Male & female 1-3 years	3	0	9	5	2	2
Male & female 4-7 years	3	0	9	5	3	2
Male & female 7-10 years	3	1	9	5	3	2
Male 11-18 years	3	1	14	7	5	2
Male 19-50 years	2	2	10	4	5	2
Male 50+ years	3	1	9	4	5	2
Female 11-18 years	3	1	12	7	4	2
Female 19-50 years	4	0	10	4	4	2
Female 50+ years	2	1	8	4	4	2
Pregnant 19-50 years	4	1	14	7	5	3
Breast feeding 19-50 years	3	1	14	7	5	3

Testing the Nutrient Guide as a Teaching tool

To test the Nutrient Guide as a potential teaching tool, it was incorporated into a nutrition communication program. The following hypotheses were considered:

G.H. 11: Intervening process responses will affect acceptance/ rejection responses.

H. 11.1 The more of the Nutrient Guide lesson the receiver reads, the more likely s/he is to make changes in his/her diet.

H. 11.2 Receivers who discuss the Nutrient Guide lesson, are more likely to make changes in their diet than those who do not discuss it.

H. 11.3 The greater the preceived difficulty of the Nutrient Guide, the less likely the receiver is to make changes in his/her diet.

H. 11.4 Those who complete the Personal Guide are more likely to make changes in their diet.

G.H. 12: Intervening process response variables will be inter-related.

H. 12.1 The more of the Nutrient Guide lesson the receiver reads, the more likely s/he is to discuss it with his/her spouse.

H. 12.2 Those who discuss the Nutrient Guide lesson are more likely to compete the Personal Guide.

H. 12.3 Those who discuss the Nutrient Guide lesson will

perceive it as less difficult to understand.

G.H. 13: The education level of the receivers will affect their responses to the Nutrient Guide during the intervening process.

The higher the level of education of the receiver,...

H. 13.1 ...the more likely s/he is to read the Nutrient Guide.

H. 13.2 ...the more likely s/he is to discuss the Nutrient Guide.

H. 13.3 ...the less difficult s/he will rate the Nutrient Guide.

H. 13.4 ...the more likely s/he is to complete the Personal Guide.

G.H. 14: The level of nutrition knowledge of the receivers will affect their responses during the intervening process.

The higher the level of nutrition knowledge of the receiver,...

H. 14.1 ...the more likely s/he is to read the Nutrient Guide.

H. 14.2 ...the more likely s/he is to discuss the Nutrient Guide.

H. 14.3 ...the less difficult s/he will rate the Nutrient Guide.

H. 14.4 ...the more likely s/he is to complete the

Personal Guide.

G.H. 15: The value placed on health by the receivers will affect their responses during the intervening process.

The higher value placed on health by the receiver,...

H. 15.1 ...the more likely s/he is to read the Nutrient Guide.

H. 15.2 ...the more likely s/he is to discuss the Nutrient Guide.

H. 15.3 ...the less difficult s/he will rate the Nutrient Guide.

H. 15.4 ...the more likely s/he is to complete the Personal Guide.

CHAPTER V. METHODS AND PROCEDURES

Having developed a communication strategy, an experiment was designed to test the strategy and to translate it into actual program materials.

A major consideration in planning an experiment to test a communication program is the potential conflict between the communication objectives (the changes desired as a result of the program) and the experimental objectives (analyzing the results and factors which affected these results). An example of this conflict was the collection of pretest experimental data. The more data requested from the potential program participants, the less likely they were to participate. The best strategy to increase enrollment would be to make enrollment relatively easy. On the other hand, from an experimental standpoint, the more information gathered before the communication program, the more parameters that could be evaluated later to measure effects of the program. Thus a compromise was necessary. Receivers were asked for two commitments in order to receive the program: 1) complete a questionnaire, and 2) indicate their interest in a nutrition communication program. To be included in the experimental sample, they also had to complete a follow-up questionnaire.

Measurement: Operationalizations of Variables

Receiver inputs

Receiver inputs were measured to describe the participating audience and also to provide baseline data from which to measure change. Receiver inputs were divided into personal status-roles and mental dispositions.

Personal status-roles The personal status-roles were sex, age, education and income. Sex was obtained by labeling pretests for mother or father before sending them. Participants were asked to record their age in years. Respondents checked one of the following categories to indicate their highest educational achievement: 1. 8TH GRADE OR LESS, 2. SOME HIGH SCHOOL, 3. GRADUATED FROM HIGH SCHOOL, 4. ATTENDED TRADE OR OTHER PROFESSIONAL SCHOOL AFTER HIGH SCHCOL, 5. ATTENDED COLLEGE, 6. GRADUATED FROM COLLEGE (BACHELOR'S DEGREE), 7. ATTENDED GRADUATE SCHOOL OR OTHER PROFESSIONAL SCHOOL AFTER COLLEGE, 8. RECEIVED MASTER'S DEGREE, 9. RECEIVED PH.D.

Family income information was requested from mothers only by asking: "Would you mind indicating your approximate family income before taxes in 1977?" Response categories were: 1. LESS THAN $5,000, 2. $5,000 TO $9,999, 3. $10,000 TO $14,999, 4. $15,000 TO $19,999, 5. $20,000 TO $24,999, 6. $25,000 OR MORE.

Mental dispositions Mental dispositions were factors related to nutrition and food practices. Data were gathered on knowledge of nutrition, value placed on health and nutrition, dietary adequacy, family discussion about nutrition and food practices. food selection and consumption patterns, and decision-making when shopping for food.

Nutrition knowledge Because the same items were used to measure change as to describe the audience, the items were written and selected to measure the participants' achievement of behavioral objectives for the program.

To develop items to assess cognitive acceptance of the nutrition information, several nutrition knowledge tests in the literature were reviewed (Eppright et al., 1970; Yetley and Garnant, 1973; U.S.D.H.E.W., 1977). Whenever possible, items were selected because some measure of their usefulness as test items was available.

The first criterion for selection of an item was its relevance to a behavioral objective for the program (see Chapter III). The second criterion (when data were available) was its ability to discriminate among respondents. When no tested items were found for an objective of the program, new items were written.

The test, which can be found in Appendix B, consisted of three parts. A scale was developed for each part by calculating Chronbach's alpha, the coefficient of reliabili-

ty, after the items had been answered. Items with the lowest reliability coefficients were dropped until a reliable scale was developed. A composite score was calculated by dividing the sum of the item scores by the number of items in the scale. When data for fewer than one-half the items in any one scale was missing, a mean score for the other items in that scale for that respondent was substituted for the missing values. For each of 10 items in part A, respondents were given five choices to indicate their certainty of the item's truth or falsity: SURE IT IS TRUE, THINK IT IS TRUE, DON'T KNOW, THINK IT IS FALSE, SURE IT IS FALSE. Responses were scored as follows: correct-sure=11, correct-think=8, don't know=6, incorrect-think=4, incorrect-sure=1. This ratio was selected based on the assumption that there is more psychological difference between "think" and "sure" than between "don't know" and "think."

Part B was a multiple-answer question about bread as a source of nutrients. Responses were scored as zero or one for each possible response. If an incorrect response was circled or a correct response was not circled, a score of zero was given for that item. A score of one was given when a correct response was circled or an incorrect response was not circled. Part C consisted of 10 questions with multiple choices as answers. Correct responses were scored "1," incorrect responses "0."

Health and nutriton goals Value placed on health and nutrition goals was measured by asking respondents to rank 12 goals according to the relative importance of the goals to them (adapted by Yetley, 1974 from Scarpatti, 1966). The goals included statements related to aspects of health, social behavior, and economics. They were:

Health goals:

Maintain or improve the quality of my diet

Maintain or improve my physical fitness

Learn and practice preventive techniques for heart disease and other diseases

Maintain or achieve desirable weight

Economic goals:

Be a good manager of money and time

Increase money income

Obtain security--financial, etc.

Reduce debts or increase savings

Social goals:

Gain and maintain the respect of people outside the family

Be active in community affairs

Clothe myself and family attractively

Maintain or improve the exterior appearance of the house and yard

The relative importance of health goals compared with economic and social goals was analyzed by assigning a score of 1 to 12 (lowest to highest) in the order of the ranking

for each subgroup (health, economic, social). The ranking also measured the relative importance placed on nutrition ("maintain or improve the quality of my diet") and on weight control ("maintain or achieve desirable weight").

Food behavior Measures of nutrition and food related practices were: family discussion about nutrition and food practices, dietary history analysis, meal and snack patterns, selection of snack foods, consumption of vitamin and mineral supplements, and decision-making when shopping for food. To measure family interaction related to nutrition and food practices, respondents were asked to describe how often they did the following:

"I let my family know which foods I like best."

"I suggest eating foods I think are good for us."

"I discuss the nutritional value of foods with my family."

"I discuss the caloric content of foods with my family."

"I discuss the importance of eating a nutritious combination of foods with my family."

"My spouse and I discuss ways to encourage our children to eat more nutritious meals and snacks."

"I encourage my family to try new foods."

"I help decide what foods to prepare for family meals."

"I encourage my children to help decide what foods to prepare for family meals."

A dietary history was collected as part of the pretest instrument. These data were analyzed for intake of six key

nutrients (Christenson, 1973). The percent of the Recommended Dietary Allowances met for each individual was calculated for protein, calcium, iron, vitamin A, thiamin, and vitamin C. Each participant received a printout of his/her dietary analysis. These data were also used to calculate a dietary score for each participant (Yetley, 1974). Each nutrient intake was rated fair, good, or excellent based on whether it was less than 67 percent, 67 to 99.9 percent, or 100 percent or more of the Recommended Dietary Allowance. An overall score was assigned according to the scheme shown in Appendix A. The higher the score, the more nearly the Recommended Dietary Allowances were met.

Another variable related to dietary adequacy was weight status. Participants reported their current height and weight on the pretest. These figures along with U.S.D.A. height and weight figures (Hathaway and Foard, 1960) were used to calculate percent of ideal weight: (reported weight/ideal weight for height) X 100. An average frame was assumed and median weights from the ideal weight table were used.

Meal-snack patterns were examined based on responses to the following questions:

> "On the average, how many days per week do you eat a morning (noon, evening) meal?"
>
> "On the average, how many snacks and drinks (other than coffee or tea) per day do you eat or drink?"

To assess nutritional quality of snacks, respondents were asked "Which of the following foods do you keep on hand for snacks?" The foods in the list provided were classified as "nutritious" snack foods or "empty calorie" snack foods. The nutritious snack foods were: fresh fruit, cheese, raw vegetables, yogurt, pumpkin or sunflower seeds, and peanut butter. The "empty calorie" snack food choices were: fried snacks such as potato or corn chips, candy, cookies or cake, rolls or donuts, pies or pastry. A "nutritious" snack food score was calculated by adding the number of nutritious snack foods circled. The score for "empty calorie" snack foods was calculated by counting the number of empty calorie snack foods <u>not</u> circled. Thus, for both the "nutritious" and the "empty calorie" snack food scores, a higher score reflected better selections.

Respondents were also asked (using the same list of snack foods), "Which of the following foods do you select for snacks away from home?" Scores for snacks away from home were calculated in the same manner as were the snacks at home.

To determine the prevalence and frequency of taking vitamin and mineral supplements among the participants, vitamin and mineral supplements were included in the list of foods under a question "How often do you usually eat the following?" Respondents were asked how important (not, some-

what, quite, very) certain considerations were to them when they shopped for their family's food:

the nutritive value of an item

the amount of nutritive value per dollar spent

the information on the nutrition label

a long-range (weekly, for example) menu plan

a short-range (daily or meal-by-meal) menu plan

whether or not you have a supply of food with similar nutritive value

Intervening process

Intervening process variables, attention, comprehension, and interaction, were measured in the posttest when participants were asked about their responses to each message.

Attention responses Respondents were asked to answer the following question for each of the three lessons:

"How much of lesson one (two, three) did you read?" (1. ALL, 2. MOST, 3. HALF, 4. LITTLE, 5. NONE)

For lesson two, respondents were also asked:

"Did you read the information about the Nutrient Guide?" (1. NO, 2. YES)

and for lesson three:

"Did you read the weight control information?" (1. NO, 2. YES)

Comprehension Comprehension was not measured directly; however, respondents were asked:

> "In general, how easy or difficult did you feel it was to understand lesson one (two, three)?" (1. VERY EASY, 2. EASY, 3. AVERAGE, 4. DIFFICULT, 5. VERY DIFFICULT).

Interaction

Family interaction was measured by asking respondents:

> "Did you and your spouse discuss any information in lesson one (two, three)?" (1. NO, 2. YES)
>
> "If YES, what did you talk about?" (See posttest questionnaire in Appendix D for specific options.)

Receiver-sender interaction was assessed by the information on feedback sheets returned by the receivers after they had received each lesson.

Outcomes

Data on cognitive, affective, and behavioral acceptance/rejection responses were collected for the same items on the posttest as on the pretest questionnaire with the exception of the dietary history and weight status. The scores for the two tests were compared using a paired t-test. Respondents also reported changes in their own food practices and their family's food practices as a result of the program.

Nutrition knowledge scales A, B, and C were used independently to measure change in knowledge of nutrition, i.e., cognitive acceptance. Changes in value placed on health and

nutrition were examined by comparing pre and post scores for goals.

Other comparisons to ascertain change in behavior were: frequency with which family discussed nutrition and food practices, quality of snack foods selected, frequency of consumption of selected vegetables, selected foods high in refined sugar, and vitamin and mineral supplements; and bases for decisions made while grocery shopping. Items discussed within the family and items related to decisions made while shopping were scaled with the procedure described for the nutrition knowledge scales. An over-all score for each variable was calculated. Posttest snack scores were calculated by the procedure already described for the pretest snack scores.

Scores for vegetable consumption, consumption of foods high in sugars, and consumption of vitamin and mineral supplements were based on frequencies per week divided by the number of items in each category. Vegetables included were carrots, squash, sweet potatoes or pumpkin, broccoli, dark leafy greens, brussels sprouts, and cabbage. Foods high in sugar were pie, cake, cookies, or baked dessert; candy; sugar, syrup, honey, jam, jelly, marmalade, preserves, or apple butter; regular pop (other than diet pop) or koolaid; and sweet roll cr donut. For vegetables, higher scores were considered better. For foods high in sugar and for vitamin

and mineral supplements, lower scores were considered better. Thus, the desired change was to increase the vegetable score and to decrease the scores for foods high in sugar and for dietary supplements.

Respondents were asked the following questions to determine whether their food practices had been influenced by the program:

> "Did you personally make any changes in your diet because of lesson one (three)?" (1. NO, 2. YES, "What changes did you make?")
>
> "Have your family's meals or snacks changed any as a result of lesson one (three)?" (1. NO, 2. YES, "What changes have you noticed?")

Nutrient Guide

The following questions were intended to assess the usefulness of the Nutrient Guide to the individuals who participated in the program:

> "How easy or difficult did you feel it was to understand the Nutrient Guide portion of lesson two?" (1. VERY EASY, 2. EASY, 3. AVERAGE, 4. DIFFICULT, 5. VERY DIFFICULT, 6. DON'T REMEMBER RECEIVING IT)
>
> "How useful was the Nutrient Guide (Personal Guide Worksheet) to you?" (DIDN'T READ, NO USE, SLIGHTLY USEFUL, MODERATELY USEFUL, VERY USEFUL)
>
> "Did you complete any of the Personal Guide Worksheets? (1. NO, 2. YES)
>
> "Did you personally make any changes in your diet after studying the Nutrient Guide?" (1. NO, 2. YES)
>
> "Did you and your spouse discuss -- (THE NUTRIENT GUIDE, WHETHER TO FILL OUT THE WORKSHEETS, HOW TO FILL OUT THE PERSONAL WORKSHEETS, WHAT YOU FOUND WHEN YOU FILLED OUT THE PERSONAL WORKSHEETS, THE FOODS YOUR FAMILY EATS, CHANGING YOUR FAMILY'S DIET, TRYING NEW OR

DIFFERENT FOODS)?

Data Collection

Initially the recruitment message, which included the pretest questionnaires, was sent to families identified by Extension staff in the Sioux City Area. Completion of the questionnaire was required to enroll in the nutrition program. Some families enrolled and some did not; thus, the participants were self-selected. Fathers and mothers answered separate questionnaires. The questionnaires were identical except that mothers were asked questions about family members and income. See Appendix D for a copy of the pretest questionnaire.

Two weeks after the last message in the nutrition program had been mailed, participants were sent a posttest questionnaire. The posttest included items from the pretest questionnaire plus new items related to the intervening process and changes in food practices (Appendix D).

Responses were solicited with a multi-contact approach similar to that used for the initial recruitment. The first mailing of the questionnaire was followed by a reminder postcard mailed from Iowa State University one week later. Then three weeks after the intitial mailing, a replacement questionnaire was sent from Iowa State University. This replacement questionnaire was scheduled to arrive one or two days after the local Extension Home Economist had sent a

letter encouraging the families to complete and return the questionnaire. These efforts yielded a response from 98 women (47.8 percent) and 54 men (26.3 percent) from 205 families who were sent posttests. Studies about how the percent responding affects the results vary. However, with this level of response, the sample may not be an accurate representation of all those who received the nutrition communication program (Goudy, 1976). It can be concluded that, in total, the program had no more impact and probably had less than the data show.

Participants

The nutrition program was designed for two-parent families with young children. The Iowa State University Extension Service staff in the Sioux City Extension Area expressed interest in providing a nutrition program for families with young children; therefore, they agreed to supply a mailing list for the study.

Although the mailing list should have included only families with young children, we later learned that a signficiant percent of the families did not fit the desired audience definition. When discerned, ineligible families were removed from the mailing list. However, in most cases determination of eligibility was not possible. The recruitment message asked those who did not have young children (12 years or under) to return a special form. Through

this procedure, some non-eligible families were identified.

The families in the sample included some with low incomes, but the majority were classified as middle-class. Some families who were not eligible completed the pretest and enrolled in the program. These families were sent the entire program, but were not sent a posttest.

Nutrition Communication Program

Message development and mailing

The overall objective of the program was to aid families in developing a holistic view of nutrition and to apply it to their particular situations.

The message content was based on generalizations and facts developed for young families by the author and discussed in Chapter III. The entire list is in Appendix E. Three messages covered the topics outlined in Figure 8. Copies of the materials prepared are included as Appendix B. The messages were written in cooperation with a journalist (Bolluyt, 1979). The information was presented in a straightforward, but conversational, manner.

Each message was accompanied by a response sheet so the family could "talk back" to the nutritionist. It included specific questions to encourage each receiver to ask questions and make comments about nutritional concerns of the family.

Message One:

- Computer dietary analysis
- Nutrients: the stuff of life
- Recommended Dietary Allowances
- Minerals
- Water-soluble vitamins
- Food fads

Message Two:

- Nutrient Guide and Personal Guides to good nutrition
- Nutrient needs for different ages
- Snacks
- Fat-soluble vitamins
- Protein
- Water
- Fiber
- Labels, ingredient and nutrition

Message Three:

- Fat
- Carbohydrates
- Weight control
- Cholesterol
- Heart disease
- Additives

Figure 8. Message content.

Messages were sent by first class mail using the Iowa State University postage meter. A personalized letter and business reply envelope for questions and comments were included with each message. For families who asked questions, answers were returned on a special form which has been included in Appendix B.

Several techniques were used to personalize mailings and to foster the definition that the nutritionist was a real person. A letter accompanying each mailing included an inside address using the first names of both parents when they were known. Each letter was individually signed by the nutritionist.

Answers to questions were handwritten and signed by the nutritionist. They were written in an informal, personal manner with an attempt to respond in terminology similar to that in the question. When possible, family members were mentioned by name. Each family member was sent an individual "Personal Guide to Good Nutrition" with his/her own name handwritten on it (Appendix B).

Recruitment

Recruitment is a critical part of voluntary education programs. The attention of the receiver must be captured before s/he can be convinced that the proposed program is important enough for commitment of some time and effort.

The recruitment message tried to convince the family to enroll in a nutrition program by: 1) discussing the importance of good nutrition to a family as an investment in its future; 2) pointing out the influence, in general, of fathers on family food behavior, and how important their participation in a nutrition program was; and, 3) offering a computer analysis of the usual food intakes of both father and mother.

The cover letter described the program and promised a dietary analysis by computer if the pretest questionnaire was completed and returned. A copy of the recruitment message is in Appendix B.

Recruitment included three stages. This strategy was based on analysis of a four-stage process used in an earlier study (Gillespie, 1975). Response to the fourth stage, a telephone call, was only seven percent compared with 44 percent in the first three stages. In addition, continued feedback from those recruited late was very poor. In this experiment, therefore, the stages were: 1) send a recruitment message to all families on the mailing list provided by the Iowa State University Extension Service; 2) ten days later, send a reminder postcard to all families from the local Extension Home Economist; and 3) send another set of materials with a new cover letter and an additional flyer emphasizing the value of the program to those who had not re-

sponded within three weeks after the original recruitment message was mailed.

Statistical Analysis

Three statistical procedures were used to analyze data from this study. To determine whether the changes in the outcome variables were significant, the Statistical Package for the Social Sciences (SPSS) subprogram t-test was used to compare after and before means on a case by case basis. The paired t-test was used because pairing (rather than using group means) reduces the effect of subject-to-subject variability. Zero-order correlations calculated with the SPSS subprogram, Pearson Correlation, were used to assess relationships between two variables in the communication model.

Finally, path analysis was performed to determine the effects of input and intervening process variables on the measures of program outcome. A block recursive rather than a completely recursive model was used. The stepwise, multiple regression procedure in the SPSS subprogram Regression was followed. In this procedure, independent variables are added one at a time. The independent variable with the highest correlation coefficient is entered first and the beta value calculated. The variable which increased the beta value the most is entered next. Independent variables are added until none of the remaining variables increase the beta significantly.

CHAPTER VI. FINDINGS AND DISCUSSION

Data for selected model variables are presented in the first part of this chapter. In part two, hypotheses about relationships of variables in the intervening process to the outcome are discussed. The third part reports an analysis of network effects among selected variables based on path analysis. Because an objective of this study was to evaluate a new Nutrient Guide as a teaching tool, audience response to it is also reviewed. Data is from those who participated in the program and who completed the follow-up questionnaire.

Description of the Model Variables

The variables represent inputs from the audience which participated in the intervention program, the intervening processes (attention, comprehension, and interaction) and the outcomes of the program. Support for the hypotheses about program outcomes developed in Chapters III and IV are also discussed.

Receiver Inputs

Receiver inputs included personal status-roles as well as mental dispositions.

Personal status-roles Of the families that enrolled in the nutrition communication program, 55 fathers (27 percent) and 92 mothers (45 percent) completed posttest questionnaires. The fathers' mean age was 33.1 years with a range from 20 years to 50 years while the mean age for mothers was 31.4 with a range from 19 to 54. The income distribution among families is shown in Table 4. About one-half of the families had annual incomes under $15,000 while only 4 families (4.8 percent) earned less than $5,000. The majority (55.9 percent) had incomes between $10,000 and $20,000. As illustrated in Table 5, with the exception of four fathers and one mother, all had graduated from high school. More than one-third had graduated from college. More than half (58.1 percent of the men and 55.4 percent of the women) had some college education. The participants were above average in years of education. Census data showed that 26.9 percent of the men and 20.4 percent of the women of similar age in the seven counties where the participants lived had one year or more of college education (U.S. Dept. Commerce, 1972).

About two-thirds of the families had either one or two children while the other one-third had from three to seven children. In three-fourths of the families, one or two children were twelve years old or younger (Table 6). One-fourth of the families (23) had three or four children under 12 years of age.

Table 4. Distribution of total family income (before taxes)

	Families n = 84		
	No.	%	Cum. %
Less than $5,000	4	4.8	4.8
$5,000 - $9,999	9	10.7	15.5
$10,000 - $14,999	30	35.7	51.2
$15,000 - $19,999	17	20.2	71.4
$20,000 - $24,999	10	11.9	83.3
$25,000 or more	14	16.7	100.0

Table 5. Distribution of educational achievement

Category	Fathers n=55 Number	Fathers n=55 Percent	Mothers n=92 Number	Mothers n=92 Percent
8th grade or less	2	3.6	--	--
Some high school	2	3.6	1	1.1
Graduated from high school	14	25.5	28	30.4
Attended trade or other school after high school	5	9.1	12	13.0
Attended college	8	14.5	18	19.6
Graduated from college	12	21.8	23	25.0
Attended graduate school or other school after college	4	7.3	6	6.5
Received masters	7	12.7	4	4.3
Received Ph.D.	1	1.8	--	--

Table 6. Distribution of the number of children per family

Number of children	Total No. n = 92	%	12 years old or younger No. n = 92	%
0	1[a]	1.1	1	1.1
1	22	24.2	29	31.9
2	36	39.6	38	41.8
3	18	19.8	15	16.5
4	10	11.0	8	8.8
5	3	3.3	0	0
6	0	0	0	0
7	1	1.1	0	0

[a]One family was expecting a child between the time the pretest data were gathered and the program began.

Mental dispositions Mental dispositions measured in the pretest included previous values about health and nutrition, and behaviors related to foods and nutrition. With the exception of two variables, weight status and dietary score, measures of mental disposition variables were also baseline data for measuring change following the intervention.

Nutrition knowledge Nutrition knowledge was assessed by individually analyzing three clusters of items. The number of items and reliability coefficients of the scales are presented in Table 7. This procedure assessed in each scale, "...how reliable a sum of weighted variables is as an estimate of a case's true score" (Nie and Hull, 1977). Scale A in its final version consisted of five questions. For each question, respondents could choose one of five responses to indicate their certainty of its truth or falsity. Starred questions in Table 8 were combined into one scale. The coefficient of reliability (Cronbach's alpha) for the five items was C.583. For the posttest, the reliability for the five items was 0.665. The overall mean score for men was 8.06±1.98 and for women, 8.68±1.70. out of a maximum score of

Table 7. Scaling: reliability of scaled items

	No. of items	Pretest no. of cases	Pretest alpha	Posttest no. of cases	Posttest alpha
Nutrition knowledge					
Scale A	5	143	.583	141	.665
Scale B	9	147	.715	147	.785
Scale C	7	115	.575	103	.620
Shopping decisions	4	110	.811	110	.805
Family discussion about F & N	8	139	.815	135	.856

Table 8. Responses to nutrition knowledge items: scale A

		Correct response
*a.	As long as my child is not sick, he must be eating the right foods . . .	F
*b.	It is always better to get too much of a nutrient than not enough . . .	F
c.	Minimum nutrient needs for some nutrients are stated as Recommended Dietary Allowances . . .	F
*d.	Between meal foods are never as good for you as the food other family members eat . . .	F
*e.	A father has very little influence on the food other family members eat . . .	F
*f.	If a child drinks milk, he will be well nourished . . .	F
g.	There is some cholesterol in almost all foods . . .	F
h.	People can stay healthy without eating meat, poultry, or fish . . .	T
i.	All persons identified as nutrition authorities or nutritionists have formal nutrition training . . .	F
j.	The attitude of other family members toward eating vegetables can have an important influence on acceptance of vegetables by pre-school children . . .	T

*Items included in scale A.

Fathers n = 53 %					Mothers n =89 %				
Sure it is true	Think it is true	Don't know	Think it is false	Sure it is false	Sure it is true	Think it is true	Don't know	Think it is false	Sure it is false
1.9	15.1	7.5	20.8	54.7	7.6	16.3	1.1	25.0	50.0
9.4	11.3	15.1	30.2	34.0	3.3	23.9	8.7	38.0	26.1
13.2	34.0	24.5	11.3	17.0	30.4	33.7	18.5	7.6	9.8
19.2	13.5	1.9	36.5	28.8	4.3	8.7	2.2	33.7	51.1
7.7	9.6	0	19.2	63.5	3.3	2.2	0	15.2	79.3
5.7	11.3	11.3	32.1	39.6	2.2	9.8	7.6	31.5	48.9
15.1	26.4	24.5	18.9	15.1	6.5	39.1	21.7	21.7	10.9
20.8	34.0	13.2	20.8	11.3	20.7	28.3	7.6	30.4	13.0
5.7	28.3	30.2	18.9	17.0	23.9	26.1	22.8	19.6	7.6
67.9	26.4	1.9	3.8	0	89.1	7.6	0	3.3	0

11 for scale A.[1] The distribution of responses for each item is given in Table 8. Non-starred items did not scale well with the other items.

Scale B consisted of nine items (Table 9) all of which were part of a question about bread as a source of nutrients. The alpha value for the pretest was 0.715 and for the posttest 0.785. Of a possible composite score of 1.00, the mean score for fathers was 0.60 and for mothers 0.73. The frequencies of correct responses for each item, including those dropped during the scaling procedure, are shown in Table 9. For scale C the mean score for mothers was 0.40+0.26 out of a possible 1.00 compared to a mean of 0.31+0.23 for fathers. The items in scale C had a coefficient of reliability of 0.575 (pretest) and 0.620 (posttest). The items and frequencies of correct responses are listed in Table 10. Of the three scales, both fathers and mothers scored best for scale A. For all three scales, women had higher scores than men, but the participants were not generally well informed about nutrition.

Values To measure initial values related to health status, respondents were asked to rank 12 goals ac-

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[1]Each item was scored as follows: correct-sure=11, correct-think=8, don't know=6, incorrect-think=4, incorrect-sure=1. The composite score was obtained by dividing the sum of the item scores by 5.

Table 9. Responses to nutrition knowledge items: scale B

	% correct	
	Fathers n = 55	Mothers n = 92
Enriched bread is a good source of which of the following: (Circle all that apply)		
*1. Vitamin A	50.9	59.8
*2. Thiamin (vitamin B_1)	65.5	82.6
*3. Riboflavin (vitamin B_2)	69.1	80.4
*4. Vitamin C	69.1	84.8
*5. Vitamin D	69.1	82.6
*6. Protein	36.4	52.2
*7. Carbohydrates	70.9	89.1
*8. Fat	54.5	65.2
9. Iron	40.0	44.6
*10. Calcium	58.2	62.0
11. Calories	21.8	20.7

*Items included in scale B.

Table 10. Responses to nutrition knowledge items: scale C

	Question	% Correct Fathers	% Correct Mothers
*a.	Men and women between ages of 25 and 35 years who are of average height and weight . . . need different amounts of the same nutrients	55.8	54.3
*b.	Athletes need more of which of the following when compared to non-athletes? . . . calories	52.9	56.0
*c.	Which one of the following nutrient groups provides the most concentrated source of energy? . . . fats	20.8	18.9
*d.	Which one of the following does not have high vitamin A value? . . . green beans	12.2	34.4
e.	Which of the following groups of nutrients can be used as sources of energy by cells? . . . carbohydrate, fat, protein	64.7	60.9
f.	Enriched breads and cereals . . . are a source of vitamins and minerals	59.6	74.4
*g.	Which of the following two foods has the greater nutritional value per dollar spent? . . . baked beans	43.4	64.1

*Items included in scale C.

Table 10. (Continued)

Question	% Correct Fathers	% Correct Mothers
The next question is related to this situation: The Johnson family wants to eat a balanced diet. They planned the following 3 meals for father, mother, 6 year old son, and 2 year old daughter. (Assume one serving of each food)		
Breakfast: Two Sweet Rolls, Margarine, Apple Juice, Coffee Lunch: Hot Dog and Bun, Potato Chips, Catsup, Banana Dinner: Hamburger Patty, Potatoes, Green Beans, Pineapple Gelatin Salad, Bread, Margarine, Milk Evening Snack: Cocoa		
*a. Which one of the following food substitutions would make the menu more nearly nutritionally adequate? . . . substitute orange juice for apple juice	17.6	33.1
b. Now that you have made a substitution (write it in the menu) to improve the nutritive quality of the above menu, what further change needs to be made in the menu to make it more nearly adequate for the 6 year old boy who is growing rapidly and is also very active . . . add more milk to diet	76.5	76.5
*c. If Mrs. Johnson were concerned about losing weight, which one of the following changes would aid in decreasing the calories in her menu without affecting the overall nutritive value of the diet? . . . substitute skim milk for cocoa	13.7	29.2

cording to their relative importance to them. The content of each goal was classified as economic, health, or social related. Receivers' valuations on health were considered important as a mental disposition which could affect participation in and acceptance of the nutrition program. Fathers ranked economic goals highest (Table 11). This finding confirmed Yetley's[1] (1974) observation in a previous study of young families in Iowa. Fathers in the present sample, however, ranked health goals somewhat higher with respect to social goals than they did in Yetley's sample. They ranked the goal "maintain or improve the quality of my diet" about in the middle (mean=6.2) whereas men in Yetley's sample ranked it lowest of the twelve goals. As shown in Table 12, about one-half of the fathers and two-thirds of the mothers ranked the goal, "maintain or improve the quality of my diet," in the upper half of the goals.

Consistent with Yetley's findings, mothers ranked health goals higher and economic goals lower than did fathers. The mean composite health score[2] for men (5.77) and for women

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[1]Although the same goals were used, the method of ranking differed somewhat between the two studies. Yetley used the goal "increase money income" as an anchor goal and respondents were asked how other goals ranked relative to it. In the present study, respondents were given a list of the 12 goals and asked to rank them in order of importance. Scores were assigned from 1 to 12 based on the rank.

[2]The higher the score, the higher the goals were ranked.

Table 11. Importance of twelve goal statements

	N	Mean[a]	S.D.	Content[b]
		Fathers		
Be a good manager of money and time	50	10.32	2.49	E
Obtain security-financial etc.	49	8.90	2.77	E
Increase money income	50	8.28	3.00	E
Reduce debts or increase savings	49	7.63	2.99	E
Maintain or improve my physical fitness	50	7.20	3.03	H
Maintain or improve quality of the diet	49	6.24	3.22	H
Gain and maintain the respect of people outside the family	50	6.00	3.41	S
Maintain or achieve desirable weight	49	5.88	3.16	H
Clothe myself and family attractively	50	5.78	2.55	S
Learn and practice prevention techniques for heart disease and other diseases	49	4.51	2.48	H
Maintain or improve the exterior appearance of house and yard	49	3.71	2.38	S
Be active in community affairs	50	3.66	2.92	S
		Mothers		
Be a good manager of money and time	91	10.55	2.11	E
Maintain or improve quality of diet	91	8.74	2.82	H
Maintain or achieve desirable weight	91	7.72	3.03	H
Obtain security-financial etc.	90	7.29	3.49	E
Maintain or improve my physical fitness	91	7.07	2.99	H
Reduce debts or increase savings	89	7.02	2.93	E
Clothe myself and my family attractively	91	6.64	2.45	S
Gain and maintain the respect of people outside	90	5.54	3.14	S
Learn and practice prevention techniques for heart disease and other diseases	91	5.31	3.15	H
Increase money income	91	4.78	3.10	E
Maintain or improve the exterior appearance of the house and yard	91	4.22	2.32	S
Be active in community affairs	91	3.38	2.67	S

[a]Possible range = 1 to 12 with 12 being most important and 1 being least important.

[b]E = Economics, H = Health, S = Social.

Table 12. Scores[a] for goal "maintain or improve the quality of my diet"

	Fathers n = 49			Mothers n = 91		
	No.	%	Cum. %	No.	%	Cum. %
Score out of possible 12						
1	3	6.1	6.1	0	0	0
2	4	8.2	14.3	1	1.1	1.1
3	5	10.2	24.5	5	5.5	6.6
4	5	10.2	34.7	3	3.3	9.9
5	4	8.2	42.9	6	6.6	16.5
6	4	8.2	51.0	9	9.9	26.4
7	7	14.3	65.3	5	5.5	31.9
8	5	10.2	75.5	5	5.5	37.4
9	2	4.1	79.6	12	13.2	50.5
10	4	8.2	87.8	8	8.8	59.3
11	3	6.1	93.9	25	27.5	86.8
12	3	6.1	100.0	12	13.2	100.0
Mean =	6.2			8.7		
S.D. =	3.2			3.0		

[a]12 most important and 1 least important.

(7.22) for participants in the pretest was higher than for those in Yetley's (1974) study (men=4.62, women=5.68). These scores were also somewhat higher than those for a randomly selected control group from a previous study in Iowa (men=5.54 and women=6.60). Those who had received a nutrition communication program in this previous study (Gillespie et al., 1976) ranked health goals significantly higher than the control group (men=7.52, women=7.20). The fact that the participants in the current study ranked health goals higher than those in previous studies might indicate that those who enrolled valued health more than those who did not. Because of the difference in time when these studies were conducted, the differences also may be due to other effects. For example, the emphasis in the news media on health and nutrition recently may have increased the salience of health goals for many people.

Previous behavior Previous behaviors measured were: 1) dietary adequacy, 2) eating patterns, 3) food selection and consumption, 4) decisions made regarding food purchases, 5) discussion about nutrition and food practices with other family members.

Table 13 summarizes fathers' and mothers' dietary scores that were based on the percent of Recommended Dietary Allowances for six nutrients (Appendix A). The higher the score, the more nearly the Recommended Dietary Allowances

Table 13. Dietary quality based on intake of six key nutrients

	Fathers n = 54			Mothers n = 92		
	No.	%	Cum. %	No.	%	Cum. %
Dietary score[a]						
7	36	66.7	66.7	10	10.9	10.9
6	13	24.1	90.8	40	43.5	54.4
5	4	7.4	98.2	33	35.9	90.3
4	1	1.9	100.1	5	5.4	95.7
3	0	0	100.1	3	3.3	99.0
2	0	0	100.1	0	0	99.0
1	0	0	100.1	1	1.1	100.1

[a]See Appendix A for scoring system based on percent 1974 Recommended Dietary Allowances. The higher the score, the more nearly the recommended allowances were met.

were met. Most of the fathers had relatively good diets based on their dietary histories. Two-thirds scored seven which meant that their intakes met the Recommended Dietary Allowances (RDA) for all six key nutrients (Table 14). One-fourth of the men did not meet the Recommended Allowance for thiamin and a few were below the RDA in calcium and in vitamin A. Only 10.9 percent of the women scored seven. The majority (79.4 percent) received a dietary score of five or six indicating that they were below the Recommended Dietary Allowances for one or two nutrients. For 87 percent of the women, iron intake was below their RDA. About one-third of the women did not meet their Recommended Allowance for calcium and over one-fifth were below their Recommended Dietary Allowance for thiamin.

As shown in Table 15, 27.8 percent of the fathers and 24.7 percent of the mothers were from 5 to 14 percent overweight. Nearly one-third of both men and women were 15 percent or more overweight.

The mean number of meals per week was 18.9 (Table 16). Over 60 percent ate a morning, noon and evening meal every day. When a meal was missed, it was most frequently the morning meal. Almost one-third (29.6 percent of the men and 26.4 percent of the women) consumed five or fewer morning meals per week. Seventy-six percent of the men and 81.3 percent of the women consumed seven noon meals per week; 90.6

Table 14. Percent RDA[a] for six nutrients

	Fathers n = 56			Mothers n = 92		
	0-66%	67-99%	≥100%	0-66%	67-99%	≥100%
Protein	0	0	56	1	4	87
Calcium	2	7	47	15	16	61
Iron	0	3	53	39	41	12
Vitamin A	4	6	46	1	10	81
Thiamin	1	13	42	2	18	72
Vitamin C	1	1	54	2	3	87

[a]1974 Recommended Dietary Allowances.

Table 15. Weight status[a] of participants

% of recommended weight[b]	Fathers n = 54			Mothers n = 89		
	No.	%	Cum. %	No.	%	Cum. %
≤84	1	1.9	1.9	4	4.5	4.5
85-94	6	11.1	13.0	10	11.2	15.7
95-104	13	24.0	37.0	22	24.7	40.4
105-114	15	27.8	64.8	22	24.7	65.2
115-124	11	20.4	85.2	12	13.5	78.7
125-134	7	13.1	98.1	7	7.8	86.5
135-144	1	1.9	100.0	7	7.8	94.4
145-154	0	0	100.0	3	3.4	97.8
155-164	0	0	100.0	2	2.2	100.0

[a]Based on weights reported by the respondents.

[b]Based on tables from Hathaway and Foard, 1960.

Table 16. Number of meals consumed per week

	No. of meals	Fathers No.	Fathers %	Fathers Cum. %	Mothers No.	Mothers %	Mothers Cum. %
			n = 54			n = 91	
Morning meal	0	4	7.4	7.4	4	4.4	4.4
	1	2	3.7	11.1	4	4.4	8.8
	2	6	11.1	22.2	7	7.7	16.5
	3	1	1.9	24.1	1	1.1	17.6
	4	2	3.7	27.8	3	3.3	20.9
	5	1	1.9	29.6	5	5.5	26.4
	6	4	7.4	37.0	5	5.5	31.9
	7	34	63.0	100.0	62	68.1	100.0
			n = 54			n = 91	
Noon meals	0	1	1.9	1.9	0	0	0
	1	0	0	1.9	1	1.1	1.1
	2	2	3.7	5.6	3	3.3	4.4
	3	2	3.7	9.3	0	0	4.4
	4	2	3.7	13.0	4	4.4	8.8
	5	1	1.9	14.8	3	3.3	12.1
	6	5	9.3	24.1	6	6.6	18.7
	7	41	75.9	100.0	74	81.3	100.0
			n = 53			n = 91	
Evening meal	0	0	0	0	0	0	0
	1	0	0	0	0	0	0
	2	0	0	0	1	1.1	1.1
	3	0	0	0	1	1.1	2.2
	4	1	1.9	1.9	0	0	2.2
	5	0	0	1.9	0	0	2.2
	6	4	7.5	9.4	1	1.1	3.3
	7	48	90.6	100.0	88	96.7	100.0

All meals per week: mean 18.9
mode 21.0

percent of the men and 96.7 percent of the women consumed seven evening meals per week. The men and women in this sample consumed more meals than those who were interviewed in a previous study of young families in Iowa (Yetley, 1974). Both men and women in that study consumed 16.4 meals per week on the average. Breakfast, as in the present study, was the meal most often skipped. Although most respondents ate three meals per day, they also snacked frequently. The mean number of snacks consumed per day was 3.3 for men and 2.8 for women (Table 17). Consequently, nutritional information related to snacks was appropriate in the intervention program.

In Tables 18 and 19 the quality of snack foods selected is summarized. Snack foods had been divided into two classes, one described as "nutritious", the other as "empty calorie". A high score for nutritious snacks indicated that an individual selected more nutritious snack foods while a high score for "empty calorie" snack foods indicated that fewer "empty calorie" foods were selected for snacks. Both classes of snack foods were evaluated for "foods usually kept on hand for snacks" as well as for "foods selected for snacks away from home."

Considerably fewer nutritious snacks were selected by both fathers and mothers when they were away from home than they kept on hand for snacks at home. This observation may reflect the lack of easily accessible nutritious snacks from

Table 17. Number of snacks consumed per day

No. of snacks	Fathers n = 47			Mothers n = 85		
	No.	%	Cum. %	No.	%	Cum. %
0	1	2.1	2.1	1	1.2	1.2
1	10	21.3	23.4	19	22.4	23.5
2	11	23.4	48.8	25	29.4	52.9
3	14	29.8	76.6	22	25.9	78.8
4	2	4.3	80.9	7	8.2	87.1
5	4	8.5	89.4	4	4.7	91.8
6	0	0	89.4	3	3.5	95.3
7	1	2.1	91.5	2	2.4	97.6
10 or more	3	6.3	100.0	2	2.4	100.0
Mean =	3.3			2.8		

Table 18. Scores for selection of 'empty calorie' snack foods[a]

	Snack foods at home					
	Fathers n = 54			Mothers n = 92		
	No.	%	Cum. %	No.	%	Cum. %
Score (6 is best)						
0	2	3.7	3.7	2	2.2	2.2
1	7	13.0	16.7	8	8.7	10.9
2	10	14.8	31.5	9	9.8	20.7
3	14	18.5	50.0	23	25.0	45.7
4	7	25.9	75.9	18	19.6	65.2
5	6	13.0	88.9	20	21.7	87.0
6	1	11.1	100.0	12	13.0	100.0
	Snack foods away from home					
0	5	9.3	9.3	6	6.5	6.5
1	6	11.1	20.4	2	2.2	8.7
2	6	11.1	31.5	12	13.0	21.7
3	13	24.1	55.6	20	21.7	43.5
4	10	18.5	74.1	23	25.0	68.5
5	11	20.4	94.4	19	20.7	89.1
6	3	5.6	100.0	10	10.9	100.0

[a]The six foods were: 1) fried snacks such as potato or corn chips, 2) pop, 3) candy, 4) cookies or cake, 5) rolls, doughnuts, 6) pies, pastry.

Table 19. Scores for selection of 'nutritious' snack foods[a]

	Snack foods at home					
	Fathers n = 54			Mothers n = 92		
	No.	%	Cum. %	No.	%	Cum. %
Score (6 is best)						
0	12	22.2	22.2	4	4.3	4.3
1	7	13.0	35.2	5	5.4	9.8
2	11	20.4	55.6	22	23.9	33.7
3	12	22.2	77.8	19	20.7	54.3
4	10	18.5	96.3	32	34.8	89.1
5	2	3.7	100.0	7	7.6	96.7
6	0	0	100.0	3	3.3	100.0
	Snack foods away from home					
0	38	70.4	70.4	54	58.7	58.7
1	8	14.8	85.2	21	22.8	81.5
2	6	11.1	96.3	8	8.7	90.2
3	1	1.9	98.1	4	4.3	94.6
4	0	0	98.1	5	5.4	100.0
5	1	1.9	100.0	0	0	100.0
6	0	0	100.0	0	0	100.0

[a]The six foods were: 1) fresh fruit, 2) pumpkin or sunflower seeds, 3) yogurt, 4) fruit or vegetable juice, 5) cheese, 6) raw vegetables.

vending machines and snack bars. The scores for "empty calorie" snack foods kept on hand were similar to scores for snacks selected away from home.

Women reported higher scores for snacks kept on hand than did men. Men also selected fewer nutritious snacks and more "empty calorie" snacks away from home than did women.

Mothers in this sample did much of the grocery shopping; however, men participated in food shopping to a significant extent as illustrated in Table 20. Among women, 84.3 percent reported doing almost all of the grocery shopping and 58.0 percent of the men did none. Over one-third of the men did some shopping for food.

Of those fathers and mothers who did one fourth or more of the grocery shopping, the men seemed to place more importance on labels but less on "nutritive value" when making food selections than did women (Table 21). Overall, however, nutritive value was the most important consideration for both men and women.

Table 22 summarizes the frequencies with which the fathers and mothers said they discussed selected topics with their families. Items which more men than women discussed with their families were "foods I like best" and the nutritional and caloric value of foods. The majority of mothers discussed "foods I like," suggested eating foods good for the family, and encouraged the family to try new foods

Table 20. Amount of grocery shopping done by father and mother

	Father n = 50		Mother n = 89	
	No.	%	No.	%
Category				
Almost none	29	58.0	1	1.1
About one fourth	14	28.0	0	0
About one half	6	10.9	1	1.1
About three fourths	0	0	12	13.5
Almost all	1	2.0	75	84.3

Table 21. Frequency of respondents who thought selected items were 'quite' or 'very' important when shopping for food [a]

	Fathers n = 21		Mothers n =	
	No.	%	No.	%
Nutritive value of an item	12	57.1	72	80.0
Amount of nutritive value per dollar spent	12	57.2	56	63.6
Information on nutrition label	7	33.3	40	45.5
List of ingredients on label	11	52.4	43	48.9
Whether or not have supply of food with similar nutritive value	6	28.6	53	60.2

[a]Choices were 'not important', 'somewhat important', 'quite important', or 'very important'.

Table 22. Frequency of respondents who discussed topics 'often' or 'very often' with their families[a]

Topic	Those who discuss often or very often: Fathers n = 53 No.	%	Mothers n = 92 No.	%
I let my family know which foods I like best	37	69.8	46	50.6
I suggest eating foods I think are good for us	14	26.4	69	76.6
I discuss the nutritional value of foods with my family	24	46.2	30	33.0
I discuss the caloric content of foods with my family	24	45.2	26	28.6
I discuss the importance of eating a nutritious combination of foods with my family	6	11.3	31	34.1
My spouse and I discuss ways to encourage our children to eat more nutritious meals and snacks	13	24.5	20	22.2
I encourage my family to try new foods	13	24.5	45	49.5
I help decide what foods to prepare for family meals	7	13.2	90	98.9
I encourage my children to help decide what foods to prepare for family meals	5	9.6	30	33.3

[a]Choices were 'never', 'seldom', 'sometimes', 'often', 'very often'.

often or very often. Overall, women discussed nutrition with their families more often than men. This finding is consistent with the traditionally defined role for women.

Intervening process

The variables in the intervening process were attention, comprehension, and interaction.

Attention Attention to each of the three messages is shown in Table 23. Nearly two-thirds (65.4 percent) of the fathers and 91.3 percent of the mothers read one-half or more of lesson one. Readership dropped for lessons two and three (47 and 45 percent for men and 81 and 76 percent for women). Women paid more attention than men to all three lessons. About three-fourths of the women read all three lessons while fewer than one-half of the fathers read all three lessons. Although readership declined as the program continued, it was much better, especially for fathers, than in a previous study; earlier, readership had dropped to 20 percent for men and 67 percent for women (Gillespie et al., 1976).

Comprehension Actual comprehension of messages, i.e., whether or not the receivers understood the same meaning intended by the sender, was not measured. However, receivers were asked how difficult they felt each lesson was. Table 24 illustrates the receiver's perceived difficulty of the lesson materials.

Table 23. Attention to messages

	Lesson 1			Lesson 2			Lesson 3		
	No.	%	Cum. %	No.	%	Cum. %	No.	%	Cum. %
Fathers									
Amount read		n = 52			n = 53			n = 53	
All	16	30.8	30.8	8	15.1	15.1	10	18.9	18.9
Most	12	23.1	53.8	10	18.9	34.0	6	11.3	30.2
Half	6	11.5	65.4	7	13.2	47.2	8	15.1	45.3
Little	18	15.4	80.8	9	17.0	64.2	4	7.5	52.8
None	9	17.3	98.1	19	35.8	100.0	24	45.3	98.1
Don't remember receiving	1	1.9	100.0	2			1	1.9	100.0
Mothers									
		n = 89			n = 89			n = 90	
All	56	60.9	60.9	41	46.1	46.1	45	50.0	50.0
Most	26	28.3	89.1	27	30.3	76.4	18	20.0	70.0
Half	2	2.2	91.3	4	4.5	80.9	5	5.6	75.6
Little	7	7.6	98.9	7	7.9	88.8	6	6.7	82.2
None	0	0	98.9	9	10.1	98.9	15	6.7	98.9
Don't remember receiving	1	1.1	100.0	1	1.1	100.0	1	1.1	100.0

Table 24. Respondents' perception of difficulty of lessons

	Lesson 1			Lesson 2 (Nutrient Guide)			Lesson 3		
	No.	%	Cum. %	No.	%	Cum. %	No.	%	Cum. %
				Fathers					
Category		n = 41			n = 29			n = 28	
Very easy	5	12.2	12.2	2	6.9	6.9	4	14.3	14.3
Easy	22	53.7	65.9	7	24.1	31.0	10	35.7	50.0
Average	13	31.7	97.6	16	55.2	86.2	13	46.4	96.4
Difficult	1	2.4	100.0	3	10.3	96.6	1	3.6	100.0
Very difficult	0	0	100.0	1	3.4	100.0	0	0	100.0
				Mothers					
		n = 91			n = 78			n = 74	
Very easy	22	24.2	24.2	13	16.7	16.7	29	39.2	39.2
Easy	40	44.0	68.1	28	35.9	52.6	25	33.8	73.0
Average	24	26.4	94.5	33	42.3	94.9	18	24.3	97.3
Difficult	4	4.4	98.9	3	3.8	98.7	1	1.4	98.6
Very difficult	1	1.1	100.0	1	1.3	100.0	1	1.4	100.0

About two-thirds of both the fathers and mothers thought that lesson one was easy or very easy to understand. About one-third of the men and one-half of the women thought lesson two was easy or very easy. For lesson three, about one-half of the fathers and three-fourths of the mothers thought it was easy or very easy to understand. Although lesson two was rated the most difficult of the three, only 13.8 percent of the men and 5.1 percent of the women thought it was difficult or very difficult. Fewer than 10 percent of either men or women thought lessons one and three were difficult. In general, then, participants felt that the messages were well within their ability to comprehend.

Interaction Interaction included interaction within the family as well as interaction between the family and the nutritionist. Material in lesson one was discussed by 81.3 percent (74) of the families (as reported by the mothers). Forty-six percent (42) of the families discussed the information in lesson two and 40.0 percent (36) discussed the information in lesson three.

The number of families who discussed was higher than that in a similar nutrition communication program (Gillespie et al., 1976) even though the earlier program included structured exercises for family discussion. Sixty percent of the families discussed the first lesson but only 12 percent discussed the last one. The improved quality of the lessons

themselves may have been more important than the structured exercises for encouraging family discussion. Attention was better in the present study and may account for the increased family discussion. Table 25 summarizes the number of families who discussed specific topics after receiving each message. Dietary analyses and the "foods the family eats" were discussed by the majority of families who talked about lesson one. Over one-half of the respondents also discussed the Nutrient Guide and snacks from lesson two. From lesson three, the most discussed topics were weight control and changing the family's diet.

Families were encouraged to complete and return a special feedback form sent with each lesson if they had questions or comments for the nutritionist. Table 26 tabulates these responses. Half the families elected this feedback channel for lesson one. Fewer families returned questions or comments after receiving lessons two and three than after receiving lesson one.

Respondents were also asked their opinion of the program's feedback option. More than one-half of the fathers (52.7 percent) and 88.5 percent of the mothers responded favorably to it. Comments were "excellent," "good," "liked it," "very useful and helpful," "liked personal answers," "good feedback from nutritionist," etc. Some responded that they "didn't use it". One person out of 110 did not like it.

Table 25. Lesson topics discussed by families

	No.	%
Lesson one	n = 73[a]	
1. Your computer diet analysis printouts	56	76.7
2. The foods your family eats	41	56.2
3. Changing your family's diet	24	32.9
4. Trying new or different foods	24	32.9
5. Taking vitamins or mineral supplements	21	28.8
6. Recommended dietary allowances	21	28.8
7. Functions of vitamins or minerals	9	12.3
8. Sources of vitamins or minerals	19	26.0
9. Food fads	15	20.5
10. Other	7	9.6
Lesson two	n = 43	
1. The Nutrient Guide	23	53.5
2. Whether to fill out the worksheets	10	23.3
3. How to fill out the personal worksheets	14	32.6
4. What you found when you filled out the personal worksheets	14	32.6
5. The foods your family eats	20	46.5
6. Changing your family's diet	14	32.6
7. Trying new or different foods	13	30.2
8. Nutrient needs of family members	14	32.6
9. Functions of vitamins or protein	8	18.6
10. Sources of vitamins or protein	10	23.3
11. Snacks	22	51.2
12. Ingredient or nutrition labels	10	23.3
Lesson three	n = 36	
1. Changing your family's diet	20	55.6
2. Fat (saturated/unsaturated)	7	19.4
3. Carbohydrates	11	30.6
4. Cholesterol	10	27.8
5. Heart disease	13	36.1
6. Weight control	29	80.6
7. Additives	12	33.3

[a]Some families did not discuss any topics.

Table 26. Feedback sheets returned

	n = 93 No.	Families %
Lesson 1	54	59.1
Lesson 2 (Nutrient Guide)	26	30.0
Lesson 3	17	18.3

When feedback was required in order to participate in a nutrition communication program (Gilliespie, 1975), the number of families who sent feedback was not much different from the present study. The feedback rate from those who received four program messages was 52 percent for the first, 22 percent for the second, 10 percent for the third and 6 percent for the fourth. These data suggest that requiring feedback for continuation in the program did not increase the number of families who sent it. Although other factors such as differences in the lesson content and treatment may have affected feedback, the data tend to support the decision not to require feedback. As in the previous study, more participants read and discussed the lessons than returned feedback.

Program outcomes

Outcomes include cognitive, affective, and behavioral changes.

Cognitive changes The first hypothesis was "After participating in the intervention program, the receivers will have a better knowledge of nutrition." Data on scales A and C for nutrition knowledge supported this hypothesis (Table 27). The mean posttest scores increased from 8.46 to 9.04 for scale A and 0.38 to 0.52 for scale C. Both changes were significant ($p<0.001$). Scores of 0.68 and 0.70 for scale B were not different. Items in scale B dealt with quite spe-

Table 27. Change in nutrition knowledge scores from pretest to posttest

	N	Pretest Mean	Pretest S.D.	Posttest Mean	Posttest S.D.	Significance level (T-test)
Nutrition knowledge Scale A	141	8.46	1.84	9.04	1.86	0.000
Nutrition knowledge Scale B	147	.68	.25	.70	.27	0.482
Nutrition knowledge Scale C	136	.38	.25	.52	.27	0.000

cific knowledge about nutrients in bread, whereas the other two scales included several different content areas.

The question about nutrients in bread required an application of information on nutrient composition. The lessons did not specifically discuss bread and its nutrient composition. To answer this question correctly, the respondent had to apply several concepts from the nutrition messages. For instance, the participant would need to remember that bread was on the IRON+B-VIT list, remember names of the B vitamins, classify bread as a better source of carbohydrate than fat, and apply the concept that fat is a more concentrated source of energy than carbohydrate. That bread is a good source of several nutrients is also a concept which runs counter to the widely held opinion that bread is mostly a source of energy. One short program might not be expected to overcome "conventional wisdom" and move respondents to application of new concepts relating to bread. The fact that scores improved for the other two knowledge scales is encouraging.

In a previcus nutrition communication program no measurable differences in nutrition knowledge were observed when participants were compared to a control group which had received no program materials (Gillespie et al., 1976). For the second study, improvements had been made in the communication program and there were also measurement differences. In the first study, posttest scores were compared with con-

trol group scores at the same point in time instead of with pretest scores; the posttest was conducted about one year after the program had ended and any immediate knowledge gained could have been fleeting. The test itself was improved so that measurement may have been better in the present study. The most likely explanation, however, is that fewer receivers read and discussed the lessons in the previous study than in the present one. The treatment of the concepts in the twc programs differed considerably and the increased attention and improved knowledge may have been due to the improved treatment.

Affective changes Value placed on health was examined because Yetley (1974) found that higher ranking of health goals was related to higher quality of diets. Hypothesis 2 "After participating in the intervention program, the receivers will place a greater value on health and nutrition goals when compared with economic and health goals" was not supported. Instead, the value participants placed on health goals relative to economic and social goals was the same on both pre and posttests (Table 28). The ranking of the single goal "improve or maintain the quality of my diet" also did not differ.

These findings are contrary to those of an earlier study (Gillespie et al., 1976). When a control group (randomly selected, no treatment) was compared with an experimental group

Table 28. Change in value of health and nutrition goals from pretest to posttest

	Pretest		Posttest		Significance level (T-test)
	Mean	S.D.	Mean	S.D.	
			Fathers		
Composite health goal score	5.77	2.06	6.20	1.95	0.194
Improve quality of diet	5.92	3.24	6.52	2.69	0.182
			Mothers		
Composite health goal score	7.21	2.10	7.21	2.01	0.965
Improve quality of diet	8.73	2.82	8.73	2.70	1.000

(received nutrition communication program), those in the program had ranked health goals significantly higher than those in the control group. Because the treatment, and to some extent the content, of the messages had been extensively revised for the second study, the difference in effect on salience of health goals might have been due to a difference in the program messages. Women in this sample ranked health goals as high before the program as women in the previous study did after the program. If the increased salience in the previous study was due to an increase in exposure to nutrition information, it is possible that women in the present study had already increased their health valuation due to exposure from other sources (e.g. publicity about dietary goals) and thus a further increase was not observed after the program.

Behavioral changes In contrast to the majority of nutrition education programs, the data indicated that behavior had changed significantly after the program was completed. Table 29 summarizes behaviors related to selection and consumption of foods. Hypothesis 3.1 "After participating in the intervention program, the receivers will select more nutritious snack foods" was supported by three of four measures related to snack foods. There was a significant increase (2.8 to 3.0) in the number of "nutritious" snack foods and a decrease in the number of "empty calorie" snack

Table 29. Changes in behavior from pretest to posttest

	N	Pretest Mean	Pretest S.D.	Posttest Mean	Posttest S.D.	Significance level (T-test)
Selection of:						
'Empty calorie' snack foods at home	146	3.55	1.60	3.95	1.58	0.002
'Nutritious' snack foods at home	146	2.75	1.49	2.98	1.48	0.064
'Empty calorie' snack foods away from home	146	3.66	1.68	3.45	1.64	0.166
'Nutritious' snack foods away from home	146	0.66	1.08	.96	1.33	0.008
Frequency of consumption of:						
selected vegetables	139	0.58	0.58	0.63	0.53	0.264
selected high sugar foods	140	3.53	2.96	3.51	3.57	0.910
vitamin & mineral supplement	140	2.51	4.20	1.97	4.11	0.121
Family discussion about food & nutrition	140	2.12	.69	2.21	.74	0.018
Decision-making regarding food shopping	98	1.76	.74	1.92	.68	0.022

foods (score increased from 3.6 to 4.0)[1] kept on hand for snacks (Table 29). The number of "nutritious" snacks eaten away from home also increased significantly (0.66 to 0.96). The number of "empty calorie" snacks selected away from home did not change.

Further support for hypothesis 3.1 was found in comments received in answer to an open ended question about changes noted in the family's diet. Respondents said they ate: "more nutritious snacks," "less candy," "less junk food," "different types of snacks," "more fruits and vegetables for snacks," and "fewer high-sugar foods" after the program than before. Some also reported that more nutritious snacks were kept on hand, that they regulated children's snacks and that snacks were better planned than before.

Hypothesis 3.2 "After participating in the intervention program, the receivers will eat selected vegetables[2] more frequently" was not supported. Nor was there empirical support for hypothesis 3.3 "After participating in the program,

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[1]The more of the "nutritious" snack foods selected, the higher the score; the fewer number of "empty calorie" foods selected, the higher the score.

[2]Carrots, squash, sweet potatoes or pumpkin, broccoli, dark leafy greens, brussels sprouts, cabbage.

the receivers will eat selected high-sugar foods[1] less frequently." In neither case did the posttest score differ from the pretest score (Table 29).

Several families reported discontinuing the use of vitamin and mineral supplements. The mean score for frequency of consumption of supplements was lower on the posttest than the pretest but the difference was not signficiant ($p=0.12$). Thus, hypothesis 3.4 "After participating in the intervention program, receivers will be less likely to consume vitamin and mineral supplements" was not supported by the frequency data.

Hypothesis 4 "After participating in the intervention program, receivers will more often discuss nutrition and food practices with their families" was supported. There was a significant increase in discussion of topics within families after the program. The composite mean score for family discussion based on eight items in the questionnaire changed from 2.12 to 2.21 ($p<0.05$;Table 29).

In addition to measuring specific behavior changes, respondents were asked an open ended question about changes they had made in their own diets and that they had observed in their family's meals and snacks as a result of the pro-

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[1]Pie, cake, cookies, baked dessert; candy; sugar, syrup, honey, jam, jelly, marmalade, preserves, apple butter; regular pop (not diet) or koolaid; sweet roll or donut.

gram. Twenty-two percent of the men (lesson 2) and 48 percent of the women (lesson one) reported that they had made personal changes in their diet as a result of at least one of the lessons (Table 30). One-third of the fathers and almost one-half of the mothers believed that their family's diet had changed also. The following changes were given as examples: increased variety of foods; ate more nutritious foods, broccoli and brussel sprouts, fruits and vegetables, high fiber food; and decreased the amount of food, energy intake, fat intake, and amount of candy and cookies; selected different snacks; and cut out vitamin and mineral supplements. These changes were consistent with program goals.

New foods were eaten by 21.8 percent (12) of the fathers and 25.0 percent (23) of the mothers. The new foods included vegetables[1], fresh fruits, desserts, lentils, and high fiber foods.

Relationship Between Intervening Process and Program Outcomes

General hypotheses 5, 6 and 7 deal with relationships between variables of the intervening process and the outcome variables. The general proposition tested was: "The intervening process is related to the outcomes of the pro-

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[1]During the program, families requested recipes for preparing vegtables such as broccoli, brussels sprouts, squash and greens and general methods for cooking vegetables.

Table 30. Reported changes in diet due to lessons

	Fathers			Mothers		
	n	No.	%	n	No.	%
Lesson 1						
Personal change	53	11	20.8	90	43	47.8
Family change	54	18	33.3	92	48	52.2
Lesson 2 (Nutrient Guide)						
Personal change	54	12	22.2	92	37	40.2
Family change	53	17	32.1	92	42	45.7
Lesson 3						
Personal change	53	11	20.8	88	29	33.0
Family change	53	14	26.4	90	35	38.9

gram." Zero-order correlation coefficients were calculated[1] to test relationships between attention, discussion of the messages, or general discussion of nutrition and knowledge, goals, and food selection. A zero-order correlation coefficient (r) indicates whether or not a relationship exists between a change in the dependent variable (Y) and a change in an independent variable (X). The sign of the coefficient indicates the direction of the relationship. A perfect positive correlation would have a coefficient of 1.000 while -1.000 would be a perfect negative correlation. The square of the correlation coefficient (r^2) measures the amount of the variation in the dependent variable that is accounted for by the independent variable. For example, a correlation coefficient of 0.200 indicates that 4 percent of the variation in Y is due to changes in X. Correlation coefficients for intervening process variables with outcome variables are given in Table 31. Significance was accepted at p=0.10.

Hypothesis 5.1 "The greater the receivers' attention to the messages, the better will be their nutrition knowledge after the program" was supported for only one of the three measures of nutrition knowledge, scale A. This correlation was very weak since change in the independent variable ex-

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[1]Subprogram Pearson Correlation of the Statistical Package for the Social Sciences was used.

Table 31. Zero-order correlation coefficients for intervening process variables with output variables

Output	Intervening process		
	Attention	Message discussion	Discussion of nutrition
Nutrition knowledge A	.112	N.S.	.213*
Nutrition knowledge B	N.S.	N.S.	.276***
Nutrition knowledge C	N.S.	.149*	.170**
Health goals	.273***	N.S.	.278***
Snack foods:			
Empty calorie - home	.215**	.222**	N.S.
Nutritious - home	.333***	.148*	.272***
Empty calorie - away	.148*	N.S.	N.S.
Nutritious - away	.208**	.148*	N.S.
Frequency of consumption:			
Vegetables	.160**	N.S.	.106
High sugar foods	-.218*[a]	-.123[a]	-.253***
Vitamin & mineral supplements	.135[a]	.132[a]	N.S.
Shopping decision-making	N.S.	N.S.	.541***
Discussion of nutrition	.313***	N.S.	

[a] = Opposite direction hypothesized.

*Significant at least at .05.

**Significant at least at .01.

***Significant at least at .001.

N.S. = not significant at least at .10.

plained only 1.2 precent (r^2) of the variation in the dependent variable.

There was a very significant ($p<0.001$) positive correlation (0.273) between attention and the value placed on health. Hypothesis 5.2 "The greater the receivers' attention to the messages, the higher the value they will place on health goals after the program" was supported, therefore. Hypothesis 5.3 "The greater the receivers' attention to the messages, the more nutritious their food practices will be" was partially supported. The score for decision-making when shopping for family foods was not related to attention nor to discussion of messages while the relationship between attention and frequency with which vitamin and mineral supplements were consumed was contrary to that hypothesized. Even though the program specifically attempted to discourage vitamin and mineral supplements, it appeared that those who read and discussed the messages took more supplements. Perhaps by increasing their awareness of nutrition and the need for vitamins and minerals, the nutrition communication program encouraged participants to use supplements. No findings suggesting this possibility were found in the literature, but an old saying, "A little knowledge is a dangerous thing," may apply. Certainly this observation deserves emphasis in evaluating other educational programs. Perhaps this weak relationship is due to other independent variables, e.g. previous

behavior regarding supplements might influence both attention and consumption of supplements after the program. In any case, the following two sub-hypotheses, then, were not supported:

H. 5.3.4 The greater the receivers' attention to the messages, the less frequently they will take vitamin and mineral supplements.

H. 5.3.5 The greater the receivers' attention to the messages, the better will be their decision-making when selecting family foods.

These sub-hypotheses, however, were supported:

H. 5.3.1 The greater the receivers' attention to the messages, the more nutritious will be the snacks they select.

H. 5.3.2 The greater the receivers' attention to the messages, the more frequently they will eat selected vegetables.

H. 5.3.3 The greater the receivers' attention to the messages, the less frequently they will eat high-sugar foods.

All four of the measures for quality of snack foods were significantly related to attention. Zero-order correlation coefficients ranged from 0.148 to 0.333. That is, the more attention paid to the lessons, the more nutritious snack foods and the fewer "empty calorie" foods were selected. The correlation coefficient between attention and frequency of vegetable consumption was 0.160 ($p<0.05$) indicating that those who read more of the messages ate selected vegetables more frequently after the program. Those who read more of the messages selected significantly fewer high-sugar foods

($r=C.218, p<0.05$). Overall, attention to the programs was related to improved nutritional behavior after the program.

Discussion of the messages was not related consistently to outcomes (Table 31). Only scale C for nutrition knowledge was correlated with it. Thus, hypothesis 6.1 "The more the receivers discuss the messages, the better will be their nutrition knowledge" was supported only weakly. The amount of discussion was not related to the value placed on health.

Discussion of messages was related to three of the four measures of snacking behavior. Thus hypothesis 6.3.1 "The more the receivers discuss the messages, the more nutritious snacks they will select" was partially supported. No relationship was found between discussion and either the frequency of vegetable consumption or the food shopping decision-making score. The weak relationship to frequency of sugar intake was in the direction hypothesized; on the other hand, the weak relationship with consumption of vitamin and mineral supplements was contrary to that hypothesized. Therefore, the following sub-hypotheses under hypotheses 6.3 were not supported:

H. 6.3.2 The more the receivers discuss the messages, the more frequently they will eat selected vegetables.

H. 6.3.4 The more the receivers discuss the messages, the less frequently they will take vitamin and mineral supplements.

H. 6.3.5 The more the receivers discuss the messages, the better will be their decision-making when selecting foods for the family.

Relationships between discussion and outcomes was found in an earlier study of a nutrition intervention program (Gillespie et al., 1976). Whether or not families discussed the program message which included their dietary analyses was significantly related to cognitive acceptance and to reported changes in diets due to the program. As in the current study, however, discussion was not related to affective acceptance/rejection, i.e., value placed on health status.

Hypothesis 7.1 "The more the receiver discusses nutrition and food practices with his/her family, the better will be his/her nutrition knowledge" was supported by all three measures of nutrition knowledge.

There was also a significant and moderately high correlation ($r=0.278, p<0.001$) between discussion of general nutrition topics and the value placed on health. Hypothesis 7.2 "The more the receiver discusses nutrition and food practices with his/her family, the higher value s/he will place on health goals" was supported by this relationship. Although discussion of the messages themselves did not relate to health goals either in the present study or the previous study (Gillespie et al., 1976), the amount of family discus-

sion in general about food and nutrition did.

Only one of the measures of snacking behavior was related to discussion of food and nutrition topics. Therefore, sub-hypothesis 7.3.1 was only partially supported. There was a weak but significant relationship as hypothesized between general nutrition discussion and frequency of consumption of selected vegetables ($r=0.106, p<0.10$). Discussion of nutrition and food practices was correlated negatively with consumption of selected high-sugar foods ($r=0.255$, $p<0.001$) but not correlated with frequency of intake of vitamin and mineral supplements. Discussion of general nutrition topics was highly correlated with decision-making while shopping for food ($r=0.541, p<0.001$).

To summarize, hypothesis 7.3.4 "The more the receiver discusses food and nutrition topics with his/her family, the less frequently they will take vitamin and mineral supplements" was not supported, but the data did support the following:

H. 7.3.3 The more the receiver discusses food and nutrition topics with his/her family, the less frequently they will eat high-sugar foods.

H. 7.3.5 The more the receiver discusses food and nutrition topics with his/her family, the better will be their food shopping decision-making.

Overall, variables in the intervening process were related to outcome variables, but in many instances, the relationship was weak.

Zero-order correlations assume that no other variables are intervening in the relationship between two variables, and this assumption, of course, is not necessarily true. Therefore, there may be other independent variables that explain part or even most of the effects just described. The path analysis discussed in the following section takes into account intervening variables.

Model Analysis

The zero-order correlations discussed in the previous section are measures of the overall effects of an independent variable (X) on a dependent variable (Y). These effects may be either indirect or direct. In addition, independent variables may be interrelated; therefore, potential interrelationships must be controlled for so that unique or "direct" effects of each independent variable can be examined. Path analysis of a network model was used to separate direct from indirect effects.

The path analysis technique

Network model and path analysis are applications and expansions of multivariate regression analysis. Multivariate regression analysis controls for covariation (interrelationships) of the several independent variables and thus determines the unique contribution of each independent variable.

Path analysis allows analysis of the sequence as well. By setting up an ordering of variables, not only are the pre-

dictors of the ultimate dependent variables considered, but also the interrelationships among the predictors can be delineated. As Yarbrough et al., (1970) have stated, "It (network analysis) seeks explanations not only of the causes of an ultimate phenomena, but causes of the causes." Thus path analysis parallels the hypotheses implicit in the theoretical communication model under study. The hypothetical relationships were tested with data by use of path analysis techniques.

Essentially, multivariate analysis measures the effect of a given independent variable after the effects of the other independent variables are taken out or controlled for (partial regression coefficient=b). The standardized partial regression coefficient, beta, is called a path coefficient. R is a measure of the amount of the variation in the dependent variable that is explained by the independent variables in the model. For example, if R^2=0.300, 30 percent of the variation in Y is explained by variables in the model. The other 70 percent is due to variation not in the model.

Path analysis is particularly appropriate for analyzing the current data because the unique contribution of each dependent variable is of interest and also because there is an implied ordering of variables based on the communication model and on the sequence of events. For example, according to the model, the intervening process variables such as

family discussion of the lessons clearly precede the outcomes such as post knowledge scores. The model is set up according to the sequence of events. In other words, discussion of the lesson is hypothesized to affect posttest nutrition knowledge and not the opposite, that the posttest nutrition knowledge scores affected discussion of the lessons. The model used in this analysis is block recursive rather than completely recursive. Variables were categorized into blocks based on components of the Nutrition Communication Model. The regression was done on variables between blocks but not within blocks. Stepwise regression was used so that only variables with significant betas were included in each model.

The theoretical model

Based on the theoretical communication model developed in Chapter III, the general network model includes three conceptual areas which may influence outcomes, personal status-roles, mental dispositions, and intervening process as shown in Figure 9. General discussion of nutrition and food practices with family members is an outcome variable which was hypothesized to affect other outcome variables as represented in Figure 9. Three general hypotheses are illustrated by the theoretical model:

G.H. 8: Personal status-roles are related to outcome directly and also indirectly through intervening process and mental dispositions.

G.H. 9: Mental dispositions are related to output directly and also indirectly through the

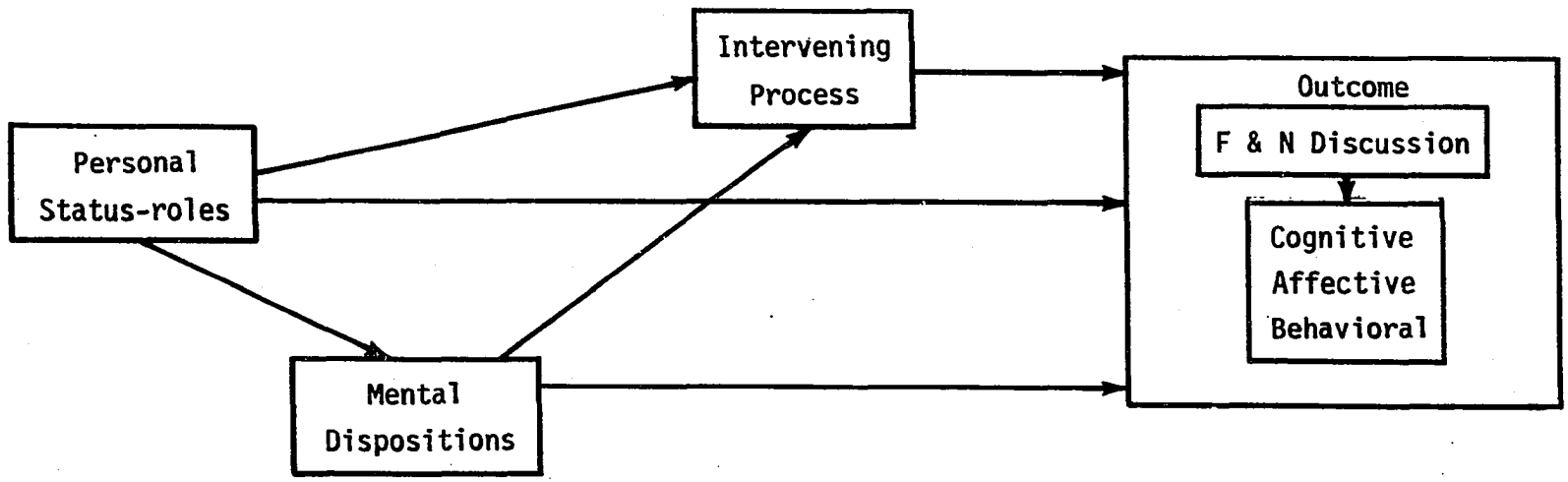

Figure 9. Theoretical model

intervening process.

G.H. 10: Intervening process is related to outcome directly only.

Each of the three conceptual areas were further specified in terms of empirical variables. The variables within the area of personal status-roles were sex, age, and education. Fifteen variables were included in mental dispositions: three scales of nutrition knowledge, health goals, discussion of nutrition and food practices with the family, "empty calorie" snack selection at home, "nutritious" snack selection at home, "empty calorie" snack selection when away from home, "nutritious" snack food selection away from home, frequency of consumption of high-sugar foods, frequency of consumption of vegetables, frequency of consumption of vitamin and mineral supplements, decision-making when shopping for food, dietary score (based on Recommended Dietary Allowances for six nutrients), and percent of ideal weight. Attention to the messages, perceived difficulty of the messages, and discussion of messages were intervening process variables.

Findings from Network Analysis

Some of the hypothesized relationships in the network model were supported, but some were not. A model was created and analyzed for each of the following outcome variables because they were significantly different after the nutrition program: family discussion of food and nutrition, knowledge

scales A and C, "empty calorie" and "nutritious" snack foods selected at home, "nutritious" snack foods selected away from home, and decision-making regarding food shopping. Frequency of consumption of vitamin and mineral supplements was also considered. Because the same variables measuring personal status-roles, mental dispositions and intervening processes were included in each model, the interrelationships among them were the same for each model. These relationships are presented in Figure 10.

The mental dispositional variables were not predicted well by the model (Figure 10). It explained 25 percent or more for only two of the variables, i.e., previous discussion of nutrition and food practices with the family and dietary score from analysis of the dietary history (Table 32). These variables were primarily predicted by sex (β=0.573 and -0.486 respectively). Age of participants was positively related only to health goals and to "empty calorie" snacks away from home. Those who were older (within the range of 19 to 51 years) rated health goal higher (β=0.304) and selected fewer "empty calorie" snack foods when away from home (β=0.322). Educational achievement predicted all three of the nutrition knowledge variables (β=0.205, 0.181 and 0.217). These findings confirmed Yetley's (1974) causal model which showed that years of education predicted nutrition knowledge for both husbands (β=0.433) and wives (β=0.427). Education was

Figure 10. Model for discussion of nutrition and food practices

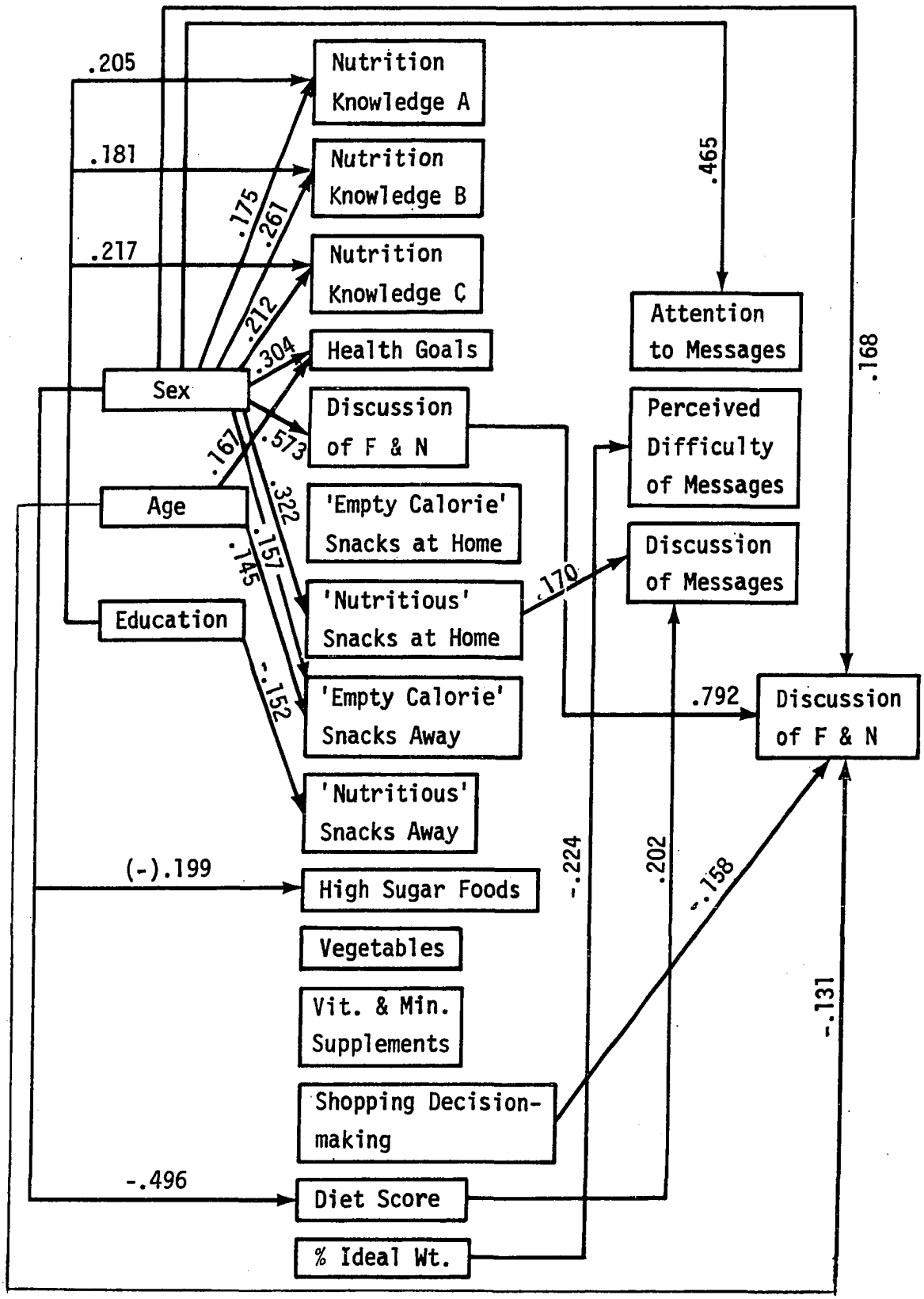
.205
.181
.217
Nutrition Knowledge A
Nutrition Knowledge B
Nutrition Knowledge C
Health Goals
Sex
Discussion of F & N
Age
'Empty Calorie' Snacks at Home
'Nutritious' Snacks at Home
Education
'Empty Calorie' Snacks Away
'Nutritious' Snacks Away
(-).199
High Sugar Foods
Vegetables
Vit. & Min. Supplements
Shopping Decision-making
-.496
Diet Score
% Ideal Wt.
Attention to Messages
Perceived Difficulty of Messages
Discussion of Messages
Discussion of F & N
.465
.168
.175
.261
.212
.304
.167
.513
.322
.157
.145
.170
-.152
.792
-.224
.202
-.158
-.131

Table 32. Percent of variance explained by variables in the model

Variables	% variation explained
Outcome	
Discussion of F & N	71.7
Nutrition knowledge A	40.4
Nutrition knowledge C	46.5
'Empty calorie' snacks at home	36.9
'Nutritious' snacks at home	32.0
'Nutritious' snacks away	26.7
Shopping decision-making	55.6
Intervening process	
Attention to messages	21.6
Perceived difficulty	5.0
Discussion of messages	6.2
Mental dispositions	
Nutrition knowledge A	6.8
Nutrition knowledge B	9.5
Nutrition knowledge C	8.6
Health goals	10.8
Discussion of F & N	32.8
'Empty calorie' snacks at home	0
'Nutritious' snacks at home	10.4
'Empty calorie' snacks away	4.0
'Nutritious' snacks away	2.3
Frequency high sugar foods	3.9
Frequency vegetables	0
Frequency supplements	0
Shopping decision-making	0
Diet score	24.6
Percent ideal weight	0

negatively related to "nutritious" snack foods selected away from home (β=-0.152).

Sex was related to a number of the mental dispositions. Men ate high-sugar foods more frequently and had better diets than women, whereas women scored higher on all three nutrition knowledge scales than did men, rated health goals higher, discussed nutrition and food practices with their family more often, made better selections of "nutritious" snack foods at home and "empty calorie" snack foods away from home. These findings are consistent with the traditional sex roles of mothers as food preparers with responsibility for family nutrition.

Yetley (1974) found that men ate "empty calorie" foods more frequently than women. As a group, men's diets based on nutrient analyses tended to be better than women's diets in two earlier studies in Iowa (Yetley, 1974; Gillespie, 1975). Because most men have higher caloric needs in relation to nutrient needs than women, they do not have to select foods as carefully to obtain needed nutrients and yet not consume excess energy.

Much of the variation in the mental dispositional variables was unexplained by the model (Figure 10 and Table 32). Factors other than age and education, therefore, must be important influences. One exception, 33 percent of variation in discussion of nutrition and food practices, was explained

by sex.

Attention to the messages was not related to any of the mental disposition variables as hypothesized based on predispositional theory. Predisposition theory suggests that those who are already behaving in the desired manner, and thus do not need the communication program, are those most likely to attend to it. Applied to the present nutrition program, those who already had better knowledge of nutrition, placed a higher value on health, and had good food practices would be those most likely to participate. This dilemma appears to have been avoided in this program. Sex was the only personal status-role variable which predicted attention, i.e., mothers attended to messages more than fathers. The model accounted for 22 percent of the variation in attention to messages (Table 32). Not only do mothers have traditional roles as food preparers, but also, nutrition communications have been designed primarily for women. Men consequently have not developed the habit of attending to messages about nutrition and foods.

The only mental dispositional variable which was related to perceived difficulty of the messages was weight status. The higher the percent ideal weight, the less difficult s/he perceived the lessons to be. No theoretical explanation is readily available for this observed effect. Perhaps an unidentified variable or variables was intervening. No

status-role variables were related either directly or indirectly to perceived difficulty. Consequently the model explained only five percent of the variation in this variable. A positive finding was that the lessons did not seem more difficult to those who had less knowledge before the program, i.e. those who could have benefited most from the information, than to those who knew more about nutrition before participating in the program.

Only six percent of the variation in discussion of the messages was explained by the model. Dietary adequacy (based on intake of six key nutrients) and selection of "nutritious" snack foods at home influenced discussion of messages directly.

Those who had better diets and those who made better snack food selections were more likely to discuss the information in the program messages. For these two measures, then, those who already were disposed to select more nearly nutritionally adequate diets were more likely to discuss the messages. Sex affected discussion of messages indirectly through "nutritious" snacks at home and through dietary score. In the first case, women were more likely to select "nutritious" snack foods and those who selected more "nutritious" snack foods were more likely to discuss the messages. In the second case, men had better dietary scores and those with better dietary scores were more likely to discuss.

Because the relationships just discussed would be included in each model for all the outcome variables, only those variables with significant direct or indirect paths to the outcome variable are illustrated and discussed.

Participation in family discussion about food and nutrition was hypothesized to be affected by variables in the intervening processes as well as by personal status-role variables and mental dispositional variables. None of the identified variables in the intervening process affected discussion of nutrition and food practices. Although 72 percent of its variation was explained by the model, most of it was explained by discussion of nutrition and food practices prior to the program. Age had a direct, negative effect, i.e., those who were younger were more likely to discuss nutrition and food practices with their families. Discussion of nutrition and food practices with the family was also hypothesized to affect the other outcome variables. However, it predicted only decision-making when shopping for food. In this case, it was a quite strong predictor (β=0.794).

The model in Figure 11 depicts a rather interesting set of relationships between decision-making when shopping for food and discussion of nutrition and food practices with the family. Previous decision-making when shopping for food had a strong positive affect on decision-making when shopping for food after the program. However, it had a negative affect

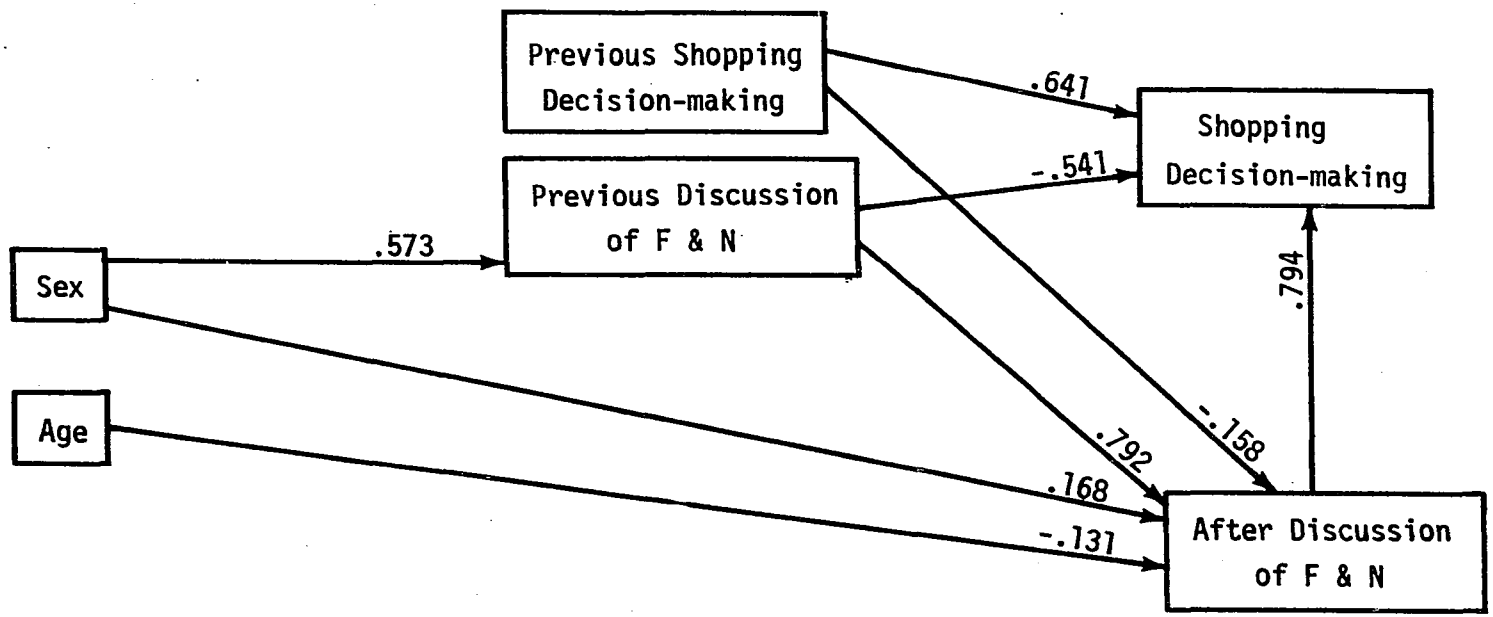

Figure 11. Model for decision-making when shopping for food. (Includes only those variables with significant direct or indirect paths to shopping decision-making.

through discussion of nutrition and food practices with the family after the program. On the other hand, previous discussion of nutrition and food practices with the family had a fairly strong negative direct affect on decision-making when shopping for food but a strong positive indirect affect through discussion of nutrition and food practices with the family after the program. Zero-order correlations were positive between each of the other three variables and decision-making when shopping for food after the program (previous decision-making when shopping for food, r=0.57; previous discussion of nutrition and food practices with the family, r=0.45; after discussion of nutrition and food practices with the family, r=0.54). Age and sex predicted decision-making when shopping for food indirectly. Sex had a mixed indirect effect as illustrated in Figure 11.

The two measures of nutrition knowledge analyzed were scales A and C. It was hypothesized that all variables would have a direct effect. Previous knowledge of items in scale A, age and educational achievement had direct effects while sex indirecly affected nutrition knowledge as measured by scale A in the posttest (see Figure 12).

Knowledge measured by scale C was not directly affected by any personal status-role variables (see Figure 13). Four mental dispositional variables were directly related to nutritional knowledge, scale C. They were previous nutrition

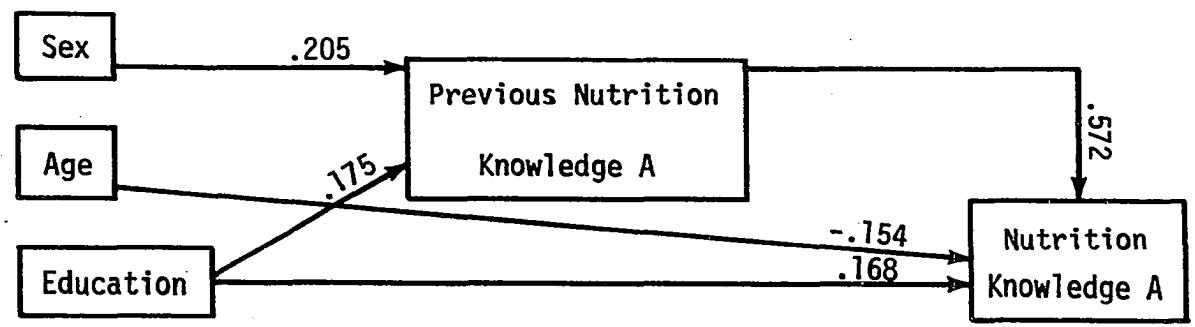

Figure 12. Model for nutrition knowledge, scale A (Includes only those variables with significant direct or indirect paths to nutrition knowledge, scale A.)

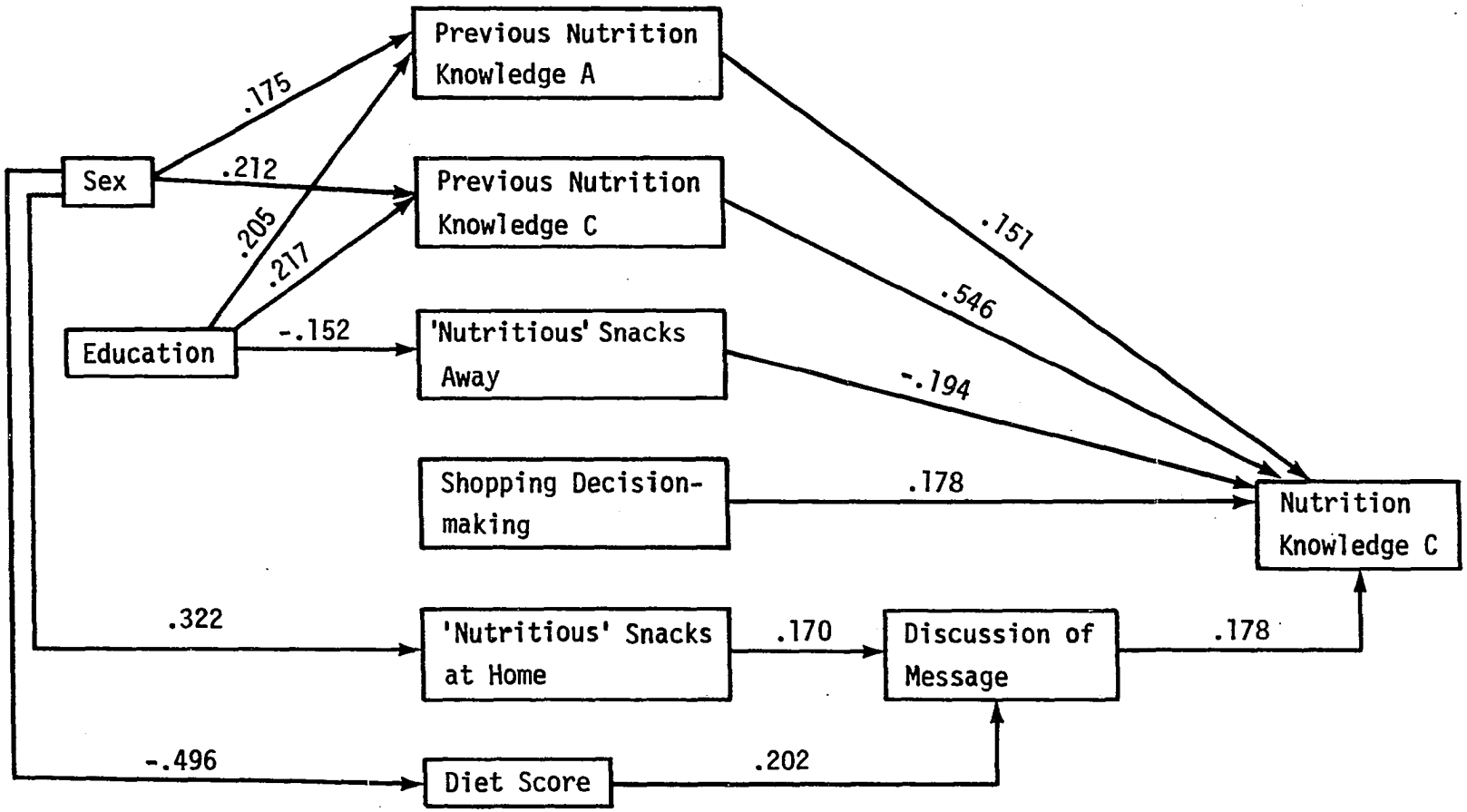

Figure 13. Model for nutrition knowledge, scale C (Includes only those variables with significant direct or indirect paths to nutrition knowledge, scale C.)

knowledge, scale C (β=0.546) decision-making when shopping for food (β=0.178), previous knowledge, scale A (β=0.157) and "nutritious" snacks away from home (β=-0.194). Discussion of the messages was the only intervening process variable affecting nutrition knowledge, scale C (β=0.178). Two dispositional variables, "nutritious" snack selection at home and dietary score, had indirect positive effects. Sex and education had indirect effects through several disposition variables.

Three measures of snacking behavior were considered as dependent variables (Figures 14, 15, and 16). All three snack variables were directly influenced by the same behavior previous to the intervention program and also by previous "nutritious" snack food selection at home. Attention to messages influenced subsequent selection of "nutritious" and "empty calorie" snacks at home but did not affect "nutritious" snacks away from home. Personal status-role variables had nc direct effects, although sex indirectly influenced all three snack variables, and educational achievement had an indirect (and negative) effect on "nutritious" snacks away via previous nutritious snacks away.

The best predictor of consumption of vitamin and mineral supplements after the program was consumption of these supplements prior to the program (see Figure 17). Frequency of vegetable consumption and decision-making when shopping for

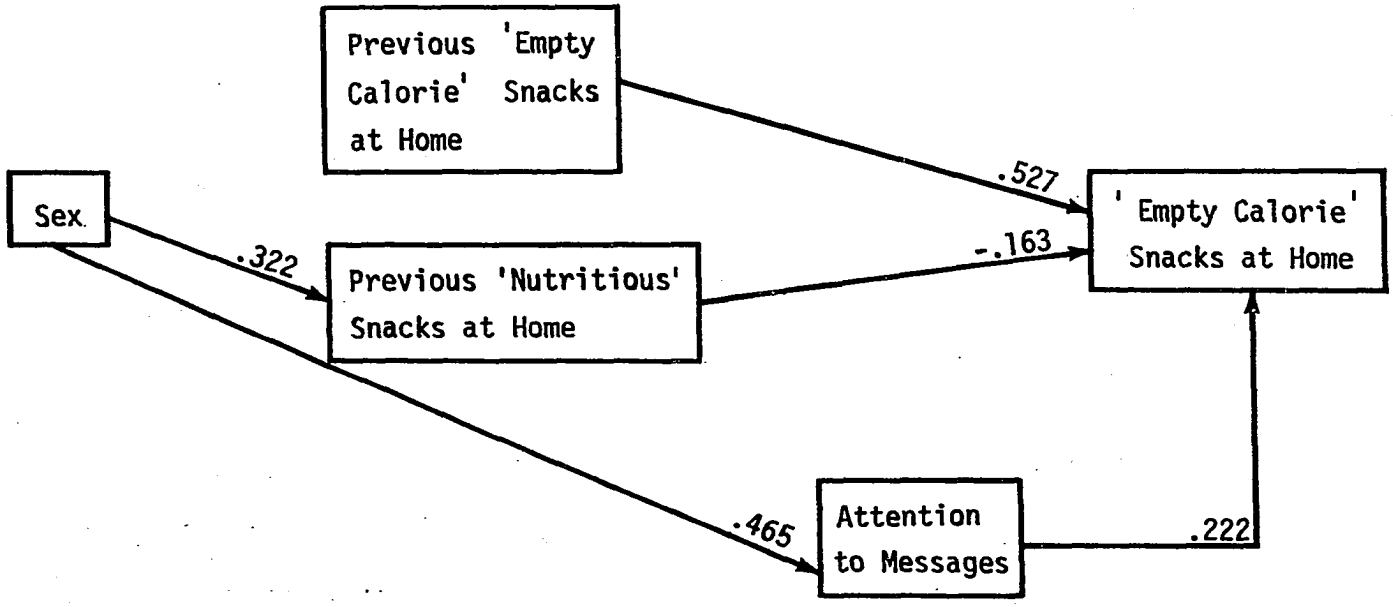

Figure 14. Model for 'empty calorie' snacks at home (Includes only those variables with significant direct or indirect paths to 'empty calorie' snacks at home.)

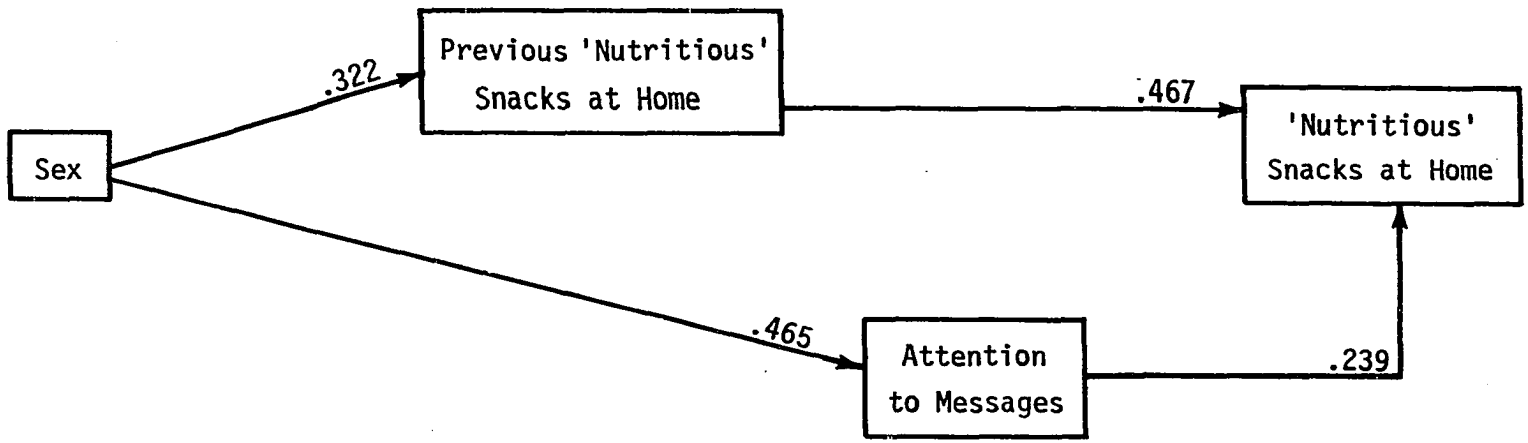

Figure 15. Model for 'nutritious' snacks at home
(Includes only those variables with significant direct or indirect paths to 'nutritious' snacks at home.)

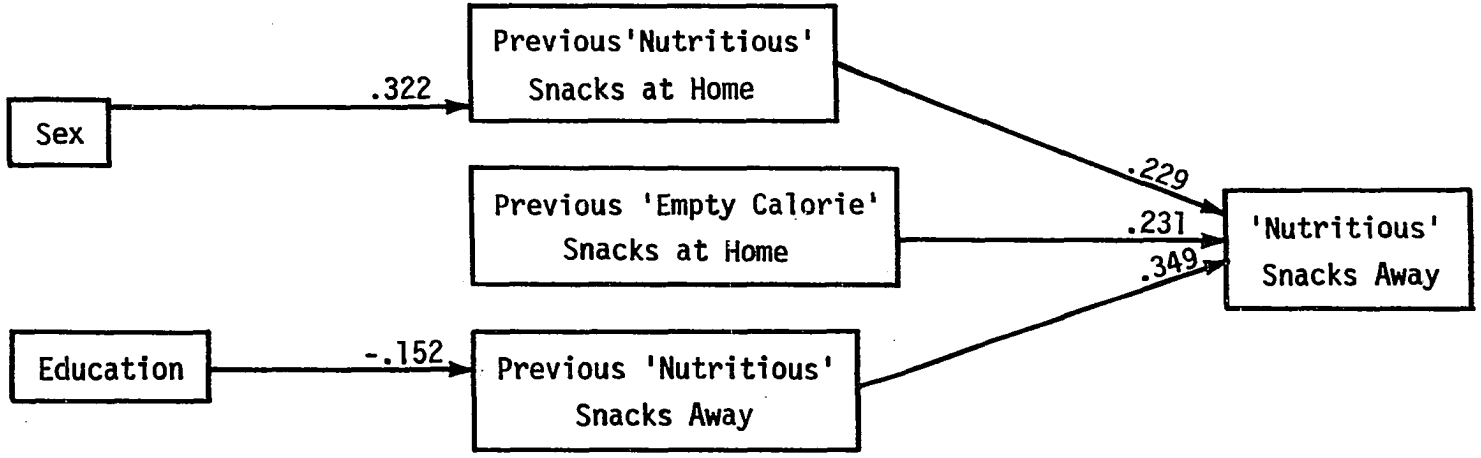

Figure 16. Model for 'nutritious' snacks away from home (Includes only those variables with significant direct or indirect paths to 'nutritious' snacks away from home.)

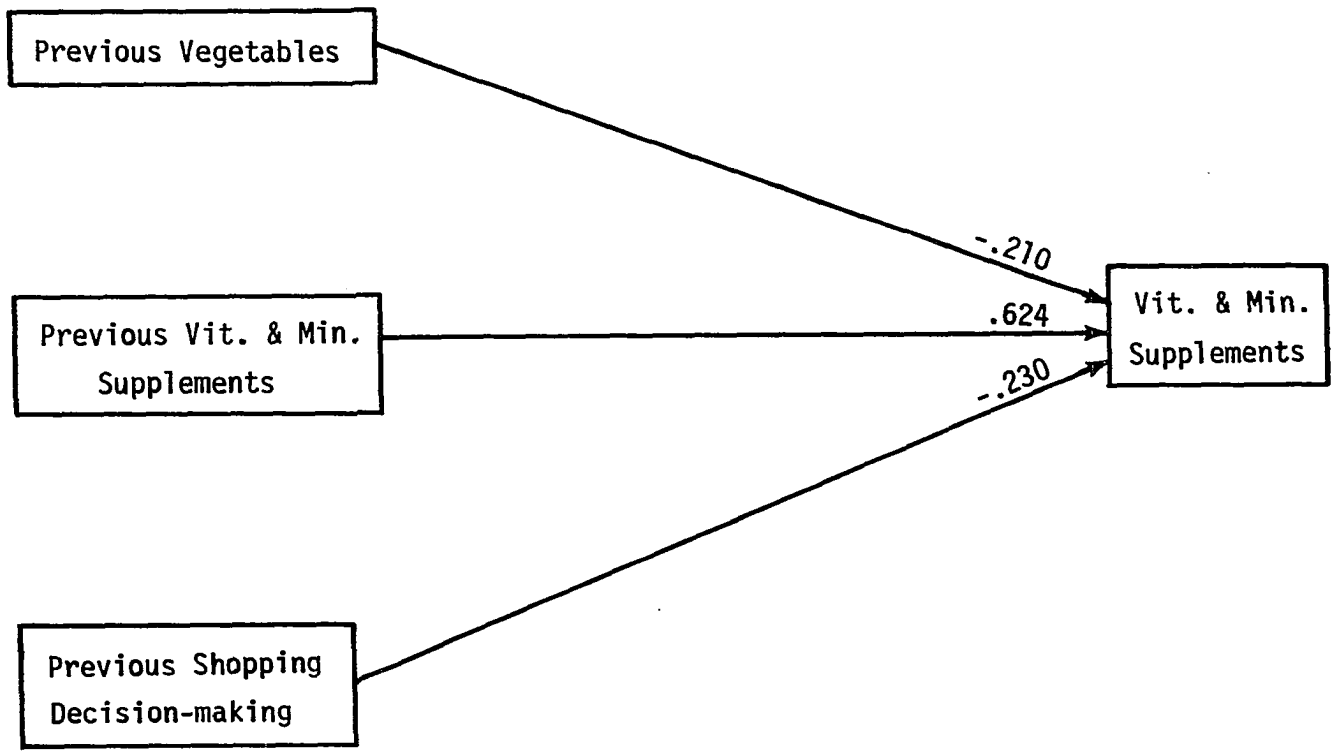

Figure 17. Model for consumption of vitamin and mineral supplements (Includes only those variables with significant direct or indirect paths to consumption of vitamin and mineral supplements.)

food prior to the nutrition program both were associated negatively with use of supplements. Perhaps those who ate fewer vegetables and considered nutrition less when making shopping decisions felt a stronger need to take vitamin and mineral supplements. No indirect effects on vitamin and mineral supplement consumption were found.

Many of the hypothesized paths from the dependent variables in these models were not supported by the data. From 27 to 72 percent of the variation of each outcome or dependent variable was explained by its model (Table 32).

The hypothesized direct effects of the personal status-role were almost non-existent and those of the intervening process variables were only weakly supported as shown in a generalized summary of network effects findings in Figure 18. Mental dispositional variables were more strongly related to outcomes. For all the models, the best direct predictor of the dependent variable was the mental disposition for the same variable previous to the program. This finding is consistent with predispositional theory, i.e., that it is easiest to reinforce existing behavior.

The hypothesized effect of mental disposition variables on intervening process variables was supported only weakly. This finding is a positive one because the objective of the program strategy was to overcome the constraints of mental disposition effects.

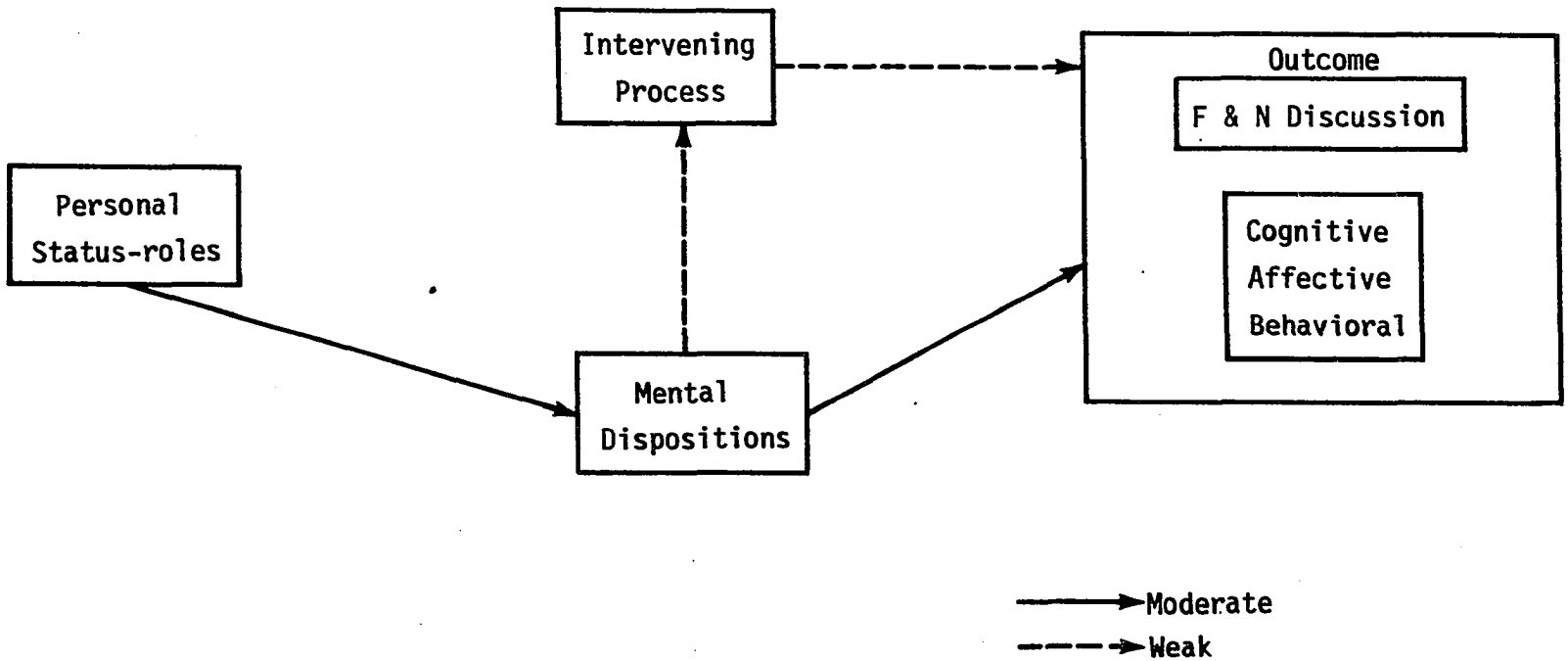

Figure 18. Generalized summary of network effect findings

Although sex influenced mental dispositions to some extent, in general, the three personal status-roles measured predicted poorly the variation in identified mental dispositional variables.

In conclusion, although the program did appear to overcome the constraining effects of mental dispositions on the intervening process, the intervening process had only a weak influence on the program outcomes. As indicated by the low percent of variation explained, a number of variables which explained variation of the dependent variables are not in the model.

The Nutrient Guide as a Teaching Tool

Because one of the objectives of this research was to test the Nutrient Guide as a potential teaching tool, this section focuses on evaluation of the Nutrient Guide. The guide was integrated into the entire program, and included in lesson two. Based on the posttest data and comments on feedback sheets received from participants during the program, the following questions will be considered: Were individuals in the target audience interested enough to read the Nutrient Guide? Did they take time to complete the Personal Guide which accompanied the Nutrient Guide? Did they feel that it was useful? and finally, Did using the Guide make a difference in their acceptance of the program objectives?

Responses to the Nutrient Guide

The Nutrient Guide was presented in its entirety in lesson two. Women who completed the posttest read at least some of this lesson (Table 23). Over half (51.6 percent) of the fathers and 74.7 percent of the mothers thought it was moderately or very useful (Table 33).

Among the men, 22.6 percent reported that they had completed the Personal Guide[1] which accompanied the Nutrient Guide. A higher percentage, 42.2 percent, of the women had completed the Personal Guide. About one-third (30.3 percent) of the fathers and over one-half of the mothers (55.9 percent) thought the Personal Guide was useful (Table 33).

Although the Nutrient Guide is a relatively long and complex tool,[2] none of the men and only three of the women reported that it was very difficult (Table 34). Fifty percent of the men and 40 percent of the women thought it was average in difficulty.

Impact of the Nutrient Guide

Did the Nutrient Guide have an impact on food behavior?

---

[1]The Personal Guides to Good Nutrition which accompanied the Nutrient Guide contained blocks to complete for evaluating food intake for a day. The Guide is contained in Appendix B.

[2]The primary concern expressed by the expert panel and other professionals who reviewed the Nutrient Guide was that it was too difficult for laypeople to understand and use.

Table 33. Usefulness of nutrient guide and accompanying personal guide

	Fathers n = 33		Mothers n = 79	
	No.	%	No.	%
Nutrient guide				
Didn't read	4	12.1	1	1.3
No use	2	6.1	7	8.9
Slightly useful	10	30.3	12	15.2
Moderately useful	12	36.4	30	38.0
Very useful	5	15.2	29	36.7
	n = 33		n = 77	
Personal guide				
Didn't read	5	15.2	1	1.3
No use	4	12.1	16	20.8
Slightly useful	14	42.4	17	22.1
Moderately useful	7	21.2	20	26.0
Very useful	3	9.1	23	29.9

Table 34. Respondents perception of difficulty of nutrient guide

	Fathers n = 34			Mothers n = 78		
	No.	%	Cum. %	No.	%	Cum. %
Category						
Very easy	2	5.9	5.9	10	12.8	12.8
Easy	9	26.5	32.4	26	33.3	46.2
Average	17	50.0	82.4	31	39.7	85.9
Difficult	2	5.9	88.2	7	9.0	94.9
Very difficult	0	0	88.2	3	3.8	98.7
Didn't read	4	11.8	100.0	1	1.3	100.0

Twenty-two percent of the fathers and forty percent of the mothers reported making changes in their diets after studying the Nutrient Guide (Table 30). Significant zero-order correlations are reported in Table 35 between the changes made in the diet and the amount of the Nutrient Guide lesson read, discussion of the lesson and completion of the Personal Guide. The following hypotheses about the Nutrient Guide were supported:

H. 11.1 The more of the Nutrient Guide lesson the receiver reads, the more likely s/he is to make changes in his/her diet.

H. 11.2 Those who discuss the Nutrient Guide lesson are more likely to make changes in their diet than those who do not discuss it.

H. 11.3 The greater the perceived difficulty of the Nutrient Guide, the less likely the receiver is to make changes in his/her diet.

H. 11.4 Those who complete the Personal Guide are more likely to make changes in their diet than those who do not discuss it.

Reading and discussion of the Nutrient Guide were significantly correlated as were discussing the guide and completing the Personal Guide (Table 35). The following hypotheses, therefore, were supported:

H. 12.1: The more of the Nutrient Guide lesson the receiver reads, the more likely s/he is to discuss it with his/her spouse.

H. 12.2: Those who discuss the Nutrient Guide lesson are more likely to complete the Personal Guide.

Table 35. Zero-order correlation coefficients among Nutrient Guide variables

	X_2	X_3	X_4	X_5
X_1 = amount read	.281 (p=.001)	-.421 (p=.001)	.431 (p=.001)	.428 (p=.001)
X_2 = discussed?		-.107 (p=.130)	.372 (p=.001)	.275 (p=.001)
X_3 = perceived difficulty			-.257 (p=.003)	-.147 (p=.061)
X_4 = completed personal guide				.424 (p=.001)
X_5 = made changes in diet?				

Comments on feedback sheets about lesson two (and the Nutrient Guide) indicated that participants found it comprehensible and useful. One respondent wrote about the guide, "...a bit more difficult than following the Basic Four, but I like the information I'm gaining." Others seemed to feel that following the guide was worth the effort: "...it was very worthwile to see what blocks[1] we were short... should have studied this before...a lot of misunderstandings cleared up", "...revealing where you can omit and not lose essential amounts of nutrients, but still eliminate some calories.", "Really opened my eyes to have many non-nutritional energy only foods, and also those low in nutrition.", "...glad it listed nutrients as well as calories or energy."

A few found it difficult to follow. One said: "liked it...very interesting, but it take (sic) me four times to read it, before I could make sense out of it." On the other hand, several wrote that it was very informative, simplifed and easy to understand. The comments made and questions asked, in general, showed that respondents were using and understanding the guide. There were a few, however, who found

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[1]The Personal Guides to Good Nutrition which accompanied the Nutrient Guide contained blocks to complete for evaluating food intake for a day. The Guide is contained in Appendix B.

it difficult or too time consuming.

Characteristics of Those Who Used the Nutrient Guide

Often those who least need information or least need to change are those who attend to communication programs. It was hypothesized that those who were better educated, had better nutrition knowledge and placed a higher value on health would be more likely to read and use the Nutrient Guide. These suggested relationships were stated in general hypotheses 13, 14, and 15:

G.H. 13: The education level of the receivers will affect their responses to the Nutrient Guide during the intervening process.

G.H. 14: The level of nutrition knowledge of the receivers will affect their responses to the Nutrient Guide during the intervening process.

G.H. 15: The value placed on health by the receivers will affect their responses to the Nutrient Guide during the intervening process.

Educational achievement was related to the amount of the messages read but not to the other intervening process variables (Table 36). Thus, general hypothesis 13 was only partially supported. There was no empirical support for general hypothesis 14. No significant relationship between any of the three nutrition knowledge scales and attention to the program was found. A weak correlation and in the direction opposite to that hypothesized was observed between nutrition knowledge and two intervening process variables, discussion of nutrition and perceived difficulty of the lessons. No re-

Table 36. Relationships of receiver inputs to responses to the Nutrient Guide

	Read guide	Discuss guide	Difficulty of guide	Complete personal guide?
Education	-.108	N.S.	N.S.	N.S.
Previous nutrition knowledge:				
Scale A	N.S.	N.S.	-.1004	N.S.
Scale B	N.S.	-.169*	N.S.	N.S.
Scale C	N.S.	N.S.	N.S.	N.S.
Previous health values	.244**	N.S.	N.S.	.150*

lationship was found between previous nutrition knowledge and completing the Personal Guide. The absence of relationships was considered a positive finding because the objective of the communication strategy was to overcome the constraints of mental dispositions. The findings suggest that, with this sample population, use of the Nutrient Guide was not bound by education level or previous nutrition knowledge.

The third general hypothesis about the Nutrient Guide, hypothesis 15, was partially supported, i.e., previous health values were correlated significantly with reading the lesson and previous health values were correlated with use of the Personal Guide. Discussion of the message and perceived difficulty of the guide were not correlated with previous value of health nor with other receiver inputs (except weakly with previous nutrition knowledge). Of the hypothesized constraints on the intervening process, previous health goals was the only one that was supported in this data and it was only partially supported.

Conclusions from Findings

It was concluded that, overall, the communication program was quite successful; changes in knowledge and behavior were significant. However, the data did not show a systematic relationship which allowed prediction of the positive outcomes. Further study is needed to define more

clearly the interrelationships within the communication model presented in this dissertation.

The data on discussion within families suggest directions for further research. The path analysis data are not entirely consistent with diffusion theory nor previous data showing significant relationships between discussion and adoption (e.g. Yarbrough et al., 1972; Lugo-Nasser, 1971; Bogunjoko, 1977). There are at least four possible explanations of this: First, perhaps because the program encouraged discussion, this variable lost its predictive value. Most previous studies measured interaction, but did not attempt to influence interaction within the reference group.

Second, there are factors unique to nutrition and food practices which were not operating in studies of other innovations. Nutrition and food practices deal with daily, complex decisions and they affect each family member in a personal way, on the other hand issues such as civil defense, pollution, and use of hybrid seed corn involve longer term and thus less frequent decisions and may or may not involve all family members. Perhaps the situation is different enough that discussion affects the adoption process differently. Third, because regression analysis was used, some variables were controlled for whereas much of the previous data showing a relationship between discussion and acceptance have been based on zero-order correlations. Per-

haps discussion does not account for much after other variables (e.g. predispositions) are controlled for. In the present study, there were some significant correlations between discussion and outcomes, but not significant path coefficients. It may be that those who are most likely to adopt are most likely to discuss, but discussion itself does not necessarily increase adoption. Fourth, the measurement of interaction might not have been adequate. Data only show whether or not repondents said they discussed each message. They do not show how much they talked nor the quality of the discussion. Further research is needed to explain the relationship between discussion within the reference group and adoption.

CHAPTER VII. SUMMARY

The objectives of this research, which was part of the North Central Regional Projects NC-108 "Changes in Food Practices for Better Nutrition," and NC-146 "Communication Strategies to Improve Nutritional Practices of Families" were to:

1. Develop a Nutrition Communication Model for planning and evaluating nutrition intervention programs.
2. Design an intervention program to improve nutritional practices of young families based on the communication model. This included:
   - -Revision of communication strategy developed and pretested in a previous study (Gillespie, 1975).
   - -Identification of subject matter content for nutrition messages.
3. Develop a food selection and evaluation guide which:
   - -classifies food according to specific combinations of nutrients.
   - -is a useful tool for learning food composition.
   - -can aid in selecting foods to meet appropriate Recommended Dietary Allowances.
   - -considers food habits of the U.S. population and deals specifically with major problems of U.S. diets (e.g. excessive caloric intake).
   - -is flexible enough to fit different life styles and

eating patterns.

-incorporates a wide variety of convenience and processed foods as well as "traditional" foods.

4. Test the effectiveness of the nutrition intervention program in terms of the receivers' attention and cognitive, affective and behavioral responses.
5. Analyze relationships among variables in the communication model.
6. Test the food selection and evaluation guide as part of an intervention program.

A framework and model to guide planning and evaluation of nutrition intervention programs was developed. According to the model, the communication process includes three major components, input, intervening process, and outcome. Sender inputs are the decisions the communicator makes about the communication strategy with respect to channel, source, message content and treatment, and over-all communication strategy. Receiver inputs are the predispositions which the receiver brings to the communication. In order to achieve the desired outcome, an appropriate intervening process must take place. Important elements of the process are attention, comprehension, and interaction. A premise of this research was that a system which allowed interaction both with the sender and with the receiver's peers was more likely to gain attention and to achieve acceptance. Outcome is the end

result desired by the communicator, i.e , acceptance responses of the receiver. There are at least three types of responses a receiver may make to a single message or to an entire program. Cognitive acceptance is based on belief, i.e., the receiver accepts or rejects the message as valid, factual, correct or true. At the attitude level, the receiver accepts or rejects the sender's conclusion or proposed changes as desirable. Overt action or behavioral acceptance is often a goal of communicators. They usually want people not cnly to believe what they say and to accept it as desirable, but they also want them to do something about it.

The model was then used as a guide for planning and evaluating a mass communication program for families with young children. A three-way interactive communication system via mass media (Gillespie, 1975) was used. Interaction within the family and between the family and the nutrition communicator was expected to enhance the probability of changes in nutritional practices.

A holistic approach to nutrition information was selected for the program. Messages included basic nutrition concepts and application of these concepts. Messages were written to help receivers understand why suggested dietary modifications were important.

To communicate food composition as a basis for planning food intakes, and other basic nutrition concepts, a Nutrient Guide was developed. Because iron, thiamin, and calcium are the nutrients most often below the Recommended Dietary Allowances in studies of food habits in the U.S. A., they were chosen as the bases for classifying foods. Food composition data were reviewed, possible nutrient combinations were selected and foods were sorted by specially written computer programs. The final guide consisted of seven exchange lists: IRON+protein, IRON+protein+THIAMIN, IRON+B-VIT, VITAMIN A, VITAMIN C, energy only and fiber.

Exchange lists were not mutually exclusive, i.e. the same food might appear on more than one list. This arrangement emphasizes foods which are good sources of several nutrients and it allows classification of mixed foods. The Nutrient Guide considers energy value in addition to nutrient needs. Each exchange was given an energy rating which could easily be converted into an approximate number of kilocalories by multiplying the rating by 50. Recommended numbers of exchanges were calculated on the basis of the Recommended Dietary Allowances for individuals by sex and age.

The communication strategy and the Nutrient Guide were tested with an experimental audience. Pretest and posttest scores were compared to evaluate changes during the program and to assess the usefulness of the Nutrient Guide as an edu-

cational tool. Receiver predispositions were measured; these data also served as the baseline data to evaluate change in beliefs (knowledge), attitudes and behavior. The relationship between the intervening process variables and the outcomes of the program were analyzed using zero-order correlations. A path analysis was performed to determine the effects of input and intervening process variables on the measures of program outcome.

Due to limited response to the posttest, conclusions from the data presented here cannot be generalized to the total audience without considerable caution. However, the findings are significant and the relationships examined contribute to understanding the process of communicating nutrition information.

Attention paid to the messages was good for fathers and very good for mothers. Family discussion occurred frequently and the amount of feedback was moderate. Nutrition knowledge increased significantly and six of nine measured behaviors changed in the desired direction. In addition, one-third to one-half of the participants reported specific changes in food practices.

The communication program was moderately successful. The most significant outcome was evidence of changes in behavior. In spite of limitations in the data, they do offer indication that it is possible to influence food practices

with a mass communication program. Any change is significant because communication research indicates that persuasive mass communication is more likely to reinforce existing attitudes and behaviors than to change them (Klapper, 1960). The Nutrient Guide was quite well accepted by respondents. Although a few reported difficulty in using it, most felt it was useful and relatively easy to understand.

Compared with a previous study (Gillespie, 1975; Gillespie et al., 1976), for those who responded to a posttest questicnnaire, attention was much better in this study, especially from fathers. Interaction both within the family and between the family and the nutritionist were improved from the previous study. Previously, the value placed on health goals was greater for program participants than for a control group which did not receive the program. This finding was not confirmed in the present study because there was no difference in the ranking of health goals between pre- and posttest scores. Contrary to the previous study, however, nutrition knowledge increased significantly in this study. The three-way interactive system worked very well.

Consistent with predispositional theory, predispositions of participants with respect to a particular outcome were the best predictors of that outcome after the program. The effort to overccme the constraints of predispositions on attention and family interaction was at least moderately suc-

cessful. Zero-crder correlations between the intervening process variables (attention and interaction) were significant; however, path analysis revealed that much of this effect was accounted for by mental dispositions. Thus, contrary to expectations, discussion within the family was not related to the measured outcomes.

In conclusion, overall, the communication program was successful; changes in knowledge and behavior were significant. However, the data did not show a systematic relationship which allowed prediction of the positive outcomes. Further study is recommended to define more clearly the relationship of discussion within reference groups to other components of the communication model.

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APPENDIX A. DIETARY SCORING SYSTEM

Dietary Scoring System for 27 or 7 point scale[a]

Category		No. of 3's	No. of 2's	No. of 1's
7 or 27		6	0	0
	26	5	1	0
	25	4	2	0
6	24	3	3	0
	23	2	4	0
	22	1	5	0
	21	5	0	1
	20	4	1	1
	19	3	2	1
5	18	2	3	1
	17	1	4	1
	16	0	5	1
	15	4	0	2
	14	3	1	2
4	13	2	2	2
	12	1	3	2
	11	0	4	2
	10	3	0	3
3	9	2	1	3
	8	1	2	3
	7	0	3	3
	6	2	0	4
2	5	1	1	4
	4	0	2	4
	3	1	0	5
1	2	0	1	5
	1	0	0	6

Six nutrients are classified as:

3= ≥100% RDA
2= 67.0-99.9% RDA
1= ≤66.9% RDA

Weight category classified as:

3= ±5% of recommended
2= between ±5% and ± recommended
1= >25% overweight

[a]Based on six nutrients. (Yetley, Beth. Personal communication. Iowa State University, Ames, Iowa)

APPENDIX B. PROGRAM MATERIALS

Message One

Nutrition

a family investment in the future

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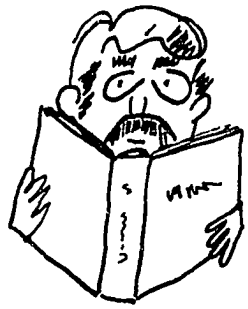


Nutrition know-how: Who has the answers?

The study of nutrition is a relatively new science. Most of the known vitamins and minerals were 20th-century discoveries. These discoveries helped scientists complete the identification of the essential nutrients--those substances vital to the life processes we usually take for granted.

But there is still much to learn. This is why responsible nutrition counselors (such as nutritionists and dietitians) make recommendations based on the best research available. As new research data becomes available, their recommendations may change. But the changes are seldom drastic. That's because a central idea governs the recommendations: moderation...no massive doses of a single vitamin...no total elimination of carbohydrates...no reliance on a single food.

Drastic plans urge people to "put all their eggs in one basket." This is not a wise investment policy. No single food contains everything the body needs. Nor does an extra amount of one nutrient make up for the lack of another. In fact, consuming excessive amounts of nutrients can lead to health problems.

This program takes the moderate approach, based on the best information available now. Much of this information is well established and will not change.

We hope the information will help you evaluate new discoveries, ideas and food products which continue to call for your attention. Then you will be able to spot false claims. You'll know the right questions to ask. And, in the end, you will be the one with the answers.

But is know-how enough?

No, probably not. Nutrition know-how is only the first step. Eating habits begin to take shape long before we are ready to learn about nutrition, perhaps as early as our first hunger pangs and feedings. From then on, food assumes a multitude of meanings.

It may be nourishment, a reward for good behavior, an expression of love or a form of entertainment.

We may learn to enjoy trying new foods, or learn to be suspicious of any departure from the meat-and-potatoes routine.

Sugar may occupy a prominent place on the table, or sweets may be off-limits.

Family eating patterns may vary from three-square-meals-a-day to all-day, cupboard-to-mouth eating.

Income, ethnic background, and religion may also affect eating habits. The list of situations goes on and on.

But whatever our experiences, we emerge from them with some deeply ingrained eating habits. For most people, at least some of these habits are unhealthy. Overeating, for example, is a common unhealthy habit.

Unfortunately, we enjoy some of these bad habits. And it isn't easy to break habits which give us pleasure. So, in addition to acquiring nutrition know-how, we must care enough to put the know-how into practice.

Parents of young children have an especially good reason to practice good food habits. Children form life-long habits by copying their parents.

Take a mental inventory of your cupboards and refrigerator. How large a variety of food is available? Ohio State University researchers found that 77 percent of the one-year-olds they studied were willing to try new foods. But, among four-year-olds, only 60 percent had that adventurous spirit.

So, providing a wide variety of nutritious foods as early as possible may be one way to help children develop good food habits.

Iowa State researchers found that the father plays an important role in determining family food choices---even when the mother does most of the shopping and cooking. Apparently, his food preferences influence her food selections.

So, not only will wise eating pay off for you. You will also set a good example for your children...while they are still forming the eating habits which will affect them throughout their lives.

Nutrients: the stuff of life

PROTEINS. ✓

MINERALS. ✓

CARBOHYDRATES. ✓

VITAMINS. ✓

FATS. ✓

WATER. ✓

Five out of six would be a good score in many tests, but not in a test of nutrient consumption. Each nutrient group is important. The members of each group have jobs which only they can do. Our bodies put each nutrient to work where it is needed, but only if we supply the nutrients in the proper balance. We eat the foods. Our bodies retrieve the nutrients and send them to their respective tasks.

When we don't get enough of one of these vital substances, our bodies react in a variety of ways, depending upon the nutrient. Take calcium as an example. Everyone needs this mineral to clot blood and help nerves and muscles function properly. Children need calcium for bone growth and adults need it to maintain and repair bones. If we don't consume enough calcium, our bodies steal some from our bones to use elsewhere.

Excesses may also damage our health. Sometimes an excess of one nutrient can even interfere with the body's use of another. A lot of vitamin E, for example, may get in the way of vitamin A.

In a child's body, nutrient balance is especially important. Growth is a complex, nutrient-hungry process. Taking care not to shortchange our youngsters' developing bodies helps insure their healthy future.

And, there's another reason to be especially careful about the quality of foods children eat. Although children need smaller amounts of most nutrients than their parents do, they actually need more nutrients per calorie because they don't eat as much as an adult. In other words, children need especially nutrient-rich foods.

Recommended Dietary Allowances

Recommended Dietary Allowances, or RDA's, are set by the National Research Council Food and Nutrition Board. They are guidelines for nutrient intake. The recommendations vary according to age and sex.

RDA's have been converted to U.S. RDA's for use on food labels. Some nutritionists think the U.S. RDA's are misleading because they equal the highest recommended RDA for each nutrient except calcium. (Calcium needs for teen-age boys are so high that the people who determined the U.S. RDA's decided the calcium maximum was not a good standard to use on food labels.)

No one needs the highest recommended amount of every nutrient. Needs vary according to age, sex and size. Therefore, the starting point is you. First decide how much food you should eat, based on your ideal size and your level of activity. (We'll show you an easy way to do this in lesson three.) Then, within that calorie limit, choose a wide variety of foods from plant and animal sources. Your choices, of course, should be based on nutrition know-how.

Why not just take a pill?

Vitamin pills taken in addition to a good diet are a poor investment. They are expensive and unnecessary. They burden the body with the extra task of flushing out some excesses and storing others. Excessive amounts may even interfere with normal life functions.

Vitamin pills taken instead of a good diet are another bad investment. Counting on the little tablets to provide health may encourage poor eating habits, such as eating too much sugar or fat, which can cause health problems even though there is a supply of the essential nutrients on hand.

Also, the pills only contain known nutrients. Nutritious foods may benefit out bodies in a lot of ways which we have not yet discovered---ways which are not part of a vitamin and mineral capsule. No one knows enough about out food needs to formulate the "complete pill." To get top health returns on your food investment, you must invest in nutritious foods.

Your computer analyses

The enclosed nutrient analyses tell you whether or not you are getting enough of six key nutrients. Look at the top row of scores. They tell you the total amount of each nutrient you are now getting, based on your answers to the food inventory questionnaire. They are measured in units appropriate to each nutrient:

protein---grams
calcium---grams
iron---milligrams
vitamin A---international units
thiamin---milligrams
vitamin C---milligrams

The second score tells what percent of your Recommended Daily Allowance you are getting. (RDA's for fathers and mothers will differ because they are based on each individual's age and sex.) If your percent score for vitamin C is 150, you are getting 50 percent more vitamin C than you need. On the other hand, if your calcium score is 50, you need twice as much calcium as you are getting. A score of 100 is about right.

Next come lists of foods which supply at least 10 percent of your RDA for the six nutrients. On a separate sheet the food code used for these lists is translated. The lists may help you balance your diet. For example, if you notice that you are getting more protein than you need, you may want to cut down on the foods listed under protein.

Later in this lesson, you'll find lists of some foods which are good sources of calcium, iron, the B vitamins, and vitamin C. In lesson two you'll get more complete lists of the food sources for all the major nutrients.

These lists should help you correct dietary imbalances in ways satisfactory to you. Your computer analyses tell you where to cut down and where to increase your intake of nutrients. The lists tell you which foods provide the nutrients. Now it's up to you. And, even though you do not have computer analyses of your children's diets, we'll be showing you how to determine their needs, too.

We figured your total nutrient intake only on the basis of the foods you consume. Any vitamin or mineral supplements you may be taking are not included in the analyses.

What good can a few tiny grams of vitamins and minerals do anyway?

A brief look at the way nutrients work will help emphasize how important it is to eat nutritious foods. But keep three important points in mind.

*Huge doses of a nutrient do not produce "superpeople." For example, although thiamin helps the brain function properly, huge doses of it won't produce a genius.

*None of these nutrients works on its own. Each works best in the presence of a proper balance of all the others.

*A nutritionally adequate diet is only one part of good health. For example, eating enough iron is no substitute for getting enough sleep. Both iron and sleep are important in preventing fatigue.

Minerals

Your diet was analyzed for the two minerals most likely to be low--calcium and iron. Calcium is one of the macro-minerals, that is, minerals which we need in relatively large amounts. Others in this catagory are phosphorus, potassium, sodium, chloride, magnesium and sulpher.

Iron is one of the micro-minerals, or minerals which we need in relatively small amounts. This category also includes copper, manganese, zinc, iodine, and molybdenum.

Other micro-minerals, such as selenium, floride and chromium, are still being studied. They are probably also essential.

. . .some of their uses

Normal functioning of the nervous system:

calcium - sodium* - potassium

Muscle movement:

calcium - sodium* - potassium - magnesium

Muscle formation and tone, bone formation, strength, and repair:

calcium - phosphorous - copper - magnesium

Normal functioning of the heart and circulatory system:

calcium - selenium - iron - copper - potassium

Maintenance of normal energy level:

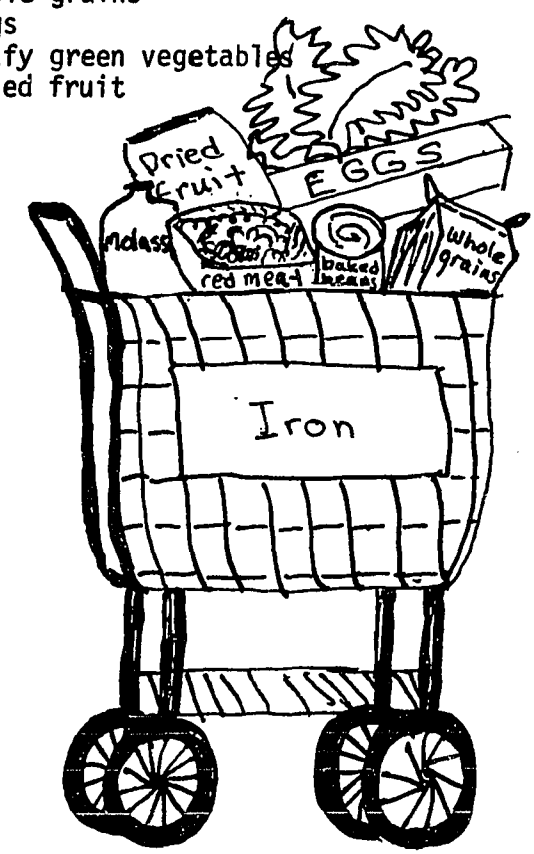
iron

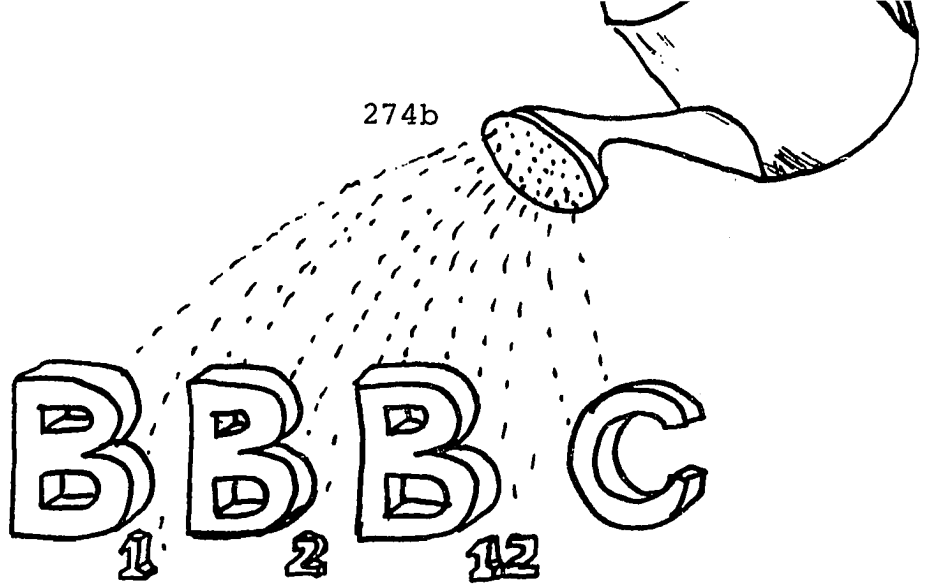
*Health problems related to sodium usually come from getting too much of it. Sodium comes mainly from common table salt and convenience foods such as canned soups. Potato chips and other salty snacks are another major source of sodium.

. . .some of their sources

Shopping list --calcium
milk
cheese
nonfat dry milk
ice cream
cottage cheese
pudding

Shopping list --iron
liver
hamburger
whole grains
eggs
leafy green vegetables
dried fruit



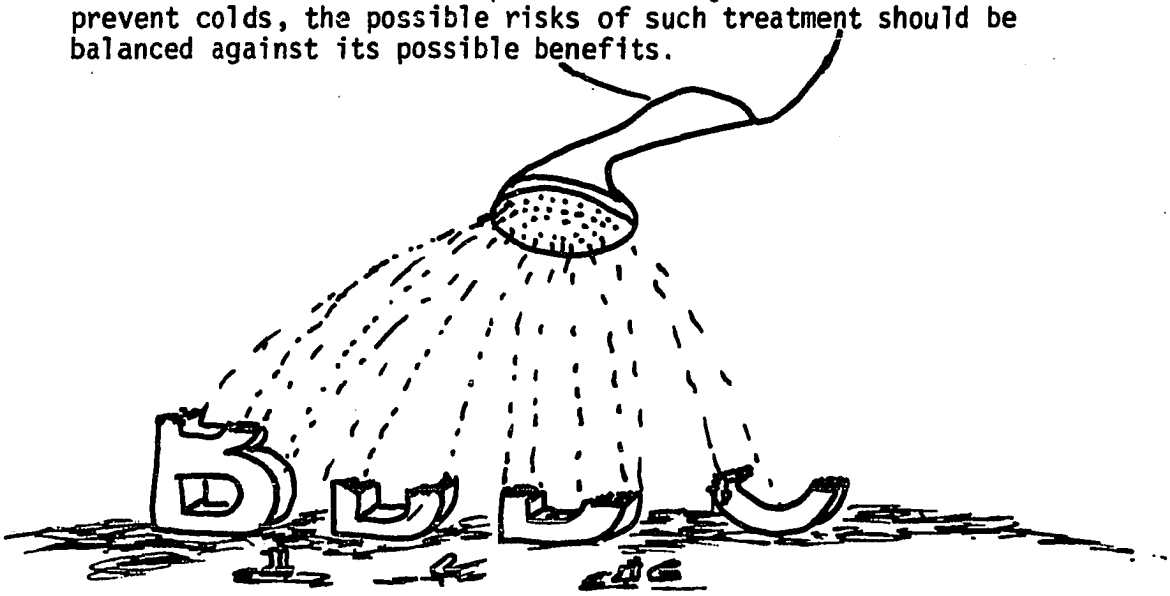


Water-soluble vitamins

The main water-soluble vitamins are thiamin (B_1), riboflavin (B_2), niacin and vitamin C (Ascorbic Acid). Of the B vitamins, thiamin is the one most likely to be low. If you are eating foods which provide enough thiamin, you are almost certainly getting enough niacin too. Riboflavin appears in thiamin-rich and calcium-rich foods. For that reason, we analyzed your thiamin intake as representative of the B vitamins. There <u>are</u> other important B vitamins such as B_6 and B_{12}.

Because these vitamins are water soluble, your body will excrete any excess you consume. But that doesn't mean you should break the rule of moderation. High doses of vitamin C, for example, can cause nausea and diarrhea. There's also some evidence that continuous high doses may increase the amount of vitamin C the body needs. That is, the body becomes dependent on high vitamin C doses.

Since there is still no proof that large doses of vitamin C prevent colds, the possible risks of such treatment should be balanced against its possible benefits.



275 a

. . .some sources and uses

THIAMIN

pork
peanuts
baked beans
whole-grain bread
enriched bread

peas
fortified cereals
enriched rice,
macaroni, noodles

Helps--
coordination
mental ability
healthy appetite
(especially important for children)
Helps prevent--
jumpy nerves
bad moods

RIBOFLAVIN

pork, beef
nuts, baked beans
whole-grain bread
enriched bread
asparagus
peas

mixed vegetables
fortified cereals
enriched noodles,
macaroni, rice
milk, cheese
pudding

Helps--
digestion
release of food energy
maintenance of nerve tissue

NIACIN

chicken
pork, beef
baked beans
whole-grain bread
enriched bread
peanuts, peas

asparagus
mixed vegetables
fortified cereals
enriched rice,
macaroni,
noodles

Helps--
release of food energy
Helps prevent--
skin disease
depression
anxiety

ASCORBIC ACID

oranges,
cantaloupe,
grapefruit,
lemons, pineapple
cabbage, potatoes
green peppers
tomatoes,
broccoli

Helps--
heal wounds
resist infection
strengthen gums
absorb iron

An example of how a nutrient works: Vitamin C helps heal wounds because it aids in the production of collagen, the "glue" which holds body cells together.

Food fads everywhere

There's such an explosion of information about food, nutrition and dieting that it's hard to know what to believe. To evaluate this information it may help to ask yourself some questions about things you have heard or read. For example:

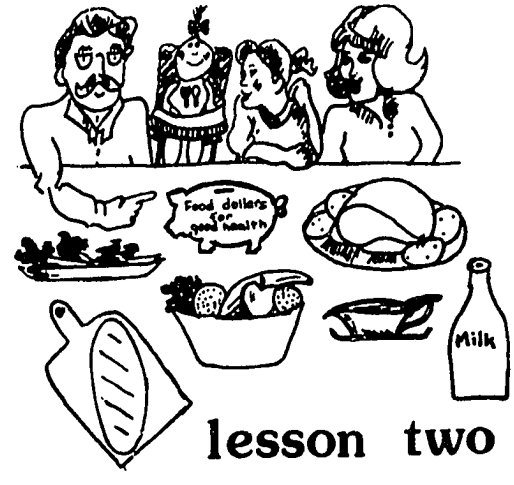
1. Do the people presenting the information have something to sell?
2. Are there extravagant promises of good health or quick weight loss?
3. Is success guaranteed? (People making these guarantees know most consumers won't admit failure to get results from the guaranteed product.)
4. Does the information contradict other reliable sources of information? (One example is the claim that grapefruit makes the body burn fat instead of storing it...It won't!)
5. Do the people presenting the information say that you can eat whatever you want without regard for nutrient content?
6. Does the recommended diet totally eliminate any nutrient group?
7. Does "proof" of the information rest on testimonials, rather than research?

If the answer to one or more of these questions is "yes," the information may not be geared to your best interests. It would be wise to consult another source.

It isn't easy to keep on top of the food fads and the information explosion, but you can do it if you're alert.

Message Two (Nutrient Guide)

Nutrition



lesson two

Nutrients—different needs for different folks

No matter what your age, sex, or level of activity, you need every essential nutrient. You differ from others only in how much of each nutrient your body requires and in how many calories you need.

For example:

*you probably need more nutrients and calories than people who match your age and sex but are smaller than you

*you probably need fewer calories than people who match your sex, age, and size but are more active than you

*if you are recovering from an illness, you may need more nutrients than when you are in good health

*your nutrient and calorie needs change as you get older

The RDA chart shows some of the nutrient requirements for males and females in various age groups. You may want to refer to it as you read through the rest of this lesson.

RDA CHART

	Age	Weight (lb)	Height (in)	Energy (Kcal)*	Protein (g)	Calcium (mg)	Vitamin A (IU)	Iron (mg)	Thiamin (mg)	Vitamin C (mg)
Infants	0.5-1.0	20	28	972	18	540	2000	15	0.5	35
	1-3	28	34	1300	23	800	2000	15	0.7	40
Children	4-6	44	44	1800	30	800	2500	10	0.9	40
	7-10	66	54	2400	36	800	3300	10	1.2	40
Males	11-14	97	63	2800	44	1200	5000	18	1.4	45
	15-18	139	69	3000	54	1200	5000	18	1.5	45
	19-22	147	69	3000	54	800	5000	10	1.5	45
	23-50	154	69	2700	56	800	5000	0	1.4	45
Females	11-14	97	62	2400	44	1200	4000	18	1.2	45
	15-18	119	65	2100	48	1200	4000	18	1.1	45
	19-22	128	65	2100	46	800	4000	18	1.1	45
	23-50	128	65	2000	46	800	4000	18	1.0	45
Pregnant				+300	+30	1200	5000	125	+0.3	60
Lactating				+500	+20	1200	6000	150	+0.3	80

Reprinted from Recommended Dietary Allowances, National Academy of Sciences, Washington, D.C., 1974.

**A kilocalorie is a measure of the energy a food provides. It comes from several nutrients: carbohydrates, fats, and proteins. It is the same measure of energy which you probably call a calorie. The word calorie is widely used instead of kilocalorie, but, from a scientist's viewpoint, there is a difference. For instance, a glass of whole milk has 165 kilocalories, or 165,000 calories. For precision's sake, the term kilocalorie will sometimes be used in these lessons.*

This chart gives you numbers but no explanations. To give meaning to these numbers, let's look at the reasons for some of the variations.

The months before birth

A well-nourished mother is more likely to give birth to a healthy baby than is a poorly nourished mother. The RDA chart shows that being well nourished during pregnancy means getting more of most nutrients. For instance, the need for iron jumps so dramatically that most doctors prescribe an iron supplement.

Teenage pregnancies can be a problem when the teenage mother is still growing. Then she has to supply nutrients and calories for her own growth as well as the baby's. An older pregnant woman may also face difficulty if her body's store of nutrients has already been drained by previous pregnancies.

Healthy women gain an average of 24 pounds during a pregnancy. This is not the time to go on a low-calorie diet. Such a diet may rob mother and baby of necessary nutrients. On the other hand, a pregnant woman doesn't need to increase her calorie intake much either so the calories she consumes must be extra full of nutrients.

The cradle years

During their first two years, children usually reach half or more of their adult height. Such high-speed growing takes high-quality nutrient fuel. In fact, infants need more food per pound of body weight than they will ever need again. (One-year-olds need almost 50 kilocalories for each pound they weigh. Their parents only need 15-20 kilocalories per pound).

And even these tiny folks need every nutrient. Milk lacks iron, vitamin C and other nutrients, but babies can store away some of these non-milk nutrients during the months before they are born. To take over when babies use up this natural supply, doctors often suggest iron supplements, formulas fortified with iron or fruit juices. Later, when it's time for solid foods, doctors may suggest iron-fortified baby cereals.

But don't be too eager to start infants on solid foods. Researchers haven't discovered any general advantages in eating solid foods before the age of five months. So, when a four-month-old seems content with a liquid diet, there may be no reason to get out the baby spoon and dish.

These little tots are also forming attitudes toward food. Forcing them to overeat may teach them the habit of overeating. Forcing them to eat unwanted foods may turn them against these foods for a long

time to come. You may need to try many different foods to find those your child likes. You may not be a great success in getting your baby to eat new foods, but you can try to make these new food experiences as pleasant as possible.

If you spend a lot of time balancing the importance of good nutrition against the importance of good food attitudes, you are not alone! There are no simple solutions to the problems parents face in feeding their children, but nutritionists, doctors, and other professionals can help you work out a solution.

And don't ignore what your own common sense tells you. After all, you can combine what you know about nutrition with what you know about your child--a valuable combination when making food decisions.

The preschool years

Children usually grow more slowly after their second birthdays, but high quality foods are still essential to their healthy growth.

Preschoolers often fall short of their vitamin C needs because they don't eat many citrus fruits, tomatoes, or other vitamin C-rich foods. It's up to parents to find tasty ways to include vitamin C in children's meals and snacks. Of course, like a lot of advice parents get, that is easier said than done. The special section on snacks may help.

These youngsters won't eat much at one time. Their stomachs are still too small. So nutritious snacks are a necessary part of keeping them comfortable and filling their nutrient and energy needs. (See page 17).

Encouraging children to overeat is another trap which catches concerned parents. Children who are taught to eat more than they should may spend the rest of their lives fighting a weight problem. The Nutrient Guide which appears later in this lesson will help you understand how much food your children need each day.

School days, school days

Grade-school children need the same kinds of foods they needed as toddlers, but they may need larger servings. However, their growth has slowed so they need less food per pound of body weight. On the average, eight-year-olds need about 36 kilocalories for each pound they weigh.

In school, children must adjust to new eating routines and new foods. They may even need to make food choices. Parents can help by teaching them the importance of eating nutritious foods and by encouraging them to try a wide variety of foods at home. If children take part in planning home meals, they will be better prepared to make wise food choices away from home.

The teens—years of growing independence

Teenage years are another time of rapid growth--not as rapid as the first two years of life, but the growth is especially complicated. Body fat may disappear while bone density increases and muscles get bigger and stronger. The endocrine glands are developing and producing male and female hormones. Teenagers coping with these complex processes cannot afford to fill up on foods which have a lot of calories but not many nutrients.

Unfortunately, a lot happens to tempt teenagers into unhealthy eating habits. For example, most teenagers have spending money in their pockets and easy access to candy and pop machines. Eating candy can become part of a group social activity and may even take the place of eating school lunches.

Dieting poses another health problem for young people. Often they prescribe their own diets without taking nutrition into account. The results are enought to make a nutritionist turn pale--and perhaps the teenagers, too.

Teenage boys generally get a better supply of nutrients than girls, simply because boys eat more. But both boys and girls tend to neglect foods containing vitamin A, riboflavin, and iron.

Teenage girls are ahead only on vitamin C consumption. That's because they usually eat more salads and fruits than boys. However, they don't usually eat enough of the foods which provide protein and iron.

Being a teenager generally means being acutely aware of personal appearance. So perhaps this is the time to emphasize the effects food has on such things as skin, teeth, growth, and weight.

Life's prime—changes continue

Many of us give a great deal of thought to our children's changing needs but forget to consider ourselves. We also go through profound changes which we must take into account if we are to maintain healthy eating habits:

*We stop growing (except for weight gain).
*We usually become less active.
*Our basal metabolism probably slows slightly.
*Heavy schedules sometimes disrupt our eating patterns.
*We have ready access to more food than we should eat. (especially a problem for homemakers)

The first three items on this list are the major reasons adults' calorie needs drop. Look at the RDA chart. It shows that a 44-pound seven-year-old needs almost as many calories as a 128-pound woman.

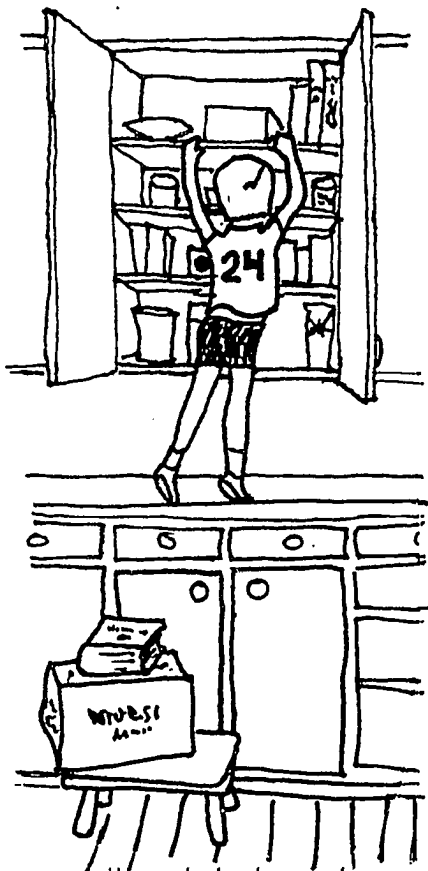
Adults also need a decreased supply of some nutrients. We need less calcium and vitamin D--about two cups of milk daily provide enough of these nutrients.

A woman's need for iron continues to be high, so high that she may not meet it unless she takes special care to eat iron-rich foods.

Don't forget that parents have an extra reason for eating wisely--their children copy them. One good example may be worth a hundred lectures.

By the age of 55, adults need 150 to 200 fewer calories than before, but their need for essential nutrients doesn't change. This means they should eat even fewer high calorie, low nutrient foods. Once again, it's time to concentrate on nutrient-rich foods.

The point, then, is this: No matter how old you are, all the nutrients are important to your health and your zest for life. The reasons for your nutrient needs vary; the amounts you need change; but you never outgrow the need for a balanced diet.



Making snacks count

When parents snack on colas and doughnuts, their children aren't likely to choose cheese cubes and fruit juice for their between-meal treats.

Snacks are important for most children. They can't eat enough at one meal to keep them going until the next. They need a between-meal fuel stop. If these pit stops provide calories but few nutrients, children can soon fill their calorie (energy) needs without getting the necessary nutrients.

Nutritious snacks such as pieces of fresh fruits and vegetables, cheese cubes, unsweetened cereals, dried fruits, crackers made from whole wheat or enriched flour, peanut butter, toast sticks made from enriched bread, and fruit juices help fill children's daily nutrient needs.

Home-baked snacks can also be nutritious. During the sugar shortage of 1974-75, some homemakers discovered they could reduce the sugar in many recipes by a third or more. The resulting cookies, quickbreads, muffins, bars and cakes had more nutrients in each serving because sugar, which provides only calories, took up less of each portion. Reducing the shortening in a recipe is another way to increase the amount of essential nutrients in each serving.

Foods such as pumpkin bread, gingerbread, molasses cookies, oatmeal-raisin cookies, and peanut butter cookies can all be valuable sources of nutrients children commonly lack.

You do pay a higher calorie price for the nutrients in these snacks than for the nutrients you get from most fruits and vegetables. And fresh fruits and vegetables are easier on teeth. Still, baked goods, in moderation, can be part of a healthy diet. If you prefer to buy ready-made baked goods, read the ingredients list carefully. It contains clues about the nutrient content of the product. (See page 23 for a discussion of ingredient labels).

Sometimes children are more enthusiastic about nutritious snacks if they help prepare them. They can fill celery with cheese spread or peanut butter. (If they dot the filled celery with raisins, they have "ants on a log.") They can help prepare deviled eggs. They can even use small vegetable pieces to make faces on the eggs.

They might enjoy fresh fruit more if they arrange chunks of it on tooth picks. Or they can spear pineapple cubes on toothpicks, put them in an ice cube tray, and cover them with orange juice. The result: frozen pineapple-orange pops, a vitamin C-rich snack which they made themselves.

Back to the major nutrients

In lesson one, we discussed minerals and water-soluble vitamins. In this lesson, we'll take a look at fat-soluble vitamins, proteins, and water. We'll also summarize what we know about fiber, which we haven't classified as a nutrient because our bodies don't absorb it.

Fat-soluble vitamins: A, D, E, and K

If you get too much of the fat-soluble vitamins, your body must store them (primarily in the liver). They can be retrieved if your body needs them, but they can also accumulate in unhealthy amounts.

Vitamin E appears in so many foods that nutritionists have never observed vitamin E deficiency in man. In animals, however, a shortage of vitamin E causes muscular paralysis and nervous disorders.

Vitamin K is also available from a wide variety of foods. It is essential to blood clotting. In fact, surgical patients are likely to get an injection of vitamin K to prevent hemorrhaging during recovery from an operation.

Contrary to what orange juice commercials would have us believe, C is not the sunshine vitamin--D is. Our bodies produce this vitamin when exposed to direct sunlight. However, because bad weather often keeps us indoors, or makes us cover up when we do go outside, we get much of our vitamin D from fortified milk. Children need 400 International Units a day, as much as they get from one quart of milk. Five times that amount, or 2,000 units, could cause growth retardation in a child, but it is almost impossible to get that much vitamin D--even after a full day's playing in the sun and a quart of fortified milk.

Large overdoses of vitamin A are also dangerous, but they don't happen very often either. We need three to five thousand units of vitamin A each day. About ten times that much (50,000 units) can cause serious health problems. Such overdoses are more likely to occur through vitamin pills than through food. However, one person who suffered from vitamin A toxicity was a vegetarian who drank huge quantities of carrot juice.

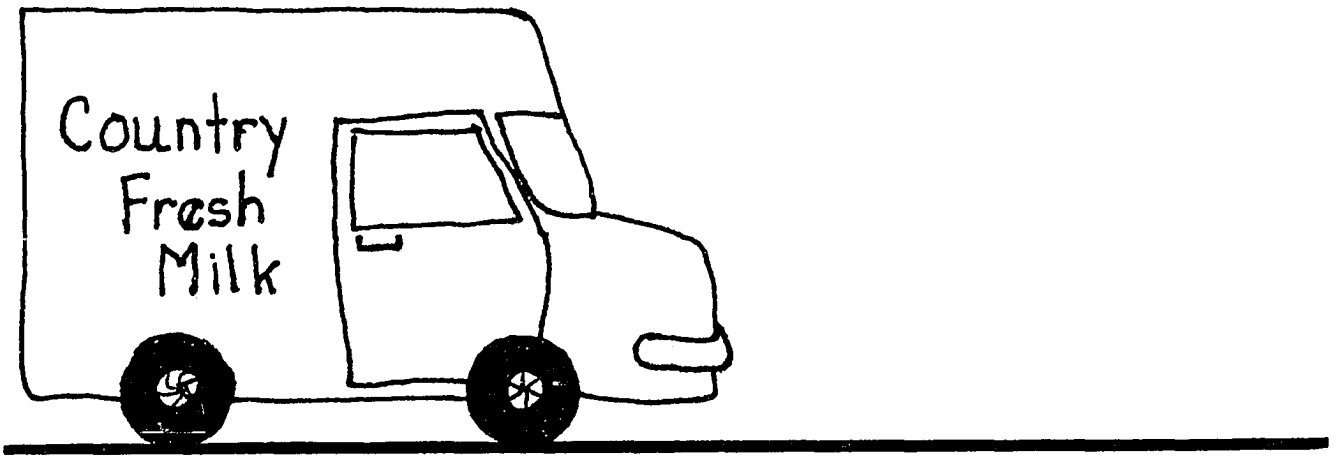
. . .some uses and sources

281 a

VITAMIN D

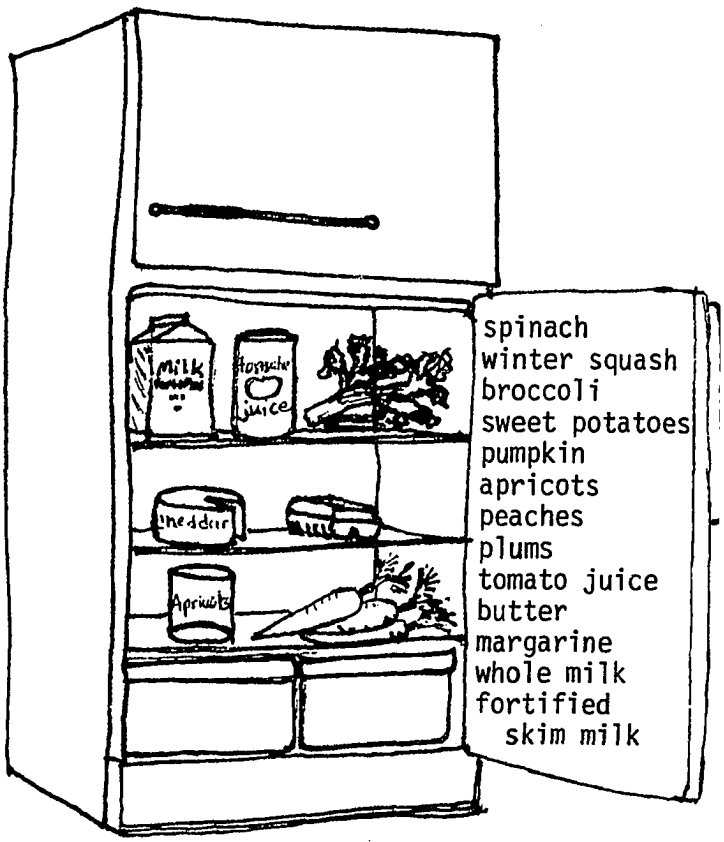
to help
  body absorb calcium
  maintain phosphate level necessary for bone calcification
to prevent
  rickets in children
  osteoporosis in adults

comes from
  unfiltered sun
   (Filters include clouds,
   glass, and clothing.)
  fortified milk



VITAMIN A

to help
  keep skin healthy
  keep linings of nose and mouth healthy
  promote optimum growth (especially
   important during childhood)
  form tooth enamel
to help prevent
  night blindness
  infection



Protein

Many people reason that if a little of a nutrient is good for you, a lot is better. That logic has led to vitamin C pills containing as much vitamin C as 15 oranges--22 times the RDA. Perhaps Americans have bought the more-is-better idea most wholeheartedly when it comes to protein.

Eating more protein than you need often means eating too much fat, because many common sources of protein are also high in fat. About half of the typical hamburger pattie is fat. A hot dog is about 30 percent protein, 60 percent fat. Processed American cheese contains more fat than protein. Eggs contain equal amounts of fat and protein.

Because of fat riding piggy-back on so much animal protein, many nutritionists recommend getting some of our daily protein from vegetables and choosing some low-fat animal proteins such as chicken, fish, and low-fat milk.

This doesn't mean eliminating beef and pork. They have their place in a healthy diet, too. For example, red meats are a much better source of iron than chicken, fish, and low-fat milk are.

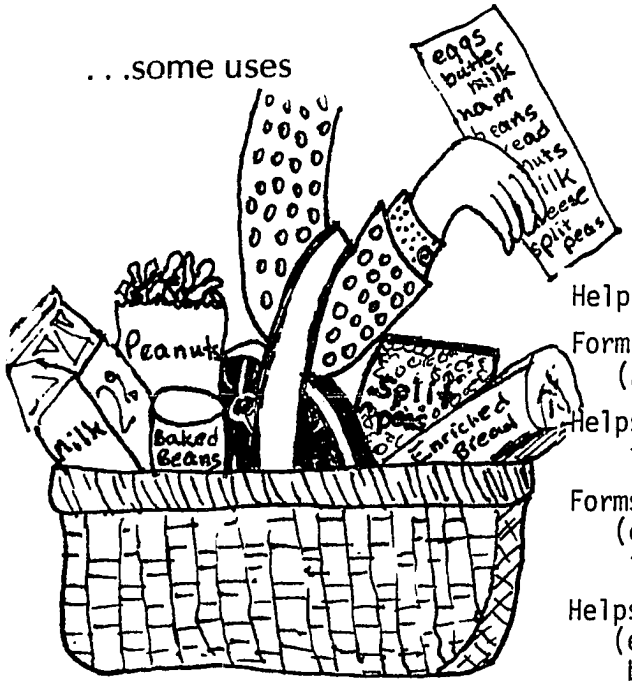
Getting your daily protein is neither as difficult nor as expensive as many people believe. The protein RDA for a 22-year-old man is 54 grams. He can fill that with two glasses of skim milk, a lean four-ounce hamburger, a half cup of baked beans, and two slices of whole wheat bread.

The protein RDA for adults is directly related to size. The 54-gram recommendation is for a 147-pound man. To figure out your personal recommendation, take 0.36 times your ideal body weight. The calculation for a 110-pound woman looks like this:

$$0.36 \times 110 = 39.6$$

This woman needs about 40 grams of protein a day.

. . .some uses



Helps maintain healthy metabolic rate

Forms protective covering for body (hair, skin, nails)

Helps produce antibodies which fight infection

Forms part of every body cell (cell growth and repair are impossible without it)

Helps make blood vessels elastic (essential in regulating blood pressure)

. . .some sources

A special note is necessary before listing protein sources. Proteins are made of amino acids, eight or nine of which are essential amino acids. Our bodies can manufacture the other amino acids, but cannot manufacture those which are essential; we must eat foods containing them.

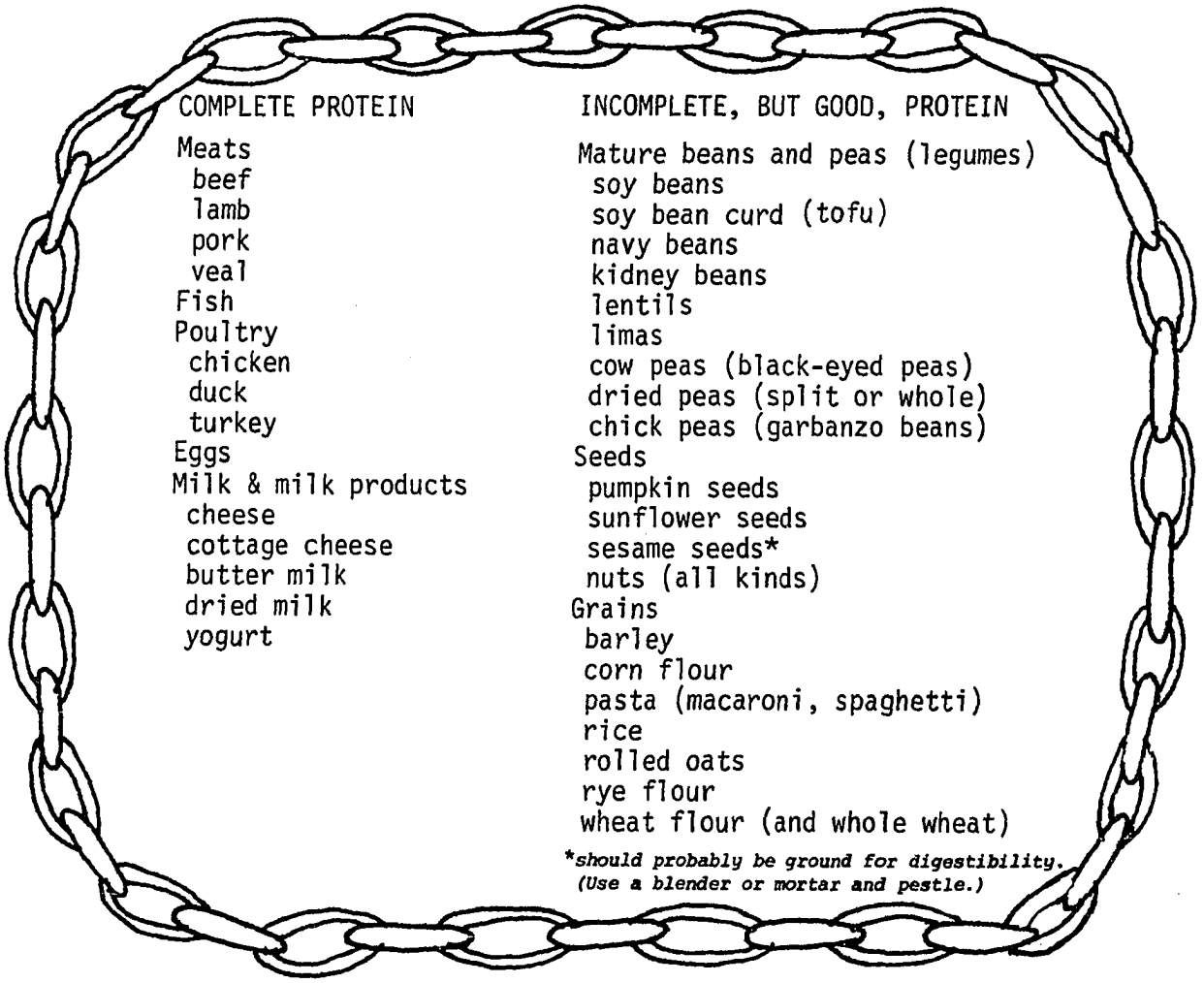
And the foods must contain all the essential amino acids because these amino acids can only form proteins when they are linked together in a chain arrangement. If one link is missing, no protein is formed and the amino acids which are present are used as energy--not as protein.

Animal proteins, which include meats, milk, eggs, and fish, contain all the amino acids essential to man, but vegetable proteins are usually low in at least one of them. So, you must eat vegetable proteins in combinations which provide all the essential amino acids--or combine them with a small amount of animal protein. For instance, a glass of milk would round out a meal of vegetable protein.

Vegetable combinations which make complete proteins are:

GRAINS(rice, cereal, flours, pasta, etc.) + LEGUMES (beans, peas, peanuts)
SEEDS(sesame, sunflower, etc.) + LEGUMES

Whole wheat or enriched bread plus peanut butter makes a complete protein. So does a mixture of sunflower seeds and peanuts.



COMPLETE PROTEIN	INCOMPLETE, BUT GOOD, PROTEIN
Meats	Mature beans and peas (legumes)
beef	soy beans
lamb	soy bean curd (tofu)
pork	navy beans
veal	kidney beans
Fish	lentils
Poultry	limas
chicken	cow peas (black-eyed peas)
duck	dried peas (split or whole)
turkey	chick peas (garbanzo beans)
Eggs	Seeds
Milk & milk products	pumpkin seeds
cheese	sunflower seeds
cottage cheese	sesame seeds*
butter milk	nuts (all kinds)
dried milk	Grains
yogurt	barley
	corn flour
	pasta (macaroni, spaghetti)
	rice
	rolled oats
	rye flour
	wheat flour (and whole wheat)

*should probably be ground for digestibility. (Use a blender or mortar and pestle.)

Water

You can survive for days, even weeks, without food, but not without water. It, too, is a vital nutrient--and the first one your body will miss.

Water carries wastes out of your body before they become toxic. It helps regulate body temperature. It is transportation for most nutrients. Once dissolved in water, these nutrients can pass through the intestinal wall and into the blood stream for delivery to all parts of the body.

Water comes from the foods you eat as well as from your water tap. Many fruits and vegetables are more than half water.

Fiber

Publicity on the virtues of fiber has filled many books and magazine and newspaper pages. Some of this publicity contains irresponsible claims that fiber can cure or prevent at least a dozen diseases. The truth is, scientists know that fiber forms a valuable part of our diets but they are still trying to discover how and why it is useful. They are studying the effects of many different kinds of fiber and trying to determine just how much fiber is enough.

Fiber is the tough part of many foods, the part that forms the cell walls of plants, giving the plants shape. Humans can't digest this fiber, or roughage, so it passes through our digestive tracts without much change.

But it does absorb water. So the fiber, swollen with water, becomes part of the body's solid waste and makes this waste bulkier and softer.

The bulkier and softer the waste, the easier it is for the intestinal muscles to move it along. Therein lies fiber's proven contribution to your well-being--it helps you avoid constipation. And there is some evidence that fiber helps prevent and treat diverticulosis, an infection which develops in tiny pouches in the intestinal wall.

Another good reason for increasing fibrous foods in your diet is that they will probably replace some of the sweet, fatty foods which you now eat.

But most claims for fiber's power have not been proven. So far, scientists have failed to establish a link between low-fiber diets and colon cancer. Nor have they found one between heart disease and low-fiber diets. In fact, some studies have shown that high levels of fiber intake may interfere with the body's absorption of iron and other trace minerals.

It seems that moderation is the answer again. Fiber is certainly a valuable food substance, but there is no evidence that you should be stuffing yourself with roughage. If you eat the kinds of fruits, vegetables, and whole grains suggested in this program, you should be getting a healthy amount of fiber.

Ingredient labels

The list of ingredients on a food package is a fine source of information. Ingredients are listed in descending order, according to the amount of each in the product. Take a list from a cookie package which says:

> flour, sugar, hydrogenated vegetable shortening, corn syrup, leavening, eggs, skim milk, salt, artificial flavors.

Flour is first on the list, telling you there is more flour in this product than anything else. There is less sugar than flour, less shortening than sugar, less corn syrup than shortening, etc. (Sugar and corn syrup are both sugars. If they were lumped together, they might take first place on the list.)

Notice that eggs and milk are listed after leavening. Considering the small amount of leavening needed to make cookies, it's apparent that the cookies contain only a tiny quantity of eggs and milk.

The first ingredient listed is flour. When enriched flour is used, the label will say "enriched flour" or "flour (enriched with... tems here will vary ..)." "Wheat flour" means the same thing as "flour." It is not enriched. However, if "whole wheat flour" is listed as a major ingredient, the product probably contains nutrients valuable to you.

Most all-purpose flour available to shoppers is enriched. Enrichment replaces the B-vitamins and iron which are lost when the wheat bran and germ are removed during the refining process. Since Iowa law does not require that flour be enriched, check the label on the flour you buy.

Nutrition labels

In lesson one, we talked briefly about the U.S. RDA's used on nutrition labels. You may have noticed that nutrition labels do not appear on all foods. That's because they are only required on fortified foods and foods for which a nutrition claim is made. Nutrients are always supposed to be listed in the same order on all foods. The nutrition information must be per serving and the serving size must be specified.

Since the U.S. RDA's do not exactly match your RDA's, nutrition labels can only give you general ideas for planning your diet. However the labels are useful in other ways:

*to compare the nutritional values of different brands and foods

*to select food for special diets, such as low sodium or low cholesterol

*to count calories

*to compare new foods with old familiar ones

Nutrient Guide:
a new way to understand your food needs

The Nutrient Guide is for people who want a broader base of information to help them:

*evaluate personal and family eating habits
*evaluate new diet and food trends
*evaluate nutrition information
*evaluate the nutritional quality of old and new foods.

Food and nutrition are complex subjects. The Basic Four plan was developed to simplify the teaching of basic nutrition. Unfortunately, the simplification has led to some misunderstandings and gaps in knowledge.

For instance, "green vegetables" is a nice, neat category of foods. But this simplification has led people to lump broccoli and green beans together. In fact, green beans do not belong in the leafy-green-vegetable category. Acorn squash, however, does have the nutrients of the "green" category, even though the squash is orange.

In developing the Nutrient Guide, we tried to simplify without oversimplifying. The result is a food guide which requires more study effort than the Basic Four. However, it also provides more information.

THE NUTRIENT GUIDE:

*MAPS OUT A PERSONAL GUIDE TO GOOD NUTRITION FOR EACH MEMBER OF YOUR FAMILY. Using it, you'll be able to see just when you have filled your recommendations for selected key nutrients.

*MAKES A DISTINCTION BETWEEN THE HIGH-CALORIE AND LOW-CALORIE SOURCES OF THE SAME NUTRIENTS. The lists will help you see the calorie price you are paying for the nutrients you are getting.

*SHOWS HOW CONCENTRATED A SOURCE OF NUTRIENTS EACH FOOD IS. For example, you'll discover that two cups of green beans contain about as much vitamin A as one-fourth cup of broccoli--broccoli being a much more concentrated source of vitamin A. However, in the category of foods containing iron and B vitamins, fresh green beans and broccoli are listed in the same amounts because they are about equal as sources of these nutrients.

*HELPS YOU IDENTIFY LOW-COST SOURCES OF THE NUTRIENTS YOU NEED. For instance, in the IRON-protein-THIAMIN list, a half cup of baked beans and an ounce of ham contain approximately equal amounts of iron, protein and thiamin. The baked beans would probably be the less expensive way to get these nutrients. (These two foods do not necessarily contain equal amounts of other nutrients.)

*GIVES EXACT QUANTITIES OF FOODS SO YOU DON'T HAVE TO GUESS HOW MUCH A SERVING IS. Most people overestimate the amount of food they need. Perhaps that is why overeating is a major nutritional problem in the United States. Using the Nutrient Guide, you'll know just how much food will fill your nutrient recommendations.

The Nutrient Guide consists of three main parts: (1) exchange lists for six nutrient groups; (2) an alphabetized food list; (3) personal guides to good nutrition for each family member.

All the foods listed within any exchange list (in the quantities specified) contain about the same amounts of the nutrients named by the list title.

The alphabetized list gathers together the information from the six exchange lists. This master list was developed to make it easier for you to fill out your personal nutrition guide.

The personal guide was designed to give you a clear picture of your eating habits and nutrient needs. After you have filled it out, you'll see which nutrient recommendations you are meeting. Then you can use the exchange lists to identify foods which supply nutrients you still need.

So you can see how this works, let's imagine an eight-year-old named Bob.

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Using your personal guide to good nutrition

One day, Bob ate these foods:

breakfast:
- 1 cup orange juice
- 1 slice toast (enriched white bread) with 1/2 tablespoon margarine

snack:
- 1 apple

lunch:
- 1/2 cup tuna salad (2 oz. tuna, 1 tablespoon mayonnaise, chopped celery)
- 2 slices whole wheat bread
- 1 medium carrot
- 10 potato chips
- 1 cup 2% milk
- 1 cup ice cream

snack:
- 2 Fig Newtons
- 8 ounces cola

dinner:
- 1 baked potato
- 2 tablespoons sour cream
- 1 pork chop (three ounces)
- 1/2 cup green beans
- 1 cup 2% milk
- 2/3 cup gelatin dessert (plain)

To evaluate the quality of his day's diet, we will use a chart like the ones included for members of your family. To complete this chart, we'll use a sample of the alphabetized list of foods.

	amount	IRON +prot	IRON +prot THI	IRON +B-VIT +fiber	CALCM +prot	VIT A	VIT C	energy rating
Apples, raw	2			1			2/3	3
Beans, snap:								
green, canned	1 cup			2		1/2		1
Breads:								
white, enriched	2 sl			1				3
whole wheat	1 sl			1				1
Celery, raw	1 cup							0
Carrots, fresh.	2 med			1		20.		1
Cola-type beverage	1 cup							2
Cookies:								
Fig Newtons	1			1				1
Gelatin dessert	2/3 cup.							2
Ice cream	1 cup				1			5
Margarine, regular	2 T					1		4
Mayonnaise	1 T							2
Milk:								
2%, fortified.	1 cup				3	1/2		2
Orange juice	1 cup					1/2	4	2
Pork, including ham:								
Roasted, lean & fat	1 oz.		1					2
Potato chips	20.			1				5
Potatoes, cooked:								
Baked	1 med			1			1	2
Tuna, canned	2 oz.	1						1

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A personal guide to good nutrition for Bob

IRON +prot	IRON +prot +THI	IRON +B-VIT +fiber	CALCIUM +prot	VIT A	VIT C	energy only	energy rating
tuna	pork chop	toast; apple	milk	orange juice; carrot	orange juice	mayonnaise	2 orange juice
pork chop		whole wheat bread	milk	carrot	orange juice	cola	1½ whole wheat bread - one slice
pork chop		whole wheat bread	milk	carrot	orange juice	sour cream	½ margarine
		carrot; potato chips	ice cream	carrot	orange juice	jello	1½ one apple
		Fig Newton	milk	carrot	1 apple		1 tuna
		Fig Newton	milk	carrot	potato		2 mayonnaise
		potato	milk	carrot			0 celery
		green beans		carrot			2 two slices whole wheat
				carrot			½ one carrot
				carrot			2½ potato chips
				carrot			2 milk
							5 ice cream
							2 Fig Newtons
							2 cola
							2 potato
							1 sour cream
							6 pork chop
							½ green beans
							2 milk
							2 jello

total: 38 X 50 = 1900 (kcals)

Each block represents one exchange. The alphabetized food list tells you how many exchanges are filled by each food you eat. This personal guide is designed especially for someone your age and sex. For a balanced diet, try to fill every block.

Let's start with Bob's breakfast. The alphabetized food list tells us that one cup of orange juice fills half an exchange of vitamin A and four exchanges of vitamin C. We've written orange juice on Bob's chart in the vitamin A and vitamin C categories. (Notice that he has already exceeded the amount of vitamin C recommended for him. There's nothing wrong with getting some extra vitamin C from foods. Nor is there any reason to avoid vitamin C foods for the rest of the day).

Bob also ate one slice of enriched toast. The alphabetized food list tells us that two slices of enriched bread equal one exchange in the IRON-B-VITAMIN-fiber (I-B-VIT) column, so one slice fills half an exchange in the third column of Bob's personal guide. We also divide the energy rating in half. (Look at the last column and compare the energy rating we recorded with the energy rating on the alphabetized list).

The margarine on his toast is only 1/4 the amount listed so he gets 1/4 of the vitamin A exchange listed and 1/4 of the energy rating. (Again, compare our entries on the personal guide with the values on the food list.)

Look next at Bob's lunch menu, which includes a carrot. Since our food list says two medium carrots equal 20 vitamin A exchanges, one carrot would equal 10. To show just how far beyond Bob's vitamin A recommendation this is, we've written "carrot" in eight imaginary blocks. Again, there's no reason to worry about his exceeding his recommended vitamin A exchanges. Food sources of vitamin A are not likely to cause him any trouble.

Look at the energy-rating column. Celery gets an energy rating of zero. Celery does contain some energy (or calories) but not enough to earn an energy rating.

The mayonnaise, cola, and gelatin appear in the energy-only column because they do not provide enough nutrients to be included in any of the nutrient categories. They do, however, provide calories, so their energy ratings must be listed in the last column.

Next, skip down to the pork chop. A three-ounce pork chop is three IRON-protein-THIAMIN (I-pro-THI) exchanges, but Bob only needs one exchange here so we've put the other two in the IRON-protein (I-pro) group. We can do this because exchanges from the two groups contain about the same amount of iron and protein.

Any I-pro-THI exchange can also be an I-pro exchange. But a food from the I-pro list cannot replace an I-pro-THI food because I-pro foods don't contain enough thiamin.

There is no I-pro-THI recommendation for some people. Thiamin recommendations are affected by calorie needs, so people who have lower calorie needs get enough thiamin from the I-B-VIT foods. They don't have to eat foods from the I-pro-THI group unless they want to. And if they do eat them, they can count them as I-pro exchanges.

After finding a place for each of the foods Bob consumed and recording all the energy ratings, we can take a look at the whole picture. It looks as though Bob is eating quite well. If he had a bedtime snack from the I-B-VIT list, he would fill every block on his chart.

Bob's total energy score is 38. We take this times 50 to find out how many kilocalories Bob consumed: 1900.

The kilocalorie RDA for a boy Bob's age is 2400. But this is an average and varies considerably from one child to the next. Perhaps Bob is smaller or less active than other children from this age group. At any rate, if he isn't hungry and has filled his nutrient needs, there is no reason for him to eat more.

If you fill your nutrient recommendations before you fill your energy (calorie) needs, you must decide how to get the calories you still need. It would be possible to get these calories from energy-only foods like candy and colas. But these foods are often high in fat and sugar. A better idea is to choose foods from several of the exchange lists so that you are still getting a balance of all the nutrients. In Bob's case, additional food from one of the first three groups would make sense.

On the other hand, you may get more calories than you need as you fill the exchange blocks. Then it's time to substitute low-energy exchanges for some of the high-energy foods you are eating.

Study Bob's chart carefully, until you understand how it was filled out.

A personal guide to good nutrition for You

Now it's time to look at your own food habits. Find the chart we've enclosed for you. If you have older children, they might enjoy filling out theirs, too. Before you begin, you might want to trace several copies of each of your charts so you'll be able to do this again.

These charts can be used either to find out what you have eaten or to plan what you will eat. It's not necessary to fill out these charts every day, but we do hope you'll do it several times. We think it will help you get a clear picture of what a

balanced diet is. And, we hope you'll come back to these charts every few weeks to refresh your memories and check on your eating habits.

When we used these charts to look at our eating habits, we had to estimate some quantities of foods. You may have to do some estimating, too. Also, some foods you eat may not be on the list. Tell us what these are and we'll try to give you the information you need. In the meantime, try comparing the ingredient or nutrition labels of foods not on our lists to the labels of foods which are listed. That may help you make judgments about nutrient content.

Your calorie totals won't come out exactly the same as they do in calorie-counting books, but they will be a close estimate. To get a simple, useful energy rating, we rounded off the exact kilocalories. For example, an energy rating of one counts as 50 kilocalories, but it includes foods having from 25 to 74 kilocalories; an energy rating of two counts as 100 kilocalories but includes foods with 75 to 124 kilocalories, and so forth. Some foods you eat will have a few more calories than the energy rating says and others will have fewer. In the end, these slight differences will probably cancel each other out.

In the appendix you'll find a table telling you how to change the personal guides for your children as they grow older and their nutrient needs change.

The Nutrient Guide is new. We hope you'll soon tell us how it works for you. Your evaluations are essential to the development of a sound nutrition education program.

NUTRIENT GUIDE

INCLUDES:

Exchange lists for six nutrient catagories

Alphabetized food list

Table of recommended exchanges

Personal guides to good nutrition

Exchange Lists

The nutrients which are most often low in U.S. diets are in capitals for emphasis.

All of these foods are prepared as you would eat them unless otherwise indicated. For example, the meat and frozen vegetables are cooked. 'Home' indicates that the food is homemade. Soups are made with water unless otherwise indicated.

Information is based on food composition data from Home and Garden Bulletin number 72, U.S.D.A. and food manufacturers product data.

1. IRON+protein Exchange List

(1 mg. iron, 8 gm. protein per exchange)

	Exchange Size	Energy Rating
Beef, lean; Veal; Liver; Heart; Canned shrimp or sardines**; Steamed scallops	1 oz.	1
Beef & vegetable stew	1/3 cup	1
Lamb; Turkey; Tuna	2 oz.	2
Cheeseburger, plain (3 oz. patty & 1 oz. cheese)	1/4	2
Chicken and dumplings*; Chili*; Lasagne* Stroganoff*; Chop suey with beef and pork (home)	1/4 cup	2
Tuna and rice casserole*; Chicken and noodles; Chicken chow mein (home)	1/3 cup	2
French toast**	1 slice	2
Eggs (any style)	1 egg	2
Salmon, canned	3 oz.	2
Frankfurters (8/lb.)	1	3
Chicken, fried or boneless canned	3 oz.	3
9" beef or chicken pot pie (home)	1/12 pie	3
Chicken-a-la-king*	1/3 cup	3
Bologna (1 oz. slice)	2 slices	3
Crabmeat, canned	1 cup	3

*Based on recipes published in Better Homes and Gardens and Betty Crocker cookbooks.

**contains calcium also

	Exchange Size	Energy Rating
Almonds; Peanuts; Pumpkin or squash kernels	1/4 cup	4
Tuna-noodle casserole*; Turkey-noodle casserole*; Macaroni & cheese (home)	1/2 cup	4
Perch, fried; Baked sole or halibut	3 oz.	4
Tomato soup (with milk)	1 cup	4
Peanut butter	3 Tbsp.	6
Custard, pumpkin or banana cream pie	1/7 pie	6
Custard	1 cup	6

*Based on recipes published in Better Homes and Gardens and Betty Crocker cookbooks.

2. IRON+protein+THIAMIN Exchange List

(1 mg. iron, 8 gm. protein, .2 mg. thiamin per exchange)

	Exchange Size	Energy Rating
Pork (incl ham), lean only	1 oz.	1
Pork (incl ham), lean and fat	1 oz.	2
Mature (dry) beans and peas, cooked (including bean soup)	1/2 cup	2
Hard roll; Bagel	1	3
Baked beans; Pork and Beans	1/2 cup	3
Macaroni (enriched); Spaghetti (enriched)	1 cup	3
Bacon	4 slices	3
Pizza (12")	1/8	3
Muffins (plain)	2	3
Pretzels (thin twisted)	10	3
Cashews; Sunflower seed kernels;	1/4	4
Post Grapenuts	1/2 cup	4
Pork link sausage	3	4
Waffle (7")	1	4
Sausage pizza (12")	1/4	6
Pecans; Walnuts; Hazel nuts (Filberts)	1/2 cup	8

3. IRON+loprotein+THIAMIN+niacin+riboflavin+fiber Exchange List

(1 mg. iron, 1 gm. protein, .1 mg thiamin)

	Exchange Size	Energy Rating
Fruits		
Dried prunes (large)	2	1
Strawberries; Blueberries; Apple juice	1/2 cup	1
Peaches (fresh); Raspberries; Watermelon cubes	1 cup	1
Dried apricots or peaches; Raisins	1/4 cup	2
Prune juice	1/2 cup	2
Blackberries; Pineapple, raw; Sour cherries (waterpack)	1 cup	2
Banana; Grapefruit	1	2
Cantaloupe	1/2	2
Honeydew melon	1/5	2
Peaches (fresh)	2	2
Plums	3	2
Apricots (fresh)	6	2
Tangerines	3	3
Frozen, sweetened strawberries	1/2 cup	3
Cranberry juice; Grapefruit juice (sweetened); Grape juice	1 cup	3
Orange; Apple; Pear	2	3
Sweet cherries	30	3
Peaches, frozen (sweetened); Canned applesauce, apricots, fruit cocktail, grapefruit sections, peaches, pineapple	1 cup	4
Vegetables		
Spinach, cooked; Beet greens, cooked	1/4 cup	0**
Asparagus; Tomato juice; Mustard greens	1/3 cup	0**
Green beans, canned; Bean sprouts, raw; Kale; Turnip greens; Dandelion greens	1/2 cup	0**
Looseleaf lettuce (e.g. Romaine)	1 cup	0**
Lettuce, Butterhead or crisphead	1/4 head	0**

**If consumed in larger quantities, energy value would be significant. Count rating of "1" for every four exchanges.

Mixed vegetables	1/3 cup	1
Brussels sprouts; Collards; Peas (canned or frozen); Winter squash (deep yellow)	1/2 cup	1
Green beans, fresh or frozen; Yellow wax beans; Bean sprouts, cooked; Beets; Broccoli, fresh or frozen; Brussels sprouts; Carrots; Cauliflower; Onions, cooked; Saurkraut; Summer squash; Tomatoes, canned	1 cup	1
Carrots, raw (medium); Green peppers; Tomatoes	2	1
Potato, baked or boiled	1	2
Corn, cream style; Parsnips; Canned pumpkin	1 cup	2
Hashed brown potatoes; Potato salad; Sweet potato	1/2 cup	3
Corn, canned or frozen; Mashed potatoes (from fresh potatoes)	1 cup	3
Sweet potato, baked or boiled	1	3
Corn on the cob (5" ears)	2	3
French fries (home or frozen, oven heated)	10	3
Potato chips	20	8

Breads

Muffins, bran	1/2	1
Whole wheat bread	1 slice	1
Enriched French; Enriched Italian; Enriched pumpernickle; Hamburger or hot dog bun; Homemade roll	1	2
Muffins, corn	1	3
Muffins, blueberry	2	3
Enriched rye bread; Pancakes (home) (4"); Enriched white, enriched cracked wheat, Enriched Vienna, Enriched raisin bread; Brown and serve or cloverleaf or pan rolls	2	3
Pumpkin bread (32 slices/loaf)	1	4
Muffins, plain, mix	2	5

*Based on recipes published in Better Homes and Gardens and Betty Crocker cookbooks.

**If consumed in larger quantities, energy value would be significant. Count rating of "1" for every four exchanges.

Cereals

Kellogg's All bran; Nabisco and Kellogg's Bran Flakes; Kellogg's Special K	1/4 cup	0**
Oatmeal	1/2 cup	1
Post: 40% Bran Flakes, Fortified Oat Flakes, Raisin Bran; General Mills: Wheaties, Presweetened cereals, Cherrios, Corn Flakes, Total; Kellogg's cereals: Raisin Bran, Presweetened; Maltomeal; Cream of wheat	1/4 cup	1
Post Grapenut Flakes, and Product 19	1/3 cup	1
Kellogg's Rice Krispies, Corn Flakes; Nabisco Spoon-sized Shredded Wheat	2/3 cup	2
Post presweetened cereals	1 cup	2
Kellogg's Country Morning Granola and General Mills Nature Valley Granola	1/3 cup	3

Mixed Dishes, etc.

Beef-noodle soup	1 cup	1
Spaghetti with meat balls (or cheese sauce); Spanish Rice*; Lasagna*	1/4	2
Enriched egg noodles; Enriched rice	1/2 cup	2
Tomato, vegetable-beef, or vegetarian soup; Clam chowder (Manhattan)	1 cup	2
Brazil nuts	6-8 lg.	4
Scalloped potatoes*	1 cup	7

*Based on recipes published in Better Homes and Gardens and Betty Crocker cookbooks.

**If consumed in larger quantities, energy value would be significant. Count rating of "1" for every four exchanges.

Crackers and Cookies

1 Fig Newton; 1/3 Carnation Breakfast Bar; 1/3 General Mills' Breakfast Squares	1
4 Graham crackers (2-1/2" sq)	2
26 Nabisco Cheese Nips; 3 Oreos; 9 Nabisco Ritz; 14 Nabisco Sociables; 7 Triscuits; 16 Wheat Thins; 3 Nabisco Chips Ahoy; 2 Nabisco Oatmeal Cookies; 1/2 piece blueberry pie	3
1/12 General Mills' angel food cake; 2 brownies (home) or cake doughnuts; 1/2 piece (1/14) mince pie; 1 piece (2-3/4" square) gingerbread; 4 chocolate chip cookies	4
1 piece Plain cake (3" square)	6
3 plain cupcakes; 2 frosted (chocolate) cupcakes; 20 vanilla wafers; 1 piece (1/16); chocolate cake or cake with chocolate icing	7

4. CALCIUM+protein Exchange List

(140 mg. calcium, 4 gm. protein per exchange)

	Exchange Size	Energy Rating
Parmesan cheese (grated); Nonfat dry milk powder	2 Tbsp	1
Evaporated milk, whole or skim	1/4 cup	1
Plain yogurt (lowfat or skim milk); Skim 1%, and 2% milk; Buttermilk	1/2 cup	1
Swiss cheese	1/2 oz.	2
Cheese: Cheddar, Blue, Provalone, Mozarella Pasturized Processed American, Pasturized Processed Cheese Food, Velveeta	1 oz.	2
Carnation Instant Cocoa Mix (1 oz. pkg)	1	2
Malted milk; Milkshake; Low fat yogurt with fruit; Whole milk; Chocolate milk**; Soft serve ice milk	1/2 cup	2
Carnation Instant Breakfast (without added milk)	1 pkg.	2
Pancakes: plain or buckwheat from mix	2	2
Plain, homemade	4	2
Salmon, canned (including bones)	3 oz.	2
Lasagne*	1/4 cup	3
Eggnog (commercial); Pudding,** regular or instant from mix or homemade vanilla; Custard; Scalloped potatoes; Del Monte Pudding Cup; Half and Half cream	1/2 cup	3
Macaroni and cheese*; Turkey noodle casserole*; White sauce (medium)	1/2 cup	4
Cottage cheese; Ice milk; Cream of chicken or mushroom or tomato soup made with milk	1 cup	4
Waffle (mix); General Mills' Breakfast Square	1	4
Bran muffins	2	4
Ice cream; Sherbet; Baked beans*; Macaroni and cheese (canned)	1 cup	5

*Based on recipes published in Better Homes and Gardens and Betty Crocker ccokbooks.

**Also contains 1 mg of iron

Pizza (12")	1/4	6
Creamed chipped beef on toast (1 slice)	1/2 cup	6
Kraft Macaroni and Cheese or Macaroni and Cheese Delux Dinner	3/4 cup	6
Custard pie	1/7 pie	6
Canned white beans with pork and tomato sauce; Tuna and rice casserole*;	1 cup	6
Biscuits (2" homemade); Boston brown bread (slices)	3	6
Ice cream (rich-16% butter fat); Spaghetti with meat balls (homemade); Chicken-a-la-king*; Tuna noodle casserole*; Betty Crocker Ready-To-Serve Pudding	1 cup	7
Hunt-Wesson Pudding Pack (5 oz. each)	2 packs	7
Gingerbread (2-3/4" square)	2 pieces	7
Muffins, blueberry, plain or corn	3	7
Betty Crocker layer cake (unfrosted)	1/6	8
Almonds	1/2 cup	8
Cheeseburger, plain (3 oz. meat and 1 oz. cheese)	1/2	8
Canned white beans with pork and sweet sauce; Chocolate pudding (home)	1 cup	8

*Based on recipes published in Better Homes and Gardens and Betty Crocker cookbooks.

5. VITAMIN A Exchange List

(1000 I.U. vitamin A)

	Exchange Size	Energy Rating
Cantaloupe (8 slices/melon)	1/3 slice	0**
Carrots; Greens (collards, dandelion, spinach, turnip, beet, mustard, kale); Pumpkin; Winter squash (yellow); Sweet potato	1 Tbsp.	0**
Kellogg's Product 19; General Mills' Total; Mixed vegetables	2 Tbsp.	0**
Broccoli; Raw, chopped parsley	1/4 cup	0**
Tomato juice	1/2 cup	0**
Loose leaf lettuce (other than head)	1 cup	0**
Apricot, fresh or dried halves	2	0**
Liver***; Braunschweiger (liver sausage)	1/2 oz.	1
Pumpkin pie (9", 7 pieces)	1/4 piece	1
Apricots, canned; Campbell's Chunky Beef Soup	3 Tbsp.	1
Peaches, dried (cooked); Purple plums (canned); Vegetarian vegetable soup; Campbell's Chunky Minestrone soup; Post Grapenuts	1/4 cup	1
Beef & vegetable soup or stew; Apricot nectar; Peaches, fresh sliced; Tomatoes, canned; Post Raisin Bran; Kellogg's All Bran	1/3 cup	1
Cherries (sour red); Kellogg's Raisin Bran	1/2 cup	1
Watermelon; Asparagus; Brussels sprouts; Summer squash; Campbell's Chili Beef Chunky Soup	1 cup	1
Peach, fresh; Tomato, fresh	1	1
Green beans	2 cups	1
Peaches, frozen (sweetened); Post 40% Bran Flakes or Fortified Oat Flakes	1/2 cup	2
Peas, green; Clam chowder (tomato base); Tomato soup (with water); Post cereals: presweetened, Grapenut flakes Honeycomb, Post Toasties; General Mills' cereals: Wheaties, Presweetened; Kellogg's cereals: All Bran, Corn Flakes, Special K, Cherrios, Corn Flakes, Presweetened cereals	1 cup	2
Grapefruit (pink or red)	1 fruit	2
Tangerines	3 fruits	2

**If consumed in larger quantities, energy value would be significant. Count rating of "1" for every four exchanges.

***1/2 oz. of liver is equivalent to 15 vitamin A exchanges

Carnation Instant Breakfast	1 pkg.	3
Tang, Start breakfast drinks	1/2 cup	3
Fortified skim milk	2 cups	3
Chicken pot pie	1/12 pie	3
Cheese pizza (12" pizza)	1/4 pizza	4
Butter; Margarine regular	2 Tbsp.	4
whipped	3 Tbsp.	4
Chili*; Lasagne*; Spanish rice*	1/2 cup	4
Peaches, canned; Dried prunes, cooked (unsweetened); Creamstyle corn; tomato soup (with milk); Spaghetti, canned	1 cup	4
Fortified 1% milk	2 cups	4
Pumpkin bread* (32 slices/loaf)	1 slice	4
Carnation Breakfast Bar	1 bar	4
1% (lowfat) milk; fortified skim milk (milk solids added); Corn, frozen; Cream of chicken soup (with water); Orange juice, frozen (reconstituted)	2 cups	4
Cream cheese	2 oz.	4
Dried prunes, large	10	4
Beef pot pie (9" home)	1/6 pie	5
Spaghetti with sauce (home)	1 cup	5
Fortified 2% milk	2 cups	5
Cheddar cheese	3 oz.	6
Pizza (12")	1/4 pizza	6
Custard	1 cup	6
2% milk (fortified); 1% choclolate milk (fortified); Corn, canned; Split pea soup	2 cups	6
Eggs	4	6
Peach pie (7 pieces/pie)	1 piece	7
Cream, light	1/2 cup	7
Eggnog (commercial); Ice cream, rich (16% B.F.); Spaghetti with meat balls; Chicken-a-la-king*; Turkey noodle casserole*	1 cup	7
2% chocolate milk; Cream of chicken soup (with milk); Bean and pork soup	2 cups	7
French toast	3 slices	7
White sauce, medium; 3-bean salad*	1 cup	8
Lima beans (baby)	2 cups	8
General Mills' Breakfast Squares	2 squares	8

*Based on recipes published in Better Homes and Gardens and Betty Crocker cookbooks.

6. VITAMIN C Exchange List

(25 mg. vitamin C)

	Exchange Size	Energy Rating
Brussels sprouts	1 sprout	0**
Cantaloupe (8 slices/melon)	1 slice	0**
Orange; Raw green pepper; Mustard and turnip greens	1/3	0**
Strawberries, fresh; Broccoli; Brussels sprouts; Cauliflower; Chopped parsley; Lemon juice	1/4 cup	0**
Asparagas (frozen); Spinach (frozen or fresh); Cabbage (finely shredded or cooked); Kale	1/2 cup	0**
Orange or grapefruit juice; Orange sections; Start, Tang breakfast drinks; Kellogg's Product 19	1/4 cup	1
Grapefruit	1/4 fruit	1
Grapefruit sections, canned; General Mills' Total	1/3 cup	1
Nabisco 100% Bran Flakes; Tomato, canned	1/2 cup	1
Tangerine; Tomato, raw; Honeydew melon (10 slices/melon)	1	1
Raspberries (fresh); Raw bean sprouts; Beet greens; Saurkraut; Summer squash; Tomato juice; Turnip, diced and cooked	1 cup	1
Blueberries; Blackberries; Pineapple, raw; Watermelon cubes; Green peas (fresh or frozen)	1 cup	2
Apricots (fresh)	6	2
Potato (medium), baked or boiled	1	2
Apricot nectar; Fortified grape drink; Mashed potatoes (from fresh potatoes); Winter squash (yellow)	1 cup	3
Carnation Instant Breakfast (without milk)	1 pkg.	3
Sweet cherries #54 30		3

**If consumed in larger quantities, energy value would be significant. Count rating of "1" for every four exchanges.

Chili*; Spanish rice*	1/2 cup	4
Lima beans (baby); Campbell's Chunky Chili Beef Soup	1 cup	4
Lemonade, frozen reconstituted; Sour cherries	2 cups	4
Bananas	2	4
Liver	3 oz.	4
French fries (frozen, oven heated)	20	5
Apples, medium	3	5
Chop suey with beef and pork; sweet potatoes	1 cup	6
Spaghetti with meat balls; Chicken a-la-king*; Scalloped potatoes*	1 cup	7
Potato salad	1 cup	8

*Based on recipes published in Better Homes and Gardens and Betty Crocker cookbooks.

7. Fiber List

Celery
Cucumber slices
Raw onions
Radishes
Dill pickles

8. Energy only List

Each contains about 100 kcal or an energy rating of 2

	Exchange Size
Popcorn, popped, plain	4 cups
Popcorn, popped with oil	2-1/2 cups
Ginger ale	1-1/2 cups
Root beer, cola	1 cup
Sugar-coated popcorn; Gelatin dessert	3/4 cup
Whipped topping, from powder	2/3 cup
Frozen whipped topping; Pears, canned; Chow mein noodles	1/2 cup
Low calorie salad dressing; sweet pickle relish	7 Tbsp.
Sour cream	4 Tbsp.
Powdered creamer	3 Tbsp.
Jams, preserves, jellies; brown or white sugar; Whipping cream, light (unwhipped)	1-1/2 Tbsp
Vegetable oil (salad or cooking); Lard; Mayonnaise	1 Tbsp.
Candy	1 oz.
Gin, Rum, vodka or whisky	1-1/2 fl. oz. (jigger)
Wine, dessert	2-1/2 fl. oz.
Grapes	25
Olives	28 med
Sweet pickles	5
Popsicle	1
Beer	1 cup (8 oz.)
French fries (Fast Food)	1/2 order

	amount	IRON + prot	IRON + prot + THI	IRON + B-VIT + fiber	CALCM + prot	VIT A	VIT C	energy rating
Almonds, shelled	1/2 cup	2			1			8
Applejuice, bottled or canned	1 cup			2				2
Apples, raw.	2			1			2/3	3
Applesauce, canned	1 cup			1				4
Apricot nectar, canned	1 cup					3	.1	3
Apricots, canned	1 cup			1		5		4
dried	1/2 cup			2		7		4
raw.	6			1		6	.1	2
Asparagus, canned; frozen	1 cup			1		1	.2	1
Bacon, cooked.	4 sl		1					3
Bagels	1		1					3
Banana, raw.	1			1			1/2	2
Beans, dry:								
Baked beans, Pork & Beans	1/2 cup		1					2
Lima, baby	1 cup.			4		1/2	1	4
Snap:								
green, canned.	1 cup.			2		1/2		1
green, fresh or frozen	1 cup.			1		1/2		1
yellow wax, canned	1 cup.			2				1
yellow, fresh or frozen	1 cup.			1				1
Cooked with tomato, pork & frank	1/2 cup		1					2
Bean salad - three bean.	1 cup.			4		.1		8
Bean sprouts (mung) raw:	1 cup.			2			.1	1
Cooked or canned	1 cup.			1				1
Beef, lean cooked.	1 oz.	.1						1
Beef & vegetable stew.	1/3 cup	.1				.1		1
Beef potpie, 9".	1/6	2				.1		5
Beer	1 cup.							2
Beet greens, cooked.	1 cup.			4		.8	.1	2
Beets, canned; cooked	1 cup.			1				1
Biscuits, baking powder.	3				1			6
Blackberries, raw.	1 cup.			1			.1	2
Blueberries, raw	1 cup.			2			.1	2
Bologna.	2 sl	.1						3
Braunschweiger	1 oz					.2		2
Brazil nuts.	6-8 lg.			1				4
Breads:								
cracked wheat.	2 sl			1				3
French, enriched	1 sl			1				2
pumpernickle, enriched	1 sl			1				2
raisin, enriched.	2 sl			1				3
rye, enriched.	2 sl			1				3
Vienna, enriched	2 sl			1				3
white, enriched.	2 sl			1				3
whole wheat.	1 sl			1				1
Breakfast cereals:								
Hot type, cooked								
Cream of Wheat	1/4cup.			1				4
Malt-O-Meal.	1/4cup.			1				4
Oatmeal.	1/2cup.			1				2
Ready-to-eat								
Post								
Grapenuts.	1/2cup		1			.2		4
40% Bran Flakes.	1 cup			4		.2		4
Fortified Oat Flakes	1 cup			4		.2		4
Raisin Bran.	1 cup			4		.3		4
Product 19	1 cup			3		.8	.4	3
Presweetened	1 cup			1		.1		2
Grapenut Flakes.	1 cup			3		.1		2
Honeycomb	1 cup					.1		2
Post Toasties.	1 cup					.1		2
Kelloggs								
All Bran	1 cup			4		3		4
Bran Flakes.	1 cup			4		1/2		2
Special K	1 cup			4		1		2
Raisin Bran	1 cup			4		2		4
Presweetened	1 cup			4		1		4

	amount	IRON + prot	IRON + prot + THI	IRON + B-VIT + fiber	CALCM + prot	VIT A	VIT C	energy rating
Rice Krispies	1 cup			2		1		2
Corn Flakes	1 cup			2		1		2
Country Morning	1 cup			3				8
Nabisco								
100% Bran Flakes	1 cup			4			2	3
Spoonsized Shredded Wheat	2/3cup			1				2
General Mills								
Wheaties	1 cup			4		1		4
Cheerios	1 cup			4		1		4
Corn Flakes	1 cup			4		1		4
Total	1 cup			4		8	3	4
Presweetened	1 cup			4		1		4
Nature Valley	1 cup			3				8
Breakfast substitutes:								
Carnation Breakfast Bar	1			3		1		4
G.M. Breakfast Square	1			3	1	1/2		4
Carnation Instant Breakfast	1 pkg			4	1	1		3
Broccoli, cooked	1 cup			1		4	4	1
Brussels sprouts, cooked	1 cup			1		1	7	1
Butter	2 T					1		4
Buttermilk . (See Milk)								
Cabbage, green, cooked, raw	1/2cup						1	0
Cakes								
Angel (General Mills)	1/12			1				4
Cupcake, plain	3			1				7
" with chocolate frosting	2			1				7
Chocolate cake	1/16			1				7
Gingerbread (2 3/4" sq)	2			2	1			8
Layer, plain (Betty Crocker)	1/16			1				8
3" square	1			1				7
" with chocolate frosting	1/16			1				2
Candy	1 oz			1				2
Cantaloupe	1/2			1		12	4	1
Carrots, cooked or canned	1 cup			1		16		1
fresh	2 med			1		20		4
Cashew nuts, roasted	1/4cup		1					1
Cauliflower, raw; cooked	1 cup			1			4	0
Celery, raw, diced	1 cup							
Cheese								
Cottage, creamed	1 cup				1	1		5
Blue	1 oz				1			2
Cheddar	3 oz				3	1		6
Mozarella	1 oz				1			2
Parmesan, grated	2 T				1			1
Provalone	1 oz				1			2
Pasteurized (processed American)	1 oz				1			2
Pasteurized processed cheese food	1 oz				1			2
Velveeta	1 oz				1			2
Swiss	1/2oz				1			2
Cream	2 oz					1		4
Cheeseburger	1	4			2			8
Cherries, sour	1 cup			1		2	1/2	2
Cherries, sweet	30			1			1	3
Chicken, canned or cooked	3 oz	1						3
Chicken a la king*	1 cup	3			1	1	1	8
Chicken and dumplings*	1 cup	4						8
Chicken and noodles*	1/3cup	1						3
Chicken potpie, 9 in	1/6	2				2		5
Chili con carne with beans*	1/2cup	2				1	1	4
Chocolate milk. (See Milk, chocolate.)								
Chop Suey	1 cup	4					1	6
Chow mein, chicken	1/3cup	1						2
Clam chowder, Manhattan style	1 cup			1				2
Cocoa, Carnation Instant	1 pkg				1			2
Cola-type beverages	1 cup							2
Collards, cooked	1/2cup			1		8	1	1
Cookies								
Fig Newton	1			1				1
Oreos	3			1				3

Based on recipes published in Better Homes and Gardens and Betty Crocker cookbooks.

	amount	IRON + prot	IRON + prot + THI	IRON +B-VIT + fiber	CALCM + prot	VIT A	VIT C	energy rating
Cookies (continued)								
Chips Ahoy	3.			1				3
Nabisco Oatmeal Cookies	2.			1				3
Brownies (homemade)	2.			1				4
Chocolate Chip (homemade)	4.			1				4
Vanilla Wafers	20.			1				7
Corn, canned	1 cup.			1		1/2.		3
cob (5")	2 ears			1		1		3
cream style	1 cup.			1		1		4
frozen	1 cup.			1		1/2.		3
Crabmeat, canned	1 cup.	1						3
Crackers								
Graham (2½" sq.)	4.			1				2
Nabisco Cheese Nips	26.			1				3
" Ritz	9.			1				3
" Sociables	14.			1				3
" Triscuit	7.			1				3
" Wheat Thins	16.			1				3
Rye Wafers	4.			1				2
Saltines	8.			1				2
Cranberry juice cocktail	1 cup.			1				3
Cream:								
Half-and-half	1/2cup.				1			3
Light, coffee, or table	1/2cup.				1			5
Sour	4 T.							2
Whipped topping	2/3cup.							2
Cream products, imitation:								
Creamers, liquid; powdered	3 T.							2
Whipped topping, frozen	1/2cup.							2
Creamed chipped beef on toast	1/2cup.				1			6
Custard, baked	1 cup.	1			2	1		6
Dandelion greens, cooked	1 cup.			.1/2.		.16	1/2.	1
Doughnuts, cake, enriched	2.			.1/2*				4
raised, enriched	1.			.1/2*				4
Eggnog	1 cup.				2	1		7
Eggs, cooked, any style	2.	2				1/2.		3
Filberts (hazelnuts)	1/2cup.		1					8
Frankfurters (8/lb)	1.	1						3
Fruit cocktail, canned	1 cup.			1				4
Fruit-flavored soda beverage	1 cup.							2
Gelatin dessert	2/3cup.							2
Gin	1 1/2oz.							2
Ginger ale	1 1/2 cup							2
Grape drink, canned	1 cup.						1	3
Grapefruit, raw, pink or red	1.			1		1	4	2
canned	1 cup.			1			3	4
Grapefruit juice, sweetened	1 cup.			1			4	3
Grape juice (not fortified)								
Canned, bottled or frozen	1 cup.			1				3
Grapes, raw	25.							2
Halibut, baked	3 oz	1						4
Ham, lean only	1 oz		1					1
lean and fat	1 oz		1					2
Hazelnuts (filberts)	1/2cup.		1					8
Heart, beef	1 oz	1						1
Honey	1 1/2T.							1
Honeydew melon	1/5			1			2	2
Ice cream	1 cup.				1			5
Ice milk	1 cup.				1			4
soft serve	1 cup.				2			4
Jams and preserves	2 T.							2
Jellies	2 T.							2
Kale, cooked	1/2cup.			1		8	1	0

**Doughnuts made with unenriched flour do not contain these nutrients. Many doughnuts made in Iowa are not made with enriched flour.*

	amount	IRON + prot	IRON + prot + THI	IRON +B-VIT + fiber	CALCM + prot	VIT A	VIT C	energy rating
Lamb, cooked	2.oz.	1						2
Lard	1 T.							2
Lasagne*	1 cup.			4	4	2		8
Lemonade, frozen, reconstituted.	2 cup.						1	4
Lemon juice.	1/4cup.						1	0
Lettuce, crisp head.	1/4 hd.			1				0
leaf (e.g. romaine)	1 cup.			1		1		0
	1 oz	1				15	1/3	1
Macaroni, cooked	1 cup.		1					3
Macaroni and cheese:								
Canned	1 cup.				1			5
From home recipe*	1/2cup.	1			1			4
Kraft Regular.	3/4cup.				1			6
Kraft Cheese Deluxe.	3/4cup.				1			6
Malted Milk beverages.	1 cup.				2			4
Margarine, regular	2 T.					1		4
whipped	3 T.					1		4
Mayonnaise	1 T.							2
Milk:								
Buttermilk	1 cup.				2			2
Chocolate 1% (fortified)	1 cup.				2	1/2		3
2% (fortified)	1 cup.				2	1/2		3
Regular	1 cup.				2			4
Evaporated, whole.	1/4cup.				1			1
skim (fortified)	1 cup.				3	1		3
1% (fortified)	1 cup.				3	1/2		2
2% (fortified)	1 cup.				3	1/2		2
Nonfat fluid	1 cup.				3	1/2		2
Nonfat dry powder.	2 T.				1			1
Whole, fluid	1 cup.				2			3
Milkshake.	1 cup.				2			4
Muffins:								
Blueberry.	3.		1 1/2		1			7
Bran	2.			4	1			4
Corn	3.			3	1			7
Plain.	3.		1 1/2		1			7
Mix.	2.		1		1			5
Muskmelons (see cantaloupe)								
Mustard greens, cooked	1/3cup.			1		5	1	0
Noodles, chow mein, canned	1/2cup.							2
Noodles(egg), cooked	1 cup.			2				4
Ocean perch, breaded, fried.	3 oz	1						4
Oils, salad or cooking	1 T.							2
Olives, green or ripe.	15.							1
Onions, cooked.	1 cup.			1				1
Orange juice; frozen, reconstituted	1 cup.					1/2	4	2
Oranges, raw	2.			1		1/2	6	2
Orange sections.	1 cup.			1		1/3	4	2
Pancakes: (4") homemade.	4.			2	1			4
mix	2.				1			2
Parsley, raw	1/4cup.					1	1	0
Parsnips, cooked	1 cup.			1				2
Peaches:								
Canned	1 cup.			1		1		4
Dried	1/4cup.			1		1		2
Frozen	1 cup.			1		2		4
Raw.	1 cup.			1		3		1
Peanut Butter.	3 T.	1						6
Peanuts:								
Roasted.	1/4cup.	1						4
Pears, canned.	1/2cup.							2
fresh	2.			1				3
Peas:								
Canned, frozen	1 cup.		2			1	1	2
Split, dry, cooked	1/2cup.		1					2
Pecans	1/2cup.		1					8

**Based on recipes published on Better Homes and Gardens and Betty Crocker cookbooks.*

	amount	IRON + prot	IRON + prot + THI	IRON + B-VIT + fiber	CALCM + prot	VIT A	VIT C	energy rating
Peppers:								
Sweet, raw	1 pod			1/2		1/3	3	1
Sweet, cooked	1 pod			1/2		1/3	3	1
Perch, fried	3 oz.	1						4
Pickle relish	7 T							2
Pie: Banana cream	1/7	1						6
Blueberry	1/7			2				6
Custard	1/7	1			1			6
Pumpkin	1/7	1				4		6
Mince	1/7			2				8
Peach	1/7					1		7
Pineapple, canned in heavy syrup	1 cup			1				4
raw	1 cup			1			1	2
Pizza, cheese	1/4		2		1	1		6
sausage	1/4		2	1	1	1		6
Plums, raw	3			1				2
Popcorn, popped, plain	4 cup							2
popped with oil	2 1/2cup							2
sugar coated	3/4cup							2
Popsicle	1							2
Pork: (including ham)								
Roasted, lean only	1 oz.		1					1
lean and fat	1 oz.		1					2
Pork sausage	3		1					4
Potato chips	20			1				5
Potatoes, cooked:								
Baked	1 med			1			1	2
Boiled	1 med			1			1	2
French fried	20			2			1	5
Hashed brown	1 cup			2				6
Mashed, from raw	1 cup			1			1	3
Scalloped*	1 cup				2		1	7
Potato salad	1 cup			2			1	6
Pretzels	10		1					3
Prune juice, canned or bottled	1 cup			2				4
Prunes, dried:								
Cooked	1 cup			4		1		5
Uncooked	10			5		1		4
Pudding:								
Instant mix	1 cup				2			6
Regular mix	1 cup				2			6
Homemade:								
Vanilla	1 cup				2			6
Chocolate	1 cup				1			8
Ready-to-eat:								
Betty Crocker	1 cup				1			7
Del Monte	1/2cup				1			3
Hunt Wesson	2 packs				1			7
Pumpkin, canned	1 cup			1		16		2
Pumpkin and squash seed kernels	1/4cup	1						4
Pumpkin bread	1 sl			1		1		4
Raisins, seedless	1/4cup			1				2
Raspberries, raw	1 cup			1			1	1
Rice:								
Cooked, enriched	1/2cup			1				2
Spanish rice*	1/2cup			1/2		1	1	4
Rolls: (enriched)								
Brown and serve	2			1				3
Commercial rolls	2			1				3
Hamburger bun	1			1				2
Homemade roll	1			1				2
Hot dog bun	1			1				2
Hard roll	1		1					3
Root beer	1 cup							2
Rum	1 1/2 oz.							2
Salad dressings:								
Commercial:								
Low calorie	7 T							2
Regular	1 T.							2

Based on recipes published in Better Homes and Gardens and Betty Crocker cookbooks.

	amount	IRON + prot	IRON + prot + THI	IRON + B-VIT + fiber	CALCM + prot	VIT A	VIT C	energy rating
Salmon, canned	3 oz.	1			1			2
Sardines, canned	1 oz.	1						1
Sauerkraut, canned	1 cup			1			1	1
Sausages, pork link	3		1					4
Scallops, steamed	1 oz.	1						1
Sherbet	1 cup				1			5
Shrimp, canned	1 oz.	1						1
Syrup, table blends	1 1/2 T.							2
Sole, baked	3 oz.	1						4
Soup, canned, condensed, prepared:								
Beef noodle	1 cup			1				1
Bean and pork	2 cups		4			1		7
Campbell's Chilli beef	1 cup			4		1	1	4
Campbell's Chunky beef	1 cup		2			5		4
Campbell's Chunky minestrone	1 cup	1				4		4
Cream of chicken (water)	2 cups	1				1		4
Cream of chicken (milk)	1 cup	1/2			1	1/2		4
Cream of mushroom (milk)	1 cup				1			4
Split pea	2 cups					1		6
Tomato (water)	1 cup			1		1		2
Tomato (milk)	1 cup	1			1	1		4
Vegetable beef	1 cup			1		3		2
Vegetarian	1 cup			1		4		2
Spaghetti, cooked	1 cup		1					3
Spaghetti in tomato sauce, cheese:								
Home recipe	1 cup			4		1		8
Spaghetti with meatballs and tomato sauce:	1 cup			4	1	1	1	7
Spinach, canned; cooked	1/2 cup			2		8	1	0
Squash, summer	1 cup			1		1	1	1
winter	1 cup			2		16	1	2
Strawberries, raw	1/2 cup			1			4	1
frozen, sweetened	1/2 cup			1			4	3
Stroganoff*	1 cup	4						8
Sugar, white or brown	2 T							2
Sunflower seeds, dry, hulled	1/2 cup		2					8
Sweetpotatoes:								
Baked or boiled	1			1		8		3
Canned, cooked	1 cup			2		16	1	6
Tang	1 cup					2	4	6
Tangerine, raw	3			1		1	3	3
Tomato juice	1 cup			3		2	1	2
Tomatoes, canned	1 cup			1		3	2	1
raw	2			1		2	1	1
Tuna, canned	2 oz.	1						1
Tuna noodle casserole*	1 cup	2			1			7
Tuna rice casserole*	1 cup	3			1			6
Turkey, roasted	2 oz.	1						1
Turkey noodle casserole *	1 cup	2			2	1		8
Turnip greens, cooked	1 cup			2		16	3	2
Turnips, cooked	1 cup			1/2			1	1
Veal, cooked	1 oz.	1						1
Vegetables, mixed, frozen, cooked	1 cup			3		8	1/2	2
Vodka	1 1/2 oz							2
Waffles (7 inch)	1		1		1			4
Walnuts:								
Black	1/2 cup		1					8
Persian (English)	1/2 cup		1					8
Watermelon, raw	1 cup			1		1	1	1
Whiskey	1 1/2 oz							2
White sauce, medium	1 cup				2	1		8
Wines, dessert	2 1/2 oz							2
table	4 oz.							2
Yogurt, plain, low fat or skim	1/3 cup				1			1
lowfat with fruit	1/2 cup				1			2

Based on recipies published in Better Homes and Gardens and Betty Crocker cookbooks.

YOUR FAMILY'S CHANGING NEEDS

As members of your family grow older, they will outgrow the personal guides provided for them in this lesson. You can adjust these personal guides to their changing needs by using the information in this table.

RECOMMENDED NUMBER OF EXCHANGES

	IRON +prot	IRON +prot +THI	IRON +B-VIT +fiber	CALCIUM +prot	VIT A	VIT C
Male & Female 1-3 years	3	-	9	5	2	2
Male & Female 4-7 years	3	-	9	5	3	2
Male & Female 7-10 years	3	1	9	5	3	2
Male 11-18 years	3	1	14	7	5	2
Male 19-50 years	2	2	10	4	5	2
Male 50+ years	3	1	9	4	5	2
Female 11-18 years	3	1	12	7	4	2
Female 19-50 years	4	-	10	4	4	2
Female 50+ years	2	1	8	4	4	2
Pregnant 19-50 years	4	1	14	7	5	3
Breast Feeding 19-50 years	3	1	14	7	5	3

Message Three

Nutrition

lesson three

More about the major nutrients

The two major nutrients we haven't yet discussed--fats and carbohydrates--are especially important as sources of energy. But each is vital to health in other ways, too.

Fats

Fats are our most concentrated source of energy (or calories). Each gram of fat provides nine kilocalories, compared to four kilocalories per gram for protein and carbohydrates.

All fats--animal and vegetable--have about the same number of calories per ounce. It makes no difference in energy whether you put butter or margarine on your toast. Each equals 100 kilocalories per tablespoon. Diet margarines have fewer calories per tablespoon because they aren't 100 percent fat. Some of the fat is replaced with milk solids and other non-fat products. Other margarines are whipped. A tablespoon of whipped margarine contains no-calorie air as well as high-calorie fat so calories per tablespoon are reduced.

Even though fat is a high-calorie nutrient, it has several benefits for you. It helps you feel satisfied because it takes a longer time to digest than do proteins and carbohydrates. It can also improve the flavor of many nutritious foods.

But its use as a flavor enhancer should be carefully controlled. On the whole, Americans probably eat too much fat.

Cutting down fat intake is recommended for two reasons: 1) Fat accounts for about 40 percent or more of the calories Americans eat. So, it must share the blame for a major nutritional problem: at least one of every four Americans is overweight. 2) There's evidence of a linkage between high fat consumption and heart disease. However, there is no proof that high fat intake causes heart disease. The linkage between the two is discussed more thoroughly on page 43.

Still, it's important not to overreact to the bad publicity about fats. Limited amounts of fat belong in a healthful diet.

. . .some uses

*carrier for fat-soluble vitamins (Too little fat in the diet can result in deficiencies of these vitamins.)

*chief source of essential fatty acids which are necessary for smooth, healthy skin; proper cell growth; and muscle control

. . .some sources

*vegetable oils (olive, corn, soybean, safflower, coconut), margarine, salad dressings

*animal fats (butter, lard, visible fat on meat, marbling in mature beef, cream, cheese, whole milk, fried foods)

*nuts

*many baked goods and snack foods

Carbohydrates

The main carbohydrates are starches and sugars. Promoters of low-carbohydrate diets have managed to portray carbohydrates as the villains which make people fat. In fact, a gram of carbohydrate provides the same number of calories as a gram of protein, and many high-carbohydrate foods are the sources of dozens of other valuable nutrients.

It is true that one type of carbohydrate should be handled with care. Processed sugars (such as white refined sugar, brown sugar, and powdered sugar) in soft drinks and candy can soon fill up a large share of our daily energy needs without contributing any other nutrients. And sugar from sticky foods is especially likely to linger on teeth and feed the tiny organisms which cause tooth decay.

But even sugar has its place. It helps make nutritious foods more appealing. It can be part of a nutritious diet, but not as large a part as it is for many people. The average American consumes 100 pounds of refined sugar a year. Put another way, about a fourth of our daily calories comes from sugar. We'll probably be doing ourselves a favor if we cut down. Sugar should probably account for no more than 20 percent of our daily calories--even less for people on low-calorie diets.

Another 30 to 35 percent of our daily calories might come from starches and naturally-occurring sugars. Grains and vegetables are the major sources of starches and fruits contain sugars.

In all, about half the calories in a balanced diet may well come from sugars, processed and naturally occurring, and from starches.

. . .some uses

*provides a large share of our energy (calories)

*provides glucose needed for muscle movement

*helps in normal functioning of brain

*helps maintain body temperature

*helps provide substances made into lubricants for joints

*helps metabolize fat we eat

. . .some sources

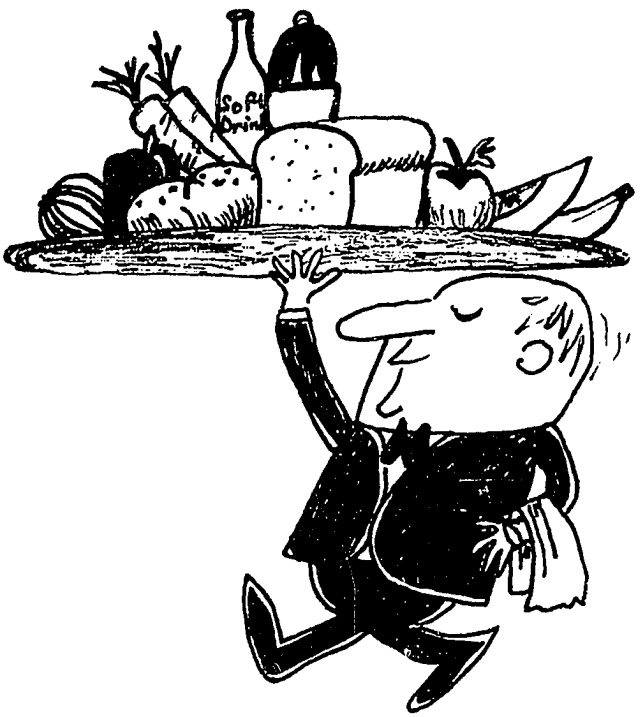
*grains

*fruits

*vegetables

*processed sugars

*prepared foods (baked goods, canned fruits and vegetables, breakfast cereals)



Weight control

The most serious nutritional problem in the United States today? Many people in the health professions say it is obesity. And it's getting worse. Americans are getting both taller and heavier, but they are getting heavier at a faster rate than they are getting taller.

A look at the problem

Most adults become less and less active as the years pass. This decrease in activity means lower calorie needs, but we keep the eating habits from our more active days. Or we develop new habits which add to the problem. We discover the latest in high-calorie, low-nutrient snacks and keep them within arm's reach. We explain away our lack of exercise by saying we're getting too old for strenuous physical activity. Or we say exercise takes too much time. Eating--or drinking--becomes the focus of social occasions. The ways we trap ourselves in cages of fat are endless.

But there is a long list of reasons for sidestepping the traps. Most people feel less attractive when they are overweight. They also feel less comfortable; movements which slim people make with ease are difficult for the overweight. Flattering comfortable clothes are hard to find.

Obese people are much more likely to contract many of the major diseases than are normal-weight people. And when they do become ill, their obesity often makes recovery more difficult. Obesity can also interfere when surgery is necessary.

The way we gain weight is as easy to describe as it is hard to control. We gain weight when we consume more calories than we use. The calories we don't use, whether they come from protein, fat, carbohydrate or alcohol, are stored as fat. They stay stored until the day we consume fewer calories than we use. Then we take them out of storage, use them as energy--and lose weight.

Some of the fat which collects on our bodies is important to our health. It cushions our vital body organs, protecting them from injury. The fat just beneath our skin is insulation. Fat rounds out angular skeletal lines, helping make us more attractive--that is, until it stops rounding and starts bulging.

A weight guide for men and women

Height (without shoes)	Weight (without clothing)		
	Low	Average	High
	Pounds	Pounds	Pounds
Men			
5 feet 3 inches	118	129	141
5 feet 4 inches	122	133	145
5 feet 5 inches	126	137	149
5 feet 6 inches	130	142	155
5 feet 7 inches	134	147	161
5 feet 8 inches	139	151	166
5 feet 9 inches	143	155	170
5 feet 10 inches	147	159	174
5 feet 11 inches	150	163	178
6 feet	154	167	183
6 feet 1 inch	158	171	188
6 feet 2 inches	162	175	192
6 feet 3 inches	165	178	195
Women			
5 feet	100	109	118
5 feet 1 inch	104	112	121
5 feet 2 inches	107	115	125
5 feet 3 inches	110	118	128
5 feet 4 inches	113	122	132
5 feet 5 inches	116	125	135
5 feet 6 inches	120	129	139
5 feet 7 inches	123	132	142
5 feet 8 inches	126	136	146
5 feet 9 inches	130	140	151
5 feet 10 inches	133	144	156
5 feet 11 inches	137	148	161
6 feet	141	152	166

To use the guide, find your height, without shoes, in the left-hand column. If you have a small frame, your weight should probably be no lower than the weight in the "low" column and no higher than the weight given in the "average" column. If you have a large frame, use the "average" and "high" columns to determine your desirable weight range. If your frame is about average, your weight should probably be somewhere near the average for your height.

Sizing up

The weight chart on page 37 will help you determine your ideal weight. If you are overweight, and a look in the mirror tells you the excess pounds are due to fat rather than above-average muscular development, you can reach your ideal weight with a diet that contains fewer kilocalories than you use as energy.

The amount of energy (or kilocalories) your body uses depends on several things. The most important is your activity. Many Iowans (as well as most other American adults) fall into the low-activity category. Even farmers do much less hard physical labor now than they did a couple of generations ago. For example, the difference between operating manual and power-steering tractors has been calculated. For an eight-hour day, power steering requires 248 fewer kilocalories than manual steering.

Desk work and most kinds of housework, although very tiring, don't take much energy. If you spend most of your time doing these things, you are probably in the low-activity category.

Very active individuals are those who engage in heavy manual labor, athletics, or other strenuous physical activity. Unfortunately, the casual jogger does not make this category.

Moderately active individuals are somewhere in between. The casual jogger, bicycler or person who does a lot of walking, stair climbing, etc., would probably fit this category.

To calculate your personal energy need, select the appropriate category in the chart below and multiply that factor by your ideal weight.

ACTIVITY	FOR WOMEN	FOR MEN*
Low	14 x wt.	16 x wt.
Moderate	18 x wt.	21 x wt.
High	22 x wt.	26 x wt.

**Men need more calories partly because they have a greater proportion of lean body mass (muscle). Even when they aren't using the muscles much, muscle tissue requires more energy for maintenance than other body cells do.*

For example, a man who is in the low-activity category and weighs 160 pounds, has an estimated energy need of 2560 (16 x 160). If the same man were moderately active, his estimated energy need would be 3360 kcal (21 x 160).

The figure that you've calculated for your estimated energy need is also an estimate of how many calories you should eat. Unless you want to gain or lose weight, you must eat the same amount as your body uses.

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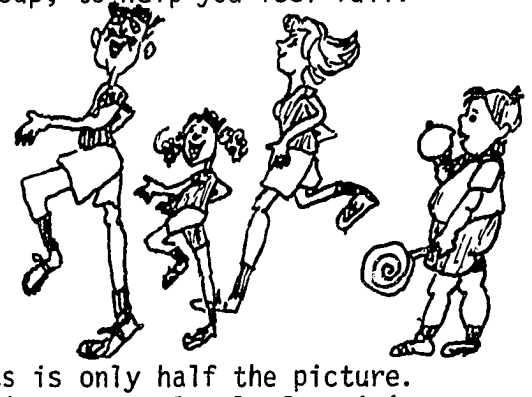
Once you have determined your energy needs, you can use the Nutrient Guide to plan your own weight-reducing diet.

1. Select most of your foods from the top of each exchange list, where you'll find low and medium energy (kilocalorie) ratings.

2. Eat only the number of exchanges suggested.

3. Limit the number of exchanges which count only as energy.

4. Eat complex carbohydrates, such as bread and cereals, and exchanges from the fiber group, to help you feel full.



Putting calories to work

Counting calories and nutrients is only half the picture. If we consume fewer and fewer calories as our level of activity decreases, we can reach the point where our energy needs don't allow for enough food to fill our nutrient needs. And--we may be damaging our health through lack of exercise.

Physical activity used to be forced on most people. Those who wanted to eat bread had to knead it first. To mow the lawn, someone had to push a manual lawn mower.

Today, we must look for ways to get exercise. We go days--perhaps weeks--without doing anything strenuous. We reach the point where we need so few calories that there isn't much room for empty calories in our diets. Then, most of the calories we consume must earn their spot on the menu by providing nutrients.

It takes about 3,500 extra kilocalories to produce a pound of stored fat. To lose a pound, your diet must provide 3,500 fewer kilocalories than your body uses. For example, to lose two pounds a week, you must consume 7,000 fewer calories each week than your body uses.

But we're not willing to cut back to the low number of kilocalories our sedentary life style requires. And that is why we're getting fatter.

If a woman replaces an hour of sitting each day with an hour's brisk walk, she will use about 170 more kilocalories a day. If her eating habits stay the same, the walking will help her take off about 15 pounds in a year. Regular exercise, even if it isn't strenuous, can be a top-notch ally in the battle against fat.

Keeping watch for the enemy

Weight control is partly a battle against sneaky calories. The mayonnaise you spread on a sandwich, the sauce or gravy you pour over vegetables and meat, the whipped cream or ice cream with which you top a helping of ginger bread, the large amount of margarine in your apple cake recipe, the salad dressing on your low-calorie salad--these things may add up to hundreds of calories a day.

Think of it this way. A 120-pound woman needs about 1700 calories a day. (120 X 14 = 1680) A 150-pound woman must eat an additional 420 kilocalories to maintain her weight. She can easily get those extra calories just from sneaky sources. A half cup of plain boiled potatoes, for example, equals 55 kilocalories. But if you pan-fry a half cup of raw potatoes with fat, the resulting serving will probably equal 200 kilocalories.

One approach to dieting is to write down <u>everything</u> you eat each day. This only works if you can be honest with yourself. It's not pleasant to admit, on paper, that you have just finished your child's peanut butter sandwich, even though you weren't hungry. But a food diary can teach you a lot about when, where, and why you overeat. Your personal guide to good nutrition would be a good place to record the food you eat in a day.

One of the best ways to detect the effects of sneaky calories is to step on a scale once a week. It's natural for weight to vary a pound or two due to changes in body fluid, but a larger variation gives early warning that calorie intake and calorie use may be out of balance.

Weight loss patterns

Many people lose weight quickly during the first week or two of dieting. Some of that loss is water leaving fat cells, so weight loss will slow down when the body adjusts to new eating habits and reestablishes its water balance.

For other dieters, body fluids behave differently. Water may even take the place of the fat which leaves fat cells. This is discouraging to the hungry dieter keeping an eagle eye on the scale. But it shouldn't last long. Once again, the body must adjust to a new routine and establish a new water balance. After a week or two, the scale should show the results of dieting.

Fat fighting for the very young

Obesity is a difficult condition to treat. Far better to prevent it. Parents can help their children avoid the social and physical burdens of being too heavy. They can

*encourage physical activity--perhaps by suggesting alternatives to television viewing.

*resist the impulse to pour on sugar and spread on butter. Many children eat plain grapefruit happily, unaware that some people put sugar on the helpless fruit. Or they eat hamburgers on unbuttered buns, until someone suggests otherwise. Some children even learn to eat breakfast cereals without sugar.

*keep low-calorie, nutritious snacks readily available. Have the carrots and celery already prepared, the apples already washed. Be prepared for snacks. An attractive plate of crackers and cheese on the table may forestall requests for cookies or potato chips.

*avoid using food, especially sweets, as a reward, thus overemphasizing its importance. Instead, children can be rewarded with a reading of a favorite book, a game of catch, or a hug.

*allow children to decide when they are full. Don't force them to clean their plates. Instead, encourage them to take small portions at a time. If they become hungry shortly after mealtime, offer them more nutritious foods. When children eat is not nearly so important as what they eat.

Babies pose a special problem. One reason to postpone solid foods is to give them a chance to accept or reject the food. At five or six months babies can show whether they are hungry or not by leaning forward eagerly or turning aside to say "no thanks." Before that, they may eat even though they are not hungry, a bad habit which may be hard to break later on.

When you do start feeding a little one solids, avoid food high in sugar and fat. There's no reason to encourage a taste for a rich diet.

Of course, any parent knows that all kids have minds of their own and thwart the most logical of parental plans. Nonetheless, we can try, in as many ways as we can, to help them develop good eating habits. Maybe half our efforts will work.

Fads for a day or food habits for life?

Many diet plans which have been popular over the years are not healthy. The low-carbohydrate diet is one example. It is built around a dietary imbalance. If carbohydrates are cut drastically, you'll probably lose more water and sodium than you should and your body won't be able to break down dietary fat normally. Also, you won't get the benefits of carbohydrates mentioned earlier. With this diet, weight loss may be exceptionally quick at first, but this loss is mostly water, not fat, so it is only temporary.

The peculiar diets which have often become fads may be useful in providing a drastic break from old food habits. But most of these diets are not nutritionally sound and should not be followed for more than a week.

Since most people who need to lose weight like to eat, they should find an interesting, appetizing diet. Then the odds are better that they can stick to their lower-calorie, but still-enjoyable diet.

And dieters need patience. To maintain health while losing weight, it's best not to lose more than a pound or two a week.

Finally, dieters must teach themselves new eating habits. These new habits will probably include 1) limiting fat and sugar in the diet; 2) giving up snacks or limiting them to one or two small ones a day; 3) getting more exercise; 4) avoiding situations which lead to overeating; 5) changing the kinds of foods you have on hand. (You can't eat what you don't have); and 6) eating a balanced diet planned around low-calorie foods such as those at the top of the exchange lists.

Successful weight control doesn't mean giving up chocolate cake forever. An occasional splurge on a favorite food can be worked into a sensible diet. New understanding of your food needs will help you adjust your eating pattern so you can indulge in a "forbidden" food now and then. The point is, even forbidden foods become part of your plan--part of your new way of eating.

Success does mean saying "goodbye" to old food habits. But it also means saying "goodbye" to old bulges!

Cholesterol and our health

Cholesterol is a fat-like substance found in every animal cell. Our bodies manufacture some cholesterol. The rest we get from the foods we eat. Only foods of animal origin (including milk and eggs) contain cholesterol. There is none in grains, fruits, vegetables or nuts. In fact, plants contain plant sterols which may be useful in reducing blood cholesterol levels.

Although cholesterol is often associated with animal fat, foods need not be fatty to be high in cholesterol. Some foods containing almost no fat, such as shellfish, liver and heart, contain large amounts of cholesterol. Even if you could take all the fat out of a pound of hamburger, there would be a good deal of cholesterol attached to the remaining tissues.

It is quite clear that the high cholesterol content of the typical American diet is related to the high level of serum cholesterol which shows up in so many blood tests in this country. This cholesterol level is important because it is one of the factors associated with a risk of heart disease. (Other primary risk factors which have been identified are obesity, high blood pressure, smoking, and diabetes. Lack of exercise, stress, and heredity are also suspected to be risk factors, but less is known about them.)

So far, no one has proven that a high level of blood cholesterol causes heart disease. A cause-effect relationship is tremendously difficult to show because of the difficulty of studying human beings. But, because heart disease is a major cause of deaths in the United States, we try to make practical use of what scientists have learned.

We know that atherosclerosis (a buildup of fatty substances inside blood vessel walls) makes heart attacks more likely. As the passageway for blood becomes smaller, the flow of blood to the heart is slowed down. Blood flow may even stop if a large clot cannot make its way through. The result is a heart attack.

We also know that people with high cholesterol levels are more likely to have atherosclerosis, but we do not know that high cholesterol intake causes atherosclerosis.

Nonetheless, we do know there is some cholesterol in the fatty substances which build up inside blood vessels. And, we believe you will not damage your health with such cholesterol-limiting habits as 1) limiting frying as a method of food preparation; 2) limiting use of shrimp and organ meats; 3) eating only as much of the fattier red meats as your nutrient needs require; and 4) choosing low-fat milk products. (Low-fat milk is probably not a good idea for most children under two because babies need calories for growth.)

On the other hand, our bodies need some cholesterol to function normally. It is necessary for the production of vitamin D, sex hormones and cortisone. It also produces the bile acids essential for fat digestion. So, based on the best research available, we recommend moderation in cholesterol intake.

We also recommend a diet containing both saturated and unsaturated fats. Fats are saturated or unsaturated depending on how much hydrogen they contain. Poly-unsaturated fats are important in helping our bodies metabolize cholesterol.

Saturated fats come mostly from animal sources and are usually hard at room temperature. (Coconut oil is one exception to this rule. It is quite saturated.) Vegetable fats, from grains and vegetables, are usually unsaturated. They are liquid at room temperature.

To make poly-unsaturated fats hard at room temperature (in margarine for example), hydrogen is chemically added to some unsaturated fatty acids. The resulting saturated fats are blended with natural oils and the final product can be mostly unsaturated. If safflower or corn oil is listed first on the ingredient label, the product is more poly-unsaturated than if vegetable oil or hydrogenated vegetable oil is listed first.

No one knows just how much saturated and unsaturated fat we should consume. The Senate nutrition subcommittee recently recommended that 10 percent of our calories come from saturated fats and 20 percent from mono- and poly-unsaturated fats. But critics say this is too drastic a departure from present eating habits. (On the average, Americans now get 16 percent from saturated and 26 percent from unsaturated fats.)

The best and simplest approach is probably to decrease total fat intake by decreasing the amount of saturated fat in our diets.

Food additives

Debates about food additives have captured public attention. Front-page stories, television programs, even comic strips and cartoons have reported and commented on the problem. The primary concern is whether some additives cause cancer, a danger which is especially difficult to determine.

In 1977 it looked as though one additive, saccharin, would be banned. Some people went through their cupboards looking for saccharin-containing foods to toss out. Others rushed out to stock up on their favorite one-calorie sodas.

The extremes of these two responses illustrate the confusion over the question of food additives. Because anyone who eats is affected by decisions on food additives, it's important to try to clear up some of this confusion.

But we begin with a word of warning. There are a lot of unanswered questions and unsolved dilemmas. In the end, many food-additive decisions are based partly on value judgments: How much risk are we willing to take to get the benefits an additive offers? This is a question which we consumers can help answer if we understand the problem and make our feelings known to government and industry officials.

If all additives were taken out of our foods, we would have to adjust to radically different shopping, cooking and eating habits. Many products we now store for months would be stamped with expiration dates or would disappear from the market. Cake mixes, peanuts, peanut butter, shortening, and vegetable oils would go rancid if stored for very long. Pickles wouldn't be crisp. Vinegar would turn cloudy. Pudding and gelatin mixes would lose flavor. Gelatins would be new colors. Many whipped products would disappear. Grated coconut and marshmallows wouldn't stay moist. Powdered sugar and salt would cake into hard lumps. Many "instant" foods would disappear. Mayonnaise and peanut butter would separate.

You might expect that improved methods of food processing and improved standards of hygiene would make fewer additives necessary. But, at the same time, more ready-to-use foods which are stored for lengthy periods mean increased need for additives.

In 1958 the U.S. Food and Drug administration published a list of food additives "generally recognized as safe." Additives developed after 1958 have been approved individually. Sometimes, in the light of new evidence, an additive is removed from the original list.

Testing procedures

For each substance tested, animals which metabolize the substance in the same way humans do are chosen as test subjects. Some are given single, large doses of the additive. Others are given varying amounts over a 90-day period. Their behavior, growth, death rate, and vital organs are examined.

Another group gets low doses of the additive throughout their lives. The fertility, reproduction and lactation of these long-term test animals may also be studied. If these tests convince researchers and the FDA that the additives are safe, the FDA issues regulations for their use.

But why use animals for tests?

The FDA is frequently criticized for basing its decisions on unrealistic test situations. For instance, to equal the saccharin per pound of body weight which the test rats consumed, you would have to drink 800 bottles of diet drink a day. But scientists say animals can be used to predict risks for humans. And they say there are good reasons to use large doses of the additives for these tests.

Human subjects are used to test some medical drugs. But food additives do not offer such great benefits that scientists are willing to risk anyone's health in the testing process.

Also, twenty years or more may pass between a person's first exposure to a cancer-causing substance and the time when cancer shows up. During that time, the person may be exposed to many other substances suspected of causing cancer. To get reliable results under these conditions, thousands of people would have to be thoroughly studied for decades. Itwould be a costly, slow and uncertain process. And, all the while, cancer would continue to take lives.

Animals, on the other hand, can be controlled so that they are all getting the same food and living in the same environment. The food is good, the environment clean. The effects of the test substance can be isolated and studied.

Thousands of substances have been tested like this. Some of them poison the animals, but only a few cause cancer. Even after receiving extremely high doses of the substances, animals almost never develop cancer. So, when cancer does occur, scientists suspect the substance--not the high doses--of triggering the disease.

Animal tests are also considered reliable because all but two substances known to cause cancer in human beings also cause cancer in laboratory animals. (Arsenic and benzene may be exceptions.)

Of course, when a prediction for humans is based on animal studies there is always some doubt about its accuracy. That is why the questions of benefit and risk are so important. Saccharin tests, for example, suggest that if every American uses moderate amounts of saccharin over his lifetime, there will be 1,200 additional cases of bladder cancer each year. The two sides of the benefit-versus-risk reaction to this evidence are

*Saccharin offers so many benefits to me that I'm willing to accept the increased risks involved in consuming saccharin.

*Nothing saccharin offers is worth an increased risk of cancer.

Decisions to make

Benefit-risk questions cover a wide variety of situations. Additives used in the enrichment of flour and fortification of milk, for example, make valuable contributions to our nutritional state while presenting almost zero risks. Nitrates present a more difficult problem. We are used to the flavor, texture and color nitrates produce when used to preserve meat. And nitrates are even more valuable because they prevent the development of botulism, a deadly food poison. However, researchers now have evidence that, in the intestinal tract, nitrates can produce some cancer-causing substances. The decision between benefit and risk is not so clear for nitrates as it is for vitamin D in milk.

Saccharin presents still another kind of dilemma. This sugar substitute is undeniably valuable for diabetics. But for non-diabetics its benefits are questionable. It probably does not do much to solve most weight problems. Non-diabetics must decide if they are really getting any benefits in return for taking the risk which the FDA says exists.

Suppose a food-coloring agent presented some risk to health. How much risk would you be willing to take for the sake of the color of some foods?

These are the kinds of dilemmas which scientists and FDA officials face. Perhaps it's time for consumers to help define <u>acceptable</u> <u>risk</u>. After all, the risk is ours.

The consumer's role

We can help by

*keeping informed (which may mean requesting information directly from the FDA)

*reading labels and demanding more complete information on the labels (many additives are not now listed on ingredient labels)

*discussing the problem with others so that more consumers will be aware of the issue

*refusing to buy foods which contain additives we prefer not to consume.

Food additives will continue to be important. At least one fifth of the world's food is lost because it spoils before it can be used. As world population increases, it will become increasingly important to preserve and consume as much as we can of the food we produce. Additives will undoubtedly be part of this effort. Thinking in terms of risk versus benefit will help us make the wisest possible decisions for ourselves and our world.

Variety—one of the pleasures of good nutrition

Just eating a lot of different foods won't guarantee you a balanced diet. But it is a good idea to choose a variety of foods from each exchange list. Foods on the exchange lists are grouped according to the amount of a few major nutrients they contain. However, there are over 30 essential vitamins and minerals the exchange lists don't take into account.

Almost every food you eat contains a few of these additional nutrients. The easiest way to get enough of all of them is to fill the nutrient needs outlined in your personal guide with many different foods. Vary the kinds of bread you eat, the kinds of cereal, the kinds of meat, and the kinds of vegetables and fruits.

Foods should vary not only from meal to meal--they should vary from day to day. For families who come to the dinner table each day expecting to see roast beef, potatoes, corn and applesauce, changes may have to be gradual. Try one new food a week, prepared according to family tastes or combined with a food which is already a family favorite. Involving your family in choosing new foods might increase their willingness to try them.

A child's cookbook might also be helpful. Children want to like foods which they have helped prepare.

You take it from here...

These three lessons include a great deal of information. We're glad you were interested enough to read through to the end. We tried to concentrate on the facts and ideas which would give you a basis for making nutrition decisions for your family--and for teaching them how to make decisions for themselves.

In other words, we are not so interested in telling you what to do. We think it makes more sense to help you understand nutrition. Then, as you encounter new schedules, new foods, changing nutrition needs, and even changing food budgets, you'll be able to make wise food choices which suit your situation.

And remember, whenever you have a question which these lessons don't help you answer, your county extension home economist and the ISU nutrition staff will be happy to help you.

	amount	IRON + prot	IRON + prot + THI	IRON + B-VIT + fiber	CALCM + prot	VIT A	VIT C	energy rating
Bamboo shoots	1-1/2 cup	. . .	. 1 .	. . .	.1/4.	. . .	. . .	. 1
Beans, Garbanzo	.1/2 cup	. 4 .	. . .	. . .	. 1 .	. . .	. . .	. 7
Breads:								
Roman Meal	1 sl	. . .	. . .	. 1 .	.1/5.	. . .	. . .	. 1
Breakfast Cereals:								
Ready-to-eat								
Granola, homemade	.1/4 cup	. . .	. . .	. 1 .	. . .	. . .	. . .	. 3
Quaker								
100% Natural Cereal	.1/4 cup	. . .	. . .	. 1 .	.1/3.	. . .	. . .	. 3
Breakfast substitutes:								
Kelloggs Poptarts	1 pastry	. . .	. . .	. 2 .	. 1 .	.1/2.	. . .	. 4
Cabbage salad made with mayonnaise.	.1 cup	. . .	. . .	.1/2.	. . .	. . .	. 1 .	. 3
Catfish	.7 oz	. 1 .	. . .	. . .	. . .	. . .	. . .	. 1
Cookies								
Animal crackers	.10	. . .	. . .	. . .	. . .	. . .	. . .	. 2
Meatloaf*	.1/6 12x7-1/2x2" loaf	. 4 .	. . .	. . .	. . .	. 1 .	. . .	. 8
Peppers, green, raw	.1 pod	. . .	. . .	.1/2.	. . .	.1/3.	. 3 .	. 1
Potatoes, cooked:								
French fried, homemade.	.20	. . .	. . .	. 1 .	. . .	. . .	. 1 .	. 5
Sardines, canned in tomato sauce	1/2 large	. 1 .	. . .	. . .	. 1 .	. . .	. . .	. 1
Shrimp, french fried, frozen, breaded, raw.	3-1/2 oz	. 1 .	. . .	. . .	.1/3.	. . .	. . .	. 3
Soft drink mix, unsweetened								
Koolaid, prepared according to package directions.	.1 cup	. . .	. . .	. . .	. . .	.1/3.	.1/2.	. 2
Soup, canned, condensed, prepared:								
Cream of celery (milk).	.1 cup	.1/2.	. . .	. . .	. 1 .	.1/2.	. . .	. 4
Soup, homemade:								
Bean*	.1 cup	. . .	. 2 .	. . .	.1/2.	. . .	. . .	. 4
Potato (half skim and half whole milk)	.1 cup	. . .	.1/2.	. . .	. 1 .	. . .	.1/2.	. 3
Soy beans	.1/4 cup	. . .	. 2 .	. . .	. 1 .	. . .	. . .	. 4
Soy sauce	.1/4 cup	. 2 .	. . .	. . .	.1/2.	. . .	. . .	. 1
Wheat germ	.1 T	. . .	. . .	. 1 .	. . .	. . .	. . .	. 1

These are the additions to the Nutrient Guide which people requested after receiving lesson two.

*Based on recipes published in Better Homes and Gardens and Betty Crocker cookbooks.

Nutrient Guide
to baby foods

	amount	IRON + prot	IRON + prot + THI	IRON I B-VIT + fiber	CALCM + prot	VIT A	VIT C	energy rating
Baby Food, Toddler:								
Desserts								
Custard pudding	7-3/4 oz jar	.1.	...	...	.1.	...	...	.4
Fruit pudding with starch base, milk and/or egg (banana, orange, or pineapple)	7-3/4 oz jar	...	...	.1.	...	...	.1/2.	.4
Dinners								
Beef-noodle	7-1/2 oz jar	.1.	...	...	.1/4.	.1.	...	.2
Chicken-noodle	7-1/2 oz jar	...	.1/2.	...	.1/2.	.2.	...	.2
Beef with vegetables	4-1/2 oz jar	...	...	.2.	...	.1.	...	.2
Chicken with vegetables	4-1/2 oz jar	...	.1.	...	...	.1.	...	.3
Turkey with vegetables	4-1/2 oz jar	...	.1.	...	.1/3.	.1.	...	.2
Veal with vegetables	4-1/2 oz jar	.1.	...	...	...	.1.	...	.2
Fruit and Fruit Products								
Applesauce	7-3/4 oz jar	...	...	.1.	...	...	...	.3
Applesauce and apricots	7-3/4 oz jar	...	...	.1.	...	.1.	...	.4
Bananas with tapioca or cornstarch, added ascorbic acid, strained	4-3/4 oz jar	...	...	.1/3.	...	...	.2.	.2
Bananas and pineapple with tapioca	7-3/4 oz jar	...	...	.1/2.	...	...	...	.4
Fruit dessert with tapioca (apricot, pineapple and/or orange)	7-3/4 oz jar	...	...	.1.	...	.1/2.	...	.4
Peaches	7-3/4 oz jar	...	...	.1.	...	.1.	...	.4
Pears	7-3/4 oz jar	...	...	.1/2.	...	...	...	.3
Pears and pineapple	7-3/4 oz jar	...	...	.1/2.	...	...	...	.3
Plums with tapioca	7-3/4 oz jar	...	...	.1.	...	.1/2.	...	.4
Prunes with tapioca	7-3/4 oz jar	...	...	.2.	...	.1.	.1/2.	.4
Meat, Poultry, Eggs								
Beef	3-1/2 oz jar	.2.	...	...	...	...	...	.2
Chicken	3-1/2 oz jar	.2.	...	...	...	...	...	.3
Pork	3-1/2 oz jar	...	.1.	...	...	...	...	.3
Vegetables								
Carrots	7-1/2 oz jar	...	...	.1.	.1/3.	...	.1/4.	.1
	1 T	...	...	...	...	.2.	...	.0
Peas	4-1/2 oz jar	...	...	.2.	...	.1/2.	.1/2.	.1
Spinach, creamed	7-1/2 oz jar	...	...	.1.	.1.	...	.1/2.	.2
	2 T	...	...	...	...	.1.	...	.0
Squash	7-1/2 oz jar	...	...	.1.	.1/2.	.4.	.1/2.	.1
Sweet potatoes	7-3/4 oz jar	...	...	.1.	...	...	.1/2.	.3
	2 T	...	...	...	...	.1.	...	.0

HERE'S YOUR CHANCE TO TALK TO US. SIGN YOUR NAME AND RETURN THIS SHEET IN THE ENCLOSED BUSINESS REPLY ENVELOPE.

Do you have any qeustions about weight control or about reducing diets?

What other questions would you like to ask about nutrition for your family?

What are your comments on this lesson?

Other things you would like to say to us:

_____
YOUR NAME

#3

APPENDIX C. USER'S GUIDE FOR THE NUTRIENT GUIDE

Why an Exchange Guide?

The nutrient lists group common foods according to the major nutrients they provide. Therefore, this plan is a guide for eating the nutrients your body needs without calculating specific nutrients. This plan also helps estimate your energy intake without tedious calorie counting. It can be used to analyze what you have eaten or plan what you are going to eat.

The lists are based on groups of nutrients that often (but not always) are present together in foods. Foods within one list may be "exchanged" for each other because they have approximately the same amount of nutrients.

Steps for Using the Plan

1. Identify foods you eat and find them on the lists.

2. Estimate the amount of each food and count the number of exchanges each food represents.

3. Compare the number of exchanges you ate (or plan to eat) with the number recommended.

4. To count kilocalories, total the energy ratings and multiply by 50.

Tips for Using the Nutrient Exchange Plan

-It is important that you select a variety of foods from each group over a period of time to ensure that you get all the nutrients (in addition to the key nutrients) that your body needs and avoid excesses of any potentially harmful components.

-If a food appears in more than one group it may be counted in each group. For example, if you eat 1/2 cup of broccoli, it would count as an exchange for the IRON+Protein+THIAMIN+ list, the VITAMIN A list and the VITAMIN C list.

-If you are interested in losing weight: 1) select most foods with low and medium energy ratings. 2) eat only the number of exchanges suggested 3) limit the number of exchanges eaten from the energy list 4) eat exchanges from the fiber group and more complex carbohydrates such as bread and unsweetened cereals to help you "feel full". Even if you're not overweight, if you aren't very active, these tips will help you keep your trim figure and still give your body the

nutrients it needs. If you are not very active, it is especially important to select foods carefully.

Determining how much energy you use

Energy needs may be quite different for different people. The amount of energy (or kilocalories) your body uses depends on three things. The most important of these is your activity. There is also some variation in the amount of energy needed to keep your body running at rest (basal metabolism). The third factor called specific dynamic action is less well understood, but does account for some of your energy requirement.

Determining your exact energy needs is a very complicated process. However, there are some ways to estimate it. Probably the simplest is a general "rule of thumb" which is based on your weight and your level of activity.

Your scales can indicate how much you weigh. Here are some pointers to help determine whether you fit into the low, moderate, or high activity category. Many Iowans (and other U.S. citizens) fall into the low activity category because of the many labor saving devices available. Even farmers today do much less hard physical labor than they did a couple of generations ago. For example, the difference between manual and power steering tractors has been calculated. For an 8 hour day, power steering requires 248 fewer kilocalories than manual steering.

Desk work and most housework though very tiring, do not require much energy to be expended and therefore, are considered in the low activity category. If you spend most of your time at this type of activity you are probably in the low activity category.

Very active individuals are those that engage in heavy manual labor, athletics, or other strenuous physical activity. The casual jogger does not fit this category. The casual jogger, bicycler or someone who does a lot of walking, stair climbing, etc. would probably fit into the moderate activity category. Energy needs also vary with sex. To caluclate your energy need, select the appropriate category in the chart below and multiply that factor by your weight.

ACTIVITY	FOR WOMEN	FOR MEN
Low	14 X wt. (lbs)	16 X wt. (lbs)
Moderate	18 X wt. (lbs)	21 X wt. (lbs)
High	22 X wt. (lbs)	26 X wt. (lbs)

For example, for a woman who is in the low activity category and weighs 140 pounds, her estimated energy need is 1960 kcal

(14 X 140). If the same woman were moderately active, her estimated energy need is 2520 kcal (18 X 140).

The figure that you've calculated for your estimated energy used is also an estimate of how much energy value that should be provided by the food you eat. Unless you want to gain or lose weight, you must eat the same amount as your body uses.

Because the amount of energy (or kcal) you expend determines how much food you can eat you can think of it as cash. Count kilocalories just like dollars. You have so many kilocalories to spend to 'buy' the nutrients that your body needs. If you buy "empty calories" your kilocalories will be gone before you buy enough nutrients for your body; hence it will be cheated out of needed nutrients.

To help you understand this, the exchange lists include an energy rating which is like the price you pay for the food. Each rating is worth 50 kilocalories.

Estimating Kilocalories with the Nutrient Guide

This plan is designed so that you can get a quick estimate (but not an exact count) of the energy in the food you have eaten or are planning to eat.

To estimate calories refer to the energy rating on the exchange lists. Total the rating for the exchanges which you selected. If a food is included in more than one exchange, count the rating only once. If you eat 2 or 3 exchanges be sure to count 2 or 3 times the rating.

Take the total energy rating times 50 to get the estimated kilocalories. You can now compare this with the energy you require for a day.

Some Questions and Answers about the Exchange Plan

Q. Is it okay to eat more exchanges than my diet plan suggests?

A. It depends upon how much energy you can afford and what choices you make within the list. If you want to maintain your weight (not lose or gain) you must consume the same number of kilocalories as your body uses. Most people have some calories yet to spend after meeting their nutrient needs from the other exchange lists. These can be spent either on exchanges in the "energy list" or on additional exchanges on the other lists.

Q. Can I use this plan to lose weight?

A. Yes. To lose weight, you must eat fewer calories than your body uses. To reduce the number of calories you eat, select exchanges with lower energy ratings and reduce the number of "energy" exchanges.

Q. How much will it cost for foods on these lists?

A. It depends what you choose. This guide lets you choose less expensive foods part or all of the time. For example, oatmeal would be a less expensive exchange than ready to eat cereal in the IRON+THIAMIN list. Beans are less expensive than pork but still meet the IRON+protein+THIAMIN exchange.

Q. Is variety from day to day really necessary. Would it be okay to select a diet I like and then eat it every day so I don't have to plan again?

A, A variety of foods from each group is important because:

1. Even though the foods in each category have a similar amount of the primary nutrients considered, there is some variation--some are below average and others are above.

2. There are a variety of trace minerals and other vitamins your body needs which are not listed in these categories, some of the foods in certain categories are better sources of them than others. For example, folacin is supplied by liver, leafy green vegetables, fruit, and yeast. Animal products are the primary source of vitamin B12.

3. It makes eating more interesting too.

Q. Do I have to eat exactly the number of exchanges suggested each day, or can I average them over several days?

A. In general, the average over several days is the most important.

Q. How do these lists compare to the Basic Four food groups?

A. These two plans are based on the same principles of nutrition. However, exchanges are based on more specifically calculated composition groupings than are the general basic four food groupings. It also gives you an estimation of energy (kilocalories) content without tedious calorie counting. Basically these lists are a new approach to achieve the same

goal--a plan to help individuals eat food that they like and that will provide the nutrients their body needs.

Q. It seems like I need a lot of exchanges. Do I really need that much food?

A. Many of the exchanges are small amounts and so you may eat enough of one food to equal several exchanges.

Q. Why do the serving sizes vary?

A. Because the different foods in the list have varying amounts of the nutrient(s). For example, it takes 1/2 cup of asparagus to get as much vitamin C as you get from 1/4 cup orange juice because orange juice is a more concentrated source of vitamin C.

Q. Why is the IRON+THIAMIN exchange for winter squash 1/2 cup and the winter squash in the vitamin A exchange only 1 Tbsp.?

A. Winter squash is a more concentrated source of vitamin A than it is of iron and thiamin.

APPENDIX D. QUESTIONNAIRES

Pretest

for Mother

An Inventory of Eating Habits

As you might expect, this questionnaire asks what you eat. But it also asks such things as when you eat and how you make food choices. Your answers will be the basis for a computer analysis of your diet. And, through a study of the information you give us, we hope to better understand the complexities of food habits. This information will be useful in helping us plan the best possible information program. We hope that answering these questions will also help you better understand your family's eating habits.

by
The Department of Food and Nutrition
in cooperation with
The Department of Journalism and Mass Communication
Iowa State University, Ames, Iowa 50010
Tel. (515) 294-5983

PLEASE TURN PAGES CAREFULLY--
THEY MAY STICK TOGETHER

2

Note: Just ignore the small numbers in parentheses which appear in this questionnaire. They are used for computer coding.

A. FOOD PATTERNS

This section is about when you eat and what you eat. You and your husband/wife may find it helpful to discuss these questions as each of you complete your own form.

1. Please answer this question by filling in the blank.

   a. On the average, how many days per week do you eat a morning meal (breakfast, brunch, etc)? . . . . . _____ (16)

   b. On the average, how many days per week do you eat a noon meal?. . . . _____

   c. On the average, how many days per week do you eat an evening meal?. . _____

   On the average, how many snacks and drinks (other than coffee or tea) per day do you eat or drink?

   d. In the morning? . . . . . _____

   e. In the afternoon? . . . . . _____

   f. In the evening? . . . . . _____

2. Which of the following foods do you usually keep on hand for snacks? (22-41)
   (Circle the number of each appropriate response.)

1.	FRIED SNACKS SUCH AS POTATO OR CORN CHIPS	11.	FRUIT OR VEGETABLE JUICE
2.	PEANUT BUTTER	12.	CHEESE
3.	NUTS	13.	RAW VEGETABLES
4.	FRESH FRUIT	14.	CANDY
5.	DRIED FRUIT	15.	COOKIES OR CAKE
6.	PUMPKIN OR SUNFLOWER SEEDS	16.	CEREAL
7.	ICE CREAM	17.	CRACKERS, PRETZELS
8.	YOGURT	18.	ROLLS, DOUGHNUTS
9.	POP	19.	PIES, PASTRY
10.	MILK	20.	POPCORN

3. Which of the following foods do you select for snacks away from home? (42-61)
   (Circle the number of each appropriate response.)

1.	FRIED SNACKS SUCH AS POTATO OR CORN CHIPS	11.	FRUIT OR VEGETABLE JUICE
2.	PEANUT BUTTER	12.	CHEESE
3.	NUTS	13.	RAW VEGETABLES
4.	FRESH FRUIT	14.	CANDY
5.	DRIED FRUIT	15.	COOKIES OR CAKE
6.	PUMPKIN OR SUNFLOWER SEEDS	16.	CEREAL
7.	ICE CREAM	17.	CRACKERS, PRETZELS
8.	YOGURT	18.	ROLLS, DOUGHNUTS
9.	POP	19.	PIES, PASTRY
10.	MILK	20.	POPCORN

Please indicate how often you eat the following foods. For example, if you eat bread three times per day, record this as:

No. of Times	Frequency	
3	(D) W M Y	D = per day W = per week M = per month Y = per year

or if you eat it 11 times per week, record this as:

11	D (W) M Y

If you never eat a food, put a "0" in No. of times.

For seasonal foods, estimate times during total year (for example, if you eat cantaloupe 1 time per week for 10 weeks out of the year, you would record 10 and circle "Y").

		No. of Times	Frequency (Circle one)	
4.	How much milk do you consume?			
a.	1 glass, whole milk	____	D W M Y	(9-11)
b.	1 glass, 2% milk	____	D W M Y	
c.	1 glass, skim milk	____	D W M Y	
d.	1 glass reconstituted dry milk	____	D W M Y	(20-22)
e.	milk on cereal	____	D W M Y	
f.	milk or cream in coffee	____	D W M Y	
g.	1 glass chocolate milk or 1 cup cocoa	____	D W M Y	
h.	pudding, yogurt, or custard	____	D W M Y	
i.	ice cream	____	D W M Y	
j.	cottage cheese	____	D W M Y	
k.	other cheeses and cheese dishes	____	D W M Y	
5.	How much meat do you eat?			
	How many times per week do you eat meat? This is meat of any kind; plain, in mixtures, or in sandwiches, excluding ordinary bacon.	____	W	(44-46)
6.	What kind of meat do you eat?			
a.	How many of these meat servings (#5) would usually be ham, pork, sausage, cold cuts or hot dogs? Don't count the number of times you eat ordinary bacon.	____	W	
b.	How many meat servings would usually be beef or lamb?	____	W	
c.	How many meat servings would be chicken, turkey, or fish?	____	W	
	TOTAL FOR QUESTION 6 (Same as answer for question 5)	____		

TURN PAGE CAREFULLY

4

		No. of Times	Frequency (Circle one)	
7.	How do you eat meat?			
	a. Of the total servings of meat, how many of these would be plain meat, not mixed with anything?	____	W	(56-58)
	b. Of the total servings of meat, how many would be mixtures; casseroles, stew, meaty soup, spaghetti with meat sauce, etc.	____	W	
	c. Of the total servings of meat, how many would be sandwiches, hot dogs or hamburgers on a bun?	____	W	
	TOTAL for question 7 (Same as answer to question 5)	____		
8.	How often do you usually eat these foods?			
	a. eggs (such as scrambled, fried, poached, deviled etc. but not those used in baking).	____	D W M Y	
	b. liver.	____	D W M Y	
	c. peanut butter or nuts	____	D W M Y	
	d. cooked dried beans, such as pork & beans, lentils, bean soup, soy beans, etc.	____	D W M Y	
9.	How often do you usually eat the following vegetables?			
	a. carrots, cooked or raw	____	D W M Y	(12-14)
	b. squash, all kinds except zucchini and other summer squash. .	____	D W M Y	
	c. sweet potatoes or pumpkin	____	D W M Y	
	d. broccoli	____	D W M Y	
	e. dark leafy greens (such as chard, spinach, beet greens, dandelion greens or turnip greens)	____	D W M Y	
	f. canned or raw tomatoes (including sauce, tomato juice, etc. but excluding catsup).	____	D W M Y	
	g. tomato soup or vegetable soup	____	D W M Y	
	h. green beans, peas, or corn	____	D W M Y	
	i. brussels sprouts	____	D W M Y	
	j. cabbage.	____	D W M Y	
	Specify other vegetable frequently eaten:			
	k. _____	____	D W M Y	
	l. _____	____	D W M Y	
	m. instant mashed potatoes	____	D W M Y	
	n. frozen potatoes (such as French fried, tater tots, or hash browns).	____	D W M Y	
	o. cooked fresh potatoes (such as baked, boiled, fried)	____	D W M Y	

5

		No. of Times	Frequency (Circle one)
10.	How often do you usually eat the following?		
	a. rice (such as instant, regular, long-cooking, converted, wild, brown, rice mix); specify kind: _____	____	D W M Y (61-63)
	b. noodles, macaroni, spaghetti	____	D W M Y
	c. pizza	____	D W M Y
	d. lettuce salad	____	D W M Y
11.	How often do you usually eat or drink the following fruits or fruit drinks?		
	a. oranges, orange juice, grapefruit, grapefruit juice, tangerines	____	D W M Y
	b. fortified fruit-flavored drink such as, Hi C, Tang, Start, Awake, Orange +, Wagner's. Specify kind: _____	____	D W M Y
	other fruit juices (excluding tomato, fortified fruit-flavored, orange, and grapefruit juices); specify kind:		
	c. _____	____	D W M Y
	d. _____	____	D W M Y (9-13)
	e. fresh apples, bananas, and pears	____	D W M Y
	f. fresh peaches	____	D W M Y
	g. muskmellon or cantaloupe	____	D W M Y
	h. canned peaches, canned applesauce, canned fruit cocktail, canned pears, and canned pineapple	____	D W M Y
	i. apricots, fresh or canned	____	D W M Y
	j. dried apricots, prunes, raisins and figs; specify: _____	____	D W M Y
12.	How often do you usually eat the following foods?		
	a. hot or cold cereal; specify kinds most often eaten: _____	____	D W M Y (25-29)
	b. bread, 1 piece (such as toast, sandwich bread, French toast, roll, biscuit, muffin, hamburger bun, hot dog bun).	____	D W M Y
	c. Is the bread usually enriched or unenriched? (Circle correct response.) DON'T KNOW, ENRICHED, UNENRICHED		
	d. one sweet roll or doughnut	____	D W M Y
	e. one pancake or waffle, 4" diameter	____	D W M Y

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		No. of Times	Frequency (Circle one)	
f.	butter or margarine (circle which most often used) 1 serving such as butter or margarine placed on potatoes, vegetables, bread, except in baking (count each serving used)	____	D W M Y	(42-44)

13. How often do you usually eat the following foods?

g.	pie, pastry, cake, cookies, baked desserts	____	D W M Y	
h.	candy or candy bars (Count each time you eat it regardless of amount)	____	D W M Y	
i.	crispy, munching foods (such as potato chips, corn chips, pretzels, popcorn)	____	D W M Y	
j.	crackers.	____	D W M Y	
k.	sugar (such as sugar used in drinks and on cereal), syrup, honey, jam, jelly, marmalade, preserves, apple butter (Count each time you eat it regardless of amount)	____	D W M Y	
l.	low calorie pop	____	D W M Y	
m.	regular pop or koolaid	____	D W M Y	
n.	instant breakfast	____	D W M Y	
o.	dietary beverage (such as Slender, Sego, etc.)	____	D W M Y	
p.	tea, coffee	____	D W M Y	
q.	beer, wine, whiskey or other alcoholic beverages	____	D W M Y	
r.	vitamin or mineral supplements	____	D W M Y	

14. This question deals with the amounts of certain foods which you usually eat. per serving. To help you estimate amounts we suggest a few items which you should gather together at this point:
    1) a sheet of typing paper (8-1/2" X 11")
    2) a 1 cup measuring cup (preferably liquid measure)
    3) a quarter pound of butter or margarine with tablespoon markings

Circle the number which best describes the amount of the food you usually eat. For example if you usually eat 1-1/2 cups of a casserole you would circle 1 cup and 1/2 cup.

		1/8 CUP	1/4 CUP	1/2 CUP	3/4 CUP	1 CUP	2 CUP	
a.	ice cream	1/8	1/4	1/2	3/4	1	2	(12-16)
b.	cottage cheese.	1/8	1/4	1/2	3/4	1	2	
c.	potatoes.	1/8	1/4	1/2	3/4	1	2	
d.	rice.	1/8	1/4	1/2	3/4	1	2	
e.	canned fruit.	1/8	1/4	1/2	3/4	1	2	
f.	casserole	1/8	1/4	1/2	3/4	1	2	
g.	cooked vegetables	1/8	1/4	1/2	3/4	1	2	
h.	cooked dried beans. . . . . (such as pork & beans)	1/8	1/4	1/2	3/4	1	2	
i.	tomato or vegetable soups . . .	1/8	1/4	1/2	3/4	1	2	

7

Circle the number which best describes the amount of the food you usually eat.

	1/8 CUP	1/4 CUP	1/2 CUP	3/4 CUP	1 CUP	2 CUP
j. cereal	1/8	1/4	1/2	3/4	1	2
k. lettuce salad	1/8	1/4	1/2	3/4	1	2

15. How much meat do you eat?

To estimate the amount of meat you eat at a meal:

1) Fold the typing paper into quarters. This size of meat 1/2" thick is approximately 6 oz.
2) Fold the paper in half again. This size 1/2" thick is approximately 3 oz.

Based on your best estimate, circle the amount of meat not counting fat or bone that you eat.

2 OZ. 3 OZ. 4 OZ. 6 OZ. 8 OZ. 10 OZ. (67-71)

16. To estimate the amounts of milk and juices, follow these steps:

1) take the glass you usually use for milk (or juice)
2) fill with water to usual level of milk
3) pour water into measuring cup
4) read amount in cups

Circle the appropriate choice.

a. milk 1/2 CUP 1 CUP 1-1/4 CUP 1-1/2 CUP

b. orange or grapefruit juice 1/2 CUP 1 CUP 1-1/4 CUP

Use the marked margarine or butter and folded paper for the next questions. A piece of cheese the same size as 1 tablespoon of margarine or butter is approximately 1/4 oz. A slice of cheese the dimensions of the folded paper (1/8 size) and 1/8" thick is approximately 1 oz. (circle the appropriate amounts)

c. cheese 1/4 OZ. 1/2 OZ. 1 OZ. 2 OZ. 4 OZ.

d. butter or margarine 1/4 TBSP. 1/2 TBSP. 1 TBSP. 1-1/2 TBSP.

Now you've completed the section on the food you eat. The remaining questions should be answered individually, without discussing them with each other.

You've finished the hardest, most time-consuming part. If you are getting tired of answering questions, take a five-minute break. But don't forget to come back---all the questions are important for a thorough evaluation.

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8.

B. NUTRITION

17. The following statements are based on opinions about nutrition. Please indicate how sure you are that each statement is true or false. (Circle either I'm sure it is true, I think it is true, I don't know, I think it is false, or I'm sure it is false, for each statement.)

	What do you think about these statements? (Circle your answer.)					
a. As long as my child is not sick, he must be eating the right foods. . .	SURE IT IS TRUE	THINK IT IS TRUE	DON'T KNOW	THINK IT IS FALSE	SURE IT IS FALSE	(16)
b. It is always better to get too much of a nutrient than not enough. .	SURE IT IS TRUE	THINK IT IS TRUE	DON'T KNOW	THINK IT IS FALSE	SURE IT IS FALSE	
c. Minimum nutrient needs for some nutrients are stated as Recommended Dietary Allowances.	SURE IT IS TRUE	THINK IT IS TRUE	DON'T KNOW	THINK IT IS FALSE	SURE IT IS FALSE	
d. Between meal foods are never as good for you as the food that you get at regular meals.	SURE IT IS TRUE	THINK IT IS TRUE	DON'T KNOW	THINK IT IS FALSE	SURE IT IS FALSE	
e. A father has very little influence on the food other family members eat.	SURE IT IS TRUE	THINK IT IS TRUE	DON'T KNOW	THINK IT IS FALSE	SURE IT IS FALSE	
f. If a child drinks milk, he will be well nourished.	SURE IT IS TRUE	THINK IT IS TRUE	DON'T KNOW	THINK IT IS FALSE	SURE IT IS FALSE	
g. There is some cholesterol in almost all foods.	SURE IT IS TRUE	THINK IT IS TRUE	DON'T KNOW	THINK IT IS FALSE	SURE IT IS FALSE	
h. People can stay healthy without eating meat, poultry, or fish.	SURE IT IS TRUE	THINK IT IS TRUE	DON'T KNOW	THINK IT IS FALSE	SURE IT IS FALSE	
i. All persons identified as nutrition authorities or nutritionists have formal nutrition training.	SURE IT IS TRUE	THINK IT IS TRUE	DON'T KNOW	THINK IT IS FALSE	SURE IT IS FALSE	
j. The attitude of other family members toward eating vegetables can have an important influence on acceptance of vegetables by preschool children.	SURE IT IS TRUE	THINK IT IS TRUE	DON'T KNOW	THINK IT IS FALSE	SURE IT IS FALSE	

18. Enriched bread is a good source of which of the following: (Circle all that apply)

1. VITAMIN A
2. THIAMIN (VITAMIN B_1)
3. RIBOFLAVIN (VITAMIN B_2)
4. VITAMIN C
5. VITAMIN D
6. PROTEIN
7. CARBOHYDRATES
8. FAT
9. IRON
10. CALCIUM
11. CALORIES

19. Circle the number of the best answer for each of the following:

a. Men and women between ages of 25 and 35 years who are of average height and weight (41)
   1. NEED DIFFERENT NUTRIENTS IN SIMILAR AMOUNTS.
   2. NEED DIFFERENT AMOUNTS OF THE SAME NUTRIENTS.
   3. NEED THE SAME NUTRIENTS IN SIMILAR AMOUNTS.
   4. NEED DIFFERENT NUTRIENTS IN DIFFERENT AMOUNTS.

b. Athletes need more of which of the following when compared to non-athletes?
   1. CALORIES
   2. PROTEIN
   3. VITAMINS
   4. MINERALS

c. Which one of the following nutrient groups provides the most concentrated source of energy?
   1. CARBOHYDRATE
   2. VITAMINS
   3. PROTEINS
   4. FATS

d. Which one of the following does not have high vitamin A value?
   1. BROCCOLI
   2. SPINACH
   3. APRICOTS
   4. SWEET POTATO
   5. GREEN BEANS

e. Which of the following groups of nutrients can be used as sources of energy by cells?
   1. CARBOHYDRATE, FAT, VITAMINS
   2. CARBOHYDRATE, FAT, PROTEIN
   3. CARBOHYDRATE, PROTEIN, VITAMINS
   4. CARBOHYDRATE, PROTEIN, FAT, WATER

f. Enriched breads and cereals
   1. ARE HIGH IN CALORIES.
   2. ARE A SOURCE OF VITAMINS AND MINERALS.
   3. SUPPLY GOOD QUALITY PROTEIN
   4. ARE NOT NEEDED BY ADULTS.

g. Which of the following two foods has the greater nutritional value per dollar spent?
   1. BAKED BEANS
   2. RUMP ROAST

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20. The next question is related to this situation:
The Johnson family wants to eat a balanced diet. They planned the following 3 meals for father, mother, 6 year old son, and 2 year old daughter. (Assume one serving of each food)

Breakfast	Lunch	Dinner	Evening Snack
Two Sweet Rolls	Hot Dog and Bun	Hamburger Patty	Cocoa
Margarine	Potato Chips	Potatoes	
Apple juice	Catsup	Green Beans	
Coffee	Banana	Pineapple Gelatin Salad	
		Bread	
		Margarine	
		Milk	

a. Which one of the following food substitutions would make the menu more nearly nutritionally adequate? (Circle number of the best answer.) (48)

1. SUBSTITUTE HAM SANDWICH FOR HOT DOG
2. SUBSTITUTE TOAST FOR A SWEET ROLL
3. SUBSTITUTE ORANGE JUICE FOR APPLE JUICE
4. SUBSTITUTE WHITE MILK FOR COCOA

b. Now that you have made a substitution (write it in the menu) to improve the nutritive quality of the above menu, what further change needs to be made in the menu to make it more nearly adequate for the 6 year old boy who is growing rapidly and is alo very active. (Circle number of the best answer.)

1. ADD MORE MILK TO DIET
2. ADD MORE MEAT
3. ADD COOKIES FOR MID-AFTERNOON SNACK
4. ADD MORE FRUITS AND VEGETABLES

c. If Mrs. Johnson were concerned about losing weight, which one of the following changes would aid in decreasing he calories in her menu without affecting the overall nutritive va ue of the diet? (Circle number of the best answer.)

1. DROP OUT BREADS, POTATOES, AND POTATO CHIPS
2. ADD GRAPEFRUIT TO EVERY MEAL
3. SUBSTITUTE MORE MEAT FOR BREAD AND POTATOES
4. SUBSTITUTE SKIM MILK FOR COCOA

C. FAMILY INTERACTION

21. Here is a list describing some of the ways you might talk about food with your family. Please describe how often you do each one. (Circle one response for each statement.) (16-24)

	How often do you . . .? (Circle your answer.)				
a. I let my family know which foods I like best	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
b. I suggest eating foods I think are good for us	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
c. I discuss the nutritional value of foods with my family	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
d. I discuss the caloric content of foods with my family	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
e. I discuss the importance of eating a nutritious combination of foods with my family	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
f. My spouse and I discuss ways to encourage our children to eat more nutritious meals and snacks.	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
g. I encourage my family to try new foods	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
h. I help decide what foods to prepare for family meals.	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
i. I encourage my children to help decide what foods to prepare for family meals	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN

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D. SOURCES OF INFORMATION

22. There's a lot of nutrition information available now. Here is a list of some sources of this information. Please indicate how often you pay attention (read, listen to, etc.) information from each source by circling one of the five responses listed after each one.

		How often do you read or listen to information from each source? (Circle your answers.)				
a.	relatives	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
b.	friends	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
c.	extension agents	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
d.	doctors	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
e.	dietitians	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
f.	pharmacists	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
g.	nutrient labels on foods . .	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
h.	ingredient lists on foods . .	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
i.	food advertising.	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
j.	articles in popular home and family magazines such as Good Housekeeping.	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
k.	articles in general information magazines such as Reader's Digest, Time	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
l.	articles in farm magazines such as Farm Journal.	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
m.	articles in fitness and health magazines such as Today's Health, Weight Watcher's . .	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
n.	newspapers	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
o.	radio programs.	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
p.	television programs	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
q.	food guides such as Basic Four, nutrient exchange plans . . .	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
r.	extension or government bulletins	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
s.	cook books	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
t.	books other than cook books .	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
u.	weight-control organizations	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
v.	continuing education programs	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
w.	others. . . . . Please specify: _____	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN

E. USEFULNESS OF INFORMATION

23. Considering the kinds of information available in each of these sources, how useful is each source to your needs and interests? (Please circle one response for each source)

	How useful is each source? (Circle your answer.)			
a. relatives.	DON'T USE	NOT USEFUL	SOMEWHAT	VERY
b. friends.	DON'T USE	NOT USEFUL	SOMEWHAT	VERY
c. extension agents	DON'T USE	NOT USEFUL	SOMEWHAT	VERY
d. doctors.	DON'T USE	NOT USEFUL	SOMEWHAT	VERY
e. dietitians	DON'T USE	NOT USEFUL	SOMEWHAT	VERY
f. pharmacists.	DON'T USE	NOT USEFUL	SOMEWHAT	VERY
g. nutrient labels on foods . .	DON'T USE	NOT USEFUL	SOMEWHAT	VERY
h. ingredient lists on foods. .	DON'T USE	NOT USEFUL	SOMEWHAT	VERY
i. food advertising	DON'T USE	NOT USEFUL	SOMEWHAT	VERY
j. articles in popular home and family magazines such as Good Housekeeping	DON'T USE	NOT USEFUL	SOMEWHAT	VERY
k. articles in general information magazines such as Reader's Digest, Time. . . .	DON'T USE	NOT USEFUL	SOMEWHAT	VERY
l. articles in farm magazines such as Farm Journal	DON'T USE	NOT USEFUL	SOMEWHAT	VERY
m. articles in fitness and health magazines such as Today's Health, Weight Watcher's . .	DON'T USE	NOT USEFUL	SOMEWHAT	VERY
n. newspapers	DON'T USE	NOT USEFUL	SOMEWHAT	VERY
o. radio programs	DON'T USE	NOT USEFUL	SOMEWHAT	VERY
p. television programs.	DON'T USE	NOT USEFUL	SOMEWHAT	VERY
q. food guides such as Basic Four, nutrient exchange plans. . .	DON'T USE	NOT USEFUL	SOMEWHAT	VERY
r. extension or government bulletins.	DON'T USE	NOT USEFUL	SOMEWHAT	VERY
s. cook books	DON'T USE	NOT USEFUL	SOMEWHAT	VERY
t. books other than cook books	DON'T USE	NOT USEFUL	SOMEWHAT	VERY
u. weight-control organizations	DON'T USE	NOT USEFUL	SOMEWHAT	VERY
v. continuing education programs	DON'T USE	NOT USEFUL	SOMEWHAT	VERY
w. others . . . . . Please specify: _____	DON'T USE	NOT USEFUL	SOMEWHAT	VERY

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F. CHOOSING FOOD FOR YOUR FAMILY

24. Now we'd like to ask about how the food for your family is chosen. How much of your family's food do you select? (Selecting food includes planning menus, preparing shopping lists and selecting items in a grocery store or market). Circle number of your answer.

1. ALMOST NONE-----(If this is your answer, go on to Question 25)
2. ABOUT 1/4
3. ABOUT 1/2
4. ABOUT 3/4
5. ALMOST ALL

If you do at least 1/4 of the food selection, we'd like you to think about how you make your selections. Below is a list of some of the things you might think about as you plan menus, prepare shopping lists or do the grocery shopping. Please indicate how important each of the following considerations is to you as you make shopping decisions. (Please circle one response for each statement).

	How important is each item?			
a. the nutritive value of an item	NOT	SOMEWHAT	QUITE	VERY
b. the amount of nutritive value per dollar spent	NOT	SOMEWHAT	QUITE	VERY
c. the information on the nutrition label	NOT	SOMEWHAT	QUITE	VERY
d. the list of ingredients on the label.	NOT	SOMEWHAT	QUITE	VERY
e. a long-range (weekly, for example) menu plan.	NOT	SOMEWHAT	QUITE	VERY
f. a short-range (daily or meal-by-meal) menu plan.	NOT	SOMEWHAT	QUITE	VERY
g. whether or not you have a supply of food with similar nutritive value	NOT	SOMEWHAT	QUITE	VERY

G. GOALS

25. Your goals affect the decisions you make and thus may affect what you eat. Please take a few minutes to think about the following list of goals. Choose the one which is most important to you and put a "1" in front of it. Put a "12" in front of the one that is least important. Then rank the other goals by filling in the remaining blanks.

____a. Be a good manager of money and time
____b. Gain and maintain the respect of people outside the family
____c. Maintain or improve the quality of my diet
____d. Maintain or improve my physical fitness
____e. Be active in community affairs
____f. Increase money income
____g. Learn and practice prevention techniques for heart disease and other diseases
____h. Obtain security - financial, etc.
____i. Reduce debts or increase savings.
____j. Maintain or achieve desirable weight
____k. Clothe myself and family attractively
____l. Maintain or improve the exterior appearance of the house and yard

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H. A FEW FACTS

Your responses to the following questions are important to our analysis of the rest of the information you've given us.

Name _____ Address _____

Phone No. _____ County _____

How old are you? _____years (50, 51)

How tall are you? _____ inches (52, 53)

How much do you weigh? _____ pounds (54-56)

Are you pregnant? (Circle number of answer) (57)

1. YES
2. NO

Are you breast feeding? (Circle number of answer) (58)

1. YES
2. NO

Please describe your work. (Circle number of appropriate answer) (59)

1. AM A FULL-TIME HOMEMAKER
2. WORK PART-TIME FOR INCOME (IN THE HOME)
3. WORK PART-TIME FOR INCOME (OUTSIDE THE HOME)
4. WORK FULL-TIME FOR INCOME (IN THE HOME)
5. WORK FULL-TIME FOR INCOME (OUTSIDE THE HOME)

How much formal education have you completed? (Circle number of answer) (60)

1. 8th GRADE OR LESS
2. SOME HIGH SCHOOL
3. GRADUATED FROM HIGH SCHOOL
4. ATTENDED TRADE OR OTHER PROFESSIONAL SCHOOL AFTER HIGH SCHOOL
5. ATTENDED COLLEGE
6. GRADUATED FROM COLLEGE (Bachelor's Degree)
7. ATTENDED GRADUATE SCHOOL OR OTHER PROFESSIONAL SCHOOL AFTER COLLEGE
8. RECEIVED MASTER'S DEGREE
9. RECEIVED Ph.D.

Would you mind indicating your approximate family income before taxes in 1977? (61)
(Circle number of answer)

1. LESS THAN $5,000
2. $5,000 to $9,999
3. $10,000 to $14,999
4. $15,000 to $19,999
5. $20,000 to $24,999
6. $25,000 OR MORE

Please list the names of the children in your home.

First name	Age	Sex
_____	_____	_____
_____	_____	_____
_____	_____	_____

(62)

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Are there any comments you would like to make? Perhaps you would like to call our attention to a nutritional concern of special interest to you. You may use the space below for that purpose.

Thank you for taking the time to complete this questionnaire.
We're glad you're joining our program.

Posttest

for Father

Evaluating nutrition information programs

This is a survey of families who participated in the nutrition information program from Iowa State University. The purpose of this study is to evaluate this information program. It will also help us find ways to improve nutrition education programs so they may better fit the needs and interests of people like you.

BY
THE DEPARTMENT OF FOOD AND NUTRITION
IN COOPERATION WITH
THE DEPARTMENT OF JOURNALISM AND MASS COMMUNICATION
IOWA STATE UNIVERSITY, AMES, IOWA 50011
TEL. (515) 294-4340

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In order to evaluate the nutrition program which you received from Iowa State University, we need your response to these questions. It should take you only about 30 minutes to complete the entire questionnaire. We ask that you do not discuss the questions with your spouse until after you have both completed the questionnaire.

The first section contains questions about the program materials which you received. You may want to refer to the booklets for this part. For the second section, we are interested in what you remember, so we ask you not to refer to the booklets. Thank you for your cooperation.

SECTION ONE: PROGRAM MATERIALS

LESSON ONE: These questions refer to the first lesson which you received in January. It included the computer analysis of your diet and information about: nutrients, Recommended Dietary Allowances, minerals, water-soluble vitamins and food fads.

Q-1 How much of lesson one did you read? (Circle number of your answer)

1. *ALL*
2. *MOST*
3. *HALF*
4. *LITTLE*
5. *NONE* → *If NONE or DON'T REMEMBER, skip to Q-4*
6. *DON'T REMEMBER RECEIVING IT* → *If NONE or DON'T REMEMBER, skip to Q-4*

Q-2 In general, how easy or difficult did you feel it was to understand lesson one? (Circle number of your answer)

1. *VERY EASY*
2. *EASY*
3. *AVERAGE*
4. *DIFFICULT*
5. *VERY DIFFICULT*

Q-3 How useful was each part of lesson one to you?

	How useful was each part? (Circle one response for each item)				
a. Computer dietary analysis	*DIDN'T READ*	*NO USE*	*SLIGHTLY USEFUL*	*MODERATELY USEFUL*	*VERY USEFUL*
b. Nutrients: the stuff of life . . .	*DIDN'T READ*	*NO USE*	*SLIGHTLY USEFUL*	*MODERATELY USEFUL*	*VERY USEFUL*
c. Recommended Dietary Allowances. . .	*DIDN'T READ*	*NO USE*	*SLIGHTLY USEFUL*	*MODERATELY USEFUL*	*VERY USEFUL*
d. Minerals.	*DIDN'T READ*	*NO USE*	*SLIGHTLY USEFUL*	*MODERATELY USEFUL*	*VERY USEFUL*
e. Water-soluble vitamins.	*DIDN'T READ*	*NO USE*	*SLIGHTLY USEFUL*	*MODERATELY USEFUL*	*VERY USEFUL*
f. Food fads	*DIDN'T READ*	*NO USE*	*SLIGHTLY USEFUL*	*MODERATELY USEFUL*	*VERY USEFUL*

Q-4 *Did you personally make any changes in your diet because of lesson one? (Circle number of your answer)*

1. NO
2. YES — What changes did you make? _____

_____

Q-5 *Have your family's meals or snacks changed any as a result of lesson one? (Circle number of your answer)*

1. NO
2. YES — What changes have you noticed? _____

_____

Q-6 *Did you and your spouse discuss any information in lesson one? (Circle number of your answer)*

1. NO
2. YES → Q-7 *If YES, what did you talk about? (Circle all that apply)*

   1. YOUR COMPUTER DIET ANALYSIS PRINTOUTS
   2. THE FOODS YOUR FAMILY EATS
   3. CHANGING YOUR FAMILY'S DIET
   4. TRYING NEW OR DIFFERENT FOODS
   5. TAKING VITAMINS OR MINERAL SUPPLEMENTS
   6. RECOMMENDED DIETARY ALLOWANCES
   7. FUNCTIONS OF VITAMINS OR MINERALS
   8. SOURCES OF VITAMINS OR MINERALS
   9. FOOD FADS
   10. OTHER — What? _____

   _____

LESSON TWO: These questions refer to the second lesson which you received. It included the Nutrient Guide, a set of worksheets labeled "Your personal guide for good nutrition," and information about: nutrient needs for ages, snacks, major nutrients (fat soluble vitamins, protein, water), fiber, and food labels.

Q-8 *How much of lesson two did you read? (Circle number of your answer)*

1. ALL
2. MOST
3. HALF
4. LITTLE
5. NONE → *If NONE, or DON'T REMEMBER, skip to Q-12*
6. DON'T REMEMBER RECEIVING IT → *If NONE, or DON'T REMEMBER, skip to Q-12*

Q-9 *How easy or difficult did you feel it was to understand the Nutrient Guide portion of lesson two? (Circle number of your answer)*

1. VERY EASY
2. EASY
3. AVERAGE
4. DIFFICULT
5. VERY DIFFICULT
6. DIDN'T READ IT

4

Q-10 How easy or difficult did you feel it was to understand the other information in lesson two? (Circle number of your answer)

1. VERY EASY
2. EASY
3. AVERAGE
4. DIFFICULT
5. VERY DIFFICULT

Q-11 How useful was each part of lesson two to you?

	How useful was each part? (Circle one response for each item)				
a. Nutrient Guide	DIDN'T READ	NO USE	SLIGHTLY USEFUL	MODERATELY USEFUL	VERY USEFUL
b. Personal Guide worksheets . . .	DIDN'T READ	NO USE	SLIGHTLY USEFUL	MODERATELY USEFUL	VERY USEFUL
c. Nutrient needs for different ages.	DIDN'T READ	NO USE	SLIGHTLY USEFUL	MODERATELY USEFUL	VERY USEFUL
d. Snacks	DIDN'T READ	NO USE	SLIGHTLY USEFUL	MODERATELY USEFUL	VERY USEFUL
e. Fat-soluble vitamins	DIDN'T READ	NO USE	SLIGHTLY USEFUL	MODERATELY USEFUL	VERY USEFUL
f. Protein, water	DIDN'T READ	NO USE	SLIGHTLY USEFUL	MODERATELY USEFUL	VERY USEFUL
g. Fiber.	DIDN'T READ	NO USE	SLIGHTLY USEFUL	MODERATELY USEFUL	VERY USEFUL
h. Labels	DIDN'T READ	NO USE	SLIGHTLY USEFUL	MODERATELY USEFUL	VERY USEFUL

Q-12 Did you complete any of the Personal Guide worksheets? (Circle number of your answer)

1. NO
2. YES

Q-13 Did you personally make any changes in your diet after studying the Nutrient Guide? (Circle number of your answer)

1. NO
2. YES What changes did you make? _____

_____

Q-14 Have your family's meals or snacks changed any as a result of lesson two? (Circle number of your answer)

1. NO
2. YES What changes have you noticed? _____

_____

4

Q-10 How easy or difficult did you feel it was to understand the other information in lesson two? (Circle number of your answer)

1. VERY EASY
2. EASY
3. AVERAGE
4. DIFFICULT
5. VERY DIFFICULT

Q-11 How useful was each part of lesson two to you?

	How useful was each part? (Circle one response for each item)				
a. Nutrient Guide	DIDN'T READ	NO USE	SLIGHTLY USEFUL	MODERATELY USEFUL	VERY USEFUL
b. Personal Guide worksheets . . .	DIDN'T READ	NO USE	SLIGHTLY USEFUL	MODERATELY USEFUL	VERY USEFUL
c. Nutrient needs for different ages.	DIDN'T READ	NO USE	SLIGHTLY USEFUL	MODERATELY USEFUL	VERY USEFUL
d. Snacks	DIDN'T READ	NO USE	SLIGHTLY USEFUL	MODERATELY USEFUL	VERY USEFUL
e. Fat-soluble vitamins	DIDN'T READ	NO USE	SLIGHTLY USEFUL	MODERATELY USEFUL	VERY USEFUL
f. Protein, water	DIDN'T READ	NO USE	SLIGHTLY USEFUL	MODERATELY USEFUL	VERY USEFUL
g. Fiber.	DIDN'T READ	NO USE	SLIGHTLY USEFUL	MODERATELY USEFUL	VERY USEFUL
h. Labels	DIDN'T READ	NO USE	SLIGHTLY USEFUL	MODERATELY USEFUL	VERY USEFUL

Q-12 Did you complete any of the Personal Guide worksheets? (Circle number of your answer)

1. NO
2. YES

Q-13 Did you personally make any changes in your diet after studying the Nutrient Guide? (Circle number of your answer)

1. NO
2. YES What changes did you make? _____

_____

Q-14 Have your family's meals or snacks changed any as a result of lesson two? (Circle number of your answer)

1. NO
2. YES What changes have you noticed? _____

_____

Q-15 *Did you and your spouse discuss any information in lesson two? (Circle number of your answer)*

1. NO
2. YES → Q-16 *If YES, what did you talk about? (Circle all that apply)*

1. THE NUTRIENT GUIDE
2. WHETHER TO FILL OUT THE WORKSHEETS
3. HOW TO FILL OUT THE PERSONAL WORKSHEETS
4. WHAT YOU FOUND WHEN YOU FILLED OUT THE PERSONAL WORKSHEETS
5. THE FOODS YOUR FAMILY EATS
6. CHANGING YOUR FAMILY'S DIET
7. TRYING NEW OR DIFFERENT FOODS
8. NUTRIENT NEEDS OF FAMILY MEMBERS
9. FUNCTIONS OF VITAMINS OR PROTEIN
10. SOURCES OF VITAMINS OR PROTEIN
11. SNACKS
12. INGREDIENT OR NUTRITION LABELS
13. OTHER What? _____

LESSON THREE: These questions refer to the third lesson which you received. It included information about: fat, carbohydrates, weight control, cholesterol, heart disease, and additives.

Q-17 *How much of lesson three did you read? (Circle number of your answer)*

1. ALL
2. MOST
3. HALF
4. LITTLE
5. NONE → IF NONE OR DON'T REMEMBER SKIP TO Q-20
6. DON'T REMEMBER RECEIVING → IF NONE OR DON'T REMEMBER SKIP TO Q-20

Q-18 *In general, how easy or difficult did you feel it was to understand lesson three? (Circle the number of your answer)*

1. VERY EASY
2. EASY
3. AVERAGE
4. DIFFICULT
5. VERY DIFFICULT

Q-19 *How useful was each part of lesson three to you?*

	How useful was each section? (Circle one response for each item)				
a. Fat	DIDN'T READ	NO USE	SLIGHTLY USEFUL	MODERATELY USEFUL	VERY USEFUL
b. Carbohydrates	DIDN'T READ	NO USE	SLIGHTLY USEFUL	MODERATELY USEFUL	VERY USEFUL
c. Weight control	DIDN'T READ	NO USE	SLIGHTLY USEFUL	MODERATELY USEFUL	VERY USEFUL
d. Cholesterol	DIDN'T READ	NO USE	SLIGHTLY USEFUL	MODERATELY USEFUL	VERY USEFUL
e. Heart disease	DIDN'T READ	NO USE	SLIGHTLY USEFUL	MODERATELY USEFUL	VERY USEFUL
f. Additives	DIDN'T READ	NO USE	SLIGHTLY USEFUL	MODERATELY USEFUL	VERY USEFUL

6

Q-20 *Did you personally make any changes in your diet because of lesson three? (Circle number of your answer)*

1. NO
2. YES What changes did you make?_____

Q-21 *Have your family's meals or snacks changed any as a result of lesson one? (Circle number of your answer)*

1. NO
2. YES What changes have you noticed? _____

Q-22 *What was your response to the weight control portion of the lesson?*

1. I DECIDED MY WEIGHT IS OK
2. I DECIDED I NEED TO LOSE WEIGHT, BUT HAVEN'T DECIDED WHETHER TO DO ANYTHING ABOUT IT
3. I PLAN TO START A WEIGHT REDUCING PLAN
4. I HAVE STARTED ON A WEIGHT REDUCING PLAN
5. I WAS ALREADY ON A WEIGHT REDUCING PROGRAM

Q-23 *Did you and your spouse discuss any information in lesson three? (Circle the number of your answer)*

1. NO
2. YES → Q-24 *If YES, what did you talk about? (Circle all that apply)*

1. CHANGING YOUR FAMILY'S DIET
2. FAT (SATURATED/UNSATURATED)
3. CARBOHYDRATES
4. CHOLESTEROL
5. HEART DISEASE
6. WEIGHT CONTROL
7. ADDITIVES
8. OTHER WHAT?_____

ALL LESSONS:

Q-25 *What happened to the materials you received? (Circle number of your answer)*

1. STILL HAVE THEM WHERE I CAN FIND THEM
2. STILL HAVE THEM, NOT EXACTLY SURE WHERE
3. DON'T KNOW
4. THREW THEM AWAY
5. GAVE THEM TO SOMEONE ELSE Who?_____

Q-26 *Did you use the folder to assemble the lessons as you received them? (Circle number of your answer)*

1. NO
2. YES

Q-27 *How did you feel about "talking back" by using the response sheet in the lessons?* _____

Q-28 *Have you tried any new foods as a result of participation in the program?*

1. NO
2. YES What foods? _____

Now that you have completed the questions about the program materials, please put the program bookelts away and do not refer to them for the rest of the questions. Remeber not to discuss questions with your spouse until you have both completed the questionnaires. Thank you for your cooperation.

FOOD PATTERNS

This section is about when you eat and what you eat.

Q-29 Please answer this question by filling in the blank.

a. On the average, how many days per week do you eat a morning meal (breakfast, brunch, etc)? . . . . . ____

b. On the average, how many days per week do you eat a noon meal?. . . . ____

c. On the average, how many days per week do you eat an evening meal?. . ____

On the average, how many snacks and drinks (other than coffee or tea) per day do you eat or drink?

d. In the morning? . . . . . ____

e. In the afternoon? . . . . . ____

f. In the evening? . . . . . ____

Q-30 Which of the following foods do you usually keep on hand for snacks? (Circle the number of each appropriate response.)

1. FRIED SNACKS SUCH AS POTATO OR CORN CHIPS
2. PEANUT BUTTER
3. NUTS
4. FRESH FRUIT
5. DRIED FRUIT
6. PUMPKIN OR SUNFLOWER SEEDS
7. ICE CREAM
8. YOGURT
9. POP
10. MILK
11. FRUIT OR VEGETABLE JUICE
12. CHEESE
13. RAW VEGETABLES
14. CANDY
15. COOKIES OR CAKE
16. CEREAL
17. CRACKERS, PRETZELS
18. ROLLS, DOUGHNUTS
19. PIES, PASTRY
20. POPCORN

Q-31 Which of the following foods do you select for snacks away from home? (Circle the number of each appropriate response.)

1. FRIED SNACKS SUCH AS POTATO OR CORN CHIPS
2. PEANUT BUTTER
3. NUTS
4. FRESH FRUIT
5. DRIED FRUIT
6. PUMPKIN OR SUNFLOWER SEEDS
7. ICE CREAM
8. YOGURT
9. POP
10. MILK
11. FRUIT OR VEGETABLE JUICE
12. CHEESE
13. RAW VEGETABLES
14. CANDY
15. COOKIES OR CAKE
16. CEREAL
17. CRACKERS, PRETZELS
18. ROLLS, DOUGHNUTS
19. PIES, PASTRY
20. POPCORN

8

Q-32 How often do you usually eat the following foods?

		No. of Times	Frequency (Circle one)
a.	carrots, cooked or raw	____	D W M Y
b.	squash, all kinds except zucchini and other summer squash.	____	D W M Y
c.	sweet potatoes or pumpkin	____	D W M Y
d.	broccoli	____	D W M Y
e.	dark leafy greens (such as chard, spinach, beet greens, dandelion greens or turnip greens)	____	D W M Y
f.	canned or raw tomatoes (including sauce, tomato juice, etc. but excluding catsup).	____	D W M Y
g.	brussels sprouts	____	D W M Y
h.	cabbage.	____	D W M Y
i.	hot or cold cereal; specify kinds most often eaten: _____	____	D W M Y
j.	bread, 1 piece (such as toast, sandwich bread, French toast, roll, biscuit, muffin, hamburger bun, hot dog bun).	____	D W M Y
k.	Is the bread usually enriched or unenriched? (Circle correct response.) DON'T KNOW, ENRICHED, UNENRICHED		
l.	butter or margarine (circle which most often used) 1 serving such as butter or margarine placed on potatoes, vegetables, bread, except in baking (count each serving used).	____	D W M Y
m.	pie, pastry, cake, cookies, baked desserts	____	D W M Y
n.	candy or candy bars (Count each time you eat it regardless of amount).	____	D W M Y
o.	crispy, munching foods (such as potato chips, corn chips, pretzels, popcorn)	____	D W M Y
p.	crackers	____	D W M Y
q.	sugar (such as sugar used in drinks and on cereal), syrup, honey, jam, jelly, marmalade, preserves, apple butter (Count each time you eat it regardless of amount.).	____	D W M Y
r.	low calorie pop.	____	D W M Y
s.	regular pop or koolaid	____	D W M Y
t.	instant breakfast	____	D W M Y
u.	dietary beverage (such as Slender, Sego, etc.)	____	D W M Y
v.	vitamin or mineral supplements	____	D W M Y
w.	peanut butter or nuts.	____	D W M Y
x.	cooked dried beans, such as pork & beans, lentils, bean soup, soy beans, etc	____	D W M Y
y.	one sweet roll or doughnut	____	D W M Y
z.	one pancake or waffle, 4" diameter	____	D W M Y

NUTRITION

Q-33 The following statements are based on opinions about nutrition. Please indicate how sure you are that each statement is true or false. (Circle either I'm sure it is true, I think it is true, I don't know, I think it is false, or I'm sure it is false, for each statement.)

	What do you think about these statements? (Circle your answer.)				
a. As long as my child is not sick, he must be eating the right foods. . .	SURE IT IS TRUE	THINK IT IS TRUE	DON'T KNOW	THINK IT IS FALSE	SURE IT IS FALSE
b. It is always better to get too much of a nutrient than not enough. .	SURE IT IS TRUE	THINK IT IS TRUE	DON'T KNOW	THINK IT IS FALSE	SURE IT IS FALSE
c. Minimum nutrient needs for some nutrients are stated as Recommended Dietary Allowances.	SURE IT IS TRUE	THINK IT IS TRUE	DON'T KNOW	THINK IT IS FALSE	SURE IT IS FALSE
d. Between meal foods are never as good for you as the food that you get at regular meals.	SURE IT IS TRUE	THINK IT IS TRUE	DON'T KNOW	THINK IT IS FALSE	SURE IT IS FALSE
e. A father has very little influence on the food other family members eat.	SURE IT IS TRUE	THINK IT IS TRUE	DON'T KNOW	THINK IT IS FALSE	SURE IT IS FALSE
f. If a child drinks milk, he will be well nourished.	SURE IT IS TRUE	THINK IT IS TRUE	DON'T KNOW	THINK IT IS FALSE	SURE IT IS FALSE
g. There is some cholesterol in almost all foods.	SURE IT IS TRUE	THINK IT IS TRUE	DON'T KNOW	THINK IT IS FALSE	SURE IT IS FALSE
h. People can stay healthy without eating meat, poultry, or fish.	SURE IT IS TRUE	THINK IT IS TRUE	DON'T KNOW	THINK IT IS FALSE	SURE IT IS FALSE
i. All persons identified as nutrition authorities or nutritionists have formal nutrition training.	SURE IT IS TRUE	THINK IT IS TRUE	DON'T KNOW	THINK IT IS FALSE	SURE IT IS FALSE
j. The attitude of other family members toward eating vegetables can have an important influence on acceptance of vegetables by preschool children.	SURE IT IS TRUE	THINK IT IS TRUE	DON'T KNOW	THINK IT IS FALSE	SURE IT IS FALSE

Q-34 Enriched bread is a good source of which of the following: (Circle all that apply)

1. VITAMIN A
2. THIAMIN (VITAMIN B_1)
3. RIBOFLAVIN (VITAMIN B_2)
4. VITAMIN C
5. VITAMIN D
6. PROTEIN
7. CARBOHYDRATES
8. FAT
9. IRON
10. CALCIUM
11. CALORIES

10

Q-35 Circle the number of the best answer for each of the following:

a. Men and women between ages of 25 and 35 years who are of average height and weight
   1. NEED DIFFERENT NUTRIENTS IN SIMILAR AMOUNTS.
   2. NEED DIFFERENT AMOUNTS OF THE SAME NUTRIENTS.
   3. NEED THE SAME NUTRIENTS IN SIMILAR AMOUNTS.
   4. NEED DIFFERENT NUTRIENTS IN DIFFERENT AMOUNTS.

b. Athletes need more of which of the following when compared to non-athletes?
   1. CALORIES
   2. PROTEIN
   3. VITAMINS
   4. MINERALS

c. Which one of the following nutrient groups provides the most concentrated source of energy?
   1. CARBOHYDRATE
   2. VITAMINS
   3. PROTEINS
   4. FATS

d. Which one of the following does not have high vitamin A value?
   1. BROCCOLI
   2. SPINACH
   3. APRICOTS
   4. SWEET POTATO
   5. GREEN BEANS

e. Which of the following groups of nutrients can be used as sources of energy by cells?
   1. CARBOHYDRATE, FAT, VITAMINS
   2. CARBOHYDRATE, FAT, PROTEIN
   3. CARBOHYDRATE, PROTEIN, VITAMINS
   4. CARBOHYDRATE, PROTEIN, FAT, WATER

f. Enriched breads and cereals
   1. ARE HIGH IN CALORIES.
   2. ARE A SOURCE OF VITAMINS AND MINERALS.
   3. SUPPLY GOOD QUALITY PROTEIN
   4. ARE NOT NEEDED BY ADULTS.

g. Which of the following two foods has the greater nutritional value per dollar spent?
   1. BAKED BEANS
   2. RUMP ROAST

Q-36 The next question is related to this situation:
The Johnson family wants to eat a balanced diet. They planned the following 3 meals for father, mother, 6 year old son, and 2 year old daughter. (Assume one serving of each food)

Breakfast	Lunch	Dinner	Evening Snack
Two Sweet Rolls	Hot Dog and Bun	Hamburger Patty	Cocoa
Margarine	Potato Chips	Potatoes	
Apple juice	Catsup	Green Beans	
Coffee	Banana	Pineapple Gelatin Salad	
		Bread	
		Margarine	
		Milk	

a. Which one of the following food substitutions would make the menu more nearly nutritionally adequate? (Circle number of the best answer.)

1. SUBSTITUTE HAM SANDWICH FOR HOT DOG
2. SUBSTITUTE TOAST FOR A SWEET ROLL
3. SUBSTITUTE ORANGE JUICE FOR APPLE JUICE
4. SUBSTITUTE WHITE MILK FOR COCOA

b. Now that you have made a substitution (write it in the menu) to improve the nutritive quality of the above menu, what further change needs to be made in the menu to make it more nearly adequate for the 6 year old boy who is growing rapidly and is alo very active. (Circle number of the best answer.)

1. ADD MORE MILK TO DIET
2. ADD MORE MEAT
3. ADD COOKIES FOR MID-AFTERNOON SNACK
4. ADD MORE FRUITS AND VEGETABLES

c. If Mrs. Johnson were concerned about losing weight, which one of the following changes would aid in decreasing the calories in her menu without affecting the overall nutritive value of the diet? (Circle number of the best answer.)

1. DROP OUT BREADS, POTATOES, AND POTATO CHIPS
2. ADD GRAPEFRUIT TO EVERY MEAL
3. SUBSTITUTE MORE MEAT FOR BREAD AND POTATOES
4. SUBSTITUTE SKIM MILK FOR COCOA

12

FAMILY INTERACTION

Q-37 Here is a list describing some of the ways you might talk about food with your family. Please describe how often you do each one. (Circle one response for each statement.) (16–24)

	How often do you . . .? (Circle your answer.)				
a. I let my family know which foods I like best	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
b. I suggest eating foods I think are good for us	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
c. I discuss the nutritional value of foods with my family	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
d. I discuss the caloric content of foods with my family	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
e. I discuss the importance of eating a nutritious combination of foods with my family	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
f. My spouse and I discuss ways to encourage our children to eat more nutritious meals and snacks.	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
g. I encourage my family to try new foods	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
h. I help decide what foods to prepare for family meals.	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
i. I encourage my children to help decide what foods to prepare for family meals	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN

TURN PAGE CAREFULLY

CHOOSING FOOD FOR YOUR FAMILY

Q-38 Now we'd like to ask about how the food for your family is chosen. How much of your family's food do you select? (Selecting food includes planning menus, preparing shopping lists and selecting items in a grocery store or market). Circle number of your answer.

1. ALMOST NONE-----(If this is your answer, go on to Question 25)
2. ABOUT 1/4
3. ABOUT 1/2
4. ABOUT 3/4
5. ALMOST ALL

If you do at least 1/4 of the food selection, we'd like you to think about how you make your selections. Below is a list of some of the things you might think about as you plan menus, prepare shopping lists or do the grocery shopping. Please indicate how important each of the following considerations is to you as you make shopping decisions. (Please circle one response for each statement).

	How important is each item?			
a. the nutritive value of an item	NOT	SOMEWHAT	QUITE	VERY
b. the amount of nutritive value per dollar spent	NOT	SOMEWHAT	QUITE	VERY
c. the information on the nutrition label	NOT	SOMEWHAT	QUITE	VERY
d. the list of ingredients on the label.	NOT	SOMEWHAT	QUITE	VERY
e. a long-range (weekly, for example) menu plan.	NOT	SOMEWHAT	QUITE	VERY
f. a short-range (daily or meal-by-meal) menu plan.	NOT	SOMEWHAT	QUITE	VERY
g. whether or not you have a supply of food with similar nutritive value	NOT	SOMEWHAT	QUITE	VERY

GOALS

Q-39 Your goals affect the decisions you make and thus may affect what you eat. Please take a few minutes to think about the following list of goals. Choose the one which is most important to you and put a "1" in front of it. Put a "12" in front of the one that is least important. Then rank the other goals by filling in the remaining blanks.

____a. Be a good manager of money and time
____b. Gain and maintain the respect of people outside the family
____c. Maintain or improve the quality of my diet
____d. Maintain or improve my physical fitness
____e. Be active in community affairs
____f. Increase money income
____g. Learn and practice prevention techniques for heart disease and other diseases
____h. Obtain security - financial, etc.
____i. Reduce debts or increase savings.
____j. Maintain or achieve desirable weight
____k. Clothe myself and family attractively
____l. Maintain or improve the exterior appearance of the house and yard

14

SOURCES OF INFORMATION

Q-40 There's a lot of nutrition information available now. Here is a list of some sources of this information. Please indicate how often you pay attention (read, listen to, etc) information from each source by circling one of the five responses listed after each one.

		How often do you read or listen to information from each source? (Circle your answers.)				
a.	relatives	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
b.	friends	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
c.	extension agents	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
d.	doctors	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
e.	dietitians	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
f.	pharmacists	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
g.	nutrient labels on foods . .	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
h.	ingredient lists on foods . .	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
i.	food advertising.	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
j.	articles in popular home and family magazines such as Good Housekeeping.	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
k.	articles in general information magazines such as Reader's Digest, Time	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
l.	articles in farm magazines such as Farm Journal.	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
m.	articles in fitness and health magazines such as Today's Health, Weight Watcher's . .	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
n.	newspapers	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
o.	radio programs.	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
p.	television programs	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
q.	food guides such as Basic Four, nutrient exchange plans . . .	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
r.	extension or government bulletins	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
s.	cook books	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
t.	books other than cook books .	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
u.	weight-control organizations	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
v.	continuing education programs	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
w.	others. . . . . Please specify: _____	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN

USEFULNESS OF INFORMATION

Q-41 Considering the kinds of information available in each of these sources, how <u>useful</u> is each source to your needs and interests? (Please circle one response for each source)

		How useful is each source? (Circle your answer.)			
a.	relatives.	DON'T USE	NOT USEFUL	SOMEWHAT	VERY
b.	friends.	DON'T USE	NOT USEFUL	SOMEWHAT	VERY
c.	extension agents	DON'T USE	NOT USEFUL	SOMEWHAT	VERY
d.	doctors.	DON'T USE	NOT USEFUL	SOMEWHAT	VERY
e.	dietitians	DON'T USE	NOT USEFUL	SOMEWHAT	VERY
f.	pharmacists.	DON'T USE	NOT USEFUL	SOMEWHAT	VERY
g.	nutrient labels on foods . .	DON'T USE	NOT USEFUL	SOMEWHAT	VERY
h.	ingredient lists on foods. .	DON'T USE	NOT USEFUL	SOMEWHAT	VERY
i.	food advertising	DON'T USE	NOT USEFUL	SOMEWHAT	VERY
j.	articles in popular home and family magazines such as Good Housekeeping	DON'T USE	NOT USEFUL	SOMEWHAT	VERY
k.	articles in general information magazines such as Reader's Digest, Time. . . .	DON'T USE	NOT USEFUL	SOMEWHAT	VERY
l.	articles in farm magazines such as Farm Journal	DON'T USE	NOT USEFUL	SOMEWHAT	VERY
m.	articles in fitness and health magazines such as Today's Health, Weight Watcher's . .	DON'T USE	NOT USEFUL	SOMEWHAT	VERY
n.	newspapers	DON'T USE	NOT USEFUL	SOMEWHAT	VERY
o.	radio programs	DON'T USE	NOT USEFUL	SOMEWHAT	VERY
p.	television programs.	DON'T USE	NOT USEFUL	SOMEWHAT	VERY
q.	food guides such as Basic Four, nutrient exchange plans. . .	DON'T USE	NOT USEFUL	SOMEWHAT	VERY
r.	extension or government bulletins.	DON'T USE	NOT USEFUL	SOMEWHAT	VERY
s.	cook books	DON'T USE	NOT USEFUL	SOMEWHAT	VERY
t.	books other than cook books	DON'T USE	NOT USEFUL	SOMEWHAT	VERY
u.	weight-control organizations	DON'T USE	NOT USEFUL	SOMEWHAT	VERY
v.	continuing education programs	DON'T USE	NOT USEFUL	SOMEWHAT	VERY
w.	others . . . . . Please specify: _____	DON'T USE	NOT USEFUL	SOMEWHAT	VERY

TURN PAGE CAREFULLY

16

Q-42 If you are employed please fill in the blanks

What is your occupation?_____

Job title _____

Employer _____

Description of work _____

_____

Do you have additional comments and suggestions to help us plan better nutrition information programs for people like you?

Thank you for taking time to complete this questionnaire.

APPENDIX E. GENERALIZATIONS

A. Physiological Aspects of Nutrition

1. The body utilizes nutrients from food for many different functions.
   a. Nutrients include water, carbohydrates, fats, protein, vitamins, and minerals.
   b. Foods contain a variety of nutrients.
   c. Nutrients serve as building blocks for growth, sources of energy, catalysts and carriers, and may serve certain specialized functions.
2. Nutrient intake affects appearance, vigor, work output, and long term health.
   a. The effects of nutrient inadequacies may not be measurable in the short run.
   b. Nutritional inadequacies are often associated with other detrimental environmental factors and thus it is often difficult to establish exact relationships between diet and health.
3. Each nutrient performs specific necessary functions which interrelate with the functions of other nutrients.
   a. Water is needed to aid digestion of food and to carry nutrients to cells throughout the body. Regulation of body temperature and removal of wastes are also functions performed by water.

b. Carbohydrates are used primarily as energy sources.

c. Fat deposits protect body organs and serve as energy sources.***lists of foods here*** The storage form of energy for the body is fat.

d. Proteins are needed to build and repair body tissue, to form regulators in digestion of foods and other reactions in the body, as energy sources and to form substances which help to ward off disease. Protein and iron are combined in hemoglobin which carries oxygen to cells and carbon dioxide from cells.

e. Calcium is important for bone and tooth formation, blood clotting and muscle contraction.

f. Phosphorus is combined with calcium in bones and teeth and is also important as an energy carrier.

g. Iron is a part of hemoglobin.

h. Vitamin A is involved in eye function and in protecting skin and mucous membrane.

i. Three of the B vitamins - thiamin, riboflavin, and niacin - are important for energy release from nutrients. They aid in proper functioning of the digestive tract and the nervous system.

j. Vitamin C is useful in formation of connective tissue which holds body cells together. It aids

in absorption of iron.

4. Although a certain level of intake of each nutrient is necessary for optimum body functioning, additional intake is not necessarily better and may be harmful.
   a. The body deals with excess intake of certain nutrients in various ways.
      1) Excess water soluble vitamins are excreted.
      2) Excess fat soluble vitamins (vitamin A, E, and D) are stored and may become toxic.
      3) When iron intake is high, a smaller proportion (but still more total) is absorbed. This excess is absorbed and stored in the body.
      4) Excess energy (from protein, fat, or carbohydrate) is stored as fat tissue.
   b. Excess intake of minerals and fat soluble vitamins stored in the body may reach toxic levels.
   c. Although vitamin C is not stored, certain adverse affects have been noted when chronic intakes of very high doses have been studied.
   d. Excess energy intake (from carbohydrate, fats, and proteins) will result in excess amount of fat tissue.
   e. Excess intake of some nutrients interferes with the functioning of other nutrients.

5. Nutritiocn is a relatively new science and there is still much to be learned about the body's needs for nutrients, and about the beneficial and harmful effects of nutrients.

   a. Reccmmendations for the kinds and amounts of nutrients needed, Recommended Dietary Allowances (RDA's), have been made by nutritionists who are members of the National Research Council Food and Nutrition Board. The values are higher than minimum nutrient needs or average needs of the population. They include a safety factor to cover individual variation.

   b. Regulatory agencies (such as FDA) have to make decisions based on evidence available although sometimes it may be incomplete. (For example, proposed ban on saccharin, nitrate accumulation in food, red dye #2 in foods).

   c. All competent scientists do not always interpret available evidence in the same way, especially when conclusive research has not been done. Therefore different recommendations may be made.

   d. Certain questions about nutrition are difficult to examine experimentally due to the limitations on using humans as subjects.

   e. Food faddists and some well-meaning individuals

take advantage of the present unknowns and make unfounded claims about the need, harm, or efficacy of certain nutrients and food stuffs.

f. Not all individuals who call themselves nutritionists are trained in nutrition.

6. Individual nutrient needs vary from person to person and from time to time for the same person. They depend upon heredity, sex, age, size, activity, and state of health.

a. Men, women, and children need the same nutrients, but in varying amounts.

1) Men often have high nutrient requirements because they are usually larger than women.

2) Women of child-bearing ages require more iron than men because of iron lost during menstruation.

3) Children need smaller quantities of nutrients than adults, but needs are greater per pound of body weight and per unit of energy needed.

b. During periods of rapid growth, needs for most nutrients increase.

c. Elderly persons need about the same amounts of most nutrients or slightly less than do young adults. Energy needs decrease as a person grows

older even if physical activity remains the same. If activity is decreased, energy needs are decreased even further.

d. Larger persons require larger quantities of nutrients than smaller people

e. The more active a person becomes, the greater is the need for energy (from carbohydrate, fat, or protein). Additional protein per se, however, is not necessary.

f. Needs for most nutrients increase during pregnancy, lactation, and periods of rapid growth.

g. Special conditions such as stress, drugs, surgery, and disease can affect nutritional needs.

7. Fat and total energy intake are of particular concern to many in the U.S. because of varying lifestyles and eating habits.

a. Excess energy storage (overweight) is a risk factor for a number of diseases.

1) Protein, carbohydrate, and fat all provide energy (kilocalories). Ounce for ounce, fat contains more than twice the energy of either carbohydrate or protein.

2) Excess intake of nutrients providing energy

will result in an excessive amount of energy which is stored as fat tissue.

3) A balance between energy intake from foods and energy expenditure is needed for weight maintenance or control. An excess or deficit of 3500 kilocalories is required to gain or lose one pound of body fat.

4) The most frequent cause of overweight is the consumption of more food (more energy) than is needed, accompanied by too little exercise.

b. High cholesterol in the diet may be related (at least for some persons) to high serum cholesterol. High serum cholesterol has been associated with heart disease.

1) The body requires some cholesterol to function normally.

2) Cholesterol is formed by the body and is found in animal foods.

3) Prudent intakes of cholesterol and total fat are recommended for normal persons. Drastic decreases in cholesterol intake may be recommended for persons with heart disease.

c. Saturated fat has been implicated as a factor related to heart disease.

1) Saturated fats occur naturally and are formed when oils are treated with hydrogen; they are usually solid at room temperature.
2) There are degrees of saturation. Some fats contain more polyunsaturated fatty acids than others.
3) Very high amounts of polyunsaturated fats may have adverse side affects. Thus, reduction in total fat may be more desirable than merely substituting polyunsaturated fats for saturated fats.

B. Food Habits and Eating Patterns

1. Food habits are a product of interactions among physiclcgical and psychological satisfactions associated with food, beliefs about foods, sociological and cultural influences and economic resources.
   a. Food likes and dislikes, attitudes, and social pressures are among the factors which influence people to choose the foods they do.
   b. Resources (time, money, knowledge, and skills) may limit or expand possible choices of food.
      1) Nutritionally adequate and varied diets are possible with limited money resources.
      2) Instinct is not a reliable guide to food selection; some knowledge of foods and

nutrition is necessary.

2. In order to insure an adequate diet, each individual should assume some responsibility for his or her own food behavior and nutrient intake.
3. The family or peer groups, by direction or example, help individuals develop food habits and attitudes toward nutrition.
   a. Parents, fathers as well as mothers, have considerable influence on food habits of family members.
   b. Food habits, like other habits which are formed at a young age, influence the individual throughout life.
   c. Positive as well as negative attitudes toward food can be developed in family or peer group settings.
   d. Eating experiences with foods affect attitudes toward those foods.
   e. Wide acceptance of foods by an individual can mean easier adaptability to varied social environments and to availability of foods; in addition, it will increase likelihood of obtaining adequate nutrition and pleasure from food.
4. Eating patterns that are equally nutritious may vary considerably among individuals and groups.

a. Eating patterns for insuring adequate nutrition can be developed to fit individual life styles.

b. Some nutrients need to be eaten in combination with other nutrients for most efficient utilization; otherwise, many different meal and snack patterns can contribute to an adequate diet.

c. What one eats is more important than when one eats or how often.

5. Food habits, like other behavior patterns, are subject to deliberate modification by those who are motivated to change but are highly resistant to direct intervention.

C. Food As Source of Nutrients

1. No food in itself is good or bad.

a. Too much of many foods can lead to overweight.

b. Energy value of the intake is a limiting factor in total food intake. Thus if too many 'empty calorie' (low nutrient/calorie ratio) foods are consumed, the limit may be reached before other necessary nutrients are ingested.

2. No one food is a good source of all nutrients.

a. Nutrient supplements may be necessary in certain instances, but most people can get adequate amounts of nutrients from foods.

b. Not enough information is available for food sci-

entists to design an ideal fabricated food.

3. Some foods are good sources of some nutrients. Many foods are high in water content. Energy value (measured in kiloclaories or calories) is low when the water content of a food is high.

   a. Carbohydrates and fats are plentiful in foods; in general, carbohydrates, including cellulose (fiber), are found in plant products. Fats are found in animal products. Processed products such as butter, margarine, shortening, oils, and salad dressings are high in fat content. Saturated fats (solid) often come from animal sources and polyunsaturated fats (liquid) from vegetable sources.

   b. Protein is provided largely by meats, milk and milk products, eggs, and legumes (dried beans and peas). Breads and cereals are also important sources of protein. Combinations of cereal products and legumes or combinations of plant with animal sources of protein can provide adequate dietary protein with less expense than the use of all animal sources of protein.

   c. Calcium is most abundant in milk and milk products and is also found in relatively large concentration in dark green leafy vegetables and

some nuts.

d. Phosphorus is found in the same foods that are good sources of protein, especially meats.

e. Iron can be found in useful amounts in meats (especially red meats), enriched and whole grain breads and cereals, and dark green leafy vegetables. Milk products and refined, unenriched breads and cereals are poor sources of iron.

f. Vitamin A can be obtained from liver, whole or fortified milks, margarine to which vitamin A has been added and butter. Carotene, found in dark green and deep yellow fruits and vegetables, can be converted to vitamin A in the body.

g. Thiamin is found most abundantly in pork, enriched or whole grain (unrefined) breads and cereals, and legumes.

h. Ribcflavin is found in fairly high quantity in milk, milk products, and enriched or whole grain (unrefined) breads and cereals.

i. Niacin is obtained from a large variety of foods including enriched or whole grain breads and cereals, meats, and legumes.

j. Vitamin C is found in a wide variety of fruits and vegetables - broccoli, brussels sprouts, cantaloups, oranges, grapefruit, peppers,

strawberries, asparagus, raw cabbage, cauliflower, dark green leafy vegetables, other melons, potatoes or sweet potatoes, tangerines, and tomatoes.

k. Vitamin B12 occurs only in foods from animal origin.

l. Vitamin D is produced within the body when the skin is exposed to sunlight. It is also present in fortified milk.

m. Vitamin E is found in vegetable oils, shortenings, and margarines.

n. Fiber can be obtained in the diet by eating fruits, vegetables, cereals, bread, and nuts. It is not necessary to buy special preparations such as cellulose bread, high bran cereals, etc.

o. Eating a variety of foods gives some assurance of a diet adequate in trace mineral content.

p. Carbohydrates are found for the most part in plant products. They include starches and sugars.

4. Foods vary considerably in the type and amount of fat and in cholesterol content.

a. Fats are plentiful in foods. They are found primarily in animal products and seeds.

b. Saturated fats (solid) are present in animal foods and polyunsaturated fats (liquid) often

come from vegetables and plants.

c. Processed products such as butter, margarine, shortenings, oils, and salad dressings are high in fat content.

d. Cholesterol is found in animal foods. Plants do not produce cholesterol and therefore they are not a source of cholesterol.

e. Since saturated fats and cholesterol are both obtained primarily from animal sources, they are often associated in foods. They are, however, different substances.

f. Energy value is low when the water content of a food is high.

5. Variety of foods in the diet is important to meet needs for all nutrients and to avoid excess of potentially toxic substances. Moderation is also a good guide for almost all food selection.

a. Some fiber is beneficial in the diet; however, there are no conclusive data to show that there are advantages to very high fiber diets. Instead, there are indications that it may be detrimental.

b. High cholesterol in the diet may be related (at least for some persons) to high serum cholesterol. High serum cholesterol has been implicated in heart disease.

6. Variety alone does not insure an adequate nutrient intake. By grouping foods according to key nutrient content, the groups can be used as guides for selecting foods to meet nutrient needs and to evaluate nutrient intake.
   a. All food groupings include foods that vary somewhat in nutrient content; therefore, it is still important to eat a variety within each group.
   b. Foods within a group can be exchanged or substituted for each other.
   c. For persons concerned about weight control, the energy value of foods within groups are also important.
   d. A new Nutrient Guide for good nutrition is based on exchangeability among foods in this guide; food lists are based on nutrients most likely to be short in U.S. diets.
      1) This guide allows estimation of energy value of the intake as well as intake of nutrients.
      2) Foods within a group can be exchanged or substituted for each other.
      3) This plan can be adapted to special diets such as those low in cholesterol, low in fat, and for weight reduction.
      4) This plan emphasizes foods that are impor-

tant sources of more than one major nutrient or nutrient class because these foods appear in more than one group.

7. Information regarding nutrient content of many foods is available on package labels.
   a. The U.S. Recommended Dietary Allowances are used to indicate content of six nutrients (protein, iron, calcium, vitamin A, thiamin, niacin, riboflavin, and vitamin C). Caloric value and fat, carbohydrate, and protein content (in grams) per serving of the food are also included.
   b. The U.S. Recommended Dietary Allowances are derived from the Recommended Dietary Allowances but combine several categories; therefore they are not exact for any age group.
      1) The U.S. Recommended Dietary Allowances intake per day compare more closely with the adult Recommended Dietary Allowances than to those for children.
      2) Less than 100% of U.S. RDA's meets the Recommended Dietary Allowances for certain ages and certain nutrients.
8. Additives are sometimes included in foods to improve color, flavor, texture, nutritional value and preservation of the food product. Some additives have

been shown to have detrimental effects as well as useful cnes. A risk/benefit ratio is one way of evaluating desirability of additives.

9. Nutritionally adequate and varied diets are possible with limited expenditures.
   a. Many expensive foods have less expensive substitutes with the same nutritional quality.
   b. Factors other than nutrient content affect the price per serving. Thus the dollar cost of food does not necessarily reflect its nutritional value.
   c. Nutritive requirements can be met without increasing total food costs.
   d. Animal protein foods are expensive relative to other foods.

D. Sources of Nutrition Information
   1. There is much inaccurate and/or misleading information about nutrition in the media.
      a. Anyone can call him/herself a nutritionist whether or not he/whe has had formal training in nutrition.
      b. Some self-proclaimed nutritionists are in the business to make money from books, lectures, magazines, and "special" foods.
      c. Those who do not concern themselves with the ac-

curacy and completeness of their information can and do make definite statements about many unknowns.

2. Competent nutritionists base their conclusions on research data.
3. To gain accurate information, one must critically evaluate the content and source.
   a. A basic understanding of nutrients, food sources and body functioning is a useful basis for evaluating information.
   b. There are few simple solutions to complex problems. Nutrition is a complex subject and therefore simple answers are usually inadequate and often inaccurate.
   c. It is often difficult to determine whether a source is a professionally trained nutritionist or a self-styled nutritionist. College degrees and organization membership are good guides.
   d. In general, health foods offer no more benefits than foods from the garden or supermarket and are usually more expensive.

APPENDIX F. BEHAVIORAL OBJECTIVES

Cognitive acceptance objectives After the nutrition program, the receiver (father or mother) will be better able to:

-Recognize that nutrients are necessary for body functioning.

-Comprehend that nutritional deficiencies are not often immediately apparent.

-Comprehend that it is difficult to identify specific relationships between nutrition and health because there are many factors which affect health.

-Comprehend that each nutrient performs certain specific functions and thus all nutrients are necessary for good health.

-Comprehend that excesses of some nutrients may be harmful and that excesses of others may be wasteful.

-Be aware that recommendations made by competent nutritionists are based on research findings and that changes in recommendations are sometimes made as new findings become available.

-Recognize that the Recommended Dietary Allowances are recommendations and not minimum requirements.

-Recognize that the amount of nutrients needed by family members vary, but that they all need the same nutrients and that each individual's needs change over time.

-Recognize that increased activity requires an increase in energy, but not necessarly an increase in protein.

-Recognize that excess fat and total energy intake should be concerns for many U.S. citizens.

-Identify nutrient sources of energy (fat, carbohydrate, protein).

-Recognize that fat is a more concentrated source of energy than either carbohydrate or protein.

-Recognize that the cause of overweight is energy intake in excess of that expended.

-Comprehend that cholesterol is necessary, but high concentrations of serum cholesterol have been implicated in heart disease.

-Comprehend that decreasing total fat in the diet may be more beneficial than replacing saturated fat with polyunsaturated fats.

-Recognize that good nutrition does not usually mean spending more money for food.

-Recognize that knowledge of food composition is useful for selecting a balanced diet.

-Recognize that each individual must take some responsibility for his or her own food intake.

-Acknowledge that parents (fathers as well as mothers) influence the food habits of other family members.

-Recognize that a wide variety of eating patterns can result in a nutritionally adequate diet.

-Recognize that proper snacks can make a postive contribution to intake.

-Comprehend that no one food supplies all nutrients.

-Identify particular foods as good sources of key nutrients.

-Identify substitutions of one food for another (exchange concept).

-Identify sources of food fiber and recognize that it can be obtained without buying special 'fiber'-supplemented foods.

-Identify enriched bread as a source of vitamins and minerals.

-Identify food sources of cholesterol and saturated fat.

-Comprehend the concept of exchanging foods within a food list.

-Recognize the need for variety of foods in the diet.

-Comprehend the risk/benefit ratio.

-Recognize that for many expensive foods there are less expensive substitutes which supply the same nutrients.

-Recognize that not all persons who call themselves nutrition authorities or nutritionists have had formal nutrition training.

Affective acceptance objectives After the nutrition program, the receiver (father or mother) will:

-Be willing to gain knowledge of food composition.

-Be willing to take responsibility for his/her own food intake.

-Be willing to help children develop good food habits.

-Be willing to try new foods.

-Be willing to use the exchange plan to evaluate family members' food intake.

-Place increased importance on the nutritive value of food items when purchasing food for the family.

-Place increased importance on the development of good food habits by children.

-Place increased importance on health goals relative to economic and social goals.

-Place increased importance on improving the quality of his/her own diet.

-Increase his/her satisfaction with the family's food behavior.

-Feel that the "Nutrient Guide" is understandable.

-Feel that the "Nutrient Guide" is a useful tool.

Behavior change objectives After the nutrition program, the receiver (father or mother) will:

-Analyze his/her own and other family members' food attitudes and food habits by participating in the communication program.

-Explore eating patterns that will meet nutrient needs of family members and fit into the family's lifestyle.

-Apply knowledge of food composition to select snack foods.

-Use the exchange plan to evaluate food intake of self and family members.

-Select a balanced diet to meet his/her nutritional needs.

-Increase the use of the ingredient labels when selecting foods for the family.

-Increase the use of the nutrition labels when selecting foods for the family.

-Make changes in food practices which improve nutrient intake according to accepted standards.

-Complete the personal guide worksheet.

-Make changes in his/her diet as a result of the "Nutrient Guide".

-Make changes in his/her diet as a result of the communication program.

APPENDIX G. EXPLANATION OF TERMS

Affective acceptance: Acceptance (by a receiver) of a message at the attitudinal level, i.e. s/he considers the proposals of the message desirable.

Behavioral acceptance: Taking the action proposed by the message.

Change agent: A professional who influences innovation decisions in a direction deemed desirable by a change agency (Rogers and Shoemaker, 1971).

Cognitive acceptance: Belief level acceptance (by the receiver), i.e., s/he considers the message to be valid, factual, correct or true.

Feedback: Communication from receiver to sender.

Holistic approach: Integrates various concepts and generalizations to give a total picture rather than only isolated facts which serve to answer specific questions but may not be very useful for making decisions in different situations.

Mass channels: Radio, television, telephone, mail, newspaper, and printed bulletins, i.e., the ways in which senders can reach many receivers.

Human communication: The process by which one individual attempts to relate to another through the use of symbols.

Message content: The concepts and ideas included in a message.

Message treatment: The manner in which concepts and ideas are presented in a message.

Nutrition communication: Persuasive communication about nutrition with the intent of changing attitudes, knowledge and/or behavior with respect to nutrition and food practices.

Outcome: Acceptance or rejection of the goals of the communication program by the receivers.

Persuasive communication: The process whereby one individual attempts to influence ideas, emotions, or behaviors of others in a specified direction.

Predispositions: Beliefs, knowledge, skills, values, and attitudes.

Receiver: Individual with whom the sender wishes to communicate.

Receiver inputs: Personal status-roles such as age, education, income and mental dispositions (e.g. previous knowledge of nutrition, food practices).

Reception environment: Setting in which a message is received.

Response to messages: Includes interpretive responses (attention, comprehension), interaction, and acceptance/rejection responses (cognitive, affective, and behavioral).

Sender: One who is responsible for the communication.

Sender inputs: Decisions made by the sender about the communication strategy. They include channel, apparent source, message content, message treatment, and over-all communication strategy.