1974

A causal model analysis of food behavior

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by

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A Dissertation Submitted to the

Graduate Faculty in Partial Fulfillment of

The Requirements for the Degree of

DOCTOR OF PHILOSOPHY

Department: Food and Nutrition
Major: Nutrition

Approved:

Signature was redacted for privacy.

In Charge of Major Work

Signature was redacted for privacy.

For the Major Department

Signature was redacted for privacy.

For the Graduate College

Iowa State University
Ames, Iowa

1974

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INTRODUCTION

The development of a causal model relating personal and social factors to food behavior was undertaken as part of the North Central Regional project NC-108, "Changes in Food Practices for Better Nutrition" (NC-108 Outline, 1971). This regional project has three objectives: a) to determine personal and social factors related to food choices and eating behavior of selected populations, b) based on personal and social factors, to devise innovative approaches to change food habits, and c) to determine the effectiveness of various intervention techniques and make recommendations for nutrition programs. The interpretation of data presented here is intended to meet partially the first phase of the project, i.e. to identify personal and social factors relating to food choices and eating behavior. The assumption has been made that current eating behavior does not meet recommended standards for all individuals in the regional area.

While America has frequently been referred to as the "land of plenty", the nutritional status of the American population has been of concern for many years. As long ago as the late 1800's, Atwater said of the American dietary, "We are a generation of fat, starch and sugar eaters...the food of the people in this country is apt to be considerably in excess of the demands for nourishment (energy)" (Van Syckle, 1941, p. 51). Approximately 70 years later, participants at the White House Conference on Food, Nutrition, and Health (1969, p. 51) noted that, "Among the affluent, it is clear that we have developed a society that is characterized by overconsumption of calories with food choices that are not necessarily the wisest on the basis of nutritional information". At the other extreme, the Citizen's Board of Inquiry into "Hunger and Malnutrition in the United States" (1968) reported that more than 14 million Americans were going to bed every night without enough food. Thus, both historically and presently, two major nutritional problems have been identified in this nation: a) overweight and b) under-nutrition.

The incidence of overweight occurs more frequently among adults than among children or adolescents. According to Dwyer, Feldman, and Mayer (1970), the percentage of persons who are 20 percent or more above ideal weight increases from childhood until middle age. These authors also reported that over 30 percent of those adults who had a weight problem were not concerned about it.

The food consumption of households in the North Central Region was assessed in 1955 and again in 1965 (U.S.D.A., 1970). The results revealed that 18 percent fewer households had diets classified as good[1] in 1965 compared with 1955. The proportion of households classified as having poor diets had increased from 11 percent to 22 percent in the 10 year period. The lower quality of the 1965 diets compared with the 1955 diets was attributed mainly to a decreased use of milk and milk products, and of vegetables and fruits.

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[1]A "good" classification was used when the per person daily intake was equal to or above the full recommended dietary allowances (RDA) for seven nutrients. A "poor" classification indicated households where the per person daily intake was less than two-thirds of RDA for one or more nutrients. RDA values were based on 1963 allowances.

Parrish (1971) asked the question, "Why, when real incomes were rising, was there a decline in nutrient balance (from 1955 to 1965)?" He suggested 10 reasons why average household food habits had changed adversely in this 10 year period. In summary, these 10 reasons were: 1) decrease in home food production, 2) decrease in home-prepared foods, 3) increase in snacking and convenience foods, 4) increase in percentage of food consumed away from home, 5) trend toward meal skipping, 6) decreased importance of food in family budgets, 7) adverse effects of differential price changes on consumption of selected items,[1] 8) increase in popularity of diet and health fad foods, 9) decreased availability of selected nutrients,[2] and 10) nature of food preferences of an affluent, urbanized mobile society. Friend (1967) reported that since 1909, the trend has been towards consumption of more meat, poultry, and dairy products (except butter), fats and oils, sugars and sweeteners, and less flour and cereal products. The percentage of calories from fat has increased while the percentage of calories from carbohydrate has decreased. A higher percentage of the carbohydrate intake was due to sugar rather than starch. Magnesium consumption also has decreased.

Thus, the pattern of food consumption has been dynamic and subject to change, sometimes rapidly, sometimes slowly. Van Syckle (1941) noted

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[1]The cost of fresh fruits and vegetables rose 22% from 1955 to 1965, while the cost of other types of food either did not change or decreased.

[2]The availability of food sources of vitamins A and C has declined from a wartime peak in 1945 to the available level of 1910. For example, the use of sweet potatoes has decreased 83% since 1920 due to decreased production of sweet potatoes by small growers.

that when the consumption of one food expands, another food must be displaced. From the viewpoint of nutritionists, the changes in food patterns that have occurred have not always been in the desired direction. The objective of this dissertation is to focus on what factors influence food behavior.

Lewin (1943, p. 36) suggested that the question of

> ...why people eat what they eat is rather complex, involving both cultural and psychological aspects, as well as problems of transportation, availability of food in a particular area, and economic considerations.

Lowenberg et al. (1968, p. 87) defined food habits of a group as "the product of the group's present environment and past history". Todhunter (1972) emphasized that food is more than a source of nutrients. She suggested that "food is intimately woven into the physical, economic, psychological, intellectual and social life of man." These definitions of food and food behavior indicate that to understand fully the factors influencing food behavior, the social sciences may be needed to provide new orientations.

If we accept the conclusions that nutritional problems exist in this country, that food habits are changing, often adversely, and that food consumption is a complex behavioral problem involving many factors, then how do we influence the foods that people eat?

A common solution for nutritional problems in the U.S. has been the use of nutrition education programs (Eppright et al., 1970; Hinton et al., 1963; Sliepcevich and Creswell, 1968; Hill, 1972; and Ullrich, 1971). Hill (1972), however warned that:

> Too often concerned people have believed they had provided nutrition education when the learner was able to repeat the facts presented. Education in nutrition is achieved only when the learner can and does apply the facts to himself.

The motivation of people to make food choices based on sound nutritional information, or even to learn sound nutritional principles, has been an elusive problem for many nutrition educators.

Several writers have discussed the motivational problems inherent in the process of changing food behavior. Babcock (1948) suggested that since food is very close to people's most primitive feelings, individuals will always feel that there is nothing new to learn about food. According to Moore (1952), most people in our society are more interested in how they feel about their food than in what or when they eat. Noar (1970) noted that nutrition cannot be sold as a prescription for health, except to faddists. He cited the example of a large cereal manufacturer who spent $15,000,000 to advertise the nutritive value of a certain new cereal product, only to find that people were eating the cereal product, not because of its nutritional benefits, but because they liked it. He concluded that people cannot be stimulated by the word "nutrition" to eat something that is good for them; rather needs and desires of consumers must be taken into account by the nutrition educator in order to achieve changes in food behavior. Eppright (1952), after analyzing data from representative Iowa families, concluded that health considerations did not seem to influence actual food selection. Foods that were considered satisfying and filling and those that tasted good were popular. Surveys of consumer behavior, according to Bauman (1971), clearly supported the idea that social values of food were far more relevant to consumption decisions than were nutritional issues. Additionally, a Cooperative Project in the Southern Region of the U.S.A.[1] observed that purchasing choices (for foods) of homemakers were not related to the nutritional value of food.

In summary, the present study has been based on the assumption that nutrition knowledge is not a sufficient condition for affecting beneficial changes in food behavior, and indeed, may not even be a necessary condition. New and innovative approaches to nutrition education, based on an in-depth look at factors affecting food behavior, appear to be needed.

The objectives of this study are three-fold: a) using a social-psychological framework, to derive a theoretical model for food behavior of young married couples, b) to test this model using causal model and path analysis techniques, and c) based on the resulting modified, empirical model, to make general recommendations for intervention programs.

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[1] Cooperative Regional Project Termination Report, Regional Project No. SM-13. Consumer responses to food promotion and education programs. Personal communication. ca. 1965.

THEORETICAL BACKGROUND

A major premise of this dissertation is that food intake is a specific type of human behavior. Therefore, a social-psychological model used to explain behavior in general has been applied to the study of food behavior.

Sherif and Sherif (1969) proposed that individual behavior can be understood only by studying it within an appropriate frame of reference. An adaptation, specific to food behavior, of this frame of reference is diagrammed in Figure 1.

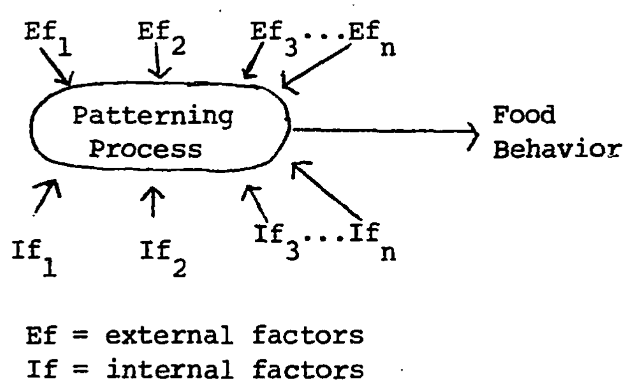

Figure 1. Frame of reference for food behavior

According to Sherif and Sherif (1969, p. 30),

> The appropriate frame of reference for studying behavior, then, is the system of relationships among all external and internal factors operative at a given time.

They continued (p. 33),

> The term frame of reference is simply a capsule summary of a general principle that behavior can be understood only against its antecedent background and immediate context. The frame of

> reference, therefore, is the totality of interrelated external factors (Ef) in the situation and internal factors (If) arising from the individual that are operative at the given time.

External factors in the frame of reference for food behavior could be such factors as the money available for food, taste preferences of family members, family approval of specific foods, advertisements, and so on. Internal factors could include individual taste preferences, habits, knowledge of nutrition, beliefs about foods, attitudes, goals, needs, wants, motives, self-concept, and so on. Thus, internal factors are those dimensions of the individual's social-psychological personality thought to be related to food behavior. External factors are those aspects of the social and economic environment which may influence food behavior.

As shown in Figure 1, the individual's food behavior is influenced by both internal and external factors. However, neither internal nor external factors directly influence food behavior. Rather, information from internal and external forces is organized into meaningful relationships by the individual, often subconsciously, via the patterning process. According to Sherif and Sherif (1969, p. 29):

> ...the individual is not constantly aware of this processing, nor all of the constituent parts.... Action follows the central process whereby the individual perceives a situation, sizes-up its salient aspects, and plans in terms of memories of the past and future objectives.

Not only does an individual consider many factors in his frame of reference, but he also assigns different relative weights to these factors. The weighted factors[1] plus the individual's need for

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[1]The relative weights are assumed to remain fairly constant over time, i.e. the weights are not randomly assigned in each instance.

consistency (or patterning) in his behavior, provide the individual with a predisposition to act in a particular way. That is, stimuli from outside the individual are placed into established patterns and predispose the individual to react in certain ways.

In summary, the individual's frame of reference with respect to food behavior would include all of the external and internal factors operative at a time in addition to the patterning process which influences the relationships which exist among the internal and external factors. Therefore, identification of the internal and external factors and the relative weightings assigned to them by an individual, should provide a basis for predicting his patterns of food behavior. Furthermore, in an intervention program, it is important to remember that the individual will not be passive, but rather will be active in maintaining a stable pattern of behavior. Forces outside the individual may pressure him to change his behavior in some way, but he will strive actively to maintain stability in his behavioral patterns (Secord and Backman, 1964).

This general discussion of the individual's frame of reference can be summarized with an example relevant to food behavior, e.g., the relationship of nutrition knowledge to food behavior. Once acquired, nutrition knowledge would become an internal factor in the individual's frame of reference. However, as shown in Figure 1, a single internal factor (in this case, nutrition knowledge) will not directly or totally determine the individual's food behavior. Rather the individual will process this information in relation to other factors in his frame of reference - factors such as what his wife or friends think of eating certain foods, what foods are available to him, and the manner in which he perceives that eating recommended foods will enhance or detract from his self-esteem. If concern with wife's or friends' approval is an important factor, health concerns would likely be less heavily weighted and nutrition knowledge would not be expected to influence his food behavior greatly. That is, because of the relationship of nutrition knowledge to other factors in the individual's frame of reference, the individual may not apply his knowledge of nutrition to his food behavior.

Behavior, in general, and food behavior specifically, is thus determined by the interrelationships of many factors. Differences in food behavior arise from differences in the internal and external factors affecting the individual, and in the relative weightings given these factors by the individual. Furthermore, food behavior itself, can be measured in different ways. Food behavior could be described as the number of meals, the particular combinations of food chosen, the snack pattern of the individual, or combinations of these and other types of food behavior.

In this dissertation, an attempt will be made to identify some of the factors relevant to the individual's frame of reference with respect to various types of food behavior, and also to estimate the relative weights assigned to these factors. Variables in the frame of reference selected for study were:

<u>Internal factors</u>

a. educational level

b. nutrition knowledge

c. social, economic, and health goal orientations

d. value-attitude orientations which measure the relative rationality of the behavior of individuals

External factors

e. family income

f. social class rating

g. nutrition knowledge of spouse

h. social, economic, and health goal orientations of spouse

i. spouse weight reduction dieting pattern

j. number of meals eaten per week by spouse

k. number of snacks eaten per day by spouse

l. frequency of consuming "empty calorie" foods by spouse

m. variety of nutritious foods consumed by spouse

n. quantity of nutritious foods consumed by spouse

Variables which are specifically food behavorial were also selected to examine their relationship to nutrient intakes. These variables were:

a. weight reduction dieting patterns

b. number of meals eaten per week

c. number of snacks eaten per day

d. frequency of consuming "empty calorie" foods

e. variety of nutritious foods consumed

f. quantity of nutritious foods consumed

g. per person food expenditures

The effects of variables in the individual's frame of reference on these behavioral variables will be analyzed. Relationships among these food behavior variables will also be analyzed. For example, the effect of the number of meals eaten on snack consumption will be examined.

The last stage of this analysis will be to determine the effect of the above factors, i.e., factors for both frame of reference and food behavior, on nutrient intakes and weight status. These latter variables were considered to be consequences of the relationships among frame-of-reference factors and food behavior factors. The following eight variables were used to measure consequences of food behavior:

a. protein intake

b. calcium intake

c. iron intake

d. vitamin A intake

e. thiamin intake

f. vitamin C intake

g. weight status

h. overall diet quality

In addition, the direct effect of the spouse's nutrient intakes or weight status on the nutrient intakes or weight status of the subject will also be determined.

In summary, the following diagram indicates the steps to be taken in the data analysis reported in this dissertation:

$\boxed{\text{Frame-of-Reference Variables}} \rightarrow \boxed{\text{Food Behavior Variables}} \rightarrow \boxed{\text{Nutrient Intakes or Weight Status}}$

The assumption has been made that in this preliminary effort not all of the relevant factors in the individual's frame of reference nor all of the food behavior variables have been included in this analysis. This model will be tested using causal and path analysis techniques.

Frame-of-Reference Variables

Educational level

Educational level was selected as being a relevant internal factor in an individual's frame of reference for food behavior. The relationship between educational level and food behavior has been studied by several researchers. Young, Berresford, and Waldner (1965b) found that educational level of homemakers was an important factor influencing family feeding. With increasing educational levels of homemakers, there was a tendency for all seven of the basic food groups[1] to be included in the menu. Furthermore, Young et al. observed that an increase in income of homemakers was associated with an increase in diet quality only if educational level was also increased. The reverse situation, i.e. increasing income while holding educational level constant, was not associated with improvements in the quality of the homemaker's diet.

Christenson (1973) observed that the educational level of wives was positively correlated with the number of servings of vitamin C-rich foods consumed per day, the number of different food items eaten, the daily frequency of meat consumption, and the percentage of RDA for calcium which was met.

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[1]This study was done prior to the use of the basic four food groups plan.

Preschool children, whose mothers had higher educational levels, tended to have better intakes of calcium, iron, thiamin, riboflavin, and ascorbic acid than did children of less educated mothers (Eppright et al., 1970). However, vitamin A content of the diet was not influenced by education of the mother. Eppright et al. found educational level of mothers to be a more significant factor than family income in determining the diet quality of their preschool children.

Dwyer and Mayer (1970) reported that educational level affected interest in weight control. They found that data from public opinion polls taken in 1950 and 1956 showed that the higher the educational level, the more likely the subjects were to be dissatisfied with their weight.

Income

The income of a family would be an external factor in an individual's frame of reference for food behavior. Income is a variable which has been associated with food behavior in past studies. Data from the 1965 North Central Region survey of dietary households (U.S.D.A., 1970) revealed that at the highest income levels ($\geq$ $10,000), 62 percent of the households met the 1963 Recommended Dietary Allowances (RDA) for seven nutrients, while only 36 percent of the lowest income families (<$3,000) met these allowances. Conversely, 36 percent of the households with incomes less than $3,000 annually had diets with one or more nutrients below two-thirds of the RDA as opposed to 11 percent of the households in the upper income bracket. As income increased, the intake of ascorbic acid improved more than intake of other nutrients.

Jalso, Burns, and Rivers (1965), on the basis of scores on a nutrition opinion test, divided a sample of New York subjects into two groups, faddist and non-faddists. Non-faddists tended to be from upper income categories, faddists from lower income categories. Rees (1959) noted that more homemakers with incomes over $5000 included more of the essential food groups than did lower income homemakers. For preschool children, Eppright et al. (1970) found that income after taxes (of their parents) was significantly related to the ascorbic acid intake of the child. Income was also significantly related to nutrition knowledge, and to attitudes toward meal planning and nutrition of mothers of these preschool children.

Social class

Social class, an external factor, was associated with diet quality of 12- to 14-year old girls by Hinton et al. (1963). They found that girls in the highest of three social status classifications[1] tended to miss fewer meals, have better diets, place a high value on health in food selection, and be less concerned about overweight compared with girls in the lowest social status classification.

Homemakers, in high status categories, with children in the sixth or lower grades, more often considered nutrition when choosing foods for their family, tended to use unusual foods more frequently, and included

[1]Social status classification included a) prestige rating of father's occupation, and b) educational level of both parents.

more essential food groups in their family meals than homemakers in low status categories (Rees, 1959). On the other hand, Christenson (1973) did not find that the social class of husbands, as determined by the North-Hatt scale, was related to dietary variables of wives.

Social class has been related inversely to obesity in adults by Dwyer et al. (1970). These authors reviewed results from public opinion polls from the 1950's which showed that as social class rose, the incidence of obesity decreased, especially for women. In another article, Dwyer and Mayer (1970) reported that men and wives of husbands in higher occupational classes were more interested in losing weight than were individuals from lower occupational classes.

Value-attitude orientations

Values and attitudes are internal factors in an individual's frame of reference. They form the basis for a predisposition or orientation to act in given directions with respect to various stimuli (Bohlen, 1967). Thus knowledge of dominant values and attitudes of an individual would provide some insight into his expected patterns of behavior.

Values and attitudes are functionally related. Both incorporate beliefs about what should be the relationships among phenomena in the universe and how the individual should relate himself to the universe. The difference between these two concepts lies mainly in the degree of abstractness of their referent objects (Hobbs, Beal, and Bohlen, 1964). Hobbs et al. suggested that attitudes be considered as specific manifestations of more generalized values and beliefs. That is, the individual would have values related to a general class of phenomena, and attitudes related to specific instances or subjects within this general class.

Both values and attitudes contain cognitive and affective components.[1] Additionally, attitudes contain a behavioral component (i.e., a tendency to act). These three components will be discussed separately and then as an interdependent unit.

Beliefs are the bases of the cognitive component of values and attitudes. Hobbs (1963, p. 46) defined beliefs as "...an enduring organization of perceptions and cognitions about some aspect of the individual's world." The beliefs of an individual are based on his perception and interpretation of reality. Because beliefs are based on an individual's subjective interpretation of phenomena or relationships among phenomena, a belief held by an individual may not be consistent with scientifically validated facts (Hobbs, 1963; Warland, 1966; and Bohlen, 1967).

The affective component of values and attitudes involves an expression of approval or disapproval. According to Bohlen (1967), when an individual acts in response to a stimulus, he decides whether the experience was good or bad, satisfactory or unsatisfactory, pleasant

[1]Cognition is the term used to indicate "all the various aspects of knowing, including perception, judgment, reasoning and remembering, thinking and imagining" (Gould and Kolb, 1964, p. 99). The affective component refers to the emotional component. The term affect "covers both positive and negative states, including...anger and anxiety as well as affection" (Gould and Kolb, 1964, p. 13).

or unpleasant. That is, he assigns an emotional (or affective) component to the experience. Thus, values, which contain both an affective and cognitive component, are an individual's beliefs about what should be the relationships among phenomena and how he should relate himself to them (Bohlen, 1967).

The individual organizes his values, and the affective and cognitive components of these values, into relatively congruent and interdependent systems. Bem (1970, p. 13) noted that,

> Individuals do not merely subscribe to random collections of beliefs but rather they maintain coherent systems of beliefs which are internally consistent.... To say that a man is consistent is not necessarily to say that he is logical or rational.

Thus, the more a person believes something to be true, the more likely he is to desire it or the more likely the individual will persuade himself that it is desirable.

Individuals are characterized by a multiplicity of values, each of which may be assigned a different weight (Hobbs, 1963). Individuals organize their values into hierarchical systems of favorableness to themselves. Consequently, many people may share the same values, but their differences of opinion stem from the relative importance they assign to these values (Bem, 1970).

Warland (1966, pp. 26-27) listed seven properties that distinguish values from other concepts. These seven properties are summarized below:

1. Values possess the property of selectivity, i.e., the quality of ordering the options available so that those who have had to make a

choice will accept it as decisive.

2. Values do not have the property of universality, i.e., all men do not make identical choices.

3. Values have the property of continuity from generation to generation via the socialization process.

4. Values can and do change, although they are a relatively stable component of personality.

5. Values are associated with roles which human beings fulfill in society or which they aspire to fulfill. Thus, values have the property of imposing obligations, or defining what is expected socially of a person in a certain role.

6. Values have the property of inducing self-evaluation. A person judges the propriety of his own conduct by reference to the (value) standards he has learned.

7. Values have the property of self-inhibition; i.e., action considered improper will be restrained by the process of internalized control, rather than by external coercive standards.

Attitudes, like values, are a function of both cognitive (belief) and affective (emotional) elements but also include motivational elements, thus having a more direct relationship to individual actions than do values (Triandis, 1971; Hobbs, 1963; Warland, 1966; Krech, Crutchfield, and Ballachey, 1962; Secord and Backman, 1964; Sherif and Sherif, 1965). Bohlen (1967) defined attitudes as, "an individual's tendency to act based upon his beliefs and values." An attitude involves what people think about, their feelings, and how they would like to behave toward an object. The behavioral component of an attitude is associated with feelings about what is correct behavior. It is a predisposition to action.

In summary, values and attitudes are functions of cognitive and affective elements, incorporating beliefs and feelings about past experiences. The major differences among these concepts are: 1) attitudes are specific manifestations of generalized values, and 2) attitudes contain a behavioral component, i.e. a predisposition to act.

Knowledge of what an individual believes, or that he places a high value on something or has a positive attitude toward an object does not guarantee that this individual will act toward that object in a predictable way. As discussed in the context of the frame-of-reference model (Figure 1), behavior is a function of many components. When many of these factors are consistent, there is consistency between attitudes and behavior. However, individuals may act counter to their attitudes in order to conform to social pressures. For example, when attitudes and other factors in the individual's frame of reference are in conflict, attitudes alone may be a weak predictor of behavior. Several investigators (Acock and DeFleur, 1972; Warner and DeFleur, 1969) demonstrated that neither attitudes nor social situational variables alone adequately predicted behavior. However, when interaction between attitudes and situational variables was analyzed, behavioral predictions improved considerably.

Scales for measuring value orientations associated with rational approaches to decision-making have been developed by the Department of Sociology at Iowa State University (Warland, 1966; Hobbs, 1963; Hobbs et al., 1964). In discussing the justification for using these scales in a research model, Hobbs (1963, p. 41) suggested that

> ...rationality of action is a function of the values of the individual...rationality is a function of the level of valuation of (that) goal[1] and the corresponding mode of organization for its attainment.

These scales for value orientations were thus intended to measure the rational selection of goals and also the rational selection of means for attaining the same goals.[2]

The rational value orientations, as developed by Warland (1966) and Hobbs (1963) were specifically concerned with the identification of rural (traditional) versus urban (modern) value orientations of farmers. Rural versus urban orientations were theorized to be opposite poles on one dimension of a continuum of values. Warland and Hobbs hypothesized that the closer a farmer's orientations to the urban (modern) end of the continuum, the more willing he would be to use scientific information and modern technology in his farming operation. That is, the more rational he would be in the selection of goals for his farm operation, and also in the

[1]"That" goal in Hobb's research was profit maximization. In this research, it would be health goals.

[2]According to Hobbs (1963, p. 83), "Although the techniques of attitude scaling are employed in the development of the empirical measures it is inferred that the scales measure and are related to more generalized values." It will be assumed then that these scales are really value scales since their referent objects are general.

selection of means for obtaining these goals, based on recommendations of knowledgeables in farming methods.

The rural or traditional orientations were defined by Warland (1966, pp. 43-46) as follows:

1. fatalism: Personal philosophy that maintains that events and man's destiny are determined by external forces in advance so that man has no control over what happens to him.

2. traditionalism: The conviction that "past-tested" methods rather than relatively new untried methods should serve as guides for decision-making. This was derived from the philosophy that emphasized the value of those things that are practical and necessary, not ornamental.

3. risk aversion: The belief that a farmer (individual) should use assured and predictable practices in his farming operation (actions) to reduce risk as much as possible. This was based on the debt avoidance value of farmers and also was associated with the Protestant ethic of risk.

4. individualism: The belief that an individual should be self-sufficient and responsible for solving his own problems and making his own decisions.

Contemporary values, such as scientific orientation and risk orientation, were postulated to be replacing more traditional rural orientations. The contemporary orientations were defined as:

1. scientific orientation: Value which advocates that a) scientific findings should be applied to all aspects of our everyday life and b) scientific findings and the scientific method should serve

as the criteria for the selection among alternative courses of action. This orientation was perceived as being the opposite of traditionalism and fatalism.

2. risk orientation: Emphasis on using methods which are perceived as involving elements beyond the individual's control for purposes of gaining predetermined ends. This was an orientation closely associated with scientific orientation, and also was oriented towards mastery rather than passive acceptance, rationalism rather than traditionalism.

Empirical testing of these rational value scales revealed that scientific orientation and risk orientation were related to farm management ability (Hobbs, 1963). Warland (1966) found value orientations to be significantly related to the policy behavior of farmers, although the value orientations were more significantly related to policy positions than to policy actions. Anson (1973) reported that modern value orientations (scientific, risk orientations) varied directly with the profit goal orientation and with adoption of modern agricultural technologies by farmers.

Limited attempts to relate values and attitudes to food behavior have produced varied results. The rational value orientations discussed above have not been used previously when food habits were examined.

Using value orientations, Hinton et al. (1963) found that health values of 12- to 14-year-old girls were associated with the missing of fewer meals, and selection of more adequate diets. Girls who placed a high value on sociability, independence, status, or enjoyment of food as an end in itself tended to consider health values unimportant in food selection and were inclined to have poor diets.

Eppright et al. (1970) looked at the relationship of specific attitudes (rather than more general values) to food behavior. They found that attitudes of mothers toward nutrition had little relationship to nutrient content of their preschool child's food intake. Mothers who had favorable attitudes toward nutrition gave more vitamin supplements than did other mothers, but they did not select foods better than others. Attitudes toward meal planning and food preparation of mothers were related to the nutritive quality of their preschool child's diet. An attitude toward permissiveness in child food selection adversely affected all nutrients, except fat, in the child's diet. Saito (1970) found a measurable difference in psychological attitudes toward food of people whose overeating patterns indicated a potential for obesity and people of normal weight. These differences were most apparent during periods of stress.

Knowledge of nutrition

Nutrition knowledge could be either an external factor or an internal factor in the individual's frame of reference. It would be an external factor if it is being presented through educational or media channels. Once acquired by the individual, it would become an internal factor in his frame of reference.[1]

[1] In the model used in this dissertation, nutrition knowledge was considered as an internal factor. However, because nutrition knowledge could theoretically be either an internal or external variable, it was felt that a discussion of it as both an internal or external factor would be useful.

If we consider nutrition knowledge as an external factor in the individual's frame of reference, it is important to consider the ways in which individuals would attune themselves to nutrition education programs. Sherif and Sherif (1969, p. 41) suggested that individuals are selective in the stimuli they perceive. They defined psychological selectivity as "the screening process that eliminates all but a few of the potential sources of stimulation at a particular time". Furthermore, the process of selectivity is not arbitrary, but rather,

> ...it is guided by the relevance of impinging stimuli to needs, attitudes, and ego concerns of the person and also by accentuated, articulated, or compelling features of the stimulus world around him (Sherif and Sherif, 1969, p. 47).

Not only are individuals selective in the objects which enter into their conscious thought, but they are also selective in perceiving only certain characteristics of an object. That is, the individual is mentally "set" to perceive specific objects in specific ways (Krech, Crutchfield, and Livson, 1970). Krech et al. suggested that there are two main determinants of this "set": 1) prior experience and 2) needs (wants), emotions, attitudes, and values. That is, "individuals tend to see what they saw before and what fits best with their current orientation to the world" (Krech et al., 1970, p. 197). Internal factors in the individual's frame of reference sensitize the perceptual mechanisms of the individual and lower his threshold for recognizing and attending to relevant objects and aspects of those objects. At the same time, when stimuli (objects) are not important to the individual's frame of reference, the stimuli will be ignored (Sherif and Sherif, 1969, p. 45).

The individual may distort information so it will fit into his own system of beliefs and values (Krech et al., 1970). Because the individual has the ability to distort information or ignore information that is not congruent with his existing beliefs, the individual may not change his own beliefs as he is exposed to new information. Furthermore, the same objects will have slightly different meanings for different perceivers since each individual has his own receptors for perceiving objects (Hobbs, 1963, p. 46).

It can be deduced from the above discussion that information alone may or may not result in changes in an individual's beliefs about certain objects, but as new information becomes available to a person, changes in his thinking may occur eventually. Krech et al. (1962, pp. 37-38) noted, however, that

> ...changes in beliefs are often initiated by changes in the individual's wants, rather than by changes in his information. As people acquire new wants, they may seek out new information.

Nutrition knowledge, once attained, becomes an internal factor in the individual's frame of reference. However, nutrition knowledge may or may not be reflected in food behavior. Bohlen (1967) proposed a five stage adoption model as being a useful tool for understanding the relationship between acquisition of knowledge and subsequent behavior. The five stages in this model are 1) awareness, 2) information gathering, 3) evaluation of alternatives, 4) trial, and 5) adoption.[1]

[1]The five stages of the adoption model are for discussion purposes only. The adoption process is not one in which the adopter passes through each stage in an irrevocable manner. The individual need not pass through each stage completely before entering the next succeeding stage. He may go back and forth between several stages for a time. Furthermore, the time required to go through all five stages may vary considerably.

The awareness stage is the point at which the individual knows about the existence of an idea or practice, but lacks details concerning its intrinsic nature and use. According to Bohlen (1967), "Awareness may begin as an involuntary act (being forced to study nutrition in school) or as serendipitous behavior". Furthermore, once the individual is aware of an idea or practice, he cannot have this experience again.

During the second stage, i.e., information stage, the individual becomes interested in the idea, and seeks further information. The movement of an individual from the awareness to the information stage or from the information stage to the evaluation (third stage) may never occur. However, providing the individual is not thwarted in the early stages, he will continue into the evaluation stage. At this point, the individual takes the knowledge he has and weighs the alternatives. He may feel that certain foods recommended as nutritious are too expensive, or they are disliked by family members, or they are not fashionable, and so on. He may find that some situations lend themselves to choosing certain foods, others do not. In other words, the individual will weigh the costs (social, economic, and personal) against the rewards (social, economic, and personal) which can be gained by continuing or changing his present behavior. He will decide whether to proceed to the fourth stage (trial stage) or whether to stop and reject a behavior change, even though the information he attained in the second stage would indicate a need for a behavior change. If the individual proceeded to the trial stage and was satisfied with the change in his food behavior, he will adopt the new dietary practices on a regular basis (fifth and final stage in the adoption model).

Knowledge of nutrition has been related empirically to food behavior and other family characteristics in several studies. The level of formal education was observed to be related to homemakers' nutrition knowledge by Eppright et al. (1970), Young et al. (1956b), and Pearson (1969). Positive relationships between dietary adequacy and nutrition knowledge were observed in 12- to 14-year old girls (Hinton et al., 1963); in seventh and eighth grade students (Wellman, 1968); and in women in two New York cities (Young et al., 1956b). There was a tendency for the diets of preschool children to be better when their mothers had more nutrition knowledge (Eppright et al., 1970). Knowledge of nutrition was also observed to be positively related to attitudes toward nutrition, meal planning, and food preparation (Eppright et al., 1970), but was not related to family income (Young et al., 1956b). For seventh and eighth grade students, a positive relationship existed between exposure to nutrition education and nutritionally adequate meal concepts (Wellman, 1968).

The content areas of nutrition knowledge that women had the most misconceptions about related to the relative amounts of certain nutrients in various foods and the amounts of nutrients needed by people of various ages (Pearson, 1969). Eppright et al. (1970) observed that the most frequently missed items on the nutrition knowledge test were those related to food composition and those that might have been strongly influenced by advertising. The greatest need for nutrition knowledge was found by Young, Waldner, and Berresford (1956a) to be in the areas of ascorbic acid-rich fruits and vegetables, adult need for milk, and the nutritive value of breadstuffs and cereals.

Goals

Goal orientations have been previously identified as internal factors in the individual's frame of reference. The selection of goals and also the selection of a means to attain a goal are intimately tied to the concept of rational value-attitude orientations discussed previously. Implicit in the consideration of rational value-attitude orientations with respect to human behavior is the assumption that behavior is goal-oriented (Hobbs, 1963). That is, there are some end states of affairs or goals which motivate each individual's behavior. These goals may vary from immediate to long range.

The study of goals which individuals hold is an attempt to identify the factors which motivate individuals toward action (Krech et al., 1962). However, to understand how goals influence behavior, one must first understand the wants and needs of individuals. According to Krech et al. (1962, p. 68):

> A motivational analysis is given in terms of active driving forces represented by such words as "wanting" and "fearing". The individual wants power, he wants status, he fears social ostracism, he fears threats to his self-esteem. In addition, a motivational analysis specifies a goal for the achievement of which man spends his energies. Wanting power, he commits his effort, time, and substance to become governor of his state; wanting status, he tries to buy his way into the "proper" country club; fearing social ostracism, he shies away from acquaintances and friends who would engage him in the support of an unpopular social cause; fearing threats to self-esteem,

he avoids situations in which his intellectual competence might be challenged."

Individuals are, therefore, impelled to act towards certain objects or conditions (goals) by positive forces (wants, needs, and desires). Alternately, individuals may be repelled away from certain objects or conditions by negative forces (fears and aversions). Thus, both positive and negative forces can initiate and sustain behavior. However, while the wants or needs of the individual integrate and organize his psychological behavior in directing and sustaining action towards a goal, the individual to whom we ascribe a power want or a prestige want is probably only aware that he seeks a certain goal. Thus, needs or wants, are usually subconscious motivators of behavior, while goals are more tangible or obvious motivating forces. Goals and needs (wants) are therefore, interdependent. To differentiate between needs and goals, Hobbs et al. (1964, p. 16) defined needs as "the continuing source of motivation for an individual (both positively and negatively)." He defined goals as the "empirical referent, or operationalization of the need." Goals, therefore, are the conscious ends toward which individuals strive, but goals are really the specific methods by which individuals seek to satisfy more basic internal needs.

Individuals are oriented toward the attainment of not one, but a multiplicity of goals. Goals, as well as the alternate means of attaining them, are arranged hierarchically by the individual (Hobbs et al., 1964). According to Krech et al. (1962), this hierarchical arrangement is a function of several factors. First of all, cultural norms and values influence the goals selected by individuals. People are influenced by and tend to order their wants and goals in accord with the values shared by members of their reference groups. The second factor influencing goal selection is biological capacity. For example, individuals with histories of heart disease would probably not select goals requiring rigorous physical exertion. Thirdly, individuals vary in their selection of goals because of differences in their personal experiences. Persons of different social class backgrounds would probably vary in the goals they choose for this reason. A fourth factor affecting the selection of goals is the accessibility in the physical, social, and economic environment. Individuals cannot obtain an adequate diet without money for food. Wives may not be able to affect their own dietary behavior without cooperation from their husbands.

Another factor affecting the individual's goal selection is the image (self-concept) the individual has of himself. The individual's self-concept influences the individual to select specifically those wants and goals which he feels will enhance and defend his self-concept. Krech et al., (1962), p. 83) gave this example:

> The foods that an individual chooses to eat must not only satisfy his hunger but also be congruent with his conception of himself as a certain kind of person.

An example could be the avoidance of milk by some adults because milk is "children's food".

In addition to variations in the goals selected by individuals, there may also be variations in the levels of achievement that different individuals set for the same goal (Krech et al., 1962). One person may feel he has achieved dietary requirements by eating three meals a day; another person may want specific kinds of foods to attain this goal.

It has already been suggested that wants or needs are basic to an individual's selection of goals and means for attaining goals. Maslow (1970) has offered a hierarchy of needs as a criteria for the ordering of needs. Maslow suggested that lower order or basic needs are dominant until satisfied. Upon satisfaction of basic needs the individual seeks satisfaction of higher order needs. Maslow's postulated hierarchy of needs from lower to higher order includes the following:

1. physiological needs, i.e. hunger, thirst
2. safety needs, i.e. security, order
3. belongingness and love needs, i.e. affection, identification
4. esteem needs, i.e. prestige, success
5. need for self-actualization, i.e. the desire for self-fulfillment

Maslow suggested that momentary satisfaction of one or more basic (lower-order) needs frees energy for an orientation toward satisfaction of higher order needs. To quote Maslow (p. 37),

> For the man who is extremely and dangerously hungry, no other interests exist but food. He dreams food, he remembers food, he thinks about food, he emotes only about food, he perceives only food, and he wants only food.

Maslow continued (p. 38), "When there is plenty of bread, new and higher wants emerge." However, any of the physiological (lower order) needs may serve as channels for higher needs. Thus, according to Maslow (p. 36), "The person who thinks he is hungry may actually be looking for comfort rather than vitamins or proteins". This statement implies that food can be used as a means of attaining higher order needs, in addition to lower order needs.

Data on goals held by Iowa farm families in which the husband was less than 38 years of age were obtained by several researchers. Scarpatti (1966) looked at seven general orientations of goals: children, family, farm, house, occupation, personal improvement, and income-property-savings. Goals were found to reflect husband and wife roles; wives were oriented toward consumption while husbands were oriented toward production. Family characteristics such as age of husband, number of children, family income, and socioeconomic class were related to at least three or more goals.

Ernest (1956) found that husbands and wives in the same families tended to agree more often in the order in which they ranked social goals than in the order of physical and economic goals. Ages of husbands and wives were found to affect their ordering of goals.

Stinson (1957) found that the goal orientations of farm families did not differ among economic status groups. Poulson (1964), using responses to both open-ended and structured questions, confirmed her hypothesis that husbands and wives who jointly make decisions exhibited greater agreement in goals than those who did not make decisions jointly. She found no support for the hypothesis that husband-wife similarity of education, number of years of education, and number of years married were related to goal agreement.

Food Behavior Variables[1]

On a weight reduction diet

Dwyer et al. (1970) noted that "dieting is a popular American avocation". Dwyer and Mayer (1970) analyzed data from a 1966 opinion poll of 953 men and 1,049 women respondents. The results revealed that 6 percent of all men and 14 percent of the women interviewed were on a weight reduction diet at the time of the interview. Furthermore, only 54 percent of the men and 30 percent of the women expressed agreement with a statement that indicated they could eat what they wanted without being concerned about gaining weight.

Wakefield and Miller (1971) studied the food behavior and weight images of college girls who perceived themselves as overweight. They found that while only 45% of the girls were classified as overweight by objective standards, 52% of the girls perceived themselves as overweight. The overweight girls tended to limit their intake of milk, breads, and cereals. Furthermore, 70% of the overweight girls did not eat breakfast as compared with 9% of the underweight and 35% of the normal weight girls.

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[1]The following variables were identified earlier as being behavioral variables: on a weight reduction diet, number of meals, number of snacks, frequency of consuming "empty calorie" foods, variety of nutritious foods eaten, quantity of nutritious foods eaten, and per person food expenditures. Except for the last variable (per person food expenditures), these same behavioral variables, as measured for the spouse, were identified as external (situational) factors in the subject's frame of reference. Therefore, these variables could be discussed in two ways: as relevant external variables in the individual's frame of reference or as behavioral variables resulting from the individual's frame of reference. However, studies in the literature have generally analyzed these variables only as behavioral variables of subjects. For this reason, these variables will only be discussed in this context here.

Christenson (1973) found that 10 young women from a total of 60 were on a weight reduction diet at the time of the interview. When re-interviewed one month later, only 3 women were still dieting. Correlational analyses by Christenson revealed that a classification of overweight as assessed by the interviewer was negatively related to the number of breakfasts eaten per week, total number of meals eaten per week, frequency of eating dark green or yellow fruits and vegetables, and percentage of RDA for protein and vitamin A met. A positive correlation was obtained between overweight classification and being on a weight reduction diet.

Hinton (1962) found that 12- to 14-year old girls who were concerned about overweight tended to have poorer diets, missed more meals, were from lower social classes, and placed a lower value on health as a value in the selection of foods than did girls who were less concerned about their weight status.

Number of meals

The number of meals consumed per week by young Iowa homemakers was found to be significantly and positively correlated with their daily milk servings, daily intake of breads and cereals, daily frequency of consuming high sugar sources, and the percentage of RDA met for protein, calcium, iron, thiamin and vitamin A (Christenson, 1973). Pearson (1971) observed that the more meals eaten by wives of industrial workers, the larger their total nutrient and food energy intakes. In girls 12- to 14-years of age, girls who missed many meals had poorer diets, tended to be in the lower social status classification, tended to be overweight, selected enjoyment more often than health as a value in food selection, had lower scores on the test of knowledge of nutrition, and expressed concern about overweight (Hinton et al., 1963).

Number of snacks

The number of snacks consumed by 12- to 14-year old girls was associated with a tendency to place a high value on sociability and status in food selection, but was not related to overall adequacy of the diet (Hinton et al., 1963). For homemakers under age 35, the total number of snack items eaten per week was significantly associated with the consumption of "empty calorie" foods (Christenson, 1973).

Thomas and Call (1973) used data from the Ten-State Survey to calculate nutrient contributions of snacks to the dietary intakes of 12- to 16-year old persons. They found that teenagers who reported eating between meals obtained about 23 percent of their recommended calorie intake from foods eaten between meals. The amount of calcium, iron, vitamin A, and ascorbic acid per 100 kilocalories for between meal foods was calculated and compared with values for the total foods consumed in 24 hours. The ratios for the between meal foods were similar or only slightly lower than the ratios for the total 24 hour period, indicating that the between meal foods were not serving only as a source of energy.

"Empty calorie" foods

Christenson (1973) found that, for young Iowa women, the frequency with which respondents consumed sugar sources was significantly correlated at the one percent level with the total number of meals, the number of servings of foods eaten per week, and the daily frequency of consuming "empty calorie" foods, the number of evening snack items eaten per week, and the total number of snack items eaten per week.

For preschool children, Eppright et al. (1970) found that the larger the number of calories from candy and soft drinks of the children, the lower was the vitamin A value of the diet. A negative attitude towards food preparation of the mother was associated with increased calories from candy and soft drinks for the children. With higher incomes and higher educational levels of the father, fewer calories came from these sources for the children.

Variety of food

Variety of food, as measured by mean number of different food items eaten per day, was correlated with overall dietary adequacy of 12- to 14-year old girls (Hinton et al., 1963). Christenson (1973) observed that the number of different food items (from a list of 67) which were used by homemakers was significantly correlated with vitamin A intake but not with other nutrients measured.

Amount of food eaten

Of all the indices studied, the amount of food eaten was found to be the factor which correlated highest with dietary quality for 12- to 14-year old girls (Hinton et al., 1963). Hinton et al. suggested that the adequacy of the diet was more closely related to quantity of food eaten than to discrimination in selection. For young Iowa wives, the total number of servings of food consumed per week[1] was associated with protein, thiamin, vitamin A, and iron intakes at the 0.01 level and with calcium and vitamin C at the 0.05 level for homemakers (Christenson, 1973).

Per person food expenditures

The amount of money per family member spent for food was more highly correlated with energy and nutrient content in the diets of preschool children than was family income, number in the family, or education of the mother (Eppright et al., 1970). However, Eppright et al. found the iron and vitamin A contents of diets to be unrelated to per capita food expenditures. Christenson (1973) found no correlation between the amount of money spent on food and the intake of six nutrients in the diets of young homemakers. Because she made no correction for number of persons in the family, her data were not directly comparable to that of Eppright et al. However, results from the 1965 North Central regional study of households (U.S.D.A., 1970) revealed that low income was not a prerequisite for determining the amount spent for food. Some low income families were found to be spending more for food per person than were high income families.

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[1]A serving was defined as one half cup of vegetables, fruits, potatoes, etc. A person eating two cups of potatoes would have four servings of potatoes per day. Thus, this measure reflects quantitative aspects of food behavior more than qualitative.

Consequences of Food Behavior

The intakes of protein, calcium, iron, vitamin A, thiamin, and ascorbic acid, an estimation of overall diet quality, and the individual's weight status were described earlier as consequences of frame-of-reference and food behavioral variables.

Nutrient intakes of young adults

Pearson (1971) collected a single 24 hour dietary recall for 186 couples where the husband was an industrial worker in Iowa. This sample included 107 men and 149 women between the ages of 22 and 34, and 79 men and 37 women between 35 and 55 years of age. The percentage of men and women, respectively, meeting the recommended numbers of servings of foods from the Daily Food Guide for breads and cereals was 87 and 48 percent; for meat, 86 and 50 percent; for milk and milk products, 54 and 33 percent; and for vegetables and fruits, 50 and 34 percent. When the consumption of all four food groups in recommended amounts was considered, 22 percent of the men and 8 percent of the women met this requirement. For men and women of ages 22 to 35, the mean percent of Recommended Dietary Allowances (RDA) for eight nutrients was as follows (adapted from Table 27, pp. 112-113):

Mean percent RDA for men and women between 22 and 35 years of age

	Men	Women
Protein	183	118
Calcium	147	92
Iron	190	56
Vitamin A	131	87
Thiamin	121	90
Riboflavin	159	107
Niacin	128	92
Ascorbic Acid	138	100

In all cases, the younger men (22 to 35) had higher mean intakes of nutrients than older men (35 to 55). Except for a value of 99 percent of RDA for vitamin A for the older men, the mean RDA was above 100 percent RDA for all men in this sample. For women, a mean above 100% RDA was achieved by younger females (22 to 35 years old) for protein, riboflavin, and ascorbic acid; and only for protein and thiamin by older females (35 to 55 years old).

Because means do not accurately reflect the number of people whose intakes were lower than recommended levels, the distribution of men and women of age 22 to 35 consuming nutrients in amounts below 66 percent of the RDA was calculated. These data are given below (adapted from Table 28, p. 116):

Percent of men and women below 66 percent RDA for ages 22 to 35 years

	Men	Women
Protein	1	14
Calcium	16	42
Iron	1	73
Vitamin A	37	56
Thiamin	19	32
Ascorbic acid	29	48

A larger percentage of the women consumed nutrients in amounts below 66 percent of the recommendations than did men, with the differences between men and women being especially large for iron.

The correlations between husband and wife for food energy and nutrient intakes were 0.28 for food energy, 0.29 for protein, 0.36 for calcium, 0.49 for iron, 0.71 for vitamin A, 0.27 for thiamin, and 0.39 for ascorbic acid. The highest correlation, vitamin A, accounted for only 50 percent of the shared variance in their intakes, with the other nutrients being significantly lower. Thus, Pearson concluded that, for this sample, the foods and quantities of foods eaten daily by husband and wife were not the same.

Christenson (1973) using a diet history, looked at the dietary intake of wives under 35 years of age in an Iowa town.[1] Her results showing the number of subjects (of a total of 63) consuming recommended numbers of servings of foods from each of the four groups in the Daily Food Guide are given below (adapted from Table 33, p. 74):

[1]Since the purpose of her research was to test the reliability of the diet history instrument, she had data for two different interview periods. Only data for the first interview will be reported here.

Food Group	No. Subjects Consuming Recommended Numbers of Servings
Meat	43
Milk, cottage cheese, cheeses	30
Fruits and vegetables	38
High vitamin C (or two fair)	41
High vitamin A	17
Breads and cereals	22
All four groups (including high vitamin C and vitamin A)	4
3 groups	17
2 groups	20
1 group	14
No groups	2

The number of subjects from interview 1 whose intakes were less than 67 percent of the RDA for protein, calcium, iron, vitamin A, thiamin, and ascorbic acid were 0, 13, 34, 9, 5, and 5, respectively.

Weight status of young adults

A subjective estimate of the weight status of young Iowa wives was obtained by Christenson[1] (1973). Of a total of 60 women interviewed, 32 were classified as normal weight, 13 as slightly overweight, and 15 as very overweight. No women were classified as underweight. Wakefield and Miller (1971) obtained heights and weights for 40 girls who lived in a college dormitory. Comparing the heights and weights of the girls with insurance table recommended weights, they classified 18 girls as overweight, 11 as average, and 11 as underweight.

Dwyer et al. (1970) reported that sex differences in the incidence of obesity did not appear until adulthood. They noted that men gained

[1]Christenson is a trained nutritionist.

more weight with age during their early 20's than did women. Consequently, by the end of their 20's and 30's, more men than women were obese or overweight. Women tended to reach their maximum weights in their 40's or 50's. Moore et al. (1962) found that obesity was inversely associated with social class for adults. This was especially true for women.

Path and Causal Model Analysis[1]

The social scientist has frequently found that single and two variable approaches to data analysis are not adequate to explain the very complex components of human behavior (Blalock, 1964; Mueller, 1967; Yetley, 1969). Causal model analysis has, therefore, been developed as a tool by which researchers can examine and interpret, without benefit of highly controlled experimental designs, the many relationships among variables which relate to human action.[2] Mueller (1967), p. 6) has defined the causal model approach to data analysis as

> ...any multi-variable analysis in which all possible relations among variables in the model are hypothesized to be either noncausally related or causally related in an indirect or direct manner.

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[1]While causal model analysis may be done by several techniques, including partial correlations, simultaneous equations, and regression analysis, only the last technique will be used in this dissertation. The use of regression analysis in causal models is frequently referred to as path analysis. The discussion that follows in this section will pertain to path analysis and not to the other types of causal analysis, although this may not always be specified explicitly.

[2]The first effort to examine non-experimental data in a causal framework was done by Sewall Wright, a population geneticist, who developed path analysis in the early 1920's. This procedure has only recently been utilized by social scientists.

The meaning of this definition should become clearer in the ensuing discussion.

A basic premise of the causal model analysis is that A causes B (A→B) (Yetley, 1969; Mueller, 1967; Blalock, 1964). That is, the cause is responsible for or produces the effect. Furthermore, causal relations are asymmetrical (one-way) within some specified time period.[1] Thus, if A causes B, then B cannot cause A (within a specified time period). According to Blalock (1964, p. 22), "The notion of causality implies, then, that if X is changed, Y will also change, provided other causal variables are held constant." This concept of holding all other variables constant in order to look at the effect of A on B is basic to the causal approach. It is, in essence, an attempt to isolate, from survey data, the direct effect of one variable on another in a manner similar to controlled experiments. That is, in experimental conditions (as opposed to non-experimental or survey conditions) the investigator attempts to control for as many extraneous factors as possible. Thus, if manipulation of the independent variable produces a change in the dependent variable, the change can be attributed, with reasonable confidence, to the independent variable under study, not to extraneous variables in the system. In causal model analysis, the effects of extraneous variables are controlled through statistical manipulation.

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[1]The phrase "within some specified time period" is important. Blalock (1964, p. 56) noted that certain variables at time t-1 may be taken as exogenous or independent. At time t, these same variables may be causally dependent on some other variables. Thus, we are measuring a causal system only at a point in time.

While many researchers feel more comfortable in hypothesizing that A is related to B, rather than hypothesizing that A causes B, Blalock (1964, p. 5) suggested that researchers are actually thinking and inferring in causal terms. He said,

> ...one <u>thinks</u> in terms of a theoretical language that contains notions such as causes, forces, systems, and properties. But one's <u>tests</u> are made in terms of covariations.

This argument can be clarified by an example germane to nutrition. Significant and positive zero-order correlations between the number of meals consumed and nutrient intakes or between the nutrition knowledge of individuals and their diet quality would indicate that these variables covaried or changed together. However, based on these correlations, many nutritionists would <u>infer</u> that the number of meals and nutrition knowledge <u>resulted</u> in improved nutrient intakes or diet quality. That is, the operationalization and analysis of relationships among these variables was made in terms of covariations; inferences, either implicitly or subconsciously, were made in terms of causality. Thus, a causal test of the above relationships would be more precise and more closely aligned with the thought process of the investigator than would a test of covariation (zero-order correlations).

One final assumption about causal models should be mentioned. This assumption is that all relevant variables are included in the model. Obviously, there would be some variables which were either unmeasured or unknown to the investigator. For this reason, Blalock (1964, p. 26) emphasized,

> ...no matter how elaborate the design, certain simplifying assumptions must always be made. In particular, we must at some point assume that the effects of confounding factors are negligible.

That is, it must be assumed that the effects of variables outside the particular model being tested can be safely ignored. On the other hand, if the results of the causal analysis show that a high degree of unexplained variation remained, the investigator would know that other variables which have not been included in the causal system should be identified and measured.

One of the advantages of a causal model analysis is that it helps the researcher interpret the relationships among variables. Yetley (1969) has suggested that four types of relationships among variables may be encountered. These are:

1. A direct relationship between A and B: A→B. According to Mueller (1967), this implies that A is a direct cause of B if and only if a change in the mean value of B is produced by changing A, holding constant all other variables which have been introduced into the system and which are not causally dependent on B.

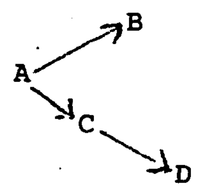
2. An indirect relationship between A and B via an intermediate variable C: A→C→B. In other words, a change in A produces a change in C which in turn produces a change in B.

3. A spurious relationship between A and B because of a common relationship to a third variable D:

$$\begin{tikzcd} & D \arrow[dl] \arrow[dr] & \\ A & & B \end{tikzcd}$$

In this relationship, A and B would probably have a significant zero-order correlation. That is, they covary together because of a common relationship to D. However, when the effect of D is controlled, a significant relationship between A and B would no longer be found.

4. Combinations of the above three relationships:



In this example A has a direct effect on B but an indirect relationship with D via C. The relationship between B and D is spurious, although they are probably correlated.

An understanding of the above types of relationships is essential before using the causal model technique.

Path analysis is a particular type of causal model technique in which regression is used to analyze all possible relationships among variables in a model. Figure 2a below shows a typical regression model as ordinarily used; Figure 2b shows a typical causal model.

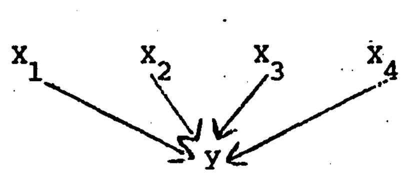


Figure 2a. Ordinary regression model

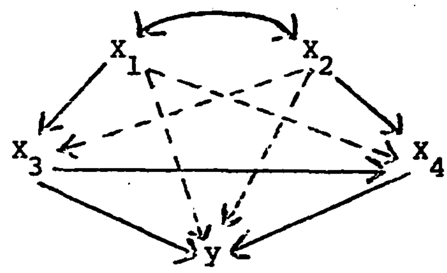


Figure 2b. Typical causal (path) model

The solid lines in these models represent hypothesized causal relationships with arrows indicating the direction of causation. In the causal model example, the dashed lines represent diagrammatically possible relationships but ones for which the researcher can find no basis in theory. The curved line with arrows at both ends indicates exogenous variables which are not related causally, although a correlation may exist between them.

The advantages of the causal (path) model analysis over ordinary regression analysis have been discussed by Coward et al. (1968). A summary of these advantages is given below:

1. Models built on multiple regressions are based on the assumption that independent variables are not related. In reality, variables exist in complex relationships with each other. Causal (path) analysis attempts to measure and describe these networks.

2. Multiple regression analysis examines only direct relationships among variables. Path analysis examines both direct and indirect relationships among variables.

3. Multiple regression only examines the effect of independent

variables on the ultimate dependent variable. Path analysis can examine the effect of independent variables on each other, in addition to their effects on the ultimate dependent variable.

4. Path analysis is concerned not only with the identification of variables for the regression equation, but also with the order of these variables in a temporal sequence.

5. Multiple regression is a predictive measure. Path analysis is both predictive and explanatory.

From the above, it can be seen that the advantages of using path analysis are many. Additionally, it is important to note that by using path analysis, we are examining slopes, in addition to the magnitude of relationships. Blalock (1964, p. 51) noted that researchers are really not interested in the size of the correlation coefficient alone. The size of the correlation coefficient only reveals the degree of scatter about the least squares equation; it describes the extent of linear relationship between two variables. However, Blalock noted (pp. 51-52)

> It is the regression coefficient which gives us the laws of science.... Regression equations give us abstract laws that tell us how much one variable should change if a given variable changes by a particular amount.... The magnitude of the regression coefficients give the expected change in Y for a given change in one of the independent variables, assuming that the remaining variables are held constant.

Also, multiple regression provides the researcher with information that certain variables explain a certain percent of the variation in the dependent variables. Thus, use of this technique adds to our understanding of the nature of relationships among variables.

Mueller (1967) suggested that three steps are necessary for doing causal model analysis. These steps consist of:

1. A written or verbal explanation of the causal relations among the variables in a system. This explanation is derived from theory and relevant past research.

2. A schematic diagram representing these relationships.

3. A set of mathematic equations representing the relationships in the schematic diagram.

The theoretical considerations and schematic theoretical diagram will be discussed later in this section. At this point, the procedures involving the testing of the model will be explained (Mueller, 1967). Once a theoretical causal (path) model has been diagrammed, a set of recursive[1] equations are written so as to test all possible relationships in the model. In writing these generalized equations, any variable is a function of all other variables preceding it in the causal system. For example, in Figure 2b, X_3 is the dependent variable when X_1

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[1]A clear-cut concise definition for the term "recursive equations" was not found, although this terminology was used by all writers in the field. Blalock (1964) provided an example of a recursive system which is given below. According to Blalock (p. 59), "Recursive systems have the property that the experimenter can, by entering at a particular point, change only the values of whatever X_i happen to appear at that point or below.

$$
\begin{aligned}
X_1 &= e_1 \\
X_2 &= b_{21}X_1 + e_2 \\
X_3 &= b_{31}X_1 + b_{32}X_2 + e_3 \\
X_4 &= b_{41}X_1 + b_{42}X_2 + b_{43}X_3 + e_4
\end{aligned}
$$

The term recursive would appear to be derived from the fact that each succeeding equation in the system has a recurrence of the variables from the previous equation, as well as an additional new variable.

and X_2 are regressed against it, and the influence of X_1 and X_2 on X_3 are determined; then X_3 becomes an independent variable, along with X_1 and X_2 when the regression analysis is done on X_4, and the effects of these three variables on X_4 are determined. This process continues until all variables (except exogenous variables such as X_1 and X_2 in Figure 2b) have been analyzed as dependent variables in a regression formula. The numbering of the variables is, therefore, intended to keep the cause and effect relationship in sequential and temporal order.

Once the recursive regression equations are written, partial regression coefficients (b values) are obtained for all possible pathways in the model. These b values are then tested for significance with a Student's t test or the F test. If a path coefficient is significantly different than zero, the causal arrow should probably be retained in the model; if not significant, the arrow should be removed. Each time a causal arrow is removed for lack of significance, a new set of recursive equations must be written, with non-significant pathways omitted, and the partial regression coefficients are again calculated. This process is continued until all path coefficients in a particular model are significant. These coefficients are then standardized so they can be compard directly.[1]

An example of what the final model from Figure 2b might look like when standardized path coefficients (β weights) are written on the appropriate causal arrows is given below in Figure 2c:

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[1]Standardized path coefficients are called β weights.

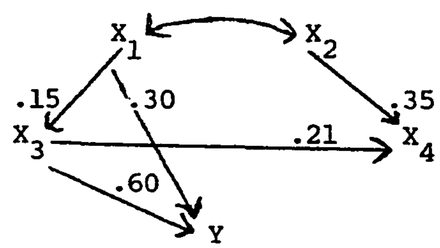


Figure 2c. Hypothetical path model

In this model, only pathways whose path coefficients were significantly different from zero have been retained. It can be seen that X_4 and Y are spuriously, not causally, related because of their common relationship to X_3. That is, when the effect of X_3 was controlled, no relationship was found between X_4 and Y. Of particular importance for intervention programs is the fact that $X_3 \rightarrow Y$ has a path coefficient (.60) that is twice as large as $X_1 \rightarrow Y$ (.30). This can be interpreted as meaning X_3 is twice as important as X_1 in causing a change in Y. Therefore, it would be twice as efficient to manipulate X_3 as X_1 in order to change Y. However, X_1 also has an indirect effect on X_3, and thus strengthens the understanding that we have of how X_3 affects Y.[1] This diagram, therefore, demonstrates one of the major advantages of causal and path analysis; that of supplying interpretive information essential for intervention programs.

Theoretical causal model

Earlier in this chapter, a theoretical schema was presented for more fully understanding the factors influencing food behavior, and ulti-

[1]Formulas are available for calculating the total contribution of X_1 to Y, taking into consideration both its direct and indirect relationships to the dependent variable.

mately its consequences, i.e., nutrient intakes and weight status. A frame-of-reference diagram was presented to emphasize the importance of describing food behavior as a result of the combination of many factors. Furthermore, the combining of many factors, some of which occur outside the individual and some of which occur internally, gives rise to patterned behavior, so that certain consistencies in an individual's behavior can be observed. This general theoretical frame-of-reference model must now be translated into a more specific causal model schema.

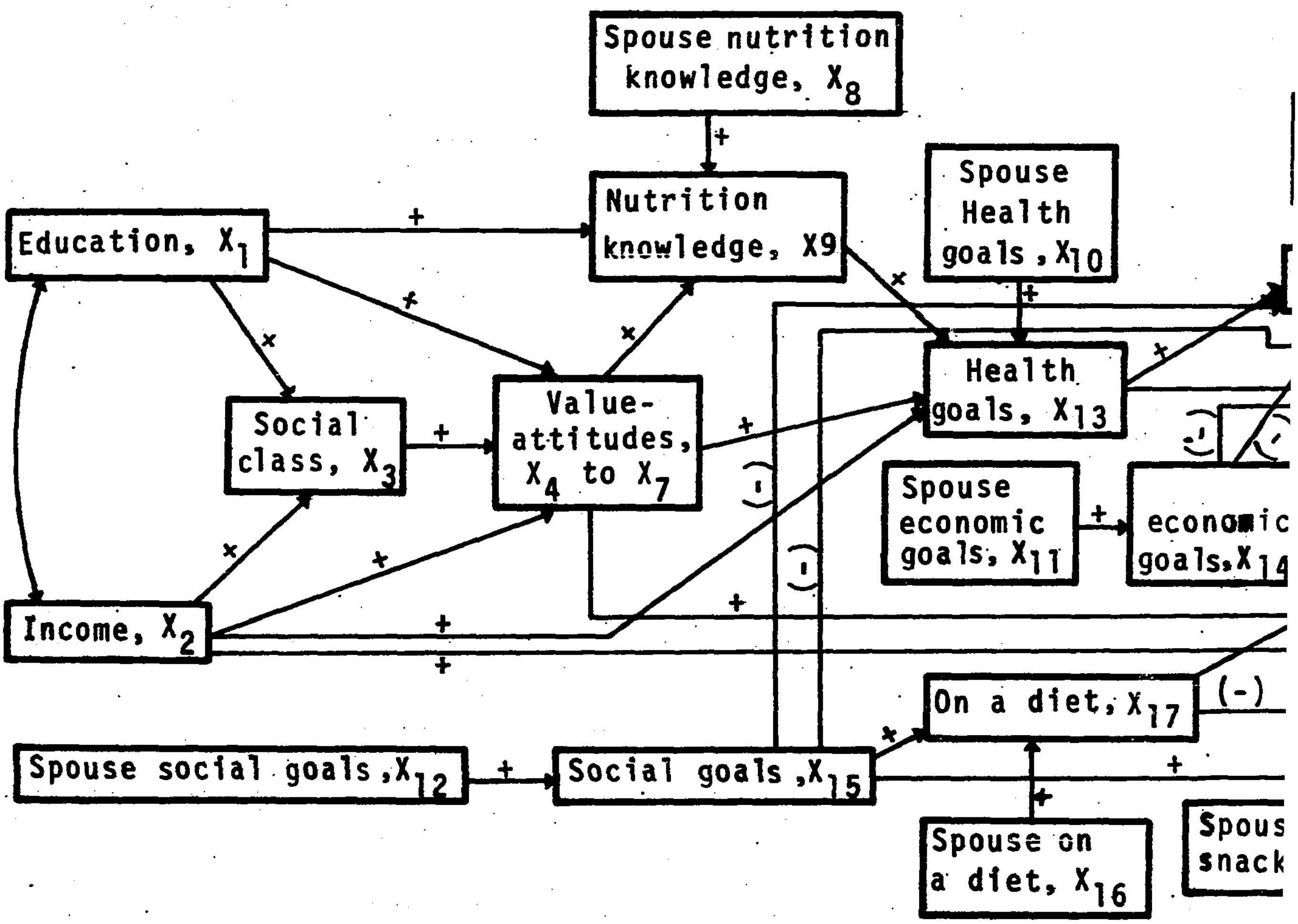
Previously, Mueller (1967) had suggested that three steps should be undertaken in using a causal model technique. First, a rationale for the causal relationships among systems should be identified in verbal or written explanations. Secondly, a schematic diagram representing these equations should be drawn. Finally, a set of mathematical equations should be written to test the hypothesized relationships. The variables, their proposed relationships to each other, and the resulting model will be discussed in the remaining portion of this chapter.

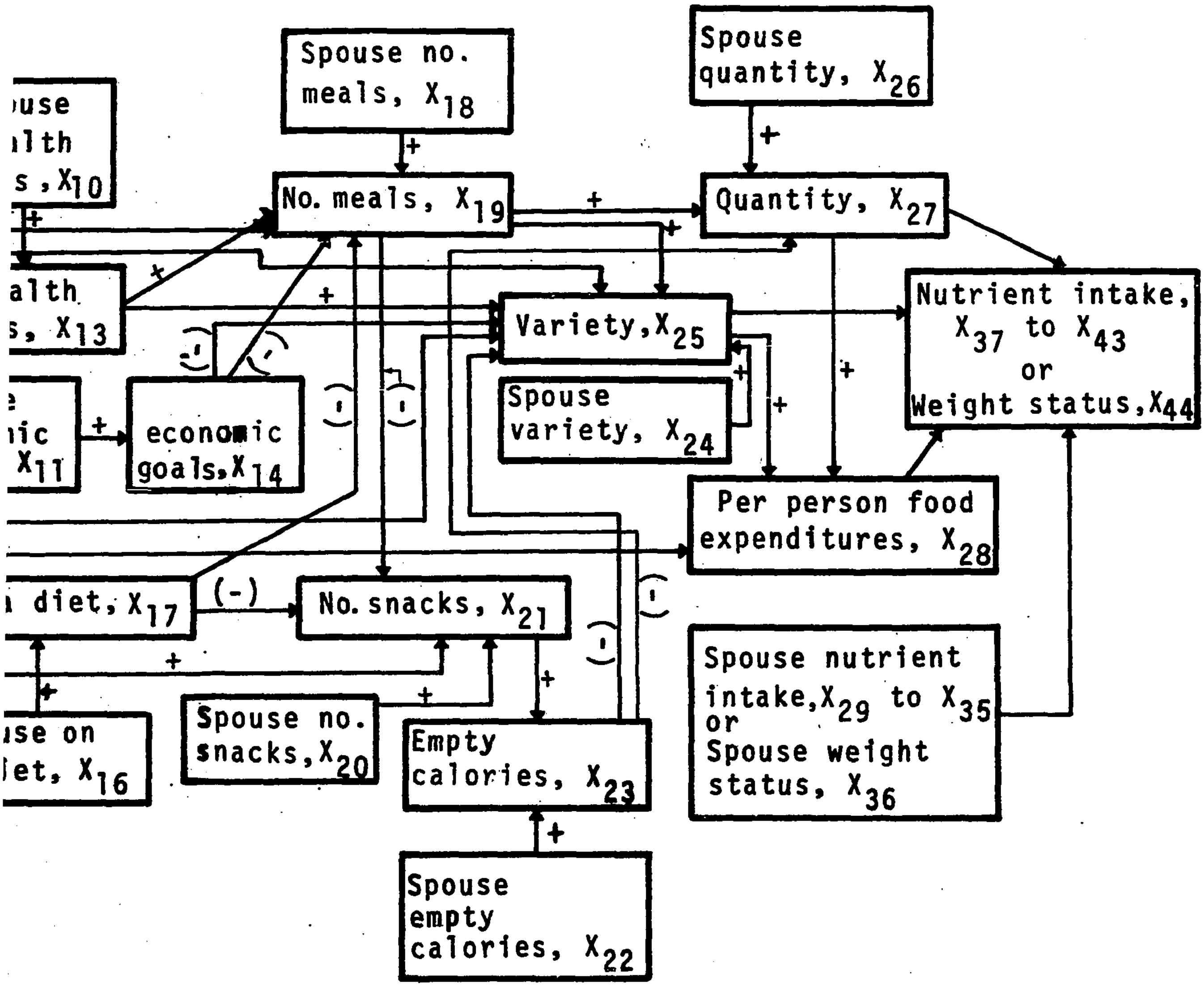
The same theoretical model has been used for both husbands and wives and is presented in Figure 3.[1] Table 1 lists the variables included in the theoretical causal model.

<u>Educational level, income, and social class rating</u>. Educational level (X_1) and total family income (X_2) were connected by a curved line

[1]Dashed lines often have been drawn in theoretical models to indicate possible relations but ones for which the researcher could find no basis in theory. However, because of the complexity and large number of variables in this particular theoretical model, dashed lines have not been drawn. In many cases, however, these relationships were tested empirically.

Figure 3. Theoretical causal model


Spouse nutrition knowledge, X_8
Nutrition knowledge, X9
Spouse Health goals, X_{10}
Education, X_1
Health goals, X_{13}
Social class, X_3
Value-attitudes, X_4 to X_7
Spouse economic goals, X_{11}
economic goals, X_{14}
Income, X_2
On a diet, X_{17}
(-)
Spouse social goals, X_{12}
Social goals, X_{15}
Spouse on a diet, X_{16}
Spous snack



use
lth
s, X_{10}
Spouse no. meals, X_{18}
Spouse quantity, X_{26}
No. meals, X_{19}
Quantity, X_{27}
alth
s, X_{13}
Variety, X_{25}
Nutrient intake, X_{37} to X_{43} or Weight status, X_{44}
ic
X_{11}
economic goals, X_{14}
Spouse variety, X_{24}
Per person food expenditures, X_{28}
diet, X_{17}
No. snacks, X_{21}
Spouse nutrient intake, X_{29} to X_{35} or Spouse weight status, X_{36}
se on
iet, X_{16}
Spouse no. snacks, X_{20}
Empty calories, X_{23}
Spouse empty calories, X_{22}

with double arrows in Figure 3 to indicate that these variables were correlated, but not necessarily causally related to each other. The following hypothesis was proposed:

Ho. 1: The educational level and total family income are positively associated.

The social class rating (X_3) was diagrammed as the result of both educational level and total family income, and the following two hypotheses identified:

Ho. 2: The greater the educational level, the greater the social class rating.

Ho. 3: The greater the total family income, the greater the social class rating.

The theoretical bases for the above three hypotheses should be evident, and thus will not be discussed.

<u>Value-attitude orientations</u> The value-attitudes consisted of four orientations (X_4, X_5, X_6, X_7) concerned with rationality in decision-making. Because these value-attitude orientations were hypothesized to form a system of interrelated configurations (Warland, 1966)[1], they have been treated as an entity in developing the theoretical model. It is widely believed that value-attitude systems vary with social class, income, and educational level. Therefore, these three variables were

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[1]While the four value-attitude orientations were expected to form a system of interrelated configurations, one of these measures (means orientation) was inadvertently coded in a direction opposite to the other three orientations. Thus the sign of the relationships between this variable and others in the model will be opposite to that of the other value-attitude orientations. This exception will not always be stated specifically each time the value-attitude orientations are discussed as an entity.

Table 1. Variables included in the theoretical causal model

X_1 = educational level
X_2 = total family income
X_3 = social class rating
X_4 = value-attitude orientation towards risk
X_5 = value-attitude orientation towards mastery
X_6 = value-attitude orientation towards modernism
X_7 = value-attitude orientation towards means orientation
X_8 = nutrition knowledge of spouse
X_9 = nutrition knowledge
X_{10} = health goals of spouse
X_{11} = economic goals of spouse
X_{12} = social goals of spouse
X_{13} = health goals
X_{14} = economic goals
X_{15} = social goals
X_{16} = spouse on a weight reduction diet
X_{17} = on a weight reduction diet
X_{18} = number of meals eaten by the spouse in a week
X_{19} = number of meals eaten per week
X_{20} = number of snacks consumed by spouse per day
X_{21} = number of snacks consumed
X_{22} = frequency of consuming "empty calorie" foods by spouse
X_{23} = frequency of consuming "empty calorie" foods
X_{24} = variety of nutritious foods consumed by the spouse
X_{25} = variety of nutritious foods consumed
X_{26} = quantity of nutritious foods consumed by spouse
X_{27} = quantity of nutritious foods consumed
X_{28} = per person food expenditures
X_{29} = protein intake of spouse
X_{30} = calcium intake of spouse
X_{31} = iron intake of spouse

Table 1 (Continued)

X_{32} = vitamin A intake of spouse
X_{33} = thiamin intake of spouse
X_{34} = vitamin C intake of spouse
X_{35} = overall diet quality of spouse
X_{36} = weight status of spouse
X_{37} = protein intake
X_{38} = calcium intake
X_{39} = iron intake
X_{40} = vitamin A intake
X_{41} = thiamin intake
X_{42} = vitamin C intake
X_{43} = overall diet quality
X_{44} = weight status

drawn as causal factors of value-attitude orientations.[1] The following hypotheses were proposed:

Ho. 4: The greater the educational level, the greater the rational value-attitude orientations.

Ho. 5: The greater the income, the greater the rational value-attitude orientations.

Ho. 6: The greater the social class rating, the greater the rational value-attitude orientations.

<u>Nutrition knowledge</u> Three variables in Figure 3 were hypothesized to be causal factors of the individual's knowledge of nutrition. The

[1]Additionally, it was assumed that other, unmeasured variables affected value-attitude orientations. However, neither time nor expertise was available to identify these during analysis of the data presented in this dissertation. Hopefully sociologists will provide more insight into the identity of these variables.

nutrition knowledge of the spouse was expected to influence the nutrition knowledge of the individual. Although no literature documented this assumption, it seemed logical that if one's spouse was interested in seeking and attaining nutrition knowledge, one would also pursue this objective. Hence, the following hypothesis was proposed:

> Ho. 7: The greater the nutrition knowledge of the spouse, the greater the nutrition knowledge of the individual.

A positive effect of rational value-attitude orientations on the individual's knowledge of nutrition also was expected. These value-attitude orientations included measurements of the individual's orientation towards mastery over his or her environment and a tendency to use scientific information in decision-making. Noting that individuals have been selective in the stimuli they perceived, many researchers have suggested that one of the factors guiding this selectivity is the values and attitudes that the individual holds (Sherif and Sherif, 1969; Krech et al., 1970). Furthermore, Krech et al. (1970) observed a tendency for distortions in perception to reflect values. Thus value-attitudes oriented towards science and rationality with respect to decision making should result in increased receptivity to nutrition education, and also in attaining accurate knowledge. Therefore, the following hypothesis was developed:

> Ho. 8: The greater the rational value-attitude orientations, the greater the nutrition knowledge.

The ninth hypothesis was based, in part, on the logic that many individuals, regardless of value-attitude orientations, could have received nutrition information in a variety of school curricula. Thus, educational level was also drawn as a direct causative factor affecting nutrition knowledge.

Ho. 9: The greater the educational level, the greater the nutrition knowledge.

Goals The importance of one's health goals was diagrammed in Figure 3 as being influenced directly by the importance of the spouse's health goals, by nutrition knowledge, by the value-attitude orientations, and by the family's income. The following four hypotheses were proposed:

Ho. 10: The greater the importance of the health goals of the spouse, the greater the importance of the health goals to the individual.

Ho. 11: The greater the nutrition knowledge, the greater the importance of the health goals.

Ho. 12: The greater the rational value-attitude orientations, the greater the importance of the health goals.

Ho. 13: The greater the income, the greater the importance of the health goals.

Hypothesis 10, which is concerned with the effect of the importance of the spouse's health goals on the importance of the health goals of the individual again was not directly derived from the literature reviewed. However, it has been noted that individuals tended to choose goals which were accessible in the physical and social environment (Krech et al., 1962). Therefore, goals which are also important to the spouse would be easier to attain than those not important to the spouse. Hence, if a spouse felt a goal was important, he (she) would be expected to agree to the expenditure of scarce resources (time, money, etc.) on this goal, and further, to be supportive of the wife (husband) in her (his) efforts to attain this goal.

Nutrition knowledge was described as a causative factor in the health goals for several reasons. First, it was consistent with the adoption model that an individual seeks information prior to evaluating and adopting a new practice (Bohlen, 1967). That is, if an individual is interested in adopting a new practice, he or she will place a high importance on goals which are consistent with it. Furthermore, because individuals vary in their selection of goals due to differences in personal experiences (Krech et al., 1962), exposure to nutrition knowledge should provide people a common basis to recognize the importance of nutrition in their lives.

The justification for hypothesis 12 was found in the theory developed by Warland (1966) and Hobbs (1963), i.e. that goals and the means of attaining goals were selected on the basis of values held by an individual. According to John (1956), the more an individual interprets the attainment of an item (goal) as essential in maintaining a value, the greater is one's motivation to seek it; and conversely, the more an individual perceives an item (goal) as contrary to a value, the more he avoids it. Thus rational value-attitude orientations, which include orientations toward use of scientific information in decision-making and behavior, should lead to the choice of health as a goal because nutrition knowledge is based on scientifically obtained facts.

Hypothesis 13 related health goals to income on the basis that when income was higher, the individual would be less concerned with financial matters and thus would be freer to work toward other goals.[1]

Economic and social goals were diagrammed as having no causative factors other than the importance that the spouse placed on each of these goals. Economic and social goals were included in the model, not because of an inherent interest in them, but because knowledge of the relative importance of these goals in the individual's frame of reference compared with health goals may enable us to understand better the role that nutrition knowledge and other factors play in determining food behavior.

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[1]Perhaps a word of caution needs to be interjected at this point. The relationship among value-attitude orientations, nutrition knowledge, and health goals were difficult to place in an asymmetrical causal framework. These variables more likely are interrelated in the following manner:

Value-attitude orientations

Goals $\rightleftarrows$ Nutrition knowledge

Alternatively, these variables may have feedback mechanisms similar to biological models. Bohlen (1967), although listing the information stage as occurring before the evaluation and trial stages in his 5-stage adoption model, also proposed that the individual may go back and forth between several stages for a time. Furthermore, in considering the idea of selective perception as set forth by Krech et al. (1970) and Sherif and Sherif (1969), it seemed logical that individuals who understood the importance of nutrition in their lives would place a high value on health goals, and that the converse would also be true, i.e., the higher the health goal, the more the individual would tend to seek out information. Thus, a circular effect among these variables would be possible. This situation serves as an excellent example of the concern expressed by Blalock (1964) that researchers must recognize that there may be more than one alternative causal model. When alternative models are tested, eventually enough data should be collected to rule out inadequate models and identify the "true" model.

The hypotheses relating spouse orientations to the social and economic goals were:

Ho. 14: The greater the importance of the economic goals of the spouse, the greater the importance of the economic goals to the individual.

Ho. 15: The greater the importance of the social goals of the spouse, the greater the importance of the social goals to the individual.

<u>On a weight reduction diet</u> Two hypotheses were suggested for identifying factors affecting weight reduction behavior of the respondents. These hypotheses were:

Ho. 16: If the spouse was on a weight reduction diet, then the greater would be the probability that the individual was on a weight reduction diet.[1]

Ho. 17: The greater the importance of the social goals, then the greater would be the probability that the individual was on a weight reduction diet.

Neither of these hypotheses is clearly supported by evidence from the literature. However, many husbands and wives appeared to share weight problems. Therefore, the fact that one's spouse was on a weight reduction diet was considered to be a possible relevant variable influencing the individual's decision to be on a weight reduction diet.

Hypothesis 17 suggested that placing a high importance on social goals may cause individuals to be on a weight reduction diet. This hypothesis was based indirectly on data of Hinton (1962) who had shown that 12- to 14-

[1]The format of hypotheses 16 and 17 and subsequent hypotheses which contain the variable of being on a weight reduction diet will vary from the format used in other hypotheses because the variable of being on a weight reduction variable has only 2 values - yes or no.

year old girls concerned with overweight attached little importance to health as a value in food selection. Therefore, a low health value might be congruent with a high social value. Furthermore, this hypothesis was suggested because weight control could be considered to be a reasonable goal of persons concerned with social prestige.

Number of meals Five hypotheses were developed concerning causative factors of the number of meals consumed. These five hypotheses were stated as follows:

Ho. 18: The greater the number of meals consumed by the spouse, the greater the number of meals consumed by the individual.

Ho. 19: The greater the importance of the health goals, the greater the number of meals consumed.

Ho. 20: The greater the importance of the economic goals, the fewer the number of meals consumed.

Ho. 21: The greater the importance of the social goals, the fewer the number of meals consumed.

Ho. 22: If the individual was on a weight reduction diet, then the greater would be the probability that the number of meals consumed was fewer.

Hypothesis 18 suggested that the more meals the spouse eats, the more likely the individual was to also eat the same number of meals. This is an obvious situational variable affecting the number of meals consumed and will not be discussed further.

Hypothesis 19, 20, and 21 identified the effects of the relative importance of three different goal orientations on the number of meals consumed. It was assumed that if the health goals were placed high on the individual's hierarchy of goal orientations, then the other goal orientations would occupy lower positions of importance. Thus placing high importance on the economic and social goals was hypothesized to cause an effect opposite in sign to that of health goals. Support for the concept that health goals positively influenced meal patterns was given by Hinton et al. (1963) who observed that when girls 12- to 14-years old missed many meals, they rated values other than health as important in choosing foods.

Hypothesis 22 suggested that individuals on weight reduction diets would reduce the number of meals they consumed. Both Hinton et al. (1963) and Wakefield and Miller (1971) found that individuals concerned about their weight status tended to miss more meals than those who were not concerned.

<u>Number of snacks</u> The number of snacks was hypothesized to be affected positively by the number of snacks consumed by the spouse and the importance of the social goals, and affected negatively by the number of meals consumed and being on a weight reduction diet. The formal statements of these hypotheses are given below:

Ho. 23: The greater the number of snacks consumed by the spouse, the greater the number of snacks consumed by the individual.

Ho. 24: The greater the importance of the social goals, the greater the number of snacks consumed.

Ho. 25: The greater the number of meals consumed, the fewer the number of snacks consumed.

Ho. 26: If the individual was on a weight reduction diet, then the greater would be the probability that the number of snacks consumed was fewer.

Of these four hypotheses, only hypothesis 24 was supported by the literature. Hinton et al. (1963) found the number of snacks consumed by 12- to 14-year old girls was associated with a tendency to place a high value on sociability. The negative effect of the number of meals on snack consumption was suggested because snack consumption possibly could compensate for skipped meals. The effects of dieting and spouse's snacks are obviously potential situational factors and will not be discussed further.

<u>"Empty calorie" foods</u> Two hypotheses were suggested with respect to identifying factors influencing the frequency of consuming "empty calorie" foods:

Ho. 27: The greater the number of snacks consumed, the greater the frequency of consuming "empty calorie" foods.

Ho. 28: The greater the frequency of consuming "empty calorie" foods by the spouse, the greater the frequency of consuming "empty calorie" foods by the individual.

The potential effect of these two variables on "empty calorie" consumption seems obvious and will not be discussed.

<u>Variety of nutritious foods eaten</u> The variety of nutritious foods eaten has frequently been identified by nutrition educators as a key factor in attaining a nutritionally adequate diet. The centrality of this factor in the proposed model is obvious, as 7 variables were assumed to cause selection of variety in food. The resulting 7 hypotheses are stated below:

Ho. 29: The greater the number of meals consumed, the greater the variety of nutritious foods eaten.

Ho. 30: The greater the importance of the health goals, the greater the variety of nutritious foods eaten.

Ho. 31: The greater the importance of the social goals, the fewer the variety of nutritious foods eaten.

Ho. 32: The greater the importance of the economic goals, the fewer the variety of nutritious foods eaten.

Ho. 33: The greater the variety of nutritious foods eaten by the spouse, the greater the variety of nutritious foods eaten by the individual.

Ho. 34: The greater the frequency of consuming "empty calorie" foods, the fewer the variety of nutritious foods eaten.

Ho. 35: The greater the rational value-attitude orientations, the greater the variety of nutritious foods eaten.

The goal orientations were expected to influence the variety of nutritious foods eaten both indirectly via number of meals eaten and directly. That is, it was assumed that variety of nutritious foods eaten could be independent of meal patterns as well as dependent on them. The potential effects of number of meals, "empty calorie" foods, and spouse nutritious variety on the variety of nutritious foods eaten seemed obvious and will not be discussed. The hypothesized direct positive effect of rational value-attitude orientations (and the negative effect of means orientations as discussed in a footnote on page 56) was based on the logic that persons who were oriented toward risk (a subcomponent of these value-attitudes) would be more willing to try new foods, and thus would consume a wider variety of foods. Additionally, persons oriented towards independence (means orientation) would be expected to be stubborn about trying new foods, and thus this orientation could produce a negative effect on the variety of foods consumed.

Quantity of nutritious foods consumed The quantity of nutritious foods consumed was expected to be positively influenced by the spouse's quantity consumption and the number of meals while being negatively affected by consumption of "empty calorie" foods. (The quantity measure is a measure of number of servings of "nutritious foods" only and does not include "empty calorie" foods). The following hypotheses were thus suggested.

Ho. 36: The greater the quantity of nutritious foods consumed by the spouse, the greater the quantity of nutritious foods consumed by the individual.

Ho. 37: The greater the number of meals consumed, the greater the quantity of nutritious foods consumed.

Ho. 38: The greater the frequency of consuming "empty calorie" foods, the less the quantity of nutritious foods consumed.

Hinton et al. (1963) found quantity was a more important factor than quality (variety) in influencing the nutrient intakes of 12- to 14-year old girls. Because quantity could reflect either the total number of servings of a variety of foods or the total number of servings of a few foods, it may or may not be related to variety. Thus, no relationship between variety and quantity was hypothesized (although it was tested empirically). Hopefully, testing the model will clarify the relationships of quality versus quantity on dietary adequacy.

Per person food expenditures The last behavioral variable in the model (prior to the consequences of food behavior, i.e. nutrient intakes) was the per person food expenditures. This variable was expected to be positively caused by the quantity and variety of nutritious foods consumed and family income. The following hypotheses were suggested:

Ho. 39: The greater the quantity of nutritious foods consumed, the greater the per person food expenditures.

Ho. 40: The greater the variety of nutritious foods consumed, the greater the per person food expenditures.

Ho. 41: The greater the family income, the greater the per person food expenditures.

Per person food expenditures have been related positively to nutrient intakes (Eppright et al., 1970 and U.S.D.A., 1970). Eppright et al. also found that the amount of money spent for food was positively related to the consumption of calories from candy and soft drinks. However, the correlation coefficients between amount spent for food and several nutrient intakes were over twice as large as the coefficient between food expenditures and the calories from candy and soft drinks. Therefore, in the present study, it was assumed that the major effect of per person food expenditures would be due to nutritious foods, not to "empty calorie" foods. Hence hypotheses 39 and 40 above were proposed. (However, the effect of snack consumption and "empty calorie" foods on per person food expenditures are diagrammatically possible relationships, and thus were tested empirically, although not specifically hypothesized).

It was difficult to decide where or how the per person food expenditures exerted a positive effect on dietary behavior. Again, a circular relationship between this variable and others may exist in the real world, and alternative models will need to be tested eventually.

The logic for hypothesis 41 was that the family can only spend money on food if it has money to spend. Therefore, family income was expected to influence money spent for food.

Nutrient intakes and overall diet quality The intakes of six nutrients and overall diet quality, which were thought to be consequences of the previously discussed variables, were hypothesized to be affected positively and directly by the quantity and variety of nutritious foods consumed, and by per person food expenditures. The following hypotheses were developed:

Ho. 42a: The greater the quantity of nutritious foods consumed, the greater the nutrient intakes and overall diet quality.

Ho. 43a: The greater the variety of nutritious foods eaten, the greater the nutrient intakes and overall diet quality.

Ho. 44a: The greater the per person food expenditures, the greater the nutrient intakes and overall diet quality.

The relative magnitude of the path coefficients obtained for the pathways pertaining to hypothesis 42a and 43a should clarify the relationship between discrimination in selection versus quantity of nutritious foods eaten in determining nutrient intakes.

In addition to the above 3 hypotheses, the nutrient intakes and overall diet quality of the spouse were expected to influence the nutrient intakes and overall diet quality of the individual. The following hypothesis was proposed:

Ho. 45a: The greater the nutrient intake or overall diet quality of the spouse, the greater the nutrient intakes or overall diet quality of the individual.

Weight status In addition to the nutrient intakes and overall diet quality, the weight status of the individual was hypothesized to be a consequence of various factors in the individual's frame of reference and food behavior patterns. Except for the direction of hypotheses 42a, 43a, and 44a, the theoretical causal model developed for the variables antecedent to nutrient intakes was also assumed to be operative as a determinant of weight status; however, the relative weightings of various factors in the model were expected to vary when weight status rather than nutrient intakes was considered. The direction of hypotheses 42a, 43a, and 44a for weight status was expected to be opposite to that hypothesized for the nutrient intakes because the scoring for the weight status was opposite in direction to that for the nutrient intakes. That is, the lower the score on the weight status variable, the closer the individual's weight was to recommended levels. The higher the weight status score, the greater was the degree of overweight. Hypotheses 42a, 43a, and 44a are thus restated for the weight status:

Ho. 42b: The lower the quantity of nutritious foods consumed, the greater the weight status.

Ho. 43b: The lower the variety of nutritious foods consumed, the greater the weight status.

Ho. 44b: The lower the per person expenditures, the greater the weight status.

Justification for hypotheses 42b and 43b was based on findings by Wakefield and Miller (1971) and Christenson (1973). Wakefield and Miller found that overweight college girls had lower intakes of milk, breads, and cereals. Christenson observed that young Iowa wives who were classified as overweight had lower intakes of dark green or yellow fruits and vegetables, protein, and vitamin A. These results would indicate that conditions of overweight were associated with decreased quantity and variety of nutritious foods consumed.[1]

Hypothesis 44b was based on indirect support from the literature. Previously, per person food expenditures were hypothesized to be positively affected by income (hypothesis 41). Hinton et al. (1963) found that girls from lower social classes were more often overweight than were girls from higher social classes. Hence lower per person food expenditures, which were expected to be closely associated with family income (and also social class), were hypothesized to be associated with obesity.

Additionally, the weight status of the spouse was expected to influence the weight status of the individual. The following hypothesis was proposed:

> Ho. 45b: The greater the weight status of the spouse, the greater the weight status of the individual.

<u>Concluding remarks concerning the theoretical causal model</u> The theoretical causal model just discussed is only one of several alternative models which should be tested if we are to understand better the many causes of dietary adequacy and weight status. Frequently, results from the literature are contradictory in the relationships observed. In

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[1]At the same time, it is logical that the condition of overweight was caused by high consumption of "empty calorie" foods. This hypothesis was not specifically stated since hypotheses 34 and 38 have already indicated that consumption of "empty calorie" foods caused decreased consumption of variety and quantity of nutritious foods.

developing this particular model, it was often necessary to choose arbitrarily one justification for expected relationships, although alternatives were obvious. Hopefully, the empirical results of this model will help to elucidate which alternative models need testing.

One other point needs to be made. The literature reviewed earlier in this dissertation revealed many more relationships among variables included in the model than have been drawn or acknowledged in the discussion of the theoretical model. The importance of these relationships in affecting dietary adequacy is not being questioned. Rather, an attempt has been made to hypothesize precisely how these variables affected other variables in the model, i.e. whether the relationships were direct, indirect, or spurious. Because the discussion of the hypotheses was concerned only with direct effects, not indirect or spurious effects, specific mention of many reported relationships was not made in the theoretical justification of hypothesized relationships. However, while the theoretical discussion was limited only to direct effects, empirical analysis of the model will provide information on indirect, spurious and direct effects. (The reader will recall that this was suggested as one of the major advantages of the path analysis technique). Furthermore, although not explicitly hypothesized, most of the diagrammatically possible effects of one variable on subsequent variables were tested. Appendix A gives the variables which were entered into each of the regression equations in the model.

METHODS AND PROCEDURES

This study was undertaken to fulfill the objective of the first of three phases of a North Central Regional Project (NC-108 Outline, 1971). This objective was identification of personal and social factors which affect nutrient intakes of young husbands and wives, with attention being given to the ways husbands and wives affect the eating habits of each other. Later phases will be oriented towards using personal and social factors, identified in the first phase as influencing food behavior, to develop innovative intervention techniques for changing food behavior of a target population. The data reported in this dissertation constitute only part of the data collected in the survey undertaken to meet the objective of the first phase of the long-range project.

Development of the Questionnaire

The survey method was used to obtain data on factors affecting the food behavior of young married couples. Development of the questionnaire involved input from both the Department of Food and Nutrition and the Department of Sociology and Anthropology at Iowa State University during the academic year of 1971-1972. Sections of the questionnaire were developed independently by the two departments and combined shortly before the survey was to take place. Individual scales and measures used in the questionnaire were either adaptations of previously used scales or were developed specifically for this project.[1]

Two questionnaires were developed; one for the husband and one for the wife.[2] The two questionnaires were the same except for wording changes necessary for making questions appropriate for the husband or the wife. For example, when asking the husband to indicate his most important roles, he was given the possible responses of husband, father, breadwinner, etc. The corresponding roles for the wife were mother, wife, housekeeper, etc.

After the questionnaire was in semi-final form, it was pretested by interviewers and staff members on 20 young couples in a town similar to those to be surveyed. As a result of this pretest, the questionnaire was revised before the actual survey was begun.

Population and Sample

The universe for this study was young married couples in Ft. Dodge and Marshalltown, Iowa, who met the following criteria:

1. the mother was 35 years of age or under
2. there was at least one child living in the home
3. both parents were living in the home.

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[1]Henceforth, the terms "this study" or "this project" will refer to the development of the questionnaire and data analysis for the survey of 117 couples conducted in the summer of 1972, and not to the overall regional project.

[2]Due to the large number of items in the questionnaire, only selected questions will be analyzed in this dissertation.

The criterion of young married couples with the wife 35 or under was used in part because a market research report by the American Dairy Association Staff (1971) concluded that the best potential target group for promotion of milk products was females, ages 20-34. This group was described as "potentially responsive and flexible for themselves, but powerful influentials, rationers, gate-keepers for children and husband" (p. 13). Researchers involved in the Iowa study felt that in the early years of marriage, eating habits of spouses would be most vulnerable to influence by their mates. Furthermore, this would be the age when parents would be most influential in affecting their children's food habits, habits which tend to resist change once formed. Thus, a population of young families seemed to be a meaningful group to study; and the results would lay the basis for later intervention programs.

A random sample of area segments in Marshalltown and Ft. Dodge, Iowa, was drawn by the Statistical Laboratory at Iowa State University. The segments were expected to average one eligible household each. Proportional sampling was used so that data from the respondents in each town could be combined into one sample for analysis purposes. Of the 238 eligible couples in the universe, interviews with 117 couples were completed; 71 from Marshalltown and 46 from Ft. Dodge. One set of completed schedules from Ft. Dodge was discarded because the husband refused to answer over half the questions. Thus, the data reported here is for 116 couples, or a total of 232 respondents.

The effect of the high rate of refusal (51 percent of the eligible sample) on the randomness of the remaining sample has not been ascertained.

The main reasons for refusal were: refusal of one spouse, vacations, and time restrictions. For the purposes of the data analysis reported here, the assumption is made that the 232 subjects interviewed constitute a random sample of the universe and thus generalizations from this sample may be made to the universe as a whole.

Interviewer Training and Procedure

The interviewers were seven recently graduated seniors or graduate students. Three of the interviewers were Food and Nutrition graduates, three were graduate students in Sociology, and one was a graduate student in Political Science. The interviewers attended a two-day training session at Iowa State University prior to the field work. The training session included instructions on using the segment maps, standard rules for interviewing, and practice interviews.

Interviewing was completed in Marshalltown before interviewing began in Ft. Dodge. The interviewers lived in a motel in the town where interviews were being conducted. Two graduate students, one from Food and Nutrition and one from Sociology, both of whom had been involved with the development of the questionnaire, were on location to supervise the field work and also to maintain a close and continuous check on the quality and completeness of the interviewing. Coincident with the arrival of the interviewing teams in the town to be surveyed, a short newspaper and radio description of the project was released to the press by the local Agricultural Extension Service. Each interviewer carried an identifying letter from project leaders at Iowa State University, and was instructed to show this letter to potential respondents who doubted the authenticity of the project.

The interviewers worked in teams of two. Each interview team was given segment maps for various areas of the towns. The team was instructed to contact each household within their segments, according to procedures recommended by the Statistical Laboratory, and to determine the eligibility of the occupants of the households for the project. If the couple in the household met the criteria, the interviewers tried to arrange an appointment for an interview. A minimum of two call backs were made to households where no one was home on the original call. Additionally, a call back was made if the potential subjects failed to be at home for the interview at the scheduled hour.[1]

The interviews were conducted in the homes of the respondents. The husband and wife were interviewed separately, but simultaneously by the two members of the interview team. If possible, the interviews were conducted in separate rooms to avoid the problem of the subjects hearing and being influenced by the responses of their spouse. The interview took an average of $1\frac{1}{2}$ hours and was conducted in June, July, or August of 1972.

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[1]Occasionally, subjects forgot the appointment. Thus, call backs for broken appointments were deemed necessary to ascertain the reason why respondents had not honored the appointment.

Variables

Educational level

The question was asked, "What is the highest grade that you have completed in school?" (Question 251, Appendix B). The number of grades completed constituted the individual's (husband or wife) value for the education variable.

Total family income

Each respondent was supplied a card with the following ten income categories and asked, "Which of these categories best represents your total income?" (Question 257, Appendix B).

Total Income Categories

1. Under $1,000
2. $1,000 to $1,999
3. $2,000 to $2,999
4. $3,000 to $3,999
5. $4,000 to $4,999
6. $5,000 to $5,999
7. $6,000 to $6,999
8. $7,000 to $9,999
9. $10,000 to $14,999
10. $15,000 and over

In most cases, the category numbers of 1 to 10, as reported by the husbands, were used as the value for the income variable for both husbands and wives. That is, there was no difference or only one category difference in their responses. However, for six couples, husbands and wives had discrepancies of two or more categories in reported income. For these 6 cases, an average category, rather than the category reported by the husbands, was used for the income variable. One couple refused to reveal their family income, so they were assigned the modal category of 9.

Social class rating

Social class ratings, from both the original North-Hatt Scale (Miller, 1970, pp. 172-178) and updated values[1], were assigned to each family (see Appendix C). The social class ratings of the North-Hatt scale are based on prestige and esteem of the husband's occupation. The scale values range from 96 for U.S. Supreme Court judges to 33 for shoe shiners. For occupational positions not specifically listed on the original or up-dated North-Hatt scales, a scale value was estimated on the basis of the scale position of similar occupations.[2] Since the North-Hatt scale utilizes the husband's occupational status only, the same social class value was assigned to both husband and wife.

Value-attitude orientations

Warland (1966) and Hobbs (1963) developed and extensively pretested value-attitude items to measure orientations towards modernism,

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[1]Interpolations of the original North-Hatt scale by Ward Bauder and Lee Burchinal, 1961, and additions by John Hartman and Dorothy Bashor, 1968; lithograph, personal communication from Department of Sociology and Anthropology, Iowa State University, 1972.

[2]Students are not included in the North-Hatt rating system; they were arbitrarily classified as 74, 75, or 76, depending on the degree towards which they were working.

individualism, risk orientation, and mastery of farmers and farm-related workers. Keeping in mind the urban population to be used in the present study, these value-attitude items were reviewed by staff members in the Department of Sociology and Anthropology at Iowa State University. Items which would be suitable for a general population sample or which could be easily reworded so as to eliminate farm-oriented wording without loss or changes of meaning were selected for use in the present study. Thirty-six of the original items survived this screening process. Following a pretest using 20 couples, additional wording modifications were made in some items to avoid ambiguities which had become apparent in the pretest. Six items were found to be frequently misunderstood and were dropped, leaving 30 items in the final survey instrument (Questions 196-225, Appendix B).

The certainty method, which includes both a response format to be used by the respondent during the interview and a scoring system to be used by coders in the data analysis, was used to measure value-attitude orientations in this study (Warren, Klonglan, and Sabri, 1969). The instructions given to the respondent were as follows:

> After each statement, tell me if you agree with the statement or disagree with the statement. After you have done this, please indicate how strongly you agree or disagree with the statement. For example, if it really doesn't make much difference to you if you agree or disagree with the statement you would rate the statement one (1). If you very strongly agree or disagree with the statement, you would rate it five (5). For some statements, the numbers 2, 3, or 4 may better describe how strongly you agree or disagree with the statement. If this is the case, you would rate the statement with the appropriate number.

The interviewer was instructed to read each of the attitude statements to the respondent and then to circle the respondent's answer, A or D, and 1, 2, 3, 4 or 5 using the following format:

A D | 1 2 3 4 5

Using this response format, each respondent was thus required to make two decisions regarding each item:

1. a directional judgment, i.e., he either agreed or disagreed with the item;

2. a certainty judgment about the directional decision, i.e. how strongly he felt about his agreement or disagreement with this item.

Because the certainty format requires two decisions by the respondent in regard to a given item, it provides the respondent a change to think about the stimulus twice before recording his response, thus enhancing the accuracy of the response (Warren et al., 1969).

During the data handling phase of the project, the response format was converted to numerical values on the basis of a 16 point scale. This scale does not assume equal intervals between values, but rather extends the distance between the values at the end of the scale in the following manner:

0	3	5	6	7	8	9	10	11	13	16
A5	A4	A3	A2	A1	AD	D1	D2	D3	D4	D5
D5	D4	D3	D2	D1	AD	A1	A2	A3	A4	A5

This type of scoring allows the value-attitudes to be expressed so that increased weight is given to the extreme responses. Implicit in this scoring system is the assumption that it takes more psychic conviction for a respondent to pick the extreme values (A5 or D5) than a more moderate value such as A3 or D3. Thus, the psychological distance is greater at the outer limits of the scale than toward the center of the scale. This scoring system has been shown to give a more reliable measure of attitude orientations than either a 3 or 11 point equal interval scoring continuum (Warren et al., 1969).

When assigning numerical values to the value-attitude items, the scoring of the item was adjusted so that all items were scored in the same theoretical direction. For example, if the respondent disagreed strongly (D5) with a negative statement concerning modern ways of doing things and agreed strongly (A5) with a positive statement about traditional ways of doing things, he would be given a score of 0 for both items. Thus, a low score for both items would indicate a traditional value-attitude orientation; a high score would indicate a modern value-attitude orientation. Missing data were assigned the mean value for that particular attitude item for the appropriate subgroup (husband or wife).[1]

Subsequent to the coding and scoring of the items, a factor analysis[2] and correlation matrix were obtained on the 30 value-attitude items. Based on the statistical analysis and on theoretical considera-

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[1]One respondent failed to answer two individual items; and another respondent did not answer one item. Thus, missing data were a problem for only 3 responses.

[2]Quartimax rotation, Alpha factor, using an SPSS computer program package (Nie, Bent, and Hull, 1970).

tions of content validity,[1] four value-attitude scales were developed. These scales were: modernism, means orientation (independence), risk orientation, and mastery. (The scale items, their coding, and inter-item correlations are given in Appendix D).

The respondent's score for each of the four value-attitude scales were obtained by summing the ratings given by the respondent for the individual value-attitude items comprising that scale. Before adding the ratings for the individual value-attitude items together, each item was standardized.[2] The items for the males were standardized using means and standard deviations for the husbands; the female items were standardized using means and standard deviations for the wives.

The modernism scale consisted of 8 items. These statements implied that past or traditional ways were best and that science had been impractical and had made life more complicated. The higher the score on

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[1]Appreciation is expressed to Dr. Joe M. Bohlen, Department of Sociology and Anthropology, I.S.U., who served as the specialist on the content validity of these scales.

[2]Items to be used in summated scales were standardized to assure that each item weighted the final scale score equally rather than by its actual mean and standard deviation. Homogeneity of means and standard deviations is one of the criteria necessary for additivity (Warren et al., 1969). The mathematical formula for standardizing these items and all subsequent items in other scales which are identified as being standardized is: $z = \frac{X_i - \bar{X}}{s.d.}$ where z = standardized value, X_i = raw score value, $\bar{X}$ = mean score value for that item, and s.d. = standard deviation = $\sqrt{\frac{\Sigma(X_i - \bar{X})^2}{n-1}}$.

this scale, the greater was the value-attitude orientation toward non-traditional or modern ways.

Five items comprised the means orientation scale. These items emphasized independence and the necessity of doing things yourself if they were to be done right. The higher the score on the means orientation scale, the greater was the value-attitude orientation towards independence.

The risk orientation scale contained four items concerned with conservatism in money matters and profit making. A high score indicated a less cautious, more risk-oriented value-attitude orientation.

The mastery scale was also composed of four items with the content being oriented toward the concept that fate or forces beyond man's control were important factors in a person's life and future. A high score indicated a value-attitude orientation toward being a master of one's own fate.

Using coefficient alpha,[1] reliability coefficients of 0.80, 0.70, 0.54, and 0.44 were obtained for the mastery, modernism, risk orientation-

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[1] The formula for coefficient alpha is: $r_{tt} = \dfrac{K\bar{r}_{ij}}{1 + (K-1)\bar{r}_{ij}}$,

where K is the number of items and $\bar{r}_{ij}$ is the average inter-item correlation of the items used in the scale (Nunnally, 1967, p. 193). Coefficient alpha provides an estimate of the extent to which the items are internally consistent, i.e. the extent to which the items are measuring the same underlying social psychological dimension. Coefficient alpha estimates the proportion of true variance to total variance attributed to the scale items. In practice, then, a low value for r_{tt} implies that a large proportion of the total variance is due to error variance (measurement and sampling error). Thus, a low reliability coefficient indicates the scale is not a reliable indicator of the dimension being measured.

tion, and means orientation scales, respectively.[1] The reliability coefficient of 0.44 for the means orientation scale is quite low and any relationships between this scale and other variables must be interpreted with caution. However, because of the exploratory nature of this research, this scale was retained.

Nutrition knowledge

The 16 items (Questions 162 to 177, Appendix B) used to assess nutrition knowledge were derived from a larger set of items developed by the Departments of Food and Nutrition and Home Economics Education at Iowa State University (Yetley and Garnant, 1973). Using the conceptual framework for nutrition education in schools provided by the White House Conference on Food, Nutrition, and Health (1969, p. 153), a table of specifications was developed to identify content areas to be covered and the relative weightings to be assigned to each content area.

A total of sixty-six items were written with weightings based on the table of specifications. The validity of the test items was assessed by having three specialists from the Departments of Food and Nutrition and Home Economics Education review the test. Test items were revised on suggestions of the specialists. The resulting nutrition knowledge test was then pretested on 81 men and women in several general biology classes at the Des Moines Area community College and 24 men and women students in an upper class sociology course at Iowa State University.

[1]Reliability coefficients between 0.50 and 0.60 were considered marginal, between 0.60 and 0.80 fair; and above 0.80 desirable.

Because the time for responding to the final survey instrument was limited, only about 10-20 items could be included to assess nutrition knowledge. Items were selected for use in the final instrument on the basis of item-total correlations and table of specifications weightings. Several items were retained to provide information on common misconceptions about nutrition. The final questionnaire contained 16 items.

Using responses in the present survey, the 16 knowledge items were analyzed statistically for reliability, with husbands and wives being analyzed as two separate subgroups. Question numbers 162, 163, 164, 166, 167, 168, 171, 172, 174, 175, and 176 were selected as components for the final composite score (Appendix B). These items were selected because they had item-total correlations close to the range of 0.20 to 0.40, the range which indicates items that best discriminate between high and low scorers. Also, the same items could be used for both spouses. The reliability coefficient, as determined by coefficient alpha, was 0.64 and 0.61 for husbands and wives, respectively.

Goals

Twelve statements reflecting goal orientations were incorporated into the questionnaire (Questions 109 to 113, items 1 to 12, Appendix B). Three objectives were desired in the analysis of the individual's goals: a) an assessment of the relative ordering of health goals in the individual's goal hierarchy, b) the choosing of goals which were approximately equal in importance to both husbands and wives, and c) the selection of goals which would be unique in meaning and thus provide a means for dividing the sample population into subgroups on the basis of their goal orientations, if this was desired for later analysis.

In order to meet the above objectives, three general content areas of goal orientations were selected; health, social, and economic. Four goals with content validity for each of these general orientations were used (Table 2). These goals were not chosen to encompass the entire

Table 2. Theoretical orientations of goal statements

Economic Orientations	Social Orientations	Health Orientations
Be a good manager of money and time	Gain and maintain the respect of people outside the family	Maintain or improve the quality of my diet
Increase money income	Be active in community or church affairs	Maintain or improve my physical fitness
Obtain security - financial, etc.	Clothe myself and my family attractively	Learn and practice preventive techniques for heart disease and and other diseases
Reduce debts or increase savings	Maintain or improve the exterior appearance of the house and yard	Maintain or achieve desirable weight

range of goals that young families might have but rather to provide some estimate of the relevancy of health goals to young, married couples. Economic and social goals were chosen to achieve objective (a) above, because Scarpatti (1966) found that when a wide variety of individual goal orientations of young farm husbands and wives were ranked in terms of importance, economic goals were near the upper end of the continuum and social goals near the lower end. Thus these two orientations should provide points of comparison against which the ordering of health goals could be compared. Although family and child-oriented goals had been found to be important to this age group, they were not included in this analysis. Family goals were generally more important to wives than husbands (Scarpatti, 1966), and therefore violated objective (b) above. Furthermore, family goals could be related to economic, social, and health orientations, and thus would not prove unique if objective (c) were pursued.

The particular goal statements used in this study for the social and economic orientations were selected from goal statements derived from open-ended questions asked of young, rural Iowa farm spouses (Scarpatti, 1966). Because the health orientation as obtained by Scarpatti's open-ended questions contained only one general health concept, i.e. concern about the health and well-being of the family, four health goals were written specifically for the present survey project. The wording for these four items was checked for clarity and understanding by pre-testing the items with 10 couples.

Importance scores for the twelve goals used in the survey questionnaire were obtained by having the respondent estimate the importance, to him, of each of 11 goals relative to a 12th or anchor goal. The procedure involved asking each respondent which goal of the 12 was most important to him; then which goal was the least important. Then the respondent was asked to compare these goals to the anchor goal, "Increase Money Income." For example, the respondent was asked how much more important his most important goal was than the anchor goal, or how much less important his least important goal was than the anchor goal. After an importance score was obtained for his most and least important goals, the respondent was asked to rate the remaining goals in a similar two-step procedure. That is, first he was asked if each goal was more or less important than the anchor goal. Then he was asked to estimate how much more or less important it was. This procedure was continued until importance scores had been obtained from the respondent for all goals, except the anchor goal.

During the data analysis phase of this study, the anchor goal was arbitrarily coded as 10.0. All other goals were given importance scores relative to this. For example, if the respondent had said a goal was twice as important as the anchor goal, the goal was given an importance score of 20.0. If he had said the goal was 20% more important than the anchor goal, the goal was assigned an importance score of 12.0. If the goal was 10% less important than the anchor goal, it was scored 9.0. Missing data were arbitrarily assigned the mean value for that item and spouse.[1]

Preliminary statistical analysis of the goals revealed heavy weightings of results by persons who were "outlyers". Of the 232 respondents interviewed, all but 26 had used scores within the range

[1]The number of respondents, from a total of 232, who had missing values for each goal was as follows: goal 1 (5); goal 2 (2); goal 3 (4); goal 4 (3); goal 5 (4); goal 6 (2); goal 7 (2); goal 8 (4); goal 9 (2); goal 10 (2); goal 11 (2); goal 12 (6).

of 0.1 to 30.0. However, these 26 individuals had scores ranging up to 999.9. The importance scores for these 26 individuals were plotted and compared against a scale of 0.1 to 30.0. Importance values that reflected their original relative orders and importance values but which fell within the 0.1 to 30.0 range were reassigned to these individuals.

After examining the range of scale values used by respondents in estimating the importance values of the goals, it appeared that the assumption of an equal interval scale[1] had not been met. That is, scale intervals less than 10.0 increased in steps of 0.5 or 1.0, whereas scale intervals greater than 10 increased in steps of 2.5, 5.0, or 10.0, with increasingly larger intervals as the scale approached 30.0. In order to more closely approximate an equal interval scale, the importance scores were divided into eleven categories on the basis of response frequency clusters. The same scale was used for all goals and for both husbands and wives so results among goals and among spouses could be directly compared.

To check on the validity of the three original theoretical orientations, and to develop composite measures for each orientation, the goals (on the basis of an eleven point scale) were analyzed using Quartimax rotation and Alpha factor. (The results are given in Appendix E.) On the basis of the factor analysis, three composite scales were derived. The health scale consisted of items 3, 4, 7, 10; the social

[1]The assumption of equal interval measurement is necessary for both product moment correlation and regression analyses.

scale consisted of items 11 and 12; the economic scale contained items 8 and 9. These particular scales allowed the same items to be used for both spouses, maintained theoretical content, and remained consistent with the empirical results of the factor analysis.[1]

All items were standardized prior to the summation step for obtaining the final scale score. Husbands' items were standardized using husbands' means and standard deviations; wives' items were standardized using wives' means and standard deviations. Using coefficient alpha, reliability coefficients of 0.80, 0.81, and 0.50 for the husbands and 0.74, 0.74, and 0.53 for the wives for the health, social, and economic goals, respectively, were obtained. Therefore, economic goals

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[1]Because four goals were chosen as being theoretically consistent for social orientations, and only two goals survived the factor analysis, this implies that two of the original goals were not consistent with the others. For the economic goal orientations, again four goals were selected, on a theoretical basis, as being appropriate for measuring this orientation. However, one of these goals was used as an anchor goal and thus was arbitrarily assigned a standard value for all respondents. Because there was no variance in the score on this goal, this goal was not included in the factor analysis. When the three remaining economic goals were analyzed, one was found to be inconsistent with the other two. The result, similarly to the social goal scale, was that only two items were included in the scale. All four of the specific health goals factored empirically into the theoretical health scale. In general, the larger the number of specific items included in a composite scale (general goal orientations, in this case), the more reliable the scale. Items included in a composite scale must meet two requirements: a) maintain theoretical content and b) meet empirical scaling requirements. Furthermore, for this project, an additional criterion was imposed; i.e., that the same specific items would be used to make the composite scores for both husbands and wives. This latter criterion was desirable because it made the general goal orientations of husbands directly comparable to those of wives. By applying these three criteria to the economic, social and health goal orientations, the resultant scales had only 2, 2, and 4 items each, respectively. In future research, the addition of more specific goal items which can be included in composite scales is recommended.

were the least well measured.

On a weight reduction diet

The variable "on a diet" refers to the answer that the respondent was on a weight reduction diet, either voluntarily or on a doctor's prescription (Question 12, items 1 and 2, Appendix B). If the respondent was on a weight reduction diet, a value of 1 was assigned to this variable; if not on a weight reduction diet, the variable was coded as zero.

Number of meals

The variable "number of meals" refers to the number of meals eaten per week by the respondent. The value for this variable was obtained by adding the number of days a week the respondent ate morning meals, mid-day meals, and evening meals (Questions 2, 5, and 8, Appendix B). When this same variable was calculated by Christenson (1973), she found that it had a test-retest reliability of 0.83 for 60 women subjects.

Number of snacks

The variable "number of snacks" is the number of snacks other than coffee or tea, consumed per day. The value for this variable was obtained by adding the number of morning, afternoon, and evening snacks consumed by the respondent (Question 11, Appendix B). This variable was found by Christenson (1973) to have a reliability of 0.75.

Consumption of "empty calorie" foods

The consumption of "empty calories" variable was obtained by adding together the average daily frequencies with which each respondent consumed pie, candy or candy bars, sugar, regular pop, beer and alcoholic beverages, doughnuts, pastry, cake, cookies, baked desserts, potato chips, corn chips, pretzels, popcorn, Fritos, syrup, honey, jam, jelly, marmalade, preserves, apple butter, Kool-aid and sweet rolls (Questions 63, 66, 67, 68, 70, 72, and 76, Appendix B).

Variety of nutritious foods consumed

The variable "variety of nutritious foods" was calculated by counting the number of foods, from a list of 58[1], which were consumed at least once a month (Questions 14 to 65, 69, 79 and 81; Appendix B). The foods included in this list were those foods for which a nutrient value was calculated. Thus, this variable measures "nutritious variety" only, and does not include "empty calorie" foods.

[1]Fair vitamin C vegetables (Questions 44 and 45), mixed vegetables (Questions 44 and 45), other vegetables (Questions 44 and 45), apricot nectar, lemonade, V8, other juices (Questions 55 and 56), dried apricots, fruit-flavored drinks, whole milk, 2% milk, skim milk, dry milk, milk on cereal, milk in coffee, chocolate milk, pudding, ice cream, cottage cheese, cheeses, meats, pork, beef, fowl and fish, plain meat, meat mixtures, sandwich meats, eggs, liver, peanut butter and nuts, dried beans, carrots, squash, sweet potatoes, broccoli, dark greens, tomatoes, soup, vegetables (green beans, peas, or corn), Brussels sprouts, cabbage, mashed potatoes, frozen potatoes, cooked potatoes, rice, pasta, pizza, lettuce salad, citrus fruits and juices, fresh fruits, canned fruits, dried fruits, cereal, bread, doughnuts, pancakes, butter, crackers.

Quantity of nutritious foods consumed

The quantity of nutritious foods consumed is the total number of standard-sized servings of the four food groups[1] eaten per day by the respondent. It was calculated by adding together the number of milk servings (in 1 cup equivalents),[2] meat or meat substitutes servings (in one ounce equivalents),[3] fruits and vegetables (1/2 cup or equivalent), and bread and cereals equivalents (1 slice of bread or equivalent). (See Appendix F.) Christenson (1973) found reliabilities of 0.34, 0.90, 0.76, and 0.58 for the meat, milk,[4] fruits and vegetables, and breads and cereals groups, respectively, but did not report a reliability for the total quantity score.

Per person food expenditures

The amount of money spent for food was calculated to represent the food expenditures per adult male equivalent nutrition unit per meal. Question 229 (Appendix B) provided information on the age of each child. The amount of money spent for food per week was obtained from Question 259 on the wife's questionnaire (Appendix B).[5] Because there were dis-

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[1]The four food groups were based on the groups suggested in the Daily Food Guide (U.S.D.A., 1967).

[2]Includes cottage cheese and cheese equivalents of milk.

[3]While a serving of meat is usually considered to be a two ounce serving, an error in the computer program resulted in the data being expressed in one ounce serving sizes in the present study and also in the pretest conducted by Christenson (1973).

[4]Did not include cottage cheese and cheese equivalents of milk.

[5]This question had a test-retest reliability of 0.84 for women in Christenson's study (Christenson, 1973).

crepancies ranging from $0 to $20 between husbands and wives on the per person weekly expenditures for groceries (correlation = 0.54), the wives' data for food expenditures and ages of the children was used to calculate per person food expenditures for both the husband and wife. No adjustment was made for home-produced food which was eaten, but not purchased at the grocery store. Also, no correction was made for the use of food stamps. Only a few respondents were using food stamps at the time of the survey, and the value of their weekly food expenditures appeared to include the value of the food stamps. Because of the particular wording of the question about food expenditures[1], the weekly amount spent for groceries probably includes some non-food expenditures such as soft drinks, pet foods, soaps and cleaning products, sales tax, etc.

The number of members in the family was expressed as adult male equivalent nutrition units in a manner similar to that in the 1965 U.S.D.A. survey of household food consumption (U.S.D.A., 1970). One nutrition unit in the present study was equivalent to the food energy allowance of a 25 year old male (National Academy of Sciences, 1968). The food energy equivalents for other family members were calculated by dividing their food energy allowances by the allowance for the reference man. Because sexes were not known for the children, an average of male and female allowances was used for children 10 years and over. No

[1] Question 259 is worded, "Approximately how much money do you spend for groceries in an average week, including milk and meat but excluding cigarettes and beer."

correction was made for pregnancy and lactation because so few women were pregnant or lactating. The adult male food energy nutrition equivalent units are given below:

family member	nutrition equivalent unit
child, 5 years or less	0.50
child, 6 to 10 years	0.75
child, 11 years or more	1.00
wife	0.70
husband	1.00

A correction for the number of meals consumed away from home was calculated because some husbands ate away from home on a regular basis, and the money spent for food was based on grocery expenditures only. The number of meals eaten at home by the husband and wife per week was obtained by adding the information on the average number of morning meals, mid-day meals and evening meals consumed or prepared at home per week (Questions 3, 6 and 9 in Appendix B). It was assumed that children ate 21 meals a week at home, an assumption probably not too erroneous since the survey was taken in the summer. The food expenditures were calculated by the following formula:

$$\text{food expenditures} = \frac{\text{(amount of money spent on groceries per week)}}{\sum_{i=1}^{m} [\text{(nutrition unit)}_i \times \text{(number of meals at home)}_i]}$$

Nutrient intakes

A dietary history developed by Christenson (1973) was the basis for estimation of nutrient intakes. This dietary assessment method was developed specifically for the regional project to meet four objectives

(Christenson, 1973, p. 1):[1]

"1. The dietary method must provide information about individuals, not only group averages.

2. Long-term usual food patterns must be reflected.

3. The method must be simple enough to be administered by trained, non-dietitian interviewers.

4. The method must be valid, reliable, and objective."

Another objective according to Christenson (1973, p. 1) was "...that the method be accurate enough to measure changes in food habits if they occurred as a result of educational programs designed to improve nutrient intake."

This dietary history method consisted of asking the respondent to estimate the frequency on a daily, weekly, monthly, or yearly basis of consuming 67 different food items, either as single items or groups of similar food items (Questions 14 to 81; Appendix B). Additionally, by referring to a set of rigid polyurethane models of various sizes, the respondents were asked to estimate usual serving sizes of specific foods or groups of foods (i.e., cooked vegetables) (Questions 86 to 101; Appendix B). Based on the frequencies and usual serving sizes consumed, nutrient contributions of 52 of the 67 food items were calculated on a daily basis, totalled, and converted to percentages of recommended

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[1]Special appreciation is extended to Marcia Christenson who developed the diet history, pretested it, made the food models, supervised the writing of the computer program, aided in the training of interviewers for this project, and made suggestions for improving the pretest form of the diet history.

allowances (RDA) for six nutrients for each subject.[1,2] The 15 items for which no nutrient calculations were made but for which frequencies were obtained fell into 3 categories (Christenson, 1973, p. 31);

> "1. foods for which it is difficult to estimate quantities eaten.
>
> 2. cross-check items used by the interviewer to locate discrepancies in responses given by the subject during the interview.
>
> 3. foods providing sugar or fat but little other food value."

This dietary history was pretested by Christenson on 60 young, married women in the spring of 1972. Using a test-retest technique, she found correlations of 0.64, 0.87, 0.71, 0.78, 0.74, and 0.54 between the two interview periods for the intakes of protein, calcium, iron, vitamin A, thiamin, and ascorbic acid, respectively.

Several modifications of the pretest form of the diet history were introduced before it was used in the present study. Some items were rearranged because subjects in the pretest had difficulty with the original sequence of certain items. For example, fruit drinks such as HiC were frequently confused with orange juice. A re-arrangement of the order in which these items were asked minimized confusion about them. Some items which were ambiguous to the subjects could be clarified during the interviewing process by trained nutritionists but needed rewording

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[1]A computer program was written in consultation with the Numerical Analysis Division of the I.S.U. Statistical Laboratory to handle this complex analysis.

[2]The six nutrients for which intakes were estimated are protein, calcium, iron, vitamin A, thiamin, and ascorbic acid.

when non-nutritionally trained interviewers were conducting the survey. Additionally, men had difficulty with some items which had not posed problems for the women subjects interviewed by Christenson.

The calculation of nutrient values for open-ended responses (Questions 17, 44, 45, 46, 53, 55, 56, 59, and 60, Appendix B)[1] was also modified from the way in which pretest[2] results were handled. If the respondent normally alternated between using two or more foods which were applicable for the open-ended response questions, the first-mentioned food only was coded during the pretest analysis. In the present study, an average nutrient composition of all foods listed by the respondent for an open-ended response was calculated. Hopefully, this procedure improved the low reliability of the estimate of ascorbic acid intake (r=.54) found by Christenson (1973).[3] In the handling of pretest

[1]Open-ended questions are those which ask "Are there any other vegetables (or fruit juices, etc.) that you frequently eat?" or "What brand of cereal do you usually eat"? That is, open-ended questions are items for which the respondent could name specific foods or brands.

[2]Pretest in this discussion is in reference to the pretest conducted by Christenson and not to the pretest of the entire questionnaire.

[3]Ascorbic acid intake was especially vulnerable to being affected by open-ended responses when the first mentioned food only was coded. For example, in the first interview of the prestest, the respondent, when asked what brand of fruit-flavored beverages she consumed, might mention that she alternated between consuming Wagner's and HiC brands. These two brands have ascorbic acid contents of 40 and 133 mg per cup, thus varying widely. In the second interview, the respondent might have reversed the order of giving her answer, i.e. responding that she alternated between using HiC and Wagner's brands. If the first mentioned brand only was coded for each interview, it is obvious that a low correlation for ascorbic acid intake between the two interview periods would result since the correlation would be between ascorbic acid contents of HiC and Wagner's drinks. However, if the ascorbic acid value of all foods mentioned for a particular question were averaged, the correlations between the two interview periods should be enhanced, and a more accurate representation of ascorbic acid intake obtained.

data, vitamin A intake was calculated in two ways; with and without seasonal corrections for vitamin A-rich foods. Due to computer programming errors, no seasonal corrections were made in the present study. Additionally, nutrient values of cereal and beverage products were altered, when necessary, after package labels were re-checked in September, 1972.[1]

Subsequent to calculation of the intakes of the six nutrients, the nutrient intakes of the respondents were expressed as RDA values (National Research Council, 1968) and were categorized into the following 10 categories:

Percent RDA Values	Category
$\leq$ 59.9	1
60.0-79.9	2
80.0-99.9	3
100.0-119.9	4
120.0-139.9	5
140.0-159.9	6
160.0-179.9	7
180.0-199.9	8
200.0-299.9	9
$\geq$ 300.0	10

The rationale for categorizing the percent RDA values into the 10 category scale above was based on the data presented in Table 3. Because a large proportion of our sample fell above 100 percent RDA (Table 3), classifying respondents into the traditional 3 categories

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[1]Christenson used nutrient values from labels in March, 1972, to calculate the food composition of these foods. During the period March to September, many cereal manufacturers had changed to higher levels of fortification in addition to an increased variety of vitamins and minerals being added to cereals and fruit-flavored drinks.

Table 3. Number of husbands and wives falling into three categories of nutrient intakes for six nutrients

Category	Nutrient Intakes					
	Protein	Calcium	Iron	Vitamin A	Thiamin	Vitamin C
Husbands						
$\geq$100% RDA	109	88	106	93	89	94
68-99% DRA	6	15	7	18	23	13
$\leq$67% RDA	1	13	3	5	4	9
Wives						
$\geq$100 RDA	89	65	15	81	83	90
68-99% RDA	22	26	33	24	25	16
$\leq$67% RDA	5	25	68	11	8	10

of poor ($\leq$ 67% RDA), good (68-99% RDA), and excellent ($\geq$ 100% RDA) resulted in a substantial loss of variance in the RDA values. Use of the raw percentage values left some extreme outlyers that unduly weighted the relationships. The 10 categories allowed considerable variance in the RDA values while still providing protection against the extreme outlyers. Also, the discriminatory power of the measurement was enhanced.

Weight status

Assessment of the respondent's weight was obtained by the interviewer upon completion of the interview schedule. Each interview team had a bathroom scale as part of their standard equipment. The interviewers were instructed to place the scales on a hard surface floor, if possible, and to zero the scale before weighing the respondent.

For each bathroom scale, tables for converting the scale readings to corrected weights were prepared by using standard weights from the Atomic Energy Commission Laboratory at Iowa State University. The actual scale readings were converted to their correct weights during coding of the data. Weights of pregnant women were normalized by subtracting the appropriate average monthly weight gain for pregnant women (U.S. Department of H.E.W., 1970) from the recorded weight of the women.

In order to estimate the weight status of the individual relative to recommended or desirable weights, information was also obtained on height and frame size. An estimate of frame size was obtained by using a steel tape to measure the right wrist, with the fingers of the respondent closed. Each interviewer of the two person team measured each respondent's wrist, thus supplying two independent measures of wrist circumference. These measurements were averaged later.

To determine frame size categories, the median wrist circumference for each height in one inch intervals for each sex was plotted and a regression line obtained. It was decided to place about 50% of the population in the medium frame category, and about 25% of the population in the large and small frame categories, respectively. The range of values used for the medium frame was based on values falling within the areas bounded by $\pm$ [(0.53) x (the standard deviation of the raw scores)] on either side of the regression line.[1] Large frame category was assigned to

[1]The value of (0.53) is the value which represented 50% of the population, centered on the mean, from the standard normal curve.

those wrist circumference values which fell above this area; small frame was assigned to those below this area (Appendix G). The wrist measurement for each individual was then compared against the plotted standards, and each subject was assigned to a small, medium, or large frame category.

Based on the individual's height and estimated frame size category, each subject was assigned a desirable weight value according to U.S.D.A. figures (Hathaway and Foard, 1960) (Appendix G). The U.S.D.A. desirable weight values were based on median weights of college men 25 to 29 years old and college women 20 to 24 years old. Two pounds were added to the original weights given in the table to correct for the weight of clothing (U.S.D.A., 1965).[1] The actual weight of each respondent was divided by the appropriate desirable weight, based on height and frame size, and multiplied by 100. This figure represented the percent of recommended weight value, with 100% implying that the respondent's actual weight was equivalent to his desirable weight. Values lower than 100% represented underweight status; higher values indicated overweight status. Before statistical analyses, the actual percentages of desirable weights, which ranged from 77.4 to 189.2%, were divided into the following 9 categories:

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[1]These authors checked the weight of clothing of a small number of persons during the National Health Survey, 1960-1962. They found the weight of men's clothing to average slightly over 2 pounds and that of women's clothing to be slightly less than 2 pounds.

percentage desirable weight	category
≤ 84	1
85-94	2
95-104	3
105-114	4
115-124	5
125-134	6
135-144	7
145-154	8
≥ 155	9

Overall diet quality

Each respondent was given a rating of excellent, good, or poor for his nutrient intake level of each of the six nutrients studied and for his weight status.[1] The intakes of each of the six nutrients were individually rated on the basis of their percentages of recommended dietary allowances.

The rating scheme was as follows:

category	percentage RDA
3 = excellent	≥ 100.0
2 = good	67.0-99.9
1 = poor	< 67.0

The weight classification was divided into three categories on the basis of deviation from desirable or recommended weight. The categories used were:

[1]This rating is in addition to the 10 categories based on percent RDA and the 9 categories based on percentage desirable weight discussed previously.

category	percentage RDA
3 = excellent	$\pm 5\%$ of recommended weight for height, sex, and frame size
2 = good	between $\pm 5\%$ and $\pm 25\%$ of recommended weight for height, sex, and frame size
1 = poor	> 25% over recommended weight

Thus, each respondent would have seven different ratings, with the possible range of ratings varying from all seven ratings being excellent to all seven ratings being poor, or any combination in between.

To obtain an overall dietary quality score, the particular combination of excellent (3's), good (2's) and poor (1's) ratings for each inidivdual were compared with the scheme presented in Table 4. On the basis of this scheme, the respondent was assigned a value for his overall dietary quality on an eight point scale. The higher the value, the better the overall quality of the diet.

The decision to use this rather complicated scheme was based primarily on the following rationale. Physiologically, a high intake of one nutrient does not compensate for a low intake of another. To average the rating values of each of the seven components in this scale would, therefore, result in a mean score that could be misleading.

Statistical Analysis

The use of path analysis in causal model techniques involves the use of multiple regression as the statistical technique. Multiple regression, as used in the causal model and path analysis procedure allows

Table 4. Categories used to determine overall diet quality on an 8 point scale

Overall diet quality category	No. of excellent ratings	No. of good ratings	No. of poor ratings	Overall diet quality category	No. of excellent ratings	No. of good ratings	No. of poor ratings
8	7	0	0	4	4	0	3
				4	3	1	3
7	6	1	0	4	2	2	3
7	5	2	0	4	1	3	3
7	4	3	0	4	0	4	3
7	3	4	0				
7	2	5	0	3	3	0	4
7	1	6	0	3	2	1	4
				3	1	2	4
6	6	0	1	3	0	3	4
6	5	1	1				
6	4	2	1	2	2	0	5
6	3	3	1	2	1	1	5
6	2	4	1	2	0	2	5
6	1	5	1				
6	0	6	1	1	1	0	6
				1	0	1	6
5	5	0	2	1	0	0	7
5	4	1	2				
5	3	2	2				
5	2	3	2				
5	1	4	2				
5	0	5	2				

> ...one to study the linear relationships between a set of independent variables and a number of dependent variables while taking into account the interrelationships among the independent variables (Nie et al., p. 175, 1970).

The variables which had been selected for analysis (according to information in Appendix A and previous discussion of theoretical model in chapter on theoretical background) were placed in multiple mode at the same inclusion level using an SPSS computer package (Nie et al., 1970). The contribution of each individual variable was then checked for significance. Those variables not achieving partial[1] significance were removed and the equation was rerun. This procedure was followed until all variables in the equation were individually (partially) significant. All reported β weights (path coefficients), tests of significance, and r-squared[2] values are based upon this last computer run of the regression equation.[3]

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[1]The "partial" effect is a measure of the amount of variation explained by one independent variable on the dependent variable after the other independent variables have explained all they could; i.e., after the effect of the other independent variables has been controlled.

[2]r-squared is the proportion of the variance in the dependent variable accounted for by the regression equation.

[3]In some cases, variables which were dropped for lack of significance had F values close to significance. These variables were allowed to enter in stepwise mode on the last run after all significant variables had been entered in multiple mode.

RESULTS AND DISCUSSION

The results to be presented in this chapter consist of two types of data; 1) descriptive data and 2) the empirical results of the causal models for husbands and wives. The descriptive data include information on frequency distributions, means and standard deviations. The discussion of the empirical causal models will be limited first to a separate discussion of husbands' and wives' models, followed by a comparison of the two models. The final section of this chapter will be a discussion of implications for intervention programs, based on the results discussed previously in the chapter.

Descriptive Data

Educational level, total family income, and social class rating

The number of grades completed by husbands and wives is given in Table 5. Eleven husbands and eleven wives, or 9.5 percent of the subjects in each subgroup, had not completed a 12th grade education. More men than women had some college education. Eight wives reported having a college education (16 years of schooling), while 12 husbands had bachelor's degrees. Further, 17 men had studied beyond the bachelor's degree while only one woman had done so. The mean number of years of schooling for the men and women was 13.6 and 12.5 years, respectively.

The total family income value was based on the husband's reported family income. The results in Table 6 revealed that more than half

Table 5. Educational level of husbands and wives

Number of grades completed	Number of Husbands	% of 116	Cumulative %	Number of Wives	% of 116	Cumulative %
6	1	0.9	0.9	0	0.0	0.0
7	0	0.0	0.0	0	0.0	0.0
8	2	1.7	2.6	1	0.9	0.9
9	3	2.6	5.2	3	2.6	3.4
10	1	0.9	6.0	4	3.4	6.9
11	4	3.4	9.5	3	2.6	9.5
12	37	31.9	41.4	69	59.5	69.0
13	22	19.0	60.3	10	8.6	77.6
14	14	12.1	72.4	13	11.2	88.8
15	3	2.6	75.0	4	3.4	92.2
16	12	10.3	85.3	8	6.9	99.1
17	4	3.4	88.8	1	0.9	100.0
18	10	8.6	97.4	0	0.0	100.0
19	2	1.7	99.1	0	0.0	100.0
20						
21	1	0.9	100.0			
Mean	13.6			12.5		
S.D.[a]	2.6			1.6		
Median	13.0			12.2		
Mode	12.0			12.0		

[a]Standard deviation.

the families had incomes in the $10,000 to $14,999 category. Eleven families had incomes less than $7,000, and 23 families had annual incomes greater than or equal to $15,000.

Table 6. Total family income

Income Category	Number of Families	% of 116
$3,000 to $3,999	1	0.9
$4,000 to $4,999	2	1.7
$5,000 to $5,999	4	3.4
$6,000 to $6,999	4	3.4
$7,000 to $9,999	22	19.0
$10,000 to $14,999	60	51.7
$\geq$ $15,000	23	19.8

Social class ratings for both husbands and wives were based on the prestige of the husband's occupation (North-Hatt scale). This sample encompassed a wide range of social class ratings (Table 7).

Value-attitude orientations

Value-attitude orientations toward risk, modernism, mastery, and means orientation were measured. A high score on the modernism scale would indicate that the respondent refuted the idea that past ways of doing things are best and that scientific information is detrimental. Individuals with a high risk orientation score would reject conservatism in their approach to new ideas or ventures. A feeling that man controls his own life and future would be representative of a high score on

Table 7. Social class ratings[a]

North-Hatt Categories		Number of Families	Cumulative %
40	common laborer[b]	1	0.9
44	bartender, janitor	1	1.7
47	factory laborer	1	2.6
50	city or construction laborer	3	5.2
54	truck driver, meat packer	15	18.1
55	skilled laborer, maintenance man	3	20.7
56	route salesman	2	22.4
59	heavy equipment operator	2	24.1
60	bricklayer, painter	7	30.2
62	clerk or cashier	1	31.0
63	plumber, barber	1	31.9
65	carpenter, postal clerk	11	41.4
66	foreman, technical clerk	6	46.6
67	policeman, bank teller	4	50.0
68	tax assessor, bookkeeper	12	60.3
69	manager of small store	7	66.4
70	accountant, administrative ass't.	9	74.1
71	reporter, manager large company	3	76.7
72	undertaker, owner of business	4	80.2
73	welfare worker, electrician	8	87.1
74	contractor (cement, electrical,etc.)	2	88.8
75	audiologist, TV engineer	2	90.5
78	public school teacher, actuary	1	91.4
79	building contractor, college instructor	2	93.1
80	bank auditor, superintendent of schools	2	94.8
82	research engineer, owner of large factory	2	96.6
86	minister, lawyer, professional	4	100.0

[a]Using North-Hatt scale and modifications.

[b]These are only an example of the occupations listed under each North-Hatt category. For a more complete listing, see Appendix C.

the mastery scale. A high score on the means orientation scale would be indicative of an orientation towards independence and the belief that to get things done right, you must do them youself. According to Warland (1966), these value-attitude orientations should form an interrelated configuration.

The intercorrelations among the scores for these four value-attitude scales (Table 8) basically established the existence of a general value-

Table 8. Intercorrelations among scores for the four value-attitude scales for husbands and wives

	Husbands			Wives		
	Risk	Means	Modernism	Risk	Means	Modernism
Mastery	.28	-.34	.53	.14*	-.25	.48
Risk		-.21	.22		-.17*	.23
Means			-.34			-.50

*Significant at 0.10 level. All other values are significant at least at the 0.05 level.

attitude configuration for the individuals in this study. However, for both husbands and wives, the means orientation scale (independence) was scored so as to be opposite in direction to the other value-attitude scales. This negative relationship of the means orientation to the other value-attitudes was consistent with the theoretical perspective of Warland (1966) who depicted the independent person as being more traditional, fatalistic, and one who avoided risk. The low correlations for the risk orientation scale with mastery and means orientations for the wives seems to suggest that, for women, the risk orientation was less likely to be a part of a more general value-attitude configuration than was true for the men.

The data presented in Table 9 revealed that for a given value-attitude scale, the scale mean (average) values obtained for the husbands and wives, as a group, were very similar. It should be noted, however, that the similarity of these group means does not necessarily imply similarity between a given husband and wife.

Table 9. Means, standard deviations, and scale values for four value-attitude scales for husbands and wives

Value-Attitude Scale	Sex	Scale Mean	Scale S.D.[a]	Theoretical Scale Range	Mean Item Value[b]
Modernism	M	82.6	16.2	0-128	10.3
	F	80.9	16.6	0-128	10.1
Mastery	M	48.1	13.4	0-64	12.0
	F	47.6	10.9	0-64	11.9
Risk	M	22.4	10.6	0-64	5.6
	F	20.8	8.1	0-64	5.2
Means	M	37.3	11.9	0-80	7.5[c]
	F	35.6	10.8	0-80	7.1

[a]Standard deviation.

[b]The theoretical range for item values was 0 to 16.

[c]Because the means orientation scale was coded in a direction opposite to that of the other three scales, the mean item value, to be comparable to other scales should be 8.5 and 8.9 for husbands and wives, respectively [(16.0-7.5) and (16.0-7.1)]. However, this does not change the relative rank of the mean item value of this scale as compared with the other three value-attitude scales.

As used in this study, the value-attitude orientations attempted to measure various dimensions of the individual's value-attitude orientations which were associated with rational approaches to decision-making. To determine the relative saliency of these dimensions, the mean item value was calculated for each value-attitude scale. As shown in Table 9, the mastery orientation had a mean item value of 12.0 for husbands and 11.9 for wives.[1] The modernism orientation had a mean item value of 10.3 and 10.1 for husbands and wives, respectively. Mean item values for the risk orientation scale were 5.6 and 5.2, while the means orientation scale had mean item values of 7.5 and 7.1 for husbands and wives, respectively. Thus, the mastery and modernism orientations were more salient to the population being studied than were the risk and means orientations.

Nutrition knowledge

The percentage of husbands and wives responding to each multiple choice answer for the 16 knowledge questions asked of the respondents is given in Table 10. Item numbers 162, 167, 170, and 172 were more often answered correctly by the husbands than by the wives, although the differences were not large. Item numbers 166, 169, and 175 were answered correctly by equal numbers of husbands and wives. The remaining nine items were more frequently answered correctly by wives than by husbands.

[1]The theoretical range for item values was 0 to 16.

Table 10. Percentage of husbands and wives responding to answers in the test of nutrition knowledge

Item No.	Question	Percent Responding[a] Husbands	Percent Responding[a] Wives	Level of Misconception[b] Husbands	Level of Misconception[b] Wives
162	Vegetables grown on organically fertilized soil are richer in nutrients than vegetables grown on chemically fertilized soil.				
	1. agree	60	67		
	+2. disagree	39	33	C	C
163	Which of the following fruits may be substituted for oranges and provide similar nutrients?				
	1. cherries	1	0		
	2. apples	16	14		
	+3. grapefruit	73	83	B	A
	4. apricots	10	3		
164	Which food in each pair has the greater food value per dollar spent?				
	(A) +1. powdered milk	47	60	C	B
	2. fresh whole milk	53	40		
165	(B) +1. oatmeal	90	94	A	A
	2. cornflakes	10	6		

[a]May not add up to 100% either because of rounding errors or because of refusal to answer by respondent.

[b]A = $\geq$75 percent of persons answering correctly; B = 50 to 74 percent of persons answering correctly; C = 24 to 49 percent of persons answering correctly; D = $\leq$25 percent of persons answering correctly.

+Indicates correct answer.

Table 10 (Continued)

Item No.	Question	Percent Responding[a] Husbands	Percent Responding[a] Wives	Level of Misconception[b] Husbands	Level of Misconception[b] Wives
166	(C) +1. baked beans	25	25	D	D
	2. beef roast	75	75		
167	A nutritionally adequate diet is most likely to be provided by eating				
	+1. a wide variety of foods	56	43	B	C
	2. three meals a day	35	44		
	3. some health foods daily	2	3		
	4. foods rich in protein	7	10		
168	Enriched breads and cereals				
	1. are high in calories	28	20		
	+2. are important for vitamins and minerals	53	66	B	B
	3. supply good quality protein	13	12		
	4. are not needed by adults	5	2		
169	"Fortified margarine" means that which of the following has been added to margarine?				
	+1. carotene	2	2	D	D
	2. polyunsaturated fats	34	40		
	3. B vitamins	57	52		
	4. yellow color	8	6		
170	Which of the following nutrient groups provide the most energy per ounce?				
	1. carbohydrates	33	49	D	D
	2. vitamins	15	13		
	3. proteins	44	34		
	+4. fats	9	4		

Table 10 (Continued)

Item No.	Question	Percent Responding[a] Husbands	Wives	Level of Misconception[b] Husbands	Wives
171	Individuals use the Daily Food Guide to				
	1. determine amount of nutrients needed each day.	21	16		
	2. show what foods to eat at each meal.	9	9		
	3. help in selecting a wide variety of foods.	12	14		
	+4. help in selecting foods containing needed nutrients	57	61	B	B
172	Athletes need more of which of the following when compared to nonathletes?				
	+1. calories	36	33	C	C
	2. protein	45	56		
	3. vitamins	19	11		
	4. minerals	0	0		
173	The recommended weight for a male adult at a certain height as he grows older.				
	+1. remains at the level of a 25 year old.	46	51	C	B
	2. increases gradually with each year of age.	11	11		
	3. increases gradually until about age 50 and then tapers off.	18	15		
	4. decreases with age as muscle mass decreases.	25	23		
174	In selecting sweet rolls that are nutritious, you should check to see if the rolls				
	+1. contain enriched flour.	48	65	C	B
	2. are fortified with vitamins A, D, and C.	40	26		
	3. contain calcium carbonate.	2	2		
	4. contain polyunsaturated fats.	10	8		

Table 10 (Continued)

Item No.	Question	Percent Responding[a]		Level of Misconception[b]	
		Husbands	Wives	Husbands	Wives
175	Each nutrient				
	1. provides energy for work and play.	22	23		
	+2. has specific uses in the body.	63	63	B	B
	3. works best by itself.	3	2		
	4. is found in almost every food.	13	12		
176	Men and women between ages of 25 and 35 years of age who are of average height and weight.				
	1. need different nutrients in same amounts.	7	6		
	+2. need same nutrients in different amounts.	40	59	C	B
	3. need the same nutrients in same amounts.	5	8		
	4. need different nutrients in different amounts.	47	28		
177	This is a label from a box of dry, sugar-coated breakfast cereal. What is misleading in this label? "One ounce provides these percentages of the minimum daily adult requirements." VITAMIN B_1 33% VITAMIN B_2 33% NIACIN 33%				
	1. One ounce is a much smaller amount than an average serving for adults.	32	28		
	2. The minimum daily adult requirement is for natural vitamins, and these vitamins are synthetic.	16	11		
	+3. The minimum daily requirements are not as good guidelines as recommended dietary allowances for adults.	34	44	C	C
	4. Destruction of vitamins during processing and storage are not considered in these percentages.	19	16		

Since one of the purposes of asking nutrition knowledge questions was to identify areas of misconceptions or ignorance, a classification system similar to that used by Pearson (1969) was used to place the items into four categories on the basis of the percentage of individuals responding correctly to them. Using this classification system, items which were answered correctly by 75 percent or more of the respondents were classified as "not being a misconception". If 50 to 75 percent of the subjects answered an item correctly, it was classified as a "misconception for some". A "general misconception" was the term used to describe items which were answered correctly by 24 to 49 percent of the respondents. A "serious misconception" referred to items which were answered correctly by less than 25 percent of the subjects. As can be seen from the summary data in Table 11, more women than men had items falling in the "not misconceptions" or "misconceptions for some" categories. More men than women had "general misconceptions." However, for the "serious misconceptions", both men and women had the same number of incorrect answers. (See items 166, 169, and 170, Table 10).

Table 11. Number of questions from nutrition knowledge test falling into several categories of misconceptions

Category	Percent Answering Correctly	General Category	Number of Items	
			Husbands	Wives
A	$\geq$ 75	Not misconceptions	1	2
B	50-74	Misconceptions for some	5	7
C	24-49	General misconceptions	7	4
D	$\leq$ 25	Serious misconceptions	3	3

Looking at the items falling into each of the four misconception categories, it is difficult to discern any pattern that would suggest certain areas of nutrition knowledge that are more prone to misconceptions than other areas. For example, items 164, 165, and 166 refer to pairs of food for which the respondent had to decide which food in each pair provided greater food value per dollar spent. Item 165, oatmeal vs. cornflakes, was answered correctly by 90 percent of the men and 94 percent of the women, and thus could not be considered a misconception for the sample as a whole. Item 164 which compared powdered milk with fresh whole milk was a misconception for some women (category B) and a general misconception for men (category C). The third item, baked beans versus roast beef, was a serious misconception for both husbands and wives, with only 25% of each subgroup answering this item correctly. Thus under one general concept area of nutrition knowledge, three different items had three different levels of misconception by respondents.

Scores from eleven items were added together to give a composite score for nutrition knowledge for each respondent. The distribution of scores for the composite nutrition knowledge test are given in Table 12. The mean scores of 5.4 for the husbands and 5.9 for the wives represented scores close to the 50% level, the difficulty level desired for maximum discrimination. Of special note is the fact that four husbands did not answer any items correctly and two husbands obtained a perfect score. Three wives answered only one item correctly, and one wife answered all 11 questions correctly.

Table 12. Distribution of composite scores for the nutrition knowledge test[a]

Test Score	Husbands: Number of Husbands	Husbands: % of Husbands	Wives: Number of Wives	Wives: % of Wives
0	4	3.4	0	0.0
1	3	2.6	3	2.6
2	8	6.9	6	5.2
3	11	9.5	12	10.3
4	16	13.8	11	9.5
5	15	12.9	20	17.2
6	23	19.8	16	13.8
7	12	10.3	17	14.7
8	13	11.2	12	10.3
9	5	4.3	12	10.3
10	4	3.4	6	5.2
11	2	1.7	1	0.9
Mean	5.4		5.9	
S.D.[b]	2.5		2.3	
Median	5.5		5.9	

[a]Based on eleven items.

[b]Standard deviation.

Goals

Goals and their importance in relation to other goals held by an individual were considered to be possible motivating factors of behavior. Data on the importance of 12 goal statements were obtained. The goals were scored on the basis of 11 categories of importance. Table 13 gives the means, medians and standard deviations of the goals, in order of their mean importance scores (see Appendix H for the frequency distribution). The three economic goals (obtain security-financial, etc., be a good manager of money and time, and reduce debts or increase savings) received the largest mean importance scores for both men and women. The health goal which states "maintain or improve my physical fitness" was 5th in importance for husbands and 4th in importance for wives. Of 4 health goals judged by respondents, this one was the most important health goal for both husbands and wives. The health goal "learn and practice preventive techniques for heart disease" was the second most important health goal for both husbands and wives. Then, for husbands, the mean importance scores of 3 social goals were given larger importance scores than were the health goals of "maintain or achieve desirable weight" and "maintain or improve the quality of my diet." For husbands, these latter two health goals constituted the lowest goals in the hierarchy of the 12 goals investigated. For wives, all health goals were more important than 3 social goals and 1 economic goal. However, the health goal concerned with diet quality was the lowest of the 4 health goals for both spouses.

Although the data are not shown here (see Appendix E), the health goal "learn and practice preventive techniques for heart disease" loaded equally by factor analysis in the health and social factors for husbands (0.41 and 0.47, respectively), thus implying that this goal had both social and health meanings for husbands in this sample. For wives, the goal "maintain or achieve desirable weight" loaded equally in the health and social factors (0.42 and 0.42, respectively). Again, this suggests that, for wives in the sample, weight maintenance had two

Table 13. Importance scores of 12 goal statements for husbands and wives

Husbands					Wives				
Goal	Mean	Median	S.D.[a]	Content[b]	Goal	Mean	Median	S.D.	Content
Obtain security-financial, etc.	7.4	7.3	2.5	E	Be a good manager of money and time	7.8	8.2	2.7	E
Be a good manager of money and time	7.2	7.4	2.5	E	Reduce debts or increase savings	7.3	7.4	2.0	E
Reduce debts or increase savings	6.5	6.5	2.5	E	Obtain security-financial, etc.	7.2	7.3	2.1	E
Gain and maintain respect of people outside family	5.6	5.4	3.0	S	Maintain or improve physical fitness	6.3	6.7	2.7	H
Maintain or improve physical fitness	5.6	5.2	2.9	H	Gain and maintain respect of people outside family	5.8	6.0	3.0	S
Increase money income	5.0	5.0	–[c]	E	Learn and practice preventive techniques heart disease and other diseases	5.6	5.8	2.9	H

[a]S.D. = standard deviation.

[b]Content refers to the orientation of these items with respect to content validity. E = economic; S = social; H = health.

[c]This item was the anchor goal. Because it was given a standard value for all respondents, it has no variance.

Table 13 (Continued)

	Husbands				Wives				
Goal	Mean	Median	S.D.[a]	Content[b]	Goal	Mean	Median	S.D.	Content
Learn and practice preventive techniques heart disease and other diseases	4.9	4.7	2.9	H	Maintain or achieve desirable weight	5.5	5.8	3.0	H
Clothe myself and family attractively	4.8	4.6	2.4	S	Maintain or improve quality of my diet	5.3	4.8	2.6	H
Be active in community or church affairs	4.5	4.1	2.7	S	Be active in community or church affairs	5.2	5.0	2.6	S
Maintain or improve exterior appearance of house and yard	4.4	3.9	2.4	S	Clothe myself and family attractively	5.0	4.5	2.3	S
Maintain or achieve desirable weight	4.1	3.3	2.7	H	Increase money money	5.0	5.0	-	E
Maintain or improve quality of my diet	3.9	3.3	2.5	H	Maintain or improve exterior appearance of house and yard	4.8	4.4	2.3	S

underlying meanings: social and health.

As described in the chapter on Methods and Procedures, three composite goal scores were obtained. The three composites were health, social, and economic orientations. Based on inter-item correlations and factor analysis results, the composite for health goal orientation contained the summated score for 4 items, while the social and economic orientations composite scores contained two items each. The mean scale scores for each of these 3 goal orientations are given in Table 14. (The slightly larger mean values for wives compared with those for husbands were probably due to the fact that psychologically, women placed the anchor goal lower in the hierarchy of importance scores than did the men; see Table 13). The economic orientation was greatest for both spouses while the health orientation was lowest for men, and occupied a median position for the wives. The relative importance of these goal orientations and particularly the low importance of the specific health goal concerned with diet quality has important implications for intervention programs.

Table 14. Mean composite scores for health, social, and economic goals of husbands and wives

Goal orientation	Scale Mean	
	Husbands	Wives
Health	4.62	5.68
Social	4.65	4.90
Economic	6.95	7.22

On a weight reduction diet

The data in Table 15 show that, at the time of this survey, 17 men and 36 women reported that they were on a weight reduction diet, either of their own volition or their physician's recommendation. These figures represent 15 percent of the men and 31 percent of the women interviewed.

Table 15. Number of husbands and wives on a weight reduction diet

	Number of husbands	% of 116	Number of wives	% of 116
Not on a diet	99	85.3	80	69.0
On a diet	17	14.7	36	31.0

The difference in the number of men and women who were on weight reduction diets was consistent with the relative importance they placed on the goal concerned with weight control. Husbands gave this goal a mean importance value of 4.1 while the mean value for the wives was 5.5. Furthermore, the weight reduction goal was 11th in importance for husbands and 7th in importance for wives.

Number of meals

The number of meals per week consumed by husbands and wives is given in Table 16. Twenty-four percent of the men and 32 percent of the women consumed 3 meals a day every day of the week (21 meals).

Between 14 and 20 meals a week were consumed by 72 men (62 percent), with 16 men (14 percent) averaging fewer than 2 meals a day ($\leq$ 13 meals a week). One man reported eating only 3 meals a week. For the wives, 54 women (47 percent) ate between 14 and 20 meals a week, with 25 women (22 percent) consuming 13 meals or less a week. When men were compared with women, more women were found at the extreme frequencies. That is, more women ate 21 meals and more women ate fewer than 14 meals a week than did men. The mean number of meals for both husbands and wives per week was 16.4, a figure just slightly greater than 2 meals a day on the average.

Table 16. Number of meals consumed per week by husbands and wives

	Husbands				Wives		
No. Meals	No. of Husbands	% of 116	Cumulative %	No. Meals	No. of Wives	% of 116	Cumulative %
3	1	0.9	0.9	3	0	0.0	0.0
7	2	1.7	2.6	7	2	1.7	1.7
8	1	0.9	3.4	8	4	3.4	5.2
9	3	2.6	6.0	9	3	2.6	7.8
10	1	0.9	6.9	10	5	4.3	12.1
11	2	1.7	8.6	11	3	2.6	14.7
12	3	2.6	11.2	12	2	1.7	16.4
13	3	2.6	13.8	13	6	5.2	21.6
14	20	17.2	31.0	14	14	12.1	33.6
15	14	12.1	43.1	15	10	8.6	42.2
16	10	8.6	51.7	16	12	10.3	52.6
17	12	10.3	62.1	17	6	5.2	57.8
18	9	7.8	69.8	18	4	3.4	61.2
19	4	3.4	73.3	19	5	4.3	65.5
20	3	2.6	75.9	20	3	2.6	68.1
21	28	24.1	100.0	21	37	31.9	100.0
Mean	16.4				16.4		
S.D.[a]	3.7				4.2		

[a]Standard deviation.

Data on the percentage of the total meals which were consumed at home is presented in Table 17. (The frequency distributions for the number of meals eaten at home and away from home are given in Appendix H). Thirty-five percent of the men and 55 percent of the women ate all their meals at home. Furthermore, 5 percent of the men ate more than 50 percent of their meals away from home.

Table 17. Percentage of total meals which are eaten at home by husbands and wives

Percentage of meals eaten at home	Number of husbands	% of 116	Number of wives	% of 116
100	41	35.3	64	55.2
90-99	15	12.9	28	24.1
80-89	19	16.4	12	10.3
70-79	15	12.9	8	6.9
60-69	11	9.5	3	2.6
50-59	9	7.8	1	0.9
40-49	6	5.2	0	0.0
Mean	83.6		94.1	
S.D.[a]	17.2		9.0	

[a]Standard deviation.

Number of snacks

The data presented in Table 18 give the frequency distribution for the average number of times snacks were consumed by husbands and wives per day. Five men consumed no snacks on the average. Twenty-seven men consumed 1 snack per day, 40 men consumed 2 snacks per day, and 24 men consumed 3 snacks per day. For the wives, 10 women consumed no snacks, with 32, 37, and 17 women consuming 1, 2, and 3 snacks per day, respectively. Twenty men and twenty women consumed 4 or more snacks per day, with 18 snacks per day being the largest reported snack consumption for both sexes. The men consumed an average of 2.7 snacks per day while the women consumed 2.3.

Consumption of "empty calorie" foods

The distribution of the average daily frequency of consuming "empty calorie" foods[1] is given in Table 19. The mean of 4.7 for husbands is larger than the wives' mean of 3.0. The range for husbands reveals that at least one man consumed an average of 33 "empty calorie" foods per day. The greater consumption by husbands may be due to the fact that husbands may have more accessibility to "empty calorie" foods from vending machines during coffee breaks at work than do their homemaker wives.

Variety of nutritious foods consumed

The variety of nutritious foods consumed by husbands and wives was calculated by counting the number of foods, from a list of 58, which were consumed at least once a month or oftener. The foods included in this list were those foods for which a nutrient value was calculated. Therefore, this measure included "nutritious" foods only, not "empty

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[1]The consumption of "empty calorie" foods is the average daily frequency with which 26 different food items, which serve as a source of energy but have little nutritive value, are consumed. This measure differs from the number of snacks which is an estimate of the number of times per day the individual has a snack, regardless of its nutritive content or lack thereof.

Table 18. Number of snacks consumed per day by husbands and wives

No. of snacks	Number of husbands	% of 116	Cumulative %	Number of wives	% of 116	Cumulative %
0	5	4.3	4.3	10	8.6	8.6
1	27	23.3	27.6	32	27.6	36.2
2	40	34.5	62.1	37	31.9	68.1
3	24	20.7	82.8	17	14.7	82.8
4	9	7.8	90.5	10	8.6	91.4
5	2	1.7	92.2	5	4.3	95.7
6	2	1.7	94.0	2	1.7	97.4
7	2	1.7	95.7	1	0.9	98.3
9	2	1.7	97.4	0	0.0	98.3
10	1	0.9	98.3	1	0.9	99.1
14	1	0.9	99.1	0	0.0	99.1
18	1	0.9	100.0	1	0.9	100.0
Mean	2.7			2.3		
S.D.[a]	2.5			2.2		

[a]Standard deviation.

calorie" foods.

The data in Table 20 show that the mean values of 35.2 and 35.0 for husbands and wives, respectively, were similar. Furthermore, the distributions for both sexes were also similar, although the wives may have had a slight edge over the husbands in the number of different foods consumed.

Table 19. Daily frequency of consuming "empty calorie" foods by husbands and wives

Frequency of eating "empty calorie" foods	Husbands		Wives	
	No. of husbands	% of 116	No. of wives	% of 116
< 1.0	4	3.4	11	9.5
1.0-1.9	7	6.0	27	23.3
2.0-2.9	20	17.2	24	20.7
3.0-3.9	27	23.3	25	21.6
4.0-4.9	18	15.5	19	16.4
5.0-5.9	16	13.8	2	1.7
6.0-6.9	5	4.3	4	3.4
7.0-7.9	6	5.2	2	1.7
8.0-8.9	5	4.3	1	0.9
9.0-9.9	6	5.2	0	0.0
>10.0	2	1.7	1	0.9
Mean	4.7		3.0	
Standard deviation	3.6		1.9	
Median	4.0		2.8	
Range	0.4-33.0		0.1-12.2	

Table 20. Variety of nutritious foods consumed by husbands and wives

No. of foods	Husbands		Wives	
	No. of husbands	% of 116	No. of wives	% of 116
15-20	1	0.9	1	0.9
21-25	4	3.4	4	3.4
26-30	18	15.5	14	12.1
31-35	37	31.9	37	31.9
36-40	39	33.6	45	38.8
41-45	15	12.9	14	12.1
46-50	2	1.7	1	0.9
51-55				
Mean	35.2		35.0	
S.D.[a]	5.4		5.1	
Median	35.4		35.7	

[a]Standard deviation.

Quantity of nutritious foods consumed

The quantity of nutritious foods consumed was based on the average number of servings from the four food groups (U.S.D.A., 1967) that were consumed per day. The data for this measure for both husbands and wives are presented in Table 21. In all cases, median values were less than mean values, indicating outlyers at the upper end of the quantity consumption. This was confirmed also by the figures for the ranges. Based on median data, men had more servings of each food group than did women, except for the number of servings of high vitamin C-rich foods and high vitamin A-rich foods. In the latter case, men and women had approximately the same number of servings, i.e. of high vitamin A fruits and vegetables (0.27 and 0.25, respectively). The median values for milk, meat, total vitamin C fruits and vegetables[1] and total fruits and vegetables for both men and women were equal to or above the recommended number of servings. Breads and cereals were consumed in recommended amounts by men but not by women. Furthermore, the consumption of specific vegetable groups, i.e. high vitamin A, and high and fair vitamin C-rich fruits and vegetables were below recommended amounts for both sexes. However, by combining the high and fair vitamin C-rich foods into a total vitamin C fruits and vegetables group, the recommended equivalent of one serving of vitamin C-rich foods was met, on the average.

[1]The total vitamin C fruits and vegetables group was a composite of the number of high vitamin C-rich fruits and vegetables plus one-half times the number of fair vitamin C-rich fruits and vegetables servings. It is, therefore, an indication of the equivalent number of servings of high vitamin C-rich foods consumed per day.

Table 21. Quantity of nutritious foods consumed by husbands and wives

Number of daily servings[a]	Husbands Mean	S.D.[b]	Median	Range	No. of husbands below recommendations[c]
Milk group	3.48	2.62	3.01	0.06-21.96	30
Meat group	8.70	4.98	7.58	1.00-38.42	10
Total fruits and vegetables	5.62	2.84	4.91	1.16-17.68	33
High vitamin A fruits and vegetables	0.38	0.39	0.27	0.00-2.60	81
High vitamin C fruits and vegetables	0.69	0.78	0.35	0.00-3.57	84
Fair vitamin C fruits and vegetables	1.46	1.28	1.17	0.12-9.48	92
Total vitamin C fruits[d] and vegetables	1.42	1.02	1.21	0.06-6.07	47
Other fruits and vegetables[e]	3.16	1.70	2.78	0.68-8.28	
Breads and cereals	4.93	2.84	4.59	0.08-19.54	47
Total quantity[f]	22.73				

[a]The criteria for number of daily servings were: milk group, 1 cup milk or equivalent; meat group, 1 ounce meat or equivalent; total fruits and vegetables, 1/2 cup or equivalent; high vitamin A fruits and vegetables, 1/2 cup or equivalent; high vitamin C fruits and vegetables, 1/2 cup or equivalent; fair vitamin C fruits and vegetables, 1/2 cup or equivalent; total vitamin C fruits and vegetables, 1/2 cup or equivalent; other fruits and vegetables, 1/2 cup or equivalent; breads and cereals, 1 slice bread or equivalent (see Appendix F for details).

[b]Standard deviation.

[c]The recommended number of servings per day were: milk group, 2; meat group, 4; total fruits and vegetables group, 4; high vitamin A fruits and vegetables, 0.5; high vitamin C fruits and vegetables, 1; fair vitamin C fruits and vegetables, 2; total vitamin C fruits and vegetables, 1; other fruits and vegetables, no recommendation; breads and cereals, 4.

[d]Number of daily servings of high vitamin C fruits and vegetables plus one half the number of servings of fair vitamin C fruits and vegetables.

[e]"Other fruits and vegetables" includes all fruits and vegetables not classified as high vitamin A, high vitamin C, or fair vitamin C fruits and vegetables.

[f]Total number of servings from milk group, meat group, total fruits and vegetables group, and breads and cereals group.

Wives				No. of wives below recommendations[c]	Mean value from data of Christenson (1973)
Mean	S.D.[b]	Median	Range		
2.53	1.60	2.42	0.09-7.91	51	2.35
5.35	2.52	4.79	1.43-16.96	37	4.72
4.83	2.45	4.00	0.88-12.94	58	4.78
0.39	0.50	0.25	0.00-4.07	86	0.31
0.82	0.87	0.54	0.00-5.80	78	0.74
1.06	0.66	0.95	0.14-3.29	105	1.21
1.35	0.98	1.08	0.09-6.56	54	
2.66	1.46	2.31	0.42-7.28		
3.06	1.41	2.86	0.39-8.26	87	3.50
15.77					15.35

It would appear that the fair vitamin C sources play a significant role in providing ascorbic acid in the diets of this population.[1]

For the wives, these data can be compared with data obtained by Christenson (1973) on 60 young women. Christenson found means of 2.35, 4.72, 4.78, 0.31, 0.74, 1.21, and 3.50 servings for milk, meat, total fruits and vegetables, high vitamin A, high vitamin C, fair vitamin C, and breads and cereals groups, respectively. These intakes were somewhat higher for breads and cereals and fair vitamin C groups but slightly lower for other food groups than values obtained in the present study. The total quantity, however, was similar in each survey. The small differences observed between Christenson's data and the present data may reflect real differences, seasonal differences, experimental error, or some combination of these factors.

While the means and medians generally indicated that the recommended number of servings of the various food groups were met, they really only confirmed that at least half the population was consuming at least recommended amounts. If four food groups only (milk, meat, total fruits and vegetables, and breads and cereals) are considered, the data in Table 21 reveal that from 10 to 47 husbands fell below the recommended number of servings, while 37 to 87 wives (out of 116) were below recommended

[1]The number of servings consumed per day for each of these food groups is based on average figures. Therefore, a person could consume 2 oranges for 4 days and have an average daily serving that met recommended levels, although there were 3 days a week in which the recommendations were not met. It is therefore suggested that some caution be exercised in interpretation of this data.

amounts of the various food groups.

Per person food expenditures

The per person food expenditures were based on the amount of money spent for foods per nutrition equivalent person per meal consumed at home. The distribution and mean values of per person food expenditures are given in Table 22. The mean value was 58 cents per meal per nutrition equivalent person, although the range varied from 21 cents to $1.64.

Table 22. Per person food expenditures per meal eaten at home

Food expenditures[a]	No. of families	% of 116	Cumulative %
.21-.30	5	4.3	4.3
.31-.40	15	12.9	17.2
.41-.50	25	21.6	38.8
.51-.60	25	21.6	60.3
.61-.70	16	13.8	74.1
.71-.80	16	13.8	87.9
.81-.90	8	6.9	94.8
.91-1.00	3	2.6	97.4
1.01-1.10	2	1.7	99.1
≥ 1.11	1	0.9	100.0

Mean	$0.58
Median	0.55
S.D.[b]	0.21
Range	0.21-$1.64

[a]Expressed as amount spent per nutrition unit per meal consumed at home.

[b]Standard deviation.

Fifty families (43 percent) spent between 41 and 60 cents per nutrition equivalent person per meal. On the basis of actual meals consumed per week, i.e., about 16, the cost per week per nutrition equivalent person would be $9.28. If we assumed 21 meals were eaten per week and multiply the mean cost per meal (58 cents) by 21, we would obtain a weekly per nutrition equivalent person food expenditure of $12.18 for the families in this sample. This latter amount can be compared with $8.67 obtained per person in the U.S.D.A. survey of households in the North Central Region (U.S.D.A., 1970).[1] Two reasons can be suggested for the higher expenditures in the data from the present study than in that of U.S.D.A. First, the U.S.D.A. data were collected in 1965, while the data in this study were collected in 1972. Therefore, 7 years of inflation could have affected food costs. Secondly, children in the present study were counted as 0.5 or 0.75 of a nutrition unit, and wives as 0.70 of a unit. In the U.S.D.A. survey, each resident of a household was counted as one unit. Thus, the divisor used to obtain per person food costs in the present study was smaller than that used in the U.S.D.A. study, and consequently the food expenditures per person would be larger.

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[1]The North Central Regional data was based on a 21 meal rate. The value of $8.67 was the money value of food used at home.

Nutrient intakes

The median and mean values for percentage of recommended daily allowances (RDA) for six nutrients for husbands and wives is given in Table 23. Except for the intake of iron by women, the median and mean

Table 23. Percent RDA[a] for six nutrients for husbands and wives

	Husbands				
	Mean %RDA	S.D.[b]	Median %RDA	Range %RDA	No. of husbands below 100% RDA
Protein	182	79	162	17-615	7
Calcium	166	103	142	10-849	28
Iron	183	86	162	32-583	10
Vitamin A	174	90	160	30-576	23
Thiamin	139	58	131	14-370	27
Vitamin C	204	150	164	25-1000	22[c]

	Wives				
	Mean %RDA	S.D.[b]	Median %RDA	Range %RDA	No. of wives below 100% RDA
Protein	141	54	134	47-342	27
Calcium	116	60	111	19-303	51
Iron	70	30	64	25-181	101
Vitamin A	143	84	119	16-654	35
Thiamin	128	47	122	38-302	33
Vitamin C	212	149	164	36-950	26[c]

[a]Recommended dietary allowances

[b]Standard deviation.

[c]New recommended dietary allowances will soon be published. The RDA for vitamin C will be decreased from 60 mg for men and 55 mg for women (ages 23-50) to 45 mg. If these new RDA were applied to the data from the present study, 17 husbands and 14 wives would be below 100% RDA for vitamin C.

intakes were all above 100 percent of the RDA values in this sample. Ranges for each nutrient intake, however, were large, and a significant number of individuals had intakes below the recommended allowances. Husbands in all cases had higher intakes than did wives.

Data presented in Table 24 compare nutrient intakes for protein, calcium, vitamins A and C with the number of servings from several food groups. The number of persons falling below recommended amounts by these two ways of evaluating dietary intake was similar for protein and the meat group for husbands, and for calcium and the milk group for both husbands and wives. The fact that 81 men and 86 women did not meet the recommended number of servings of vitamin A-rich foods yet only 23 men and 35 women had intakes of vitamin A less than RDA values suggests that

Table 24. Comparison between intakes of nutrients and food groups for husbands and wives

Nutrient intakes	No. of persons below 100% RDA		Food groups	No. of persons below recommended servings	
	Husbands	Wives		Husbands	Wives
Protein	7	27	Meat group	10	37
Calcium	28	51	Milk group	30	51
Vitamin A	23	35	High vitamin A fruits and vegetables	81	86
Vitamin C	22	26	Total vitamin C fruits and vegetables	47	54

vitamin A-rich fruits and vegetables play only a moderate role in supplying the vitamin A needs of individuals. A similar situation was apparent for vitamin C intake and vitamin C-rich foods. Thus, using number of servings from the four food groups to predict adequacy of nutrient intakes would seem somewhat risky. Some of the discrepancies in this sample may have been due to the role that fortified cereals and citrus-substitute beverages played in diets of the respondents.

Weight status

The distribution for percent of recommended weights for husbands and wives is given in Table 25. Both husbands and wives tended to be slightly above recommended weights, with the mean percentage being 112 and 111 percent for husbands and wives, respectively. The median value of 106 percent for wives, however, was near recommended weight levels. For husbands, 13 men were less than 95 percent of recommended weight while 19 wives were underweight. Twenty-two men and 37 wives were within the recommended weight range of 95-104%. Thus more women than men had normal to under normal weights. In the overweight category (105-124%), 62 men and 41 women were in this range. If we define obesity as greater than 25% above recommended values, 19 men and 19 women were obese. Wives were overweight to a greater extent than were husbands, with the wives' range going to 189 percent above recommended values compared with 150 percent for men.

Table 25. Frequency distribution for percentages of recommended weights for husbands and wives

% of Recommended weight	Husbands			Wives		
	No.	%	Cumulative %	No.	%	Cumulative %
75-84	1	0.9	0.9	2	1.7	1.7
85-94	12	10.3	11.2	17	14.7	16.4
95-104	22	19.0	30.2	37	31.9	48.3
105-114	38	32.8	62.9	28	24.1	72.4
115-124	24	20.7	83.6	13	11.2	83.6
125-134	12	10.3	94.0	6	5.2	88.8
135-144	5	4.3	98.3	4	3.4	92.2
145-154	2	1.7	100.0	2	1.7	94.0
155-164	0	0.0	100.0	5	4.3	98.3
$\geq$ 165	0	0.0	100.0	2	1.7	100.0
Mean	112.0			110.8		
S.D.[a]	13.6			19.9		
Median	111.8			106.2		
Range	77.4-149.7			80.8-189.2		

[a]S.D. = standard deviation.

Overall diet quality

The frequency distribution of respondents according to an assessment of overall diet quality is given in Table 26. (The scoring system for the overall diet quality is given in Table 4 in the Chapter on Methods and Procedures.) The means and medians for husbands and wives were near the upper end of the scale, although values for wives were more widely spread than those of husbands. The modal value for husbands was 7 and implies that over half the men had only one nutrient intake of their weight status classified as good (between 67 and 99% RDA or between ± 5 and ± 25% recommended weight), with all others being excellent. For

Table 26. Frequency distribution according to overall diet quality

Overall diet quality[a]	No. of Husbands	% of Husbands	No. of Wives	% of Wives
1	0	0.0	2	1.7
2	1	0.9	4	3.4
3	1	0.9	3	2.6
4	1	0.9	9	7.8
5	9	7.8	16	13.8
6	25	21.6	43	37.1
7	68	58.6	34	29.3
8	11	9.5	5	4.3
Mean	6.6		5.8	
S.D.[b]	1.0		1.4	
Median	6.8		6.0	

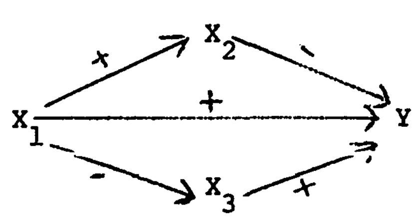
[a]See Table 4 for scoring system for obtaining overall diet quality. The overall diet quality score includes an assessment of the respondent's intake of each of six nutrients and also the respondent's weight status. The higher the score of overall diet quality, the closer recommendations for nutrient intakes and weight status are met.

[b]Standard deviation.

the wives, the modal value was in category six, thus implying that one nutrient intake or the weight status was poor (<67% RDA or >25% overweight).

Causal Models

In the discussion to follow, interpretation of the findings will be facilitated by first working through the abstract example below:



The arrows represent causal linear relationships, with the nature of the relationship indicated by the algebraic sign. As shown in this diagram, X_1 exerts indirect effects on Y via two alternative routes, with X_2 and X_3 as the intervening variables. Both indirect routes have a net negative effect on Y. Thus, the direct (partial)[1] effect of X_1 on Y is opposite in sign to the indirect effects. How, then, does the zero-order correlation coefficient between X_1 and Y compare with the β weight (path coefficient) for the direct effect of X_1 on Y ($X_1 \rightarrow Y$)? The zero-order correlation between X_1 and Y is an estimate of the overall (direct plus indirect) effects of X_1 on Y. In this example, it would be possible for the effects of the two negative indirect paths via the intermediate variables X_2 and X_3 ($X_1 \rightarrow X_2 \rightarrow Y$ and $X_1 \rightarrow X_3 \rightarrow Y$) to overshadow the direct positive effect of X_1 on Y ($X_1 \rightarrow Y$) such that the zero-order correlation could be zero or perhaps even negative. Thus, the zero-order correlation values may not seem consistent with the direct (partial) values (path coefficients or β weights), and may even be in the reverse direction. In the discussion to follow, the terms intermediate or intervening variables, direct versus indirect (causal) effects, and zero-order versus partial effects, will be frequently employed.[2]

---

[1]The partial or direct effect is the effect of the independent variable (X_1, in this case) on the dependent variable (Y), after the effects of the other independent variables (X_2 and X_3) on Y have been controlled.

[2]It is recognized that the antecedent causes and intervening variables which will be identified in the following discussion are relevant only to the particular variables in this system, and may vary when alternative models are tested. However, this qualification will not be specifically stated each time when making interpretations and conclusions about the models which were tested in this dissertation.

In discussing causal models, an understanding of the four types of relationships among variables is also relevant. Although these relationships were discussed in detail previously, they will be summarized below:

1. direct relationship: $A \rightarrow B$

2. indirect relationship: $A \rightarrow C \rightarrow B$ where $C \rightarrow$is an intervening variable between A and B.

3. a spurious relationship: $\begin{tikzcd} & A \arrow[dl] \arrow[dr] & \\ B & & C \end{tikzcd}$ where the zero-order correlation between B and C is due to a common relationship to A.

4. combinations of the above: $\begin{tikzcd} & B & \\ A \arrow[ur] \arrow[dr] & & \\ & C \arrow[dr] & \\ & & D \end{tikzcd}$

In the discussion to follow, the husbands' and wives' models will be discussed separately, and then compared. Because of the large number of variables included in the models, only selected variables will be discussed.

Husband's model

The data for the husbands' model have been presented in Tables 27 and 28.[1] Table 27 contains the significant path coefficients (β weights) which were found. The significant zero-order correlation

---

[1]The data reported in these tables and subsequent tables and figures in this dissertation were significant at least at the 0.10 level of significance. This level of significance was chosen because it was felt that in exploratory research of the type undertaken here, a lower level of significance (i.e., 0.10) would enable us to identify factors which, while only weakly significant here, may be worth purusing in later studies when improved or different measurement techniques could be used.

Table 27. Path coefficients[a] for frame-of-reference and food behavior variables of husbands

Independent variables	Dependent variables X_3	X_4	X_5	X_6	X_7	X_9	X_{13}
X_1, H. Education	.535	.290	N.S.[†]	.242	N.S.	.433	.282
X_2, Income	.148*	N.S.	.253	N.S.	-.156*	.195	N.S.
X_3, Social class		.256	.171*	N.S.	N.S.	-.174*	N.S.
X_4, H. Risk			N.T.[b]	N.T.	N.T.	.158*	N.S.
X_5, H. Mastery				N.T.	N.T.	.173*	-.160*
X_6, H. Modernism					N.T.	-.194	N.S.
X_7, H. Means						N.S.	N.S.
X_8, W. Knowledge						N.S.	N.S.
X_9, H. Knowledge							-.326
X_{10}, W. Health goals							.172*
X_{13}, H. Health goals							
X_{11}, W. Economic goals							
X_{14}, H. Economic goals							
X_{12}, W. Social goals							
X_{15}, H. Social goals							
X_{16}, W. On a diet							
X_{17}, H. On a diet							
X_{18}, W. Meals							
X_{19}, H. Meals							
X_{20}, W. Snacks							
X_{21}, H. Snacks							
X_{22}, W. "Empty calories"							
X_{23}, H. "Empty calories"							
X_{24}, W. Variety							
X_{25}, H. Variety							
X_{26}, W. Quantity							
X_{27}, H. Quantity							
X_{28}, Per person expense							

[a] Path coefficients = β weights.

[b] N.T. = not tested. That is, these relationships were not analyzed in the multiple regression procedure (see Appendix A).

[*] Significant at least at 0.10 level. Non-starred path coefficients are significant at least at the 0.05 level.

[†] N.S. = not significant at least at 0.10 level.

X_{14}	X_{15}	X_{17}	X_{19}	X_{21}	X_{23}	X_{25}	X_{27}	X_{28}	Independent Variables
N.S.	N.S.	N.S.	N.S.	.251	N.S.	N.S.	N.S.	N.S.	X_1
N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	-.169	N.S.	X_2
N.S.	.231	N.S.	N.S.	N.S.	-.179	N.S.	N.S.	N.S.	X_3
N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	X_4
N.S.	-.279	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	X_5
N.S.	N.S.	N.S.	N.S.	-.214	N.S.	N.S.	N.S.	N.S.	X_6
N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	-.146*	N.S.	N.S.	X_7
N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	X_8
N.S.	N.S.	N.S.	N.S.	-.180*	N.S.	.211	N.S.	N.S.	X_9
N.T.	N.T.	.152*	.228	-.159*	N.S.	N.S.	N.S.	N.S.	X_{10}
N.T.	N.T.	.214	N.S.	N.S.	N.S.	.189	N.S.	N.S.	X_{13}
N.S.	N.T.	N.S.	N.S.	N.S.	.210	N.S.	N.S.	N.S.	X_{11}
	N.T.	-.171*	N.S.	N.S.	.177*	-.155*	N.S.	N.S.	X_{14}
	.215	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	X_{12}
		N.S.	N.S.	-.175*	N.S.	N.S.	.167	N.S.	X_{15}
		.300	N.S.	.186	N.S.	N.S.	N.S.	N.S.	X_{16}
			-.162*	N.S.	-.153*	N.S.	N.S.	N.S.	X_{17}
			.160*	N.S.	N.S.	N.S.	.175	N.S.	X_{18}
				N.S.	N.S.	.254	N.S.	-.292	X_{19}
				.157*	N.S.	N.S.	N.S.	.173	X_{20}
					N.S.	.185	N.S.	N.S.	X_{21}
					N.S.	N.S.	N.S.	N.S.	X_{22}
						N.S.	.398	N.S.	X_{23}
						.270	N.S.	-.341	X_{24}
							N.S.	N.S.	X_{25}
							N.S.	N.S.	X_{26}
								N.S.	X_{27}
									X_{28}

Table 28. Zero-order correlation coefficients for frame-of-reference and food behavior variables of husbands

Independent variables	Dependent variables X_3	X_4	X_5	X_6	X_7	X_9	X_{13}
X_1, H. Education	.58	.44	.23	.24	N.S.[†]	.46	N.S.
X_2, Income	.32	.22	.31	.16*	-.16*	.34	N.S.
X_3, Social class	1.00	.42	.25	.18*	N.S.	.22	N.S.
X_4, H. Risk		1.00	N.T.[a]	N.T.	N.T.	.32	N.S.
X_5, H. Mastery			1.00	N.T.	N.T.	.23	-.14*
X_6, H. Modernism				1.00	N.T.	N.S.	N.S.
X_7, H. Means					1.00	N.S.	N.S.
X_8, W. Knowledge						.18*	N.S.
X_9, H. Knowledge						1.00	-.24
X_{10}, W. Health goals							.17*
X_{13}, H. Health goals							1.00
X_{11}, W. Economic goals							
X_{14}, H. Economic goals							
X_{12}, W. Social goals							
X_{15}, H. Social goals							
X_{16}, W. On a diet							
X_{17}, H. On a diet							
X_{18}, W. Meals							
X_{19}, H. Meals							
X_{20}, W. Snacks							
X_{21}, H. Snacks							
X_{22}, W. "Empty calories"							
X_{23}, H. "Empty calories"							
X_{24}, W. Variety							
X_{25}, H. Variety							
X_{26}, W. Quantity							
X_{27}, H. Quantity							
X_{28}, Per person expense							

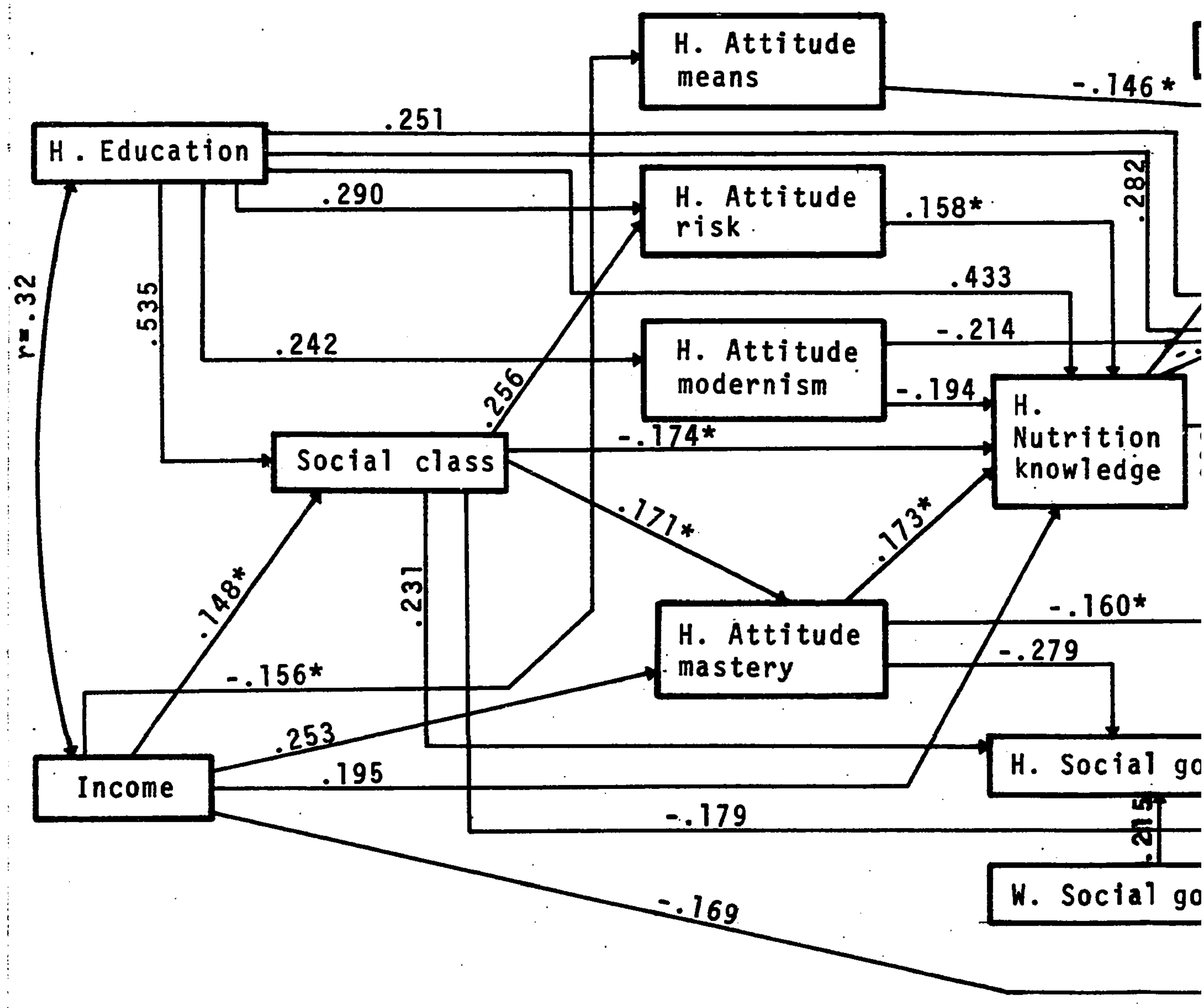
[a]N.T. = not tested in the multiple regression procedure for the causal models (see Appendix A).

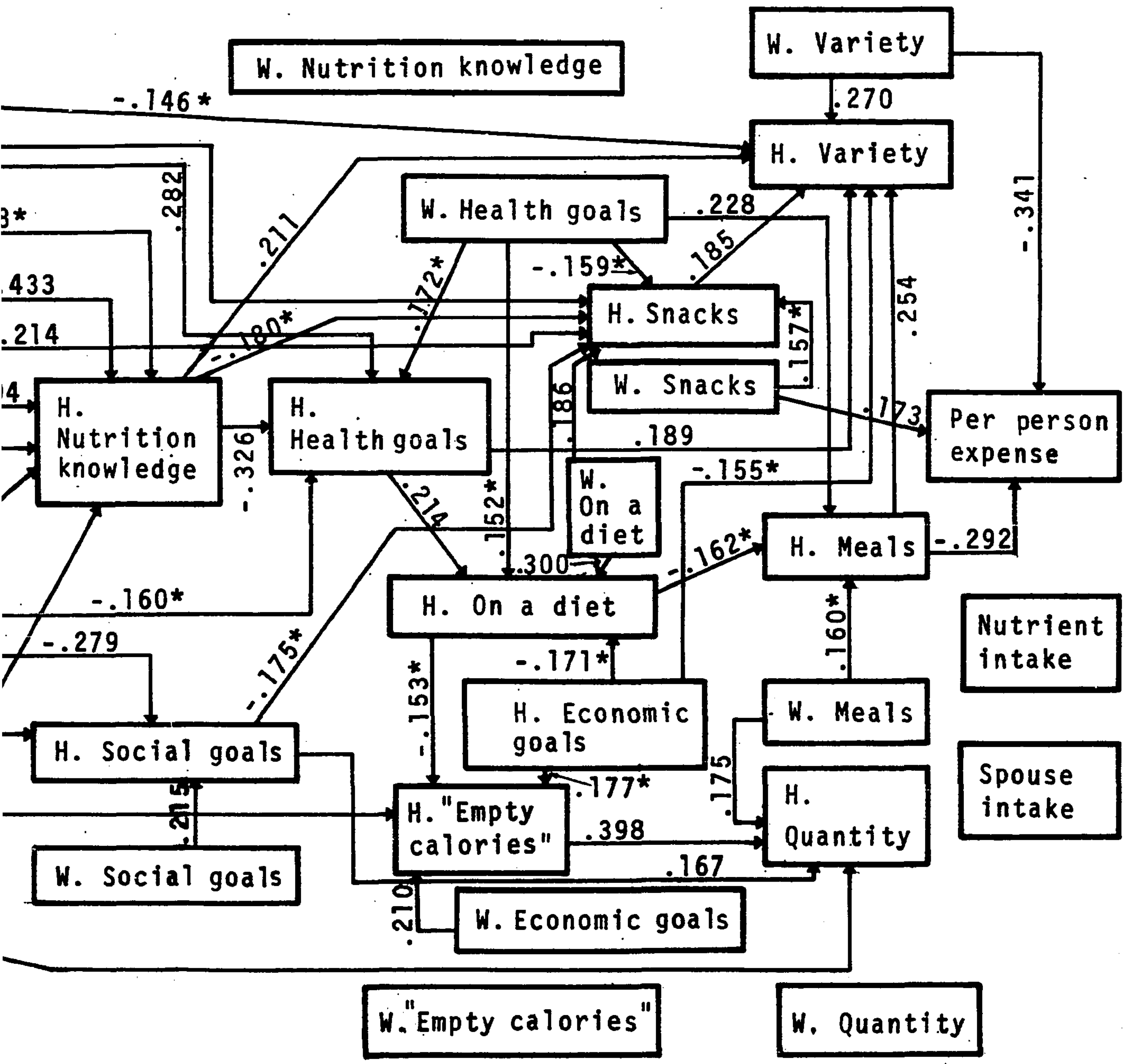
*Significant at least at 0.10 level. Non-starred path coefficients are significant at least at the 0.05 level.

[†]N.S. = not significant at least at 0.10 level.

X_{14}	X_{15}	X_{17}	X_{19}	X_{21}	X_{23}	X_{25}	X_{27}	X_{28}	Independent variables
N.S.	N.S.	.15*	N.S.	N.S.	-.13*	.25	N.S.	N.S.	X_1
N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	.20	-.16*	N.S.	X_2
N.S.	N.S.	N.S.	N.S.	N.S.	-.16*	.23	N.S.	-.15*	X_3
N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	.22	N.S.	N.S.	X_4
N.S.	-.20	N.S.	.15*	N.S.	N.S.	N.S.	N.S.	N.S.	X_5
N.S.	N.S.	N.S.	N.S.	-.14*	N.S.	N.S.	N.S.	N.S.	X_6
N.S.	.13*	.13*	-.15*	.15*	N.S.	-.18*	N.S.	N.S.	X_7
N.S.	N.S.	N.S.	.18*	N.S.	-.14*	.32	N.S.	-.21	X_8
N.S.	-.16*	N.S.	.13*	N.S.	-.14*	.30	-.16*	N.S.	X_9
N.T.	N.T.	.20	.21	-.15*	N.S.	.13*	N.S.	-.21	X_{10}
N.T.	N.T.	.17*	N.S.	-.14*	N.S.	N.S.	.14*	-.14*	X_{13}
N.S.	N.T.	.16*	N.S.	N.S.	.17*	N.S.	N.S.	N.S.	X_{11}
1.00	N.T.	N.S.	N.S.	N.S.	.19	-.15*	N.S.	N.S.	X_{14}
	.20	.15*	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	X_{12}
	1.00	N.S.	N.S.	-.13*	N.S.	N.S.	.15*	-.15*	X_{15}
		.30	N.S.	.16*	N.S.	N.S.	N.S.	N.S.	X_{16}
		1.00	-.13*	N.S.	-.15*	N.S.	N.S.	N.S.	X_{17}
			.19	N.S.	-.13*	.16*	N.S.	-.27	X_{18}
			1.00	N.S.	N.S.	.32	N.S.	-.32	X_{19}
				.17*	N.S.	N.S.	N.S.	.17*	X_{20}
				1.00	N.S.	.15*	N.S.	N.S.	X_{21}
					N.S.	N.S.	N.S.	N.S.	X_{22}
					1.00	N.S.	.39	N.S.	X_{23}
						.36	N.S.	-.35	X_{24}
						1.00	N.S.	-.26	X_{25}
							N.S.	N.S.	X_{26}
							1.00	N.S.	X_{27}
								1.00	X_{28}

Figure 4. Husbands' model


H. Attitude means
-.146*
H. Education
.251
.282
.290
H. Attitude risk
.158*
r=.32
.535
.433
.242
H. Attitude modernism
-.214
-.194
.256
H. Nutrition knowledge
Social class
-.174*
.171*
.173*
.148*
.231
-.160*
H. Attitude mastery
-.279
-.156*
.253
H. Social go
Income
.195
-.179
.215
W. Social go
-.169


W. Nutrition knowledge
W. Variety
H. Variety
W. Health goals
H. Snacks
W. Snacks
H. Nutrition knowledge
H. Health goals
Per person expense
W. On a diet
H. On a diet
H. Meals
Nutrient intake
H. Economic goals
W. Meals
H. Social goals
H. "Empty calories"
H. Quantity
Spouse intake
W. Social goals
W. Economic goals
W. "Empty calories"
W. Quantity
-.146*
.270
.282
.211
.228
.185
-.159*
.172*
-.341
.433
.254
.214
-.180*
.157*
.186
.173
.189
-.326
-.155*
.214
.152*
.300
-.162*
-.292
-.160*
-.279
-.175*
-.171*
.160*
-.153*
.175
.177*
.215
.398
.167
.210

coefficients for these same variables are presented in Table 28. The diagram of the husband's model, with the significant path coefficients, is given in Figure 4. This model includes only the frame-of-reference and food behavior variables but does not include variables which were considered consequences of food behavior, i.e. the nutrient intakes and weight status. These latter variables will be discussed later.

Nutrition knowledge of husbands Six variables (husbands' educational level; husbands' value-attitude orientations toward modernism, risk, and mastery; social class; and family income) were observed to produce direct effects on the husbands' nutrition knowledge (Figure 4a).[1] The husbands' educational level was hypothesized to produce a

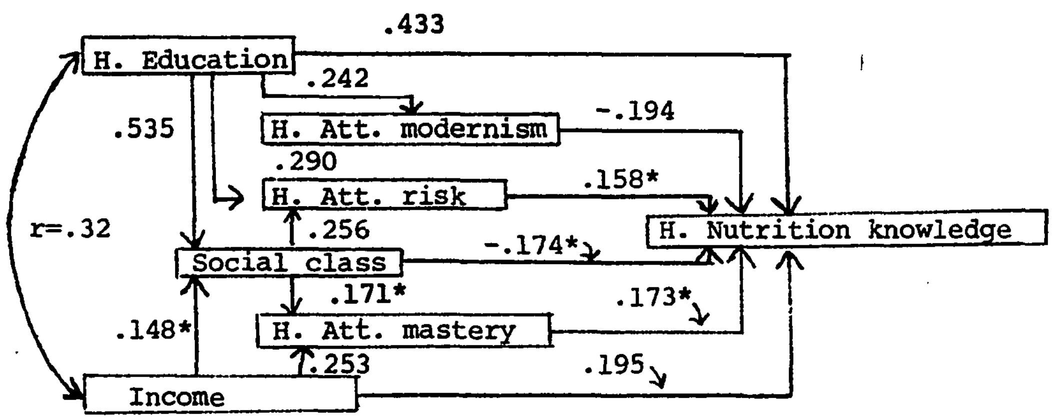


Figure 4a. Nutrition knowledge of husbands

[1]Throughout the discussion of the husbands' model, small sections of the model presented in Figure 4 will be derived to facilitate discussion of the results of the husbands' model. However, it should be recognized that only selected relationships have been diagrammed in the derived models and a more thorough understanding of the relationships among variables, especially indirect relationships, can be obtained from Figure 4.

positive change in the husbands' nutrition knowledge. This hypothesis was strongly supported by a path coefficient of 0.433.

The hypothesized positive effects of the mastery and risk orientations on nutrition knowledge were only weakly supported (Figure 4a). No support was found for the hypothesized negative influence of means orientation on the nutrition knowledge of husbands. Since the means orientation scale had a low reliability (0.44), this may be the reason for the insignificant results. Also, the means orientation had lower saliency than the modernism and mastery orientations, and may not have been important enough to the husbands to cause a significant relationship with nutrition knowledge.

The orientation towards modernism was the only value-attitude orientation exerting a direct effect on the husbands' knowledge of nutrition that was significant at the 0.05 level (Figure 4a). However, the direction of this relationship was negative, and thus was opposite in sign to that hypothesized ($\beta = -0.194$). The value-attitude orientation toward modernism contains a subdimension intended to measure the individual's scientific orientation, and his favorableness toward using scientific findings as criteria for selection of goals and means among alternative courses of action. Furthermore, the modernism orientation was pointed out previously as being an orientation that was salient to the respondents in this sample when compared with the other three value-attitude orientations (Table 9). As described in the chapter on theoretical background, value-attitude orientations are concerned with what people think, feel, and how they would like to behave toward an object, i.e. nutrition knowledge in this case. However, the implementation of these value-attitudes are thought to change with different social roles (Warland, 1966). Perhaps husbands in this sample do not see acquisition of nutrition knowledge as important to their masculine role even though they have a high orientation towards modernism. Or it may be that husbands do not see nutrition knowledge as scientific.

The effects of social class and income were not hypothesized to have a direct causative effect on nutrition knowledge, but were expected to exert indirect positive effects on knowledge of nutrition via the value-attitude orientations. As shown in Figure 4a, partial support for this hypothesis was obtained. Indirect positive effects of social class on nutrition knowledge via the intervening variables of husbands' risk and mastery value-attitudes, and indirect positive effects of income via mastery orientation were observed. However, in addition to these expected positive indirect effects, income also exerted an indirect negative effect via social class. Furthermore, direct effects (in addition to the indirect effects) for both social class and income on nutrition knowledge were also observed (β = -0.174 and 0.195, respectively). As shown in Figure 4a, the direct effect on income was positive, and the direct effect of social class was negative. The effects of income and social class on husbands' knowledge of nutrition are excellent examples of the fact that indirect and direct effects can vary in their direction of influence. The direct effects of social class on husbands' nutrition knowledge were opposite in direction to the indirect effects. For the effect of income on husbands' nutrition knowledge, the direct and one indirect effect were positive, while another indirect effect was negative.

The positive direct and negative indirect effects of social class on husbands' nutrition knowledge can also serve as an example to show how zero-order correlations (total effects) relate to path coefficients (direct or partial effects). As shown in Table 28, the zero-order correlation coefficient between social class and husbands' nutrition knowledge was +0.22. When this value is compared with the negative path coefficient ($\beta = -0.174$), it is apparent that the two indirect positive paths have overshadowed the direct negative effect of social class to give a positive zero-order correlation. However, when the effects of education, income, social class, risk and mastery orientations were controlled, the direct (or partial effect) of social class on nutrition knowledge was negative (Figure 4a).

This direct negative relationship of social class on nutrition knowledge is difficult to understand. Perhaps husbands in lower social classes may not have much power or authority in their occupations, and therefore, see the home as an area where they can exercise their influence. In this case, knowledge of nutrition becomes a useful tool for them.

The wives' knowledge of nutrition was also hypothesized to affect the husbands' nutrition knowledge but this relationship was not supported by the path analysis, although the nutrition knowledge of husbands and wives was correlated (r=.18, Table 28). Evidently this correlation was spurious, as diagrammed below:

$$\begin{tikzcd}
\text{H. Education} \arrow[r, "+"] \arrow[d, bend right, leftrightarrow, "r=.57"'] & \text{H. Knowledge nutrition} \\
\text{W. Education} \arrow[r, "+"] & \text{W. Knowledge nutrition}
\end{tikzcd}$$

As this diagram shows, husbands and wives educational levels were correlated with a magnitude of 0.57. The educational level of each spouse had a strong path coefficient leading to his or her own knowledge of nutrition. However, when the effect of educational level on nutrition knowledge was controlled, and the pathway from wives' nutrition knowledge to husbands' knowledge was tested, no relationship was found. Thus the correlation between husbands' and wives' nutrition knowledge was spurious in the causal sense and was due to the antecedent covariance between educational levels.

<u>Husbands' health goals</u> Goals were described earlier as motivators of behavior because they are chosen by individuals as a means of satisfying or attaining some basic personal need. Social, economic, and health goal orientations were compared with an anchor goal in order to obtain an estimate of the relative importance of health goals compared to social and economic goals for this population. As discussed previously, husbands, as a group, rated health goals lower in importance than social or economic goals.

The variables which were observed to have direct effects on the husbands' health goals were the following: husbands' education, husbands' value-attitude towards mastery, husbands' nutrition knowledge, and wives' health goals (see Figure 4b).

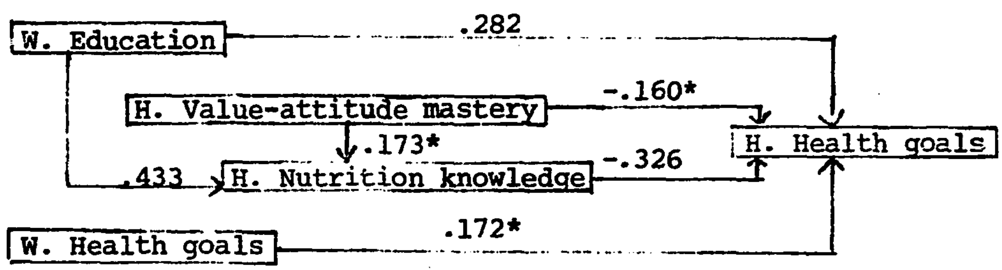


Figure 4b. Husbands' health goals

Increases in (total) family income, and husbands' value-attitudes toward risk and modernism were hypothesized to produce a positive change in the importance of their health goals. For husbands, the linkage between means orientation and importance of the health goals was hypothesized to be negative. None of these hypotheses were supported (Figure 4b).

The husbands' orientation toward mastery was expected to affect the importance of the health goals positively. While the husbands' orientation towards mastery did produce a change in the importance of their health goals (at the 0.10 level of significance), the effect was negative, rather than positive (β = -.160)

The husbands' knowledge of nutrition was hypothesized to produce a positive change in the importance husbands placed on health goals. Instead, as shown in Figure 4b, a strong negative effect was produced (β = -0.326). This relationship, from an intervention point of view, was discouraging. However, one characteristic of goals is that once they are attained, they may not maintain a high level of importance to the individual (Krech et al., 1962). One possible explanation for the negative effect of nutrition knowledge on the husbands' health goals could be that the husbands believed they had already applied their knowledge of nutrition to eating behavior, and thus had achieved their goal of good health. Time and energy can thus be spent to pursue other as yet unattained goals. Several alternative explanations may be operating. As discussed in the second chapter, the choosing of goals is influenced by reference groups and cultural norms. Individuals also choose goals that they perceive will enhance their self-concept or help them to meet other basic needs. For males in this age group, giving priority to health goals may not receive much support from their reference groups. Also, health goals may not have been perceived as being consistent with roles occupied by males. Or, husbands who had high nutrition knowledge may not have placed a high value on health goals because they did not perceive health goals as a means of enhancing their self-esteem, or meeting their power, status, or self-actualization needs, etc. The weak negative effect of the husbands' orientation toward mastery would support the idea that husbands' did not view health as a goal by which they could implement their value for mastery over their environment.

No direct effect of educational level on health goals was hypothesized because it was anticipated that educational level would exert an indirect effect via the value-attitude orientations and the husbands' knowledge of nutrition. However, as shown in Figure 4b, in addition to the observed indirect effect of education on health goals, a positive direct effect of education on husbands' health goals was also found (β = 0.282). This may be interpreted to mean that educated husbands place health goals high in their hierarchy of goals, regardless of the level of their nutrition knowledge.

<u>Husbands on a weight reduction diet</u> The variables of wives' health goals, husbands' health goals, wives on a weight reduction diet, and husbands' economic goals were observed to have direct effects on husbands being on a weight reduction diet (see Figure 4c).

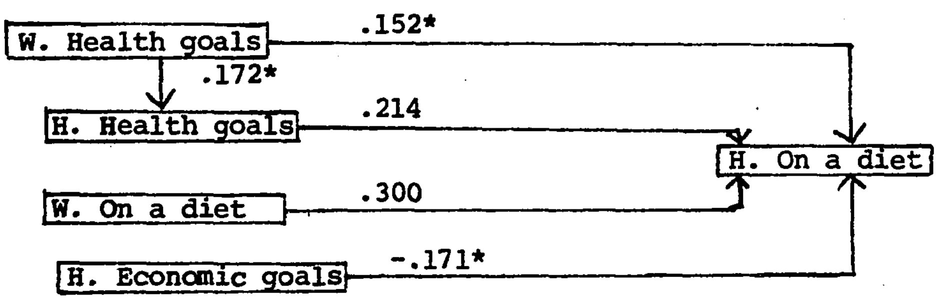


Figure 4c. Husbands on a weight reduction diet

While the data show that the husbands' health goals produced a positive influence on the weight reduction variable, the husbands' social goals, not their health goals, were originally hypothesized to cause husbands to diet. Since the assumption had been made that a high importance on health goals implied a lower hierarchical position for social and economic goals, logically social and health goals both would not cause the husband to be on a weight reduction diet. The weak negative effect of the husbands' economic goals on the weight reduction variable, an effect opposite in direction to that of the health goals, was consistent with this assumption. The negative effect of economic goals implied a low ranking for health goals in the individual's hierarchy of goals. The relationship of the husbands' health goals to the weight reduction variable may be due partly to one of the items in the health goal orientation scale, "maintain or achieve a desirable weight". Although there were other items in the health goal scale, the similarity of this one item to the dependent variable suggests that the observed relationship has been partially built into the statement of goals.

As shown in Figure 4c, the wives' health goals influenced the husbands' weight reduction variable both indirectly via the husbands' health goals and directly.

The strong path coefficient ($\beta = 0.300$) between the wives being on a weight reduction diet and the husbands being on a weight reduction diet appears to confirm the hypothesis that overweight was a family problem.

<u>Number of meals consumed by husbands</u> Three variables (wives' health goals, husbands on a diet, and number of meals consumed by wives produced direct effects on the number of meals consumed by husbands (Figure 4d).

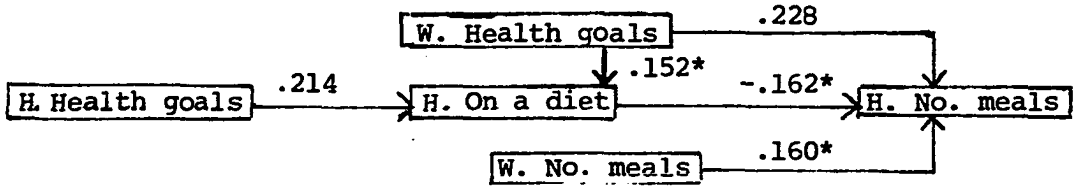


Figure 4d. Number of meals consumed by husbands

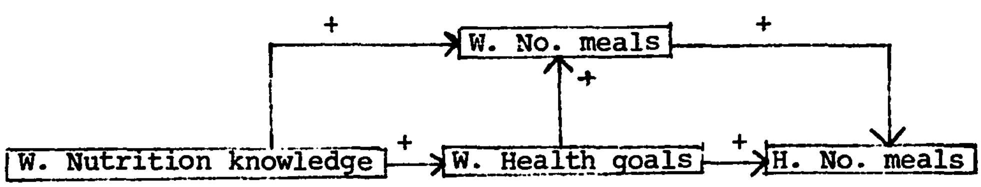
Although the husbands' health goals were hypothesized to affect the number of meals they consumed, the data did not support this hypothesis (Figure 4d). The only observed effect of the husbands' health goals was an indirect negative one via the intervening variable of the husbands being on a weight reduction diet.

While the husbands' health goals did not directly affect the number of meals they ate, the wives' health goals did have a strong positive direct effect on the number of meals consumed by husbands (β = 0.228, Figure 4d). In fact, the wives' health goals were the strongest single factor influencing the number of meals consumed by husbands. Apparently wives who felt that health was important made an effort to prepare meals regularly for their husbands. In addition to the direct positive effect of wives' health goals on the number of meals consumed by husbands, wives' health goals also exerted an indirect negative effect via the intervening variable of the husbands being on a weight reduction diet (Figure 4d).

The data in Figure 4d confirmed the assumed negative relationship between husbands' weight reduction variable and the number of meals consumed. However, because only 17 men were on a weight reduction diet at the time of the survey, the relationship was significant only at the 0.10 level.

The hypothesized positive effect of the number of meals consumed by wives on the number of meals consumed by husbands was supported at the 0.10 level of significance. The importance of this relationship was weakened perhaps by the fact that 60% of the husbands (Table 17) ate at least one or more meals away from home per week.

The data presented in Table 28 show a significant zero-order correlation between wives' knowledge of nutrition and the number of meals consumed by husbands (r=.18). However, wives' nutrition knowledge was not related directly to the number of meals eaten by husbands when the partial regression coefficients were examined (Figure 4d). As diagrammed below, the zero-order correlation between wives' nutrition knowledge and the number of meals consumed by husbands was apparently due to three indirect effects; one via the wives' health goals, another from the wives' health goals to the number of meals consumed by wives and then to the number of meals consumed by husbands, and third via the number of meals consumed by wives. (These relationships will be discussed more fully in the next section dealing with the wives' model).



Thus, this model shows that the wives' nutrition knowledge correlated positively with husbands' meals, but actually exerted its effect indirectly via wives' health goals and the number of meals consumed by wives. That is, when the effect of the wives' health goals and the number of meals consumed by the wives were controlled, wives' nutrition knowledge was not related to the number of meals consumed by husbands. Therefore, the wives' knowledge of nutrition did not influence the number of meals husbands ate unless wives also placed a high value on health goals and/or wives' number of meals were a result of nutrition knowledge.

Number of snacks consumed by husbands Seven variables produced direct effects on the number of snacks consumed by husbands. As shown in Figure 4e, these 7 variables were: wives' snacks, husbands' education, husbands' orientation toward modernism, husbands' nutrition knowledge, wives' health goals, husbands' social goals, and wives' on a weight reduction diet.

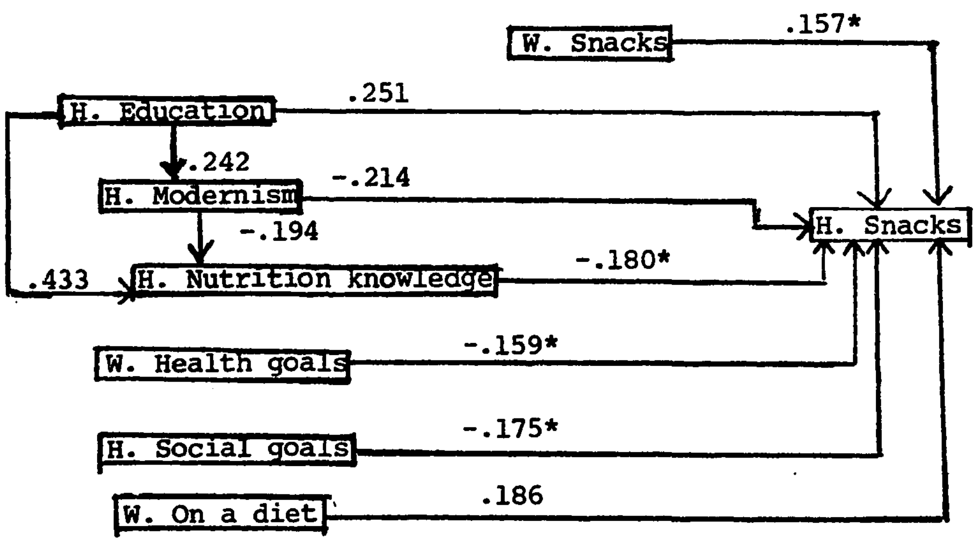


Figure 4e. Number of snacks consumed by husbands

The observed strong positive effect of husbands' educational level on their snack consumption ($\beta = 0.251$) was not hypothesized. An explanation for this relationship is difficult. Perhaps husbands with more years of education were in occupations where snack foods were available for coffee-breaks; or perhaps it was popular for several men to have coffee together in the morning and afternoon at a coffee shop or restaurant where snack foods were available; or, perhaps their occupations were stress-producing, so they consumed snacks to relieve tension. Whatever the reason, it is obvious that education itself cannot increase snack consumption. Presumably there is an intervening, unidentified variable(s) which would enable us to understand this relationship better.

As shown in Figure 4e, in addition to its direct positive effect on snack consumption, the husbands' educational level produced a negative effect via two indirect loops: one loop involved the intervening variable of husbands' nutrition knowledge, and the other loop had husbands' value-attitude towards modernism as an intervening variable. The negative indirect effects and the positive direct effect of husbands' educational level on their snack consumption as analyzed in the causal model, probably cancelled each other and accounted for the lack of a significant zero-order correlation between husbands' educational level and their snack consumption (Table 28).

The husbands' value-attitude orientation toward modernism produced a direct negative effect on husbands' snack consumption ($\beta = -0.214$), although an indirect positive effect occurred via the intervening variable of nutrition knowledge (Figure 4e).[1] The modernism orientation contains a subcomponent that implies that individuals should use scientific information in behavior. Perhaps when the effects of nutrition knowledge and education were controlled, the individual with an orientation towards modernism used his scientific orientations as a rationale to reduce snack intake.

Another possible explanation of the negative effect of value-attitudes toward modernism on snack consumption could be that husbands with more modern orientations were more concerned about weight control. However, no relationship between the modernism orientation and husbands being on a diet, or their health goals (which contained an item about weight maintenance) was found (Figure 4). Therefore, this interpretation does not seem likely.

As shown in Figure 4e, if wives were on a weight reduction diet, a positive change was produced in husbands' snack consumption (β = 0.186). Possibly, if a husband's food intake suffers because his wife is on a diet, he compensates by increasing his snack consumption. A weak negative effect of wives' health goals on husbands' snack consumption was also observed (β = -0.159).

Two variables, husband being on a weight reduction diet and the number of meals eaten by husbands, were hypothesized to produce a negative

[1]The path coefficient from husbands' modernism orientation to nutrition knowledge is negative. The path coefficient from husbands' nutrition knowledge to husbands' snacks is also negative. The net effect of two negative pathways is positive.

change in husbands' snack consumption. Neither of these hypotheses were confirmed (Figure 4e). The positive effect of wives' snack consumption was supported as hypothesized, but only at the 0.10 level of significance ($\beta = 0.157$). Husbands' social goals also were expected to increase the number of snacks they consumed. A relationship between these 2 variables was weakly supported, but in the opposite direction to that proposed. That is, husbands' social goals produced a negative change in the snack consumption of husbands ($\beta = -0.175$). This effect differed from that reported by Hinton (1962) who found that 12- to 14-year old girls who placed a high value on sociability when selecting food also consumed increased numbers of snacks. Perhaps the difference in findings between the data of Hinton and the data on the husbands in this sample was due to a difference in populations; or it may have been due to the fact that Hinton measured sociability specifically in relation to food selection. In the present study, social goals were measured in a general way, and compared to other goal orientations, but they were not tied directly to food selection or consumption.

<u>Husbands' "empty calorie" consumption</u>[1] Four variables (husbands' economic goals, husbands on a diet, social class, and wives' economic goals) were observed to produce direct effects on the husbands' "empty calorie" consumption (Figure 4f).

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[1]Some confusion may be generated by the discussions of snack and "empty calorie" consumptions. The reader is reminded that snack consumption refers to the number of times per day a person eats or drinks a snack, regardless of what it is that he eats or drinks (except coffee or tea). The "empty calorie" consumption refers to the average number of times per day the respondent consumes specific foods such as candy and potato chips, which contribute little except food energy value.

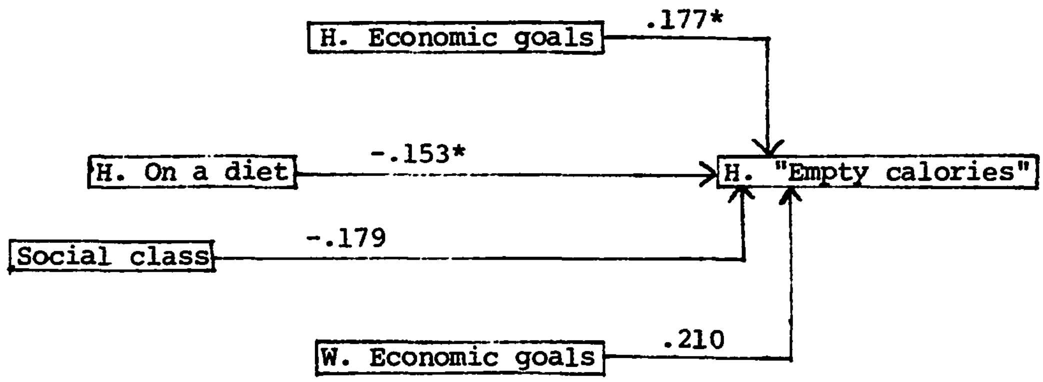

Figure 4f. Husbands' "empty calorie" consumption

If husbands were on a weight reduction diet, they decreased their "empty calorie" consumption ($\beta = -0.153$) (Figure 4f). It was expected that the husbands' dieting behavior would affect their "empty calorie" consumption negatively, but in an indirect manner via snack consumption, rather than directly as indicated here. However, snack consumption did not cause a change in "empty calorie" consumption. Therefore, dieting behavior exerted its effect directly on usage of "empty calorie" foods.

Although not hypothesized, social class exerted a direct negative effect on the husbands' "empty calorie" consumption ($\beta = -0.179$) (Figure 4f). This evidence suggested that at higher social class levels, husbands may have been more concerned with weight control. Alternatively, husbands in low social classes and in lower status occupations may have had a higher energy requirement and may have partially met the requirement by consuming "empty calorie" foods. It was possible that husbands in lower social classes were heavier users of sugar in coffee than were husbands in higher status occupations. Regardless of the way in which social class exerted its direct effect on "empty calorie" consumption, it would seem that the effect of social class on the husbands' "empty calorie" consumption was probably exerted via some unidentified and unmeasured variable(s).

The strong positive effect of wives' economic goals on husbands' "empty calorie" consumption ($\beta = 0.210$) may have reflected the fact that when wives' economic goals were high, their health goals tended to be low (Figure 4f). Thus, they may not have enjoyed cooking and meal preparation, with the result being a greater use of foods which were included in the "empty calorie" composite score. Similarly the influence of husbands' economic goals ($\beta = 0.177$) may have reflected the lower importance of their health goals relative to their economic goals, and consequently less concern with avoiding "empty calorie" foods.

The number of snacks consumed by husbands and the wives' "empty calorie" consumption were expected to increase "empty calories" consumed by husbands. Neither of these hypotheses were supported (Figure 4f). Evidently the snacks consumed by the husbands consisted of a number of "nutritious" foods in addition to or instead of "empty calorie" foods. This interpretation would be consistent with the findings of Thomas and Call (1973) that the snacks of teen-agers contributed significantly to their total nutrient intakes. An alternative explanation could be that the effects of the "empty calories" variable may be confused by the items which were included in the measure. In the chapter on Methods and Procedures, foods which supplied mainly calories but little other nutritive value were listed. This list included jams, jellies, and sugar in addition to potato chips, pop, and pastries, etc. Because sugar, jams and jellies would often be heavily consumed for breakfast, these food items obviously would not be related to snack consumption. Furthermore, the respondent, when asked how many snacks were usually consumed was told to exclude coffee and tea. Because the frequency of using sugar (in any form, including in tea or coffee) was counted in the "empty calorie" score, but coffee and tea were excluded from the counting of the number of snacks consumed per day, husbands using sugar in their coffee would have an increase in their "empty calorie" score without a concommitant increase in their snack consumption score.

Variety of nutritious foods consumed by husbands From a nutrition education viewpoint, consuming a variety of foods has often been recommended as one means of attaining adequate nutritional intake. Variety, therefore, appeared to be an important variable to be considered in a causal model of food behavior. The diagram in Figure 4g shows that 7 variables had significant path coefficients leading directly to the variety of nutritious foods consumed by husbands.

The variety of nutritious foods consumed by wives was hypothesized to affect positively the variety of foods consumed by husbands. As shown in Figure 4g, the data supported this hypothesis. Wives' variety was found to be the most important single variable affecting husbands' variety, with a β weight of 0.270.

The hypothesized direct negative influence of husbands' social goals on the variety of nutritious foods consumed was not supported by the

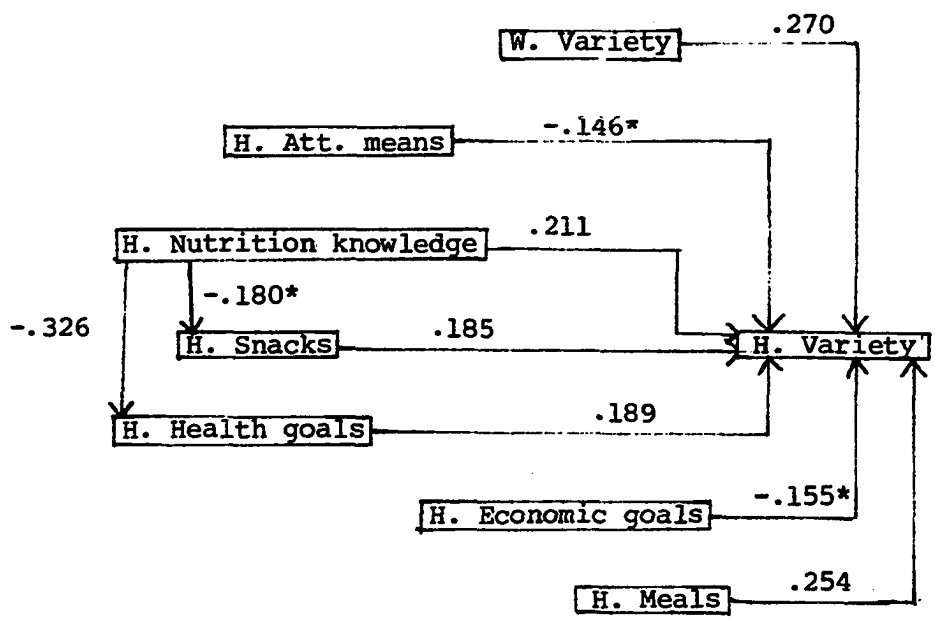

Figure 4g. Variety of nutritious foods consumed by husbands

data (Figure 4g). However, as shown in Figure 4, the social goals exerted an indirect negative effect via the intervening variables of husbands' snacks:

$\boxed{\text{H. Social goals}} \xrightarrow{-.175^*} \boxed{\text{H. Snacks}} \xrightarrow{.185} \boxed{\text{H. Variety}}$

Thus the hypothesized effect of social goals was supported, but the effect was indirect rather than direct as expected.

The hypothesized negative relationship of husbands' economic goals and the positive relationship of husbands' health goals to variety of nutritious foods consumed were supported by the data (β = -0.155 and 0.189, respectively) (Figure 4g). The negative influence of husbands' economic goals probably reflected the low importance of health goals when economic goals were important.

As shown in Figure 4g, husbands' nutrition knowledge exerted a direct positive effect on their variety of nutritious foods eaten ($\beta = 0.211$). In fact, their nutrition knowledge was the second most important factor affecting the number of different foods consumed by husbands. In addition to the observed direct effect of nutrition knowledge on husbands' variety, two indirect effects were found; one from husbands' nutrition knowledge through their health goals to their variety of nutritious foods consumed, and the other from nutrition knowledge to the number of snacks consumed to the variety of nutritious foods consumed. However, these indirect effects, as diagrammed in Figure 4g, were negative rather than positive. Thus the direct effect was opposite in sign to the indirect effects. These opposing relationships could have implications for an intervention program.

As discussed above, both the husbands' nutrition knowledge and their health goals had direct effects on the variety of nutritious foods they consumed. It was originally hypothesized that the only effect of nutrition knowledge on the variety of nutritious foods consumed by husbands would be an indirect effect via the husbands' health goals. However, the direct positive effects of both nutrition knowledge and health goals demonstrated that these two factors can operate independently for husbands. That is, husbands can place a high value on health without nutrition knowledge. Conversely, nutrition knowledge can affect husbands' food behavior, even though they may place another goal higher than health.

It was proposed that the value-attitude orientations would directly affect the variety of nutritious foods consumed by husbands. The risk orientation, especially, was expected to produce a positive change in the variety of nutritious foods consumed by husbands by enhancing their willingness to try new foods. This relationship was not supported by path analysis (Figure 4g), although a zero-order correlation coefficient of 0.22 was observed between husbands' attitude toward risk and the variety of foods consumed (Table 28). This correlation appears to be due to an indirect effect through an intervening variable of nutrition knowledge, rather than to a direct effect (Figure 4). One possible explanation for the lack of direct relationship between husbands' risk orientation and variety of nutritious foods consumed may be that the items in the risk orientation scale tended to be concerned with risk in regard to financial matters. Perhaps an orientation towards risk in financial areas does not carry over to food behavior. Also, this scale had a fairly low reliability (r_{tt} = 0.54), thus making it more difficult to obtain significant relationships. Furthermore, the scores on the risk orientation scale for husbands indicated that this orientation had the lowest saliency of the 4 value-attitude scales tested (see Table 9). Thus, risk orientation may not have been important enough to husbands in this sample to influence their behavior.

A negative influence for husbands' means orientation on the husbands' variety was hypothesized. The items in the means orientation scale emphasized independence and the necessity of doing things youself if they are to be done right. It was assumed that the more independent a person was, the less likely he would be to try new foods. That is, this orientation was associated with a meat, bread and potatoes person.

This hypothesis was supported at the 0.10 level of significance (β = -0.146) (Figure 4g). The low significance level of the relationship may be due to the low reliability of the means orientation scale (r_{tt} = 0.44).

As expected, the number of meals consumed by husbands exerted a positive effect on the variety of foods consumed by husbands (β = 0.254) (Figure 4g). The number of snacks consumed by husbands, although not hypothesized, also had a positive effect on their variety of nutritious foods (β = 0.185). The variety score included only those foods for which nutritive values were calculated. The list of foods in the composite variety score included, among other foods, fruit-flavored beverages, ice cream, nuts, crackers, pizza, fruits, and doughnuts. All these foods could have been used as snack items. Thus, foods chosen as snacks by husbands contributed to their nutrient intakes.

Although significant path coefficients were not obtained for the influence of husbands' education, family income, social class and wives' knowledge of nutrition on the variety of nutritious foods consumed by husbands (Figure 4g), significant zero-order correlation coefficients between these measures and husbands' variety were obtained (r=0.25, 0.20, 0.23, and 0.32, respectively) (Table 28). The model in Figure 4 diagrams the pathways for which the relationships with variety of foods were operative. Educational level exerted indirect positive effects via a loop containing husbands' snacks and via another loop containing the nutrition knowledge of husbands. Income exerted indirect positive effects via nutrition knowledge and husbands' attitude toward mastery.

The net indirect effect of social class was also positive via the loop passing through nutrition knowledge and husbands' snacks.[1] The zero-order correlation between wives' nutrition knowledge and husbands' variety of nutritious foods consumed was probably due to an indirect effect of wives' nutrition knowledge on husbands' variety via the intervening variable of wives' variety of nutritious foods consumed:

$$\boxed{\text{W. Nutrition knowledge}} \xrightarrow{+} \boxed{\text{W. Variety}} \xrightarrow{+} \boxed{\text{H. Variety}}$$

(This effect of wives' nutrition knowledge on wives' variety will be more fully discussed later in the section on the wives' model).

Quantity of nutritious foods consumed by husbands   The number of standard-sized servings of foods from the four food groups plan (U.S.D.A., 1967) was calculated and constituted the variable labeled quantity of nutritious foods eaten.

Three variables were expected to affect the quantity of foods consumed by husbands. The first variable was the quantity of foods consumed by wives; this variable, as shown in Figure 4h, did not affect husbands' quantity of nutritious foods consumed. Therefore, the hypothesis was not supported.

Secondly, the number of meals consumed by husbands was expected to produce a positive effect on the amount of nutritious foods they consumed. This hypothesis also was not supported by the data (Figure 4h).

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[1] Two negative path coefficients in an indirect loop have a net positive effect.

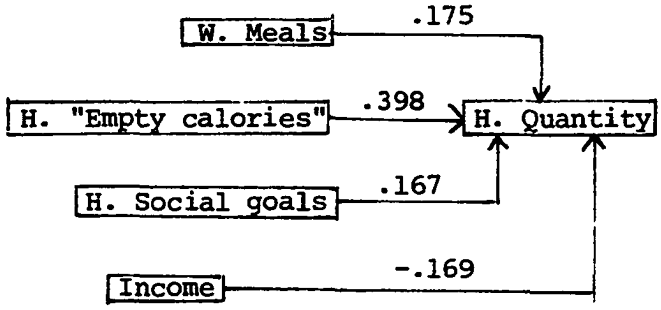

Figure 4h. Quantity of nutritious foods consumed by husbands

This finding was surprising, but may be resolved by taking a closer look at the mean number of servings of each food group (Table 21 and previous discussion of Table 21). The meat group had a much larger mean than did the other food groups. The mean number of servings (expressed in one ounce units) and standard deviation for the meat group was 8.70 $\pm$ 4.98; with 3.48 $\pm$ 2.62, 5.62 $\pm$ 2.84, and 4.93 $\pm$ 2.84 servings being the mean values and standard deviations for the milk, fruits and vegetables, and breads and cereals groups, respectively, for husbands. The mean for the meat group was obviously larger than was the mean for the other 3 food groups. Therefore, for the husbands, the quantity score was weighted most heavily by the meat group.[1] Furthermore, the standard deviations were not independent of their means. One of the conditions which must be met before adding individual items together to form a

[1]Serving sizes for the meat group are commonly expressed in 2 ounce equivalents, rather than 1 ounce equivalents as used here. However, the programmer who wrote the computer program for both this study and the study by Christenson (1973), inadvertently analyzed the data in 1 ounce serving sizes. If, however, the serving sizes for the meat group had been expressed in 2 ounce sizes, the mean for the meat group would have been more consistent in relation to the means for the other food groups.

composite scale score is that the variance of the items must be homogeneous and independent of the means (Warren et al., 1969). This requirement appears to have been violated in the calculation of the quantity score.[1]

Once the interpretive limitations of the quantity score were noted, a logical interpretation for the lack of any relationship between the number of meals the husbands ate and their quantity score was possible. Some men might have eaten a large steak for the evening meal, thus consuming a large number of ounces of meat in one meal and perhaps only eating one meal. Other men might have spread the number of meat servings out more evenly over 2 or 3 meals. Thus, no clear cut influence of the husbands' meals on their quantity consumption would be demonstrated.

Although a negative effect was expected for the husbands' "empty calorie" consumption on his quantity consumption, the data in Figure 4h revealed instead a strong positive relationship ($\beta = 0.398$). Apparently, husbands who were large consumers of the four food groups were also large consumers of all foods.

As shown in Figure 4h, the total family income had a direct negative effect on the quantity of nutritious foods consumed by husbands. This effect might have been caused by the fact that husbands with higher in-

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[1]This measure was also used by Hinton (1962) and Christenson (1973). The unequal weighting effects of the various food groups was evidently not noticed by these researchers, and the possibility of this effect did not become apparent to me until late in the data analysis procedure. It is suggested that in future analyses, the requirements for additivity should be more carefully observed when developing food behavior scales.

comes tended to have more sedentary occupations, and thus had lower caloric requirements. An indirect negative effect of social class on husbands' quantity via the husbands' "empty calorie" consumption (Figure 4) added support to this interpretation. Obviously an unidentified intervening variable(s) is operating between the income and quantity variables.

A positive effect of the husbands' social goals on the quantity of nutritious foods eaten was also observed ($\beta = 0.167$). Although unexpected, this finding was probably related to the previously discussed weighting of the quantity score by the meat group. Persons attaching much importance to social goals were likely to be sensitive to the social desirability (by their peers) of various foods. These individuals would be more likely to consume large amounts of status foods such as steak (or meats in general) than others who placed less importance on social goals. The diagram in Figure 4h shows that the number of meals eaten by wives exerted a positive effect on the quantity of food eaten by husbands ($\beta = 0.175$). This result was puzzling since it had already been noted that the number of meals eaten by husbands did not affect the quantity of food they ate. No explanation is offered for this observation.

Per person food expenditures Three variables were expected to influence positively the per person food expenditures in the husbands' model. These variables were the quantity and variety of nutritious foods consumed by husbands, and the family income. As shown in Figure 4i, none of these hypotheses were supported. Instead, significant negative path coefficients were observed for the wives' variety of foods consumed and the number of meals consumed by husbands on the per person costs (β =-0.341 and -0.292, respectively). In the husbands' model also, the number of snacks consumed by wives produced a positive change in the per person food costs.

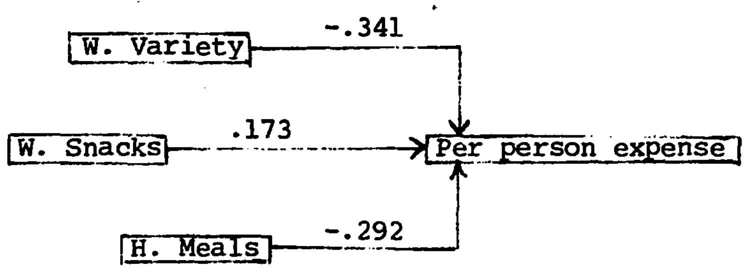
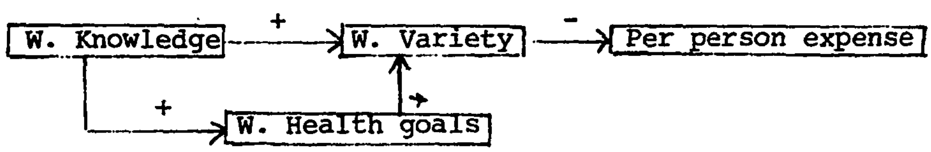


Figure 4i. Per person food expenditures in husbands' model

In the chapter on Methods and Procedures, the calculation of the per person food costs was described; corrections were made for the number of meals consumed away from home. This cost estimate was based on grocery expenditures only and did not include expenditures for food eaten away from home. The negative path coefficient from the number of meals consumed by the husbands to the per person food costs may have been caused by the fact that husbands ate meals away from home. That is, they received credit for number of meals consumed regardless of where the meals were eaten; but the expenses for meals away from home were not included in grocery expenditures, and thus were not reflected in per person food expenditures.

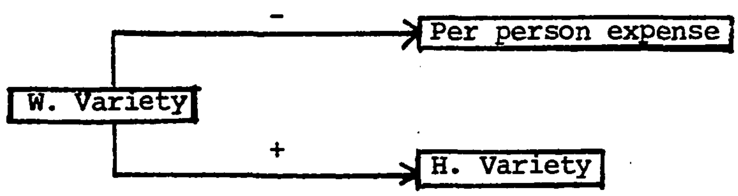
The negative effect of the wives' variety of nutritious foods consumed and the positive effect of their snack consumption on food expenditures, as analyzed in the husbands' model, may indicate that if wives ate many high priced snack foods, they may have used fewer kinds of foods in meals. Therefore, the cost of snack foods, not of nutritious foods, would have increased grocery expenditures. Furthermore, it was the wives' snacks, not the husbands, which contributed to at home food costs. Perhaps the husbands' snacks were frequently eaten away from home and thus were not reflected in grocery expenditures.

The data for the zero-order correlation coefficients in Table 28 revealed significant negative coefficients between per person food expenditures and the following: wives' knowledge of nutrition (r=-0.21), wives' health goals (r=-0.21), number of meals consumed by wives (r=-0.27), and by husbands (r=-0.32), and variety of nutritious foods consumed by husbands (r=-0.26). As shown in Figure 4i, the path coefficients for these variables were not significant. The negative zero-order correlations between food expenditures and wives' nutrition knowledge or wives' health goals are apparently due to indirect negative effects of the latter two variables on wives' variety:



(These relationships will be discussed in greater detail later.) The negative correlation between the number of meals consumed by wives and per person expenditures in the husbands' model is apparently due to an indirect relationship via husbands' meals:

The last correlation (i.e., husbands' variety and per person food expenditure) is spurious as shown below:



That is, when the effects of wives' variety of nutritious foods consumed were controlled, a significant path coefficient between husbands' variety and food expenditures did not exist.

<u>Nutrient intakes and overall diet quality of husbands</u> The path coefficients for the intakes of protein, calcium, iron, vitamin A, thiamin, and vitamin C, and for overall diet quality have not been included in Figure 4. The significant path coefficients leading to these variables are given in Table 29, and the corresponding significant zero-order correlation coefficients are given in Table 30. The path coefficients reported in Table 29 represent variables exerting direct (but not indirect) effects on the nutrient intakes or overall diet quality of husbands. To better understand the total (both direct and indirect) relationships among frame-of-reference and food behavior variables as they relate to nutrient intakes or diet quality, it is suggested that the reader mentally place the nutrient intake in the box at the right hand side of the diagram in Figure 4 and mentally draw in the appropriate

Table 29. Path coefficients[a] for nutrient intakes, weight status, and overall diet quality of husbands

Independent variables	Dependent variables: Protein	Calcium	Iron	Vit. A	Thiamin	Vit. C	Weight status	Overall diet quality
H. Education	N.S.[†]	N.S.	N.S.	N.S.	.118*	N.S.	N.S.	.195
Income	N.S.	N.S.	.191	N.S.	.118	N.S.	N.S.	N.S.
Social class	N.S.	N.S.	N.S.	N.S.	-.226	N.S.	N.S.	-.164*
H. Risk	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
H. Mastery	N.S.	N.S.	-.213	-.192	N.S.	N.S.	N.S.	N.S.
H. Modernism	N.S.	N.S.	N.S.	N.S.	-.128	N.S.	N.S.	-.179
H. Means	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
W. Knowledge	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
H. Knowledge	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
W. Health goals	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
H. Health goals	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
W. Economic goals	N.S.	N.S.	N.S.	N.S.	-.087*	N.S.	N.S.	.155
H. Economic goals	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
W. Social goals	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
H. Social goals	N.S.	N.S.	-.130	N.S.	N.S.	N.S.	N.S.	N.S.
W. On a diet	N.S.	-.168	N.S.	-.230	-.131	N.S.	N.S.	N.S.
H. On a diet	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	.287	-.162
W. Meals	N.S.	N.S.	N.S.	N.S.	N.S.	.198	N.S.	N.S.
H. Meals	N.S.	N.S.	.189	.148*	.155	N.S.	N.S.	.180
W. Snacks	N.S.	-.153	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
H. Snacks	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
W. "Empty calories"	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
H. "Empty calories"	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
W. Variety	N.S.	N.S.	-.196	-.157*	N.S.	N.S.	N.S.	N.S.
H. Variety	N.S.	.280	N.S.	.408	-.091*	.363	N.S.	.407
W. Quantity	N.S.	N.S.	.114*	N.S.	N.S.	N.S.	N.S.	-.305
H. Quantity	.781	.417	.779	.427	.795	.445	N.S.	.273
Per person expense	N.S.	N.S.	-.287	-.157	-.098*	N.S.	N.S.	N.S.
W. Nutrient intakes or weight status	N.S.	.133*	N.S.	.202	N.S.	.172	.310	.251

[a]Path coefficients = β weights.

*Significant at least at 0.10 level. Non-starred path coefficients are significant at least at the 0.05 level.

[†]N.S. = not significant at least at 0.10 level.

Table 30. Zero-order correlation coefficients between frame-of-reference or food behavior variables and nutrient intakes or weight status of husbands

Independent variables	Dependent variables: Pro-tein	Cal-cium	Iron	Vit. A	Thia-min	Vit. C	Weight status	Overall diet quality
H. Education	N.S.†	.15*	N.S.	.16*	N.S.	.20	N.S.	.14*
Income	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
Social class	N.S.	N.S.	N.S.	N.S.	-.23	.17*	N.S.	N.S.
H. Risk	N.S.	N.S.	N.S.	N.S.	-.13*	N.S.	N.S.	.14*
H. Mastery	N.S.	N.S.	-.20	-.18*	-.19	N.S.	N.S.	N.S.
H. Modernism	N.S.	-.14*	-.14*	N.S.	-.22	N.S.	N.S.	-.16*
H. Means	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
W. Knowledge	N.S.	N.S.	N.S.	.20	N.S.	.21	N.S.	.21
H. Knowledge	N.S.	N.S.	-.14*	N.S.	N.S.	N.S.	N.S.	.20
W. Health goals	N.S.	N.S.	N.S.	N.S.	N.S.	.19	N.S.	.15*
H. Health goals	N.S.	N.S.	.18*	.27	.21	.24	N.S.	N.S.
W. Economic goals	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	.15*
H. Economic goals	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
W. Social goals	N.S.	N.S.	N.S.	N.S.	N.S.	.14*	N.S.	N.S.
H. Social goals	.14*	N.S.	N.S.	N.S.	.18*	N.S.	N.S.	N.S.
W. On a diet	N.S.	-.19	-.14*	-.21	-.22	N.S.	.22	N.S.
H. On a diet	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	.28	-.17*
W. Meals	N.S.	N.S.	.24	.25	N.S.	.34	N.S.	N.S.
H. Meals	N.S.	N.S.	.21	.25	.13*	N.S.	N.S.	.36
W. Snacks	N.S.	-.18*	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
H. Snacks	N.S.	N.S.	-.14*	N.S.	N.S.	N.S.	N.S.	N.S.
W. "Empty calories"	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
H. "Empty calories"	.24	.15*	.25	N.S.	.30	.13*	N.S.	N.S.
W. Variety	N.S.	N.S.	N.S.	N.S.	N.S.	.26	N.S.	.14*
H. Variety	N.S.	.31	N.S.	.44	N.S.	.39	-.14*	.53
W. Quantity	N.S.	N.S.	N.S.	N.S.	N.S.	.17*	N.S.	N.S.
H. Quantity	.78	.45	.73	.46	.80	.46	N.S.	.31
Per person expense	N.S.	N.S.	-.20	-.21	N.S.	-.20	N.S.	-.22
W. Nutrient intakes or weight status	N.S.	.18*	N.S.	N.S.	N.S.	.17*	.30	N.S.

*Significant at least at 0.10 level. Non-starred path coefficients are significant at least at the 0.05 level.

†N.S. = not significant at least at 0.10 level.

path coefficients.[1] For example, the data inTable 29 revealed that the husbands' quantity of nutritious foods consumed exerted a direct positive effect on their protein intake (β = 0.781). (This variable was the only one from the husbands' model which exerted a direct effect on protein intake). The reader should mentally place protein intake of husbands in the box at the right of the diagram in Figure 4, and mentally draw an arrow from husbands' quantity to protein intake and place the appropriate path coefficient (β = 0.781) on the line. This, then, constitutes the complete model, as analyzed here, for protein intake of husbands. The same procedure can be followed for each of the other nutrient intakes, weight status, and overall diet quality. However, in discussing the variables influencing nutrient intakes and overall diet quality in the causal model, the nutrient intakes will be treated as a group.

Earlier, in the discussion of the theoretical causal model, four variables were expected to produce positive changes in the nutrient intakes and overall diet quality. These four variables were 1) variety of nutritious foods consumed by husbands 2) the quantity of nutritious foods consumed, 3) the per person expenditures for food, and 4) the wives' intake of the same nutrient or overall diet quality.

The data in Table 29 show that positive path coefficients were observed for the pathway from the husbands' variety of nutritious foods

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[1]The relationships among the variables which have been analyzed prior to the nutrient intakes and weight status will not vary, regardless of whether we are considering protein or calcium as the ultimate dependent variable.

consumed to his calcium, vitamin A, and vitamin C intakes, as well as to his overall diet quality (β = 0.280, 0.408, 0.363, and 0.407, respectively). Therefore, this hypothesis was firmly supported for these three nutrients and overall diet quality. Additionally, a weak negative effect of husbands' variety on thiamin intake was also obtained (β = -0.098).

The quantity of nutritious foods consumed by husbands produced a positive change in the intakes of all 6 nutrients and in their overall diet quality (Table 29). This hypothesis was thus supported in all cases.

Although the per person expenditures on food were hypothesized to affect nutrient intakes positively, the data in Table 29 show that this variable exerted a negative effect on iron, vitamin A, and thiamin intakes, and had no effect on the other nutrient intakes of husbands. The hypothesis, consequently was not supported for any of the dependent variables (nutrient intakes and overall diet quality). Eppright et al. (1970) reported that the nutrient content of the diets of preschool children, except for vitamin A and iron, was correlated with the amount of money spent for food. Evidently husbands in the present study obtained a considerable percentage of their nutrient intakes from foods consumed away from home (and consequently not purchased with grocery money). The nutrients consumed by preschoolers, on the other hand, probably came mainly from home sources.

The fourth hypothesis, that wives' nutrient intakes would affect positively husbands' intakes, was supported for the calcium, vitamin A, and vitamin C intakes, and for the overall diet quality (β = 0.133, 0.202, 0.172, and 0.251, respectively) (Table 29). Wives' intakes of thiamin, iron and protein had no effect on husbands' intakes of these nutrients.

The number of meals was hypothesized to exert an indirect positive effect on husbands' nutrient intakes via husbands' variety and quantity of nutritious foods consumed. However, as shown in Table 29, the number of meals husbands consumed exerted a direct positive effect on their iron, vitamin A, and thiamin intakes, and overall diet quality (β = 0.189, 0.148, 0.155, and 0.180, respectively). In addition, the number of meals consumed by wives produced positive changes in husbands' vitamin C intakes (β = 0.198). Perhaps wives were influencing husbands to eat breakfast, since vitamin C is a nutrient which is usually associated with breakfast foods.

If wives were on weight reduction diets, the husbands' intake of calcium, vitamin A, and thiamin suffered (β =-0.168, -0.230, -0.131, respectively). Negative effects on husbands' nutrient intakes were also produced by their own (husbands') value-attitude orientation toward mastery. The β weights for the pathways leading to iron and vitamin A were -0.213 and -0.192, respectively. The husbands' orientation towards modernism produced direct negative effects on their thiamin intake (β = -0.128) and overall diet quality (β = -0.179).

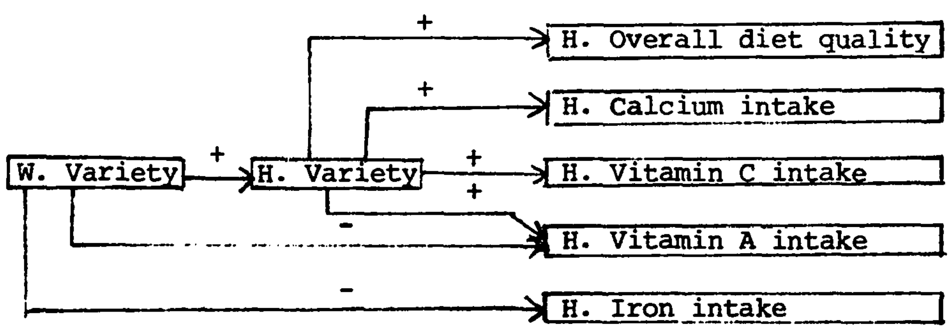
The direct negative effects of husbands' mastery and modernism orientations on their intakes is difficult to explain. In the causal model in Figure 4, the husbands' value-attitude toward mastery produced a weak negative effect on their health goals (β = -0.160). Husbands' orientation towards modernism produced a negative effect on their knowledge of nutrition (β = -.194; Figure 4). These findings suggested that husbands did not see acquisition of nutrition knowledge or health goals as important routes for implementing their mastery and modernism value-attitudes.[1] Although these relationships serve as useful guides for interpreting the effect of mastery and modernism orientations on nutrient intakes, they do not explain the direct effect of these value-attitudes on nutrient intakes. That is, it is not logical that the husbands' orientation towards mastery could produce a direct change in the intake of a nutrient. Rather, a value-attitude orientation could only exert its effect indirectly through some intervening variable(s). Obviously, the intervening variable(s) has not been identified and included in this model. A possible explanation may be that the husbands' attitude towards mastery was mediated through the particular foods they selected for eating, i.e. by patterns of food intake which were not reflected in the food behavior variables used in the present study.

The total family income produced direct effects on the husbands' iron and thiamin intakes (β = 0.191 and 0.118, respectively). These results suggested that families with higher incomes might have purchased more foods that were highly fortified, thus increasing their iron and

[1]The reader is reminded that the mastery and modernism orientations were the two most salient of the four value-attitude orientations tested for husbands in this sample.

thiamin intakes. However, this interpretation is not consistent with the negative effect of per person food expenditure on iron intake. The discrepancy perhaps reflected the fact that the family income was related to all meals consumed by husbands, while the per person food expenditures were related only to those meals they consumed at home. In any case, the direct effect of income on nutrient intakes is not logical, and indicates that unidentified variables are operative.

The variety of nutritious foods eaten by wives produced a negative change in husbands' iron and vitamin A intakes (β = -0.196 and -0.157, respectively). This result was unexpected since the variety of nutritious foods consumed by wives had already been observed to have a strong positive effect on the variety of nutritious foods consumed by husbands; and husbands' variety intake influenced three of their nutrient intakes and their overall diet quality. These relationships are diagrammed below:



The dichotomous effect of wives' variety on husbands' nutrient intakes might have been due to the fact that some husbands ate most of their meals at home while others ate a large percentage of their meals away from home. Perhaps if husbands and wives were eating together, the indirect path from wives' variety to husbands' variety to husbands' nutrient intakes was operative. On the other hand, if husbands and wives ate only 1 meal or less together per day, there might well be little relationship between wives' variety and husbands' intake. Wives might have eaten nutritious lunches while husbands were eating a sandwich, or vice versa. This interpretation could be checked by appropriate subsampling, and analyzing the model again.

The data in Table 29 show that a strong negative change was produced in the husbands' overall diet quality by the quantity of foods consumed by wives ($\beta = -0.305$). The overall diet quality was a composite score based on the combined effects of all the nutrient intakes plus the respondents' weight status. Therefore, it is difficult to understand why wives' quantity intake did not affect any of the individual nutrient intakes of husbands. Perhaps several of the nutrient intakes were very slightly affected in a negative way by the wives' quantity. Then, when these variables were combined, this effect was magnified.

Weight status of husbands The weight status values were based on the respondent's weight divided by the recommended weight for height and frame size. Higher values for the weight status would indicate greater degrees of obesity. Hence, the relationships between the weight status and other variables were expected to be opposite in direction to the relationships observed for the nutrient intakes.

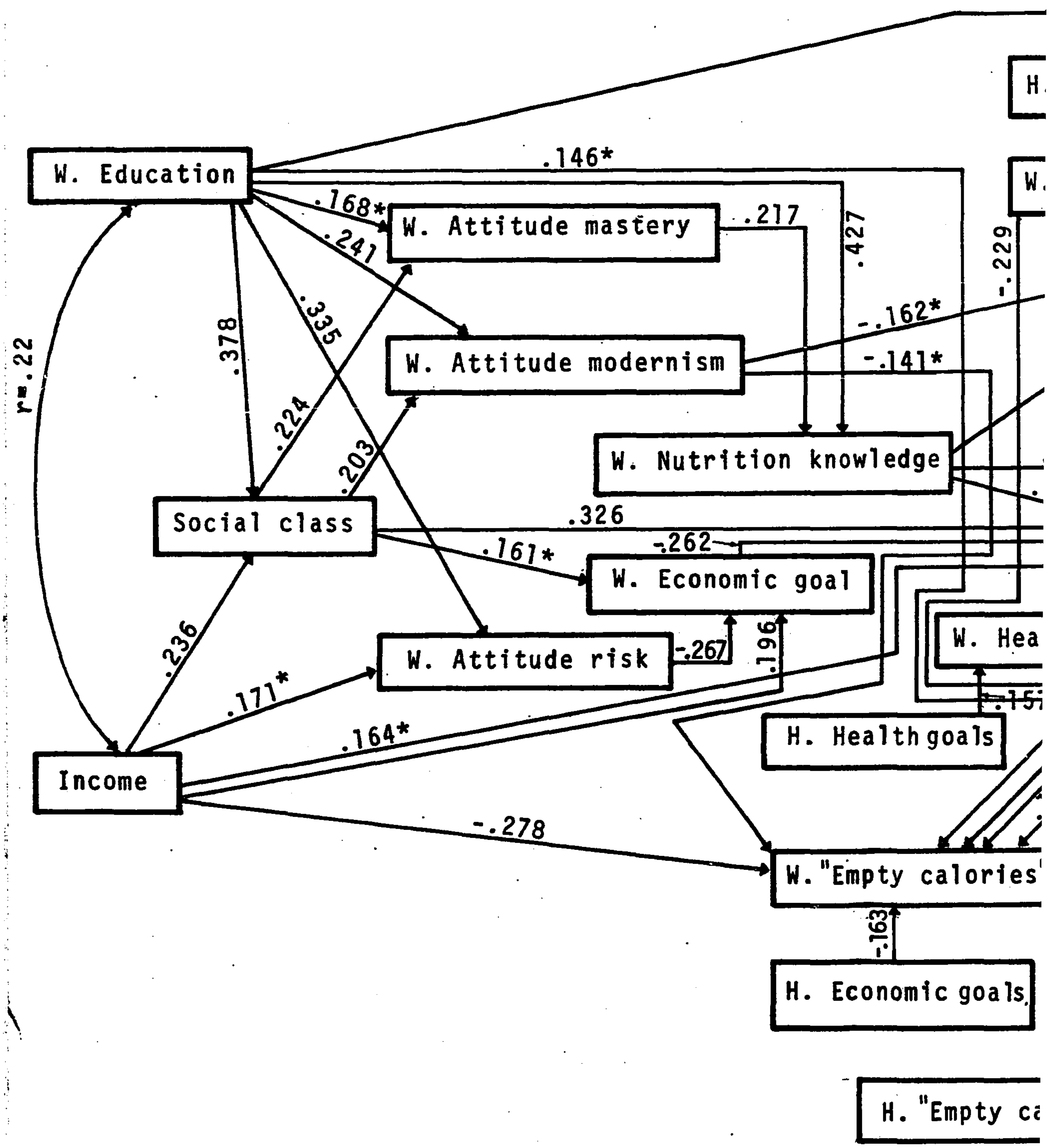
The original purpose in choosing weight status as an ultimate dependent variable was to identify causal factors of overweight or obesity in this population. This objective was not achieved. Data which will be presented revealed that only 17 percent of the variance in the husbands' weight status was explained by the factors examined. Furthermore, only two variables produced a direct effect on husbands' weight status (Table 29). The wives' weight status had a β weight of 0.310, indicating that to a limited extent, the weight status of spouses was congruent.

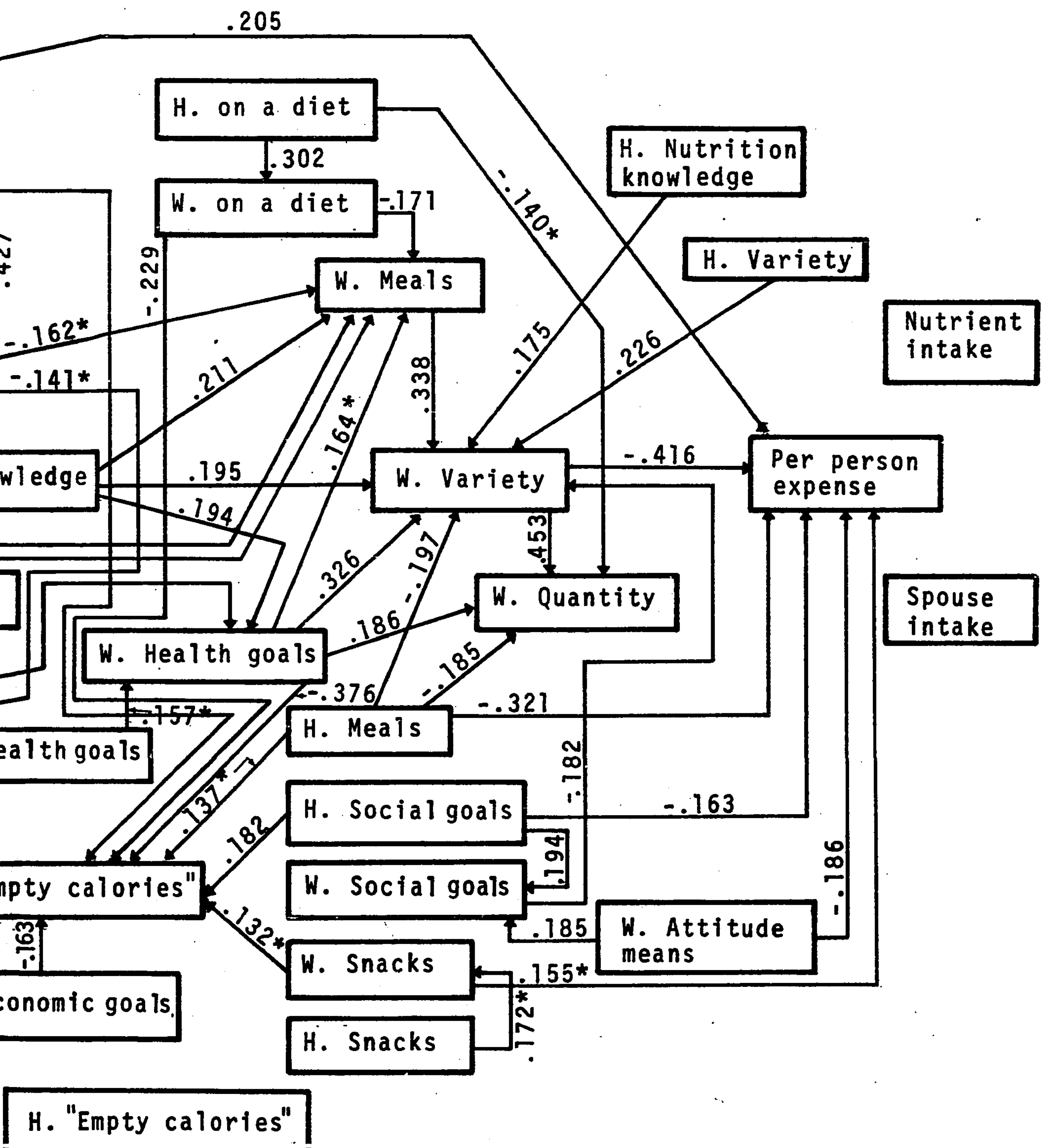
The second variable which had a positive effect on the husbands' weight status was husbands being on a weight reduction diet ($\beta = 0.287$). This relationship is obviously incorrect. That is, the husband being on a weight reduction diet should not have caused his overweight condition. It would have been more logical to test the reverse relationships diagrammed below:

$$\boxed{\text{H. Weight status}} \longrightarrow \boxed{\text{H. On a weight reduction diet}}$$

It was hypothesized that a condition of overweight would be negatively and directly affected by the variety and quantity of nutritious foods consumed by husbands and by per person food expenditures. The snack consumption and "empty calorie" consumption were hypothesized to produce indirect positive effects on husbands' weight status by decreasing variety, quantity, and food expenditure variables. None of these hypotheses were supported. Perhaps the husbands' weight status had been established for some time before this study was undertaken. If this were the case, it would be better to use weight status as an independent variable in the model and see if it had an effect on meal or

Figure 5. Wives' model


W. Education
.146*
.168*
.241
W. Attitude mastery
.217
.427
-.229
-.162*
W. Attitude modernism
-.141*
.335
.378
r=.22
.224
.203
W. Nutrition knowledge
Social class
.326
-.262
.161*
W. Economic goal
.196
-.267
W. Attitude risk
.236
.171*
.164*
H. Health goals
Income
-.278
W. "Empty calories"
-.163
H. Economic goals
H. "Empty


.205
H. on a diet
.302
W. on a diet
-.171
-.140*
H. Nutrition knowledge
H. Variety
Nutrient intake
W. Meals
-.229
-.162*
-.141*
.211
.164*
.338
.175
.226
wledge
.195
W. Variety
-.416
Per person expense
.194
.453
.326
-.197
W. Quantity
Spouse intake
W. Health goals
.186
-.185
-.376
.157*
H. Meals
-.321
ealth goals
.137*
-.182
H. Social goals
-.163
.182
.194
-.186
mpty calories"
W. Social goals
.132*
.185
W. Attitude means
-.163
W. Snacks
.155*
conomic goals
.172*
H. Snacks
H. "Empty calories"

food patterns.

Wives' model

The diagram of the wives' model is given in Figure 5. The same theoretical model constituted the starting point for both husbands and wives, and included the same basic variables. However, the empirical wives' model differed from the husbands' empirical model because variables and interrelationships among variables operative for wives differed from those for husbands. The data for the β weights in the wives' model are presented in Table 31. Table 32 contains the zero-order correlation coefficients for the variables examined in the model.

Nutrition knowledge of wives The educational level of the wives was hypothesized to produce a positive effect on the wives' knowledge of nutrition. As shown in Table 5a, this relationship was strongly supported by a β weight of 0.427.[1]

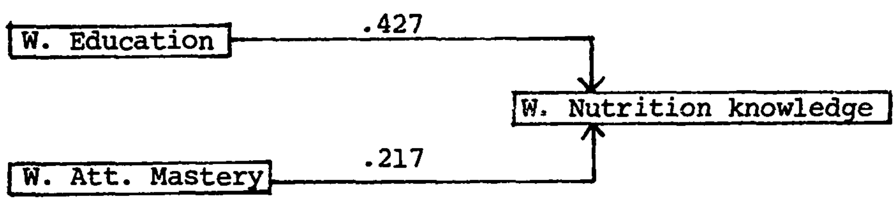


Figure 5a. Nutrition knowledge of wives

[1] Similarly to discussion of the husbands' model, small sections of Figure 5 will be derived to facilitate discussion of the results of the wives' model. Again, it should be recognized that only selected relationships have been diagrammed in the derived models, and a more thorough understanding of the relationships among variables, especially indirect relationships, can be obtained from Figure 5.

Table 31. Path coefficients[a] for frame-of-reference and food behavior variables of wives

Independent variables	Dependent variables X_3	X_4	X_5	X_6	X_7	X_9	X_{13}
X_1, W. Education	.378	.335	.168*	.241	N.S.[†]	.427	N.S.
X_2, Income	.236	.171*	N.S.	N.S.	N.S.	N.S.	.164*
X_3, Social class		N.S.	.224	.203	N.S.	N.S.	N.S.
X_4, W. Risk			N.T.[b]	N.T.	N.T.	N.S.	N.S.
X_5, W. Mastery				N.T.	N.T.	.217	N.S.
X_6, W. Modernism					N.T.	N.S.	N.S.
X_7, W. Means						N.S.	N.S.
X_8, H. Knowledge						N.S.	N.S.
X_9, W. Knowledge							.194
X_{10}, H. Health goals							.157*
X_{13}, W. Health goals							
X_{11}, H. Economic goals							
X_{14}, W. Economic goals							
X_{12}, H. Social goals							
X_{15}, W. Social goals							
X_{16}, H. On a diet							
X_{17}, W. On a diet							
X_{18}, H. Meals							
X_{19}, W. Meals							
X_{20}, H. Snacks							
X_{21}, W. Sancks							
X_{22}, H. "Empty calories"							
X_{23}, W. "Empty calories"							
X_{24}, H. Variety							
X_{25}, W. Variety							
X_{26}, H. Quantity							
X_{27}, W. Quantity							
X_{28}, Per person expense							

[a]Path coefficients = β weights.

[b]N.T. = not tested in the multiple regression procedure for the causal models (see Appendix A).

*Significant at least at 0.10 level. Non-starred path coefficients are significant at least at the 0.05 level.

[†]N.S. = not significant at least at 0.10 level.

X_{14}	X_{15}	X_{17}	X_{19}	X_{21}	X_{23}	X_{25}	X_{27}	X_{28}	Independent variables
N.S.	N.S.	N.S.	N.S.	N.S.	.146*	N.S.	N.S.	.205	X_1
.196	N.S.	N.S.	N.S.	N.S.	-.278	N.S.	N.S.	N.S.	X_2
.161*	N.S.	N.S.	.326	N.S.	N.S.	N.S.	N.S.	N.S.	X_3
-.267	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	X_4
N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	X_5
N.S.	N.S.	N.S.	-.162*	N.S.	-.141*	N.S.	N.S.	N.S.	X_6
N.S.	.185	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	-.186	X_7
N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	.175	N.S.	N.S.	X_8
N.S.	N.S.	N.S.	.211	N.S.	N.S.	.195	N.S.	N.S.	X_9
N.T.	N.T.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	X_{10}
N.T.	N.T.	N.S.	.164*	N.S.	-.376	.326	.186	N.S.	X_{13}
N.S.	N.T.	N.S.	N.S.	N.S.	-.163	N.S.	N.S.	N.S.	X_{11}
N.T.	N.T.	N.S.	-.262	N.S.	N.S.	N.S.	N.S.	N.S.	X_{14}
N.T.	.194	N.S.	N.S.	N.S.	.182	N.S.	N.S.	-.163	X_{12}
		N.S.	N.S.	N.S.	N.S.	-.182	N.S.	N.S.	X_{15}
		.302	N.S.	N.S.	N.S.	N.S.	-.140*	N.S.	X_{16}
			-.171	N.S.	-.229	N.S.	N.S.	N.S.	X_{17}
			N.S.	N.S.	.137*	-.197	-.185	-.321	X_{18}
				N.S.	N.S.	.338	N.S.	N.S.	X_{19}
				.172*	N.S.	N.S.	N.S.	N.S.	X_{20}
					.132*	N.S.	N.S.	.155*	X_{21}
					N.S.	N.S.	N.S.	N.S.	X_{22}
						N.S.	N.S.	N.S.	X_{23}
						.226	N.S.	N.S.	X_{24}
							.453	-.416	X_{25}
							N.S.	N.S.	X_{26}
								N.S.	X_{27}
									X_{28}

Table 32. Zero-order correlation coefficients for frame-of-reference and food behavior variables of wives

Independent variables	Dependent variables X_3	X_4	X_5	X_6	X_7	X_9	X_{13}
X_1, W. Education	.43	.37	.26	.33	N.S[†]	.48	N.S.
X_2, Income	.32	.24	N.S.	.22	-.14*	N.S.	.16*
X_3, Social class	1.00	.29	.30	.31	-.15*	.30	N.S.
X_4, W. Risk		1.00	N.T.[a]	N.T.	N.T.	.29	.13*
X_5, W. Mastery			1.00	N.T.	N.T.	.33	.23
X_6, W. Modernism				1.00	N.T.	.16*	.15*
X_7, W. Means					1.00	N.S.	N.S.
X_8, H. Knowledge						.18*	N.S.
X_9, W. Knowledge						1.00	.20
X_{10}, H. Health goals							.17*
X_{13}, W. Health goals							1.00
X_{11}, H. Economic goals							
X_{14}, W. Economic goals							
X_{12}, H. Social goals							
X_{15}, W. Social goals							
X_{16}, H. On a diet							
X_{17}, W. On a diet							
X_{18}, H. Meals							
X_{19}, W. Meals							
X_{20}, H. Snacks							
X_{21}, W. Snacks							
X_{22}, H. "Empty calories"							
X_{23}, W. "Empty calories"							
X_{24}, H. Variety							
X_{25}, W. Variety							
X_{26}, H. Quantity							
X_{27}, W. Quantity							
X_{28}, Per person expense							

[a]N.T. = not tested in the multiple regression rpocedure for the causal models (see Appendix A).

*Significant at least at 0.10 level. Non-starred path coefficients are significant at least at the 0.05 level.

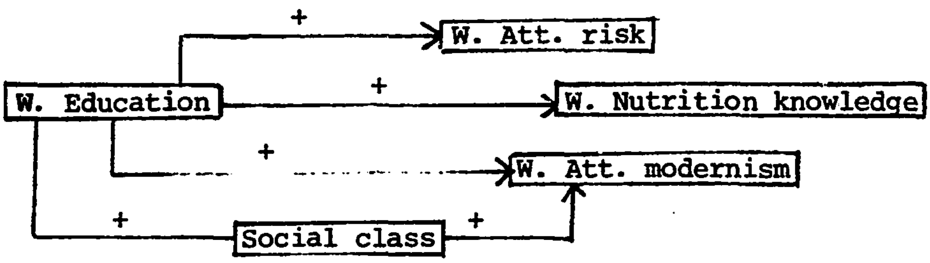
[†]N.S. = not significant at least at 0.10 level.

X_{14}	X_{15}	X_{17}	X_{19}	X_{21}	X_{23}	X_{25}	X_{27}	X_{28}	Independent variables
N.S.	N.S.	N.S.	.26	N.S.	N.S.	.29	.23	N.S.	X_1
.18*	N.S.	N.S.	.14*	N.S.	-.35	.24	.14*	N.S.	X_2
.14*	N.S.	N.S.	.31	N.S.	N.S.	.33	.15*	-.15*	X_3
-.17*	N.S.	N.S.	.16*	N.S.	N.S.	.33	.14*	N.S.	X_4
N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	.23	.14*	N.S.	X_5
N.S.	N.S.	N.S.	N.S.	N.S.	-.17*	.20	N.S.	N.S.	X_6
N.S.	.19	N.S.	N.S.	N.S.	N.S.	N.S.	-.14*	N.S.	X_7
N.S.	N.S.	N.S.	N.S.	N.S.	-.15*	.28	N.S.	N.S.	X_8
N.S.	N.S.	N.S.	.32	N.S.	N.S.	.42	.16*	-.21	X_9
N.T.	N.T.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	-.14*	X_{10}
N.T.	N.T.	N.S.	N.S.	-.16*	-.45	.30	.25	-.21	X_{13}
N.S.	N.T.	N.S.	N.S.	N.S.	-.16*	N.S.	N.S.	N.S.	X_{11}
1.00	N.S.	N.S.	-.18*	N.S.	-.18*	N.S.	N.S.	N.S.	X_{14}
	.20	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	-.15*	X_{12}
	1.00	N.S.	N.S.	N.S.	-.18*	N.S.	N.S.	N.S.	X_{15}
		.30	N.S.	N.S.	-.16*	N.S.	N.S.	N.S.	X_{16}
		1.00	-.16*	N.S.	-.26	N.S.	N.S.	N.S.	X_{17}
			.19	N.S.	N.S.	N.S.	N.S.	-.32	X_{18}
			1.00	-.13*	N.S.	.44	.33	-.27	X_{19}
				.17*	N.S.	N.S.	-.15*	N.S.	X_{20}
				1.00	.22	N.S.	N.S.	.17*	X_{21}
					N.S.	N.S.	N.S.	N.S.	X_{22}
					1.00	N.S.	N.S.	N.S.	X_{23}
						.36	N.S.	-.26	X_{24}
						1.00	.48	-.35	X_{25}
							N.S.	N.S.	X_{26}
							1.00	N.S.	X_{27}
								1.00	X_{28}

The wives' knowledge of nutrition was expected to be influenced by the husbands' knowledge of nutrition. This hypothesis was not supported by the path analysis (Figure 5a). However, the nutrition knowledge of husbands and wives was correlated (r=0.18, Table 32). A diagram showing that this correlation was spurious was presented earlier in the discussion of husbands' nutrition knowledge.

The four value-attitude orientations were also hypothesized to affect wives' knowledge of nutrition. However, as shown in Figure 5a, only wives' mastery orientation had a positive effect on their knowledge of nutrition (β = 0.217). As has been discussed previously, the mastery orientation was the most salient of the 4 value-attitude orientations for wives in this sample. The mastery orientation reflected a desire to control one's life and future. Because implementation of values (attitudes) is thought to change with different social roles, wives may see acquisition of nutrition knowledge as a way in which they can implement their mastery orientation as part of their feminine roles.

Although significant β weights were not obtained for the linkages of social class, and orientations towards risk or modernism to the nutrition knowledge of the wives (Figure 5a), these three variables did have zero-order correlations with the wives' knowledge of nutrition (r=0.30, 0.29, and 0.16; Table 32). The nature of these relationships can be clarified by the following diagram:



The correlations between the wives' nutrition knowledge and the variables of risk or modernism orientations or social class are spurious because of the antecedent effect of education on these variables. When the effect of education was controlled, social class, risk and modernism orientations were no longer related to the wives' knowledge of nutrition.

Wives' health goals Total family income was hypothesized to affect positively the wives' health goals. This hypothesis was supported at the 0.10 level of significance (β = 0.164; Figure 5b). This hypothesis was based on the supposition that women at higher income levels would be less concerned about economic goals, and thus would be more interested in other goals - possibly health goals. This was apparently true, at least to a limited extent.

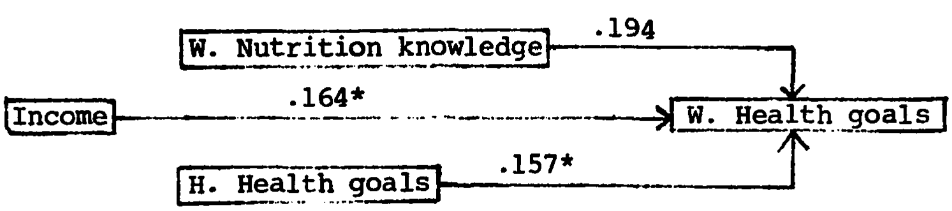
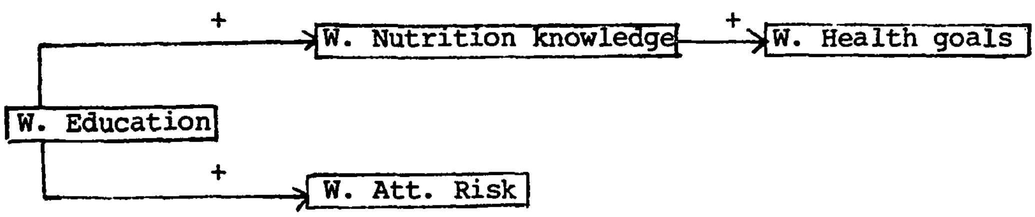


Figure 5b. Wives' health goals

It was hypothesized that both wives' knowledge of nutrition and husbands' health goals would produce positive changes in wives' health goals. These two hypotheses were supported at the 0.05 and 0.10 levels of significance, respectively (β = 0.194 and 0.157),

The expected positive linkages of the four value-attitude orientations to the wives' health goals were not supported by path analysis (Figure 5b). However, there was a zero-order correlation coefficient of 0.23 between the wives' orientation toward risk and their health goals (Table 32). This correlation appears to have been a spurious relationship due to the antecedent effect of the wives' educational level, as diagrammed below:



When the effect of wives' education was controlled, the path coefficient from wives' risk orientation to their health goals was not significantly different from zero.

<u>Wives on a weight reduction diet</u> As shown in Figure 5c, the only variable influencing the wives' weight reduction behavior was the husbands being on a diet (β = 0.302). Thus perceived overweight and subsequent dieting seemed to be a family problem.

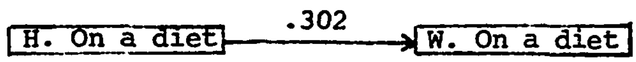


Figure 5c. Wives on a weight reduction diet

Number of meals consumed by wives Six variables produced direct changes in the number of meals consumed by wives. These variables were the following: wives on a diet, wives' orientation towards modernism, wives' nutrition knowledge, social class, wives' economic goals, and wives' health goals (see Figure 5d).

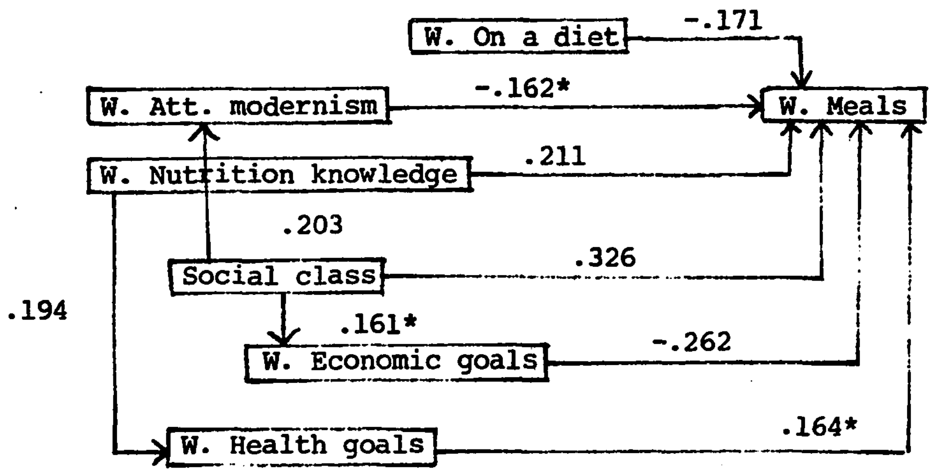


Figure 5d. Number of meals consumed by wives

The wives' health goals were hypothesized to produce positive changes in the number of meals consumed by wives. As shown in Figure 5d, this hypothesis was supported at the 0.10 level of significance (β = 0.164). The wives' social and economic goals, and their being on a weight reduction diet were hypothesized to affect negatively the number of meals they ate. The latter two hypotheses were supported (β = -0.262 and -0.171), but the expected negative effect of the social goals was not confirmed.

The nutrition knowledge of wives was expected to exert an indirect positive effect on the number of meals they consumed via the intervening health goals variable. While this indirect effect was supported by the data a direct causal linkage was also observed ($\beta = 0.211$; Figure 5d). Evidently, for the wives in this sample, nutrition knowledge and health goals could exert their influence on wives' meals directly and independently. In addition, nutrition knowledge could also exert its effect indirectly via the health goals.

The number of meals consumed by husbands was hypothesized to produce a positive change in the number of meals consumed by wives. As shown in Figure 5d, this hypothesis was not supported. However, the data in Table 32 revealed that the number of meals consumed by husbands did have a significant zero-order correlation with the number of meals consumed by wives ($r=0.19$). This correlation was apparently due to a causal effect of the number of meals consumed by wives resulting in a positive change in the number of meals consumed by husbands, rather than the reverse effect as hypothesized here (i.e., number of meals consumed by husbands would produce a positive change in the number of meals consumed by wives). This conclusion was reached by comparing the relationships between spouse meals and the number of meals consumed by husbands or wives in their respective models (Figures 4 and 5). As diagrammed below, in the husbands' model, the number of meals consumed by wives' produced a direct positive change in the number of meals consumed by husbands. In the wives' model, the number of meals consumed by husbands had no effect on the number of meals consumed by wives, when the effects of other independent variables were controlled. Thus the models demonstrate that the zero-order correlation between the number of meals consumed by husbands and wives was due to the causal effect of the wives' meals on husbands' meals, and not to the reverse relationship:

Husbands' model	Wives' model
$\boxed{\text{W. Meals}} \xrightarrow{+} \boxed{\text{H. Meals}}$	$\boxed{\text{H. Meals}} \qquad \boxed{\text{W. Meals}}$

The weak negative influence of the wives' modernism orientation on the number of meals eaten by wives was an unexpected finding (Figure 5d). It was hypothesized that the wives' modernism orientation would exert an indirect positive effect on their meals via their nutrition knowledge and their health goals. As shown in Figure 5d, these indirect effects were not supported. While the modernism orientation contains a dimension concerned with scientific orientations, it also contains a dimension that refutes the idea that past ways of doing things are best. Perhaps women with modern orientations did not see the traditional three meals a day pattern as necessary for good health.

Another finding which was not hypothesized was the strong positive direct effect of social class on the wives' meal pattern ($\beta = 0.326$, Figure 5d). No explanation for this effect has been offered, although an unidentified intervening variable(s) was probably exerting an effect.

Although a significant path coefficient was not obtained for the effect of the wives' education on the number of meals they consumed, these two variables were correlated with a coefficient of 0.26 (Table

32). This correlation was apparently due to indirect effects of education on the number of meals consumed by wives' via nutrition knowledge and health goals (Figure 5).

<u>Number of snacks consumed by wives</u> The only significant path coefficient affecting wives' snack consumption was from husbands' snack consumption ($\beta = 0.172$; Figure 5e). This β weight was significant at the 0.10 level of significance, and explained only 3 percent of the

$$\boxed{\text{H. Snacks}} \xrightarrow{.172*} \boxed{\text{W. Snacks}}$$

Figure 5e. Number of snacks consumed by wives

variance in the wives' snack consumption. Therefore, the major factors influencing the number of snacks consumed by wives were not identified.

<u>Wives' "empty calorie" consumption</u> Two variables (husbands' "empty calories" and wives' snacks) were expected to affect directly the "empty calorie" consumption of wives. However, as shown in Figure 5f, 9 variables had direct path coefficients leading to the frequency of consuming "empty calorie" foods by the wives.

The hypothesized positive effect of husbands' "empty calorie" consumption was not supported by the data. The expected positive effect of wives' snacks was supported by the data, but only at the 0.10 level of significance ($\beta = 0.132$). This weak positive effect of wives' snacks on their "empty calorie" consumption suggested that, to a limited extent, wives' snacks consisted of "empty calorie" foods.

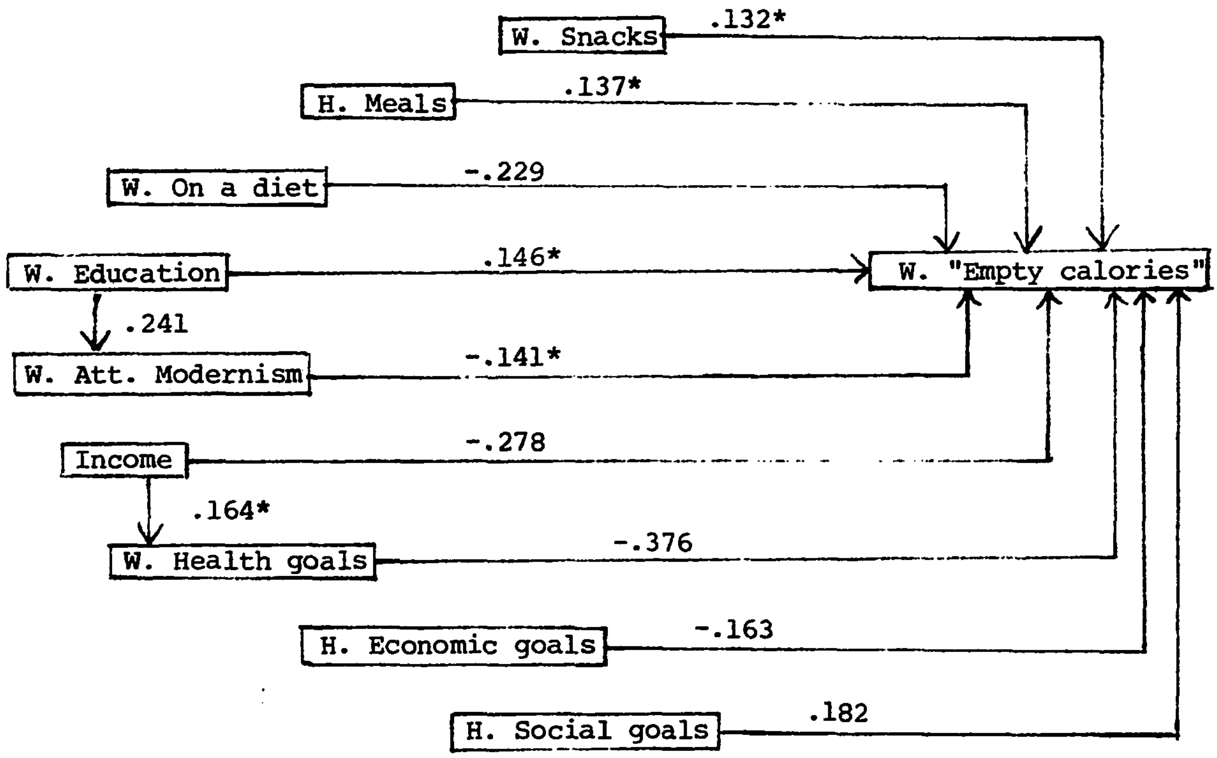


Figure 5f. Wives' "empty calorie" consumption

As shown in Figure 5f, the most influential factor affecting wives' "empty calorie" consumption was the wives' health goals (β = -0.376). Controlling the number of "empty calorie" foods they ate might have been one of the easiest and most obvious means the wives saw for obtaining health goals.

Although unexpected, the wives' educational level was found to affect positively, although weakly, their "empty calorie" consumption (β = 0.146), while family income exerted a direct negative effect (β = -0.278). The partial effects of the wives' education and income variables were thus opposite in sign, although these two variables were positively correlated with each other (r=0.22; Figure 5). The direct negative effect of income on wives' "empty calorie" intake may have been due to greater concern about weight control of women with higher family incomes. The additional indirect negative loop of income on wives' health goals (containing a dimension relating to weight control) lends support to this interpretation. Whatever the reasons for the direct effects of income and education on wives' "empty calorie" consumption, unidentified intervening variables must be operative since direct causal effects are not logical.

The diagram in Figure 5f revealed that husbands' economic goals produced a negative change in wives' "empty calorie" consumption (β = -0.163). Perhaps husbands with high economic goals urged their wives to reduce the grocery bill and elimination of "empty calorie" food items resulted.

The husbands' social goals also produced a change in the wives' "empty calorie" consumption, but the effect was opposite in direction to that caused by the husbands' economic goals (β = 0.182). Possibly when the husbands' social goals were high, married couples were involved in considerable entertaining or social events with friends. Because social events are frequently accompanied by the serving of "empty calorie" foods (beer and alcoholic beverages, soft drinks, chips, desserts, etc.), the consumption of "empty calorie" foods by the wives would be increased.

Although not hypothesized, the wives' modernism orientation produced a weak negative change in their "empty calorie" consumption (β = -0.141; Figure 5f). A similar negative relationship was found for husbands between their modernism orientation and their snack consumption (see Figure 4). The same interpretation for husbands and for wives is offered. That is, the modernism orientation contained a subcomponent that said individuals should use scientific information as a basis for their behavior. Perhaps when the effects of nutrition knowledge and education were controlled, women with orientations towards modernism used their scientific knowledge as a rationale to reduce their "empty calorie" consumption.

If the wives were on weight reduction diets, their consumption of "empty calorie" foods was decreased (β = -0.229; Figure 5f). This seemed logical and will not be discussed further.

Although the number of meals consumed by husbands was not expected to produce a direct negative effect on wives' consumption of "empty calorie" foods, a weak positive direct effect of husbands' meals on wives' consumption of "empty calorie" foods was observed (β = 0.137; Figure 5f). Perhaps when husbands ate more meals, wives' baked more desserts, which then resulted in an increase in their "empty calorie" score.

<u>Variety of nutritious foods consumed by wives</u> The wives' health goals, the number of meals wives consumed, and the variety of nutritious foods consumed by husbands were hypothesized to lead to increased variety of nutritious foods consumed by wives. These hypotheses were supported by the data (β = 0.326, 0.338, and 0.226, respectively; Figure 5g). The hypothesized negative effect of the wives' social goals on the variety of nutritious foods they consumed was also supported by the data (β =

-0.182). However, as shown in Figure 5g, no empirical support was found for either of the hypothesized negative effects of wives' economic goals or their "empty calories" on consumption of a variety of nutritious foods.

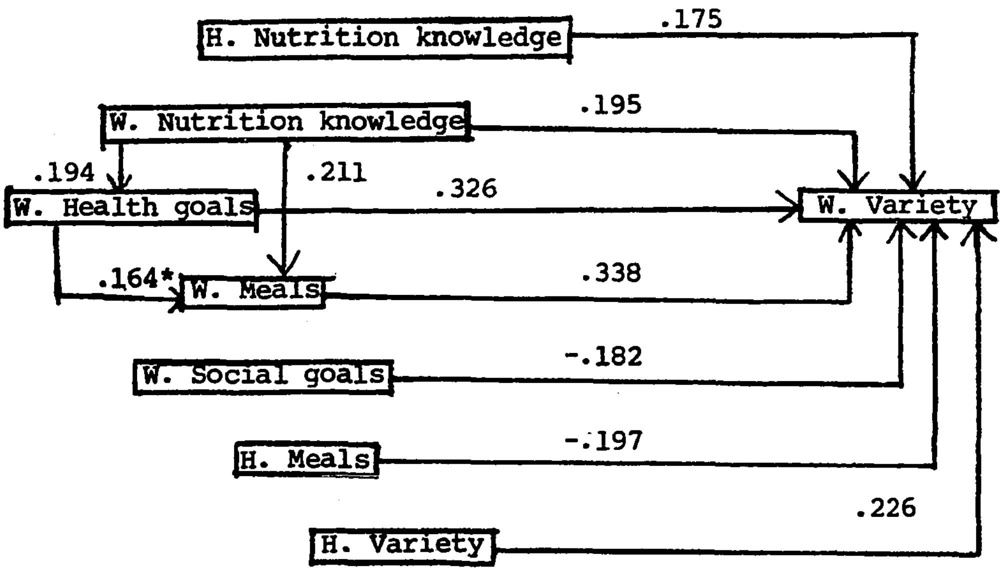


Figure 5g. Variety of nutritious foods consumed by wives

Of the relationships described above, it was especially interesting that wives' health goals exerted a strong direct effect on the variety of nutritious foods consumed, and that this effect was independent of the number of meals consumed by wives. The fact that wives' health goals can affect the variety of nutritious foods independently of the number of meals implied that even though some wives may not have been following the traditional 3 meals a day pattern, they could still obtain a large variety of nutritious foods in their food selection behavior.

The relationship of wives' health goals to their variety of nutritious foods can also be compared with the relationship of wives' health goals to their "empty calorie" consumption (see previous discussion of "empty calorie" consumption of wives). The path coefficient from health goals to "empty calories" was -0.376, while the path coefficient from health goals to variety was 0.326. Thus, health goals affected the variety of nutritious foods consumed and the "empty calorie" consumption with approximately the same magnitude, although the direction of influence was reversed. Thus health goals exerted a "double-barrelled" effect on food selection of wives.

Means orientation, which emphasized independence, was expected to have a direct negative effect on the variety of foods consumed by wives. This hypothesis was not supported by the data. However, as shown in Figure 5, the wives' means orientation exerted a negative effect indirectly on the wives' variety via the wives' social goals:

$$\boxed{\text{W. Means}} \xrightarrow{.185} \boxed{\text{W. Social goals}} \xrightarrow{-.182} \boxed{\text{W. Variety}}$$

Thus, while the hypothesis of a direct effect was not supported, an indirect effect via an intervening variable did exist.

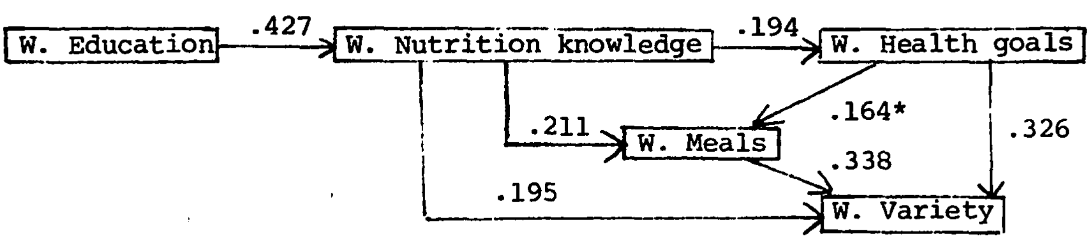
Risk orientation was hypothesized to produce a positive change in the variety of nutritious foods consumed by wives because women with this orientation were expected to try new foods. Although a significant β weight from the wives' risk orientation to their variety was not found, there was a significant zero-order correlation (r=0.33; Table 32). In fact there were significant zero-order correlations (but not significant path coefficients) between the variety of nutritious foods consumed by wives and the following variables: wives' education (r=0.29), family income (r=0.24), social class (r=0.33), and orientation towards modernism (r=0.20) (Table 32). The correlation between risk orientation and variety was apparently due to an indirect net positive effect via the wives' economic goals and the number of meals:

$$\boxed{\text{W. Att. risk}} \xrightarrow{-.267} \boxed{\text{W. Economic goals}} \xrightarrow{-.262} \boxed{\text{W. Meals}} \xrightarrow{.338} \boxed{\text{W. Variety}}$$

The correlation between social class and wives' variety could be due to several indirect routes. The strongest route would appear to be the following:

$$\boxed{\text{Social class}} \xrightarrow{.326} \boxed{\text{W. Meals}} \xrightarrow{.338} \boxed{\text{W. Variety}}$$

Educational level could be related to wives' variety via several alternative routes. Since education of wives positively affected both the wives' risk orientation and social class rating, the two routes diagrammed above could contribute also to the positive zero-order correlation between wives' educational level and the variety of nutritious foods they consumed. The wives' educational level could also derive its positive zero-order correlation with wives' variety from the following routes:



Income and the wives' value-attitude toward modernism were related positively to educational level, social class, and wives' value-attitude towards risk (Figure 5). Presumably the correlation between income or modernism and wives' variety were also influenced by the three routes diagrammed above.

Nutrition knowledge of both husbands' and wives' was expected to produce an indirect positive change in the variety of nutritious foods the wives consumed via the intervening variables of wives' health goals and the number of meals they consumed. While the indirect effect on wives' variety was supported for the wives' nutrition knowledge (Figure 5g), a direct effect of both husbands' and wives' knowledge of nutrition on the wives' variety was also observed (β = 0.175 and 0.195, respectively). In fact, the only variable in the wives' model which was influenced directly by husbands' knowledge of nutrition was the variety of nutritious foods consumed by the wives. Thus, when the husbands' nutrition knowledge was high, husbands may have encouraged their wives to serve a larger variety of foods.

As shown in Figure 5g, the number of meals consumed by husbands produced a negative change in the variety of foods consumed by wives(β = -0.197). The number of meals consumed by husbands had been expected to produce an indirect positive effect on wives' variety via the intervening variable of number of meals consumed by wives. However, the number of meals consumed by husbands did not influence the number of meals consumed by wives. The direct negative effect of husbands' meals on wives' variety may have been due, therefore, to the fact that husbands varied greatly in the number of meals they consumed at home (from 40 to 100 percent of total meals per week). When husbands were eating meals away from home, wives may have been snacking or eating only a limited variety of nutritious foods.

Quantity of nutritious foods consumed by wives The quantity of nutritious foods consumed was measured as the total number of standard-size servings of the four food groups which the wives consumed per day. Three variables were hypothesized to produce direct effects on the quantity of foods consumed by wives. The number of meals consumed by wives and the quantity of foods consumed by their husbands were both hypothesized to have a positive effect on the quantity of foods consumed by wives. Wives frequently consuming "empty calorie" foods were expected to decrease the quantity of foods they consumed. As shown in Figure 5h, none of these hypotheses were supported by the data:

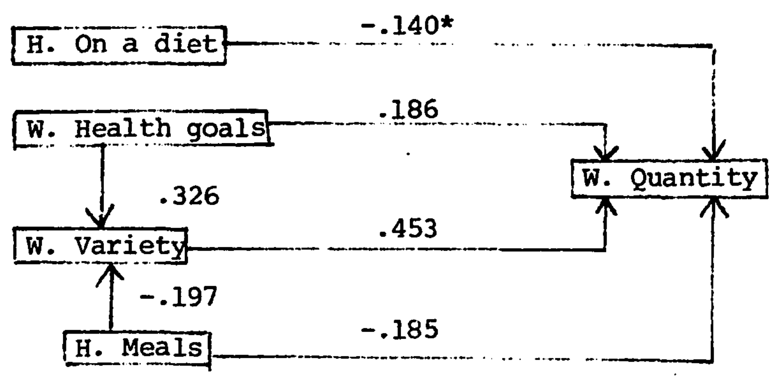


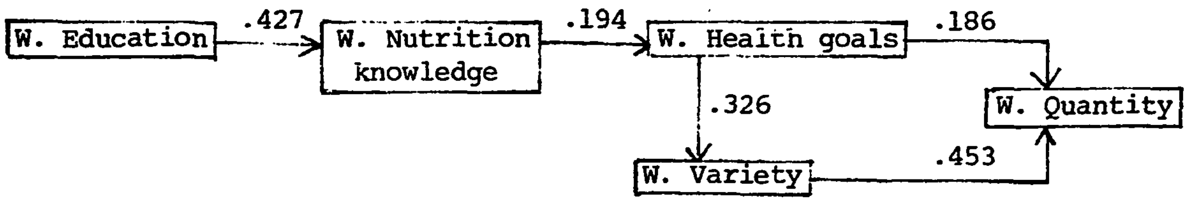
Figure 5h. Quantity of nutritious foods consumed by wives

Although the number of meals consumed by the wives did not produce the expected change in the quantity of nutritious foods they consumed when path coefficients were analyzed, these two variables were significantly correlated (r=0.33; Table 32). This zero-order correlation was apparently due to an indirect effect of number of meals consumed by wives on their quantity consumption, through the variety of foods they consumed (see diagram below):

$$\boxed{\text{W. Meals}} \xrightarrow{+} \boxed{\text{W. Variety}} \xrightarrow{+} \boxed{\text{W. Quantity}}$$

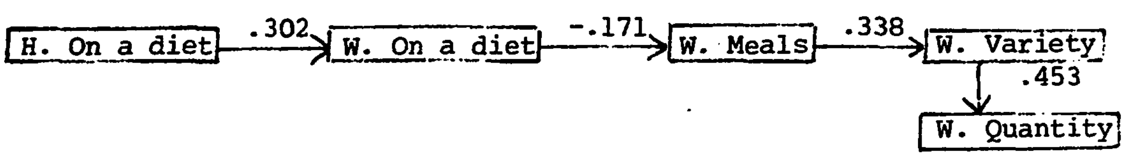
The strong direct effect of the wives' variety on their quantity consumption ($\beta = 0.453$; Figure 5h) had not been hypothesized because quantity could be due either to many servings of a few foods or to a few servings of many different foods. Thus, any clear cut relationship was difficult to predict. However, for the wives in this sample, the quantity of nutritious foods they consumed was determined to a significant degree by the variety of foods they ate.

Although the wives' health goals were not expected to exert a direct effect on the quantity of foods they consumed, a significant β weight (0.186) was obtained for this path. The direct relationship between wives' health goals and their quantity consumption suggested that wives who placed a high value on health were more likely to be concerned with and consequently would practice good eating habits. This pathway could also account for the positive zero-order correlation (r=0.23; Table 32) between the wives' educational level, which occurred antecedent to the health goals, and the quantity of nutritious foods they consumed:



From the above diagram, it is obvious that education and quantity would covary together.

If the husbands were on a weight reduction diet, the wives' quantity was weakly and negatively affected ($\beta = -0.140$). In addition to this direct effect of husbands' dieting behavior, the husbands' weight reduction behavior had an indirect negative effect on the wives' quantity via the intervening variables of 1) wives on a diet, 2) wives' meals, and 3) wives' variety:



Thus, if the husbands were reducing their intakes, the wives were also likely to reduce their intakes, possibly as a gesture of support for their husbands.

Per person food expenditures[1] The per person food expenditures were based on the amount of money the family spent on groceries per week, corrected for the equivalent calorie-nutrition units of the individual family members, and the number of meals eaten at home. Three variables were hypothesized to increase the per person food expenditures. These variables were 1) the variety of foods consumed by the wives, 2) the quantity of foods consumed, and 3) the total family income. However, the diagram in Figure 5i shows that only the first of these variables (variety of nutritious foods consumed by wives) produced a direct effect on the amount of money spent per person. However, this effect was

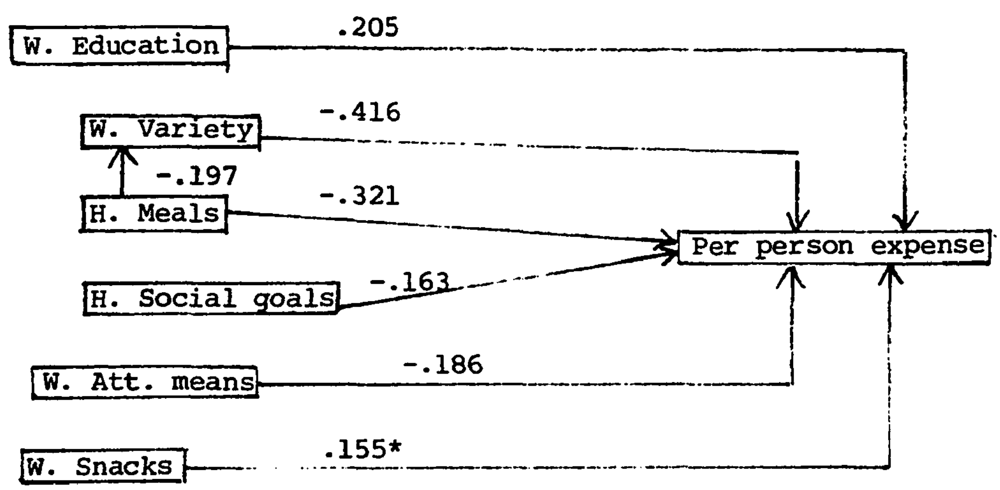


Figure 5i. Per person food expenditures in wives' model

[1]The per person food expenditures variable which was analyzed in the husbands' model was the same as that used in the wives' model. However, since the independent variables entering the regression equation varied somewhat for these two models, the variables and the respective β weights which were identified as causative factors of per person food expenditures varied somewhat between the two models.

negative, rather than positive as hypothesized (β = -0.416). Although not hypothesized, the number of snacks consumed by the wives weakly increased the food costs per person (β = .155). The negative effect of the variety of nutritious foods consumed and the positive effect of snacks consumed on the per person food expenditures suggested that high food expenditures were due to use of snack foods which were more likely to be costly than to the use of a wide variety of foods.

As shown in Figure 5i, the means orientation of the wives produced a negative effect on the per person food expenditures, as analyzed in the wives' model. Wives who placed a high value on independence (means orientation) may have refused to buy high priced items at the grocery store.

The number of meals consumed by husbands and the husbands' social goals both produced negative effects on per person food expenditures in the wives' model (β = -0.321 and -0.163, respectively; Figure 5i). The negative effect of the husbands' meals again probably reflected the fact that husbands ate more meals away from home than did their wives, and thus the number of meals consumed by husbands may not have been reflected in the grocery expenditures. The negative effect of the husbands' social goals was more difficult to explain. Perhaps husbands who placed a high importance on social goals ate more meals away from home; money spent for food away from home was not included with that spent for groceries. Or, perhaps husbands who placed a high importance on social goals wanted to use their financial resources for other visible goods, and thus skimped on grocery expenditures.

Although not hypothesized, the educational level of the wives was observed to affect positively the per person food expenditures (β = 0.205; Figure 5i). A possible explanation could be that women with more education might have been more inclined to buy and use convenience foods, which often are higher in price than products made from "scratch." An unidentified, intervening variable is probably operative in the pathway between these two variables.

Nutrient intakes and overall diet quality of wives Analogous to the husbands' model, the path coefficients from the variables influencing intakes of protein, calcium, iron, vitamin A, thiamin, and vitamin C have not been included in the diagram of the wives' model. it has been left to the reader to place the nutrient intake mentally into the box at the right side of the diagram in Figure 5 and to connect the appropriate variables using path coefficients given in Table 33. The reader is reminded that the relationships among variables drawn in Figure 5 will not change. Only the added path coefficients specific for each nutrient intake will vary.

The significant path coefficients leading to the six nutrient intakes of wives are given in Table 33. The significant zero-order correlation coefficients are presented in Table 34. The nutrients and the variables influencing them will be discussed as a group.

Earlier, four hypotheses were proposed to predict the effects of independent variables on the nutrient intakes and overall diet quality of wives. Four variables, 1) the variety of nutritious foods consumed

Table 33. Path coefficients[a] for nutrient intakes, weight status, and overall diet quality of wives

Independent variables	Dependent variables							
	Protein	Calcium	Iron	Vit. A	Thiamin	Vit. C	Weight status	Overall diet quality
W. Education	N.S.†	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
Income	N.S.	N.S.	N.S.	N.S.	-.114	N.S.	N.S.	N.S.
Social class	-.085	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
W. Risk	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
W. Mastery	N.S.	N.S.	N.S.	N.S.	N.S.	-.159	N.S.	N.S.
W. Modernism	N.S.	.166	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
W. Means	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
H. Knowledge	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	-.135*	N.S.
W. Knowledge	N.S.	N.S.	N.S.	N.S.	-.169	N.S.	N.S.	N.S.
H. Health goals	N.S.	.159	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
W. Health goals	N.S.	N.S.	N.S.	.144	N.S.	N.S.	N.S.	N.S.
H. Economic goals	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
W. Economic goals	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
H. Social goals	N.S.	-.149*	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
W. Social goals	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
H. On a diet	N.S.	N.S.	N.S.	N.S.	-.100*	N.S.	-.267	N.S.
W. On a diet	N.S.	.140*	N.S.	.188	N.S.	N.S.	.416	N.S.
H. Meals	N.S.	N.S.	N.S.	-.165	N.S.	N.S.	N.S.	N.S.
W. Meals	N.S.	N.S.	N.S.	N.S.	.165	N.S.	-.199	.216
H. Snacks	N.S.	.155	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
W. Snacks	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
H. "Empty calories"	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	-.116*
W. "Empty calories"	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	-.157	N.S.
H. Variety	.166	N.S.	N.S.	N.S.	N.S.	-.178	-.218	N.S.
W. Variety	N.S.	N.S.	N.S.	.193	.184	.281	N.S.	.221
H. Quantity	N.S.	N.S.	N.S.	-.192	-.249	-.254	N.S.	N.S.
W. Quantity	.910	.621	.662	.600	.721	.492	N.S.	.500
Per person expense	.133	N.S.	N.S.	.130	.108*	.204	-.268	.128*
H. Nutrient intakes or weight status	N.S.	.128*	N.S.	.244	.205	.252	.225	.165

[a]Path coefficients = β weights.

*Significant at least at 0.10 level. Non-starred path coefficients are significant at least at the 0.05 level.

†N.S. = not significant at least at 0.10 level.

Table 34. Zero-order correlation coefficients between frame-of-reference or food behavior variables and nutrient intakes or weight status of wives

Independent variables	Dependent variables							
	Protein	Calcium	Iron	Vit. A	Thiamin	Vit. C	Weight status	Overall diet quality
W. Education	.24	.28	.15*	.24	N.S.†	.16*	-.16*	.24
Income	.18*	N.S.	N.S.	.19	N.S.	.17*	N.S.	.17*
Social class	N.S.	N.S.	N.S.	.23	N.S.	.20	-.18*	.27
W. Risk	N.S.	N.S.	.18*	.19	N.S.	.19	N.S.	.24
W. Mastery	.13*	.16*	N.S.	.18*	N.S.	N.S.	N.S.	.14*
W. Modernism	N.S.	.21	N.S.	N.S.	N.S.	N.S.	N.S.	.20
W. Means	N.S.	-.14*	N.S.	-.15*	N.S.	N.S.	N.S.	-.18*
H. Knowledge	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	-.14*	N.S.
W. Knowledge	N.S.	.18*	N.S.	.22	N.S.	.13*	N.S.	.24
H. Health goals	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
W. Health goals	.23	.13*	.24	.31	.21	N.S.	.16*	.19
H. Economic goals	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
W. Economic goals	N.S.	-.14*	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
H. Social goals	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
W. Social goals	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
H. On a diet	N.S.	N.S.	N.S.	N.S.	-.14*	N.S.	N.S.	N.S.
W. On a diet	N.S.	N.S.	N.S.	.15*	-.13*	N.S.	.44	N.S.
H. Meals	N.S.	N.S.	N.S.	-.16*	N.S.	-.24	N.S.	N.S.
W. Meals	.30	.25	.20	.29	.38	.24	-.22	.47
H. Snacks	N.S.	N.S.	-.19	N.S.	-.14*	N.S.	N.S.	-.13*
W. Snacks	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
H. "Empty calories"	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	-.18*
W. "Empty calories"	-.13*	N.S.	-.15*	-.18*	N.S.	N.S.	-.20	N.S.
H. Variety	.13*	.18*	N.S.	.13*	N.S.	N.S.	-.20	.21
W. Variety	.44	.37	.32	.51	.44	.40	N.S.	.55
H. Quantity	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
W. Quantity	.90	.60	.66	.73	.80	.62	N.S.	.66
Per person expense	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	-.18*	N.S.
H. Nutrient intakes or weight status	N.S.	.18*	N.S.	N.S.	N.S.	.17*	.30	N.S.

*Significant at least at 0.10 level. Non-starred path coefficients are significant at least at the 0.05 level.

†N.S. = not significant at least at 0.10 level.

by wives, 2) the quantity of standard-serving sizes eaten, 3) the per person expenditures for food, and 4) the husbands' intake of the same nutrient or their overall diet quality, were hypothesized to produce positive changes in the wives' nutrient intakes or in the wives' overall diet quality.

The first of these variables (i.e., variety of nutritious foods consumed by wives) produced positive changes in their vitamin A, thiamin, and vitamin C intakes and their overall diet quality (β = 0.193, 0.184, 0.281), and 0.221; Table 33). The hypothesis involving the effect of variety of nutritious foods was thus supported for these 3 nutrients and overall diet quality, but not for protein, calcium, or iron intakes.[1]

The quantity of nutritious foods consumed by wives produced positive effects, as predicted, on all the nutrient intakes and on the overall diet quality of the wives. The β weights for protein, calcium, iron, vitamin A, thiamin, and vitamin C were 0.910, 0.621, 0.662, 0.600, 0.721, and 0.492, respectively (Table 33). The β weight for the overall diet quality of the wives was 0.500.

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[1]The measure, variety of nutritious foods consumed, was obtained by counting the number of different foods eaten by the respondent on a regular basis. The individual food items included in this score were not standardized prior to the summation step. Hence, it was possible that the scores for this variable were weighted by the fruits and vegetables, because more variety was possible within these groups than for other food groups. Therefore, the effect of variety on the vitamin A and C intakes may have been confounded by weighting. Although direct summation has been used by previous researchers, it is suggested that possible weighting effects be corrected prior to calculation of scale scores in future research.

The positive effect of the per person food expenditure on the wives' nutrient intake was supported for their intakes of protein ($\beta = 0.133$), vitamin A ($\beta = 0.130$), thiamin ($\beta = 0.108$), and vitamin C ($\beta = 0.204$), and also for their overall diet quality ($\beta = 0.128$), but not for intakes of iron and calcium.

In summary, for wives, the 4 variables of 1) variety, 2) quantity, 3) per person food expense, and 4) husband's intake affected positively wives' intakes of vitamin A, thiamin, and vitamin C, and their overall diet quality. Protein intake was influenced by quantity of food and food expenditures; calcium was influenced by wives' quantity and by husbands' intake of calcium. Iron intakes were influenced only by quantity of food eaten.

The data in Table 33 revealed that in general, the effect of variables, other than the four discussed above, had neither consistent nor strong relationships with the nutrient intakes in the wives' model. These variables will not be discussed.

Weight status of wives The weight status values were based on the weight of each respondent divided by the recommended weight for the respondent's height and frame size. The larger the value for weight status, the greater the degree of obesity. Therefore, the relationships between weight status and other variables were expected to be opposite in direction to the relationships observed for the nutrient intakes.

The variety and quantity of nutritious foods consumed by the wives were hypothesized to produce negative effects on their weight status.

These two hypotheses were not supported (Table 33). The expected negative effect of the per person food expenditure on wives' weight status was confirmed with a path coefficient of -0.268. The husbands' weight status exerted an expected positive effect on the wives' weight status ($\beta = 0.225$).

The reason for using weight status as an ultimate dependent variable was the hope that factors causing overweight in the respondents could be identified. However, the findings for wives were similar to those for husbands, i.e. the relationships observed did not seem logical. For example, the data in Table 33 indicated that if wives were on a weight reduction diet, a positive change was produced in weight status ($\beta = 0.416$). That is, if the wives were on a diet, this caused them to be overweight. Obviously, the reverse relationship was more reasonable and should be tested. The wives' "empty calorie" consumption produced a negative change in their weight status ($\beta = -0.157$). This implied that a high "empty calorie" consumption caused a more normal weight status. Again, it would be more logical to test the reverse hypothesis: overweight caused lower consumption of "empty calorie" foods.

Two variables, number of meals consumed by wives and variety of nutritious foods consumed by husbands, produced negative changes in wives' weight status ($\beta = -0.199$ and -0.218). From a theoretical viewpoint, it was difficult to decide which direction these relationships should be tested. For example, one could logically argue that the fewer meals the wives' consumed, the more likely they were to "stuff themselves" in one sitting and consequently become overweight. Or, fewer meals might result in constant snacking. On the other hand, it could be argued that overweight caused a reduction in the number of meals consumed because of concern about overweight and because of possible reduced energy needs due to reduced physical activity. No attempt has been made in this analysis to test relationships simultaneously or in the direction opposite to that hypothesized.

Similarly, logical arguments could be given for testing the effect of husbands' variety on wives' weight status in both directions. If husbands' variety were small, wives may have been more likely to be overweight because the diet consisted of foods which had high caloric concentrations. Or, vice versa, if wives were overweight they might have been "lazier" and thus less interested in preparing a variety of foods for meals, or even in preparing meals.

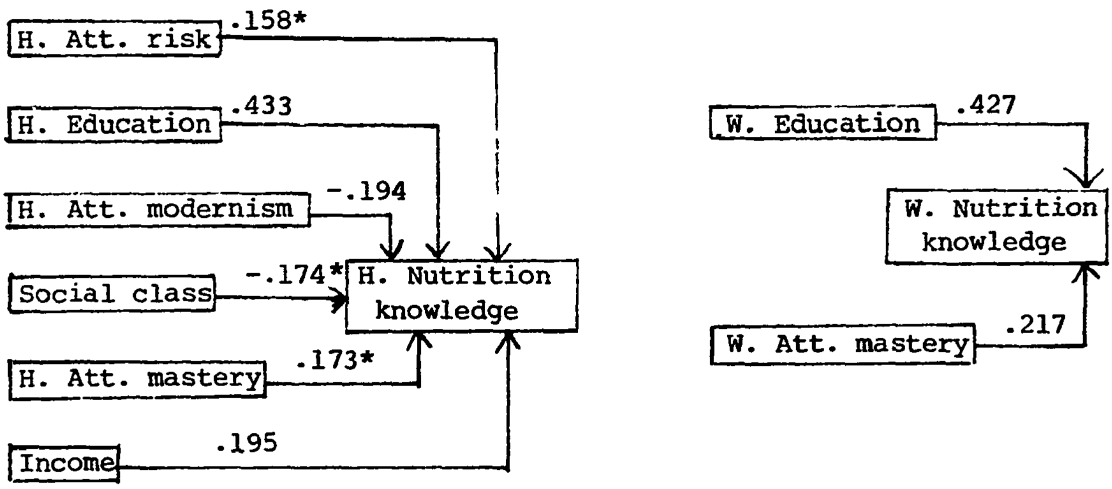
The data in Table 33 show that if husbands were on weight reduction diets, their wives were more likely to be of normal weight (β = -0.267). Again, the reverse relationship may be a more logical interpretation. That is, if the wives' weights were normal, they may have put pressure on their husbands to adopt weight reducing diets.

Comparison of husbands' and wives' models

In this section, the major differences observed between husbands' and wives' models will be discussed. These differences are derived from the models presented in Figures 4 and 5. Only those relationships which were judged to be most important will be discussed.

Nutrition knowledge As shown in the diagram below, the nutrition knowledge of the wives was caused directly by two factors, while six factors directly affected the nutrition knowledge of the husbands (although three were significant only at the 0.10 level of significance). It appears then, that factors influencing the attainment of nutrition

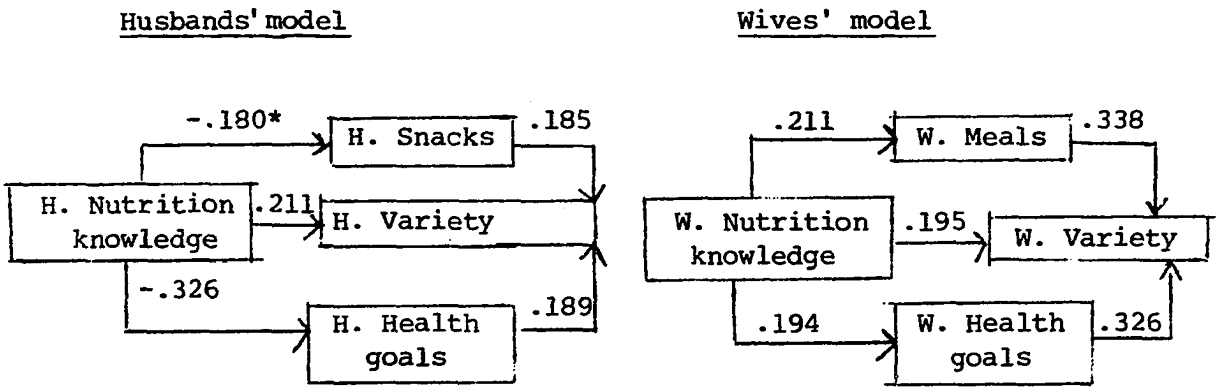
Husbands model[1] Wives' model



knowledge for husbands were more diffuse than for the wives. Wives often receive nutrition education in junior or high school home economics classes, while husbands would not likely have such a specific source of nutrition knowledge. However, for both husbands and wives, educational level was the most important factor affecting their nutrition knowledge.

[1]A direct comparison of the path coefficients for two populations (i.e., husbands and wives) cannot be made. Only path coefficients within the same model can be directly compared.

The way in which nutrition knowledge affected subsequent variables in the models was not identical for husbands and wives. As shown in the diagram below, the effect of nutrition knowledge on the variety of foods consumed by husbands and wives was similar. However,



the effect of nutrition knowledge on health goals differed markedly, being positive for wives and negative for husbands. An intervening variable such as role expectations may help to interpret this difference. The data on mean importance scores for the goal orientations revealed that husbands gave lower mean values to health goals than did wives. Perhaps health goals were perceived as important concerns for wives in their roles as homemakers, but husbands were expected to be concerned with other matters. If, however, husbands placed low importance on health goals, it is reasonable to assume that wives may not have served foods that contributed optimally to nutritional recommendations, because such foods were not requested or not accepted by husbands. Because energy requirements of wives were lower than husbands' requirements, nutrient intakes of wives would be adversely affected to a greater extent than would intakes of husbands by sub-optimum food selection.[1] Therefore, an important function of any intervention program would be to help husbands realize that the importance they place on health affects not only themselves, but other family members also.

As also shown in the above diagram, the nutrition knowledge of wives affected the number of meals they consumed while the nutrition knowledge of husbands affected the number of snacks, but not the number of meals they consumed. Perhaps husbands exerted more control over their snack consumption and therefore exerted their knowledge of nutrition in this area, while the wives had greater control over meals prepared and eaten. In addition, the importance of three meals a day[2] may have been emphasized in home economics classes taken by wives. Husbands, who perhaps obtained their nutrition knowledge from sources other than home economics classes, may not have been impressed with the concept that three meals a day are important.

The diagram in Figure 4 reveals that wives' knowledge of nutrition did not exert a direct effect on any variables in the husbands' model.[3] In contrast, as shown in Figure 5, husbands' knowledge of nutrition

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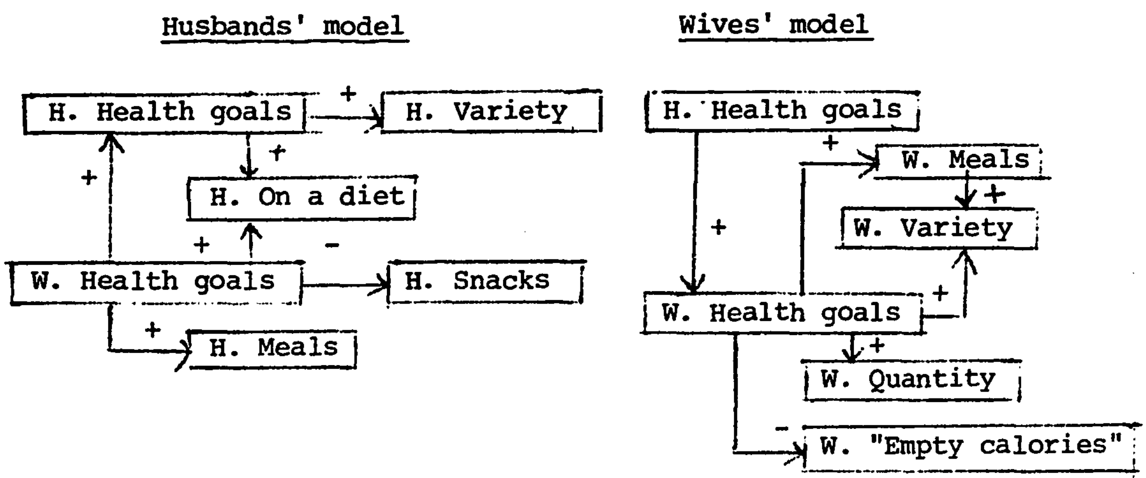
[1]The husbands, by consuming larger quantities of foods which contribute lower concentrations of nutrients could obtain adequate nutrient intakes, while wives could not consume large enough quantities of these foods to meet recommended nutrient allowances.

[2]This is a concept which not all nutritionists accept.

[3]The wives' knowledge of nutrition did exert indirect effects on variables in the husbands' model via the wives' health goals and wives' meals, but these were tested only in the wives' model, not the husbands' model.

directly affected the variety of foods consumed by wives. Perhaps within the power structure of the family, wives may not have felt free to use their knowledge of nutrition if it was inconsistent with husbands' knowledge or food preferences. If husbands had good knowledge of nutrition, they may have reinforced food behavior of their wives by encouraging them to prepare a variety of foods which were subsequently consumed by both of them. The lack of effect of wives' nutrition knowledge on husbands' food behavior may also be due to the fact that some husbands ate only one meal a day at home. Hence, wives may have had little control over their husbands' food behavior, regardless of how much nutrition knowledge the wives had.

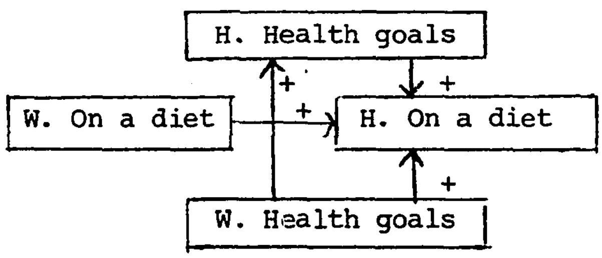
<u>Health goals</u> The importance of health goals, as determined by the number of variables directly affected by them, varied for husbands and wives. From the diagram below, it can be seen that the



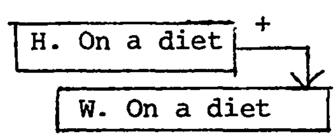
husbands' health goals produced a direct effect on two variables in the husbands' model and one variable in the wives' model. On the other hand, wives' health goals affected eight variables - four in the wives' model and four in the husbands' model. Thus, the importance placed on health by wives affected more than twice as many variables than did husbands' health goals.

<u>On a weight reduction diet</u> The factors affecting dieting behavior of husbands and wives also varied (see diagram below).

<u>Husbands' model</u>

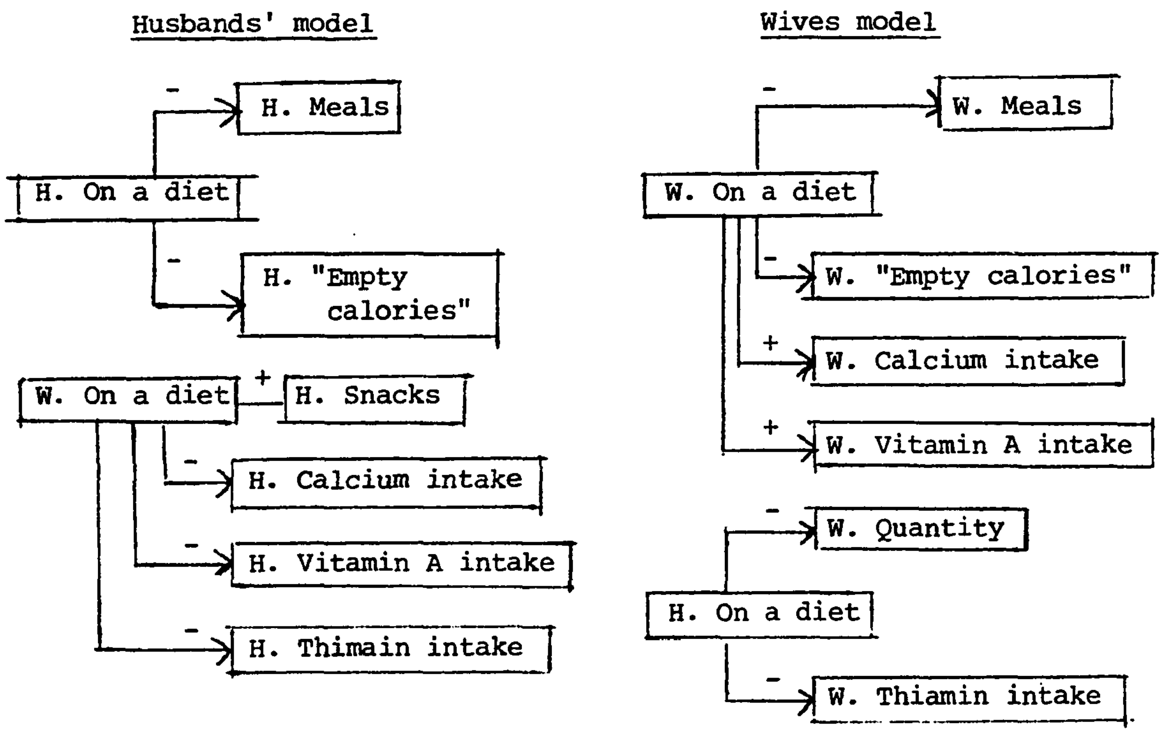


<u>Wives' model</u>



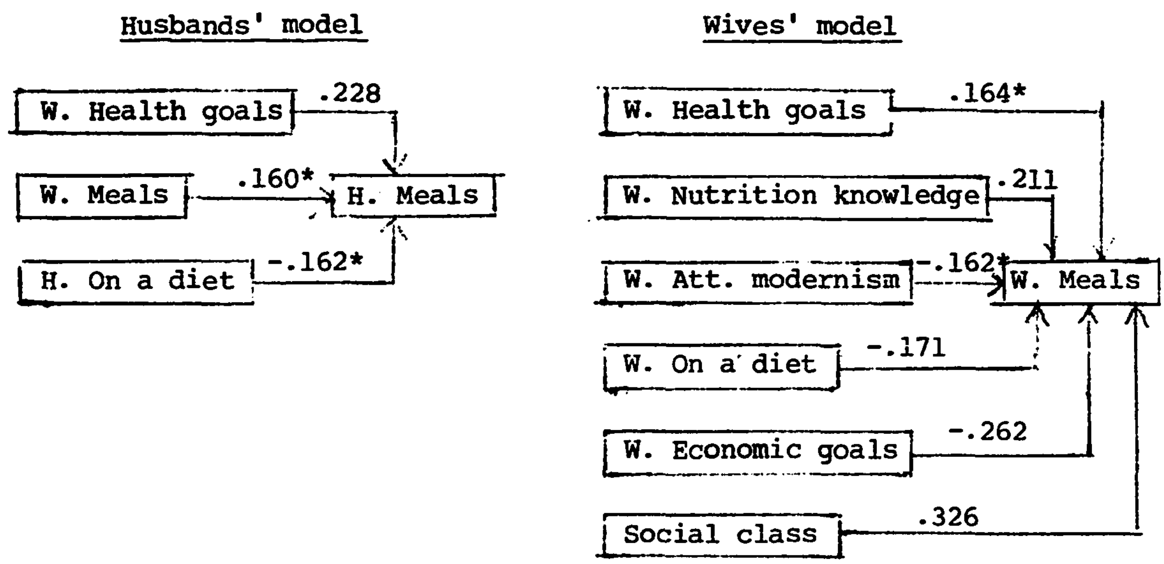
While weight reduction by wives was influenced only by the fact that their husbands' were on a diet, dieting behavior of husbands' was affected both by their own health goals and the health goals of their wives; in addition, wives' dieting behavior caused similar behavior in husbands. Since factor analysis of goal orientations (see Appendix E) showed that maintenance of normal weight had an underlying social dimension for wives, perhaps wives pressured their husbands and themselves to lose weight, but husbands were less concerned with weight control.

The diagram below shows that when wives were on a weight reduction diet, their intakes of calcium and vitamin A were affected positively. However, husbands' intakes of calcium, vitamin A, and thiamin were adversely affected when wives were dieting. Furthermore, when wives' were dieting, husbands' increased their snack consumption; perhaps they were compensating for decreased intake of food at meal times. When husbands were dieting, only thiamin intake of wives was adversely affected. Thus wives' dieting behavior appeared to have a greater detrimental effect on husbands' nutrient intakes than on their own in-



takes, while husbands' dieting behavior exerted relatively small adverse effects on wives' nutrient intakes as well as on their own.

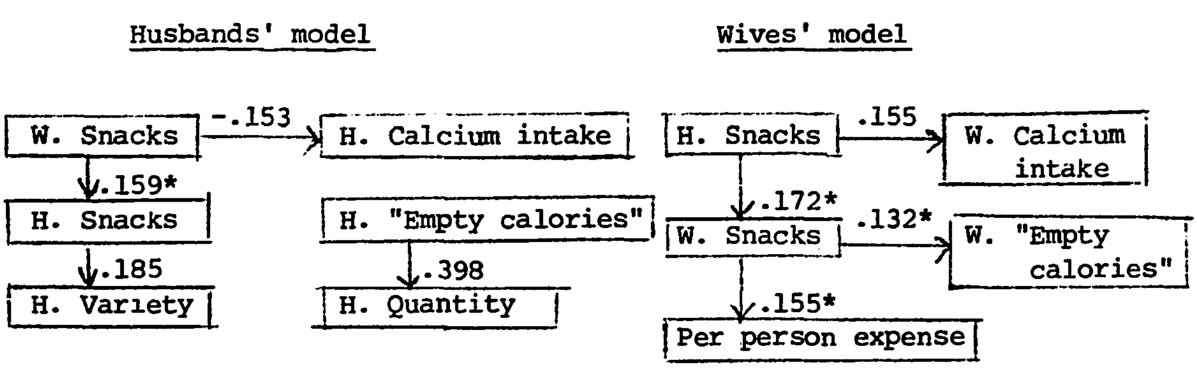
Number of meals   The variables which directly affected the number of meals consumed by husbands and wives are diagrammed below:



One difference between husbands' and wives' models is the strong direct effect of social class on the number of meals consumed by wives, and the absence of such an effect on husbands' meals. Because the direct effect of social class on the number of meals consumed does not appear to be logical, unidentified and unmeasured intervening variables must exist. No explanation can be offered for the difference in effect of social class on the number of meals consumed by husbands and wives.

The results in the above diagram also indicate that it was the wives who influenced the number of meals consumed both by themselves and by their husbands, even though many husbands frequently ate meals away from home. As expected, the most frequently skipped meal was breakfast. Perhaps wives who placed high importance on health made an effort to prepare breakfast. If the wives did not feel health was important, husbands may have tended to skip breakfast.

<u>Snack and "empty calorie" consumption</u> As shown in the diagram below, the number of snacks consumed by husbands did not affect their "empty calorie" consumption, while the number of snacks consumed by wives had a positive effect on their "empty calorie" consumption. Furthermore, husbands' snack consumption was related to their variety

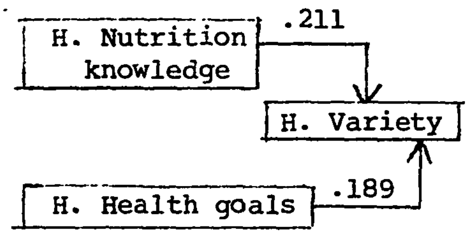


intake, and their "empty calorie" consumption was related to the quantity of nutritious foods they consumed. It is possible that husbands' snacks were more frequently nutritious foods while wives' snacks consisted more frequently of "empty calorie" foods. This explanation was supported by the fact that the number of snacks consumed by wives negatively affected calcium intake of husbands; while husbands' snacks produced a positive change in wives' calcium intake. Thus snack consumption by husbands and wives affected their spouses' calcium intake in opposite directions. The results from wives' data would thus be closely aligned with the theoretical model and with the results of

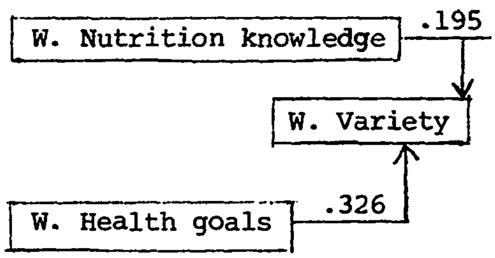
Christenson (1973), whereas husbands' behavior would be similar to that described by Thomas and Call(1973) who found that snacks eaten by teen-agers contributed significantly to their nutrient intakes.

Variety and quantity of nutritious foods consumed As shown below, one of the major differences between the factors affecting the variety of nutritious foods consumed by husbands and wives was the

Husbands' model



Wives' model



relative effects of nutrition knowledge and health goals of the respondents on the variety of foods they consumed. For husbands, nutrition knowledge was slightly more important than health goals (although the two values probably did not differ significantly) in affecting the variety of nutritious foods consumed by husbands. However, for wives, the health goals were over 50% more important than nutrition knowledge in affecting the variety of foods they consumed. No explanation can be offered for this finding.

The relationship between the variety of nutritious foods consumed and the quantity of nutritious foods consumed also varied between husbands' and wives' models, as shown below:

Husbands' model		Wives' model
H. Variety	H. Quantity	W. Variety $\xrightarrow{.453}$ W. Quantity

For wives, the variety of foods consumed produced a large positive change in the quantity of nutritious foods they consumed. For husbands, no relationship existed between the variety and quantity of nutritious foods consumed. By comparing the ratio of β weights for the effects of husbands' quantity to variety (Q/V) with the same ratio for wives, we may gain further insight into the relative effects of quantity versus variety (quality) on nutrient intakes. These ratios (derived from Tables 29 and 33) are summarized below:[1]

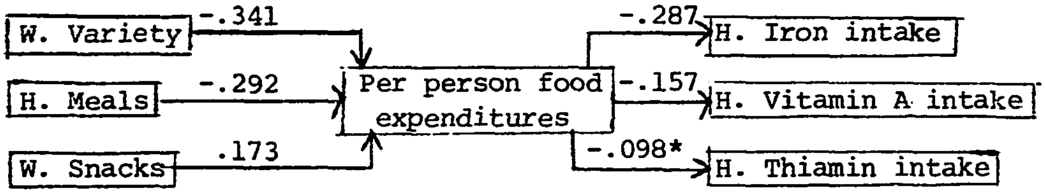
Dependent variables	Husbands: Independent Variables: variety	Husbands: Independent Variables: quantity	Husbands: Q/V	Wives: Independent Variables: variety	Wives: Independent Variables: quantity	Wives: Q/V
calcium	0.280	0.417	1.5	-	-	-
vitamin A	0.408	0.427	1.0	0.193	0.600	3.1
thiamin	-	-	-	0.184	0.721	3.9
vitamin C	0.363	0.445	1.2	0.281	0.492	1.8
overall diet quality	0.407	0.273	0.7	0.221	0.500	2.3

[1]Comparable data for husbands and wives on thiamin and calcium intakes were not available because variety did not have a significant path coefficient for these variables for husbands and wives, respectively.

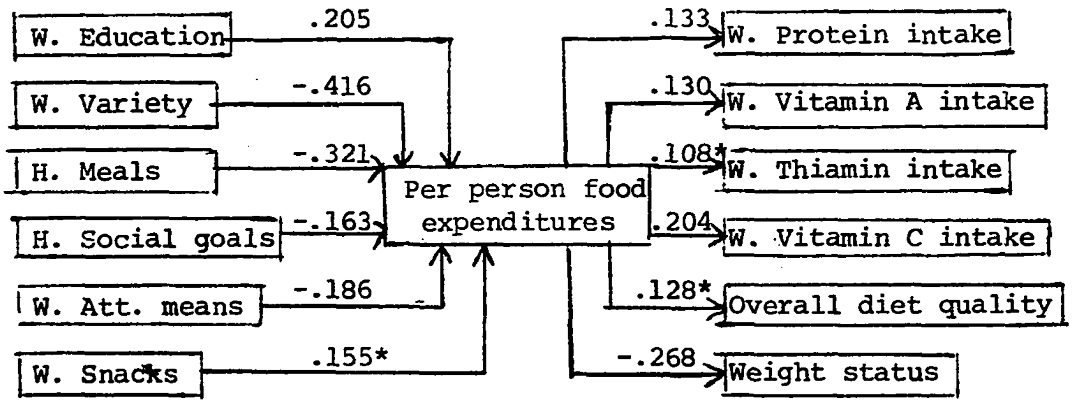
Because the ratios of quantity to variety (Q/V) for 4 nutrients were larger, in general, for wives than for husbands, the quantity of nutritious foods eaten was relatively more important than variety for wives. If we compare the Q/V value associated with overall diet quality for husbands with that for wives, the importance of variety on husbands' overall diet quality was magnified, while the importance of quantity for wives' overall diet quality was again demonstrated. Because there was no relationship between variety and quantity of foods eaten by husbands (see diagram above), variety exerted its effect on nutrient intake independently of quantity. For wives, the variety of foods consumed exerted its effect primarily on nutrient intakes indirectly via quantity, rather than directly (see above diagram). The quantity and variety of nutritious foods may have affected nutrient intakes of husbands and wives differently because meat intake weighted the quantity score unduly (see discussion for husbands' causal model on quantity of nutritious foods consumed). Weighting by meat had a greater impact on the quantity score of husbands than that of wives.

Per person food expenditures The per person food expenditures, in both husbands' and wives' models, drawn below, appeared to be due to a positive effect of wives' snacks and a negative effect of wives' variety and husbands' meals:

Husbands' model



Wives' model



Additional factors affected the per person food expenditures in the wives' model. Also, the amount spent for food had different effects on the nutrient intakes of husbands and wives. The food expenditures positively affected four nutrient intakes for wives and negatively influenced three nutrient intakes for husbands; presumably, much of the money spent for husbands' food did not come from grocery expenditures.

Implications for intervention

One of the objectives of this dissertation was to make general recommendations for intervention programs based on the empirical results of the model tested. Nutrient intakes and weight status were analyzed as end products of internal and external factors in an individual's frame of reference with respect to food behavior and also as a result of specific food behavioral practices. The frame-of-reference variables were expected to produce effects on food behavior practices directly, and to influence nutrient intakes and weight status indirectly. Food behavior practices were expected to influence nutrient intakes and weight status directly, and to be modified by frame-of-reference variables.

Blalock (1964) suggested two criteria for evaluating the adequacy of any model being tested. First of all, if a high degree of unexplained variation was found, the researcher should look for other variables that were not included in the proposed model. Secondly, if the researcher could find no theoretical reason for a direct causal link between two variables in the model, one or more unmeasured intervening variables that could explain the direct linkage should be postulated and tested.

The first criterion suggested above, i.e., a high degree of unexplained variation, can be evaluated by looking at data in Table 35. The percent of variance explained for nutrient intakes by variables included in this model varied from 36 percent for the calcium intake of the husbands to 85 percent for the protein intake of the wives. The percent of variance explained for the weight status of the husbands was only 17 percent, while 44 percent of the variance in the wives' weight

Table 35. Percent of variance explained for the variables included in husbands' and wives' models

Variable Name	Percent variance explained	
	Husbands' model	Wives' model
Frame-of-reference variables		
social class	36	24
mastery orientation	12	11
risk orientation	24	17
means orientation	2	0
modernism orientation	6	14
nutrition knowledge	31	28
health goals	16	9
economic goals	0	10
social goals	14	7
Food behavior variables		
on a weight reduction diet	17	9
number of meals	10	26
number of snacks	16	3
"empty calories"	12	43
variety	33	45
quantity	22	29
per person food expenditures	24	34
Nutrient intakes and weight status		
protein intake	61	85
calcium intake	36	48
iron intake	70	44
vitamin A intake	53	66
thiamin intake	75	72
vitamin C intake	44	52
weight status	17	44
overall diet quality	53	59

status was explained. When the overall diet quality was considered, 53 and 59 percent of the variance for husbands and wives, respectively, was explained. Although reliability of the measurement of nutrient intakes was not checked in this study, Christenson (1973) found reliabilities of 0.64, 0.87, 0.71, 0.78, 0.74, and 0.54 for the measurement of protein, calcium, iron, vitamin A, thiamin, and ascorbic acid intakes[1] for Iowa wives of a similar population sample. These reliability values indicated that approximately 50 percent of the variance in the ascorbic acid score was due to error variance while the error variance in the other measurements decreased to approximately 15% for calcium. While a correction for measurement error was not made in the present study, it is possible that a large percent of the true variance for the nutrient intakes of the present population was explained. A more definitive estimate of the percent of true variance explained could be obtained in subsequent analyses by using the errors-in-variables approach to data analysis (Warren, Keller, and Fuller; 1973).

For weight status, especially for husbands, only a small percentage of the variance was explained, indicating the need for identifying additional causative factors. As was pointed out during the discussion of the husbands' model, weight status may have been determined earlier in the husbands' life. Consequently, the relevant causal factors affecting weight status would have been operative during a time period prior to this study, and therefore would not have been measured in the present study.

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[1]Using test-retest correlations.

As shown in Table 35, in general, the percent of variance explained for food behavior variables was less than for nutrient intakes. The variation explained for the food behavior variables ranged from 3 percent for the number of snacks consumed by wives to 45 percent of the variation in the variety of foods consumed by wives. The quantity of nutritious foods consumed (which was the most important variable in explaining nutrient intakes) had only 22 and 29 percent of its variance explained for husbands and wives, respectively. An understanding of the causes of the food behavior variables is important for intervention programs because these are the "manipulatable" factors which directly influence nutrient intakes. Nutrient intakes can not be influenced directly, but can only be affected via other factors, such as food behavior variables. Hence, identifying and measuring additional causative factors of food behavior variables is imperative.

The frame-of-reference variables, as shown in Table 35, also had a low percent of their variance explained. Of particular interest for a nutrition intervention program was the percent variance explained for nutrition knowledge and health goal scores. For husbands and wives, 31 and 28 percent, respectively, of the variance in the nutrition knowledge scores was explained. Since educational level of husbands and wives exerted by far the largest influence (path coefficients of 0.433 and 0.427, respectively) on nutrition knowledge of spouses, the effect of nutrition education or related subjects in school curricula appear to be important. On the other hand, a large percentage of the variation in the knowledge scores was unexplained; an even larger percentage of the variance in the health goals was unexplained. Therefore, identification and measurement of other motivational and situational factors which influence the acquisition of nutrition knowledge and the enhancement of health goals is desirable to aid in the planning of intervention programs.

In summary, the results in Table 35 suggest that more work is needed to identify factors which influence food behavior and relevant frame-of-reference variables. Relatively less emphasis need be placed on measuring nutrient intakes, since a relatively large percentage of the variation in these variables has already been explained. More research will be necessary to understand the causes and relationships among manipulatable variables which occur antecedent to nutrient intakes.

The second criterion suggested by Blalock (1964) for evaluating empirical models was to identify pathways for which the researcher could not identify theoretical reasons for a direct linkage between two variables. In these cases, additional factors which could serve as possible intervening variables should be postulated. The implications of this criterion for the data presented in this study have already been briefly discussed for the husbands' and wives' models. For example, frame-of-reference variables can not influence directly nutrient intakes, but rather must exert their influence through food behavior variables. Nonetheless, as shown in Tables 36 and 37, some frame-of-reference variables did have direct linkages to nutrient intakes, thus indicating the existence of unidentified intervening variables. For example, social class rating exerted a direct negative effect on thiamin intake of husbands (Table 36). Obviously social class could not affect thiamin intake directly but must exert an influence through some intervening variable such as self-concept or role expectations which would then influence the particular foods chosen by the individual; the foods chosen ultimately would affect nutrient intakes. In the husbands' model, other examples of direct links which theoretically should be mediated by intervening variables are a) the effect of income on husbands' intakes of iron and thiamin; b) the effect of husbands' mastery and modernism orientations on their intakes of iron, vitamin A, and thiamin; and c) husbands' modernism orientation on their overall diet quality (Table 36). For wives, direct effects were observed for a) income on thiamin intakes; b) social class on protein intakes; c) orientation toward mastery on vitamin C intakes; and d) modernism orientation on calcium intakes (Table 37). Hence, the results of empirical testing of theoretical models can be used to identify areas of incompleteness in our knowledge of factors affecting nutrient intakes.

One of the main advantages of using causal models is the interpretation of the data for action programs. Yetley (1969) suggested four criteria for choosing the most important variables to be influenced (or manipulated) in an intervention program. These four criteria are:

1. historical sequence: This criterion selects as the most important variables those appearing first in the causal sequence. These variables are related directly or indirectly to all or most of the succeeding variables.

Table 36. Comparison of direct and indirect effects of frame-of-reference and food behavior variables on nutrient intakes and weight status of husbands

Frame-of-reference variables	Protein		Calcium		Iron		Vitamin A	
	D[a]	I[b]	D	I	D	I	D	I
H. Education	N.S.[c]	N.S.	N.S.	.148	N.S.	N.S.	N.S.	.166
Income	N.S.	N.S.	N.S.	N.S.	.191	-.191	N.S.	N.S.
Social class	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
H. Att. Risk	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
H. Att. Mastery	N.S.	N.S.	N.S.	N.S.	-.213	.018	-.192	.006
H. Att. Modernism	N.S.	N.S.	N.S.	-.146	N.S.	-.137	N.S.	N.S.
H. Att. Means	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
W. Knowledge	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	.198
H. Knowledge	N.S.	N.S.	N.S.	N.S.	N.S.	-.140	N.S.	N.S.
W. Health goals	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
H. Health goals	N.S.	N.S.	N.S.	N.S.	N.S.	.176	N.S.	.270
W. Economic goals	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
H. Economic goals	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
W. Social goals	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
H. Social goals	N.S.	.142	N.S.	N.S.	-.130	.130	N.S.	N.S.
W. On a diet	N.S.	N.S.	-.168	-.019	N.S.	-.136	-.230	.019
W. Meals	N.S.	N.S.	N.S.	N.S.	N.S.	.239	N.S.	.253
W. Snacks	N.S.	N.S.	-.153	-.031	N.S.	N.S.	N.S.	N.S.
W. "Empty calories"	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
W. Variety	N.S.	N.S.	N.S.	N.S.	-.196	.196	-.157*	.157
W. Quantity	N.S.	N.S.	N.S.	N.S.	.114*	-.114	N.S.	N.S.
W. Nutrient intake or weight status	N.S.	N.S.	.133*	.042	N.S.	N.S.	.202	-.202

[a]D = direct effect or partial effect = path coefficient or β weight.

[b]I = indirect effect = $(r_{ij}-\beta_{ij})$ = [(zero-order correlation)-(path coefficient)]. The indirect effect indicates that portion of the total effect of an independent variable on the dependent variable that is not explained by the direct effect.

[c]N.S. for direct values indicates values which were not significant at the 0.10 level of significance. N.S. for indirect values indicates those values for which an indirect effect could not be calculated because both the zero-order correlation and path coefficient were not significant. However, when a value for an indirect effect was calculated, there was no way of assessing its significance. Thus, reported indirect values were not assessed with respect to significance levels.

*Significant at the 0.10 level of significance. Non-starred significant at least at the 0.05 level of significance.

Thiamin		Vitamin C		Weight status		Overall diet quality	
D	I	D	I	D	I	D	I
.118*	-.118	N.S.	.196	N.S.	N.S.	.195	-.058
.118	-.118	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
-.226	-.002	N.S.	.173	N.S.	N.S.	-.164*	.164
N.S.	-.128	N.S.	N.S.	N.S.	N.S.	N.S.	.137
N.S.	-.188	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
-.128	-.092	N.S.	N.S.	N.S.	N.S.	-.179	.017
N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
N.S.	N.S.	N.S.	.209	N.S.	N.S.	N.S.	.212
N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	.197
N.S.	N.S.	N.S.	.192	N.S.	N.S.	N.S.	.149
N.S.	.208	N.S.	.241	N.S.	N.S.	N.S.	N.S.
-.087*	.087	N.S.	N.S.	N.S.	N.S.	.155	-.008
N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
N.S.	N.S.	N.S.	.144	N.S.	N.S.	N.S.	N.S.
N.S.	.177	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
-.131	-.089	N.S.	N.S.	N.S.	.217	N.S.	N.S.
N.S.	N.S.	.198	.143	N.S.	N.S.	N.S.	N.S.
N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
N.S.	N.S.	N.S.	.263	N.S.	N.S.	N.S.	.138
N.S.	N.S.	N.S.	.168	N.S.	N.S.	-.305	.305
N.S.	N.S.	.172	.000	.310	-.009	.251	-.251

Table 36 (Continued)

Frame-of-reference variables	Protein D[a]	Protein I[b]	Calcium D	Calcium I	Iron D	Iron I	Vitamin A D	Vitamin A I
Food behavior variables								
H. On a diet	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
H. Meals	N.S.	N.S.	N.S.	N.S.	.189	.018	.148*	.100
H. Snacks	N.S.	N.S.	N.S.	N.S.	N.S.	-.145	N.S.	N.S.
H. "Empty calories"	N.S.	.242	N.S.	.150	N.S.	.248	N.S.	N.S.
H. Variety	N.S.	N.S.	.280	.028	N.S.	N.S.	.408	.027
H. Quantity	.781	.000	.417	.034	.779	-.048	.427	.030
Per person expense	N.S.	N.S.	N.S.	N.S.	-.287	.081	-.157	-.050

Thiamin		Vitamin C		Weight status		Overall diet quality	
D	I	D	I	D	I	D	I
N.S.	N.S.	N.S.	N.S.	.287	-.010	-.162	-.004
.155	-.021	N.S.	N.S.	N.S.	N.S.	.180	.175
N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
N.S.	.296	N.S.	.134	N.S.	N.S.	N.S.	N.S.
-.091*	.091	.363	.029	N.S.	-.141	.407	.124
.795	.005	.445	.015	N.S.	N.S.	.273	.036
-.098	.098	N.S.	-.199	N.S.	N.S.	N.S.	-.220

Table 37. Comparison of direct and indirect effects of frame-of-reference and food behavior variables on nutrient intakes and weight status of wives

Frame-of-reference variables	Protein		Calcium		Iron		Vitamin A	
	D[a]	I[b]	D	I	D	I	D	I
Education	N.S.[c]	.236	N.S.	.276	N.S.	.146	N.S.	.235
Income	N.S.	.178	N.S.	N.S.	N.S.	N.S.	N.S.	.188
Social class	-.085	.085	N.S.	N.S.	N.S.	N.S.	N.S.	.228
W. Att. risk	N.S.	N.S.	N.S.	N.S.	N.S.	.177	N.S.	.191
W. Att. mastery	N.S.	.127	N.S.	.158	N.S.	N.S.	N.S.	.182
W. Att. modernism	N.S.	N.S.	.166	.048	N.S.	N.S.	N.S.	N.S.
W. Att. means	N.S.	N.S.	N.S.	-.142	N.S.	N.S.	N.S.	-.153
H. Knowledge	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
W. Knowledge	N.S.	N.S.	N.S.	.176	N.S.	N.S.	N.S.	.215
H. Health goals	N.S.	N.S.	.159	-.159	N.S.	N.S.	N.S.	N.S.
W. Health goals	N.S.	.227	N.S.	.133	N.S.	.235	.144	.164
H. Economic goals	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
W. Economic goals	N.S.	N.S.	N.S.	-.142	N.S.	N.S.	N.S.	N.S.
H. Social goals	N.S.	N.S.	-.149*	.149	N.S.	N.S.	N.S.	N.S.
W. Social goals	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
H. On a diet	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
H. Meals	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	-.165	.007
H. Snacks	N.S.	N.S.	.155	-.155	N.S.	-.188	N.S.	N.S.
H. "Empty calories"	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
H. Variety	.166	-.035	N.S.	.175	N.S.	N.S.	N.S.	.130
H. Quantity	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	-.192	.192
H. Nutrient intakes or weight status	N.S.	N.S.	.128*	.047	N.S.	N.S.	.244	-.244

[a]D = direct effect or partial effect = path coefficient or β weight.

[b]I = indirect effect = $(r_{ij}-\beta_{ij})$ = [(zero-order correlation)-(path coefficient)]. The indirect effect indicates that portion of the total effect of an independent variable on the dependent variable that is not explained by the direct effect.

[c]N.S. for direct values indicates values which were not significant at the 0.10 level of significance. N.S. for indirect values indicates those values for which an indirect effect could not be calculated because both the zero-order correlation and path coefficient were not significant. However, when a value for an indirect effect was calculated, there was no way of assessing its significance. Thus, reported indirect values were not assessed with respect to significance levels.

*Significant at the 0.10 level of significance. Non-starred direct values are significant at least at the 0.05 level of significance.

Thiamin		Vitamin C		Weight status		Overall diet quality	
D	I	D	I	D	I	D	I
N.S.	N.S.	N.S.	.162	N.S.	-.165	N.S.	.242
-.114	.114	N.S.	.168	N.S.	N.S.	N.S.	.171
N.S.	N.S.	N.S.	.195	N.S.	-.184	N.S.	.271
N.S.	N.S.	N.S.	.188	N.S.	N.S.	N.S.	.240
N.S.	N.S.	-.159	.159	N.S.	N.S.	N.S.	.141
N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	.197
N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	-.180
N.S.	N.S.	N.S.	N.S.	-.135*	-.001	N.S.	N.S.
-.169	.169	N.S.	.131	N.S.	N.S.	N.S.	.239
N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
N.S.	.208	N.S.	N.S.	N.S.	.158	N.S.	.187
N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
-.100*	-.045	N.S.	N.S.	-.267	.267	N.S.	N.S.
N.S.	N.S.	N.S.	-.235	N.S.	N.S.	N.S.	N.S.
N.S.	-.140	N.S.	N.S.	N.S.	N.S.	N.S.	-.130
N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	-.116*	-.064
N.S.	N.S.	-.178	.178	-.218	.021	N.S.	.212
-.249	.249	-.254	.254	N.S.	N.S.	N.S.	N.S.
.205	-.205	.252	-.080	.225	.076	.165	-.165

Table 37 (Continued)

Frame-of-reference variables	Protein D[a]	Protein I[b]	Calcium D	Calcium I	Iron D	Iron I	Vitamin A D	Vitamin A I
Food behavior variables								
W. On a diet	N.S.	N.S.	.140*	-.140	N.S.	N.S.	.188	-.038
W. Meals	N.S.	.298	N.S.	.251	N.S.	.195	N.S.	.290
W. Snacks	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
W. "Empty calories"	N.S.	-.132	N.S.	N.S.	N.S.	-.148	N.S.	-.177
W. Variety	N.S.	.435	N.S.	.371	N.S.	.323	.193	.313
W. Quantity	.910	-.011	.621	-.016	.662	.000	.600	.128
Per person expense	.133	-.133	N.S.	N.S.	N.S.	N.S.	.130	-.130

Thiamin D	Thiamin I	Vitamin C D	Vitamin C I	Weight status D	Weight status I	Overall diet quality D	Overall diet quality I
N.S.	-.134	N.S.	N.S.	.416	.025	N.S.	N.S.
.165	.217	N.S.	.243	-.199	-.020	.216	.256
N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
N.S.	N.S.	N.S.	N.S.	-.157	-.048	N.S.	N.S.
.184	.256	.281	.123	N.S.	N.S.	.221	.328
.721	.083	.492	.126	N.S.	N.S.	.500	.162
.108*	-.108	.204	-.204	-.268	.091	.128*	-.128

2. strength of the path coefficient: This criterion selects as most important that variable having the largest path coefficient (β weight) with a second (dependent) variable.

3. the size of the cumulative effect (direct and indirect) of a given variable on a second variable, using the ultimate dependent variable.

4. the selected variable must be open to influence by a change agent.

The first criterion suggested was that of historical sequence. In the models presented in Figures 4 and 5, frame-of-reference variables were analyzed first. These variables included educational level, income, social class, value-attitude orientations, nutrition knowledge, goals, and spouse food behavior variables. These variables would thus be important because they subsequently influence most food behavior variables, and ultimately nutrient intakes. However, in applying the criterion of historical sequence to selection of variables for intervention programs, planners of intervention programs should be aware that the influence of frame-of-reference variables on nutrient intakes is indirect. That is, the influence of the frame-of-reference variables on nutrient intakes is mediated via several intervening variables. If one or more of these intervening variables were inoperative in certain individuals, the influence of the frame-of-reference variables would not be as expected.

The second criterion was that we should look at the strength of the path coefficients. The quantity of nutritious foods consumed by both husbands and wives had the largest path coefficients affecting nutrient intakes - in fact these path coefficients were approximately 3 to 8 times larger than any of the other β weights obtained (Tables 31 and 33). At the same time, as shown in Table 35, only 22 and 29 percent of the variance in the quantity of nutritious foods consumed by husbands and wives were explained by the variables included in this analysis. Thus additional work must be done before we will know how to "manipulate" this important variable.

Presumably the criterion of looking for the strongest path coefficients for identifying relevant variables for intervention programs could also work in reverse. That is, by looking for variables which do not have path coefficients leading away from them, we can identify those factors for which time and effort in an intervention program would be wasted. In other words, we can identify "dead-end" routes which should be avoided in an intervention program. Consumption of "empty calorie" foods is apparently a "dead-end" factor in the models tested in this study. "Empty calorie" consumption was hypothesized to affect adversely the variety and quantity of nutritious foods consumed, and ultimately to affect negatively nutrient intakes and positively, weight status. The diagram below shows that these effects were not observed for either husbands or wives. For husbands, the effect on the quantity of nutritious foods consumed was actually positive, perhaps indicating a

<u>Husbands' model</u> $\qquad$ <u>Wives' model</u>

$\boxed{\text{H. "Empty calories"}} \xrightarrow{+} \boxed{\text{H. Quantity}}$ $\qquad$ $\boxed{\text{W. "Empty calories"}} \xrightarrow{-} \boxed{\text{W. Weight status}}$

relationship to energy needs. For wives, the only effect of "empty calorie" consumption was a negative effect on their weight status; an effect which was opposite in direction to that hypothesized. That is, the higher the consumption of "empty calorie" foods, the more nearly normal was the weight status of the wives. Thus concern with "empty calorie" consumption would not appear to be an important aspect to be considered in the planning of an intervention program for this population.

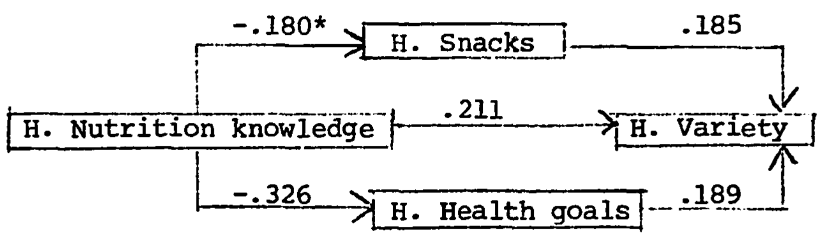
The third criterion suggested by Yetley (1969) for identifying variables for use in intervention programs was the size of the cumulative effect of a given variable on a second variable, in this case, the effect of frame-of-reference variables and food behavior variables on ultimate dependent variables (nutrient intakes and weight status). The data in Tables 36 and 37 provide information on the direct and indirect effects of frame-of-reference and food behavior variables on nutrient intakes and weight status of husbands and wives. The net effect of the independent variables on the dependent variables can be obtained by adding the direct plus indirect values.[1,2] In most cases, the

[1]The reader is reminded that the direct and indirect effects may be opposite in sign. Thus, the net effect in some cases will be less than either the direct or indirect effects separately, or the direct and indirect effects may cancel each other to give a net effect that is zero.

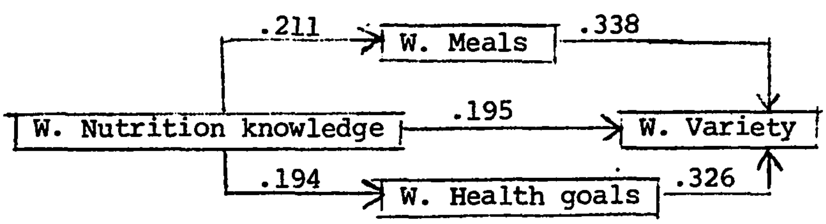
[2]While the data presented in Tables 36 and 37 for indirect effects provide a useful tool for obtaining a quick estimate of the effect of independent variables on dependent variables, the reader is cautioned that the indirect effect may contain spurious relationships. Therefore conclusions from the data in these tables should be guided by results obtained from the models presented in Figures 4 and 5.

independent variables exerted most of their influence either directly or indirectly. However, a few variables had both direct and indirect effects which were significant.[1] In an intervention program, cognizance of the alternative routes for influencing a variable should be helpful. For example, the following diagrams (from Figures 4 and 5) show that for husbands and wives, knowledge of nutrition can affect the variety of foods they consumed, both directly and indirectly:

Husbands' model



Wives' model



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[1]In Table 36, these variables included (a) the effect of husbands' meals on husbands' vitamin A intakes and their overall diet quality, and (b) the effect of husbands' variety on their overall diet quality. In Table 37, variables exerting both direct and indirect effects were (a) the effects of wives' meals on their thiamin intake and overall diet quality; (b) the effects of wives' variety on their vitamin A, thiamin, vitamin C, and overall diet quality; and (c) the effects of wives' quantity on their vitamin A and vitamin C intakes, and their overall diet quality.

In the husbands' model, husbands' nutrition knowledge had a direct positive effect on the variety of foods consumed by husbands. However, both indirect routes (via snacks and health goals) had net negative effects. Thus, in planning an intervention program for husbands, the direct route for influencing variety would appear to be best. For example, if the nutrition education program was oriented towards urging men to decrease their snack consumption, the ultimate result would apparently be a decrease in the variety of foods consumed. The purpose of an intervention program should be to block undesired routes and support desired routes.

In the wives' model diagrammed above, both the direct and indirect routes for affecting variety by nutrition knowledge are positive. Therefore, the main concern of planners of an intervention program would be which route to emphasize. If a low income, poorly educated group of women were the target population, a program to influence the number of meals they consumed (along with recipe suggestions for preparing nutritious foods) might be best. For women of different populations, one of the other routes might be better. In summary, when considering the cumulative effect of one variable on a second variable, it is advantageous to understood whether effects are direct or indirect, and what alternative routes exist for channels of influence.

The last criterion for identifying relevant factors for intervention programs was that the selected variable(s) must be open to influence by change agents. This criterion eliminates the choice of some of the variables identified by the first criterion, i.e. educational level, income, social class.[1] To affect nutrient intakes, the "manipulatable" frame-of-reference and food behavior variables must be influenced by action program. Again the results given in Table 35 show that, for the most part, we have explained a low percentage of the variation in the "manipulatable" variables. Thus a need to identify additional factors in the model is emphasized.

The question of how variables might be "manipulated" in an intervention program will be discussed briefly. One major consideration will be the question of how to motivate people to change their food practices. Rosenstock (1960) suggested that there are two factors which define whether a health event is motivating:

1. the degree to which the individual believes he is susceptible to a health problem or disease.

2. the extent to which the individual believes that contracting such a disease or problem would have serious consequences for him.

Thus, the person who fails to believe that he is likely to develop a given health problem or who fails to believe that the health problem will be serious, will not be motivated to take action regarding it. Swinehart (1968) found a linear positive relationship between the amount of worry about a health problem and the amount of interest in readership

[1]Although government programs have been proposed to influence income levels via negative income tax proposals, these types of solutions are not within the realm of this project. However, the effect of such programs could be predicted and aided by the use of models similar to those presented here.

of newspaper articles about health by people 65 years of age or older. The data from the present study revealed that concern with diet quality was the lowest in importance of 12 goals for husbands, and 8th in importance for wives. Of the four health goals measured, it was the lowest in importance for both husbands and wives. An obvious inference would be that husbands and wives in this population do not see undernutrition as a health problem that they are likely to face. Therefore, in the light of Rosenstock's criteria, these people would not be motivated to do anything about the quality of their diets; or as Swinehart found, to read about methods for diet improvements. Galdston (1952) suggested that nutrition education programs have not been successful because nutritionists failed to recognize that people are not really interested in eating for health. Along these same lines, Bruch (1970) suggested that concern by individuals with weight control is not due to the threat of stress of illness due to overweight, but to the failure by individuals to live up to their ideal self-images.

Maslow (1970) listed a hierarchy of 5 basic needs which serve as motivators of peoples' behavior (see discussion in chapter on theoretical background). These needs were a) physiological needs, b) safety needs, c) belongingness needs, d) esteem needs, and e) self-actualization needs. Maslow suggested that lower order needs (a and b above) will be dominant determinators of behavior until met. Once lower order needs are met, individuals will be motivated towards attaining higher order needs. According to Maslow's hierarchy of needs, concern with eating for health would be a low order need, and therefore we could infer that it is probably not a motivator of behavior for an affluent American population. The great interest in extension programs on weight control and gourmet cooking, and the lack of interest in extension programs on food for family's health in one of the cities surveyed in this study[1] may indicate that people are interested in food as a means of meeting higher order needs (i.e., esteem and self-actualization needs), but are not interested in food as a way of attaining lower order needs (i.e., health needs).

How then, should planners of intervention programs cope with the problem of motivation? Rosenstock (1960) posed the question, "Should public health programs be adapted to fit people or will people be adapted to fit programs?" He suggested that any attempt to increase the importance that individuals place on health must first entail a decreased importance for some other dimension of their lives. From Maslow's hierarchy of needs an increase in motivation towards consideration of health needs would require people to move to lower order needs in their hierarchy of needs, a movement that opposes the "normal" pattern. Perhaps, rather than attempting to change the values that individuals place on health, planners of nutrition intervention programs should follow the advice of Galdston (1952) and link their instructions, not to health, but to the "motive forces that govern man's life." That is, help people to see how they can use foods wisely to meet goals which they feel are important. In other words, help people to learn to use recommended

[1]Personal communication, home economics extension staff, Ft. Dodge, Iowa, summer, 1972.

foods as a means of attaining higher order needs of belongingness, esteem, and self-actualization.

In addition to motivational factors, situational factors have also been discussed as important determinants of behavior. Situational factors are external to the individual. These factors were identified in the chapter on theoretical background as the following: income, social class, nutrition knowledge of spouse, goal orientations of spouse, dieting behavior of spouse, number of meals eaten by spouse, number of snacks eaten by spouse, "empty calorie" consumption of spouse, variety of foods consumed by spouse, quantity of foods consumed by spouse, and spouse nutrient intakes and weight status. Nutrition education programs in the past have been based on the assumption that the wife is the "gatekeeper" or controller of food for the household (Lewin, 1943). Implicit in this assumption is the concept that wives control the situational factors affecting food behavior of their families. Thus, providing nutrition information to the wives (gatekeepers of food) was thought to be an effective means of influencing the nutritional status of all family members. However, in the present study, wives' nutrition knowledge was not directly related to any of the variables describing husbands' food behavior or nutrient intakes. These results would appear to negate Lewin's assumption that wives, as gatekeepers of food, can manipulate situational factors in the home so as to improve their own and their family's eating behavior. Thus, nutrition knowledge of wives does not appear to be a sufficient condition for sound food behavior practices of family members.

Planners of intervention programs must be aware that situational variables play a role in influencing food behavior of family members. The objectives of future intervention programs should include manipulation of situational factors, in addition to manipulation of knowledge and motivational factors, so that wives will be able to apply nutrition knowledge within the home. Since the attitudes, goals, nutrition knowledge, and food behavior of spouses are important situational factors affecting wives' food behavior, intervention programs must include husbands if these situational factors are to be influenced. For example, wives' health goals were found to affect directly four factors in wives' food behavior and four factors in husbands' food behavior, but wives' knowledge of nutrition had no direct effects on husbands' food behavior. Goals are more likely to be chosen by individuals if the goals are perceived as being accessible within the social (in this case, home) environment (see chapter on theoretical background). Perhaps wives who placed a high importance on health goals perceived that the resultant behavior would be acceptable to their husbands, i.e. the situational factors (husbands' acceptance) within their particular social environment made health goals acceptable and feasible goals to attain. This rationale may also explain why the importance that wives' placed on health goals was 50 percent more effective in determining the variety of nutritious foods consumed by wives than was their nutrition knowledge (β = 0.326 and 0.195, respectively). That is, if the wives' perceived that consuming a variety of foods was acceptable to their husbands, the wives placed a higher importance on goals related to this type of food behavior. Other wives, who had nutrition knowledge relating to the advantages of consuming a variety of foods, may not have placed great importance on health goals which would ultimately lead to the solution of a larger variety of foods because they perceived that this type of food behavior was unacceptable to their husbands, i.e. it was an unaccessible goal in the home environment. Thus the spouses' response to foods, as perceived by the wives, are important situational factors which affect not only respondents' food behavior, but also possibly the food behavior of all family members.

To summarize the above discussion, reference to an article by Galjart (1971) seemed appropriate. Galjart suggested that in social action programs, three factors may impede adoption of new practices:

1. ignorance: the individual has no knowledge that would permit doing anything other than what is currently being done.

2. inability: the individual has knowledge of other ways or methods but is unable to use these methods because of economic or situational reasons.

3. unwillingness: the individual knows what he can (or should) do, but is unwilling, probably because of the lack of relevant personal or social incentives.

Galjart emphasized that intervention programs cannot be effective if only one or two of these factors are considered. All must be taken into account. Thus intervention programs aimed only at dissemination of knowledge will influence only the ignorance factor, and will disregard the factors of inability and unwillingness. Refusal by the respondent to accept or implement knowledge may not denote a lack of knowledge or unwillingness, but rather may reflect perceived inability due to situational or economic reasons. The effects of income, social class, and spouse variables that were observed in this project emphasize the importance of the inability (situational) factors on nutritional status. The influence of respondents' value-attitude orientations and goals on relevant variables give us additional insight into ways of coping with the unwillingness (or motivational) factor.

SUMMARY

Identification of personal and social factors related to food behavior was an objective of the North Central Regional project NC-108, "Changes in Food Practices for Better Nutrition." In order to meet this general objective, three specific objectives were followed in writing this dissertation:

1. Using a social-psychological framework, a theoretical model was developed for food behavior.

2. This model was tested using causal model and path analysis techniques.

3. General recommendations, based on the resulting, modified empirical models were made.

A basic premise of this dissertation was that food intake is a specific type of human behavior. Consequently, theoretical orientations and data analysis techniques from the social sciences were expected to provide useful tools for better understanding the factors affecting food behavior.

The variables analyzed were categorized in three ways; a) frame-of-reference variables, b) food behavior variables, and c) nutrient intakes or weight status. Frame-of-reference variables included both internal (personal) and external (situational) factors which could affect various types of food behavior of individuals. Several specific types of food behavior were hypothesized as being caused by frame-of-reference variables relevant to food behavior. Nutrient intakes or weight status

were considered to be consequences of specific types of food behavior; and indirectly, to also be affected by frame-of-reference variables.

The survey method was used to obtain data from young married couples in two Iowa towns. Three criteria were used to define the universe for this sample; a) the mother was 35 years of age or under, b) there was at least one child living in the home, and c) both parents were living in the home. Husbands and wives were interviewed separately, but during the same time period, by two interviewers. Interviews were obtained with 116 couples, or a total of 232 respondents.

The data was analyzed using causal model and path analysis techniques. Path analysis is a particular type of causal model technique in which multiple regression is used to analyze all possible relationships among variables in a model. The causal model and path analysis techniques allow researchers to examine and interpret, without benefit of highly controlled experimental designs, the many relationships among variables which relate to human behavior. Causal model analysis is especially useful for interpreting data for intervention programs.

The results presented included both descriptive data and the empirically-modified causal models for both husbands and wives. Comparisons of the differences between husbands and wives models were also made. Using two criteria, the adequacy of the husbands' and wives' models were evaluated. The first criterion indicated that a high degree of unexplained variation in dependent variables should indicate the need for identifying and measuring additional relevant variables. The data showed that a relatively greater percentage of the variance was explained for nutrient intakes than for food behavior and frame-of-reference variables. Thus, it was suggested that additional research was needed in identifying factors affecting nutrition knowledge, health goals, and specific types of food behavior, with less emphasis on nutrient intakes. The percent of variance explained for husbands' weight status was especially low, perhaps indicating that a condition of over-weight occurred in a time period prior to the age range covered in the present survey.

The second criterion discussed for evaluating the adequacy of the causal models was that where a direct causal link between two variables in a model was observed, but for which no theoretical reason for a direct linkage could be suggested, one or more unmeasured intervening variables should be postulated and tested. Areas where unidentified intervening variables appeared to be operative were identified and possible intervening variables were suggested.

Finally, 4 criteria were applied to the empirical causal models to identify the most important variables for intervention programs. The suggestion was made that, to be successful, intervention programs must consider three different areas; a) ignorance, b) inability because of situational or economic reasons, and c) unwillingness due to personal reasons. An intervention program that fails to consider all three areas can be expected to have only limited success. Special emphasis was placed on the concept that husbands may adversely affect the home food situation thus making it difficult for wives to use nutrition knowledge in influencing food behavior of themselves and other family members.

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ACKNOWLEDGMENTS

The research reported in this dissertation was part of Project no. 1927, the Iowa Agriculture and Home Economics Experiment Station's contribution to the North Central regional project 108 (NC-108 Changes in Food Practices for Better Nutrition). Appreciation is expressed to the Iowa Experiment Station for its support of this research.

Special appreciation is extended to Dr. Charlotte Roderuck for her guidance and encouragement throughout all phases of this project. Without her willingness to accept new ideas and new methodologies, this dissertation would not have taken its present form.

The investigator wishes to recognize the contributions made by members of the Department of Sociology and Anthropology who were highly involved in all stages of this project: Dr. Joe Bohlen, Dr. Richard Warren, Dr. Robert Schafer, and Dr. Rita Braito. Special appreciation is also extended to Mrs. Penny Shenk, who was a hard-working, capable, and pleasant co-worker (and at times, room-mate) during schedule development, interviewing, and data analysis. Tom Buboltz also deserves thanks for his expert help in debugging of computer programs.

Recognition is given to my parents, Rev. and Mrs. J. L. DeGarmo, who helped with child care during the last 18 hectic months; and to my children, Monique and Ned, who were understanding of the time their mother devoted to her "schoolwork". Finally, the writer wishes to recognize her husband, Mervin, who served as both a source of information and as a sounding-board for the basic concepts and methodologies used in this dissertation, and who also found time to complete his own dissertation, in addition to helping with home and family duties.

APPENDIX A: VARIABLES IN THE RECURSIVE EQUATIONS

Table 38. Variables entering the set of recursive equations

Dependent variable	Independent variable
Social class, X_3	education, X_1 total family income, X_2
value-attitude orientation towards risk, X_4	education, X_1 total family income, X_2 social class rating, X_3
value-attitude orientation towards mastery, X_5	education, X_1 total family income, X_2 social class rating, X_3
value-attitude orientation towards modernism, X_6	education, X_1 total family income, X_2 social class rating, X_3
value-attitude orienation towards means (independence), X_7	education, X_1 total family income, X_2 social class rating, X_3
nutrition knowledge, X_9	education, X_1 total family income, X_2 social class rating, X_3 value-attitude orientation toward risk, X_4 value-attitude orientation towards mastery, X_5 value-attitude orientation towards modernism, X_6 value-attitude orientation towards means, X_7 nutrition knowledge of spouse, X_8
health goals, X_{13}	education, X_1 total family income, X_2 social class rating, X_3 value-attitude orientation towards risk, X_4 value-attitude orientations towards mastery, X_5 value-attitude orientation towards modernism, X_6 value-attitude orientation towards means, X_7 nutrition knowledge of spouse, X_8 nutrition knowledge of individual, X_9 health goals of spouse, X_{10}

Table 38 (Continued)

Dependent variable	Independent variable
economic goals, X_{14}	education, X_1 total family income, X_2 social class rating, X_3 value-attitude orientation towards risk, X_4 value-attitude orientation towards mastery, X_5 value-attitude orientation towards modernism, X_6 nutrition knowledge of spouse, X_8 nutrition knowledge of individual, X_9 economic goals of spouse, X_{11}
social goals, X_{15}	education, X_1 total family income, X_2 social class rating, X_3 value-attitude orientation towards risk, X_4 value-attitude orientation towards mastery, X_5 value-attitude orientation towards modernism, X_7 value-attitude orientation towards means, X_7 nutrition knowledge of spouse, X_8 nutrition knowledge of individual, X_9 social goals of spouse, X_{12}
on a weight reduction diet, X_{17}	education, X_1 total family income, X_2 social class rating, X_3 value-attitude orientation towards risk, X_4 value-attitude orientation towards mastery, X_5 value-attitude orientation towards modernism, X_6 value-attitude orientation towards means, X_7 nutrition knowledge of spouse, X_8 nutrition knowledge of individual, X_9 health goals of spouse, X_{10} health goals of individual, X_{13} economic goals of spouse, X_{11} economic goals of individual, X_{14} social goals of spouse, X_{12} social goals of individual, X_{15} spouse on a weight reduction diet, X_{16}

Table 38 (Continued)

Dependent variable	Independent variables
number of meals, X_{19}	education, X_1 total family income, X_2 social class rating, X_3 value-attitude orientation towards risk, X_4 value-attitude orientation towards mastery, X_5 value-attitude orientation towards modernism, X_6 value-attitude orientation towards means, X_7 nutrition knowledge of spouse, X_8 nutrition knowledge of individual, X_9 health goals of spouse, X_{10} health goals of individual, X_{13} economic goals of spouse, X_{11} economic goals of individual, X_{14} social goals of spouse, X_{12} social goals of individual, X_{15} spouse on a weight reduction diet, X_{16} individual on a weight reduction diet, X_{17} number of meals consumed by spouse, X_{18}
number of snacks, X_{21}	education, X_1 total family income, X_2 social class rating, X_3 value-attitude orientation towards risk, X_4 value-attitude orientation towards mastery, X_5 value-attitude orientation towards modernism, X_6 value-attitude orientation towards means, X_7 nutrition knowledge of spouse, X_8 nutrition knowledge of individual, X_9 health goals of spouse, X_{10} health goals of individual, X_{13} economic goals of spouse, X_{11} economic goals of individual, X_{14} social goals of spouse, X_{12} social goals of individual, X_{15} spouse on a weight reduction diet, X_{16} individual on a weight reduction diet, X_{17} number of meals consumed by spouse, X_{18} number of meals consumed by the individual, X_{19} number of snacks consumed by spouse, X_{20}

Table 38 (Continued)

Dependent variable	Independent variables
consumption of "empty calorie" foods, X_{23}	education, X_1 total family income, X_2 social class rating, X_3 value-attitude orientation towards risk, X_4 value-attitude orientation towards mastery, X_5 value-attitude orientation towards modernism, X_6 value-attitude orientation towards means, X_7 nutrition knowledge of spouse, X_8 nutrition knowledge of individual, X_9 health goals of spouse, X_{10} health goals of individual, X_{13} economic goals of spouse, X_{11} economic goals of individual, X_{14} social goals of spouse, X_{12} social goals of individual, X_{15} spouse on a weight reduction diet, X_{16} individual on a weight reduction diet, X_{17} number of meals consumed by spouse, X_{18} number of meals consumed by the individual, X_{19} number of snacks consumed by spouse, X_{20} number of snacks consumed by the individual, X_{21} consumption of "empty calorie" foods by spouse, X_{22}
variety of nutritious foods eaten, X_{25}	education, X_1 total family income, X_2 social class rating, X_3 value-attitude orientation towards risk, X_4 value-attitude orientation towards mastery, X_5 value-attitude orientation towards modernism, X_6 value-attitude orientation towards means, X_7 nutrition knowledge of spouse, X_8 nutrition knowledge of individual, X_9 health goals of spouse, X_{10} health goals of individual, X_{13} economic goals of spouse, X_{11} economic goals of individual, X_{14} social goals of spouse, X_{12} social goals of individual, X_{15} spouse on a weight reduction diet, X_{16}

Table 38 (Continued)

Dependent variable	Independent variables
variety of nutritious foods eaten (Continued)	individual on a weight reduction diet, X_{17} number of meals consumed by spouse, X_{18} number of meals consumed by the individual, X_{19} number of snacks consumed by spouse, X_{20} number of snacks consumed by the individual, X_{21} consumption of "empty calorie" foods by spouse, X_{22} consumption of "empty calorie" foods by the individual, X_{23} variety of nutritious foods eaten by spouse, X_{24}
quantity of nutritious foods eaten, X_{27}	education, X_1 total family income, X_2 social class rating, X_3 value-attitude orientation towards risk, X_4 value-attitude orientation towards mastery, X_5 value-attitude orientation towards modernism, X_6 value-attitude orientation towards means, X_7 nutrition knowledge of spouse, X_8 nutrition knowledge of individual, X_9 health goals of spouse, X_{10} health goals of individual, X_{13} economic goals of spouse, X_{11} economic goals of individual, X_{14} social goals of spouse, X_{12} social goals of individual, X_{15} spouse on a weight reduction diet, X_{16} individual on a weight reduction diet, X_{17} number of meals consumed by spouse, X_{18} number of meals consumed by the individual, X_{19} number of snacks consumed by spouse, X_{20} number of snacks consumed by the individual, X_{21} consumption of "empty calorie" foods by spouse, X_{22} consumption of "empty calorie" foods by the individual, X_{23} variety of nutritious foods eaten by spouse, X_{24} variety of nutritious foods eaten by individual, X_{25} quantity of nutritious foods eaten by spouse, X_{26}

Table 38 (Continued)

Dependent variable	Independent variables
per person food expenditures, X_{28}	education, X_1 total family income, X_2 social class rating, X_3 value-attitude orientation towards risk, X_4 value-attitude orientation towards mastery, X_5 value-attitude orientation towards modernism, X_6 value-attitude orientation towards means, X_7 nutrition knowledge of spouse, X_8 nutrition knowledge of individual, X_9 health goals of spouse, X_{10} health goals of individual, X_{13} economic goals of spouse, X_{11} economic goals of individual, X_{14} social goals of spouse, X_{12} social goals of individual, X_{15} spouse on a weight reduction diet, X_{16} individual on a weight reduction diet, X_{17} number of meals consumed by spouse, X_{18} number of meals consumed by the individual, X_{19} number of snacks consumed by spouse, X_{20} number of snacks consumed by the individual, X_{21} consumption of "empty calorie" foods by spouse, X_{22} consumption of "empty calorie" foods by the individual, X_{23} variety of nutritious foods eaten by spouse, X_{24} variety of nutritious foods eaten by the individual, X_{25} quantity of nutritious foods eaten by spouse, X_{26} quantity of nutritious foods eaten by the individual, X_{27}

Table 38 (Continued)

Dependent variable	Independent variable
protein, calcium, iron, vitamin A, thiamin, vitamin C intakes, overall diet quality, or weight status, X_{37} to X_{44}	education, X_1
	total family income, X_2
	social class ratings, X_3
	value-attitude orientation towards risk, X_4
	value-attitude orientation towards mastery, X_5
	value-attitude orientation towards modernism, X_6
	value-attitude orientation towards means, X_7
	nutrition knowledge of spouse, X_8
	nutrition knowledge of individual, X_9
	health goals of spouse, X_{10}
	health goals of individual, X_{13}
	economic goals of spouse, X_{11}
	economic goals of individual, X_{14}
	social goals of spouse, X_{12}
	social goals of individual, X_{15}
	spouse on a weight reduction diet, X_{16}
	individual on a weight reduction diet, X_{17}
	number of meals consumed by spouse, X_{18}
	number of meals consumed by the individual, X_{19}
	number of snacks consumed by spouse, X_{20}
	number of snacks consumed by the individual, X_{21}
	consumption of "empty calorie" foods by spouse, X_{22}
	consumption of "empty calorie" foods by the individual, X_{23}
	variety of nutritious foods eaten by spouse, X_{24}
	variety of nutritious foods eaten by the individual, X_{25}
	quantity of nutritious foods eaten by spouse, X_{26}
	quantity of nutritious foods eaten by the individual, X_{27}
	per person food expenditures, X_{28}
	spouse intake of protein, calcium, iron, vitamin A, thiamin, or vitamin C; or overall diet quality of spouse; or weight status of spouse, X_{29} to X_{36}

APPENDIX B: EXCERPTS FROM QUESTIONNAIRES

Questions from the Questionnaire used to Obtain Data for this Dissertation

Meals and Snacks

2. On the average, how many days per week do you eat a morning meal?

    3. On the average, how many of these morning meals which you eat are prepared and eaten in your home or carried with you and eaten away from home?

    4. On the average, how many of these morning meals are prepared at a restaurant, cafeteria, or obtained from a vending machine?

5. On the average, how many days per week do you eat a mid-day meal?

    6. On the average, how many days per week do you eat a mid-day meal which is prepared in your home (this includes a sack lunch prepared at home)?

    7. On the average, how many of your mid-day meals are prepared at a restaurant, cafeteria, or obtained from a vending machine?

8. On the average, how many days per week do you eat an evening meal?

    9. On the average, how many of your evening meals are prepared in your home (this includes a sack lunch prepared at home)?

    10. On the average, how many of your evening meals are prepared at a restaurant, cafeteria, or obtained from a vending machine?

11. On the average, how many snacks and drinks (other than coffee or tea) per day do you eat or drink in the: morning_____
afternoon _____
evening _____

Weight reduction diets

12. Would you please indicate to me by the appropriate number(s) which of the following diets you are currently following?

    0. No diet
    1. Weight reduction (own prescription)
    2. Weight reduction (doctor's prescription)
    3. For gaining weight
    4. For allergy
    5. Diabetic
    6. Modified fat
    7. Restricted salt
    8. Pregnant, on a special diet
    9. Pregnant, not on a special diet
    10. Breast-feeding, on a special diet
    11. Breast-feeding, not on a special diet
    12. Ulcer diet
    13. High protein
    14. Low cholesterol diet

Diet history

I have just asked you what your usual food pattern for meals and snacks is. Now I am going to ask you how often you eat certain food items. I'd like you to give the answer something like this: Number of times per day, or number of times per week, or number of times per month, or number of times per year, or never. Please answer for yourself only.

We are interested in asking about the milk you drink. There are five (5) kinds of milk commonly consumed. They are whole milk, 2% milk, skim milk, reconstituted dry milk, and chocolate milk or cocoa. Which of these kinds of milk do you drink?

"How often do you drink _____?"

		No. of times	(Code) 1 2 3 4 Frequency	Food Code
14.	I glass, whole milk		D W M Y	
15.	1 glass, 2% milk		D W M Y	
16.	1 glass, skim milk		D W M Y	
17.	1 glass, reconstituted dry milk Specify brand:_______________		D W M Y	
18.	1 glass chocolate milk or 1 cup cocoa		D W M Y	

"How often do you eat (or drink) _________?"

		No. of times	(Code) 1 2 3 4 Frequency	Food Code
19.	milk on cereal		D W M Y	
20.	milk or cream in coffee Specify kind: ________		D W M Y	
21.	pudding, yoghurt, or custard		D W M Y	
22.	ice cream		D W M Y	
23.	cottage cheese		D W M Y	
24.	other cheeses and cheese dishes		D W M Y	
25.	How many times do <u>you eat</u> meat per week? This is meat of any kind; plain, in mixtures, or in sandwiches, excluding ordinary bacon.		W	
26.	How many of these meat servings would usually be ham, pork, sausage, cold cuts or hot dogs? Don't count the number of times you eat ordinary bacon.		W	
27.	How many of these meat servings would usually be beef or lamb?		W	
28.	How many of these meat servings would chicken, turkey, or fish?		W	
29.	Of the servings of meat, how many of these would be plain meat, not mixed with anything?		W	
30.	Of the servings of meat, how many would be mixtures: casserole, stew, meaty soups, spaghetti with meat sauce, etc.?		W	
31.	Of the servings of meat, how many would be sandwiches, hot dogs or hamburgers on a bun?		W	

"How often do you eat (or drink) __________?"

		No. of times	(Code) 1 2 3 4 Frequency	Food Code
32.	liver		D W M Y	
33.	eggs, such as, scrambled, fried, poached, deviled, etc., but not those used in baking		D W M Y	
34.	peanut butter or nuts		D W M Y	
34.	cooked dried beans, such as pork 'n beans, lentils, bean soup, soy beans, etc.		D W M Y	
36.	carrots, cooked or raw		D W M Y	
37.	squash, all kinds except zucchini		D W M Y	
38.	sweet potatoes or pumpkin		D W M Y	
39.	broccoli		D W M Y	
40.	tomato soup or vegetable soup		D W M Y	
41.	green beans, peas, or corn		D W M Y	
42.	brussels sprouts		D W M Y	
43.	cabbage		D W M Y	
44.	other vegetables frequently eaten. Specify:__________		D W M Y	
45.	other vegetables frequently eaten. Specify: _________		D W M Y	
46.	rice, such as instant, regular long, cooking, converted, brown, wild, rice mix. Specify kind: ____		D W M Y	
47.	noodles, macaroni, spaghetti		D W M Y	
48.	instant mashed potatoes		D W M Y	

"How often do you eat (or dring) ________?"

		No. of times	(code) 1 2 3 4 Frequency	Food Code
49.	frozen potatoes, such as French fried, tator tots, or hash browns		D W M Y	
50.	cooked fresh potatoes, such as baked, boiled, fried		D W M Y	
51.	pizza		D W M Y	
52.	lettuce salad		D W M Y	
53.	fortified fruit--flavored drink, such as Hi C, Tang, Start, Awake, Orange +, Wagner's. Specify kind: ________		D W M Y	
54.	oranges, orange juice, grapefruit, grapefruit juice, tangerines		D W M Y	
55.	other fruit juices, excluding tomato, fortified fruit-flavored, orange, and grapefruit juices. Specify: ________		D W M Y	
56.	other fruit juices. Specify: ________		D W M Y	
57.	apples, bananas and pears (fresh)		D W M Y	
58.	canned peaches, canned applesauce, canned fruit cocktail, canned pears, canned apricots and canned pineapple		D W M Y	
59.	dried apricots, prunes, raisins, and figs. Specify: ________		D W M Y	
60.	hot or cold cereal. Specify: Brand: ________		D W M Y	
61.	bread, 1 piece such as toast, sandwich bread, French toast, rolls, biscuits, muffins, hamburger buns, hot dog buns, etc.		D W M Y	

		No. of times	(code) 1 2 3 4 Frequency	Food Code
62.	Is the bread usually enriched or unenriched?		D W M Y	
	Don't know, enriched, unenrich.			
63.	sweet rolls, donuts, 1 serving		D W M Y	
64.	pancakes, waffles 1 4" diameter		D W M Y	
65.	butter or margarine, 1 serving such as, butter or margarine placed on potatoes, vegetables, bread, etc., except in baking		D W M Y	
66.	pie, pastry, cake, cookies, baked desserts		D W M Y	
67.	candy or candy bars		D W M Y	
68.	crispy, munching foods, such as potato chips, corn chips, pretzels, popcorn, Fritos		D W M Y	
69.	crackers		D W M Y	
70.	sugar, syrup, honey, jam, jelly, marmalade, preserves, apple butter - including sugar used in cereal and drinks		D W M Y	
71.	low calorie pop		D W M Y	
72.	regular pop or Kool-aid		D W M Y	
73.	instant breakfast		D W M Y	
74.	dietary beverage, such as Slender, Metrecal, Sego, etc.		D W M Y	
75.	tea, coffee		D W M Y	
76.	beer, wine, whiskey or other alcoholic beverages		D W M Y	
77.	vitamin or mineral supplements		D W M Y	

	No. of times	(code) 1 2 3 4 Frequency	Cood Code
79. tomatoes, such as, canned, raw, in sauce, or as tomato juice, but excluding catsup		D W M Y	
81. dark, leafy greens, such as chard, spinach, beet greens, dandelion greens or turnip greens		D W M Y	

Quantities of food consumed

In order to help estimate the size of servings of certain foods you eat, I have several food models representing different serving sizes, each labeled with a number. Could you tell me which model or models most closely resemble the size of serving of ____________ (insert food) that you usually eat? Add together both first and second helpings.

____

(white models)

86. ice cream
87. cottage cheese
88. potatoes
89. rice
90. canned fruit

(Gray models)

91. casserole
92. cooked vegetables
93. cooked dried beans, such as pork and beans

(Bowl) [MARKED IN ONE CUP UNITS]

94. tomato or vegetable soup
95. cereal
96. lettuce salad

(Brown models)

97. plain meat, no fat or bone

(Glasses)

98. milk
99. orange or grapefruit juice

(Orange models)

100. cheese

(Yellow models)

101. butter or margarine

Goals

109. People vary greatly in the goals they consider important. Looking at the list of goals which people either have or wish to achieve, choose the goal which you feel is mot important to you.

110. Which goal is the least important to you?

111. Now consider the specific goal of "Increase money income." For you personally, how much more important is the goal (INSERT GOAL MENTIONED IN Q. 109) than the goal of "Increase money income?" For example, your answer may be something like 2 times as important or 5 times as important and so on. You may use any number you wish. Record the answer you have just given me beside the goal you rated. (R. may use percentages also).

112. For you personally, how much less important is the goal (INSERT GOAL MENTIONED IN Q. 110) than the goal of "Increase money income?" For example, your answer may be something like 10% less important or 25% less important and so on. You may use any percentage numbers you wish. Again, record the answer you have just given me beside the goal rated.

GOALS

1. Be a good manager of money and time.
2. Gain and maintain the respect of people outside the family.
3. Maintain or improve the quality of my diet.
4. Maintain or improve my physical fitness.
5. Be active in community or church affairs.
6. Increase money income.
7. Learn and practice preventive techniques for heart disease and other diseases.
8. Obtain security -financial, etc.

GOALS (Continued)

9. Reduce debts or increase savings.
10. Maintain or achieve desirable weight.
11. Clothe myself and family attractively.
12. Maintain or improve the exterior appearance of the house and yard.

Number of specific goal	Importance CIRCLE RESPONSE		Importance Score
1. ________	more	less	________
2. ________	more	less	________
3. ________	more	less	________
4. ________	more	less	________
5. ________	more	less	________
6. ________	more	less	________
7. ________	more	less	________
8. ________	more	less	________
9. ________	more	less	________
10. ________	more	less	________
11. ________	more	less	________
12. ________	more	less	________

113. "From now on we will go through each of the other goals listed on this card and give each an importance rating in relation to the goal '<u>Increase moeny income.</u>' You can record each answer on the worksheet also."

"For you personally, is the goal of ________ more or less important than the goal "Increase money income?"

If more (less), how much more (less) important is this goal than the goal "Increase money income?"

Nutrition knowledge

The next several cards contain statements about food and nutrition. In your opinion, which one number under each statement is the best response?

162. Vegetables grown on organically fertilized soil are richer in nutrients than vegetables grown on chemically fertilized soil.

1. agree
2. disagree

163. Which of the following fruits may be substituted for oranges and provide similar nutrients?

1. cherries
2. apples
3. grapefruit
4. apricots

Which food in each pair has the greater food value per dollar spent?

164. (A) 1. powdered milk
    2. fresh whole milk

165. (B) 1. oatmeal
    2. cornflakes

166. (C) 1. baked beans
    2. beef roast

167. A nutritionally adequate diet is most likely to be provided by eating

1. a wide variety of foods.
2. three meals a day.
3. some health foods daily.
4. foods rich in protein.

168. Enriched breads and cereals

1. are high in calories.
2. are important for vitamins and minerals.
3. supply good quality protein.
4. are not needed by adults.

169. "Fortified margarine" means that which of the following has been added to margarine?

1. carotene
2. polyunsaturated fats
3. B vitamins
4. yellow color

170. Which of the following nutrient groups provide the most energy per ounce?

1. carbohydrates
2. vitamins
3. proteins
4. fats

171. Individuals use the Daily Food Guide to

1. determine amount of nutrients needed each day.
2. show what foods to eat at each meal.
3. help in selecting a wide variety of foods.
4. help in selecting foods containing needed nutrients.

172. Athletes need more of which of the following when compared to non-athletes?

1. calories
2. protein
3. vitamins
4. minerals

173. The recommended weight for a male adult at a certain height as he grows older

1. remains at the level of a 25 year old.
2. increases gradually with each year of age.
3. increases gradually until about age 50 and then tapers off.
4. decreases with age as muscle mass decreases.

174. In selecting sweet rolls that are nutritious, you should check to see if the rolls

1. contain enriched flour.
2. are fortified with vitamins A, D, and C.
3. contain calcium carbonate.
4. contain polyunsaturated fats.

175. Each nutrient

1. provides energy for work and play.
2. has specific uses in the body
3. works best by itself.
4. is found in almost every food.

176. Men and women between ages of 25 and 35 years who are of average height and weight

1. need different nutrients in same amounts.
2. need same nutrients in different amounts.
3. need same nutrients in same amounts.
4. need different nutrients in different amounts.

177. This is a label from a box of dry, sugar-coated breakfast cereal. What is misleading in this label?

1. One ounce is a much smaller amount than an average serving for adults.
2. The minimum daily adult requirement is for natural vitamins, and these vitamins are synthetic.
3. The minimum daily requirements are not as good guidelines as the recommended dietary allowances for adults.
4. Destruction of vitamins during processing and storage are not considered in these percentages.

Value-attitude orientations

We are interested in your feelings or opinions about the following statements. You will probably agree with some of these statements and disagree with some of them.

After each statement, tell me if you agree with the statement or disagree with the statement. After you have done this please indicate how strongly you agree or disagree with the statement. For example, if it really doesn't make much difference to you if you agree or disagree with the statement you would rate the statement one (1). If you very strongly agree or disagree with the statement, you would rate it five (5). For some statements, the numbers 2, 3, or 4 may better describe how strongly you agree or disagree with the statement. If this is the case, you would rate the statement the appropriate number.

196.	Time spent by a person in finding out about new ideas and practices is time well spent.	A D	1 2 3 4 5 0
197.	I think traditional ways are the best ways of doing things.	A D	1 2 3 4 5 0
198.	The man who stands alone is the man who is admired.	A D	1 2 3 4 5 0
199.	About the only thing that science has accomplished for the individual is to make life more complicated.	A D	1 2 3 4 5 0
200.	Education is valuable but it will never be as valuable as experience for success.	A D	1 2 3 4 5 0
201.	Everything considered, all of the scientific developments in the country have done about as much harm as good.	A D	1 2 3 4 5 0

202.	Fate seems to decide some people will be successful--others failures.	A D	1 2 3 4 5 0
203.	It is more important for people to make decisions on the basis of past experience than to try to find new ways of doing things.	A D	1 2 3 4 5 0
204.	Many people have become so scientific they have forgotten the importance of good practical judgment.	A D	1 2 3 4 5 0
205.	One of the best indicators of whether a man will be successful is his ability to make his own decisions.	A D	1 2 3 4 5 0
206.	If a man wants a thing done right, he must do it himself.	A D	1 2 3 4 5 0
207.	Young people today are too willing to take chances because they have never known how tough times can be.	A D	1 2 3 4 5 0
208.	Actually you can rely on very few people.	A D	1 2 3 4 5 0
209.	The future is in the hands of fate and we might as well accept it.	A D	1 2 3 4 5 0
210.	The most important function of education is to teach a person to be independent.	A D	1 2 3 4 5 0
211.	In making decisions it is more important to follow one's own judgment rather than to do what other people are doing.	A D	1 2 3 4 5 0
212.	I regard myself as the kind of person who is willing to take a few more risks than the average person.	A D	1 2 3 4 5 0
213.	Everyone should have some money laid aside for a "rainy day."	A D	1 2 3 4 5 0
214.	I'm not concerned about what my neighbors think of the way I live.	A D	1 2 3 4 5 0
215.	Probably the best guide in making decisions is what has worked in the past.	A D	1 2 3 4 5 0

216.	The best advice to a young family is to be cautious.	A D	1 2 3 4 5 0
217.	There is really no reason for man to explore outer space.	A D	1 2 3 4 5 0
218.	We should view whatever happens to us as planned by forces beyond our control.	A D	1 2 3 4 5 0
219.	In making decisions it is better to think in terms of minimizing profits.	A D	1 2 3 4 5 0
220.	The person who gets ahead fastest is the one who sticks to the old proven ways of doing things.	A D	1 2 3 4 5 0
221.	I would rather invest money in a savings account in a bank than in the stock market.	A D	1 2 3 4 5 0
222.	Man's future depends primarily upon the technical advances made by scientific research.	A D	1 2 3 4 5 0
223.	Scientific information is a necessity to a person in making decisions.	A D	1 2 3 4 5 0
224.	Much of the scientific information people receive is too impractical to be of value.	A D	1 2 3 4 5 0
225.	Man is the victim of circumstances beyond his control.	A D	1 2 3 4 5 0

Per person food expenditures

228. How many living children do you have?

229. What is the age of each child?

259. Approximately how much money do you spend for groceries in an average week, including milk and meat but excluding cigarettes and beer?

Education

251. What is the highest grade that you have completed in school?

Social class

254. What is your occupation? [BE SPECIFIC. RECORD ALL JOBS.]

Total family income

257. Which of these categories best represents your total family income?

    1. Under $1,000
    2. $1,000 to $1,999
    3. $2,000 to $2,999
    4. $3,000 to $3,999
    5. $4,000 to $4,999
    6. $5,000 to $5,999
    7. $6,000 to $6,999
    8. $7,000 to $9,000
    9. $10,000 to $14,999
    10. $15,000 and over

APPENDIX C: NORTH-HATT SCALES

The Original
North-Hatt Scale

U.S. Supreme Court Justice	96
Physician	93
State Governor	93
Cabinet Member, Fed. Gov.	92
Diplomat, U.S. Foreign Service	92
Mayor, large city	90
College Professor	89
U.S. Representative	89
Banker	88
Government scientist	88
County Judge	87
Head, Dept. in State Gov.	87
Minister	86
Architect	86
Chemist	86
Dentist	86
Lawyer	86
Member, Board of Directors Large Corporation	86
Nuclear Physicist	86
Priest	86
Psychologist	85
Civil Engineer	84
Airline Pilot	83
Artist that paints pictures that are exhibited in galleries	83
Owner of a factory that employs about 100 people	82
Sociologist	82
Accountant for large business	81
Biologist	81
Musician in Symphony	81
Author of novels	80
Capt. in Reg. Army	80
Building Contractor	79
Economist	79
Instructor Public Schools	79
Public School Teacher	78
County Agricultural Agent	77
Railroad Engineer	77
Farm Owner and Operator	76
Official, International Labor Union	75
Radio Announcer	74
Newspaper Columnist	74
Owner-Operator, Printing Shop	74
Trained Machinist	73
Welfare Worker, City Gov.	73
Electrician	73
Undertaker	72
Reporter, Daily Newspaper	71
Manager, Small Store	69
Bookkeeper	68
Insurance Agent	68
Traveling Salesman for wholesale concern	68
Tenant Farmer	68
Playground Director	67
Policeman	67
Railroad Conductor	67
Mail Carrier	66
Carpenter	65
Automobile Repairman	63
Plumber	63
Garage Mechanic	62
Local Official Union	62
Owner-Operator Lunch Stand	62
Corporal, Reg. Army	60
Machine Operator, Factory	60
Barber	59
Clark in Store	58
Fisherman, owns own boat	58
Streetcar Motorman	58
Milk Route Man	54
Restaurant Cook	54
Truck Driver	54
Lumberjack	53
Filling Station Attendant	52
Singer in Night Club	52
Farm Hand	50
Coal Miner	49
Taxi Driver	49
Railroad Section Hand	48
Restaurant Waiter	48
Dock Worker	47
Night Watchman	47
Clothes Presser in Laundry	46
Soda Fountain Clerk	45
Bartender	44
Janitor	44
Share Cropper	40
Garbage Collector	35
Street Sweeper	34
Shoe Shiner	33

Ward Bauder
Lee Burchinal
June, 1961

INTERPOLATIONS

Accountant	78
Accountant, Certified Public	81
Accountant, Comptroller	70
Accountant, Tax, Gas Co.	80
Actuarial Assit. (life ins.)	74
Actuary	78
Administrative assistant, National Guard	70
Advertising man, metropolitan paper	70
Advertising promoter	72
Advertising writer	70
Agent, Internal Revenue	77
Agent, Purchasing	68
Agent, Rental	68
Airway Operation Specialist (Control Airport Traffic)	74
Analyst, Service	66
Appraiser, Real estate, commercial property	68
Arborist for city	73
Artist, Advertising	74
Artist, Technical	69
Assembler at aircraft plant	59
Attendant, Tool Crib	57
Audiologist	75
Auditor, Bank	80
Auditor, insurance co., state	79
Automotive spare parts specialist	62
Baker (owns shop)	68
Baker	62
Bakery worker	48
Band leader	76
Bank teller	67
Barber who owns his own shop and employs 1 other man	63
Baseball player, minor league	67
Bellhop	48
Biochemist	85
Blockman	60
Blueprint reader	67
Boards children at home	59
Biolermaker	66
Boilermaker's helper, R.R.	60
Bookbinder	60
Brakeman, Railroad	63
Bricklayer	60
Brickmason	65
Brick setter	60
Broker, Manufacturer's	70
Broker, Motor Freight Co.	71
Broker, Real Estate	72
Broker, Stock	79
Buffer, Auto	56
Builder of homes (supervises work)	69
Busboy-busgirl	43
Butcher	59
Butter maker	58
Buyer for furniture store	71
Buyer for a department store for a single department	70
Buyer for a hardware store	70
Cabinet maker	66
Captain in city fire department	70
Car Washer	50
Carpet layer	54
Carton Maker	55
Cashier	62
Cashier, Bank	70
Cement Finisher	52
Chairman (surveying)	62
Chauffeur	49
Checker in metal-assembly line	64
Chemist, Ink (no formal education)	64
Chicken, sexer	65
Chief of a bureau, within a department, in state government	81
Chief of police, city of 350,000	80
Chiropodist	77
Chiropractor	75
Claim adjustor, insurance	70
Clerk Actuarial in an insurance co.	65
Clerk, Airlines	68
Clerk, Billing	59
Clerk, Chief, R.R. Freight Office	68
Clerk of court	68
Clerk, General Office worker	62
Clerk, IBM	68
Clerk, Law	70
Clerk, Liquor Store	62
Clerk, Payroll	66
Clerk, Postal	65
Clerk, Railroad freight office	63
Clerk, shipping supply factory	59
Clerk, Stock	51
Clerk, Supply	59
Clerk, Technical	66
College Instructor	79
College Training	75
Concessionaire	62
Contractor, Cement	74
Contractor, General Painting	74
Coordinator, management-labor	75

Coordinator, Oil Co.	74
Coppersmith (R.R.)	62
Cosmetologist	58
County Road Worker	48
Court Reporter	68
Custodian	44
Cytologist	80
Dairyman	66
Dealer, Automobile	77
Dealer, Farm implement	66
Dealer, Hardware	66
Dealer, Lumber	70
Department Head of a dept. store	73
Department Head of large co.	78
Department Head (Ass't) of a dept. store	70
Department Leader-Steel Fabrication	65
Department store buyer for large store	72
Designer, Tool	75
Dress Designer	75
Dietician	78
Director, Activities, Lazarus Co.	71
Director, Ass't. Trade and Industrial Education, State of Ohio	81
Director, Executive, YWCA	81
Director, Radio Station	76
Director, Religious Education	77
Dishwasher	33
Dispatcher, Chief Highway, Motor Carrier Co.	69
Dispatcher, Taxi	65
Dispatcher, Train, R.R.	67
Distributor, Oil Business	69
Draftsman	69
Dressmaker	62
Driller, Diamond Core	68
Driver, Ambulance	55
Driver, City Bus	57
Driver, School Bus	55
Driver, Greyhound Bus	63
Druggist, Wholesale	70
Editor	81
Electric Motor Tester	62
Electrotyper	66
Embalmer who owns his own undertaking establishment	72
Engineer	80
Engineer, Aeronautical	83
Engineer, (Mechanical) Assistant research	78
Engineer, Ceramic	79
Engineer, Construction	80
Engineer, Consulting	86
Engineer, Electrical	83
Engineer, Heating	68
Engineer, Industrial	82
Engineer, Mechanical	80
Engineer, Maintenance	64
Engineer, Operating, city	70
Engineer, Process	77
Engineer, Radio	77
Engineer, Research	82
Engineer, Sales	73
Engineer, Sales (gas heating)	68
Engineer, Stationary	62
Engineer, Surveying	78
Engineer, Time study	75
Engineer, Tool	75
Engineer, T.V.	75
Engineering aids, Senior	72
Engineman, R.R.	65
Examiner, Bank	75
Examiner, Tax	77
Executive, Jr. advertising firm	70
Executive, large manufacturing plant	81
Executive, (Publicity Director) for a large department store	78
Executive, publishing co.	81
Executive, Telephone co.	76
Executive, Transportation	79
Expeditor, Aviation co.	66
Express messenger, supervisor on express train	66
Factory worker - assembly line	55
Farmer, tenant - one who owns livestock and machinery and manager of the farm	68
Fieldman, Producers Livestock Coop.	70
Fire Chief	70
Fireman, City	65
Fireman, R.R.	65
Fireman, Stationary	53
Fitter (female)	61
Flagman, Railroad	60
Floral Designer	65
Florist Production Worker	50
Fly man (newspaper)	59
Foreman, Assembly line	66
Foreman, Body Shop	66
Foreman, Construction	66
Foreman, main crew, factory	67
Foreman, Maintenance, of schools	52
Foreman, Railroad roundhouse	66
Foreman, Shipping Dept. Casket Co.	69
Foreman, Shop, factory	67

Foreman, Warehouse	60
Funeral director	72
Furniture maker, church	67
Glass worker	59
Governess	69
Grinder, bearing	67
Grinder, casting	60
Grinding, general	59
Guard	55
Guard, Railroad	55
Horticulturist	77
Hospital Aids, Psychiatric	61
Hospital Worker	50
Housekeeper	53
Housekeeper, Private	54
Iceman	50
Inspector, Assembly line	66
Inspector, Bank	74
Inspector, Building	68
Inspector, Building	73
Inspector, Factory	65
Inspector, Furnace	62
Inspector, Machine Shop	67
Inspector, Railroad steel car	60
Inspector, Regrigerator controls in plant	62
Installer, Canopy in jet planes	63
Installer, Escalator	62
Installer, PBX - telephone	65
Instructor, Ceramic (makes and sells)	78
Insurance Group Leader, V.A.	74
Insurance Underwriter	69
Interviewer, Personnel	71
Investigator, city tax division	71
Investigator, credit	61
Iron Worker, Ornamental	68
Iron Worker, Structural	63
Jeweler	72
Jeweler, Manufacturing	73
Jig and Furniture Builder Class	68
Job Setter	69
Laboratory Aids	60
Laborer, City	50
Laborer, Common	40
Laborer, Construction	50
Laborer, Factory	47
Lather	55
Laundress	45
Leader of a dance band	70
Librarian	74
Librarian, Museum	76
Lieutenant, Air Force	75

Lieutenant of police (R.R.)	69
Loan officer in bank	74
Lineman, telephone company	63
Machinist's helper (R.R.)	59
Machinist journeyman	65
Machinist, Master	70
Maid	48
Mail Handler at Depot	62
Maintenance man in factory	55
Maintenance, Park	55
Maintenance, Public Building	55
Maintenance, Road	55
Maintenance worker in furnished apartments	48
Major, Air Force	81
Manager, Advertising	78
Manager, Assistant Floor	69
Manager, Ass't. parts, factory	65
Manager, Ass't., restaurant	67
Manager, branch, large co.	71
Manager, Business	72
Manager, chain retail grocery store	72
Manager, credit, van & storage co.	70
Manager, large dept. retail groc.	68
Manager, dept. in larger co.	72
Manager, display, single department of department store	68
Manager, district, heat regulation company	70
Manager, district sales for large company	72
Manager, division wholesale coop.	72
Manager of dry cleaning store	68
Manager of dry goods store	69
Manager, foundry	72
Manager of garage	68
Manager, general, manufacturing plant that employs over 100 men	77
Manager of a grill	67
Manager of a hotel	78
Manager of a large co.	72
Manager of a large dept. store	80
Manager of life insurance co.	75
Manager, lumber company	74
Manager, motel	70
Manager of movie theater in downtown section of city	70
Manager, department, newspaper	
Manager, Office	
Manager, parts, factory	68
Manager, plant, of larger co.	75
Manager of a poolroom	58

*Problem is to determine value for housewife

Manager, Production control	79
Manager, Promotion	74
Manager, Public Utility	81
Manager, regional claims (life insurance)	70
Manager, Restaurant	68
Manager, Sales	70
Manager, Sales--salesman who supervises 7-12 other salesmen	70
Manager of a service station	68
Manager, Tavern	61
Manager of transportation and moving co.	70
Manager, T.V. service (wholesale)	70
Manufacturer's representative	70
Meat Packer	54
Mechanic, Airplane	67
Mechanic, Auto	65
Mechanic, Auto (in partnership)	68
Mechanic, Cash register	66
Mechanic, Elevator	65
Mechanic, field, road building machinery	67
Mechanic, gas meter	62
Mechanic, maintenance	63
Mechanic, Radio	67
Mechanic, refrigeration	67
Melter Loader	61
Messenger for armored car co.	57
Metal plate worker	58
Metallurgist	80
Mica layer in factory	58
Millwright	60
Minister (No theological training, high school education)	72
Musician, hotel, etc.	70
Nurses aide	60
Nurses attendant	58
Nurse, (hospital)	76
Nurse, practical	66
Nurse, registered	78
Officer, security	67
Officer, trust	78
Operator, beauty shop	60
Operator, bulldozer	59
Operator, calculating machine	64
Operator, coal elevator	51
Operator, crane	59
Operator, diesel	62
Operator, elevator	52
Operator, equipment, army depot	58
Operator, freezer	59
Operator, linetype, printing shop	67
Operator, movie projector	62
Operator, Multigraph	63

Operator, radio, airport tower	67
Operator, radio telephone	64
Operator, steam shovel	59
Operator, telephone	59
Opthalmologist	89
Optician	75
Optometrist	83
Owner - dry cleaning plant	75
Owner grocery store	70
Owner, large wholesale business	82
Owner, Machine Shop	73
Owner, small-to-medium restaurant in the city	68
Owner, shoe repair shop	65
Owner, small mfg. plant	78
Owner, (co), insurance corporation	78
Owner, (co), motel business	72
Owner, (co), small store in city	72
Owner-operator of an automobile repair shop that employees 3 other people	67
Owner and operator, beauty shop	65
Organ Tuner	70
Owner-operator, cigarette vending machine co.	69
Owner and operator, cleaning business (one store)	68
Owner and operator, confectionary	66
Owner and operator, farm	76
Owner-operator, real estate agency	73
Owner, apartment	70
Owner, laundromat	65
Owner-operator, insurance agency (partner)	71
Owner-operator, investment agency	75
Owner, service station	69
Owner, small business	70
Owner, Tavern	64
Painter	60
Parking attendant	47
Parts man	60
Professional	86
Patrolman, state highway	68
Pattern maker (wood and metal)	67
Personal (testing, etc.)	76
Pharmacist	75
Photographer, commercial	72
Physical Therapist	68
Piano tuner	69
Pipefitter	58
Plasterer	60
Player in a dance band	65
Plumber who owns his own shop	67
Police officer (R.R.)	66
Porter	44

President, large retail chain store	84
President, wholesale company	81
Press feeder - printing shop	59
Printer, newspaper	68
Printing pressman	66
Proof reader	67
Proprietor of sheet-metal business	71
Publicity man for large companies	71
Publisher	84
Rag sorter	39
Railroad conductor	67
Railroad guard	55
Railroad switchman	60
Railroad telegrapher	65
Railroad yard master	73
Real estate	70
Recreation director (YMCA)	70
Repairman, office machines	67
Repairman, shoe	57
Repairman, shoe (cobbler)	60
Repairman, telephone company	62
Repairman, T.V.	67
Repairman, washing machine	65
Repairman, watch	67
Restaurant partner	66
Retail business	72
Roofer	60
Salad lady	50
Sales correspondent - division local branch of nationwide mfg.	70
Salesman	68
Salesman, car	68
Salesman, cosmetic	60
Salesman, insurance	68
Salesman, retail, not involving canvassing or traveling	68
Salesman, route	60
Salesman, route (driver)	56
Salesman, used car	62
Salesman, wholesale, not involving traveling	68
Sales promotion worker	72
Sales representative	68
Saw sharpener	50
Science field	81
Scientist	89
Seamstress	57
Secretary	65
Secretary-treasurer, large co.	76
Secretary, university dept.	65
Seed corn research	68
Septic Tank cleaner (self-employed)	50
Sergeant, Army	66
Servant, domestic	47
Sheet metal worker	54
Siding applicator (self-employed)	65
Skilled trade	70
Social worker	74
Soil conservationist	76
Specifier, order dept.	66
Statistician, Dept. of Agri.	78
Steel mill worker	50
Steel temperer	60
Stenographer	66
Stockhandler	
Stockkeeper, municipal div., of electricity	64
Stockman in linen supply co.	52
Stock selector	58
Streetcar conductor	58
Student, business school	65
Student, graduate	76
Student, senior medical	79
Student, university	74
Superintendent	67
Superintendent, building	52
Superintendent, construction co. roads and streets	77
Superintendent, factory	72
Superintendent, high school	80
Superintendent, machinist	70
Superintendent, piping	69
Superintendent, plant	74
Superintendent, railroad	75
Superintendent, service-large department store	76
Superintendent, steel mill	72
Superintendent, truck stop	65
Supervisor-State of Ohio Fish Management	77
Supervisor, long distance, telephone co. (female)	65
Supervisor, Coal Co.	64
Supervisor, office	68
Supervisor, John Deere	69
Tailor	67
Technician, aircraft	78
Technician, dental	73
Technician, radio	68
Technologist, medical	74
Tire builder	60
Tool and Die maker	65
Tool setter	60
Tree surgeon, self-employed	76
Tree trimmer for public utility	51
Truck gardener	66
U.S. employee-quartermaster purchasing	69
Upholsterer	62
Veterinarian	84

Vice president of a large whole-sale food company	80
Vice president, real estate development co.	84
Vocational rehabilitator, V.A.	78
Waitress	50
Warehouse worker	51
Watchmaker	74
Welder	59
Wrecking business (self-employed)	65
Writer in public relations dept.	74
Yardmaster, R.R.	73

[illegible]
Dorothy N. Bashor
July, 1968
AVS Study

Additions to North-Hatt Scale
Alphabetical listing

Accountant, bookkeeping - 68
Accountant, professional - 78
Accountant, public - 78
Acting - 80
Administration - 70
Administration, business - 70
Advanced accounting - 81
Agent - 68
Agent, depot - 70
Agent, secret - 78
Agriculture - 76
Agriculture business - 70
Agriculture chemicals - 66
Agriculture work - 50
Agronomist - 82
Airline communications - 74
Airline management - 68
Airline reservationist - 68
Airline worker - 74
Animal science specialist - 82
Archeology - 82
Army pilot - 83
Art field - 74
Artist - 74
Artificial inseminator - 68
Assembly worker - 55
Assessor, tax - 68
Astronaut - 85
Astronomer - 82
Astrophysics - 86
Athlete - 67
Auctioneer - 68
Auto painting - 65
Automation IBM - 68
Automotive test driver - 60
Aviation - 68
Aviation design or repair - 75
Bagger - 55
Bank administrator - 70
Bank employee - 67
Banking and insurance - 75
Beauty operator - 60
Beef boner - 54
Biology field - 81
Biologist (wildlife) - 81
Board of directors, Ford - 77
Body shop owner - 67
Body and fender shop - 67
Bouncer - 52
Build homes for lumber company - 65
Bulk can driver for Carnation - 55
Bush pilot - 83
Business advisor - 70
Business executive - 70
Business job, junior executive - 70
Business representative - 68
Businessman - 70
Butcher (owns shop) - 70
Can milk man - 56
Cartoonist - 74
Ceramic tile layer - 63
Checker at Rath - 65
Chief of police - 70
City employee - 55
City street department - 55
Civil service - 70
Clerk - 60
Clerk, IBM - 68
Clerk, receiving - 59
Clothing - 60
Company worker - 55
Computers - 68
Computer analyst - 73
Computer center work - 68
Computer controller - 68
Computer operations - 68
Computer processor - 73
Computer programmer - 73
Computer science - 68
Constructionist - 50
Construction Corp. owns - 70, Construction, road-
Construction, unspecified - 50
Contractor - 70 or 74
Contractor, ditching - 70
Contractor , drainage and sewer - 70
Contractor, electrical - 74
Contractor, field tiling - 67
Contractor, plumbing and heating - 67
Co-op station attendant - 52
County auditor - 78
County auditor of large county - 78
County co-op creamery - 58
County job - 48
Crate maker - 55
Custom work - 67
Data processor - 68
Dealer, livestock - 68
Design, homes - 75
Design, mechanical - 75
Designer - 75

Maintenance - 55
Makes tractor gears - 60
Manage cooperative - 70
Management, corporation - 70
Management, industrial - 70
Management, marketing - 70
Management, ranch - 68
Manager - 70
Manager, ag. business - 70
Manager, airport - 70
Manager, computer - 73
Manager, co-op - 72
Manager, county ASCS program - 66
Manager, county home - 70
Manager, department store - 70
Manager, elevator - 72
Manager, farm - 68
Manager, farm service - 70
Manager, grocery store - 72
Manager, hardware store - 70
Manager, industry - 77
Manager, livestock - 68
Manager, livestock salebarn - 68
Manager, meat department - 68
Manager, men's clothing store - 69
Manager, ranch - 68
Manager, retail - 70
Manager, stock yard - 72
Manager, store - 70
Manager, truckline - 70
Manager, V.F.W. - 60
Manufacturing wood and metal - 55
Mathematician - 86
Meat grader - 65
Meat man - 54
Mechanic, diesel - 68
Mechanic, farm (or tractor) - 67
Mechanic, tractor - 67
Mechanical - 62
Mechanics, specialized - 65
Merchant, retail feed - 70
Military man - 72
Military officer - 75
Military sergaent - 66
Mink rancher - 76
Model aircraft industry - 60
Motorcycle racer - 60
Movie star - 70
Music - 70
Musician - 70
Navigation - 73
Night club manager - 61
Night club owner - 64
Nutritionist, livestock - 86
Oceanography - 81
Occupational therapy - 76
Oil jobber - 68
Osteopath - 80
Owner of bank - 88
Owns dry cleaning business - 75
Owns elevator - 73
Owns small manufacturing company - 69
Packing company - 59
Packing plant worker - 55
Painter in factory - 66
Peace Corps - 74
Personal management of large company - 72
Philosopher - 81, Photoengraver - 73
Physicist - 86
Physicist, nuclear - 86
Plumber and electrician - 73
Poet - 74
Political analyst - 74
Political science - 92
Politician - 92
Politics - 92
Postal worker - 66
Postmaster - 70
Post office - 70
President - 92
Printer - 68
Pro baseball - 67
Produce - 58
Production worker - 55
Professional - 86
Professional entertainer - 70
Psychiatric aide - 74
Psychiatrist - 93
Race car driver - 60
Radio work - 67
Railroad worker - 60
Railroad yard clerk - 60
Ranch hand - 50
Ranch owner - 76
Recreational director - 70
Refrigeration - 67
Refrigeration expert - 67
Restaurant owner and business manager of several buildings - 70
Road construction operator - 59
Road maintenance for highway commission - 55
~~Road maintenance operator - 59~~
Route work - 56
Quarry worker - 55

APPENDIX D: ATTITUDE SCALES

Attitude Scales
NUTRITION STUDY - 1927
Department of Sociology and Anthropology

Mastery Scale

Construction:

Item #

202 Fate seems to decide some people will be successful--others failures.

209 The future is in the hands of fate and we might as well accept it.

218 We should view whatever happens to us as planned by forces beyond our control.

225 Man is the victim of circumstances beyond his control.

Coding

All Items

A5	A4	A3	A2	A1	AD	D1	D2	D3	D4	D5
0	3	5	6	7	8	9	10	11	13	16

The individual item scores are added together to get a total score for this scale.

Range in scores:

Possible: 0 to 64
0 - Not a master of own fate
64- Master of own fate

Mastery Scale (4 Items)

	202	209	218	225	(Total)
202		.4849	.3743	.4094	.7234
209			.5277	.5878	.8125
218				.5884	.8002
225					.8166

Reliability coefficients: Alpha = .79356; Standardized = .79705

All correlation coefficients are significant at .001 level

Comment: These four items compose the original Fatalism Scale.

Traditionalism Scale

Construction:

Item #

197	I think traditional ways are the best ways of doing things.
199	About the only thing that science has accomplished for the individual is to make life more complicated.
201	Everything considered, all of the scientific developments in this country have dome about as much harm as good.
203	It is more important for people to make decisions on the basis of past experience than to try to find new ways of doing things.
215	Probably the best guide in making decisions is what has worked in the past.
217	There is really no reason for man to explore outer space.
220	The person who gets ahead fastest is th one who sticks to the old proven way of doing things.
224	Much of the scientific information people receive is too impractical to be of value.

Coding

All Items

A5	A4	A3	A2	A1	AD	D1	D2	D3	D4	D5
0	3	5	6	7	8	9	10	11	13	16

The individual item scores are added together to get a total score for this scale.

Range in scores:

Possible: 0 to 128
0 - Traditional
128- Non-traditional or modern

TRADITIONALISM SCALE

Item-Total Correlations (Pearson Correlations)
Reliability Coefficients

	197	199	201	203	215	217	220	224	(Total)
197		.1603*	.1124**	.2705	.1740*	.1398**	.3098	.1859*	.4489
199			.4213	.1803*	.1495**	.3990	.3099	.1130**	.5257
201				.2344	.1782*	.3153	.2327	.1916*	.5667
203					.1894*	.1732*	.2680	.2391	.5092
215						.0710 (NS)	.3329	.2499	.4515
217							.3113	.2433	.5800
220								.2032	.5282
224									.4829

Reliability coefficients: Alpha = .69749; Standardized = .70183

** Significant at .05

* Significant at .01

(NS)
Not significant

All others significant at .001

Risk Orientation

Construction:

Item #

213	Everyone should have some money laid aside for a "rainy day."
216	The best advice to a young family is to be cautious.
219	In making decisions it is better to think in terms of minimizing losses rather than maximizing profits.
221	I would rather invest money in a savings account in a bank than in the stock market.

Coding

All Items

A1	A2	A3	A4	A5	AD	D1	D2	D3	D4	D5
0	3	5	6	7	8	9	10	11	13	16

The individual item scores are added together to get a total score for this scale.

Range in scores:

Possible: 0 to 64
0 - Not risk oriented
64 - Risk oriented

Risk Orientation Scale (4 Items)

	213	216	219	221	(Total)
213		.2445	.1557*	.2882	.5778
216			.2741	.2121	.6716
219				.2098	.6481
221					.6925

Reliability coefficients: Alpha = .53678; Standardized = .54542

*Significant at .01

All others significant at .001

Means Orientation Scale

Construction:

Item #

Item #	
198	The man who stands alone is the man who is admired.
206	If a man wants a thing done right, he must do it himself.
208	Actually you can rely on very few people.
210	The most important function of education is to teach a person to be independent.
214	I'm not concerned about what my neighbors think of the way I live.

Coding

All Items

A1	A2	A3	A4	A5	AD	D1	D2	D3	D4	D5
16	13	11	10	9	8	7	6	5	3	0

The individual item scores are added together to get a total score for this scale.

Range in scores:

Possible: 0 to 80
0 - Not independent
80 - Independent

Means Orientation Scale (5 Items)

	198	206	208	210	214	(Total)
198		.1724*	.1272**	.0234(NS)	.0654(NS)	.4741
206			.3299	.2120	.1097**	.6623
208				.0096(NS)	.1126**	.5622
210					.1832*	.5215
214						.5476

Reliability coefficient: Alpha = .43695; Standardized = .43524

**Significant at .05

* Significant at .01

(NS)
Not significant

All others significant at .001

Item #	
87	Composite Traditionalism Score
88	Composite Score Traditionalism Sub-Scale 1 (Not used in final scales)
89	Composite Score Traditionalism Sub-Scale 2 (Not used in final scales)
90	Composite Risk Orientation Score
91	Composite Means Orientation Score
92	Composite Mastery Score

Total-Total Correlation of Scale Scores (6 Items)

	87	88	89	90	91	92
87		.8751	.7362	.2272	-.3122	.4549
88			.3169	.2193	-.2373	.3858
89				.1387**	-.2801	.3522
90					-.1884*	.2426
91						-.2497

**Significant at .05

* Significant at .01

All others significant at .001

APPENDIX E: FACTOR ANALYSIS OF GOALS

Table 39a. Factor analysis of 11 goal statements for husbands[a]

Goal no.	Goal Statement	Factor loadings[b]			
		I	II	III	IV
1	Be a good manager of money and time	.49			
2	Gain and maintain respect of people outside the family	.49			
3	Maintain or improve the quality of my diet		.72		
4	Maintain or improve my physical fitness		.70		
5	Be active in community or church affairs	.63			
7	Learn and practice preventive techniques for heart disease and other diseases	.41	.47		
8	Obtain security-financial, etc.			.43	
9	Reduce debts or increase savings			.64	
10	Maintain or achieve desirable weight		.66		
11	Clothe myself and my family attractively	.81			
12	Maintain or improve the exterior appearance of the house and yard	.82			

[a]The anchor goal (Increase money income) was not included because it was arbitrarily assigned a value of 10.0 and thus had no variance.

[b]Only factor loadings $\geq$ .40 are reported.

Table 39b. Factor analysis of 11 goal statements for wives[a]

Goal no.	Goal Statement	Factor loadings[b] I	II	III	IV
1	Be a good manager of money and time	.40			
2	Gain and maintain respect of people outside the family				.80
3	Maintain or improve the quality of my diet	.70			
4	Maintain or improve my physical fitness	.78			
5	Be active in community or church affairs	.51			
7	Learn and practice preventive techniques for heart disease and other diseases			.42	
8	Obtain security - financial, etc.			.68	
9	Reduce debts or increase savings			.68	
10	Maintain or achieve desirable weight	.42	.42		
11	Clothe myself and my family attractively		.64		
12	Maintain or improve the exterior appearance of the house and yard		.70		

[a]The anchor goal (Increase money income) was not included because it was arbitrarily assigned a value of 10.0 and thus had no variance.

[b]Only factor loadings $\geq$ .40 as reported.

APPENDIX F: SERVING SIZES OF FOODS

Serving sizes for Quantity of Food Eaten Variable

Milk Group	Serving equivalent for milk group
whole milk	8 ounces
2% milk	8 ounces
skim milk	8 ounces
reconstituted dry milk	8 ounces
milk on cereal	8 ounces
milk in coffee	8 ounces
chocolate milk or cocoa	8 ounces
pudding, yoghurt, or custard	8 ounces
ice cream	2 cups
cottage cheese	1.5 cups
cheeses	1.2 ounces

Meat Group	Serving equivalent for meat group
meat	1 ounce
eggs	1 egg
liver	1 ounce
peanut butter or nuts	2 tablespoons
cooked dried beans	1/2 cup

Fruits and Vegetables Group	Serving equivalent for fruits and vegetables group
carrots	1/2 cup
squash	1/2 cup
sweet potatoes or pumpkin	1/2 cup
broccoli	1/2 cup
dark, leafy greens	1/2 cup
other vegetables	1/2 cup
other fruit juices	1/2 cup
broccoli	1/2 cup
Brussels sprouts	1/2 cup
citrus fruit juices	1/2 cup
cabbage	1/2 cup
cooked fresh potatoes	1/2 cup
green beans, peas, or corn	1/2 cup
instant mashed potatoes	1/2 cup
frozen potatoes	1/2 cup
canned fruit	1/2 cup
oranges, tangerines	1 medium
grapefruit	1/2
tomatoes	1/2 raw; 1/3 cup canned
tomato soup	1 cup
lettuce salad	1 cup

Fruits and Vegetables Group (continued)	Serving equivalent for fruits and vegetables group
apples, bananas, pears	1 medium, each
dried fruit	5 apricot halves, or 1-1/2 tablespoons raisins, or 4 prunes, or 1 fig

Breads and Cereals Groups	Serving equivalent for breads and cereals group
rice	1/2 cup
pasta (noodles, macaroni, spaghetti)	1/2 cup
hot or cold cereal	1 cup
bread	1 slice
sweet rolls, doughnuts	1 doughnut or 1 roll
pancakes, waffles	1 4" diameter pancake
crackers	5 crackers

APPENDIX G: FRAME SIZES, HEIGHTS, AND WEIGHTS

Table 40. Frame sizes based on wrist circumference and height

MALES	Wrist circumference[a]			FEMALES	Wrist circumference[a]		
Height[a]	small[b] frame	medium frame	large frame	Height[a]	small[b] frame	medium frame	large frame
63	≤6.35	6.36-6.75	≥6.76	56	≤5.19	5.20-5.63	≥5.64
64	≤6.40	6.41-6.80	≥6.81	57	-	-	-
65	-	-	-	58	-	-	-
66	≤6.50	6.51-6.90	≥6.91	59	≤5.37	5.38-5.81	≥5.82
67	≤6.55	6.56-6.95	≥6.96	60	≤5.42	5.43-5.87	≥5.88
68	≤6.60	6.61-7.00	≥7.01	61	≤5.48	5.49-5.93	≥5.94
69	≤6.65	6.66-7.05	≥7.06	62	≤5.54	5.55-5.98	≥5.99
70	≤6.70	6.71-7.10	≥7.11	63	≤5.60	5.61-6.04	≥6.05
71	≤6.75	6.76-7.15	≥7.16	64	≤5.66	5.67-6.10	≥6.11
72	≤6.80	6.81-7.20	≥7.21	65	≤5.72	5.73-6.16	≥6.17
73	≤6.85	6.86-7.25	≥7.26	66	≤5.78	5.79-6.22	≥6.23
74	≤6.90	6.91-7.30	≥7.31	67	≤5.84	5.85-6.27	≥6.28
75	≤6.95	6.96-7.35	≥7.36	68	≤5.90	5.91-6.33	≥6.33
76	≤7.00	7.01-7.40	≥7.41	69	≤5.95	5.96-6.39	≥6.40
				70	≤6.01	6.02-6.44	≥6.45
				71	≤6.07	6.08-6.50	≥6.51

[a]Measurements are in inches.

[b]Frame size was determined by first drawing a regression line through the median wrist measurement value for each height. The range for the medium frame was based on the area falling within [(.53) x (Std. Deviation of the raw scores)]. Large frame was for those values falling above this area; small frame below. This distribution resulted in approximately 50% of the population having medium frame; and 25% each for small and large frame size.

Table 41. Ideal weights in USDA tables[a]

MALES				FEMALES			
Height[b]	Small Frame	Medium Frame	Large Frame	Height	Small Frame	Medium Frame	Large Frame
63	120[c]	131	143	56	89	97	106
64	124	135	147	57	92	100	110
65	128	139	151	58	96	103	113
66	132	144	157	59	99	107	117
67	136	149	163	60	102	111	120
68	141	153	168	61	106	114	123
69	145	157	172	62	109	117	127
70	149	161	176	63	112	120	130
71	152	165	180	64	115	124	134
72	156	169	185	65	118	127	137
73	160	173	190	66	122	131	141
74	164	177	194	62	125	134	144
75	168	181	198	68	128	138	148
76	172	185	203	69	132	142	153
				70	135	146	158
				71	139	150	163

[a]Hathaway and Foard (1960): Table 80, 111 (Suggested weights for heights).

[b]Height is in inches; and is without shoes.

[c]Weights are in pounds. Two pounds were added to the original weights in the tables to correct for weight of clothing (U.S. Department of Health, Education and Welfare, 1965).

APPENDIX H: ADDITIONAL TABLES

Table 42a. Distribution of importance scores from least to most important for 12 goal statements for husbands

Value of Goal	Be good manager 1	Gain respect 2	Improve diet 3	Physical fitness 4	Community affairs 5	Increase income[b] 6	Prevent disease 7	Obtain security 8	Reduce debts 9	Desirable weight 10	Clothe attractively 11	Appearance house 12
	Goal Statements[a]											
Least Important												
1	0	11	20	7	16		17	0	3	18	8	9
2	3	11	22	11	18		15	3	5	22	13	14
3	5	7	19	16	12		11	3	5	22	13	21
4	15	20	14	11	21		13	7	6	14	22	32
5	8	10	13	18	11	116	11	22	28	11	21	10
6	9	11	10	10	8		13	7	11	8	13	6
7	19	13	7	13	10		11	19	20	5	6	6
8	19	10	3	8	8		10	15	12	3	9	9
9	9	6	3	5	5		5	7	5	4	6	4
10	18	12	3	11	6		8	15	17	7	4	4
11	11	5	2	6	1		2	18	4	2	1	1
Most Important												
Mean	7.25	5.60	3.91	5.58	4.53	5.00	4.90	7.40	6.49	4.09	4.85	4.44
S.D.[c]	2.50	2.96	2.52	2.88	2.71		2.89	2.52	2.48	2.73	2.41	2.40
Median	7.45	5.40	3.34	5.22	4.07		4.68	7.34	6.50	3.32	4.60	3.94

[a]See Appendix E for complete goal statement.

[b]"Increase money income" was the anchor goal. It was arbitrarily assigned a value of 10.0 for all respondents.

[c]Standard deviation.

Table 42b. Distribution of importance scores from least to most important for 12 goal statements for wives

Value of Goal	Goal Statements[a]											
	Be good manager 1	Gain respect 2	Improve diet 3	Physical fitness 4	Community affairs 5	Increase income[b] 6	Prevent disease 7	Obtain security 8	Reduce debts 9	Desirable weight 10	Clothe attractively 11	Appearance house 12
Least Important												
1	4	10	8	2	10		7	1	0	12	3	8
2	4	8	11	11	12		18	0	0	14	12	13
3	0	11	13	12	6		9	4	2	10	18	18
4	9	18	25	11	27		18	5	7	13	25	22
5	6	6	4	5	6	116	3	21	18	5	12	9
6	8	10	8	13	12		9	12	13	16	12	15
7	14	18	18	21	18		15	18	21	11	9	16
8	18	11	12	15	12		14	26	24	11	16	9
9	19	7	12	11	7		13	13	14	10	8	5
10	14	11	5	10	5		8	7	10	9	1	0
11	20	6	0	5	1		2	9	7	5	0	1
Most Important												
Mean	7.75	5.81	5.32	6.28	5.24	5.00	5.58	7.16	7.28	5.54	5.05	4.75
S.D.[c]	2.69	2.95	2.63	2.70	2.60		2.90	2.13	1.98	3.04	2.28	2.30
Median	8.22	6.00	4.75	6.69	5.00		5.83	7.33	7.36	5.75	4.50	4.36

[a]See Appendix E for complete goal statement.

[b]"Increase money income" was the anchor goal. It was arbitrarily assigned a value of 10.0 for all respondents.

[c]Standard deviation.

Table 43a. Number of meals eaten away from home per week

No. Meals	Husbands: No. Husbands	Husbands: % of 116	Wives: No. Wives	Wives: % of 116
0	41	35.3	64	55.2
1	13	11.2	26	22.4
2	14	12.1	12	10.3
3	7	6.0	2	1.7
4	7	6.0	5	4.3
5	8	6.9	5	4.3
6	8	6.9	1	0.9
7	6	5.2	0	0.0
8	4	3.4	0	0.0
9	3	2.6	1	0.9
10	3	2.6	0	0.0
[illegible]	2	1.7	0	0.0
Mean	2.8		Mean 1.0	
S.D.[a]	3.1		S.D. 1.6	
Median	1.8		Median 0.0	

[a]Standard deviation.

Table 43b. Number of meals eaten at home per week

	Husbands		Wives	
No. Meals	No. Husbands	% of 116	No. Wives	% of 116
3	1	0.9		
6	1	0.9		
7	1	0.9	7	2.6
8	10	8.6	8	2.6
9	7	6.0	9	5.2
10	8	6.9	10	6.9
11	8	6.9	11	3.4
12	10	8.6	12	4.3
13	10	8.6	13	5.2
14	16	13.8	14	11.2
15	12	10.3	15	11.2
16	8	6.9	16	8.6
17	5	4.3	17	6.9
18	3	2.6	18	0.9
19	6	5.2	19	4.3
20	4	3.4	20	10.3
21	6	5.2	21	16.4
Mean	13.5		Mean	15.4
S.D.[a]	3.9		S.D.	4.2
Median	13.6		Median	15.3

[a]Standard deviation.

Table 44a. Distribution of servings of "basic four food groups" for husbands

No. of Daily Servings	Milk[a] No. of husbands	Milk[a] % of 116	Meat (oz.) No. of husbands	Meat (oz.) % of 116	High Vit. A No. of husbands	High Vit. A % of 116
0.0	0	0.0			4	3.4
0.1-0.49	4	3.4			77	66.4
0.50-0.99	10	8.6			28	24.1
1.00-1.49	8	6.9	1	0.9	5	4.3
1.50-1.99	8	6.9	0	0.0	1	0.9
2.00-2.49	12	10.3	1	0.9	0	0.0
2.50-2.99	15	12.9	2	1.7	1	0.9
3.00-3.49	15	12.9	3	2.6		
3.50-3.99	7	6.0	3	2.6		
4.00-4.49	8	6.9	4	3.4		
4.50-4.99	3	2.6	6	5.2		
5.00-5.49	8	6.9	10	8.6		
5.50-5.99	4	3.4	4	3.4		
6.00-6.49	4	3.4	5	4.3		
6.50-6.99	1	0.9	9	7.8		
≥7.00	9	7.8	68	58.6		
Mean	3.48		8.70		0.38	
S.D.[c]	2.62		4.98		0.39	
Median	3.01		7.58		0.27	
Range	0.06-21.96		1.00-38.42		0.00-2.60	

[a]Includes cottage cheese and cheese.

[b]Does not include high vitamin A, high vitamin C, or fair vitamin C groups.

[c]Standard deviation.

High Vit. C		Fair Vit. C		Other Fruits & Veg.[b]		Total Fruits & Veg.		Breads and Cereals	
No. of husbands	% of 116	No. of husbands	% of 116	No. of husbands	% of 116	No. of husbands	% of 116	No. of husbands	% of 116
12	10.3	0	0.0	0	0.0	0	0.0	0	0.0
52	44.8	13	11.2	0	0.00	0	0.0	1	0.9
20	17.2	37	31.9	6	5.2	0	0.0	2	1.7
12	10.3	30	25.9	9	7.8	2	1.7	4	3.4
7	6.0	12	10.3	23	19.8	2	1.7	2	1.7
9	7.8	8	6.9	6	5.2	9	7.8	9	7.8
2	1.7	7	6.0	21	18.1	5	4.3	9	7.8
		2	1.7	9	7.8	5	4.3	9	7.8
2	1.7	1	0.9	11	9.5	10	8.6	11	9.5
		2	1.7	8	6.9	10	8.6	9	7.8
		1	0.9	5	4.3	16	13.8	12	10.3
		1	0.9	6	5.2	10	8.6	15	12.9
				2	1.7	2	1.7	2	1.7
		1	0.9	4	3.4	10	8.6	8	6.9
				2	1.7	8	6.9	4	3.4
		1	0.9	4	3.4	27	23.3	19	16.4
0.69		1.46		3.16		5.62		4.93	
0.78		1.28		1.70		2.84		2.84	
0.35		1.17		2.78		4.91		4.59	
0.0-3.57		0.12-9.48		0.68-8.28		1.16-17.68		0.08-19.54	

Table 44b. Distribution of servings of "basic four food groups" for wives

No. of Daily Servings	Milk[a] No. of wives	Milk[a] % of 116	Meat (oz.) No. of wives	Meat (oz.) % of 116	High Vit. A No. of wives	High Vit. A % of 116
0.0	0	0.0	0	0.0	7	6.0
0.1-0.49	11	9.5	0	0.0	79	68.1
0.50-0.99	7	6.0	0	0.0	21	18.1
1.00-1.49	15	12.9	1	0.9	7	6.0
1.50-1.99	18	15.5	2	1.7	0	0.0
2.00-2.49	8	6.9	4	3.4	1	0.9
2.50-2.99	18	15.5	8	6.9		
3.00-3.49	12	10.3	11	9.5		
3.50-3.99	7	6.0	11	9.5		
4.00-4.49	8	6.9	10	8.6	1	0.9
4.50-4.99	4	3.4	15	12.9		
5.00-5.49	1	0.9	8	6.9		
5.50-5.99	3	2.6	14	12.1		
6.00-6.49	1	0.9	8	6.9		
6.50-6.99	2	1.7	1	0.9		
$\geq$7.00	1	0.9	23	19.8		
Mean	2.53		5.35		0.39	
S.D.	1.60		2.52		0.50	
Median	2.42		4.79		0.25	
Range	0.09-7.91		1.43-16.96		0.0-4.07	

[a]Includes cottage cheese and cheese.

[b]Does not include high vitamin A, high vitamin C, or fair vitamin C groups.

[c]Standard deviation.

High Vit. C		Fair Vit. C		Other Fruits & Veg.[b]		Total Fruits & Veg.		Breads and Cereals	
No. of wives	% of 116	No. of wives	% of 116	No. of wives	% of 116	No. of wives	% of 116	No. of wives	% of 116
8	6.9	0	0.0	0	0.0	0	0.0	0	0.0
48	41.4	25	21.6	1	0.9	0	0.0	1	0.9
22	19.0	35	30.2	9	7.8	2	1.7	5	4.3
13	11.2	31	26.7	14	12.1	1	0.9	6	5.2
7	6.0	14	12.1	16	13.8	5	4.3	12	10.3
13	11.2	5	4.3	23	19.8	5	4.3	16	13.8
4	3.4	5	4.3	14	12.1	12	10.3	26	22.4
		1	0.9	14	12.1	17	14.7	13	11.2
				7	6.0	16	13.8	8	6.9
				4	3.4	6	5.2	13	11.2
				5	4.3	8	6.9	5	4.3
				2	1.7	5	4.3	4	3.4
1	0.9			1	0.9	8	6.9	3	2.6
				4	3.4	3	2.6	2	1.7
				1	0.9	7	6.0	1	0.9
				1	0.9	21	18.1	1	0.9
0.82		1.06		2.66		4.826		3.06	
0.87		0.66		1.46		2.446		1.41	
0.54		0.95		2.31		4.002		2.86	
0.00-5.80		0.14-3.29		0.42-7.28		0.881-12.937		0.39-8.26	