

Factors affecting rural males' adoption of dietary behaviors to
reduce heart disease

by

Kristine Kay Ankeny

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INTRODUCTION

The first attempts to inform the American public about the link between dietary fat and the incidence of heart disease began in the early 1960s. In 1961, the American Heart Association issued its first statement recommending the reduction of dietary fat to reduce the risk of developing heart disease (Stamler, 1981). Since that time, public and private organizations have devoted millions of dollars to efforts aimed at educating the American people about the value of adopting lifestyle behaviors to reduce the risk of developing heart disease and other chronic diseases. Some of these efforts have included the Dietary Guidelines issued in 1985 by the United States Department of Agriculture and United States Department of Health and Human Services (1985), Healthy People, the Surgeon General's Report of Health Promotion and Disease Prevention (United States Department of Health and Human Services, 1979), and the United States Senates' Select Committee on Nutrition and Human Needs, Dietary Goals for the United States (1977). All of these efforts call for the reduction of total fat consumption to decrease the risk of heart disease. However, heart disease continues to be the primary cause of mortality among Americans, according to the Surgeon General's Report on Nutrition and Health (United States Department of Health and Human Services, 1988).

The success of these efforts to educate the American public about the link between diet and heart disease over the past several decades is subject to question. A Lou Harris and Associates poll conducted in

1984 indicated that up to 67% of Americans acknowledge that they would be healthier if they made some dietary changes (Louis Harris and Associates, Incorporated, 1984). Pierce et al. (1984) found a similar level of awareness in their study of 879 randomly selected adult Oregonians. However, 88% of these subjects indicated they believed the foods they currently consumed did not increase their risk of heart disease. In Crawford's (1988) review of current studies on this topic, she indicates a public awareness of the role of dietary fat in the risk of heart disease but confusion about which foods and what types of fat have a lower risk associated with them. The level of awareness these studies indicate conflicts with Shekelle and Liu's (1978) study of 617 adults under the age of sixty years. While 75% of these subjects reported belief that heart disease is preventable, there was widespread lack of knowledge about probable causes, including those concerning diet. However, since this study was conducted more than ten years ago, knowledge about the relationship between diet and heart disease may have increased.

If the attempts to inform the American public about the role of nutrition in the development of heart disease have been somewhat successful, whether this knowledge is a good predictor of behavior modification to adopt eating patterns associated with a lower risk is open to question. Carruth et al. (1977) found that personality rather than nutrition knowledge was a strong predictor of behavior change in a study of members of a unit of Nutrition Education Assistants Program in

Missouri. Similarly, Shepherd and Stockley (1987) report an individual's attitude is a better predictor of dietary change than is nutrition knowledge, based on their questionnaire completed by 210 subjects in the United Kingdom.

An additional variable that may be related to an individual's willingness to modify his or her diet is gender. Several studies suggest that males are less likely than females to report belief in major dietary and lifestyle factors recommended to the public to prevent heart disease. Kline and Terry (1986) in a study of 706 Midwestern adults found that females were more likely than were males to agree with statements concerning the beneficial effect of limiting saturated fats. Similarly, Sullivan and Schwartz (1981), with a 19 statement attitude instrument administered to adults, found that females had more negative attitudes towards high fat foods than did males. In addition, they found that attitude was a good predictor of behavior change. In Shepherd and Stockley's study (1985) using a questionnaire that assessed consumption of foods high in fat and attitudes about these foods, similar results were reported. Females had more negative attitudes toward high fat foods and lower consumption of these foods compared to males in the study. Knapp et al. (1988) studied avoidance of saturated fat and cholesterol by gender and ethnic differences. This study reported that females of both ethnic groups, non-Hispanic whites and Mexican Americans, avoided saturated fat and cholesterol more than males of either ethnic group.

These results indicate a need to target nutrition intervention to the male population, in particular, for the reduction of dietary fat to reduce the risk of heart disease. The importance of this need is underscored by the fact that of the 1.25 million heart attacks occurring in this country each year, two-thirds of them occur in the male population (United States Department of Health and Human Services, 1988).

In order to better understand the differences between males who adopt diets lower in total and saturated fat and those who do not the innovation-decision model described by Rogers (1983) was used. This model delineates factors thought to be influential to individuals in evaluating a new idea and making a decision to adopt or reject that idea. Two major areas thought to influence the adoption of a diet lower in total and saturated fat were investigated in this study. The first was the demographic characteristics of the subjects, and the second was the information sources which the subjects use. The objective of this study was to determine how adoptors of diets lower in total and saturated fat differ from nonadoptors regarding demographic characteristics and information sources used. This knowledge will enable nutrition educators to better target their attempts to reach those who still need to make dietary modification to reduce their risk of heart disease.

REVIEW OF LITERATURE

Demographic Characteristics

The innovation decision model proposes that the demographic characteristics of an individual will affect his or her attitude toward and subsequent adoption of a new idea (Rogers, 1983). Age, race, educational attainment, socioeconomic status, occupation, family composition, family history of heart disease, and degree of control of food selection may each have an impact on the decision to adopt a lower fat diet.

Many studies have identified demographic variables associated with the incidence rates of heart disease. Other studies have identified risk factors and the effects of demographic variables on the prevalence of these factors. Few studies have examined the effects of demographic variables on specific behaviors, such as consuming a lower fat diet to reduce the risk of heart disease.

Demographic variables as predictors of heart disease risk

Socioeconomic status The relationship between socioeconomic status and the risk of heart disease has been well established by a number of studies. Income level, social class, salaried employees compared to wage earners, and education have been used in combination or singularly as measures of socioeconomic status. Abramson et al. (1982) compared a number of characteristics used to indicate social class as it related to health in 857 men over the age of 30. This

study found that occupational scales, education, and income yielded similar results when used as indicators of social class.

In a Finnish study of 10,951 subjects, socioeconomic factors such as place of residence (urban vs. rural), education level, and family income were all related to risk factors associated with heart disease (Tuomilehto et al., 1978). The subjects at highest risk were identified with a combination of factors that included smoking, high blood cholesterol values, and hypertension. Those identified most at risk by these factors were rural males with low levels of education and low family incomes.

Similar results were reported in a large study of British male civil service workers (Rose and Marmot, 1981). The subjects in this study were categorized into five employment grades. When analyzed for the presence of heart disease risk factors, low employment grade was a stronger predictor of heart disease risk than blood cholesterol values, smoking, or high blood pressure.

Another large scale study involved 18,000 males in Oslo, Norway (Holme et al., 1976). This study used a combination of income and education for comparison to a coronary risk factor score. This score consisted of a combination of blood lipid values, body weight, smoking, and physical activity level. A strong negative correlation was found between social status and the risk of heart disease.

In an analysis of data collected from the Dupont Company employees from 1957 to 1983, a comparison of myocardial infarction rates was made

between salaried employees and wage earners (Pell and Fayerweather, 1985). During this time period there was an overall decline in the incidence rate of 28.2%. However, the rate of decline was much greater for salaried employees (37.6%), than for wage earners (18.2%).

A combination of education and occupation was used as a socioeconomic index in a study of heart disease risk among 362 adults in suburban Ohio (Khourly et al., 1981). The results of this study indicate that a high socioeconomic status is associated with a decrease in the risk of heart disease due to lower rates of smoking, blood pressure, and intake of certain foods related to the progression of heart disease.

Education Several studies have examined the relationship between education and the risk of heart disease, independent of occupation or income level. Liu et al. (1982) combined data from three studies--the Chicago Heart Association Detection Project, the Peoples Gas Company Study, and the Western Electric Study--to determine the impact of education on mortality rates from cardiovascular disease. A total of 11,027 males were classified into one of four education levels. The results indicated that the highest mortality rates were for individuals with the least education.

In a study of similar size in Norway, 12,368 adults were examined to determine the effect of education independently on the risk of heart disease, while controlling for smoking, physical activity level, body mass index, and consumption of some selected food items (Jacobsen and

Thelle, 1988). Although the differences between education groups diminished when these variables were controlled, the level of education attained still had a significant impact on risk, with those with higher levels of education having the least risk.

Race Another demographic variable that has been found to have an impact of the incidence of heart disease is race. Differences in the incidence of heart disease between Whites and Blacks were found in a survey of studies on coronary heart disease mortality and morbidity reported by Gillum (1982). Before 1968, Black males had lower cardiovascular disease death rates than White males. For a period of time following this, the rates for Black males rose and surpassed the rates for White males. By 1982, the rates for the two races were very similar. This is in agreement with a recent report using vital statistics data from the National Center for Health Statistics. These data indicate that the coronary heart disease mortality rates have continued to decrease for White males. However, there has been a leveling off of the declines in these rates for Black males and for females of both races (Sempos et al., 1988).

In a study comparing the cases of acute myocardial infarction between urban and rural adults of both races, 1,085 cases were analyzed (Keil et al., 1985). This analysis revealed that White males had the highest prevalence rates overall, with higher rates in rural areas. However, rural Black males had lower rates than did urban Black males. Females of both urban and rural areas of both races had similar rates.

Marital status Marital status in another demographic variable which has been associated with the risk of heart disease. An evaluation of the relationship between marital status and the incidence of cardiovascular disease was made on 7,849 individuals residing in the midwestern United States (Venters et al., 1986). These subjects were grouped into one of four categories: married, never married, widowed, and divorced or separated. The highest hospitalization rate due to heart attack or stroke was for the separated or divorced group. The lowest rate was for those who had never been married. These groups were then analyzed for the presence of risk factors associated with heart disease. The divorced or separated group had the highest level of smoking and alcohol consumption and the most physical activity. Married individuals had lower hospitalization rates but had high blood lipids and less physical activity.

Librach et al. (1975) reported on a study of 2,459 individuals and their incidence of myocardial infarction rates according to marital status. The rates were significantly lower for the nonmarried males than for the married males. A possible reason these results differ from those of Venters, as cited above, may be due to the grouping of the never married, separated, divorced, and widowed into one category in this study. Vinter's results indicated differing rates for these three groups, thus the validity of combining them may be open to question.

Age The age of an individual is also a demographic variable that has been shown to be associated with the risk of heart disease. A three year study of 110,000 adults, aged 35 to 64 years, found a sharp increase with age for the incidence rates of myocardial infarction and angina (Shapiro et al., 1969). These findings are in agreement with age specific rates for myocardial infarction found in the DuPont and Framingham studies (Pell and Fayerweather, 1985; Margolis et al., 1976).

Demographic variables as predictors of attitudes, knowledge, and behavior

The association of heart disease with various demographic variables is well documented but the relative contribution of each specific factor is less well understood. Additional research has focused on the effect demographic variables such as income, age, and education have on knowledge, attitudes, and food consumption behaviors.

In a study examining attitudes toward and knowledge of high fat foods, 210 adults were assessed. Data were also collected for age, sex, and occupation of the subjects (Shepherd and Stockley, 1987). This study found that males, in general, had more positive attitudes towards high fat foods. Males aged 26 to 45 years, those from higher social classes, and women tended to have more negative attitudes toward these foods. Attitude was a stronger predictor of consumption behavior than was nutrition knowledge in this study.

Sullivan and Schwartz (1981), as described earlier, reported that the demographic variables of age, sex, personal history of heart disease, and education level had a statistically significant association with attitude, knowledge, and practice related to diet and heart disease. More specifically, older age, lower education level, and individuals who were less physically active tended to have more negative attitudes toward diet and heart disease. Females tended to have more positive attitudes toward these topics.

The effect of the demographic variables of education and income on dietary practices was one of subjects covered in the Minnesota Heart Survey (Kushi et al., 1988). This study consisted of 1,718 adults surveyed using a 24 hour dietary recall method. Results of this study indicate that high educational attainment was associated with consumption of a less atherogenic diet. However, the effect of income on dietary practices differed between the sexes. Males of higher income levels had higher intake of protein and cholesterol than those with lower incomes. In addition, males with higher income levels had higher serum cholesterol levels. These differences were not observed between female subjects of different income levels.

Thompson (1988), using the 1977-1978 National Food Consumption Survey, reported differences in fat intake among females from different income levels. Those in higher income levels were reported to consume 64.9 grams of fat per day compared to 59.3 grams per day for women of lower income levels. The sources of fat in the diet also differed

between income groups. This study did not analyze the data for differences of fat intake among income levels for males.

These studies indicate that the differences in heart disease rates observed between social classes may not be clearly due to differences in dietary practices, but may be due to reduction of other risk factors such as smoking and physical activity levels.

Information Sources

The role of information sources in modifying dietary behavior

In the innovation-decision model described by Rogers (1983), an individual may receive a message or new idea from another individual or institution. The importance of information in the decision making process to adopt or not adopt this new idea is due to its role in reducing the uncertainty associated with the new idea. In the study reported in this thesis, the new idea is to modify dietary fat to reduce the risk of heart disease. As an individual receives information on this topic, uncertainty about the subject will be reduced and thus will facilitate the decision making process. According to this model, the decision to adopt a lower fat diet must be preceded by information that increases the individual's knowledge of the role of dietary fat in the occurrence of heart disease and how to reduce dietary fat.

This model is in agreement with Rosenstack's Model of Health Belief's in which he proposes "that individuals will generally not seek

preventative care or health screening unless they possess minimal levels of relevant health motivation and knowledge, view themselves as potentially vulnerable and the condition as threatening, are convinced of the efficacy of intervention and see few difficulties in understanding the recommended health behavior" (Becker and Maiman, 1983). If this model is applied to changing dietary behaviors by lowering total fat and saturated fat intake to reduce the risk of heart disease, information sources play a key role. Before changes in behavior can occur, the individual must be exposed to information recommending a fat modified diet, see himself or herself as being at risk of developing heart disease, understand the recommended steps to reduce the risk, and be convinced that modifying the diet would be one way of reducing the risk.

Sources of nutrition information

Health information, including nutrition information, is disseminated from a broad range of sources and in a variety of media forms. Several studies have examined the frequency of using different information sources by various groups. In a national survey of 1,188 individuals, 80% females and 20% males, the respondents were questioned about which sources of information they most often relied on for nutrition information (Murray, 1978). Forty-four percent reported that magazine and newspaper articles were their primary sources of information. These were followed by doctors and clinics (24%), food product labels (28%), books (22%), medical experts on television (18%),

television commercials (15%), cookbooks (17%), magazine and newspaper advertisements (15%), government (12%), and school economist (12%). These respondents were also asked who they felt should be responsible for nutrition education. They indicated that the government, food manufacturers, and doctors should be primarily responsible for educating the public about nutrition. Newspapers and magazines were listed low on this scale of responsibility even though they were the sources most often used.

In another study of nutrition information sources (as cited by Turner, 1984) subjects were asked "How do you normally find out what is good for you?" Sixty percent listed commonsense as their first choice, with this term defined as incidental learning from many sources. The next choice was media, which included newspapers, magazines, and television, followed by family and friends, and then books. The last category listed was professionals which included doctors and schools.

In a study of the elderly, Grotkowski and Sims (1978) examined nutrition knowledge and dietary practices of subjects aged over 65 years. The sources of nutrition information these subjects felt were the most helpful were television, physicians, magazine articles, and cookbooks, in descending order. It is interesting to note that in this study, although television was the most helpful source listed, it was not associated with higher nutrition knowledge scores.

Of particular interest to this study were results reported by Sullivan and Schwartz (1981). They investigated sources of nutrition

information, frequency of its use, and the effects of demographic variables on knowledge and attitudes toward diet and cardiovascular disease in 281 adult Canadians. The information sources used most frequently by all subjects were mass media, which included magazines, books, newspapers, and television. This was followed by interpersonal sources, including doctors, family members, and friends. Gender was found to have a significant influence on knowledge, attitudes, and practices with females being more knowledgeable about diet and heart disease and having more positive attitudes toward this topic.

Connell and Crawford (1988) statistically examined the differences in 182 adults in two Pennsylvania counties for sources of health information using the demographic variables of gender, age, and rural or urban residence. The most frequently used sources were printed materials, television, and informal networks, which included physicians, nurses, pharmacists, family members, and friends. No differences were found between rural and urban residents in the sources of information available to them. The results indicate that females received more health information from all sources compared to males. Older women received slightly less and older males significantly less health information than other subjects in this study. The results indicate the need to target the male population, in particular, for nutrition and other health information, along with the need to find the most effective means for achieving this goal.

Effectiveness of mass media as information sources

Audio, audio-visual, and printed materials available to the public compose mass media information sources. Several studies report success in increasing nutrition knowledge via mass media means such as television programs and radio features (Wolczuk, 1973; Shannon et al., 1979; Medved, 1966; Chicci and Guthrie, 1982). However, these studies are based on changes in pre-test and post-test knowledge scores which may have little or no impact of behavior change.

Another point of interest is whether mass-communication channels are reaching those individuals who need to make dietary modifications to decrease their risk of heart disease. In Hochbaum's discussion of behavior, education, and the use of media he states that the more people are interested in and the more they already know about the subject, the more likely they are to read or listen to communications dealing with it (Hochbaum, 1979). Thus, efforts to disseminate nutrition information via mass media may only reach individuals already interested in this topic. Individuals who have not yet adopted lower fat diets may be the first to ignore information on this topic when it is presented through mass media channels.

Few studies have examined the effectiveness of mass media messages about dietary behavior and/or physiological parameters. One study that did examine these variables was the Stanford Three Community Heart Disease Prevention Project (Fortmann et al., 1981). This project tested the effectiveness of nutrition information disseminated via

television, radio, newspapers, billboards, and direct mailing of printed materials in three California communities with similar characteristics. Two of the communities received the mass media messages while the third served as a control. Reduction in dietary cholesterol and saturated fat was significantly greater in the two test communities which received the media campaign compared to the control community which did not received the media campaign.

Another project, the Fargo-Moorhead Heart Health Program, used a community-wide, five year program of health education to reduce the incidence of heart disease (Murray, 1986). This study used multimedia communication channels to deliver health information. However, it went beyond this to also include a community-based organization which stimulated interpersonal communication channels such as family, peer groups, classes, and programs. The results of this project are not available at this time.

Effectiveness of interpersonal information sources

Family members, friends, doctors, and other health care professionals are considered as interpersonal (face-to-face) information sources. In the innovation-decision model, mass media plays an important role in providing information about a new idea. However, interpersonal channels are seen as more valuable in the formation of attitudes toward a new idea, and thus exert great influence in the decision to adopt or not adopt the new idea. An interpersonal channel of information is described as a face to face

exchange between the message sender and receiver (Rogers, 1983). In the published research on nutrition information sources reported earlier, interpersonal channels are reported as an important source of information by the respondents in each study cited. However, published studies could not be found that examined the effectiveness of these channels, either collectively or specifically, on dietary behavior changes.

The perceived credibility of interpersonal sources for health information varies greatly, with doctors leading the list, family members scoring in the middle of the range, and friends or neighbors scoring last (as cited by Turner, 1984). In a review of food behavior studies, Foley et al. (1979) reports that agreement within the family is a stronger influence than is individual belief regarding food choices. This may be either an inhibiting or a promoting factor when recommended dietary changes are initially attempted. For example, friends and family members were the most important sources of information when new food dishes were tried in a study of homemakers in small towns (Dickens, 1965).

As an individual receives nutrition information recommending reducing saturated and total dietary fat, it must be reconciled with the belief system of his or her social network. Therefore, the rate of and interest in adoption will vary among individuals.

Dietary Fat Intake in the United States

As cited earlier, in 1977 the United States Senate's Select Committee on Nutrition and Human Needs recommended six dietary goals to help prevent chronic disease in the United States (Select Committee on Nutrition and Human Needs, 1977). One of these goals recommended that total dietary fat be reduced to 30% of total daily caloric intake. In addition, another goal recommended that saturated fat be reduced to 10% or less of total daily caloric intake. This section will review current consumption patterns of dietary fat in the United States to examine how well these goals have been achieved.

Methods for analyzing nutrient intake fall into two broad categories. One is the use of the United States Department of Agriculture's food disappearance data. These data are based on the quantities of food available for consumption, thus include more than is actually eaten. However, they are useful for following consumption trends over varying time periods. These data are reported in pounds per capita and are called food use rather than consumption. Studies making use of these data will be discussed first.

The other category of nutrient intake analysis is individual intake data based on information generated from asking individuals about their individual consumption habits. Individual differences in nutrient intake can be reported and compared by using these data. Studies using this type of analysis will be reviewed following the review of the per capita intake studies.

Per capita use of fat

In a study examining changes in fat and oil per capita food use between 1950 and 1985, disappearance data from the U.S. Department of Agriculture were analyzed (Rizek et al., 1988). This study reported that per capita food use of total fat increased from 49 pounds in 1950 to 67 pounds in 1985. However, the type of fat used changed significantly. There was a shift to greater use of vegetable oils, primarily due to the replacement of butter with vegetable oil-based margarines. There was a concurrent decrease in the use of lard. However, there was an increase in the use of edible beef tallow which the authors attribute to increased use by the restaurant industry and in the production of shortening.

A report issued by the U.S. Department of Agriculture in 1985 based on disappearance data describes changes in per capita use of some selected items from 1960-63 to 1980-83 (Bunch, 1985). Per capita use of fats and oils increased from 49 pounds to 63 pounds, similar to the increases reported by Rizek et al. (1988). Animal fat use decreased from 20 pounds to 13 pounds, while vegetable oil use rose from 29 pounds to 50 pounds. The use of poultry increased in the time period between 1960-63 and 1970-73. This was followed by a drop in use, with the 1980-83 value of 154 pounds still somewhat higher than the 1960-63 value of 147 pounds. The per capita use of cheese increased from the 1960-63 value of about 9 pounds to about 21 pounds for 1980-1983. The use of fluid milk, butter, and ice cream all decreased during this time period.

Marston and Raper (1986), also using the U.S. Department of Agriculture's disappearance data, reported nutrients per capita per day in gram amounts. In 1909-13 these values for fat were 124 grams per day, while in 1984 166 grams per day were reported. This report also analyzed the contribution of major food groups to fat intake between 1967-69 to 1984. In 1967-69 meat, poultry, and fish contributed 37% of the fat intake, dairy products excluding butter contributed 12%, and fats and oils including butter contributed 40%. In 1984, meat, poultry, and fish contributed 34% of the fat intake, dairy products excluding butter still contributed close to 12%, and fat and oils including butter contributed 44%. These shifts were attributed to increased per capita use of shortening from 16 pounds to 21 pounds as well as an increase of edible oil use from 16 pounds to 21 pounds per capita.

The most recent disappearance data available from the U.S. Department of Agriculture reports some major changes in food use patterns since 1970 (Bailey et al., 1988). In 1970 red meat represented three-fourths of total meat use. By 1986, it had dropped to two-thirds. However, increases in the use of poultry more than offset the decrease, resulting in an overall increase in meat consumption since 1970. Per capita use of fat continues to rise with increases in the use of fat from vegetable sources and decreases in the use of fat from animal sources. The contribution of fat from animal sources has declined 10% over a 20 year period of time. There has been

a 35% increase in the use of visible fat, rising from 47.7 pounds per person in 1965 to 64.4 pounds per person in 1985. This rise is attributed to greater use of salad and cooking oils, shortening, table spreads, lard, and edible beef tallow. The consumption of cheese doubled between the level in 1966 and the level in 1986.

Individual intake of dietary fat

One of the largest national surveys using individual intake data was the Second National Health and Nutrition Examination Survey (NHANES II) conducted from 1976 to 1980 using a 24 hour dietary recall method (U.S. Department of Health and Human Services, 1983). This survey revealed that males ages 35-44 years consumed a mean of 103 grams of fat per day with 37 grams of this represented by saturated fat. For males ages 45-54 years, the mean intake of fat per day was 99 grams, of which 36 grams were saturated fat. For males in both age groups, approximately 38% of the total calories consumed were from fat, with approximately 14% of these calories coming from saturated fat. Thus, both age groups failed to meet the dietary recommendation as cited earlier.

Folsom et al. (1987) compared the changes in nutrient intake of 1973-74 to 1980-82 in a subsample drawn from the larger sample examined in the Minnesota Heart Survey Project, which used 24 hour dietary recall data. This study did not find any significant changes in the total fat intake or percentage of fat represented by saturated, monosaturated, or polyunsaturated fats between the two study periods.

For males, the percentage of calories from fat was 42% in both time periods. For females, the percentage of calories from fat was 40% in 1973-74 and 41% in 1980-82. In the more recent time period, only 8.3% of the males and 12.4% of the females achieved the dietary goal for total fat intake of 30% or less of total caloric intake.

The NHANES II results are in close agreement with those of the Continuing Survey of Food Intakes of Individuals conducted in 1985 (United States Department of Agriculture, 1986). This survey used 1-day dietary intake data for males 19-50 years of age. Total dietary fat represented 37.2% of the total caloric intake, with 13.64% of the total caloric intake composed of saturated fat.

These studies all agree that most American males fail to meet the two dietary goals cited earlier for the reduction of total dietary fat and reduction of saturated fat.

RESEARCH OBJECTIVES, HYPOTHESES, AND METHODOLOGY

Research Objectives

The objectives of this study were to examine a rural male sample to:

1. Determine their degree of adoption of food behaviors to reduce total and saturated dietary fat.
2. Identify information sources used by the sample about changing food behaviors to reduce total and saturated dietary fat.
3. Identify descriptive characteristics that predict the adoption of dietary behaviors to reduce total and saturated dietary fat and the use of sources of information on this topic.
4. Evaluate which information sources are used most frequently by those who have made dietary changes to reduce total and saturated dietary fat.

Research Hypotheses

1. A high degree of adoption of dietary behaviors to reduce heart disease is positively correlated with income, education, and occupation.
2. A high degree of adoption of dietary behaviors to reduce total and saturated dietary fat is positively correlated with being diagnosed with high serum cholesterol levels and a family history of heart disease.

3. There is a positive correlation between high degree of adoption of food behaviors to reduce total and saturated dietary fat and the frequency of receiving information on this topic.

Methodology

Instrument development

In the fall of 1988, a four-part research instrument was developed to assess adoption of food consumption behaviors associated with reducing total and saturated dietary fat, attitudes associated with adoption of those behaviors, use of information sources, and the descriptive characteristics of the subjects. The attitudinal section of this instrument is not part of this thesis, and will not be discussed. The development of the other three sections are discussed below. A copy of the complete research instrument is found in Appendix A.

The first section of the research instrument was designed to assess the degree of adoption of food behaviors to reduce total and saturated dietary fat. A food frequency format was chosen for this assessment. This method has been shown to be reproducible and valid by Pietinen et al. (1988) in separate studies examining each of these characteristics.

The frequency of consumption was determined for ten groups of food items which had been identified by the Continuing Survey of Food Intake

by Individuals in males 19 to 50 years of age as contributing the most to the intake of total and saturated dietary fat (United States Department of Agriculture, 1986). For each of these ten groups the subjects were asked how often they consumed each specific food item. The response range was daily, several times per week, about once a week, or less than weekly. Each of these categories was assigned a numerical value, with less than weekly having a value of zero and daily consumption having a value of three. The next two items asked about the type of table fat and cooking fat used in each subject's home. If the subject responded with a brand name, the product label was checked and then assigned a value ranging from zero to three, according to the content of saturated fat. These values corresponded with the values given to the first ten items to assess the degree of adoption of food behaviors to reduce total and saturated dietary fat. The final item on this portion of the research instrument addressed product label reading for the intent of avoiding saturated fat. The response choices for this item ranged from never to almost always. The response choice was assigned a value from zero to three to correspond to the other items on this portion of the research instrument.

The second section of the research instrument was designed to collect data on the types of information sources used by the subjects about fat in their diets and the frequency of their use during the last year. Four types of information sources were examined--mass media, interpersonal, health care professionals, and community sources.

Subjects were asked to rate the usage of fourteen information sources. The mass media section included newspaper or magazine articles, books, newsletters or pamphlets, television, and radio. The interpersonal sources included family members and friends or neighbors. The health care professionals included physicians, nurses, dietitians, and other health care providers. The last category, community sources, included community meetings or classes, health fairs or other public screenings, and health food stores. The frequency response range was none, once or twice, and more than twice for receiving information on dietary fat during the last year.

The third section of the research instrument was designed to collect data on the descriptive characteristics of the subjects. The variables included age, educational attainment, annual household income, occupation, race, marital status, spouse's employment outside of the home, and the number of individuals living in the home of the subject. An additional item inquired if the subject had been diagnosed as having high blood cholesterol levels. The items following this sought information about the family history of high blood cholesterol levels and heart attacks. The family members asked about were father, mother, brothers, sisters, spouse, and children.

In the final portion of this section, three items were developed to assess involvement in food selection. These items asked each subject to estimate his participation in food shopping and cooking for the home. The response range for these items was almost always, about

half the time, seldom, and never. The next item inquired about the frequency of eating away from home. Since this item did not distinguish between possibilities such as sack lunches, restaurants, or other peoples' homes, it was impossible to interpret the data it generated. Thus, this item was not analyzed statistically with other variables.

The research instrument was approved for use by the Iowa State University Committee on the Use of Human Subjects in Research.

Expert review

The research instrument was evaluated by six individuals with expertise in areas which included lipid diet therapy, food composition, community food behaviors, lipid chemistry, and nutrition education. In addition, one of the reviewers had expertise in using the innovation-decision model and its application to rural sociology. A complete list of the reviewers' names and positions is located in Appendix B. The reviewers were asked to comment on the clarity and content of the items, and to make suggestions for improvements on specific items or on the instrument as a whole. Consideration was given to the reviewers' comments and suggestions, resulting in some minor revisions of the research instrument being made before it was pilot tested.

Pilot test

A pilot test was conducted by trained telephone interviewers at the statistical laboratory, Iowa State University, Ames, Iowa, in the

fall of 1988. The questionnaire was administered by telephone to four individuals who met the criteria for the study. These individuals were asked to inform the interviewer if any of the items were unclear. Minor revisions were made based on the comments from the individuals participating in the pilot test.

Data collection

In February, 1989, Quality Controlled Service Company, Sunset Hills, Missouri, conducted telephone interviews using the research instrument to collect data. The interviews were conducted by trained telephone interviewers using a random sample of telephone numbers for nonmetropolitan areas of the state of Iowa.

The criteria for participation in this study required that the subject be a male from ages 35 to 55 years and who had not been previously diagnosed as having diabetes, a heart attack, or stroke.

A total of 2,402 individuals were contacted by telephone (Table 1). Of these, 1,744 failed to meet the criteria for the study, 351 refused all communication with the interviewer, 7 terminated the interview before completion, and 300 were successfully interviewed. Each interview lasted approximately 20 minutes.

Data analysis

Each interview form was numerically coded and the data entered on Iowa State University's NAS AS/9160 computer. The Statistical Analysis System (SAS Institute, Inc., 1985) was used for the statistical procedures.

TABLE 1. Responses to telephone contacts (n=2,403)

Telephone contacts	Frequency	Percent
Interviewed	300	12
Did not meet criteria	1,744	73
Refused to participate	351	15
Terminated interview	7	<0.1

A composite food behavior score was calculated for each subject based on responses to the 13 food behavior items on the research instrument. Low behavior scores indicated a high degree of adoption of behaviors to reduce total fat and saturated dietary fat, while high behavior scores indicated a low degree of adoption of these behaviors.

A composite family heart health score was calculated based on responses to the items inquiring about family history of high blood cholesterol levels and heart attack. This score was called the family heart health score for each subject, with a high score indicating the subject had a family history of heart disease.

A score based on participation in food selection was calculated from responses to the two items on the research instrument concerning participation in food shopping and cooking. This score was called the food participation score for each subject, with a high score indicating greater participation in these activities.

Frequencies and percentages were determined for each variable. Tests of correlation between ordinal or interval level data were

carried out using Pearson's correlations. Differences between nominal level variables were investigated using the chi-square test. The level of significance was set at a probability of less than or equal to .05.

RESULTS AND DISCUSSION

Descriptive Characteristics

Demographic characteristics

The demographic characteristics of the sample are found in Table 2. The sample was comprised of 300 males residing in the state of Iowa who ranged in age from 35 to 55 years. The ages of the subjects who participated in this study tended to be younger than would be predicted by Iowa population statistics (Iowa Department of Economic Development, 1987). The expected percentages would be 33% for those in the age category of 35 to 39 years, 23% for those 40 to 44 years of age, 23% for those 45 to 49 years of age, and 21% for those 50 to 54 years of age. The overall trend towards a younger sample may be due to a greater willingness of younger individuals to participate in the telephone interview format.

The participants in this study tended to have a higher educational attainment than is found in the population of Iowa, in general. Iowa census data indicate that 71.5% of Iowans have completed a minimum of four years in high school (United States Department of Commerce, Bureau of the Census, 1982). However, in this study 95.7% of the participants had, as a minimum, a high school education.

TABLE 2. Demographic characteristics of respondents (n=300)

Characteristic	Frequency	Valid percent
Age		
35-39	130	43.7
40-44	76	25.5
45-49	45	15.1
50-55	47	15.7
Missing	2	--
Education		
Less than high school	13	4.4
High school graduate	134	44.7
Some college or technical school	62	20.7
College degree	63	21.0
Post college degree	28	9.3
Race		
White, non-Hispanic	296	99.0
Other	3	1.0
Missing	1	--
Occupation		
Professional, administrator, owner, supervisor	86	29.4
Farming	56	19.1
Skilled craftsman, laborer, factory worker	100	34.1
Clerical, sales, service	45	15.4
Other	6	2.0
Missing	7	--
Marital status		
Married	269	89.7
Single or divorced	31	10.3
Spouse works outside home		
Yes	174	64.7
No	95	35.3
No spouse	31	--

Table 2. continued

Characteristic	Frequency	Valid percent
Number in home		
1	17	5.7
2	58	19.5
3	57	19.1
4	81	27.2
5	56	18.8
6 or more	29	9.7
Missing	2	--
Annual household income		
Less than \$ 15,00	18	6.1
\$15,000 - 29,000	131	44.7
\$30,000 - 44,000	89	30.4
Greater than \$45,000	55	18.8
Missing	7	--

For the characteristics of race, 99.0% of the subjects reported being White, non-Hispanic. This is comparable to the population of Iowa in general, which is 97% White, non-Hispanic (United States Department of Commerce, Bureau of the Census, 1982).

The largest occupation category in this study included skilled craftsmen, factory workers, machine operators, and laborers (34.1%). This was followed by the occupation category which included professionals, administrators, owners, and supervisors (29.4%). The next category was composed of farmers (19.1%). The smallest category included those who were employed in clerical, sales, or service work (15.4%).

In this study, 89.7 % of the participants reported that they were married. This is a higher rate of marriage than would be predicted using Iowa data for males over the age of fifteen years, which is 64% (United States Department of Commerce, Bureau of the Census, 1982). However, this difference can be partially attributed to the age range of the participants in this study. Young males 16-34 are more likely to have never been married, while males over age 55 are more likely to be widowed. This study included neither of these age groups.

The percentage of respondents who reported that their wives were employed outside of the home is 64.7%. This compares to a nationwide average of 55.8% (United States Department of Commerce, Bureau of the Census, 1988). Nationally, 48.4% of women without children under the age of 18 years are employed outside the home. However, for those with children under the age of 18 years in the home, 63.9 % are engaged in outside employment. The percentage reported in this study may more closely reflect the latter, due to the larger percentage of young participants.

Table 2 shows that about half the subjects had three to four individuals permanently residing in their homes. Data collected in 1986 revealed that 2.57 persons per household was the average for Iowa (United States Department of Commerce, Bureau of the Census, 1988). The average household size in this study was 3.67. This difference may be attributed to the age range of these subjects, many of whom probably still have children residing in their households, as compared to the

entire population of the state, which would include younger and older individuals who are not as likely to have children residing in their homes.

The annual household income of the subjects in this study was classified into one of four categories as shown in Table 2. Approximately 45% of the subjects reported an annual household income between \$15,000 and \$29,000, while 30.4% reported an annual income between \$30,000 and \$44,000. These results are comparable to the average household income for Midwestern households, which is \$29,584 (United States Department of Commerce, Bureau of the Census, 1988).

Several statistically significant relationships were found between the demographic variables. As expected, occupation and income were associated with each other ($\chi^2=25.225$, $df=9$, $p=.003$). Additionally, occupation and income both were related to the level of education ($\chi^2=79.849$, $df=6$, $p=.000$; $r=0.171$, $p=.003$). Those with higher levels of education were more likely than those with lower levels to have higher incomes and be employed as professionals, administrators, owners, or supervisors.

The spouse's employment outside of the home was related to the occupation of the subject ($\chi^2=9.164$, $df=3$, $p=.027$). Farmers were less likely than those in other occupations to have a spouse employed outside the home. Another factor affecting employment of the spouse outside of the home was the size of the household ($\chi^2=9.090$, $df=2$, $p=.011$). If the household consisted of five or more members, the

spouse was not as likely to have outside employment, as compared to households of four or less members. The number of household members was also associated with age, with younger subjects more likely than older subjects to have larger households ($r=-0.228$, $p=.000$).

Diagnosed high blood cholesterol levels

The percentage of subjects who reported that they had been diagnosed as having high blood cholesterol levels was 18.3%. There was a positive correlation between being diagnosed with high blood cholesterol level and age ($\chi^2=6.041$, $df=1$, $p=.014$). Older subjects were more likely than younger subjects to report being diagnosed with this condition.

Family heart health history

The results of the items on the research instrument that covered the propensity towards heart disease as evidenced by high blood cholesterol levels are reported in Table 3. These items inquired about specific family members who had been diagnosed as having high blood cholesterol levels. Mothers (14.0%) were the most frequently reported family member to have been diagnosed with this condition, followed by fathers (10.7%), brothers or sisters (10.2%), spouses (5.6%), and children (2.0%).

The next items in this section of the research instrument inquired about the family history of heart attack. The results of these items are found in Table 4. Fathers (20.4%) were the most frequently

TABLE 3. Family history of diagnosed high blood cholesterol levels
(n=300)

Subjects reporting diagnosis in family member category		
Family member category	Frequency	Percent
Father	32	10.7
Mother	42	14.0
Brothers or sisters	29	10.2
Spouse	15	5.6
Children	5	2.0

reported family member to have suffered a heart attack. Other family members were much less likely to be diagnosed with this condition, with mothers at 6.0%, brothers or sisters at 3.2%, and spouses at 0.3% diagnosis. No subject reported a child diagnosed with this condition.

TABLE 4. Family history of heart attack (n=300)

Subjects reporting diagnosis in family member category		
Family member category	Frequency	Percent
Father	61	20.4
Mother	18	6.0
Brothers or sisters	9	3.2
Spouse	1	0.3
Children	0	0.0

An overall family history of high blood cholesterol level score was calculated for each subject. The subject was assigned a score of 1.0 if no family members had been diagnosed with high blood cholesterol levels. If the subject had one family member who had been diagnosed with this condition he was assigned a score of 2.0. A score of 3.0 represented two or more family members had been diagnosed with high blood cholesterol levels. The frequencies and percentages for these scores are shown in Table 5.

TABLE 5. Family history of high blood cholesterol level scores
(n=300)

Number of family members	Frequency	Percent
0	211	70.3
1	59	19.7
2 or more	30	10.0

An overall family history of heart attack score was also calculated. A score of 1.0 was assigned to subjects who did not have any family members who had been diagnosed with this condition. A score of 2.0 was assigned to subjects who had one or more family members who had suffered a heart attack. The frequencies and percentages of these scores are found in Table 6.

TABLE 6. Family history of heart attack scores (n=300)

Number of family members	Frequency	Percent
0	218	72.7
1 or more	82	27.3

The two family history scores were statistically analyzed with the demographic variables to determine if significant relationships existed. High scores for family history of high blood cholesterol levels and family history of heart attacks were both significantly associated with the subject being diagnosed with high blood cholesterol levels ($\chi^2=12.449$, $df=2$, $p=.002$; $\chi^2=9.012$, $df=1$, $p=.003$). A high score for family history of heart attack was positively correlated with the age of the subject ($r=0.119$, $p=.040$) and with a high score for family history of high blood cholesterol levels ($r=.310$, $p=.000$).

In further statistical analysis of these data, the family history of high blood cholesterol levels and the family history of heart attacks were combined and named the family heart health history score. Subjects who had been diagnosed with high blood cholesterol levels had significantly higher scores than those who did not report this diagnosis ($\chi^2=15.915$, $df=3$, $p=.001$). These results are consistent with results from the Western Collaborative Study (Sholtz et al., 1975) and a study conducted by the Cincinnati Lipid Research Clinic (Morrison et al., 1980) which both showed familial aggregation of coronary heart

disease risk factors, including high blood lipid levels. These studies examined parental history of heart disease in adult samples with age ranges comparable to the sample in this study.

Participation in food shopping and cooking

The next items on the research instrument examined the subject's participation in food selection activities (Table 7). Each subject was asked how often he does or helps with the food shopping for his home. Eighty-three of the subjects (27.7%) reported they always shop or help shop, while 82 of the subjects (27.35%) shop or help shop at least half the time. One hundred and three of the subjects (34.3%) shop or help shop less than half the time. Thirty-two of the subjects (10.7%) never shop or help shop for the food for their homes. On the item that inquired about the frequency of cooking or helping with cooking for their homes, 52 of the subjects (17.3%) always cook or help cook. Seventy-four of the subjects (24.7%) cook or help cook at least half the time. One hundred and thirty-three of the subjects (34.3%) cook or help cook less than half the time, while 41 of the subjects (13.7%) reported they never cook or help with the cooking for their homes.

Responses to the items on the research instrument that inquired about participation by the subject in food shopping and cooking were combined into a mean score and named the food participation score. Several statistically significant relationships were found between the food participation score and the demographic variables. There was a negative correlation between the size of the subject's household and

TABLE 7. Participation in food shopping and cooking (n=300)

Statement	Almost always		About 1/2 the time		Seldom		Never	
	n	%	n	%	n	%	n	%
How often do you do or help with the food shopping for your home?	83	27.7	82	27.3	103	34.3	32	10.7
How often do you do or help with the cooking for your home?	52	17.3	74	24.7	133	44.3	41	13.7

his food participation score ($r=-0.296$, $p=.000$). This indicates that subjects with fewer household numbers had greater participation in food shopping and cooking. This relationship may be partially due to the effect of unmarried individuals who have small households but are more likely to almost always do the food shopping and cooking in their homes. Household income was also negatively correlated with the food participation score ($r=-0.172$, $p=.003$). This indicates that males with higher incomes were less likely than those with lower incomes to participate in food shopping and cooking.

Occupation was also related to the food participation score of the subjects ($\chi^2=26.522$, $df=12$, $p=.009$). Those subjects who were in the category that included skilled craftsmen, factory workers, machine operators, and laborers had a fairly even spread of scores across the response range from low to high. Farmers tended to have the lowest scores, thus the least participation in food shopping and cooking. Those subjects in the occupation category which included clerical, sales, and service workers tended towards high food participation scores. Subjects in the category of professionals, administrators, owners, and supervisors also tended to have high food participation scores. However, the data revealed that there was a subset within each of the latter groups which had low food score.

The employment of the subject's spouse outside of the home was significantly related to the food participation score of the subject ($\chi^2=24.686$, $df=4$, $p=.000$). Those subjects whose spouses were not

employed outside of the home were more likely to have low food participation scores than their opposing counterparts. These results differ from those of a recent study conducted in Iowa (Schafer and Schafer, 1989) which found that food related activities still remain the primary responsibility of the wife independent of whether she is employed outside of the home. However, younger couples had more expectation that the husband would participate in food related activities.

Food Behavior

Consumption of high fat foods

The consumption frequency of ten groups of high fat foods by the research subjects is reported in Table 8. Three items asked about frequency of consumption of selected groups of meat and poultry. Sixty-one percent of the subjects reported they consumed ground beef several times a week, and 18.0% of the subjects reporting daily consumption of this item. The subjects reported less frequent consumption of sausage, franks, bacon, and high fat luncheon meats, with only about 25% consuming these foods several times a week or daily, and approximately 75% consuming these foods once per week or less than weekly. A majority of the subjects (53.3%) reported consuming fat on meat or skin on chicken less than weekly with only 3.0% of the subjects reporting daily consumption of these items.

TABLE 8. Consumption of high fat foods (n=300)

Food	Daily		Several times a week		About once a week		Less than weekly	
	n	%	n	%	n	%	n	%
Ground beef	54	18.0	183	61.0	53	17.7	10	3.3
Sausage, franks, bacon, high fat luncheon meats	11	3.7	63	21.0	119	39.7	107	35.7
Fat on meat, skin on chicken	9	3.0	48	16.0	83	27.7	160	53.3
Whole milk	60	20.0	17	5.7	7	2.3	216	72.0
Cream, ice cream	17	5.7	54	18.0	93	31.0	136	45.3
Natural and processed cheese	31	10.4	127	42.5	100	33.4	41	13.7
Margarine, butter, sour cream	197	65.7	57	19.0	19	6.3	27	9.0
Sweets, such as desserts, doughnuts, candy bars	79	26.3	99	33.0	77	25.7	45	15.0
Snack crackers, chips	27	9.0	105	35.1	91	30.4	76	25.4
Fried foods	52	17.3	134	44.7	69	23.0	45	15.0

Four items asked about consumption of selected dairy foods and margarine. For the first of these items, almost three-fourths of the subjects reported they consumed whole milk less than weekly. However, for the remainder of the subjects, 20.0% consumed whole milk daily. Very few of the subjects reported moderate consumption of whole milk, as represented by the two middle response choices. About three-fourths of the subjects reported they consumed cream or ice cream about once a week or less. However, for another high fat dairy product, natural or processed cheese, consumption tended to be more frequent, with 52.9% reporting they consumed it several times per week or daily.

The fourth item in this group asked about consumption of margarine, butter, and sour cream. This item had the most daily consumption reported of any item, with 65.7% of the subjects reporting daily use of these products. Since consumption of these products is widely practiced, the type of products used becomes of concern, and will be discussed in the following section.

The next two items asked about consumption of sweets and high fat snack foods. The consumption of sweets such as cakes, cookies, doughnuts, pies, sweet rolls, and candy bars was fairly evenly spread across the first three categories of consumption frequencies -- daily, several times per week, and about once per week. The consumption of snack crackers and chips was fairly evenly distributed across the last three categories of consumption frequencies--several times a week, about once a week, and less than weekly. Thus, sweets were being

consumed somewhat more often than snack crackers and chips by these subjects.

The results for last item in this group, consumption of fried food, is not encouraging. The majority (62.0%) of the subjects reported consuming fried foods several times per week or daily.

The pattern shown in this study of frequent consumption of ground beef and infrequent consumption of visible fat on other meat items is consistent with the University of Arizona's Household Refuse Analysis Project (Rathje and Ho, 1987). This study found that two distinct trends of fat consumption have recently developed. These are the decreased purchasing red meat with separable fat and the increased purchasing of meat with non-separable fat, such as ground beef.

Other food behavior practices related to fat intake

Three items on the research instrument inquired about other specific food practices related to fat intake (Table 9). The first of these items asked about the type of table fat usually used in the home. The most frequent response for this item was margarine that does not list liquid vegetable oil as the first ingredient (48.2%). This was followed by margarine that lists liquid vegetable oil as the first ingredient (39.6%), and the least frequent response was butter (12.2%). Fifty-five subjects (18.3%) could not name the brand of margarine used or did not know what type of table fat was used in their homes. This is reported as missing data.

TABLE 9. Other food behavior practices related to fat intake (n=300)

Practice	Frequency	Percent
Type of table fat used		
Margarine - liquid vegetable oil first ingredient	97	39.6
Other margarine	118	48.2
Butter	30	12.2
Missing	55	--
Type of cooking fat used		
Liquid vegetable oil	221	79.8
Shortening	44	15.9
Butter, lard, bacon grease	12	4.3
Missing	23	--
Label reading to avoid saturated fat		
Almost always	63	21.0
About half of the time	51	17.0
Seldom	90	30.0
Never	96	32.0

Subjects were next asked what type of cooking fat was usually used in their homes. A large percentage (79.8%) of the subjects in this study reported that liquid vegetable oil was the main type of cooking fat used in their homes. Shortening was used by 15.9% of the

subjects, and 4.3% of the subjects reported using butter, lard, or bacon grease. Twenty-three subjects (7.7%) were unable to name the type of cooking fat used in their homes. This is listed as missing data.

The third question collected information about the frequency of label reading for the specific intent of avoiding saturated fat. Twenty-one percent of the subjects reported always reading product labels for this purpose, 17.0% read labels about half the time, 30.0% seldom read labels, and 32.0% never read labels. Statistical analysis revealed a very significant relationship between frequency of reading labels and involvement in food shopping ($\chi^2=26.001$, $df=9$, $p=.002$). Individuals who reported that they never shop or help shop for food were much more likely to also report that they did not read product labels.

Individual Food Behavior Scores

A food behavior score was calculated for each subject in the study based on responses to items on consumption of high fat food items and food behavior practices, as described in the methods section. The scores ranged from zero to three, with low scores representing a high degree of adoption of dietary behaviors to reduce total fat and saturated fat. High scores represented a low degree of adoption of these behaviors. The mean behavior score for the sample population was 1.33, indicating an overall moderate degree of adoption of behaviors to lower dietary fat and saturated fat, while the range was 0.15 to 2.62.

The behavior score, as described above, was found to have several statistically significant relationships with the descriptive variables of this study sample. There was a negative correlation between behavior and age ($r=-.11647$, $p=.0445$). This indicates a trend for older subjects to have adopted more behaviors to reduce total and saturated fat in the diet than younger subjects. In an analysis of the NHANES II data by Block et al. (1988), it was suggested that while the absolute intake of fat may decrease with increasing age, the relative percentage of each type of fatty acid in the diet remains unchanged. However, in a study analyzing differences in food selection in different family life-cycle stages, younger families had the least concern about saturated fats and cholesterol in their diets (Cross et al., 1975).

The size of the households of the research subjects was positively correlated with the behavior score in this study ($r=0.145$, $p=.012$). This indicates that the larger the household size, the lower the adoption of behaviors to reduce dietary fat and saturated fat. This statistical association might be anticipated since the correlation cited earlier indicated a relationship between younger age and larger household size. In the study by Cross et al. (1975) cited above, along with lack of concern about dietary fat by younger families, there was great concern at this life-cycle stage for economizing when selecting foods. Thus, in the present study, economizing may have been more important than health when selecting food by younger subjects with larger households.

The level of education was negatively correlated with the behavior score in this study ($r=-.18685$, $p=.0011$). Thus, the more education the subjects had completed, the higher their adoption of behaviors to reduce dietary fat and saturated fat. Income was not found to be significantly related to behavior in this study. These results are consistent with those of the Minnesota Heart Survey (Kushi et al., 1988), which revealed that education, independent of income, was a factor in adopting eating patterns suggested to decrease the risk of heart disease.

Occupation was also found to be significantly related to behavior to reduce dietary fat and saturated fat ($\chi^2=19.441$, $df=6$, $p=.003$). The occupation category which included professionals, administrators, owners, and supervisors tended to have low behavior scores. Farmers tended to have high behavior scores as did the category that included skilled craftsmen, factory workers, machine operators, and laborers. Those in the category which included clerical, sales, and service workers tended to have moderate behavior scores. This indicates that farmers and blue collar workers had lower adoption of dietary behaviors to reduce dietary fat and saturated fat. Clerical, sales, and service workers had adopted some of these behaviors, and the category including professionals, administrators, owners, and supervisors had the greatest degree of adoption of these behaviors.

Involvement with food shopping and cooking was found to be negatively correlated with the behavior score ($r=-0.211$, $p=.000$). This

indicates the greater the participation in cooking and food shopping by the subjects, the more likely they were to adopt food behaviors to decrease dietary fat and saturated fat.

The last descriptive variable that was significantly related to the behavior score of the subjects was diagnosed high blood cholesterol levels ($\chi^2=12.031$, $df=2$, $p=.002$). This indicates that diagnosis of this condition may have led to greater concern about the consumption of dietary fat and saturated fat.

Sources of Information

The subjects were asked how often they had received information about fat in their diets from a variety of sources during the last year. The percentage of subjects receiving information on this topic from fourteen sources is found in Table 10. Five of the 14 information sources asked about were mass media sources. The most frequently used mass media information source was television. About 71% of the subjects reported they had received information about dietary fat from this source more than twice during the last year. Another frequently used mass media source of information was newspaper or magazine articles. Sixty-four percent of the subjects reported they had received information about dietary fat from this source more than twice during the last year. The radio was used by 45.3% of the subjects more than twice in the last year. The least frequently used mass media sources were newsletters or pamphlets, and books.

TABLE 10. Frequency with which subjects received information about dietary fat during the last year (n=300)

Information source	None		Once or twice		More than twice	
	n	%	n	%	n	%
Mass media						
Television	28	9.3	58	19.3	214	71.3
Newspaper or magazine article	49	16.3	59	19.7	192	64.0
Radio	106	35.3	58	19.3	13	45.3
Newsletter or pamphlets	103	34.3	97	32.3	100	33.3
Book	181	60.3	57	19.0	62	20.7
Interpersonal						
Family members	101	33.7	80	26.7	119	39.7
Friends or neighbors	171	57.0	65	21.7	64	21.3
Health care professionals						
Physicians	190	63.3	73	24.3	37	12.3
Nurses	232	77.3	43	14.3	25	8.3
Other health care providers	255	85.3	27	9.0	17	5.7
Dietitians	265	88.3	20	6.7	15	5.0
Community						
Health food stores	260	86.7	22	7.3	18	6.0
Health fair or screening	231	77.0	60	20.0	9	3.0
Meetings or classes	266	88.7	25	8.3	9	3.0

These results are comparable to those reported in Connell and Crawford's (1988) study of the use of health care information. They found that printed materials were used most frequently, followed by television, and then interpersonal sources.

Statistical relationships were examined between the information sources and descriptive characteristics (Table 11). Although television was the most frequently reported source of information about dietary fat, it was not found to be significantly related to any of the descriptive variables. This was probably due to its frequent use by a majority of the subjects. It was also not found to be significantly related to adopting food behaviors to reduce total and saturated dietary fat.

The use of newspaper or magazine articles was significantly related to the subject's age, educational level, and income ($r=0.115$, $p=.047$; $r=0.193$, $p=.001$; $r=0.128$, $p=.029$). Occupation ($\chi^2=12,775$, $df=6$, $p=.047$) was also found to be significantly related to the use of this information source. These results indicate that subjects who were older, had more education, had higher incomes, or were employed as professionals, administrators, owners, or supervisors were likely to report more frequent use of newspaper or magazine articles as sources of information than other subjects in this study.

Adoption of food behaviors to reduce total and saturated dietary fat were also found to be significantly related to the use of newspaper or magazine articles as sources of information about dietary fat

TABLE 11. Statistical relationships between information sources used and descriptive characteristics (n=300)

Information source	Descriptive characteristics							
	Age ^a	Education ^a	Occupation ^b	Income ^a	Food shopping/ cooking score	Family heart health history ^a	Diagnosed high cholesterol ^b	Behavior ^a
Television	.019	.098	5.927	.050	.055	.013	1.373	.019
Newspaper/ magazine articles	.115*	.193***	12.775*	.128*	.054	.061	2.888	-.126*
Radio	-.122*	.098	5.384	.011	.066	-.043	3.174	.070
Newsletters/ pamphlets	.077	.220***	5.590	.101	.074	.122*	12.319**	-.126*
Books	.010	3.900	.090	.053	.053	.070	.943	-.092
Family members	.104	.169**	10.118	.228***	.066	.167**	8.702*	-.132*
Friends/ neighbors	.155*	.132*	10.532	.201***	.037	.082	4.590	-.033
Physicians	.088	.073	5.643	.149*	.088	.138*	45.909***	-.233***
Nurses	.040	.054	10.735	.018	.075	.111	11.547**	-.120*
Other health care professionals	.065	.098	7.031	.048	.106	.022	1.614	.014
Dietitians	.021	.049	9.957	.003	.077	.049	2.774	-.042

Health food stores	.025	.109	7.925	.099	.112	-.060	2.168	-.153*
Health fairs/screenings	-.040	.161	15.464***	.082	.071	.053	3.961	-.077
Meetings/classes	.015	.103	11.503	.054	.061	.004	.705	-.026

^aPearson's r.

^bChi-square.

* p < .05.

** p < .01.

*** p < .001.

($r=-0.126$, $p=.029$). This indicates that subjects who frequently use this source of information had greater adoption of these food behaviors.

The use of the radio as an information source was found to be significantly related to the age of the subject ($r=-0.122$, $p=.035$). Younger subjects were more likely than older subjects to report receiving information about dietary fat via the radio.

Education was found to be a highly significant factor in the use of pamphlets or newsletters ($r=0.220$, $p=.000$). Two other factors found to be related to the use of this information source were a family history of heart disease ($r=0.122$, $p=.034$) and if the subject had been diagnosed with high blood cholesterol levels ($\chi^2=12.319$, $df=2$, $p=.002$). These latter two factors could be reflective of the common practice in the clinical setting of distributing educational literature to patients who have been diagnosed with high blood cholesterol levels or who are considered at risk for heart disease due to a family history of this condition.

Food behavior to reduce total and saturated dietary fat was found to be significantly related to the use of newsletters or pamphlets ($r=-0.126$, $p=.029$). Subjects who reported frequent use of this source for obtaining information about dietary fat had a higher degree of adoption of these food behaviors than subjects who used this information source less frequently.

The use of books as an information source on the topic of dietary fat was not significantly related to any of the descriptive variables or with adoption of food behaviors to reduce total and saturated dietary fat.

The interviewer asked the frequency with which the subject had received information about dietary fat during the last year from two interpersonal sources -- family members and friends or neighbors. About 40% of the subjects reported that they had received information about dietary fat from family members more than twice in the last year. The other interpersonal information source, friends or neighbors, was used by 21.3% of the subjects with this same frequency rate.

As illustrated in Table 11, the use of family members as a source for obtaining information about dietary fat was found to be significantly related to education ($r=0.169$, $p=.003$), income ($r=0.228$, $p=.000$), family history of heart disease ($r=0.167$, $p=.004$), and diagnosed high blood cholesterol levels ($\chi^2=8.702$, $df=2$, $p=.013$). These results indicate that if subjects had high education levels, high income levels, a family history of heart disease, or a diagnosis of high blood cholesterol levels, information was more likely to be shared through a family network. This may take the form of exchanging printed materials among family members or discussions related to the topic of dietary fat and heart disease.

Adopting food behaviors to reduce total and saturated dietary fat were found to be significantly related to the use of family members as

a source for obtaining information about dietary fat ($r=-0.131$, $p=.022$). Subjects who reported more use of this information source were more likely to have a greater degree of adoption of these food behaviors.

The use of friends or neighbors as a source for obtaining information about dietary fat was found to be significantly related to age ($r=0.155$, $p=.008$), education level ($r=0.132$, $p=.022$), and income ($r=0.201$, $p=.001$). This indicates that subjects who were older or had higher levels of education or income were more likely than younger subjects or those with lower levels of education or income to report receiving information about dietary fat from this source. Adoption of food behaviors to reduce total and saturated dietary fat was not found to be significantly related to the use of friends or neighbors as an information source.

The subject was asked the frequency with which he received information about dietary fat from four groups of health care professionals. In general, physicians, nurses, dietitians, and other health care providers were used as information sources very infrequently by subjects in this study. The percentage of subjects who reported that they had received information about dietary fat more than twice during the last years from these sources ranged from a maximum of 12.3% for physicians to a minimum of 5.0% for dietitians.

As illustrated in Table 11, the annual household income of the subject was found to be significantly related to the use of physicians

as a source for obtaining information about dietary fat ($r=0.149$, $p=.010$). This may be due to greater use of physicians, in general, by those individuals with higher income levels. A family history of heart disease or diagnosed high blood cholesterol levels were also found to be significantly related to the use of this information source ($r=0.138$, $p=.017$; $\chi^2=45.909$, $df=2$, $p=.000$). These results suggest that males who have been diagnosed with high blood cholesterol levels or have a family history of heart disease are receiving information on dietary fat from their physicians.

Adoption of food behaviors to reduce total and saturated dietary fat was also found to have a highly significant relationship to receiving information on dietary fat from a physician ($r=-0.233$, $p=.000$). Thus, a greater adoption of these food behaviors was related to the use of this source of information.

The use of nurses as sources for obtaining information on dietary fat was significantly related to a positive diagnosis of high blood cholesterol levels ($\chi^2=11.547$, $df=2$, $p=.003$). In addition, adoption of food behaviors to reduce total and saturated dietary fat was significantly related to the use of this information source ($r=0.120$, $p=.037$). The use of nurses as a source for obtaining information on dietary fat could be a reflection of the role of the nurse to carry out the instructions of the physician in dispensing educational materials to the patient.

Dietitians and other health care professionals were not used to a large degree by subjects in this study, and no significant relationships were found between their use and the descriptive variables or the adoption of food behaviors.

The subjects were asked the frequency with which they had received information about dietary fat from three community sources during the previous year. In general, community information sources were used very infrequently by subjects in this study. Six percent of the subjects had received information on this topic from health food stores more than twice during the last year. The use of health fairs or other community screening for obtaining information about dietary fat was reported by 3.0% of the subjects for the same frequency rate. Three percent of the subjects had received information about dietary fat from community meetings or classes more than twice in the last year.

The use of health food stores as a source for obtaining information on dietary fat was found to be significantly related to the adoption of food behaviors to reduce total and saturated dietary fat ($r=-0.153$, $p=.008$). This could be due to the fact that individuals who patronize health food stores may be more concerned about their health, in general, thus their food behaviors may be a result of this concern rather than due to information they receive from this source.

Occupation was found to have a highly significant relationship with the use of health fairs or other public screening to obtain information about dietary fat ($\chi^2=15.464$, $df=3$, $p=.001$). Blue collar

workers were the least likely to use this source of information. Professionals, administrators, owners, and supervisors were the most likely to use this source of information, followed closely by clerical, sales, and service workers and blue collar workers. Farmers tended to report moderate use. Adoption of food behaviors to reduce total and saturated fat was not found to be significantly related to the use of this information source.

The use of community meetings or classes as sources of information on dietary fat was not found to have any statistically significant relationship to the descriptive variables or with adoption of food behaviors to reduce total and saturated dietary fat.

The fourteen sources of information, as discussed above, were divided into four broader categories. These were designated as mass media, interpersonal, health care professionals, and community sources. The relationships between these four variables and the descriptive and food behavior variables were statistically analyzed and are found in Table 12 (Appendix C). The results of these analyses did not differ greatly from the statistical analysis of the fourteen specific information sources.

SUMMARY, IMPLICATIONS, AND CONCLUSIONS

Summary

The innovation decision model was used to examine 300 rural, middle-aged males in Iowa for factors that contribute to the adoption of low fat, low saturated fat diets associated with reduction of heart disease risk. The descriptive characteristics of the subjects, use of information sources, and food behaviors to reduce total and saturated dietary fat intake of these subjects were studied using a telephone interview format.

The subjects in this study were between the ages of 35 to 55 years. The majority were relatively well-educated, white, and married with average annual household incomes. The largest occupation category of subjects in this study was blue collar workers followed by professionals or administrators, farmers, and sales or service workers. A majority of the subjects' wives were employed outside of the home. The average household sizes was 3.67. Less than 30% of the subjects had been diagnosed with high blood cholesterol levels or had a family history of heart disease.

Most subjects in this study reported a low to moderate involvement in food shopping and cooking. Low involvement in these activities was associated with farming as an occupation, no employment of the spouse outside of the home, large household size, and high income levels.

Food behaviors related to reducing total and saturated dietary fat were examined by consumption frequency reported by the subject for several high fat food items. The subjects tended to consume ground beef, cheese, table fats, high fat sweet snacks, and fried foods at a relatively high frequency rate. Less frequent consumption was reported for sausage, franks, or bacon; whole milk; ice cream or cream; snack crackers or chips; and fat on meat or skin on chicken. Almost half of the subjects used margarines that do not have liquid vegetable oil listed as the first ingredient as their main table fat at home. However, most subjects reported liquid vegetable oils as the main type of cooking fat used in their homes. Two-thirds of the subjects seldom or never read product labels with the intent of avoiding saturated fat.

Subjects whose food behaviors reflected a diet lower in total and saturated fat tended to be older, have higher levels of education, be employed as professionals or administrators, have small household sizes, be more involved in food shopping and cooking, and have had a diagnosis of high blood cholesterol levels.

The most frequently used sources of information were in the mass media classification, with television being the most frequently used source for obtaining information on dietary fat. This was followed by newspaper or magazine articles, radio, newsletters or pamphlets, and books. Frequent use of newspaper or magazine articles and newsletters or pamphlets was significantly related to food behaviors associated with reducing total and saturated fat.

Interpersonal sources of information about dietary fat were used to a moderate degree by subjects in this study. Greater adoption of food behaviors to reduce total and saturated dietary fat were related to more frequent use of family members as sources of information.

Health care professionals and community sources were not used to a great degree by subjects in this study for obtaining information on dietary fat. However, obtaining information from physicians and nurses was shown to be significantly related to behaviors associated with decreasing the intake of total and saturated dietary fat. Receiving information on this topic from a health fair or other public screening was found to be associated with the occupation of the subject. Those subjects employed as professionals and administrators or as sales and service workers were more likely than other subjects to report receiving information on dietary fat from these sources. Greater adoption of food behaviors to reduce total and saturated dietary fat was related to receiving information on this topic at a health food store.

The overall trend of more frequent use of all information sources by those who reported a higher degree of adoption of food behaviors to reduce total and saturated dietary fat is consistent with the innovation decision model. Early adopters of an innovation are influenced to a greater degree by mass media sources of information compared to later adopters. Since mass media sources were the most frequently used sources of information on dietary fat used by subjects

in this study, their potential impact on behavior change is evidenced by the results of this study.

Implications

From the results of this study several trends were observed which define the descriptive characteristics of individuals who had lower adoption of dietary behaviors associated with diets low in total and saturated fat. This information is of value to nutrition educators as they attempt to reach the public with efforts to reduce the incidence of heart disease. Nutrition education can be structured to target the individuals who still need to make dietary changes. The results of this study indicate that those who most need to be reached with nutrition information are blue collar workers and farmers, males with lower levels of education, and younger males. In addition, since more involvement in food shopping and cooking was associated with greater adoption of food behaviors to reduce total and saturated fat consumption, efforts to encourage males' participation in these activities should be developed.

Another implication of this study is that individuals who have been diagnosed with high blood cholesterol levels have greater adoption of food behaviors to reduce total and saturated fat. Since knowledge of this condition appears to impact behavior, this supports programs to screen individuals for blood lipid levels.

The results of the portion of the study that examined actual food behaviors are very useful for evaluating which dietary practices to reduce total and saturated fat intake have been implemented successfully by rural males. Conversely, this also reveals those specific food behaviors that may need to be further targeted in future nutrition education programs. Those food items that appear to contribute a significant level of total fat and saturated fat to the diet of individuals in this study are ground beef, cheese, sweet snacks, fried foods, and margarine that does not have liquid vegetable oil listed as the first ingredient. In addition, more emphasis needs to be placed on the value of reading product labels to bring about more informed food choices when attempting to lower dietary total fat and saturated fat.

Finally, information sources which appear most effective for reaching this audience with information on the foods still contributing a significant quantity of fat in the diet can be suggested by the results of this study. In general, mass media information sources may be very effective due to their widespread use and value in the decision making process, as suggested by the innovation-decision model. Newspaper or magazine articles and newsletters or pamphlets may be best since these were shown to be positively related to behavior. Also, since younger subjects were identified as a group who have lower adoption of food behaviors to reduce total and saturated dietary fat and who use the radio more frequently to get information on this topic,

further efforts for nutrition education by this means should be explored.

Family members were shown to be a potentially effective way to channel information on dietary fat, especially for those who had been diagnosed with high blood cholesterol levels or had a family history of heart disease. There may be a family communication network in which information on this topic is either discussed or written materials are passed among family members. Since family members as a source of information on dietary fat was significantly related to greater adoption of food behaviors to reduce total and saturated dietary fat, these family networks should be facilitated and encouraged by those whose role it is to educate about the need for making dietary behavior changes.

Even though health care professionals were not used as a source of information on dietary fat to a great degree by subjects in this study, physicians and possibly nurses were shown to have a strong impact on behavior associated with reducing the risk of heart disease. This was especially true for those subjects who had been diagnosed with high blood cholesterol levels. Since the effectiveness of physicians as sources of information was suggested by greater adoption of food behaviors to reduce total and saturated dietary fat by those by those who had received information from this source, they may be equally as effective for reaching other individuals who might also benefit from adopting a lower fat diet.

Community information sources were not used to a great degree by subjects in this study, and at this point in time may be an untapped resource.

Conclusions

This study showed that the innovation-decision model was useful for determining the adoption of food behaviors associated with reducing the risk of heart disease. It revealed the descriptive characteristic differences between those who had high adoption of these food behaviors and those who had lower adoption. In addition, high fat food consumption behaviors were further identified and thus present a challenge for future nutrition education programs. The results of this study can be used to develop programs that can more effectively reach individuals who need further information to facilitate decisions to reduce their dietary intake of total and saturated fat, and thus reduce their risk of heart disease. In conclusion, this study can enable nutrition educators to better target their audience with more specialized information, and thus contribute to the effort to help prevent heart disease in this country.

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APPENDIX A. RESEARCH INSTRUMENT

Pre-questionnaire Criteria

1. Are you a male age 35 to 55 years? (If yes, continue.)

2. Have you been diagnosed as having diabetes, a heart attack, or stroke? (If no, continue.)

3. Have you received dietary instruction from a dietitian about a special diet in the last five years? (If no, continue.)

1. How often do you usually eat:

Ground beef or foods containing ground beef

Frankfurters, sausage, bacon, or high fat luncheon meats such as bologna and salami (does not include ham, chicken, turkey or pressed luncheon meats)

Whole milk

Cream or ice cream

Natural and processed cheeses such as American, Swiss, or cheddar (does not include skim milk cheeses, mozzarella or cottage)

Margarine or butter

Regular salad dressing, sour cream, or gravy

Snack crackers, chips, or sweet rolls

Fat on meat or skin on chicken

Fried foods

	Daily	At least every other day	At least once per week	Less than weekly
Ground beef or foods containing ground beef	3	2	1	0
Frankfurters, sausage, bacon, or high fat luncheon meats such as bologna and salami (does not include ham, chicken, turkey or pressed luncheon meats)	3	2	1	0
Whole milk	3	2	1	0
Cream or ice cream	3	2	1	0
Natural and processed cheeses such as American, Swiss, or cheddar (does not include skim milk cheeses, mozzarella or cottage)	3	2	1	0
Margarine or butter	3	2	1	0
Regular salad dressing, sour cream, or gravy	3	2	1	0
Snack crackers, chips, or sweet rolls	3	2	1	0
Fat on meat or skin on chicken	3	2	1	0
Fried foods	3	2	1	0

2. What brand of margarine or butter do you usually use in your home?

-
- 0 - margarine with liquid vegetable oil as the first ingredient
 - 2 - other margarine
 - 3 - butter

3. What type of fat do you usually use for cooking in your home?

- 0 - liquid vegetable oil
- 1 - margarine with liquid vegetable oil as the first ingredient
- 2 - shortening or other margarine
- 3 - lard or butter

4. When shopping for foods, how often do you read labels on food products to avoid foods which contain lard, butter, and coconut and palm oils: always, most of the time, seldom, or never?

- 0 - Always
- 1 - Most of the time
- 2 - Seldom
- 3 - Never

5. During the past five years, has the amount of the following foods that you eat increased, decreased, or remained about the same?

Ground beef or foods containing ground beef

Frankfurters, sausage, bacon, or high fat luncheon meats such as bologna and salami (does not include ham, chicken, turkey, or pressed luncheon meats)

Whole milk

Cream or ice cream

Natural and processed cheeses such as American, Swiss, or cheddar (does not include skim milk cheeses, mozzarella or cottage)

Margarine or butter

Regular salad dressing, sour cream, or gravy

Snack crackers, chips, or sweet rolls

Fat on meat or skin on chicken

Fried foods

	Increased	Remained about the same	Decreased	Have not eaten the food in the last 5 years
Ground beef or foods containing ground beef	5	3	1	9
Frankfurters, sausage, bacon, or high fat luncheon meats such as bologna and salami (does not include ham, chicken, turkey, or pressed luncheon meats)	5	3	1	9
Whole milk	5	3	1	9
Cream or ice cream	5	3	1	9
Natural and processed cheeses such as American, Swiss, or cheddar (does not include skim milk cheeses, mozzarella or cottage)	5	3	1	9
Margarine or butter	5	3	1	9
Regular salad dressing, sour cream, or gravy	5	3	1	9
Snack crackers, chips, or sweet rolls	5	3	1	9
Fat on meat or skin on chicken	5	3	1	9
Fried foods	5	3	1	9

6. During the past five years, have you changed the type or brand of table fat, such as margarine or butter, that you usually use in your home?

Yes (see below)

3 - No

(If more than one change, record last change)

Change from _____ to _____

- 1 - change from butter or other margarine to margarine with liquid vegetable oil as the first ingredient
- 2 - change from butter to other margarine
- 3 - brand change but did not result in change in type of fat
- 4 - change from other margarine to butter
- 5 - change from margarine with liquid vegetable oil as the first ingredient to other margarine or butter

7. During the past five years, have you changed the type of fat that you usually use for cooking in your home?

Yes (see below) 3 - No

(If more than one change, record last change)

Change from _____ to _____

- 1 - change from any other fat to liquid vegetable oil
 - 2 - change from other margarine to margarine with liquid vegetable oil as the first ingredient
 - 2 - change from lard or butter to shortening or any type margarine
 - 3 - change from lard to butter or vice versa
 - 3 - change from shortening to other margarine or vice versa
 - 4 - change from margarine with liquid vegetable oil as the first ingredient to other margarine
 - 4 - change from shortening or any type margarine to lard or butter
 - 5 - change from liquid vegetable oil to any other fat
8. Over the past five years, has there been an increase, decrease, or no change in your reading of food product labels to avoid foods which contain lard, butter, and coconut and palm oils?
- 5 - decrease
 - 3 - no change
 - 1 - increase

9. Next, I would like to ask your opinion of high fat and low fat diets. Let me explain what I mean by high fat and low fat. A high fat diet is one which commonly includes several of these foods each day:
- meats such as ground beef, bologna, salami, frankfurters, sausage, bacon, and solid fat on the edge of meat
 - dairy products such as whole milk, cream, ice cream, and natural or processed cheese
 - items added to food at the table such as butter, margarine, regular salad dressing, sour cream or gravy
 - snack foods such as chips and sweet rolls
 - processed foods which contain palm or coconut fat
 - and foods fried or made with lard, butter, or shortening

A low fat diet has these characteristics:

- meats commonly eaten are poultry, fish, or very lean red meats
- dairy foods are commonly skim or lowfat milk and those made from skim or lowfat milk
- the fats used at home are primarily liquid vegetable oil or margarine made from liquid vegetable oil
- little or no extra fat is added to foods at the table, such as butter, margarine, regular salad dressing, sour cream or gravy
- foods usually avoided include fried foods, snack chips, sweet rolls, and foods made with butter, lard, or coconut and palm fats

10. How many times during the last year have you received information about fat in your diet from the following sources: none, once or twice, or more than twice.

	<u>none</u>	<u>once or twice</u>	<u>more than twice</u>
Newspaper or magazine articles	1	2	3
Books	1	2	3
Newsletters or pamphlets	1	2	3
Television	1	2	3
Radio	1	2	3
Family members	1	2	3
Friends or neighbors	1	2	3
Physicians	1	2	3
Nurses	1	2	3
Dietitians	1	2	3
Other health care providers	1	2	3
Community group meetings	1	2	3
Health fair or other community screenings	1	2	3
Health food stores	1	2	3

During the last year have you received information about fat in your diet from any other sources?

1 - Yes

2 - No

If yes, what were they? _____

11. Demographic information.

A. How old were you on your last birthday? _____

B. What is the highest level of education that you obtained?

Elementary	1	2	3	4	5	6
Secondary	7	8	9	10	11	12
Some college	13					
Technical school	13					
College graduate	14					
Post graduate	15					

C. What is your annual household income to the nearest 1,000 dollar level? \$ _____,

D. What ethnic group do you belong to?

- 1 - White, non-Hispanic
- 2 - White, Hispanic
- 3 - Black
- 4 - American Indian
- 5 - Other

E. What is your current occupation or job? _____
(If more than one, code for the one the respondent considers his major occupation.)

- 1 - Professional (RN, engineer, accountant, doctor, teacher, lawyer, etc.)
- 2 - Administrator, manager, or owner (own business, school principal, etc.)
- 3 - Farm operator (own or rent)
- 4 - Foreman, supervisor
- 5 - Skilled craftsman (plumber, electrician, baker, etc.)
- 6 - Clerical or sales
- 7 - Operator (assembly, meatcutter, equipment operator)
- 8 - Farm laborer
- 9 - Nonfarm laborer
- 10 - Service work (fireman, janitor, food worker)
- 11 - Disabled
- 12 - Unemployed
- 13 - Other _____

F. What is your marital status?

- 1 - married
- 2 - single
- 3 - separated
- 4 - widowed
- 5 - divorced

G. How many people reside in your home? _____

	<u>Yes</u>	<u>No</u>
Do you have a spouse living in your home?	1	2
Do you have any children under the age of six living in your home?	1	2
Do you have any children between the ages of six and eighteen living in your home?	1	2
Do you have any children over the age of eighteen living in your home?	1	2
Do you have any other relatives living in your home?	1	2
Do you have any nonrelatives living in your home?	1	2

H. Have you or any of your relatives been diagnosed as having any of the following conditions?

	<u>Self</u>		<u>Father</u>		<u>Mother</u>		<u>Siblings</u>		<u>Spouse</u>		<u>Children</u>	
	<u>Yes</u>	<u>No</u>	<u>Yes</u>	<u>No</u>	<u>Yes</u>	<u>No</u>	<u>Yes</u>	<u>No</u>	<u>Yes</u>	<u>No</u>	<u>Yes</u>	<u>No</u>
High blood pressure	1	2	1	2	1	2	1	2	1	2	1	2
High blood cholesterol	1	2	1	2	1	2	1	2	1	2	1	2
Heart attack	—		1	2	1	2	1	2	1	2	1	2
Stroke	—		1	2	1	2	1	2	1	2	1	2

	<u>Always</u>	<u>At least</u>	<u>Less than</u>	<u>Never</u>
		<u>1/2</u>	<u>1/2</u>	
I. How often do you do the food shopping for yourself?	4	3	2	1
How often do you do the cooking for yourself?	4	3	2	1

J. How many meals, on the average, do you eat away from home each week?

APPENDIX B. RESEARCH INSTRUMENT REVIEW PANEL

Reviewer and Area of Expertise

Betty Lou Deede, R.D. Extension Home Economist, Sac County, Iowa.

Community food behavior

Jacqueline Dupont, Ph.D., R.D. Professor of Food and Nutrition, Iowa State University, Ames, Iowa.

Lipid chemistry

Linda Snetselaar, Ph.D., R.D. University of Iowa Hospitals and Clinics, Iowa City, Iowa.

Lipid diet therapy

Janet Stammer, M.S., R.D. Iowa Department of Health, Des Moines, Iowa.

Community food behavior

Phyllis Stumbo, Ph.D., R.D. University of Iowa Hospitals and Clinics, Iowa City, Iowa.

Food composition

John Tait, Ph.D. Professor of Rural Sociology, Iowa State University, Ames, Iowa.

Innovation-decision model

APPENDIX C. STATISTICAL RELATIONS BETWEEN INFORMATION SOURCE
CATEGORIES AND DESCRIPTIVE CHARACTERISTICS

TABLE 12. Statistical relations between information source categories and descriptive characteristics

Descriptive characteristics	Categories			
	Mass media	Interpersonal	Health care professionals	Community
Age ^a	.035	.149**	.060	-.003
Education ^a	.188**	.175**	.087	.150**
Occupation ^b	7.683	11.527	9.755	17.828*
Income ^a	.115*	.250***	.085	.105
Participation in food shopping and cooking ^a	.045	.018	.109	.129*
Family heart health history ^a	.067	.145*	.111	.019

Diagnosis of high

blood cholesterol

levels^b

1.863

9.236**

45.046***

.694

Behavior^a

-.077

-.097

-.136*

-.199*

^aPearson's r.

^bChi-square.

* p < .05.

** p < .01.

*** p < .001.