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Nutrition Knowledge and Nutrition Behaviors of Mothers whose Children Participated in a Cardiovascular Health Education Program

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Nutrition Knowledge and Nutrition Behaviors of Mothers whose Children Participated in a Cardiovascular Health Education Program

by

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ABSTRACT

Nutrition Knowledge and Nutrition Behaviors of Mothers whose Children Participated in a Cardiovascular Health Education Program

Cardiovascular problems have their origin early in life. This descriptive study was designed to examine a difference between mothers' cardiovascular nutrition knowledge before and after their fifth graders participated in a health education program. Another purpose was to explore if children shared nutrition information with their mothers, and if mothers reflected the nutrition information by altering their selection and preparation of foods. The study sample consisted of 74 participants.

Using a paired sample t-test, a significant increase was found in participants' mean nutrition knowledge scores. Seventy-five percent of the participants stated they received nutrition information from their children and 83.3% stated that their child discussed the nutrition information. The Guttman Scaling procedure indicated that mothers who changed nutrition behaviors were more likely to have read the materials and to have discussed the information with their children. The findings are important to professionals involved in teaching children good nutrition behaviors.

This thesis is dedicated

to my husband,

Philip III

and my three children,

Laura, Philip IV, and Paul.

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CHAPTER I

The Problem

Introduction

In recent years, death and disability from heart disease and stroke have been reduced by means of new medical and surgical techniques and identification of key risk factors. In spite of this reduction, cardiovascular disease (CVD) is still the number one health problem for Americans (Levy, 1984).

Since the 1930's, heart disease has been considered a health problem of the elderly. Autopsy studies performed on young American soldiers killed in combat during the Korean (Enos, Holmes, & Beyer, 1955) and Vietnam (McNamara et al., 1971) Wars, however, produced evidence that heart disease begins in early childhood. Community studies began as a result of this evidence to determine the presence of cardiovascular risk factors in children (Berenson et al., 1982; Gillum et al., 1983; Laskarzewski et al., 1980; Lauer et al., 1984). The risk factors identified in these studies were the same as those factors identified in epidemiologic studies of adults, e.g., family history, elevated cholesterol levels, hypertension, cigarette smoking, diabetes, and obesity (Blumenthal et al., 1975; Kolbe & Newman, 1984).

Other studies with adults have shown an association between diet and heart disease and a significant correlation between a decreased serum cholesterol level and a reduction of fat intake (Blackburn, 1980; Hataway et al., 1984; Lasser, 1981). Many studies, including the Framingham Massachusetts heart study, have provided evidence that a diet excessive in saturated fats, cholesterol, salt, and calories predisposes an individual to heart disease (Dunn, 1983; Pender, 1982).

Lasser (1981) provided an extensive review of studies which supported the relationship between dietary intake and heart disease. As a result of these studies, some health professionals believe that programs aimed at teaching children good nutrition will prevent or reduce the risk of heart disease in adulthood.

Nutrition education programs may improve nutrition knowledge, but the concern among professionals is the application of this knowledge to improve eating behavior (Kirks, Hendricks, & Wyse, 1982). At home children must depend on the parents or other adult caretakers to provide a wide variety of foods from which the children can choose a healthy diet. Therefore, the purposes of this study were to examine mothers' nutrition knowledge before and after their children participated in a health education program and to explore if children participating in a nutrition education program shared the information learned with their mothers. Another purpose was to determine whether mothers reflected this nutrition information by altering their selection and preparation of food.

Government officials, school officials and health professionals believe that the nation's schools are the most appropriate and efficient vehicle to inform children of preventive measures to establish a healthy life-style (Kolbe, 1984). The National Center for Health Education in 1984 reported that a comprehensive school health program had been implemented in 595 School Districts in 41 states which involved more than 528,000 children from kindergarten through grade seven. In the State of Michigan, the initial phase to implement a comprehensive health program began during the Fall of 1984 with the

inclusion of 25 percent of Michigan schools. The project was scheduled to continue over a period of three years in which 25 more schools would be added each year. The cost of this three-year project was estimated at 4.65 million dollars.

In 1982, the American Heart Association (AHA) published a health education program entitled "Putting Your Heart into the Curriculum." Implementation of the AHA program began in a number of Michigan schools at the same time as the comprehensive health education program. Today over 250 schools in Michigan are utilizing the AHA health education program. The AHA program was developed as a teacher's guide for the purpose of teaching children good health habits; a section on nutrition is included in the program. In 1984, the Grand Blanc School District in Genesee County added the AHA program to the school's health education curriculum.

The fifth graders from this school district were selected for the present study. The fifth grade level was chosen because peer influence is not as strong at this level as it may be at a higher grade level. Also children in this age group are more capable than younger children of understanding abstract concepts such as nutrient composition. These two factors, less peer pressure and more capability for understanding nutrition concepts, may enable fifth graders to communicate the information learned at school to their mothers.

In summary, CVD risk factors for children have been identified in recent studies to be the same risk factors identified in adult epidemiologic studies. The studies with adults have also revealed a correlation between diet and decreased serum cholesterol levels.

Health professionals believe that teaching children to develop good eating habits early in life may prevent death or reduce disability from cardiovascular disease. Since children are not responsible for the selection or preparation of foods at home, this study was designed to examine mothers' nutrition knowledge and to explore if nutrition information obtained in the school is transferred by the student to the parent.

Need for the Study

Good health habits are not acquired by education alone. A review of the literature indicates that parents, by acting as role models, strongly influence the health behaviors of their children. There is little, if any, research which suggests that children may influence their parents' health behaviors. This investigator believes this is a void in health education research and believes that children could be a vehicle by which parents obtain health information. If, in fact, children do carry health information home, there is the possibility that parents may alter their health behaviors.

There is support for health education in the schools by government officials and health professionals; however, some issues not addressed in the literature are the teachers' qualifications to teach comprehensive health programs or the time taken from academic subjects to incorporate health into the curriculum. Nurses who are active participants in the promotion of healthy life-styles and the prevention of premature death or disability from illnesses are in an excellent position to act as resource persons for schools and teachers.

Therefore, because nurses have the opportunity to play a vital role in health education programs, nurses need to investigate the impact of these programs on children and their parents. The information from the study may help nurses who are involved with children in clinics, hospitals, communities, or schools.

Purpose

Health education programs are presently being implemented into the school curriculum. It is believed by some health professionals that good health habits developed early in life may prevent or reduce cardiovascular disease.

Good health skills are difficult for children to develop, especially nutrition skills since children must rely on parents or adult caretakers for their meals. Therefore, the purposes of this study are to examine mothers' nutrition knowledge before and after their children participate in a health education program; to explore if children carry nutrition information learned in school home to their mothers; and to determine if mothers reflect this information by altering their health behaviors.

Research Questions

The research questions for this study are as follows:

1. Is there a difference in mothers' nutrition knowledge before and after their children participate in a health education program?

1a. Is there a relationship between any of the intervening variables and nutrition knowledge?

2. Do children take home materials on nutrition obtained in school to their mothers?

3. Do mothers read materials brought home by their children?

4. Do children discuss nutrition information learned in school with their mothers?

5. Do mothers who receive materials on nutrition or whose children communicate nutrition information change their nutrition behaviors?

5a. Is there an interrelationship between receiving materials, reading the materials, discussing the materials, and changing behavior?

Definition of Concepts

The concepts defined are mothers, nutrition knowledge, nutrition behavior, children, and health education.

Mothers

Traditionally, the mother's role has been that of nurturer and housekeeper. In recent years, the role of mother has been altered in American households because of the large number of women working outside of the home. Despite the growing employment of women, the mother is still primarily responsible for the care, feeding, educating, and raising of the children (Miller & Janosik, 1980).

The father or a sibling may assume the mother's role. Therefore, for the purpose of this study, mother is defined as the natural mother

or the individual who assumes the role of mother by planning and preparing the meals.

Nutrition Knowledge

Knowledge is acquired information. According to Whitney and Cataldo (1983), nutrition is a science which consists of the study of nutrients. In addition, the definition can be expanded to include the effects of the environment and human behavior on nutrition. For the purpose of this study, nutrition knowledge is defined more specifically as acquired information about nutrition as it relates to CVD, saturated fats, cholesterol, salt, and snacks.

Nutrition Behavior

Behavior is the way one acts, functions, or reacts in a particular manner. In the United States, the trend is to encourage Americans to adopt new eating behaviors which may prevent or reduce cardiovascular disease. Furthermore, the method in which foods are prepared is also an important factor in developing healthier life-styles. Nutrition behavior for the present study is defined as the mothers' report of their selection and preparation of foods in relationship to cardiovascular disease.

Children

Chinn (1979) includes the fifth grader in her definition of later childhood which is defined as the period when a child advances in cognitive abilities. Jean Piaget (1972) places the children of eight to 11 years of age intellectually in what he calls the period of concrete operations. Children in the fifth grade are reaching the period of concrete operations which enables them to understand and

clarify new information such as nutrition concepts. Fifth graders vary in age, although most children in this grade level are between ten and 11 years of age. According to Ilg and Bates (1955), Gesell describes the ten year old as amiable and cooperative, and the 11 year old as the reverse. Erikson (1950) utilizes a psychosocial approach about children: he places the school-age child in a stage termed industry versus inferiority. Children who are industrious may try to master the skills to adopt a healthy life-style while children who fear inferiority may not attempt to develop a healthy life-style.

The family may have a great deal of influence on the child's health behavior if the relationship between the family members and child is strong. During this age period the child begins to relate to others as an individual in his or her own right and to practice advanced skills of socialization. For this study, children are defined as those children approximately between the ages of ten and 11 who have reached the stage of cognitive development in which they can understand and clarify new information such as nutrition concepts.

Health Education

Health education, according to the President's committee, is defined as the "process that bridges the gap between health information and health practice" (Schoenrich, 1974, p.3). Green and Iverson (1982) define health education as "any combination of learning experiences designed to facilitate voluntary adaptations of behavior conducive to health" (p.321). School health education is specifically defined by Green and Iverson (1982) as "any combination of learning experiences initiated by personnel in the preschool, school, or college setting to

develop the behavioral skills required to cope with the challenges to health expected in, and the cognitive skills required to comprehend the further learning scheduled for, the student's immediate years ahead" (p.321). This definition of school health education best defines the concept of health education for this study. More specifically, the education program focuses on nutrition as it relates to CVD.

In summary, the concepts central to the study are mothers, nutrition knowledge, nutrition behavior, children, and health education. Mothers are defined as the natural mother or that individual who assumes the role of mother. Nutrition knowledge refers to acquired information on nutrition as it relates to CVD. Nutrition behavior is defined as the practice of good nutrition. Children are defined as individuals who have the intellectual ability to understand nutrition concepts and are between the ages of ten and 11. Health education is defined using Green and Iverson's definition of school health education.

Intervening Variables

An intervening variable is a factor that may influence the dependent variables in the study. According to Polit and Hungler (1983) characteristics of the participants in the study may be the most common intervening variables. For this study the demographic variables which are expected to have an effect on the dependent variables, nutrition knowledge and nutrition behavior, are divided into the characteristics of the participants and the characteristics of the household. The characteristics of the participants considered in this

study are education level, occupation, and working status (full, part-time, or occasionally). The characteristics of the household are spouses' education, the amount of money spent on food, number of people in household, members of the household with cardiovascular problems, and member of the household on special diets. Other intervening variables are attitude toward health education and other sources of nutrition information entering the home during the study period.

Researchers (Eppright et al., 1970; Harrison, et al., 1969; Schwartz, 1975; Touliatos, 1984; Wang, 1971) have found a positive relationship between nutrition knowledge and education levels of participants. Fathers' occupation has been studied in relationship to heart health knowledge and nutrition behavior (Burdine et al., 1984), but similar studies for mothers' occupation were not found. Since mothers are expected to be the primary responsible person for preparing the meals, their occupation outside of the home may affect the outcome of the study.

Cook et al. (1973) found no association between mothers' work status and nutrient intake of their children. In contrast, Touliatos et al. (1984) found a relationship between mothers working status and the dietary quality of children's diets.

Eppright et al. (1970), included in a large study with mothers in 12 states, an investigation of eating behaviors and certain family characteristics. In the study, amount of money spent on food was highly correlated with energy and nutrient content of the diet. The number of family members may have an effect on the amount of money

spent on food, since one would expect that more resources would be spent for feeding larger families.

Prior knowledge of the role nutrition plays in cardiovascular disease is more likely to occur in those households in which a family member has been diagnosed with a CVD problem. A mother who is already preparing special diets will perhaps have a higher knowledge of nutrition than a mother who is not preparing special meals. An important variable which needs to be controlled in the study is nutrition information brought into the home during the study period. Participants have reported obtaining nutrition information from a variety of sources (Fox et al., 1970; Grotkowski, 1978; Schwartz 1975).

Two questions pertaining to health education were included to explore parents' attitude toward health education and their desire to take part in health education programs presented to their children. Some researchers (Gunn & Stevenson, 1985; Kirks, Hendricks, & Wyse, 1982; Puska et al., 1981) involved parents in health education programs for children. All the studies showed positive results from parent involvement.

Not all variables that may have an influence on the outcome are addressed in this study, for example marital status and income were eliminated by request of the school administration because they felt these variables were too personal. Social class was not included because the subjects for the study were taken from a predominately white middle class area.

Limitations

The limitations in this study are as follows:

1. The study does not control for race or ethnicity which may influence the nutrition behavior of the subjects.
2. The subjects who agree to participate may differ from those who do not participate.
3. The sample population is limited geographically and, therefore, the findings may not be generalized to a larger population.
4. The study does control for the objectives to be included in the curriculum but does not control for the methods used by the teachers to present the objectives to the children.
5. All of the children may not be at the same level in their cognitive development.
6. All of the children may not be at the same maturation level.
7. All of the children may not be in the same stage of psychosocial development.
8. The instruments have in part been developed by the researcher and have not been tested for validity or reliability.

Assumptions

The assumptions for the study are as follows:

1. It is assumed that nutrition knowledge can be adequately measured by means of a questionnaire.
2. It is assumed that the knowledge instrument will be sensitive enough to indicate level of knowledge.

3. It is assumed that subjects' answers to the questions on the instruments reflect their true knowledge.
4. It is assumed that the teachers will present the material during the specific time period outlined in the study.

Overview of Study

The study is presented in six chapters. In Chapter I, the introduction to the problem, need for the study, purpose of the study, statement of the problem, research questions, definitions of concepts, intervening variables, limitations and assumptions of the study were presented. In Chapter II the conceptual framework and the concepts of nutrition knowledge, mothers, children, health education, and nutrition behaviors are described. The relationship of these concepts to nursing is also discussed. A review of the literature is presented in Chapter III. The studies reviewed pertain to the prevention of CVD and children, nutrition knowledge, and health behavior. The method, data collection procedure, health education program, instruments, reliability and validity, data analysis and interpretation, source of subjects, and human rights are presented in Chapter IV. The presentation of the data analysis is presented in Chapter V and in Chapter VI the results of the study are discussed.

CHAPTER II

Conceptual Framework

Introduction

There are three forms of prevention -- primary, secondary, and tertiary. Primary prevention is the prevention of disease, for example well baby exams, sex education, and programs on risk factors of heart disease. Secondary prevention refers to early diagnosis and prompt treatment by techniques such as screening tests for hypertension. Tertiary prevention focuses on maintenance and rehabilitation. The purpose of tertiary prevention is to prevent further disability from chronic illness and to assist the patient to return to greater usefulness (Brill & Kilts, 1980; Spradley, 1975). Primary prevention provides the focus for the conceptual framework used in the study.

In the United States, chronic illnesses have become the main focus of medicine in recent years. Changing patterns of disease have caused a shift from the treatment of illness to prevention and health promotion. According to Pender (1982), chronic illnesses do not respond to medical cure, and almost all such health problems are caused or aggravated by inappropriate health habits formed in early childhood and adolescence.

The identification of cardiovascular risk factors such as elevated lipids and elevated blood pressure in children has led some health professionals and government officials to support health education programs in the school system. The program utilized in this study is the "Putting Your Heart into the Curriculum" published by the American Heart Association (AHA), which is designed for the purpose of developing healthy life-styles in childhood. The AHA program is used

with children from kindergarten through high school and is divided into levels to meet the learning needs of the children in various stages of development. The material in this curriculum is designed to be incorporated into the regular academic subjects or used as a separate course.

School age children are more independent than pre-school age children and exercise control over eating habits. Yet, they still must rely on their mothers for most of their daily nutrition intake. Various studies have been conducted to determine what factors may influence a mothers' nutrition behaviors. The purposes of this study is two-fold. The first purpose is to examine if there is a difference between mothers' nutrition knowledge before and after their children participate in a health education program based on nutrition. The second purpose is to explore two questions: Are children a vehicle by which mothers receive nutrition information? Does this information on nutrition influence mothers to alter their health behavior?

The conceptual framework for this study is based on the concepts of health education, children, mothers, mothers' nutrition knowledge, and mothers' nutrition behaviors. These concepts are discussed in relationship to King's theory and nursing. The framework for this study is based on King's theory of open systems and King's model of human interaction. King's model has been modified to show the interaction between the mother and child. In addition to the concepts used in the conceptual framework, a discussion of cardiovascular risk factors in children is presented.

Health Education

Health education is defined as "the process that bridges the gap between health information and health practice" (Schoenrich, 1974, p. 3) or as "any combination of learning experiences designed to facilitate voluntary adaptations of behavior conducive to health" (Green & Iverson, 1982, p. 321). School health education is focused on teaching health behaviors within the school curriculum to children and adolescents. The health education programs implemented in the school may cover a wide variety of health issues. The health problem for this study is related to prevention of cardiovascular risk factors in early life.

Roush (1980) reviewed studies with adults, children, and adolescents which demonstrated the effects of education programs on dietary intake and concluded that there is potential, through education, for altering the physiologic state to reduce CVD risks. According to Green and Iverson (1982) because of national concern, most evaluation research to investigate the effectiveness of school health programs has been on selective curricula, mainly associated with drug abuse, smoking and sexuality. As a result, nutrition education has shifted from support of education to school lunch and food stamp programs. In addition, Green and Iverson (1982) emphasized the influence of the home and mass media on the food preferences of young children. They were concerned that school health programs would not be able to offset the negative influences of the home and mass media. Mullen (1981), in contrast, stressed the positive effect family and mass media could have on children's health behaviors.

Earlier, in 1981, Iverson indicated that community and family support are necessary in order for school health programs to be effective. Cooperation between school health education personnel, health professionals, and community agencies is necessary for coordination of efforts, as well as the sharing of resources. Without this cooperation, it is possible that health education in the schools will not be able to make a noteworthy impact on children's health habits.

McGinnis (1981) agreed with Iverson that it is critical that there be cooperation and coordination between the two major professional sectors, medicine and education, in developing health education programs. Dr. McGinnis recalled from his experiences in promoting immunizations, the important role played by the schools in eliminating infectious diseases. He believed that the schools can now play a role in early intervention for the prevention of CVD and other chronic health problems, since health problems may be the result of behaviors and exposures shaped at an early age.

In summary, health education is being promoted in the school system by school officials and health professionals. It is believed by those involved that cooperation and coordination of efforts by education personnel, health personnel, the community, and the home environment are essential for school health programs to succeed. Health education in relationship to CVD prevention is a new concept to school health programs. The need to develop skills in children for the purpose of reducing or preventing CVD risk factors has only recently become an issue in health education.

Cardiovascular Risk Factors

Health professionals supporting the implementation of CVD prevention programs in the schools are concerned with the need for children to develop lifelong habits. Studies involving children indicated that they are at risk by the same factors that affect adults.

According to the AHA (Heart Facts, 1986), 63,290,000 Americans have one or more forms of heart or blood vessel disease (estimate based on 1983 provisional statistics for the U.S.). In 1986, approximately 1.5 million Americans had a heart attack and approximately 550,000 of them died. CVD accounts for 50 percent of the deaths of the almost two million Americans who die each year. Nearly one-fifth of these deaths occur in persons under the age of 65.

The major underlying cause associated with heart disease is atherosclerosis, a patchy accumulation of lipids, triglycerides, cholesterol, calcium, fibrous tissue, complex carbohydrates, and blood products in the lining of arterial walls (Foster, 1978). Atherosclerosis is a slow process believed to have its beginning as fatty streaks in arteries. These fatty streaks can be found in the aortas of all children at ten years of age and in the coronary vessels during the second decade of life (Enos et al., 1955; Kolbe & Newman, 1984; McNamara et al., 1971; Porth, 1982). Adult studies, especially the well known Framingham studies, have identified elevated serum cholesterol levels with an increased risk to heart disease. Lauer, Connor, Leaverton, Reiter, and Clarke (1975) investigated the distribution of the serum cholesterol and triglyceride levels, blood pressure (BP), and excess body weight in a school-age population. They

identified a large number of children who were already at risk for the development CVD.

Berenson, Frank, MacD. Hunter, Srinivasan, Voors, and Webber (1982) looked at the consistency or tracking of risk factors in individual children over time. Tracking is defined as persistence of levels (serum cholesterol, serum triglycerides, serum lipoprotein, insulin and BP) within a particular rank or percentile with respect to other children at the same age, race, and sex. Results indicated that cardiovascular risk factors were present over time, indicating the possibility of risk to CVD in adulthood.

A second risk factor, hypertension is also being studied with adults and children. Hypertension is a chronic elevation in arterial blood pressure. The exact level at which the pressure is considered clinically abnormal varies among professionals. The criteria established by the World Health Organization defined hypertension as "pressures that exceed 160 mm Hg systolic and 95 mm Hg diastolic" (Porth, 1982, p. 148). Some experts believe that a reading of 140/90 is the desirable upper limit and anything over this number increases the risk of heart attack and stroke (Blackburn, 1980).

Hypertension is also described in terms of essential (or primary) hypertension and secondary hypertension. The term essential is issued to designate hypertension of unknown origin. Secondary hypertension is used to describe hypertension caused by certain specific diseases or infections. Studies to determine the presence of CVD risk factors in children excluded those with secondary hypertension. Longitudinal studies, such as those conducted in Bogalusa, Louisiana (Berenson,

1982), Muscatine, Iowa (Lauer et al., 1975) and Minneapolis, Minnesota (Gillum et al., 1983), have identified the presence of elevated blood pressure over time. Nevertheless, not enough time has passed to determine if these children have hypertension as adults.

Lasser (1981) completed an extensive literature review of epidemiological studies in which the relationships between nutrition, plasma cholesterol, and CVD were studied. Lasser believed that clinicians could not wait for the results of experimental studies to indicate precise mechanisms before treating a condition, if epidemiological studies indicate a practical method of treating or preventing disease. Lasser suggested that there is a benefit in lowering cholesterol levels through control of dietary intake of cholesterol and saturated fats. There are health professionals (Lasser, 1981), however, who do not believe lowering fat intake by dietary means will reduce the risk of CVD.

The American Society for Clinical Nutrition assembled a panel of nine health professionals to review published scientific evidence relating to five dietary issues - fat, cholesterol, alcohol, excess calories, and salt. The panelists were unable to agree on recommendations for a diet lowering fats. Some of the reasons for the lack of agreement were that a low-fat diet would have little effect on serum lipid levels; diets produce different results in different individuals and, therefore, a single diet for an entire population was not possible.

In summary, there is evidence that some children have risk factors present at a young age. Whether or not the risk factors present will

result in the manifestation of disease in adulthood is still under investigation. A relationship between dietary intake of fats and CVD has been established in studies on adults. In spite of the controversy among health professionals regarding the implementation of prevention measures to reduce CVD, there are programs being initiated in the school system to teach children skills for reducing or preventing CVD.

Children

The AHA health program "Putting Your Heart into the Curriculum" is divided into four levels. Each level is specifically prepared to meet the learning needs of the children at various stages of cognitive development to promote skills necessary for preventing CVD risk factors. For this study the second level prepared for students in fifth grade was used. Piaget, Gessell, and Erikson's theories are discussed in relationship to the concept of children. In addition, King's theory is applied to the children's concept of health.

Piaget's theory of cognitive development involved two processes: development which resulted in genuine learning and learning, in a narrow sense, because it is limited to certain situations. Development is affected by four factors: maturation, experience, social transmission, and equilibration. The first factor maturation refers to physical structure, in particular the central nervous system which takes time to reach its highest level of development. Experience or contract with objects is the second factor influencing development. Social transmission is the third factor influencing cognitive development, and an example of this factor is the transmission of

information -- be it from a conversation with mother or instructions by a teacher. Equilibration is a fourth factor which integrates the other three and is defined in part as a process whereby "periods of incomplete understanding of reality are followed by periods of greater understanding" (Ginsburg & Opper, 1969, p. 323).

The second process, learning is described in two forms. In the narrow sense, learning consists of acquisition over time in relationship to a response of specific situation. The second form results from the equilibration process, that is, the time when the child has the mental structure to assimilate new experiences and the ability to generalize the new information to other situations.

Gesell, unlike Piaget, believed that maturation was the chief factor explaining development and that maturation had a direct effect on all aspects of psychological functioning (Ginsburg & Opper, 1969). According to Gesell, the ten year old is at the age of equilibrium, which means the child is happy, cooperative, relaxed, congenial, and affectionate with parents. The average ten year old begins to feel loyalty to peers. Some fifth graders are 11 years of age. Unlike the ten year old, the 11 year old is moody, rebellious, and competitive -- resenting those in authority, and striving for independence (Scipien et al., 1975). Psychologically, Erikson places the school age child in the stage which he calls industry versus inferiority. At school the child receives systematic instruction in order to develop a sense of industry which stimulates competition. A sense of inferiority is evident when the children lack the ability to compete successfully. The family is the primary agent of socialization, shaping the

personality, values, norms of behavior, philosophy, and life goals (Scipien et al., 1975). The influence the family has on the health behaviors of a child will depend on the ties between them.

The child's concepts of health and illness have been reviewed by Kalnins and Love (1982). Children's concepts of health and illness change qualitatively according to the stage of development. In the pre-operational stage children define health as being able to go outside and play. In relation to other people, children define health using external cues such as nice skin and rosy cheeks (Kalnins & Love, 1982). Older children capable of formal thought are aware of health as a difficult concept to define and use internal cues such as feeling good and being happy (Kalnins & Love, 1982). The same general progression from concrete to more abstract reasons has been used to define illness.

The concept of health is influenced by previous experience which influences perception. Perception, according to King (1981), is a process of organizing, interpreting, and transforming information from sense data and memory. Children's perception of a situation is an important determinant of their response to it. During this period of development, certain attitudes, values, and feelings form. Previous learning experiences influence the child's feelings toward the material presented in the health education program. The child, because of his age, has little experience to relate to the information. As a result, the child may not perceive the information in the classes as important. Motivation is affected by the importance the child place on the health information. If the child perceives the information as important, then

the child will act by communicating the information to the mother.

King (1981) viewed communication "as a vehicle by which human relations are developed and maintained" (p. 79). Some channels of communication between child and mother are the spoken word or printed material. Giving and receiving information is an important step in the process of communication. Gordon and Haynes (1982) reported that parents requested additional nutrition information following their children's participation in a school-home nutrition education program. Gunn and Stevenson (1985) reported that 67% of the parents in their school nutrition program gained new knowledge as a result of their children's involvement.

To summarize, the cognitive development period of the child is important for the understanding of concepts related to health. Piaget defines the child based on the period of cognitive development. While Gesell concentrates on maturation as the chief factor to explain development. Erikson established his definition of the school-aged child utilizing a psychological approach. No matter which approach is used to define this age level, one would conclude that the fifth grader is the best level for the study. In addition, King's theory was used to describe the children's perception.

Mothers

Most researchers define role as a set of expectations applied to an occupant of a particular status that is characterized by both certain obligations (or duties) and privileges (or rights) (Society Today, 1973). The society and culture in which one lives determines

the duties and rights of a role. In this section, King's theory is also discussed in relationship to the concept of mother.

Smart and Smart (1982) refer to the home environment as a microsystem with three dimensions. These three dimensions are defined as physical space and materials, people in roles and relationships to the child, and activities that people carry on with the child and each other. Therefore, the mother is an important interacting person in this microsystem and is often the main caretaker of the children and the one responsible for the selection and preparation of the meals for the household. Yet, the American family is in transition (Scholnick & Scholnick, 1980). High divorce rates or death of a spouse remove the mother from her traditional role, thus transferring a segment of this role of caretaker to another member in the household.

According to King (1981) individuals have their own world of reality based on their perceptions. People's communications are their perception of persons and things in the environment. Thus, the child's perception of the mother or person in the role of mother determines if a transaction of information takes place. The mother or individual assuming the role of mother accepts or rejects this transaction based on her perception of the child. If the information is accepted by the mother, she may be influenced to alter the selection and preparation of foods for the household.

Nutrition Knowledge

Knowledge is acquired information. For this study, nutrition knowledge is acquired information about nutrition as it relates to CVD, saturated fats, cholesterol, salt, and snacks. Nutrition is a science which consist of a study of nutrients that supply energy to the body for growth, maintenance and/or repair (Whitney & Cataldo, 1983).

Fats are classified as saturated and unsaturated depending on the fatty acids present. A fatty acid is saturated when its chain of carbon atoms contains all the hydrogen it can hold. In addition, saturated fats are hard at room temperature and found in foods such as beef, lamb, pork fat, butter, and cream. Unsaturated fatty acids are defined as monounsaturates and polyunsaturates. A monounsaturate fatty acid is a fatty acid lacking two hydrogen atoms and having one double bond between the carbons. An example of a monounsaturate fat is olive oil. Polyunsaturated fat is a fatty acid that lacks four or more hydrogen atoms and has two or more double bonds between the carbons (Whitney & Cataldo, 1983). Examples of polyunsaturated fats are most vegetable oils and fish oils.

Cholesterol is a fatlike substance and a common member of the lipid family. Cholesterol is synthesized by the human body, or ingested from foods, and is a component of blood and tissues. It is the amount of cholesterol and saturated fat consumed in the diet that is believed to affect the amount of cholesterol in the blood. Foods high in cholesterol are of animal origin; examples are brain, kidney, liver, egg yolk, beef heart, and shrimp (Whitney, 1983).

The fat in the American diet makes up approximately 42 percent of the total calories. The Food and Nutrition Board and the American Medical Association recommend that people decrease the consumption of fat to 30 percent of total calories (Dunn, 1983).

Common table salt, or sodium chloride, contains about one-half sodium. One level teaspoon of salt contains about 2300 mg of sodium. According to Dunn (1983), the estimate safe and adequate dietary intake of sodium for adults is 1100-3300 mg/day, and for children ages seven to ten it is 600-1800 mg/day. In the United States, the usual daily intake of sodium for an adult is about 2300-6900 mg/day. Salt is found in many foods and is often added to foods at the table, during cooking, and in the commercial processing of foods.

In August of 1986, the American Heart Association released its latest guidelines for heart-healthy eating. New recommendations include restricting protein to 15 percent of total calories, primarily to hold down meat consumption. The AHA also advised that calories from total fat should represent less than 30 percent of all calories, with saturated fat accounting for no more than ten percent of total calories. Cholesterol intake should be no more than 100 milligrams per 1,000 calories, not to exceed 300 mg per day. Sodium intake should be limited to one gram per 1,000 calories, not to exceed three grams per day (half a teaspoon of ordinary table salt is approximately one gram of sodium) (AHA Update, 1986).

Snack foods high in saturated fats, salt, and sugar account for approximately one-third of the caloric intake of children (Berenson et al., 1982). It is suggested by the American Heart Association

(1982) that snack foods consist of food items that contribute to the needs of protein, minerals, and vitamins in a child's diet. Fruit, low-fat milk, or low-fat yogurt are examples of food items recommended for snacks.

Nutrition knowledge is gained through the teaching-learning process. This process is a dynamic interaction between two individuals. The teaching-learning process is not simply one individual imparting information to the other (Brill & Kilts, 1980). All individuals bring to the learning situation their own beliefs, perceptions and demographic characteristics. The demographics considered in this study which may influence the learning process are the participants' education level, occupation, and work status.

Eppright et al. (1970) found a positive relationship between education level and nutrition knowledge studies. Schwartz (1975), however, did not find a relationship between education and nutrition knowledge. Occupation may be a factor in how one perceives nutrition information. Nutrition knowledge may be a repetition for mothers who hold positions in the health field and may result in a lack of motivation to relearn the information. A participant not employed in a health field may be more receptive to learning the new information. Limited time due to working way from home may also affect a participant's willingness to learn new information.

In addition to characteristics of the participant, characteristics of the household may affect nutrition knowledge. Resources for food expenditures and the number of family members in the household were found to be more highly correlated with nutrition knowledge than income

or education (Eppright et al., 1970). A participant with a family member diagnosed with a CVD problem or with a family member on a special diet may not be motivated to learn more information. On the other hand, a participant may perceive the need for nutrition information offered in the study.

The purpose of providing nutrition information is to change nutrition behaviors by increasing knowledge. Perron and Endres (1985), Touliatos et al. (1975), and Schwartz (1975) did not find a correlation between nutrition knowledge and health practices. These studies did note a correlation between attitude and nutrition knowledge. This finding may indicate that attitude may play an important role in changing health behaviors. Another area of interest in the study is participants' approval of health education and the people whom the participants considered best able to present the program to the children. Wilcox, Gillies, Wilcox, and Reid (1981) conducted an experimental study which measured parents' attitudes toward health education. They concluded that subjects in the experimental group assigned more importance to health education than the control group. Parents, as a whole, wish to see a wide range of health topics taught in the school; however, they were reluctant to delegate the responsibility of health education to teachers alone. Seventy-nine percent of parents expressed a willingness to cooperate with teachers and the school in developing home/school programs for health education. This finding is important, given the influence the family has on health behavior.

In summary, nutrition knowledge refers to the acquiring of new information. For this study the focus is on nutrition information in relationship to CVD. Knowledge is obtained through the teaching-learning process. Demographic variables can influence the participants' motivation to accept the nutrition information brought home from school by the children and may influence a change in nutrition behavior.

Nutrition Behavior

The role nutrition plays in the prevention of cardiovascular diseases is an important area of study. Some health professionals believe that there is enough evidence to warrant the implementation of preventive nutrition measures for cardiovascular disease. Furthermore, they believe these measures should begin in childhood. As a result, school health education programs are being incorporated into school curricula. The goals of the programs are to increase student knowledge and to assist them in learning skills necessary for establishing good health habits. Although many health habits can be taught to children, eating patterns are difficult to change since children have limited control over their diets. Reinforcement of the value of nutrition must be carried out in the home environment.

Teaching children strategies for healthy living is only part of the solution to reducing CVD risk factors. According to Gillespie (1981), the home environment has a direct influence on children's health behaviors. Parents' food preferences and knowledge, beliefs, and attitudes about nutrition, the dynamics of the eating situation, as

well as the foods available in the home, and the food preferences of the children all affect nutrition behavior. Education programs increase knowledge but do not necessarily change behavior. Children are at a disadvantage for changing eating patterns since they rely on adults for food selection and preparation.

Dielman et al. (1982) did a study to determine the relationships between the health beliefs and behaviors of parents and those of their children. The findings indicated that children are influenced by the parents' behaviors but not parents' beliefs. Lewis and Lewis (1982) did a review of children's role in society and concluded that only during the past 30 years has there been any suggestion that parents consider the desires of children in planning their activities of daily living. Relying on personal experiences, Lewis and Lewis (1982) concluded that most children are competent enough to assume some responsibility for their health, although parents are reluctant to acknowledge the children's ability to do so.

The purpose of this study was to examine mothers' nutrition knowledge before and after their children participate in a health education program and secondly, to explore if children share this nutrition information with their mothers and if so, to determine whether mothers alter nutrition behaviors. If Lewis and Lewis are correct in assuming that most adults do not wish to be aware of children's competence in decision making regarding health then the mothers in this study may not be influenced by the information that children bring home from school.

Some studies reviewed involved parents' participation in the health education programs for children. Gordon and Haynes (1982) used children's homework assignments to test parental involvement and then suggested that parents' participation had some impact on the composition of meals served at home. An experimental study (Kirks, Hendricks, & Wyse, 1982) based on parents' involvement in nutrition education for primary grade students revealed that the parents who received nutrition education reported that their children were consuming a higher quality diet than parents who did not receive the nutrition education. These studies rely on direct participation of the parent. Most schools, however, direct nutrition programs at the children but not the parents. Other studies based on children learning new health habits only involve parents for reporting health behaviors of their children following the program rather than the effects children's new knowledge may have on the parent. Coates, Jeffrey, and Slinkard (1981) did a study specifically to evaluate a heart-healthy school program and to determine if children could influence the health behaviors of family members. Some families reported a change in food selection after the children participated in the heart-healthy program.

In June of 1981, a conference entitled "The Health Behavior of Children: Research Findings and Direction" was held at the University of Texas (Bruhn & Parcel, 1982). One outcome of the conference with regard to children's health behaviors was that the family is an interactive system and, therefore, the influences on health behavior are multidimensional and multidirectional. Thus, parents may influence their children's health behaviors and children, in turn, may influence

the parents' health behaviors. Because of family interaction, siblings may also influence one another's health behaviors.

In summarizing, the role of nutrition is an important segment of health education of children. The purpose of nutrition education is to develop good nutrition behaviors. Health professionals have determined that parents influence the health behaviors of their children. Most school health programs are directed at the children without parent involvement. Therefore, it is important for health professionals to examine what happens to nutrition information after the material is presented to the children in school.

Summary

A review of the literature showed that cardiovascular risk factors are present in children. Some of these risk factors are elevated serum cholesterol levels, elevated blood pressures, and obesity. These risk factors may be associated with dietary intake. School health education programs presently being instituted in the schools contain nutrition sections to prevent or reduce risk factors to chronic illnesses. Studies involving nutrition knowledge do not necessarily support the theory that knowledge alone can bring about behavioral changes. Education levels of participants were significant in determining nutrition knowledge. Amount of money for food expenditures or income was not as significant as education in some cases. In order to change nutrition behaviors in children, the home environment must be taken into account since knowledge alone does not change behaviors.

Nursing Theory

The focus of nursing in King's model is based on the care of human beings. The model incorporates the idea that nursing's goal is a concern for the health of individuals, groups, or communities. The domain of nursing, according to King (1981), "includes promotion of health, maintenance and restoration of health, care of the sick and injured, and care of the dying" (p. 4). Nurses collaborate with physicians, families, and other health professionals in the coordination of a plan for delivery of health services. The nurse's role in this framework is to work with other health professionals as well as with school officials to implement a health education program in a particular school system. In addition to acting as a resource person, the nurse's role is to evaluate the outcomes.

King accepts the premise that human beings are open systems interacting with the environment, and incorporates this philosophy in her conceptual framework for nursing. King's framework consists of three systems -- personal, interpersonal and social. King's concept of person, one of four central concepts of the discipline of nursing, includes the three systems. Each of these three systems has permeable boundaries which are illustrated in Figure 1 as broken lines. The permeability of these boundaries allows for an exchange of matter, energy, and information into each system (King, 1981; Fitzpatrick & Whall, 1983).

In King's model, perception is a basic concept and a major part of the interaction process. Perception is defined by King as a "process of organizing, interpreting, and transforming information from sense

data to memory" (1981, p. 24). She continues by stating that perception is a human transaction with the environment it gives meaning to one's experience, represents one's image of reality, and influences one's behavior. Furthermore, perception is the way each human being interprets reality. This interpretation is not the same for each individual since perception is related to other factors, such as past experiences and socioeconomic backgrounds.

The personal system views each individual as a unique total system, as a social being who is rational, sentient, and who is capable of processing selective inputs from the environment. The individuals in this study are in various stages of development, have their own genetic make-up, and have had different experiences in life. Each of these factors plays an important role in how each individual perceives the nutrition information and its importance. In Figure 1, the child and the mother are illustrated as individuals by enclosing each in a separate circle. The dotted lines indicate that the individual is able to receive or share information. The child's stage of cognitive development and experiences in life contribute to the child's perceptions. The child's perceptions of situation, places, things, and other people constitute part of the child's internal environment.

The mother is also depicted in Figure 1 as an individual. A mother's perception of nutrition information carried home by the child may be influenced by several factors such as education level, occupation, amount of money available for food, previous experiences with diets, or cardiovascular disease in the family. These factors may or may not influence the mother to adopt different nutrition practices

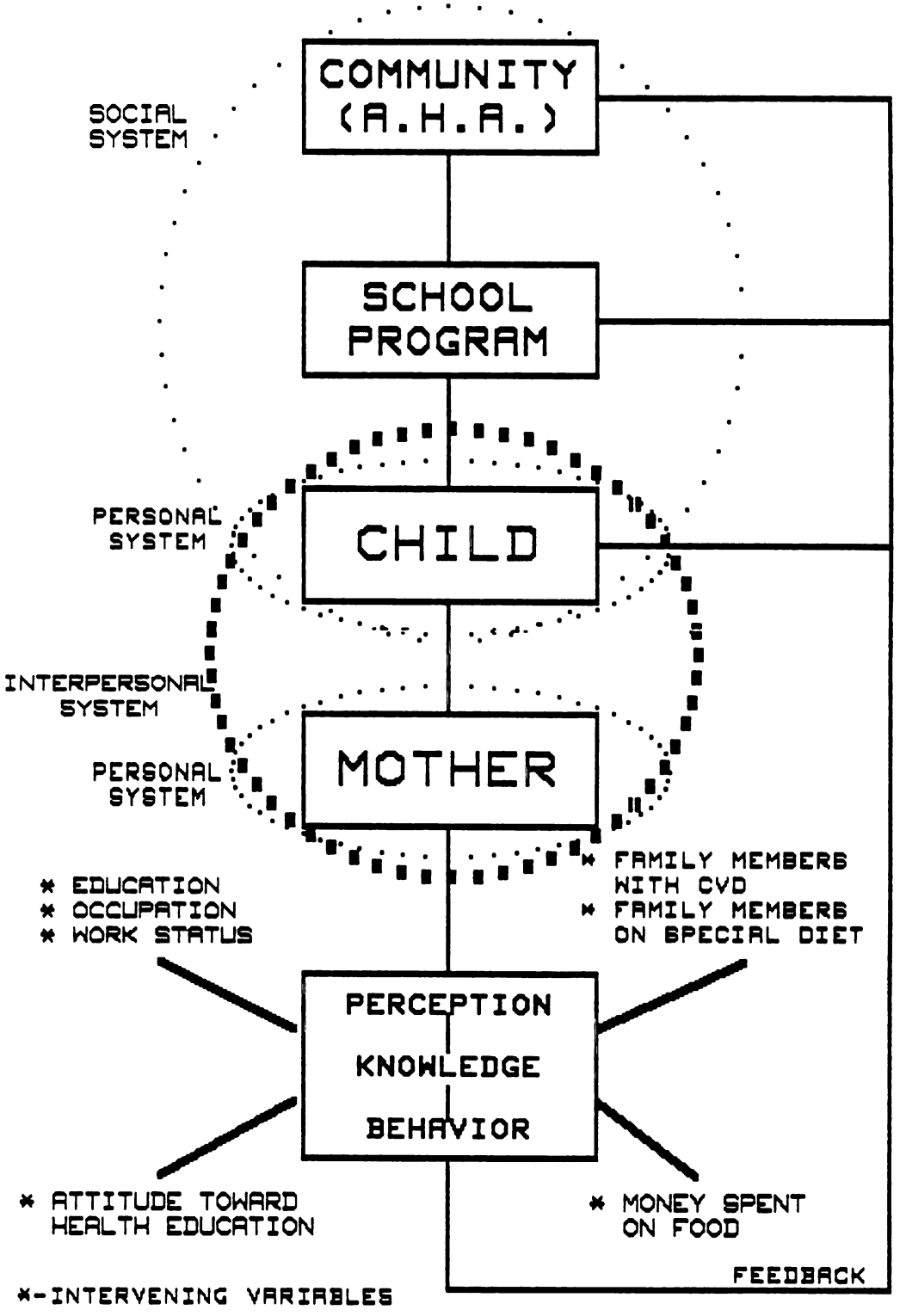

Figure 1: King's Conceptual Framework Applied to the Study Variables

for the family or increase her nutrition knowledge. The mother, therefore, plays an important role in the development of the child's nutrition habits. The interaction between mother and child is referred to as the interpersonal system.

The interpersonal system is defined by King (1981) in her concept of person, as a system composed of two or more individuals interacting in a given situation. Therefore, interaction may take place between two people or a group of people. For this study, the interaction is between the mother and child.

The process of interaction between two or more individuals represents a combination of verbal and nonverbal behaviors that are used to reach the desired goal. The goal in this situation is for the child to share or communicate nutrition information to the mother. The dotted lines around the mother and child allow for the transfer of information from one individual to another. How receptive the mother is to the nutrition information will depend on the openness of this boundary that surrounds the dyad.

Communication between the individuals is essential in order for any information to cross the boundary. Information may be given directly to the mother by the child verbally transmitting the nutrition information, or indirectly by the child carrying home written materials on nutrition received in school.

Social system can include the family, education system, peer groups, and work systems which influence people as they grow, develop, and move through various stages of life. The school is central to the

social system in this study. The school is involved as the location used by the health professionals to distribute the information.

King's definition for the basic concept of environment consists of both internal and external components. King proposes that an understanding of the ways human beings interact with their environment to maintain health is essential to nurses. The internal environment enables human beings to adjust to continuous changes taking place in the external environment. One way this process takes place is through the process of communication. Fawcett (1984) states that King did not discuss environment explicitly.

External environment for this study is depicted in Figure 1 as the community (AHA) and the school. The school is an organization in which teachers use their role as educators to provide an opportunity for children to learn strategies to develop good nutrition habits which will promote a healthy life-style. The teachers often rely on community resources for support in teaching children health. Community in this study refers to the American Heart Association which is a resource for health promotion. The Association provides teachers with curriculum guides, audiovisual aids for the guides, printed materials, and speakers such as physicians, nurses, and dietitians. School and community in Figure 1 is the child's social system, the open ring (dotted lines) allows for the transfer of information.

Although feedback is included in King's framework, she does not discuss it in detail. Feedback is added to Figure 1 to indicate that successful outcome could motivate the child, school, and community to continue and enhance the education process.

In Figure 2, King's model of human interaction has been modified to illustrate the interaction between the mother and child. Perception, communication, and transaction are important concepts in the interaction process. The child and mother perceive each other in the given situation. The child makes a judgment as to whether or not the mother may be interested in the materials. If the child perceives the mother may have an interest, the child may make a decision to share the information. This sharing is done through the concept of communication in which the information is directly or indirectly given to the mother by the child. In turn, the mother makes a decision to listen to the child's communication. If the mother perceives this information as beneficial, she accepts the information the child is sharing. A transaction occurs if the mother increases her knowledge and/or selects and prepares foods as indicated in the information.

The purpose of implementing a health education program in the school system is to assist the child in developing good health habits. Health is defined as "dynamic life experiences of human beings, which implies continuous adjustment to stressors in the internal and external environment through optimum use of one's resources to achieve maximum potential for daily living" (King, 1981, p. 5). Nursing plays a strategic role in the process of aiding individuals to maintain optimal health. Promotion of a healthy life-style is essential to the role of nursing. In the implementing of health education programs, the nurse's role is to assist community agencies in developing and promoting preventive strategies to improve health and to assist the school as a resource person for the teachers, children, and parents.

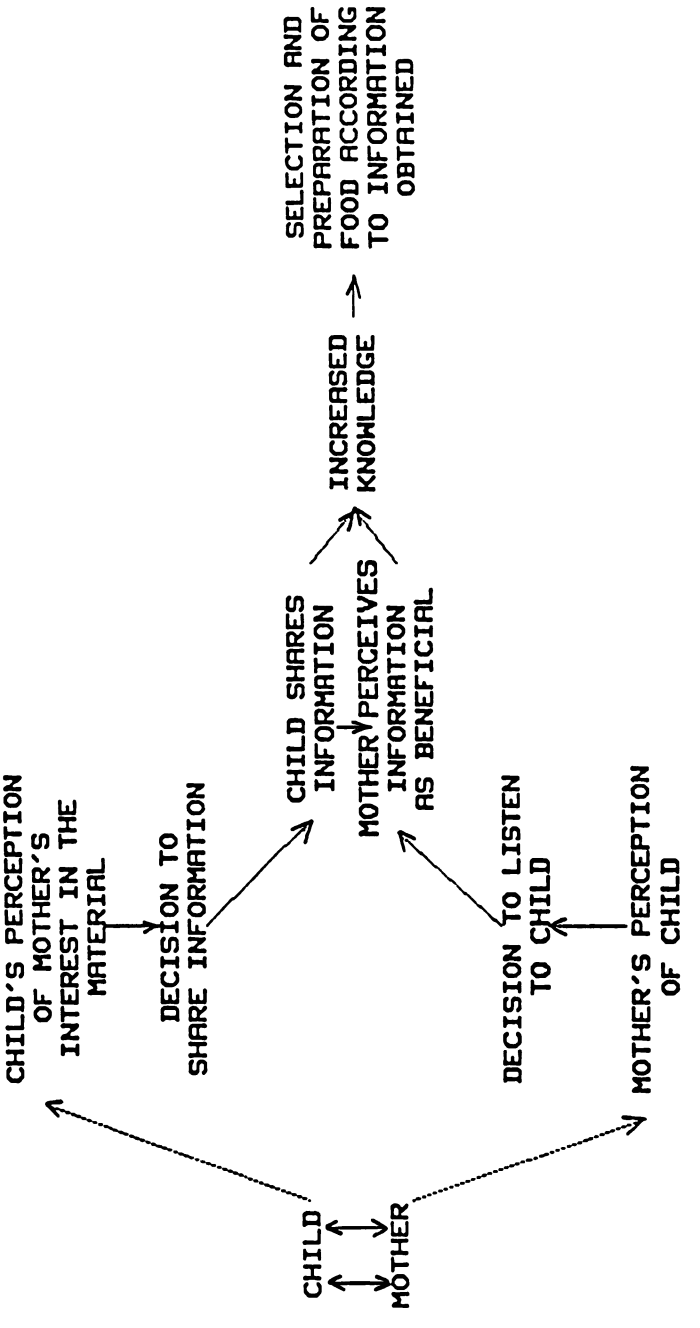

Figure 2: King's Model of Human Interaction Modified to Illustrate Mother and Child Interaction

To summarize, King's theory of open systems and her model of human interaction provide the framework for this study. Figure 1 is an illustration of the overall study, whereas Figure 2 is a modification of King's human interaction to show the interaction between the mother and child.

In this chapter a discussion of cardiovascular risk factors in children was presented, as well as the concepts of health education, mother, children, nutrition knowledge, and nutrition behaviors. The concepts were discussed in relationship to King's open systems theory and her model of human interaction. In Chapter III, a review of the literature will be presented.

CHAPTER III

Review of Literature

Introduction

A discussion of research studies and papers that relate to cardiovascular risk factors in children, health education, nutrition knowledge, nutrition behaviors, and intervening variables is presented in the review of the literature. In the first section, an in-depth discussion of the two studies that led to investigation of CVD risk factors in children is introduced. Also included are later studies that explored CVD risk factors in children. The second section includes a presentation of studies that investigated the effectiveness of health education programs implemented in the community and schools.

A review of the literature that focuses on nutrition knowledge of mothers and children is presented in the third section. The North Central Regional Study that investigated mothers' nutrition knowledge with a sample population covering 12 states is also discussed. Studies to examine the effects of health education on nutrition behavior are presented in a fourth section. Finally, studies that address demographic variables which may influence nutrition knowledge and behaviors are discussed.

Cardiovascular Risk Factors in Children

Although death from myocardial infarction, angina pectoris or stroke is rare in children, most health professionals now believe that the roots of these health problems develop in childhood. Prior to the 1950's heart and blood vessel disease was believed to originate in the elderly. A study in 1955 by three physicians, Drs. Enos, Holmes, and

Beyer (1955), however, shed new light on the problem when they explored the presence of coronary artery disease in 300 American soldiers killed in combat during the Korean War. It was this study that produced the first evidence that coronary artery disease was not restricted to the elderly. The subjects for this study had a mean age of 22.1 years. Two of them were 40 and 44 years of age and the remaining 18 were between 18 and 22 years of age. The average height of the men was five feet seven and three-quarters inches and the average weight was 145.8 pounds. Nineteen were white and one was black. Evidence of hypertension was not present in any of the subjects.

The hearts of these dead soldiers were dissected and gross examination on the coronary vessels was performed. The findings revealed that 77.3% of the men had gross evidence of plague buildup. The degree of the disease varied from minimal eccentric thickening to complete occlusion of one or more main coronary branches. Twenty of the soldiers had arteries with more than 50 percent narrowing of the lumen.

A low rate of coronary artery disease among Japanese was found in earlier studies. Therefore, the same investigators compared the American casualties with Japanese civilian casualties to control for the stress of war as a possible explanation for the presence of coronary disease in American soldiers. The subjects for the comparison study involved 114 male and female Japanese. Thirty of the male Japanese were between the ages of 20 and 30 years. The comparison revealed 65% of plague buildup in the 30 male Japanese. The two main

differences in the comparison between the American and Japanese casualties were the following: 1) No plagues causing more than 50 percent of luminal narrowing were found in the Japanese males between 20 and 30 years of age; and 2) The amount of phagocytized lipids in the stoma of the plague was less in the Japanese than the amount observed in the American soldiers. The conclusion drawn by the investigators were: 1) coronary artery disease was present in young males and was not restricted to the elderly; and 2) plasma lipids, phagocytized in plaques, were more abundant in American soldiers than Japanese, implicating diet as the source of lipid.

During the Vietnam War, McNamara, Molot, and Stremple (1971) duplicated the previous study with young American casualties. The mean age of the subjects matched those of the Korean study. The analysis was done by angiography rather than gross examination (angiography was not available in 1953). The results of this study revealed only 45 percent narrowing of the lumen in the arteries of young American males. This is a marked contrast to the findings of the Korean study. The Vietnam study did not include a comparison with Vietnamese casualties.

It was believed that the difference in the studies may be attributed to the methods used to judge the luminal compromise. According to McNamara (1971) gross examination in the post mortem state used in the Korean study can not be adequately judged due to elastic fibers of the vessel that markedly reduce the size of the vessel while there is no change in the plaque. Enos and Beyer (1971) responded to the results of the Vietnam study with a letter to the Journal of the American Medical Association. In the letter, they wrote that results

of the Vietnam study differ because of the downward trend in atherosclerosis since the Korean War. This trend, according to Enos and Beyer (1971), was brought about by new diagnostic tools for coronary artery disease and diet modification. In the letter, the physicians also stated that angiograms, like gross examination, were sometimes inadequate.

Although there was a significant difference in the severity of disease in the coronary vessels of young American soldiers seen in the two studies, both studies did confirm the presence of coronary artery disease in young adults. More evidence that coronary artery disease is present in children, as well as adults, has been documented at the international level (McGill, 1968). The Korean and Vietnam studies paved the way for large community studies involving children of all age groups.

In the United States, systematic studies have been carried out to investigate the clinical aspects of risk factors present in children, and some of these studies have included the relationship of diet to CVD risk factors. Four major studies were conducted in different geographic areas of the United States and used different methods for gathering and analyzing data. The first study began in Muscatine, Iowa in 1970. The Bogalusa study began in 1972 and the other two studies, the Princeton Lipid Study and the Rochester study began in 1973.

Muscatine Studies (Clarke et al., 1978; Lauer et al., 1975) took place in rural Iowa in a predominately white community. Subjects were school-age children between five and 18 years. A total of 4,829 children were included in the initial study. Observations were made at

two-year intervals of non-fasting serum cholesterol and triglycerides (until 1973 when the procedure changed to fasting serum lipids), blood pressure and anthropometrics. Results indicated that the mean serum cholesterol levels were 182 mg/dl; the goal for mean serum cholesterol in children is 150 mg/dl (Lasser, 1981). Twenty-four percent of the children had cholesterol levels greater than 200 mg/dl. The mean serum triglyceride level was 108 mg/dl, and increased with age. Serum cholesterol levels did not correlate with the amount of fat contained in the breakfast consumed on the day of the blood test ($r=0.02$). Dietary histories revealed 79 percent of the children had no fat intake for breakfast or had under 15 gm of fat. Only nine percent had a high fat breakfast (above 25 gm) and many children had no breakfast.

In this study, blood pressure levels were also obtained. Hypertension was defined as a systolic blood pressure of 140 mm Hg or above, or a diastolic blood pressure of 90 mm Hg or above. The systolic and diastolic blood pressures increased with age. In the 14 to 18 year olds, 8.9% had systolic hypertension and 12.2% had diastolic hypertension. Both systolic and diastolic hypertension occurred together in 4.4% of the six to nine year olds and 16.7% of the 14 to 18 year olds. Low pressures were obtained in children six to nine years of age and few had adult hypertension levels.

Relative weights were computed for each subject as percentage above or below the median weight for all subjects of the same height, age, and sex. Obesity also increased through the school years. Among the six to nine year olds, 25 percent of the subjects had a relative weight greater than 110%. In the 14 to 18 year olds, 25% of the

subjects had relative weight of 110% or more, and 8% had relative weight of at least 130%. A large number of children were found to be at risk for CVD. This conclusion was based on criteria which had been established for adults from data obtained in national and international studies; at this time there is no standard for children.

Cholesterol, triglycerides, and blood pressure were repeated measured in the Muscatine subjects (Clarke et al., 1978). After a six year period, a significant proportion of children with initially high values demonstrated consistent high levels of cholesterol, and to a lesser degree triglycerides throughout the study period. Blood pressure measurements were not consistent. In 1981, a follow-up report of blood pressure tracking in the same Iowa subjects was published by Lauer, Clarke, and Beaglehole (1978). Clarke et al (1978), defined tracking as "the phenomenon of children maintaining their rank within their age-sex group" (p. 626). The findings in this study established a relationship between body size, growth, and blood pressure level in childhood. A nutrition segment of the Muscatine study is mentioned, but details of the results was not reported.

Even though the great majority (96.4%) of the children were white, the investigators generalized their findings to the general population of children. In the discussion section of the study, the authors concentrated on reporting the findings of cholesterol values and blood pressure and did not mention the findings regarding triglyceride levels.

The Bogalusa Heart Study (Berenson et al., 1982), in contrast to the Muscatine Study, included white and black children. The age level

of the subjects ranged from 2.5 to 14 years of age at the initial visit. This study is presently tracking fasting serum cholesterol and triglycerides levels, blood pressure, and in addition, fasting serum glucose levels (Berenson et al., 1982). The findings thus far are congruent with the results of the Muscatine Study.

The Princeton Study (Glueck et al., 1983) like the Bogalusa study involved biracial subjects -- 75% white and 25% black. The purpose of this longitudinal study was to survey fasting serum lipids and blood pressure levels. Parents were also included in the study and their involvement will be discussed in more detail in the diet section. Findings supported the Muscatine and Bogalusa studies.

The Rochester Study (Ellefson et al., 1978) included 3,666 predominately white school-age children of upper and middle socioeconomic classes. Observations were obtained on multiple risk factors, such as fasting serum lipids. The findings were consistent with the above studies.

CVD risk factors have been, and in some cases still are being evaluated in children to determine if elevated levels of serum lipids and blood pressure are maintained into adulthood. Epidemiologic studies have documented that blood pressure (BP) increases throughout childhood (National Committee on Detection, Evaluation, and Treatment of High Blood Pressure, 1985). Criteria of BP standards in children have not been reached at present. As a result there is no absolute level of BP to define hypertension in children. The studies are based on adult criteria. In time this criteria may change for children as a result of the findings at the conclusion of the longitudinal studies.

At this time, the findings indicate that CVD factors are present in children.

The four major U.S. children studies concentrating on CVD risk factors may in time help us to identify those children who are at greater risk for CVD in adulthood. Such studies of children are also being conducted in other nations. CVD risk factors have been found in Jerusalem school children (Halfon et al., 1983), in Finnish children (Puska et al., 1981, 1982) and in a Dutch school study (Kromhout, van der Haar, & Hautvast, 1977). In Japan there is a low incidence of ischemic heart disease deaths and a relatively high rate of deaths due to cerebral apoplexy (sudden paralysis from obstruction of a blood vessel). As the diet of children in Japan changed to a Western-style, including hamburgers and barbarcue meats, a change in blood lipid levels in Japanese children has been observed (Okuni, 1980).

Dietary Intake Studies

A detailed review of the literature has been done by Lasser (1981) on studies of adults involving the relationship between diet and CVD. Two of the longitudinal studies of children also included a dietary segment.

The Bogalusa Studies incorporated a dietary study (Frank, Berenson, & Webber, 1978) into the epidemiological survey. The purpose of the dietary study was to determine the nutrition factors that might account for elevated levels of blood pressure and serum lipids present in children. Of the one hundred eighty-five primarily fifth graders participating in the dietary segment of the original study, 35% were black and 65% white. These children were selected because earlier

testing showed them to be capable respondents to a 24-hour dietary recall, to be attentive and reliable interviewees, and to be less likely to fabricate responses than older children. Age of the child was considered an important criteria; the ten year old child was found to be spontaneous, curious, and honest by the researchers of the Bogalusa study.

Each child was given a three-hour physical examination which included measurements taken for height, weight, triceps skinfold, maturation, serum lipids, blood pressure, and hemoglobin. The 24-hour recall was collected from each child in a 30 minute interview conducted by a trained nutritionist (Frank, Berenson, Schilling, & Moore, 1977). Graduated food models and visual aids were used to increase the accuracy of quantitative information. Three sets of ten children were each interviewed by two nutritionist to assess the accuracy of the children's answers for the data collection. Eggs were the main food source of cholesterol and milk was the primary source of saturated fatty acids and protein. Intermittent snacks provided the most calories; breakfast and dinner contributed most of the day's cholesterol; and lunch was the primary source of lactose and calcium. Children with high serum cholesterol levels showed significantly greater fat intakes than those with low serum cholesterol levels. No correlation was found between carbohydrate and sucrose intakes and fasting serum glucose levels. In general children consumed a diet high in energy, fat (particularly saturated fat), sucrose, and sodium. Snack foods high in fat, salt, and sugar accounted for approximately one-third of the caloric intake.

Advantages of the 24-hour dietary recall are considered to be the practicality and the simplicity of gathering the nutrition data from a large number of subjects (Frank et al., 1977). One of the disadvantages of the 24-hour recall is that it may not be representative of the usual dietary intake of the subject (Stunkard & Waxman, 1981).

Baranowski (1985) listed some of the factors that affect the accuracy of self-reporting of human behavior. Some of these factors listed are 1) the physical environment in which the self-reporting takes place; 2) the clarity of the instructions; 3) the subject's emotional state; and 4) the social environment in which the subjects may give answers which they believe the investigator wants to hear.

Laskarzewski et al. (1980) designed a study to assess potential interrelationships between nutrient intake of parents and children in the Princeton School District in suburban Cincinnati. The study population consisted of 294 families (60 black and 234 white) that included at least one parent and one child. In families with more than one parent and/or more than one child, the oldest parent and oldest child were arbitrarily chosen. The children ranged in age from six to 19 years. During the initial visit fasting blood samples were taken to determine cholesterol and triglyceride levels. The nutrition information was collected using the standardized Lipid Research Clinics' collaborative 24-hour dietary recall. Simple correlations and analysis of covariance were used to assess parent-child nutrient intake relationships. There were significant positive correlations between nutrient intake of parents and their children for total carbohydrate,

saturated fats, polyunsaturated fats and calories. By analysis of covariance with adjustment for sex, race, age, and recall group, the parent-child association of cholesterol intake was also significant.

Cholesterol, total fat, and saturated fatty acid intakes were very similar between the two populations. In comparison with the Bogalusa (9-11 year olds) study, the Cincinnati white boys and girls (10-12 year olds) and the Bogalusa Blacks had higher energy intakes than the Bogalusa whites or Cincinnati blacks. One possible cause that may account for this difference was the method used to collect the data for the 24-hour recall. In the Bogalusa study the recall information was obtained directly from the children; in the Cincinnati study the recall information was obtained from the parents. Another possible cause may be a difference in the demographic variables between the subjects in the studies. One of the limitations of both studies is the lack of demographic data. The Bogalusa study reported only differences for sex and race, whereas the Princeton study reported interrelationships for child and parent for sex, race, and age. Other variables, such as income and ethnicity, were not included.

In summary, longitudinal studies involving children are being conducted throughout the U.S. and abroad. The findings of these studies are preliminary and it will take many years before all the data are compiled. The studies presented in this section are focused on an investigation of the physiological risk factors of CVD in children and do not control for other variables such as, environment or family history. At this time the evidence does support the presence of CVD risk factors in children. Studies which involved dietary research

indicated a relationship between parents and children's dietary intake. This relationship is important for the implementation of preventive measures to change dietary habits.

Health Education

Mortality rates for CVD had declined during the period from 1968 to 1978. There was a 20.7% decline in overall ischemic heart disease mortality (Lasser, 1981) or a 26% decrease in the age-adjusted death rate for all CVD deaths (Kolbe & Newman, 1982). The reason for the decline is debatable, since medical care techniques improved at the same time as research was being conducted to identify risk factors. Levy (1984) presented a detailed report of the factors which may account for the decline in CVD mortality rates in the United States. Among the factors discussed by Levy were the development of acute coronary care units, new drugs, surgical techniques, diagnostic tests for early detection, and identification of specific risk factors. Thus, it could be said that the decline may be due to the combination of new techniques and preventive measures.

Risk factors identified by researchers include age, sex (male), family history, hypercholesterolemia, smoking, hypertension, diabetes mellitus and obesity. The first three factors cannot be controlled, however, the other factors can be modified or prevented. Both awareness of the risk factors and strategies to prevent or reduce these changeable factors have been the goal of community and school health education programs.

In the United States, a good example of a health education program designed to lower lipids through education is the Stanford Three Community Study (Stern et al., 1976). This was a two-year education campaign conducted in three northern California communities. Two communities were assigned to the experimental group and one to the control group. Personal counseling of high risk individuals ("intensive instruction") took place in one of the treated communities. In the other treated community, a mass-media bilingual health education campaign was conducted. The campaign consisted of direct mailing of information booklets, newspaper columns by a doctor and dietitian, and radio and TV health education programs. The subjects studied were males and females from 33 to 59 years of age. The nutrition objectives of the campaign were to reduce the consumption of cholesterol, saturated fat, and to increase their consumption of polyunsaturated fat. There was one initial survey and two follow up surveys.

Blood was drawn during all three surveys to determine cholesterol and triglyceride levels of the subjects. Dietary behavior of the subjects was assessed before and after the campaign using a dietary questionnaire. Average daily consumption of cholesterol, saturated fat, and polyunsaturated fat were calculated.

Both intensive instruction and the mass media campaigns led to a significant reduction in cholesterol and saturated fat consumption in both men and women. The intensively instructed men tended to have a greater reduction than the men exposed to mass-media only. Women responded equally to mass-media and counseling approaches. According to Pender's (1982) review of this study, mean changes in serum

cholesterol concentration for the various groups under study correlated with those that would have been predicted on the basis of self-reported changes in dietary behavior.

The improvements in the communities were maintained over the two years. The findings indicated that mass-media health education campaigns can lead to significant changes in dietary practices. One limitation of this study was the method used for collecting the data of behavioral change: a questionnaire designed to be administered by trained non-professionals which required only ten to 12 minutes. The findings revealed lower correlations between surveys for estimated consumption of various dietary ingredients than found in studies that utilized professionals and an in-depth questionnaire.

The Stanford Three Community Study did not assess the effect of the mass-media education program on the community members that were not part of the study. These researchers did not determine if the members of the household of the participants were affected by the campaign. The results of the study, however, did show the impact of health education on individual behavior.

Community programs have also been initiated in foreign countries such as Finland (Puska et al., 1981; 1982). The Finnish study combined the school and community to influence nutrition behaviors in relationship to CVD risk factors in 13 to 15 year old children. An intensive intervention was carried out in two schools. A county-wide intervention was implemented in the rest of the area. The program was implemented to develop healthy life-styles in general, although some measures were specifically aimed at high-risk children with elevated

cholesterol levels. Part of the program was designed to reduce total fat, cholesterol, and salt intake in the children's diets. Changes in food preparation were encouraged at home and in the schools. Parent gatherings, posters, written recommendations, a project magazine, and the mass media were used to promote these changes. Screening was done by the school nurse and a health record was maintained on each child.

Results of the school study showed a reduction in percent of energy from fat from 37% to 32% and an increase in the P/S ratio from 0.13 to 0.6 in the average intensive intervention school diet. The findings of the study showed a decrease of about 1.0 gm of NaCl intake. During the two year intervention, mean blood cholesterol levels decreased. A lower consumption of fats was reported for children in the intensive program compared to the consumption of fats by children in the county-wide area and reference county. The community and the school were utilized to increase children's responsibility for adopting good health behaviors. This study and the Stanford Community study used the mass-media with positive results. The cost for these programs and the feasibility, however, were not discussed in either study.

Journal of School Health has reported a number of school studies of health education programs and children's responses. Holcomb, Carbonari, Weinberg, and Nelson (1981) evaluated a comprehensive cardiovascular curriculum by analyzing student achievement and attitudes and by assessing teacher acceptance of the curriculum. The curriculum consisted of a series of independent self-instructional units focusing on the circulatory system and heart, cardiovascular disease, risk factors of CVD, warning signs, and emergency procedures

for heart attacks. The subjects consisted of the ninth graders in a large suburban school district in Houston, Texas. The 897 ninth graders were divided into a control group (those students who had completed two school quarters of health) and the experimental group (students completing the health class in the third quarter). Member of the National Heart and Blood Vessel Research and Demonstration Center conducted an in-service for teachers on the material to be presented to the students.

Four hypotheses concerning learning, attitude, teacher acceptance, and the relationship between teacher acceptance and student learning were formulated to guide the analysis of the data. A one factor ANOVA with two levels was used for analysis. The findings showed a significant improvement in knowledge levels among students. As a result of the program, students expressed concern about their own risk of developing heart problems and expressed positive attitudes toward their ability to prevent and control cardiovascular disease. Although teacher acceptance of curriculum was positive, the relationship between teacher acceptance and student learning was difficult to ascertain. No explanation for the difficulty was suggested; therefore, additional research is needed to assess a relationship between teachers, acceptance and students' learning.

Six months later, Holcomb, Carbonari, Nelson, and Wylie (1982) tested the same students to assess the long-term impact on students' cognitive retention and attitudes. The purpose of the study was to investigate the retention of CVD knowledge and attitudes toward prevention of CVD risk factors. The six month interval included the

period over summer vacation. Four hypotheses were formulated to guide the analysis of the data. Students who had received the special CVD curriculum had a higher knowledge level six months later than the control group. The greatest differences between the groups on the retention test were in the areas testing CVD and risk factors--areas which were the primary emphasis of the curriculum.

Other school health education programs with a focus on CVD and its associated risk factors have been shown to be effective in increasing student knowledge (Eng, Carter, & William, 1979; Fang, 1980; Green & Iverson, 1982; Podell et al., 1978; Way, 1981). Not all studies conducted to test retention have shown an increase over time (White, Albanse, & Anderson, 1978).

Schwartz (1975), conducted a study to test long-term effectiveness of nutrition education of post high school female graduates who had been enrolled in a three-year comprehensive home economics program that included nutrition. The subjects in the study had been out of school for four years and it was assumed that they were at the time of the study representative of wives, mothers, students, career or working women. The mean scores on the knowledge test of the graduates who had the home economics program were higher than those of graduates who had not taken the course; however, the difference was not significant at the 0.05 level of significance. The responses related to the nutrition practices showed no significant differences in the mean scores between graduates with home economic classes and those who did not have a class in home economics. The results of the attitude section also showed no significant difference between the two groups.

Schwartz (1975) did not discuss demographic variables in her report; but she did provide information on other sources of nutrition information obtained by the subjects. The knowledge-attitudes-practices model was applied to determine the nature of the relationship of nutrition knowledge to attitudes and practices and the interrelationship of knowledge and attitudes with practices among the subjects. This study was one of the few studies reviewed that presented a theoretical model.

There is controversy over the value of school health education programs since knowledge alone may not be sufficient to change behavior. At the present time, programs are designed not only to introduce the student to the cognitive aspects of good health but also to develop the skills necessary for behavior change (Kolbe & Newman, 1982).

In summary, the Stanford Three Community Study and the Finland Study were presented to show the effect of mass-media education programs on the community. Other studies that evaluated a comprehensive cardiovascular curriculum and retention of health education programs presented to students were reviewed. Specific studies on nutrition knowledge will be discussed in the next section.

Nutrition Knowledge Studies

A search of the literature revealed that nutrition knowledge studies have been conducted with a variety of subjects such as school children, mothers (especially in relationship to infants and preschoolers), nurses, teachers, and elderly persons. A common

assumption among health educators is that individuals given basic knowledge of nutrition will apply this knowledge in selecting foods and preparing meals for themselves and family members.

Nutrition knowledge of mothers has been studied especially in relationship to the feeding of infants and preschoolers. Eppright et al. (1970) conducted a study to test nutrition knowledge and attitudes of mothers. This study is known as the North Central Regional Study.

States included in the Regional study were Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin. Mothers of preschoolers in the 12 states were interviewed regarding eating behavior of their children and certain family characteristics. A knowledge test was administered by trained interviewers. The mean score of the knowledge test was significantly lower for mothers from large cities with a population over 50,000 than for mothers in small cities (less than 50,000). No explanation was given for the difference in knowledge, however, it is possible that the mothers in the large cities may have been from the lower economic class and may have had less education. No difference was noted for any mothers based on their attitudes toward nutrition.

Wang (1971) did a study to assess knowledge of homemakers and 4-H youths. The ability of low versus middle-income homemakers and 4-H youths to distinguish nutrition fallacies from facts was assessed in the study. The middle-income homemakers had scores significantly higher than the low-income homemakers or the 4-H youths. Education was cited as the possible difference in scores.

Perron & Endres (1985) found no correlation among nutrition knowledge, attitudes, and dietary practices of female athletes, thus suggesting other factors besides knowledge may affect behavior. The subjects in this study were between the ages of 13 and 17 and were dependent on others for food selection and preparation.

More recent literature covering nutrition knowledge included a number of studies evaluating children's knowledge. This may be due to the development and implementation of health education programs in the school system. The child's cognitive development level is being considered in studies that test nutrition knowledge. Kalnins and Love (1982) stated that an understanding of children's concepts of health and illness are a prerequisite for health education.

Michela and Contento (1984) tested children's conceptions of nutrients and the dimensions underlying their classifications of foods into groups. It was determined that understanding of nutrients increases with a higher cognitive development level. The result, according to the researchers is the need for health education curricula that are appropriate for the age of the child.

Primary grade students were the subjects for a nutrition education study which took into consideration the children's cognitive level. Kirks, Hendricks, and Wyse (1982) administered nutrition knowledge tests to kindergarten, first, second, and third graders. The knowledge measuring instrument consisted of picture items. The kindergartners and first graders had the test read to them by the test administrator, while second and third graders read their own test. Three schools were involved, two as the experimental groups and one as the control.

Parents were involved in one of the experimental groups. Cognitive scores for kindergarten and first graders were significantly higher for children in the school with parent involvement than for children in schools without parent involvement. The investigators believed the difference may have been due to greater interaction between mother and child.

Intelligence was related to both nutrition knowledge and dietary quality in a study by Touliatos et al. (1984) who tested nutrition knowledge in ten to 13 year olds. Factor analysis was used to determine the relationships between IQ and nutrition knowledge and dietary quality. Results indicated that children with higher IQ's had more knowledge and were more likely to use the information to select the foods they ate than were the children with lower IQs.

In summary, nutrition knowledge of mothers or homemakers was tested in studies during the early 1970's. The North Central Regional Study reported in the early 1970's involved mothers in twelve States. Today, there are an increasing number of researchers investigating children's nutrition knowledge and the retention of this knowledge. In addition, the children's cognitive development level should be considered in the preparation of knowledge tests.

Health Behavior

A number of health programs have been instituted in school curricula to promote good health habits in children. The primary emphasis of the health programs is on knowledge acquisition as a means of improving health practices. Today, educators believe knowledge is a

necessary, but not a sufficient factor to bring about change in behavior. They now believe that health education must include strategies for developing good nutrition practices (Green & Iverson, 1982). In addition to developing skills, the influence of the parents on the child's health behaviors must also be considered.

Eating behaviors are an integral part of individual and family life-styles and are influenced by a variety of factors. Two of the factors which may affect a child's health habits are the parents, health beliefs and practices. Dielman et al. (1982) conducted a study to determine the relationships of health beliefs and health behaviors of parents and their children. A population sample was drawn from Washtenaw County, Michigan, for a household interview survey. How the households were selected was not documented in the report of the study. The interview included one adult member of the household. Later, the spouses of primary respondents were randomly selected and interviewed, and if the household had children between the ages of 6 and 17, one child was randomly selected and interviewed. All interviews were conducted by trained interviewers in the respondent's homes.

Index scores were constructed for parental and child health beliefs. These scores were entered, along with the demographic data in a series of multiple regression analyses. The findings indicated that the child's age was significantly related to the child's health behaviors and beliefs. There was a significant relationship between parental behavior and children's snacking and cigarette smoking behaviors.

The investigators concluded that children's health behaviors are subject to parental influences because of the visibility of the parents' actions. The parents' health beliefs do not seem to influence the children's beliefs, the reason may be that beliefs are usually communicated verbally to the children, unlike parents' behaviors that are observed by the children. The investigators concluded that it may be more effective to aim education programs toward the child using a sound cognitive component for the appropriate age rather than focusing education on the adult whose health habits were already established.

A study was done by Gordon and Haynes (1982) who believed that enlisting parents as ancillary instructors in the home would not only reinforce what the child had learned in school but might also have a positive effect on the attitudes and behaviors of the parents. The authors examined the concept of parents as ancillary instructors in a pair of parallel studies, one on smoking education and one on nutrition education. The studies were undertaken concurrently in the same school system. The focus of the report was on the nutrition aspect of the study.

Children in 20, fourth grade classes constituted the sample. Ten classes were randomly assigned to the experimental group and ten to the control group. The experimental group consisted of 255 children whose parents agreed to participate by helping their children with nutrition homework. The control group consisted of 247 parents whose children were in the school program but did not take home assigned homework. The study was conducted over a three-week period in which the children in the experimental group received help with nutrition homework from a

parent. Six months later, parents in both groups completed a one-time survey form inquiring about nutrition practices at home. Returned surveys came from 214 parents in the experimental group and 218 parents in the control group.

Gordon and Hayes hypothesized that parents involved in helping their children with nutrition homework would be more diet conscious with respect to meal preparation and eating habits of their children than parents not involved with homework assignments. Chi-square analysis was used to describe the differences between the two groups regarding the eating habits of the children and family. The results showed that parents in the experimental group were more likely to make changes in meals at home than the parents in the control groups. Further, their children were eating more of the "right foods" for breakfast and supper. More parents in the experimental group requested printed material on planning balanced meals than parents in the control groups. The authors did not differentiate between the sex of the parent nor did they indicate if the parent who helped with the homework was the same parent who filled out the questionnaire.

Gunn and Stevenson (1985) involved parents in a nutrition program for a healthy heart. Head Start parents, staff members, and teachers were the participants because they selected and prepared the food for the children in the head start program. The purpose of this study was to evaluate the possibility that the mothers, staff, and teachers could be role models for the children.

Race distribution was 47% white and 53% nonwhite. A pretest and posttest were given to participants. The program included an

introductory presentation, newsletters, and cassettes and tapes. Parents reported a gain in new knowledge about fats, salt, sugar, and exercise; this new information led to the decreased consumption of fats and an increase in exercise. The Head Start staff reported a greater change in the consumption of grains and cereals per day but less change in exercise.

Coates, Jeffery, and Slinkard (1981) conducted a study to examine the changes in eating and exercise habits of children exposed to the Heart Healthy Program. These children were all fourth grade students from one school and all fifth grade students from a second school in the same district. There were an equal number of male and female students from each school. Two grades were used in order to generalize results beyond one age group. Families included in the study were all Caucasian with educational and income levels above the national average. A time series design with multiple baselines and lagged replication was employed. Observations of eating and exercise behaviors were begun simultaneously in both schools to collect the baseline data. The overall program and 12 lessons were implemented in classroom instruction, participatory classroom activities, personal goal setting, parent handouts, feedback and reinforcement. Direct observations of eating and playground activity, as well as written tests administered before and after the program to the students were used to evaluate the program. The same procedures were later used for the follow-up. A family interview was done with randomly selected families by telephone. The respondent (usually the mother) was asked to report food eaten by each family member on the previous day.

Results indicated a decrease in heart-healthy type foods discarded at lunchtime, increased knowledge about heart-health, and an increase in consumption of heart-health foods at home by the students and family members as reported by parents (especially the mother). Changes in eating habits persisted over the four month follow-up period which spanned summer vacation.

The parents were aware of the objectives of the study and this knowledge may be responsible for the eating changes at home. This study is unusual in the sense that most school studies reviewed did not include changes in behavior but only changes in knowledge and attitude.

Health educators believe that education alone is not enough to bring about changes in behavior. In this section, the results of studies reviewed indicated that children's health behaviors are influenced by the parents. Changes in parents' health behaviors as a result of involvement in health education programs were also reported.

Intervening Variables

The intervening variables are those factors that may have an effect on the dependent variables in the study. The demographic variables for this study may have an effect on the mothers' nutrition knowledge and health behaviors. The demographic variables were divided into characteristics of the participants and characteristics of the household. The characteristics of participants included education, occupation, and work status (amount of time working). The characteristics of the household consisted of spouses' education, amount of money spent on food per week per family member, number of

family members in the household, family members living in the household with a diagnosis for CVD problems, and special diets of family members in the household. In addition, attitude toward health education and other sources of nutrition information were considered.

Eppright et al. (1970) included amount of money spent on food, number in household, and education level of mother. The significance of these variables differed according to the nutrient content of the diet and energy, however, considering nutrition knowledge, Eppright and associates found that the mother's education was highly correlated with knowledge and favorable attitudes toward nutrition. Education of the mother was more related to these components than money spent on food and number in the household.

Touliatos et al. (1984) included social class, ethnicity, family structure, number of children in the family, and maternal employment, as well as children,s age, sex and IQ. In this study the children's nutrition knowledge was tested rather than the parents'. The older children had higher nutrition knowledge which indicated that older children had more time to learn nutrition concepts. Sex of the child did not correlate with knowledge. There was a correlation between ethnicity and nutrition knowledge. The quality of the diet had no correlation with the amount of money spent on food. Both the white and non-white families had resources to provide their children with comparable diets. Family structure, number of children in the home, and maternal employment did not correlate with nutrition knowledge. Interestingly, maternal employment was related to dietary quality. The authors suggested that working mothers may compensate for their time

away from home by providing their children with proper meals. Employed and nonemployed mothers imparted comparable nutrition information to their children. The intelligence level of the children was related to their knowledge but not related to their dietary quality, again suggesting that knowledge is not enough to change behavior.

Schwartz (1975) included a report on sources of nutrition information and the type of diets the respondents were following at the time of the study. The sources were divided into categories--professional, personal, promotional, and printed materials. For professional sources the home economist and teacher were listed, while mothers were categorized under personal source. Cookbooks and magazines were prominent among printed materials. Thirty-eight percent of the respondents were on weight reduction diets. The findings did not indicate a direct relationship between weight reduction diets and nutrition education or practice.

Health education variables were tested in a study by Wilcox et al. (1981). Parents favored the implementation of health education, but did not want the teachers to be in sole control of educating their children on health matters.

Demographic variables have been included in the study. A brief discussion of studies that included information on the relationship of demographic variables and nutrition knowledge and behaviors were presented.

Summary

In this chapter, one dimension of the literature review considered the studies that led to the investigation of risk factors for CVD in

children. Four U.S. longitudinal studies conducted with children and some studies from abroad were outlined. The results of these longitudinal studies may assist health professionals in predicting which children are at risk for heart or blood vessel disease. Preventive measures through health education programs for all are being implemented in spite of the controversy over whether or not nutrition can prevent or reduce the severity for CVD. Health education programs have increased knowledge of CVD risk factors and this knowledge has been retained to some degree. Studies conducted to investigate behavioral changes indicate that the family has a strong influence on children's health behaviors. Other studies have indicated that parent involvement can encourage changes of nutrition behaviors. There are few studies on mothers' selection and preparation of food affecting the diets of school-age children. Most studies investigating the knowledge or behaviors of mothers centered around infants or preschoolers. School-age children have limited control over food selection and methods or preparations. Therefore, more studies with family involvement to influence the nutrition habits of school-age children are needed.

In Chapter IV, a description of the sample population, setting, data collecting procedure, and a health education program for this study is presented. In addition, the operational definitions of the variables, instruments, methods for data analyses, hypotheses, and subjects rights are discussed.

CHAPTER IV

Method

Introduction

This study was designed to examine if there is a difference between mothers' nutrition knowledge pertaining to cardiovascular disease (CVD) before and after their children participated in a health education program. A second purpose was to explore if children share information learned in a health education program with their mothers; and to look into whether or not mothers who receive nutrition information alter their health behaviors. A pretest-posttest design in which questionnaires are self-administered by the same group of subjects was used to examine mothers' nutrition knowledge. For statistical analysis, the paired sample t-test was used to assess if there was a difference between mothers' nutrition knowledge scores before and after their children were exposed to the nutrition information. A section with open-ended questions was included with the nutrition knowledge posttest to determine if children communicated information learned in health education classes with their mothers. In addition, mothers were asked if they altered their selection and preparation of foods. The Guttman Scale was used to analyze mothers' health behaviors, and descriptive statistics were utilized to analyze the characteristics of the sample population. A one-way ANOVA was used to determine a relationship between the characteristics of the sample population and nutrition knowledge. This study was undertaken because schools are implementing into the curriculum health education programs in which children are taught good health behaviors. Children, however,

are dependent on adult caretakers for the selection and preparation of meals.

Sample

The subjects for this study were mothers or the individuals assuming the role of mother for the fifth graders enrolled in a public school system. This school system is situated in an area populated primarily by white, middle-class families and is located in the Southeastern corner of Genesee County Michigan. Three hundred and ninety-three fifth graders were enrolled for the 1986 Winter term. All mothers of the fifth graders attending this public school system in January of 1986 were asked to participate. Mothers who responded and met the eligibility criteria were designated as the sample population. To be eligible for inclusion in the study, mothers had to meet the following criteria:

1. Be responsible for care of a fifth grader who was participating in the "Putting Your Heart into the Curriculum" program in school during February and March of 1986.
2. Have a fifth grader participating in six out of eight program sessions plus complete the two homework assignments on nutrition using AHA pamphlets.
3. Live in the same home as the fifth grader at the time of the study.
4. Be responsible for the food selection and preparation for the household.

On the pretest questionnaire, items numbered 14, 15, and 16 were used to screen the participants for inclusion in the study. In addition, school personnel provided information on children's participation in the program. If a participant's child was absent for more than two sessions of the program, that participant was excluded from the study.

Setting

The fifth grades of the school district were housed in four elementary school buildings located in different areas of the District. Twelve teachers were assigned to teach the fifth graders in this school system during the 1986 Winter term. The Assistant Superintendent was contacted in the Winter of 1985 for permission to use this school system for the study. Written permission from the school administration was received in May of the same year (see Appendix A).

In November of 1985, a meeting with the teachers was arranged to discuss the study, obtain their cooperation, present the objectives to be taught to the children, and discuss the time sequence for implementation of the objectives into the class plan. Four meetings were held, one at each school. Two principals attended the meeting along with the teachers of their schools. All four principals were supportive of the study.

Study Design

A packet containing a cover letter, postcard, and the first questionnaire were sent to the home of each fifth grader at the

beginning of the data collection process (see Appendix B for cover letter). January 1986 was selected for the first mailing to the children's home to avoid a conflict with the holiday period.

The cover letter included a description of the study, the responsibility of the participants, instructions for participation, and instructions for those participants who wished to withdraw from the study. The postcard and questionnaire were coded with the same number. Spaces for the participant's name, participants's address, elementary school attended by the fifth grader, teacher's name, and a space for the participant to request a copy of the results were also provided on the postcard. This information was necessary: 1) to be able to follow-up with the second questionnaire to the respondents who agreed to participate in the study; 2) to identify the elementary school and classroom teacher in order to separate the participants who had children in a class in which the teacher might not follow through with the study; and 3) to mail a copy of the results to those who requested it. Participants were instructed to return the postcard separately from the questionnaire. The code on the questionnaires was used to process data. The first mailing of the data collection tools was done by an individual not directly involved with the study.

Following the presentation of the program to the students, a letter of instructions (see Appendix C) and the second questionnaire with a stamped addressed envelope was mailed in April to those participants who returned the postcard and the first questionnaire. The code numbers on the postcard corresponded with the code numbers on

the second questionnaire. After the second questionnaire was returned, the items were coded for the computer and the data analyzed.

Study Interventions: Health Education Program

"Putting Your Heart into the Curriculum" (1982) was adopted by the school officials as a supplement to the school's present health education program. In the Fall of 1984, the school officials with assistance from the members of the American Heart Association conducted workshops to orient the teachers in the school system to this curriculum, and fifth grade teachers in this study participated in the workshop specifically for the fifth grade level.

For this study, the teachers were asked to keep a record of those children who were absent for more than two sessions of the health education program and to indicate if the sessions missed included the homework assignments. The objectives were taken from the AHA health education program. The topics covered in the program were as follows: 1) circulatory system; 2) CVD risk factors; 3) prevention of CVD risk factors; 4) role of saturated and polyunsaturated fats in the diet (in relationship to CVD); 5) the role of cholesterol in the diet in relationship to CVD; and 6) sensible snacks.

The program material was presented in eight classroom sessions by the regular classroom teachers. Children were instructed to complete the homework assignments by obtaining information from the individual who selects and prepares the food for the household. The children were given written materials on nutrition published by the American Heart Association to facilitate the homework assignments. Assignments were

returned to the classroom teacher. A list of the materials used as teachers' references, students resources, and for the parents can be found in Appendix D.

During February and March of 1986, the AHA materials such as pamphlets on nutrition, were presented to the students by the teachers as planned. Also available to the teachers were audio-visual aids that correspond to the curriculum through the school media center. Four dietitians from the Flint/Genesee Division of the American Heart Association of Michigan met and planned a one day presentation at each school as one of the program sessions. To prepare the presentation, the four dietitians used a copy of the knowledge test in order to cover the information pertinent to the study. For an outline of the presentation see Appendix E. The same presentation was given to the classroom teachers and students involved in the study at all four schools. Each dietitian made one presentation. The investigator remained in contact with the teachers during the time the program was presented to the children. A meeting at each school was held with the teachers at the completion of the study to discuss which materials were actually presented to the students, what methods they used to present the material to the class, and, most importantly, what materials or assignments were sent home. The teachers all stated they had followed the guidelines given to them at the first meeting.

Operational Definitions of the Variables

The two dependent variables defined for this study are nutrition knowledge and nutrition behavior. The independent variable is children's participation in the CVD program.

Children's Participation

Participation in this study referred to the children taking part in the heart health education program presented to them by their classroom teacher. Health education was a part of the regular school curriculum. The program content for this study was divided into eight sessions. The children must have participated in six of the eight sessions. Two of the eight sessions included homework assignments based on the material learned in the program. Children's participation was operationalized as the children's participation in at least six sessions of the CVD health education program in which two of the six sessions included the homework assignments.

Nutrition Knowledge

For this study, nutrition knowledge was operationalized as a set of questions that asked the participants about nutrition in relationship to cardiovascular disease or more specifically, atherosclerosis and hypertension. The questions related to fats, cholesterol, salt, snacks, and cardiovascular disease. Each of these knowledge areas was represented by several items in the knowledge section of the pretest and posttest questionnaire (Appendix F, questionnaire #2).

It was hypothesized that the following items measure the specific knowledge areas:

Saturated and unsaturated fats--items 16, 18, 25, 30, 31, 34, 39, 40.

Cholesterol--items 2, 12, 19, 20, 22, 27, 35, 37.

Salt--items 3, 4, 7, 8, 11, 13, 28, 33.

Snacks--items 1, 9, 15, 17, 21, 23, 26, 38.

Cardiovascular diseases--items 5, 6, 10, 14, 24, 29, 32, 36.

Some of the items were taken from measures found in the "Evaluation Handbook for Health Education Programs in Nutrition" published by the Department of Health and Human Resources (1983). The other items were developed from the teachers reference materials or by the investigator.

In section two of the pretest and posttest questionnaire nutrition knowledge items are numbered one through 40. For the purpose of analysis, a likert scale of four possible answers was provided for each item. A numerical value was assigned to each answer. A detailed description is included under the section entitled refinement of instruments.

Nutrition Behavior

The variable, nutrition behavior was operationalized as a combination of questions requiring YES/NO responses and open-ended questions. Nutrition behavior pertained to the selection and preparation of certain foods.

The items on the posttest questionnaire which specifically address the selection and preparation of foods are as follows: items numbered 19, 20, 21, 22, 23, 24, 27, 28, 29, 30, 31, 32. These items are in the form of conditional questions that is to say, a response to them depends on certain specified prior information or behavior. For

example, question number 19 asked, "Did the materials influence the foods you selected for the family?" If the mother did not receive the materials it would not be possible to answer the question. The items numbered 14, 15, 16, 17, 18, 25, and 26 specify the relevant conditions. Thus, the nutrition behavior section has two sets of items: those items which pertain directly to the selection and preparation of foods and those items which enable the participants to answer the questions on behavior changes. See Appendix F, questionnaire #3 for nutrition behavior items.

Intervening Variables

To obtain the intervening variables a demographic section was added to the first section of the pretest questionnaire (Appendix F, questionnaire #1). Items pertaining to common characteristics of participants that could have had an effect on the dependent variables in the study were as follows: education, occupation, and work status. The characteristics of the household, which could have had an effect on the outcome of the study were amount of money spent on food, number of family members in the household, members of the household with diagnosed CVD problems, and members of the household on special diets. Two other intervening variables on the pretest questionnaire were attitude of the participants toward health education and who should teach their children health. On the posttest questionnaire another intervening variable addressed was other sources of nutrition information entering the home during the study period.

Summary

In summary, the variable nutrition knowledge has been measured before and after the participants' children took part in a health education program. The variable nutrition behavior was measured after the participants' children took part in the program. The data were obtained from self-administered questionnaires mailed to participants before and after their children were exposed to the section of the education program focusing on nutrition as it relates to CVD. Operational definitions including intervening variables were discussed.

Refinement of Instruments

The instruments for this study consisted of two-self administered questionnaires filled out by the participants in the privacy of their own homes. The pretest questionnaire consisted of a demographic section and a knowledge test and the posttest questionnaire consisted of a list of food groups and frequency columns to check off the number of times a food item was used. Prior to the study, the instruments were administered to parents of fifth graders and to college students willing to evaluate the instruments. A pretesting of the instruments resulted in changes of the wording and formatting of some questions on the demographic section of the pretest and on the nutrition knowledge test. The nutrition behavior section required a complete change in format. A second pretesting was done on the revised instruments and no further alterations were deemed necessary.

The knowledge section for the pretest and posttest were the same test. To prevent a possible mix up of pretests and posttests, the

questionnaires were color coded as well as assigned a number code. In this section, the development, coding, reliability, and validity of the instrument are presented.

Nutrition Knowledge

A review of the literature was done to locate an acceptable tool to measure nutrition knowledge related to CVD. The "Evaluation Handbook for Health Education Programs in Nutrition" contained several measures dealing with nutrition. Only one measure, however, dealt specifically with nutrition, diet and heart disease (Sullivan & Schwartz, 1981). Most of the items for this study were taken from the measure by Sullivan and Schwartz which dealt specifically with nutrition and heart disease. Other items included in the study were taken from other measures in the handbook or developed by the investigator. Following a pretesting of the instruments, some items were reworded for clarity. The order of the questions on the knowledge questionnaires was randomly selected using a computer random selection program. The questions were designed to test the nutrition knowledge of the participants as it relates to cardiovascular disease.

There were four possible answers; definitely false, probably false, probably true, definitely true. This range of answers was utilized to measure the degree of certainty the participants had regarding CVD and nutrition. The scoring was done by assigning a numerical value to each answer. For true statements, four points were given for definitely true, three points for probably true, two points for probably false, one point for definitely false. The values are

reversed for false statements and missing responses were assigned a zero (see Appendix F, questionnaire #2).

Nutrition Behavior

The first questionnaire to test nutrition behavior consisted of a list of food groups and methods of preparation of foods. The respondents were asked to check a column to measure the frequency with which a food group was included in the diet and the frequency with which foods were prepared using a particular method. The column headings contained specific frequencies. This questionnaire was confusing and difficult for the respondents to answer. Therefore, the section on nutrition behavior for the posttest questionnaire was changed to questions requiring YES/NO responses and to a set of open-ended questions. On a second pretesting, the subjects reported no difficulties with the revised format of the instruments to measure nutrition behavior.

The scoring for the nutrition behavior questions was developed after the return of the posttest. The answers were categorized (Appendix G). For example, if a participant answered no to the question, "Did the materials influence the foods you selected for the family?" the next question asked for an explanation. The two answers given in response to why they did not change were as follows: no need to change, or following guidelines already. A "1" was assigned to no need to change and "2" was assigned to following guidelines already. For the questions on the behavior section of the posttest which required either a YES or NO answer, a YES answer was assigned a "1" and a NO answer was assigned a "2" (See Appendix F, questionnaire #3).

Data Analysis Procedure

In this section, the validity and reliability of the instruments are discussed. In addition, the analysis-techniques used to answer the research questions and describe the sample population are presented.

Reliability and Validity

For testing validity, "content validity is of most relevance to individuals designing a test to measure knowledge in a specific content area" (Polit & Hungler, 1983, p. 395). Since the instruments for this study measured mothers' nutrition knowledge, it is important that the test items represent the content that the test is designed to measure. There is no objective method to test for content validity since it is based on the judgement of individuals. Therefore, following the final draft of the instruments, the questionnaires were submitted to the thesis committee members for approval.

The reliability of an instrument refers to the degree of consistency with which the instrument measures the attribute under study (Polit & Hungler, 1983). There are several methods for estimating reliability, all of which are based on correlational techniques. In this study, reliability is understood to refer to the internal consistency of a measurement instrument, that is, the extent to which the individual items in the instrument measure the same characteristic. This type of reliability is assessed by computing Cronbach's Coefficient Alpha (Crano & Brewer, 1973).

As already mentioned, many items that are part of the nutrition knowledge test with this study were taken from the evaluation handbook. These items include numbers 3, 5, 6, 7, 8, 10, 14, 15, 16, 23, 24, 25,

29, 30, 31, 32, 36, 38, 39, and 40. In addition items 3, 7, and 40 were also taken from this instrument but a word has been added or omitted for clarity. The format for answering the nutrition knowledge section consisted of four possible answers; definitely true, probably true, probably false, and definitely false. The reliability score for the overall instrument, as presented in the handbook had yielded a coefficient of .72 for the overall knowledge test. The reliability coefficients for the three subtests included in this instrument were as follows: how foods affect the heart .45; food composition .64; and current facts versus fallacies .62. Details of items included in the subtests were not given in the handbook or in the available reference.

Other items in the nutrition knowledge section were from other instruments in the handbook that were not subject to reliability analysis such as items numbered 11, 23, 28. A third part of the two questionnaires pertaining to foods and methods of preparation were developed by the researcher.

Five subscales were identified for the present study prior to being administrated to the participants. These five subscales consisted of nutrition knowledge concerning heart disease, fats, cholesterol, snacks, and salts.

It was necessary to find out if the instruments chosen were viable for the study sample. Therefore, a reliability test (Cronbach Alpha) was run on the suggested scale and subscales. The results of the reliability test revealed low coefficients indicating that subscales were not internally consistent for the data. Further check of the data revealed general weaknesses in the instrument. Responses tended to be

similar for any given item which resulted in generally low standard deviations indicating low variability in responses. For example, not infrequently more than 80% of the participants chose the same response categories for the items resulting in highly skewed distributions. Such low variability translates into low correlation coefficients. To measure the extent of variation among response patterns to individual items. the Pearson Product Moment Coefficient was used. Given the stated problem, it was not surprising to find that most correlations did not exceed a +/-.20.

Unfortunately, since multivariate analyses, like reliability analysis and factor analysis, are all based on initial correlation matrices, they too did not yield reliable and consistent clusters of variables that formed distinct conceptual dimensions. As will be seen in the presentation of the data analysis, one particular problem that emerged was that reliability scores for the same subscales varied dramatically between the pretest and posttest. Nevertheless, five knowledge dimensions were identified; knowledge of heart disease, knowledge of snacks, knowledge of fats, knowledge of cholesterol, and knowledge of food composition.

Data Analysis and Interpretation

The data analysis was performed on five research questions and two subresearch questions. The research questions for this study were as follows:

1. Is there a difference between mothers' knowledge before and after their children participate in a health education program?
2. Do children take home materials obtained in school to their mothers?
3. Do mothers read the materials brought home by their children?
4. Do children discuss nutrition information learned in school with their mothers?
5. Do mothers who receive materials on nutrition from their children or whose children communicate nutrition information change their nutrition behaviors?

In addition, two subresearch questions included were as follows:

1. Is there an interrelationship between receiving materials, reading materials, discussing materials, and changing behaviors?
2. Is there a relationship between any of the intervening variables and nutrition knowledge?

The major hypothesis for the study is stated as follows:

Mothers' knowledge of nutrition as it relates to CVD increases when their children participate in a health education program.

Ha: $\underline{m}$ after $>$ $\underline{m}$ before

Ho: $\underline{m}$ after $\leq$ $\underline{m}$ before

To determine if there is a difference between the mean scores of measurements taken from the same sample, a paired sample t-test was

used. In this study, this test was used to examine the difference between mothers' nutrition knowledge before and after their children participated in a health program.

The meaning of a significance test in the case of convenience sampling, however, is not quite clear. Statistical significance tests indicate the probability that a test statistic obtained from a sample could have occurred by chance given the truth of a particular null hypothesis about conditions in the population. In this case, the t-test probability would indicate how likely it is to have obtained a particular difference of means in the sample when in fact, there are no differences in the population. Among the critical assumptions for applying such a significance test is that the sample subjects were chosen randomly from a larger population. Without random selection, it is not clear what the meaning of the computed probabilities is.

Descriptive statistics were used to analyze research questions two through five. The descriptive statistics included frequencies and percents.

To determine if there was an interrelationship between specific items, a Guttman Scaling Procedure was used. Four items taken from the nutrition behavior section of the posttest were hypothesized to form a Guttman Scale. The items were as follows:

1. Did your fifth grader give you any materials on nutrition published by the American Heart Association?
2. Did you read the materials?

3. Regardless of whether or not your fifth grader gave you materials from the Heart Association, did you discuss the material on nutrition learned in school?
4. Did the materials influence the foods you selected for the family?

These four questions suggest the possibility of a Guttman like response pattern. That is to say one would expect a cumulative response pattern of the following sort; mothers who indicated that they changed behavior were more likely to have read the materials that were given to them and to have discussed the information with their children. Some mothers who read the materials did not change behaviors. Mothers who did not read the materials although they received them, may have discussed questions pertaining to nutrition, but they may not have changed behaviors. Mothers not given the materials by the children obviously were unlikely to read the material or change behavior. Finally, there is the group of those who did not discuss nutrition at home, this group is unlikely to have received the materials or read the materials or changed behaviors.

The purpose of the scale is to divide the mothers into the five groups mentioned above and assign them a score from zero to four: the highest number being assigned to the group which is most likely to perform all the functions and the lowest number assigned to the group which is most likely not to perform any of the functions.

The Guttman diagram tests whether the subjects in the sample display a response pattern that allows one to rank order them into

these distinct categories. The purpose of the Guttman Scale is to find out the degree of subjects involvement in the project.

The internal consistency of the Guttman Scale can be measured by the "coefficient of scalability." The coefficient of scalability varies from zero to one and should be well above .6 if the scale is truly unidimensional and cumulative. For this study. the coefficient of scalability was .92 for the four above items.

Analysis of Intervening Variables

Descriptive statistics such as, percentages and frequencies, were used to describe the characteristics of the participants and the characteristics of the household. Frequency tables were used to organize the data by listing all the observed values of the variables being studied and the number of times each value was observed.

To explore relationships between select characteristics of the participants or their households and their nutrition knowledge, a one way ANOVA was utilized. A one way ANOVA is applied rather than the Pearson Correlation because the variables have values representing only nominal categories. The Pearson Correlation requires interval scales for both variables compared.

In summary, the paired sample t-test was used to answer the first research question which addressed the difference between mothers' nutrition knowledge before and after their children participated in a health education program. Descriptive statistics were used for research questions two through five and the Guttman Scale was utilized to explore the subresearch question pertaining to behavior. A one way ANOVA was utilized to explore relationships between select variables.

Human Rights Protection and Benefits

Permission to conduct this study was obtained from UCRIHS. See Appendix H for the approval letter from UCRIHS.

The consent form procedure for this study consisted of a cover letter explaining the study and the responsibilities of the participants. The investigator used the return of the data tools as evidence of informed consent to protect anonymity. This was explicitly stated in the cover letter. In addition, on the first page of the pretest and posttest questionnaires in capital letters was the statement:

> "I HAVE READ AND UNDERSTOOD THE DESCRIPTION OF THIS STUDY AND MY RIGHTS AS A SUBJECT. I FURTHER UNDERSTAND THAT THE RETURN OF THESE DATA MATERIALS CONSTITUTES MY INFORMED CONSENT TO PARTICIPATE."

No signature was requested.

Confidentiality was ensured by an individual not involved in the study being responsible for the mailings of the data tools to the children's homes. A postcard was enclosed with the cover letter and the first questionnaire. The purpose of the card was for the second mailing. Participants were instructed to return the cards separately from the questionnaire to protect their identity. The questionnaires were returned separately from the postcard and did not contain the subjects' signature. A stamped self-addressed envelope was enclosed for direct mailing of the questionnaire to the investigator. A coding system was used to correlate questionnaires for statistical analysis.

There were no potential risks to the subjects since the study did not involve any invasive procedures or treatments for health problems. The education program from the American Heart Association was already a part of the school's curriculum and was not being instituted for the purpose of this study.

As a result of this study, subjects may increase their nutrition knowledge as it relates to cardiovascular disease. The participants may discover that the methods used to prepare meals are as important to the practice of good nutrition as the types of foods purchased. The children of the subjects may also benefit since it was stated in the literature that children's health behaviors are influenced by their parents. The subjects may become better role models for their children by practicing good nutrition habits in the home. If children are influenced by their parents health practices, society can benefit as these children reach adulthood. This benefit to society may be a reduction in chronic cardiovascular illnesses, a decrease in health costs, and an increase in productivity.

Summary

In Chapter IV an overview of methodology and procedures were presented. The discussion included sample, data collecting procedures, operational definitions of the variables, instruments, reliability and validity, data analysis, scoring and interpretation, and human rights protection and benefits. The data are presented in Chapter V.

CHAPTER V

Data Presentation

Overview

The data presented in this chapter describes the characteristics of the study sample, the characteristics of the participants' households, nutrition behaviors of the participants, and nutrition knowledge of the participants. Comparisons of means are used to measure the difference between mothers' nutrition knowledge before and after their children participate in a health education program. Statistics to explore the mothers' health behaviors following their children's participation in the health education program are also presented. An analysis of the reliability of the nutrition knowledge instrument is given. The presentation of the data is the focus of this chapter, while an interpretation of the results of the statistical analyses and summary are presented in Chapter VI. The main research questions to be answered are as follows:

1. Is there a difference between mothers' nutrition knowledge before and after their children participate in a health education program?
2. Do children take home materials on nutrition obtained in school to their mothers?
3. Do mothers read the materials brought home by their children?
4. Do children discuss nutrition information learned in school with their mothers?

5. Do mothers who receive materials on nutrition or whose children communicate nutrition information change their nutrition behaviors?

Subresearch Questions

Two subresearch questions addressed in this study are as follows:

1. Is there an interrelationship between receiving the materials, reading the materials, discussing the materials, and changing behaviors?
2. Is there a relationship between any of the intervening variables and nutrition knowledge?

Study Sample

The subjects for this study were all mothers or individuals who assumed the role of mother for fifth graders enrolled in the participating school system. The population in this school district is predominantly white middle class. Pretest questionnaires were sent to the homes of all 393 fifth grade students enrolled in the Winter term of 1986. Twelve pretest packets were returned undeliverable, leaving a total of 381 possible subjects. One hundred thirty-nine (36.5%) mothers responded by completing the pretest questionnaire. Postcards included in the packet for the mailing of the second questionnaire were received from 129 (33.98%) subjects.

The second questionnaire was mailed to the 129 subjects and from this group 79 participated by returning the second questionnaire. Of the remaining 79 participants, five participants were eliminated because their children were absent for a substantial part of the health

education program (criteria for inclusion in the study as outlined in Chapter IV). The final sample population was comprised of 74 participants. All 74 stated that they had primary responsibility for the selection and preparation of the food for the household. Seventy-one (97.3%) of the participants were mothers, the remaining 3.7% consisted for two stepmothers and one father.

In the following section, data on demographic and other characteristics of the subjects are presented. Tables are included to clarify some of the data. The percentages shown in the tables are based on the total number of valid responses to each item rather than the total number of participants.

Descriptive Findings of the Study Sample

Fourteen (18.9%) of the participants indicated that their highest education level was high school graduate. Eight (10.8%) had trade school or nursing diplomas and 20 (27%) attended some college. Five (6.8%) completed junior college, 22 (29.7%) had BA or BS degrees, and five (6.8%) had post-graduate degrees. No participants reported less than a high school diploma. Spouse's education level was generally somewhat higher: two (2.8%) had some high school and ten (13.9%) completed high school; four (5.6%) had trade or nursing diplomas; ten (13.9%) had some college, five (6.9%) completed junior college; and 24 (33.3%) were college graduates. Seventeen (23.6%) had post-graduate degrees. Two did not respond to the question. Data for education levels of participants and their spouses are summarized in Tables 1 and 2.

Table 1: Frequencies and Percents of Participant's Education Levels (n = 74)

Education Level	Number of Responses	Percent
High school graduate	14	18.9
Trade school, diploma nursing	8	10.8
Some college	20	27.0
Junior college	5	6.8
College graduate (BS/BA)	22	29.7
Post-graduate degree	5	6.8
	74	100.0

Table 2: Frequencies and Percents of Spouses' Education Levels (n = 72)

Education Level	Number of Responses	Percent
Some high school	2	2.8
High school graduate	10	13.9
Trade school, diploma nursing	4	5.6
Some college	10	13.9
Junior college	5	6.9
College graduate (BS/BA)	24	33.3
Post-graduate degree	17	23.6
	72	100.0

Thirty-five (48.6%) of the participants reported being homemakers, 11 (15.3%) had medical, nursing, or allied health positions, ten (13.9%) held managerial or professional jobs, nine (12.5%) were working in a service occupation, four (5.6%) were in technical, or administration support positions, one (1.4%) was a laborer, and two (2.8%) were students. Two did not respond. Table 3 describes the occupational data.

Table 3: Frequencies and Percents of Participants' Occupation (n = 72)

Occupation	Number of Responses	Percent
Managerial, professional	10	13.9
Medical, nursing, allied health	11	15.3
Technical, sales, administrative support	4	5.6
Service	9	12.5
Operator, laborer	1	1.4
Student, other	2	2.8
Homemaker	35	48.6
	72	100.0

Of participants that were employed outside of the home, twenty-one (45.7%) worked part-time, 14 (30.4%) worked full-time, and 11 (23.9%) worked occasionally outside of the home.

The number of members in a household ranged from two to eight persons with a mean of 4.4 persons (Table 4). Another characteristic

Table 4: Number and Percent of Members in the Household (n = 72)

Members	Number of Responses	Percent
Two	1	1.4
Three	7	9.7
Four	34	47.2
Five	23	31.9
Six	5	6.9
Seven	1	1.4
Eight	1	1.4
	72	100.0

Mean = 4.4 persons

to describe the household is the amount of money spent on meals per family member per week which includes all household meals, lunches, and restaurant meals. One (1.4%) participant spent $5 and $9 per member and four (5.8%) participants spent between $10 and $14. Twelve (17.4%) participants indicated that they spent between $15 and $19 per family member per week. Nineteen (27.5%) spent $20 to $24 and fourteen (20.3%) spent between $25 and $29. Thirty to $34 were spent by 13 (18.8%) participants. Three (4.4%) spent between $35 and $39. Another three participants spent $40 to $44 per member per week. Five people either did not report the number of members in the family or amount of money spent on food. The mean for amount of money spent on food per

person was $23.90 and medial $22 for the 69 participants who answered both questions. Table 5 is a summary of the data.

Table 5: Amount of Money Spent on Meals Per Family Member Per Week (n = 69)

Amount of Money	Number of Responses	Percent
$ 5 - $ 9	1	1.4
$10 - $14	4	5.8
$15 - $19	12	17.4
$20 - $24	19	27.5
$25 - $29	14	20.3
$30 - $34	13	18.8
$35 - $39	3	4.4
$40 - $44	3	4.4
Mean = $23.90 Medial = $22.00	69	100.0

Forty-three (58.9%) of the participants stated that they purchased main meals at a fast food restaurant less than once per week. One to two main meals per week were purchased at a fast food restaurant by 29 (39.7%) participants. Only one participant (1.4%) indicated purchasing main meals at a fast food restaurant three or more times per week.

In answer to the question, "Has any member in the household been diagnosed with heart disease, high blood pressure, or diabetes?" 21 (29%) checked YES, 51 (71%) checked NO, and two did not respond. Fifteen (75%) of the 21 were either the mother or father of the fifth

grader. In two cases both parents were diagnosed with one of the above medical problems. Two participants indicated that both grandparents had a diagnosis of CVD or related illness, and one reported a single grandparent with a CVD problem.

Thirty (40.5%) participants stated that a member of the household was on a special diet. Forty-two (59.5%) reported no members on a special diet. Nine of the 30 (30%) were on low calorie diets with six (20%) on low salt. Two of the 30 (6.7%) were on low fat diets and four (13.3%) were on a combination low fat and low salt diet. These data are summarized in Table 6.

Table 6: Special Diets of Family Members in Household (n = 30)

Special Diet	Number of Responses	Percent
Low salt	6	20.0
Low fat	2	6.7
Low salt and low fat	4	13.3
Low calorie	9	30.0
Hypoglycemia	4	13.3
Other	5	16.7
	30	100.0

The participants were asked if they approve of health education as a regular part of the school curriculum, all 74 answered favorably. When asked who should present the health education material to the

children, two (2.7%) checked classroom teacher only, 35 (47.3%) checked teacher and health professional, and 37 (50%) wanted teacher, health professional, and parents to be involved.

In this section, the data for the demographic section on the first questionnaire were presented. The demographic data pertained only to those participants who returned the pretest and posttest questionnaires and who met the eligibility criteria.

Descriptive Statistics for Health Behaviors

Behavior changes were identified using open-ended questions and the responses were grouped into categories devised by the investigator and a number assigned to them. Tables will be used in areas where visualization may be helpful.

Materials about Nutrition

Fifty-four (75%) indicated they had received materials on nutrition published by the American Heart Association from their fifth grader. In addition, one participant stated receiving materials from a second grader and 17 (25%) of the participants did not receive the materials and two gave no response. Of the 55 participants who received the materials, 52 (92.9%) stated that they read the materials. Three (7.69%) participants looked through the materials but did not read them.

The materials were found to be interesting by all 55 of the participants who received the materials. In answer to the question "What was most interesting about the materials?" 39 of the 55 responded to the question. Fourteen (35.9%) of the 39 indicated new information

as the reason for interest in the materials. Seven (17.9%) stated that the materials were a review of previous knowledge and six (15.4%) found the information on the heart of interest. Four (10.3%) were interested in the foods that contained fats. There were two responses for each of the following categories: recipes, foods containing salt and fats, and label reading. There was one response for foods containing salt and one response for risk factor information. Altogether, a total of 39 responses were recorded for this question. A summary is presented in Table 7.

Table 7: Participants' Responses to What they Found Interesting About the Materials

(n = 39)

Interest	Number of Responses	Percent
Informative	14	35.9
Review	7	17.9
Recipes	2	5.1
Foods containing salt	1	2.6
Foods containing fats	4	10.3
Foods containing salt and fats	2	5.1
Information on label reading	2	5.1
Information on heart	6	15.4
Information on risks factors	1	2.6
	39	100.0

Influence of Materials on Food Selection and Preparation

Twenty-four (44.4%) participants stated that the material had an influence on the foods they selected for the family and 30 (55.6%) stated that they were not influenced by the materials to change the selection of food. Of the 24 who were influenced, the following changes were reported by the participants: one (4.2%) increased fruits and vegetables, three (12.5%) read labels before selecting foods, seven (29.2%) selected foods with less fat, and five (20.8%) changes selection of foods to the foods in the guidelines for preventing CVD problems. One (4.2%) selected less prepared foods, three (12.5%) selected foods with less salt and four (16.7%) fell in the "other" category (see Table 8). The "other category indicates multiple answers for the questions such as, changed selection for foods and use less prepared foods.

The reasons given for no change in behavior as a result of receiving materials were as follows: three (11.1%) participants wrote "no reason to change" and 16 participants (88.9%) wrote "follow the guidelines already."

When asked if the materials influenced the method of preparation of foods, ten (18.9%) stated yes and 43 (81.1%) stated no. Two did not answer. Of those who answered yes, the changes reported were as follows, two (18.2%) fried foods less; four (36.4%) roast, bake and broil more, two (18.2%) used less salt, and three (27.3%) used less salt and less fat. These changes are presented in Table 9. The reasons given for not changing the methods of preparation were: no reason to change, four (12.1%); following guidelines already, 29 (87.9%).

Table 8: Reported Changes in Food Selection as Result of Materials Received

(n = 24)

Change	Number of Responses	Percent
Increase fruits and vegetables	1	4.2
Read labels before selecting	3	12.5
Select foods with less fat	7	29.2
Change selection certain foods	5	20.8
Select less prepared foods	1	4.2
Avoid foods high in salt	3	12.5
Other	4	16.7
	24	100.0

Table 9: Reported Changes in Preparation of Foods as a Result of Receiving the Materials

(n = 11)

Changes	Number of Responses	Percent
Fry foods less	2	18.2
Broil and bake more	4	36.4
Use less salt and fat	3	27.3
Use less salt	2	18.2
	11	100.0

Discussion about Nutrition

Whether or not they received the AHA materials from the children, participants were asked if their child discussed the information with them. In addition, open-ended questions were used to ask if the discussion influenced their food selection and preparation.

Sixty-two (83.3%) stated that their child discussed the nutrition information with them, while 12 (16.7%) stated their children did not discuss nutrition information with them. Fifty-three (85.5%) children initiated the discussion and nine (14.5%) parents stated that they initiated the discussion. Twenty-five (41.7%) participants indicated that they changed the selection of foods for the family as a result of the discussion about nutrition. No changes were reported by 35 (58.3%). Twenty-four of the 25 reported the following changes: one person (4.2%) bought leaner meats, one began reading labels, seven (29.2%) stated that children were helping with the selection of food for the family, four (16.7%) selected food low in salt, and five (20.8%) selected less read meat. One participant indicated the use of more chicken and another stated a reduction in junk foods, while a third indicated less salt. Three (12.5%) gave a multiple answer (see Table 10). Behavior did not change for 24 (75%) who already follow the guidelines and for four (12.5%) who felt it was not necessary to make changes. Another four (12.%) felt they did not use much salt in the first place.

As a result of the discussion, 15 (24.6%) participants stated that they changed the methods of food preparation but 46 (75.4%) made no changes. Specific changes in method of preparing food (Table 11) were

Table 10: Reported Changes in Selection of Foods as a Result of Discussion Pertaining to Nutrition

(n = 24)

Changes	Number of Responses	Percent
Buy leaner meats	1	4.2
Read labels	1	4.2
Children help	7	29.2
Select foods low in salt	4	16.7
Select less red meat	5	20.8
Use more chicken	1	4.2
Less junk foods	1	4.2
Use less prepared foods	1	4.2
Combined answers of above	3	12.5
	24	100.0

reported by 13 of the participants as follows: children helped with meals, one (7.7%); broil and bake more, seven (53.8%); do not fry foods, one (7.7%); add less salt, two (15.4%); and two other participants gave multiple answers. The following reasons were given for not changing: three participants reported (9.7%) "no need to change," and 33 (90.3%) reported following the guidelines already.

Table 11: Changes in Preparation of Foods as a Result of Discussion (n = 13)

Changes	Number of Responses	Percent
Children help	1	7.7
Broil and bake more	7	53.8
Do not fry foods	1	7.7
Use less salt	2	15.4
Other	2	15.4
	13	100.0

Other Sources of Information

Participants were asked if they received information on nutrition from a source other than the fifth grader. Thirteen (21.7%) indicated magazine or newspaper articles. The categories TV programs, friends, dietitian, and physician were each selected by one participant. Forty-three (71.7%) were categorized under other which meant they checked more than one of the categories. Out of the 43, more than 30 claimed information on nutrition was obtained from a combination of magazines, newspapers, and TV. Three participants in this category included nurses as one of the sources. Fourteen did not respond.

Factor Analysis of Knowledge Subscales

The knowledge instrument used in this study was subjected to an exploratory factor analysis because of the low reliability coefficients obtained with the first set of subscales. The procedure for the factor

analysis is described and the results of the factor analysis of the knowledge instrument are presented.

The main purpose of this procedure is to identify clusters of variables to which respondents have similar response pattern. Factor analysis is a statistical procedure for reducing a large set of variables into a smaller set of variables representing common characteristics or underlying dimensions. The underlying dimensions are called factors (Polit & Hungler, 1983).

The first step in the factor analysis is the computation of a correlation matrix. The next step is to explore the data-reduction possibilities by constructing a set of new variables on the basis of interrelations found in the data. The first factor extracted accounts for the maximum amount of variance among all items subjected to the factor analysis. The following factors account for the highest possible amount of remaining variance, for example the variance is not accounted for by the previous factor(s).

The next step consists of a procedure called factor rotation. In this procedure the factors are rotated in such a way that the clusters of variables are distinctly associated with a factor, thereby enhancing interpretability. Seven possible factors were extracted from the 40 knowledge questions that comprised the knowledge instrument. The items in each factor were reviewed for common characteristics. For two factors, no meaningful common denominator could be found. Five factors were theoretically acceptable and the groups were then tested for reliability using Cronbach's Alpha. Results of the reliability test are discussed in the next section.

Based on content, factor analyses, and reliability, the knowledge subscales were identified as follows:

knowledge of heart disease: questionnaire items #5, #6, #16, #18, #25, #30, #40.

knowledge of snack foods: questionnaire items #14, #15, #23.

knowledge of fats: questionnaire items #2, #6, #12, #16, #26.

knowledge of cholesterol: questionnaire items #12, #19, #26, #27.

knowledge of food composition: questionnaire items #2, #18, #19, #20, #21, #25, #26, #27, #33, #34, #38, #39, #40.

Reliability of the Knowledge Instrument

The reliability of the knowledge instrument was measured by computing coefficient alpha (Cronbach's Alpha) for each of the subscales. Coefficient alpha is a reliability index which estimates the internal consistency or homogeneity of a measure composed of several subparts of items (Polit & Hungler, 1983). The subscale which measured knowledge of heart disease had an alpha coefficient of .73 for the pretest and .66 for the posttest. The subscale for snack foods had an alpha coefficient of .60 for the pretest and .49 for the posttest with item #8 deleted. The fat subscale had an alpha coefficient of .61 pretest and .45 on posttest. The alpha coefficient for the cholesterol subscale was .64 for the pretest and .48 for the posttest with item #35 deleted. The food composition subscale had coefficient alphas of .64 for pretest and .63 for the posttest (outlined in Table 12).

Table 12: Knowledge Subscales Including Alpha Coefficients for Pretest and Posttest

Subscale	Pretest Alpha	Posttest Alpha
Heart disease	.73 (N = 72)	.66 (N = 72)
Snack foods	.60 (N = 71)	.49 (N = 74)
Fats	.61 (N = 72)	.45 (N = 68)
Cholesterol	.64 (N = 71)	.48 (N = 70)
Food composition	.64 (N = 69)	.63 (N = 65)

The overall knowledge instrument was also tested for reliability. Thirty-nine of the 40 items of the knowledge instrument were retained and yielded an alpha coefficient of .72 with item #35 deleted.

The reliability coefficients were low due to general weaknesses in the instrument. A large proportion of participants chose the correct response category for the items resulting in highly skewed distributions. The resulting small standard deviations and low variability translate into low correlation coefficients. Under these circumstances an alpha value of about .5 may be considered acceptable.

In this section the results of the reliability tests to measure the internal consistency of the knowledge subtests were presented. The reliability for the overall knowledge instrument was also presented. In the next section, the inferential statistics are discussed.

Inferential Statistics

The Statistical Technique

The paired sample t-test is a statistical technique that can be used to evaluate the difference in mothers' nutrition knowledge scores before and after their children participate in the CVD health education program. For this study to reject the null hypothesis, the level of confidence was set at 0.05.

First Research Question

Study hypothesis: Mothers' nutrition knowledge will be increased after their children participate in a health education program.

($H_a: \underline{M}$ post $> \underline{M}$ pre)

Null Hypothesis: Mothers' nutrition knowledge will not increase when their children participate in a health education program.

($H_o: \underline{M}$ pre $\geq \underline{M}$ post)

The paired sample t-test was performed on each knowledge subscale and on the overall knowledge instrument. For the later instrument (consisting of 39 items with four response categories each) the highest possible score was 156 points. Because zero was assigned to the unanswered items, scores of one to four were assigned to the answered items. Therefore, the lowest possible score was 39.

The mean score for the overall knowledge pretest was 136.7 with a standard deviation of 8.28. The mean score for the posttest was 138.7 with a standard deviation of 8.26. The sample size was 57, therefore the degrees of freedom is 56 (N-1). As indicated earlier, to test for

the existence of a difference between pre and posttest means, a significance level of .05 was chosen. That is to say, only if the observed difference in mothers' nutrition knowledge could have occurred by chance less than five times out of 100 will the study hypothesis be accepted. Under conditions of the null hypothesis, t-values of more than 1.673 should occur in less than 5% of the samples. Given that the actual t-value computed for the sample (df=56) was 2.333, the null hypothesis is rejected and the study hypothesis that there is a real difference is accepted. The results of the paired sample t-test for the all knowledge instrument is presented in Table 13.

Table 13: Paired Sample t-test for the All Knowledge Instrument

Ho: $\underline{M}$ posttest-pretest scores 0
Ha: $\underline{M}$ posttest-pretest scores 0
P = .05
DF = N-1 (56)

	Pretest	Posttest	Pre-Post Change
Mean	136.71	138.70	1.98
SD	8.28	8.26	6.42
N	57	57	57
t-value (paired-sample)			2.333
t.05(1), 56			1.673

$p < .025$

The results of the t-tests for each of the subscales is presented in Table 14. The difference between the pretest and posttest were found significant for three of the five subscales. The differences for the fats and cholesterol subscales were not found to be significant.

Second Research Question

Do children take home materials on nutrition obtained in school to their mothers?

Seventy-five percent or 54 out of 72 participants stated that they received the materials published by the American Heart Association from their fifth grader. Twenty-five percent did not receive the materials and two participants did not respond to the question.

Third Research Question

Do mothers read the materials brought home by their children?

Fifty-two (92.9%) read the materials given to them by the children. Seven percent did not read them.

Fourth Research Question

Do children discuss nutrition information learned in school with their mothers?

Eighty-one percent or 60 out of 72 participants stated that their child did discuss nutrition information with them. Twelve participants (16.4%) did not discuss the materials with their children.

Fifth Research Question

Do mothers who receive information on nutrition or whose children communicate nutrition information change their nutrition behaviors?

Table 14: T-test Results for Five Knowledge Subscales t.05 (one-tail)

	Pretest	Posttest	Differences
Subscale Heart Disease			
Mean	26.39	26.64	.253
SD	2.00	1.87	.253
Sample	71	71	71
t-value			1.389
possible score range: 7-28			$p < .10$
Subscale Snack Foods			
Mean	11.57	11.73	.15
SD	1.00	.80	.69
Sample	71	71	71
t-value			1.892
possible score range: 3-12			$p \leq .05$
Subscale Fats			
Mean	17.14	17.23	.089
SD	2.50	2.46	2.20
Sample	67	67	67
t-value			.333
possible score range: 5-20			$p > .25$
Subscale Cholesterol			
Mean	12.92	13.17	.205
SD	2.67	2.49	2.44
Sample	68	68	68
t-value			.695
possible score range: 4-16			$p > .25$
Subscale Food Composition			
Mean	42.06	43.11	1.04
SD	4.76	5.08	3.30
Sample	63	63	63
t-value			2.512
possible score ranges: 13-52			$P < .01$

Thirty-eight out of 54 participants (70.3%) stated that they made some change in the selection and/or preparation of foods for the family. Sixteen participants (29.6%) reported no changes in nutrition behaviors. Twenty participants did not respond.

Subresearch Questions

Two subresearch questions were addressed in this study.

Subresearch Question #1

Is there an interrelationship between receiving materials, reading materials, discussing materials, and changing behavior?

To explore if mothers can be ranked-ordered according to the degree to which they were exposed to the program and in order to find out if behavior change is the result of cumulative exposure to the program, Guttman Scaling procedures were applied. The Guttman Scale can be used as means of analyzing the underlying operating characteristics of three or more items in order to determine if their interrelationships meet several special properties. Guttman Scales must first be unidimensional, that is the component items must all measure movement towards or away from the same single underlying object. Second, Guttman Scales must be cumulative. Operationally, this implies that the component items can be ordered according to some criteria of inclusion and that respondents who reply positively to a more inclusive item respond positively to a less inclusive item. While a negative response on a less inclusive item should be coupled with negative responses on more inclusive items.

In this study, the results indicated that the 22 mothers who changed their nutrition behaviors, also had received, read and discussed the materials. Twenty-three mothers answered positively to the first three items but did not change behaviors. Sixteen participants received materials or discussed them but did not read the materials or change behavior. Nine participants answered negatively to all the questions. Table 15 gives the scaling results of the research question. The items scaled perfectly yielding a cumulative rank-ordering of participants according to the degree to which they participated or were exposed to the study.

Table 15: Outline of Guttman Scaling to Determining an Interrelationship Between Materials Received, Materials Read, Materials Discussed, and Behaviors Changed

(n = 70)

Number of Participants	Scoring	+ Response	- Response
22	3	mothers received materials, discussed, read and changed	
23	2	mothers received materials, discussed, and read	no change
16	1	received, discussed	did not read no change
9	0		did not receive materials or discuss or read or change

Coefficient of Scalability = 1.0

Subresearch Question #2

Is there a relationship between any of the intervening variables and nutrition knowledge?

A one-way ANOVA was used to determine if there was a relationship between the intervening variables and the subscales of the nutrition knowledge test. Two relationships were found. There was a relationship between mothers' occupation and knowledge of food composition in the pretest ($p < .04$), however, the differences in the scores between the occupational groups were not significant for the posttest. The second relationship occurred between mothers' work status and the all knowledge pretest ($p < .04$) but again, there was no relationship found between these variables in the posttest. The one way ANOVA was also performed on the Guttman Scale with the knowledge subscales. No relationships were found.

Summary

Descriptive data were presented to describe the study population and change in behaviors. Cronbach Coefficient Alpha was used to test reliability of the nutrition knowledge test and subtest. Also in this section are presented the results of a paired sample t-test to evaluate the difference between mothers' nutrition knowledge scores before and after their children participated in a health education program.

Descriptive statistics (frequencies and percentages) were used to explore if children communicate information to their mothers about nutrition and whether the mothers alter their nutrition behaviors by changing the selection or preparation of foods. The Guttman Scale was

used to measure if mothers who received the materials from their children also read, discussed the materials, and made changes in their nutrition behaviors. Relationships between the intervening variables and nutrition knowledge were also explored.

CHAPTER VI

Summary of Findings, Interpretation, and Implications for Nursing

Introduction

In chapter VI, a summary and interpretation of the research findings are discussed. Implications for nursing education and practice along with recommendations for future research are offered.

Summary and Interpretation of Findings

Characteristics of the Study Sample

The study sample was acquired from a predominately white middle class school district in the southeastern corner of Genesee County, Michigan. Of the 74 participants who returned the questionnaires and met the study criteria, 71 were the natural mother, two were stepmothers, and one was a father.

In the following section of this chapter, the characteristics of the participants and their households are compared with those in other studies. The characteristics of the participants that were examined consisted of education, occupation, and work status.

Education levels of the participants in this study ranged from high school graduation to beyond four years of college, with 27% having some college, 29.7% having a BA/BS degree and 6.8% having a post graduate degree. Similarly, Newell, Fox, Brewer, and Johnson (1985) reported mothers' education levels ranging from less than a high school diploma to doctorate degrees. In contrast, Fox, Fryer, Lamkin, Vivian, and Eppright (1970) reported that 7% of the mothers had college degrees with high school graduation the most often reported level of education attainment and one-third of the subjects did not complete high school.

Similar to Fox et al. (1970), Emmons and Hayes (1973) reported 50% of the subjects in their nutrition study had completed high school while 14% had more education and 36% had less than a high school education. Zitter (1980) predicted that during the 1980's education levels would increase, especially for women. The subjects in the present study, along with the subjects in the Newell et al. (1985) study, did show mothers with doctoral education. Although, the difference in the mothers' education levels may be due to changing trends, it may also indicate that the mothers in this study are not representative of the general population.

The most frequently reported occupation categories in this study were as follows: 48.6% homemakers, 15.3% health related, 13.9% managerial or professional, 12.5% service (eg. waitress), and 5.6% sales or administrative support. Of those mothers who were employed, only 30% worked full time, 45.7% worked part-time, and 23.9% worked occasionally. In contrast, Emmons and Hayes (1973) reported half of the mothers in their study were employed; 72% were employed full-time and 28% part-time. Occupations of mothers were not reported. Fox et al. (1970) reported only 15% of the subjects were employed with only 60% working full-time and 40% working part-time. Occupations of the subjects were not reported. The work status of the mothers in the present study fell between the two extremes of these studies.

In this study, a one way ANOVA showed a relationship on the pretest between occupation of the mothers and knowledge of food composition. Since there was no significance noted between these two variables on the posttest, one can conclude that the participants who

scored lower in the pretest showed a gain of knowledge in the posttest. Another relationship on the pretest occurred between work status and the overall knowledge subscale. But again, there was no significant difference between work status and the overall knowledge subscale on the posttest. There is no explanation for these differences between the pretest and posttest scores other than a change in the knowledge of some of the participants. More information would be needed before a final conclusion can be drawn.

In summary, the participants in this study were highly educated with 51.4% working outside of the home; of those who did work, most of them worked part-time. In other studies, education levels varied and included subjects with less than a high school diploma. Few mothers in the Fox et al. (1970) study worked. The subjects in the Emmons and Hayes (1973) study differed from the present study in that of the mothers who worked, the majority did so full-time. A relationship between mothers' occupation and food composition was found on the pretest and a second relationship was found between work status and the overall knowledge subscale.

Characteristics of the Household

The demographic variables used to describe the characteristics of the household are as follows: spouse's education, number of people in the household, amount of money spent on food/person/week, family members on special diets, and types of diets.

Education levels ranged from some high school (2.8%) to completion of post graduate degrees (23.6%). In contrast, Fox et al. (1970)

reported that one-third of fathers did not complete high school and 17% were college graduates.

For this study, no participant reported more than eight family members. Seventy-nine percent reported four or five members with four (47.2%) cited most often. Most families in the Emmons and Hayes (1973) had four, five, or six family members (68.1%), while 7.4% of the families were smaller, 24.5% were larger, with 19.5% having seven or eight family members, and 5% having over nine family members. Fox et al (1970) reported the numbers of family members ranging from two to 16 members. The large range in the Fox et al. (1970) study of family members may be due to the large population which covered 12 states. In addition, the national average for members per household is 2.7, however, this includes household without children. Therefore, the average in this study of four members per household is considered high in comparison to the national average.

Since the data obtained for the present study included the number of family members in addition to the amount of money spent on food, the food budget per family member per week was calculated. The mean was $23.90 per week per family member and median was between $21 to $25. In 1983, published in the Michigan Statistical Abstracts for a family of four living either in Detroit or urban areas of the United States, the average amount of money spent on food per family member per week was $28. In comparison, the participants in this study spent less than the national average. Given the socioeconomic backgrounds of the participants, they should spend more than the national average. One participant reported less than $10 per member for food per week. It is

possible that the participant did not calculate the amount correctly or may have been in a different socioeconomic level than the majority of other participants.

Twenty participants reported the mother or father of a fifth grader had a diagnosed CVD problem. Thirty (41%) participants reported that family members were on special diets. A low salt diet was being followed by 20% of the 30, while 30% were on weight reduction or low calorie diets, and the other 50% were on other therapeutic diets, such as hypoglycemic. Similarly, Schwartz (1975) reported that of the subjects on special diets, 38% were on a low caloric or weight reduction diet. The data collected on this information pertained only to heart related problems for family members living in the household. The reason for obtaining this data was to determine if mothers with CVD problems in the family were more likely to change behaviors than mothers with no immediate concerns of CVD problems. With 41% of the participants preparing special diets in their home it is reasonable to conclude that participants had a high knowledge of nutrition before the study took place and, therefore, did not have a reason to change behaviors. There was no relationship found, however, between families with CVD and nutrition knowledge.

In summary, the spouses of the participants had higher education levels than fathers in another study (Fox et al., 1970). The mean number of people in the household for this study was four. The range was from two to eight members. Amount of money spent of food per family member per week was less than the national average. Twenty family members had a diagnosed CVD problem and were on a special diet.

Additional Information

In addition to the characteristics of the participants and their household, the participants were asked if they approved of health education in the school and who should teach the children. All 74 participants were in favor of health education in the school; however, only two participants felt that the classroom teacher alone should be responsible for teaching the program. Ninety-seven percent of mothers believed that a health professional along with the teacher should conduct health education in the schools. Fifty percent of the mothers stated that parents should be included in the teaching along with the teacher and health professional. Similarly, Wilsox, Gilles, Wilcox, and Reid (1981) found that the vast majority of the subjects in both the control group and experimental group supported health education. Seventy-nine percent of the parents expressed a desire to be involved with the development and carrying out of the programs, this is in contrast to the present study in which only fifty percent wanted an active part.

Participants in this study overwhelmingly reported that magazines and newspapers were the main source for nutrition information. TV was the third most frequently reported source. Few participants obtained information from dietitians or nurses. Nine reported obtaining information from a physician, although the number was low, it was still higher than for dietitians (4) or nurses (3). Sixty respondents answered the question and 43 of them listed multiple sources. The findings were similar to Schwartz (1975) and Grotkowski (1978) who also reported written materials, magazines, newspapers, and cookbooks, as

the main source of nutrition information. Grotkowski (1978) also reported physicians as a frequent source. Dietitians and nurses were not reported in these studies as a source for nutrition information.

To summarize, 100% of the participants were in favor of health education being a part of the curriculum, however, only 50% wished to be actively involved in the programs. Participants in the present study overwhelmingly reported that information regarding nutrition entered the home by magazines and newspapers. Nurses and dietitians were rarely reported as a source of information in this study and were not reported as a source in other studies.

Research Questions

Five research questions and two subresearch questions were addressed in this study. The first research question pertaining to nutrition knowledge is written in the null hypothesis form as follows:

> Mothers' knowledge of nutrition as it relates to CVD does not increase when their children participate in a health education program.

To test the hypothesis a paired sample t-test was performed. To discriminate the degree of certainty in the participants responses, the four-point scoring system was used in calculating the t-test. The t-value for the overall knowledge test was 2.333 (df 56) which was significant at the .025 level which satisfies the .05 level of significance selected for this study. Therefore, the null hypothesis is rejected. Statistically, however, the assumptions of the t-test are that the distribution of test scores in the population is normal and

the sample is random. The sample distributions of the scale variables were skewed, it is unlikely that they were drawn from a normal distribution. In addition, the lack of random sampling reduces the dependability of the significant tests. What can be said, however, is that the mean scores on the posttest were greater than those on the pretest. The participants increased their knowledge of nutrition between the time that the pretest and posttest were administered. Since the present study was not an experimental design with a control group, a number of factors can account for the gain in participants' knowledge. This could be due to the pretest-posttest design in which exposure to the material alone can increase knowledge. Other factors may be that the participants' interest was stimulated by the study or that information was obtained from other sources of material which entered the home during the study period.

The nutrition knowledge section of the questionnaire had five subscales--knowledge of heart disease, snack foods, fats, cholesterol, and food composition. Not all of the difference in the scores from the subscales were significant at the .05 level. The two subscales not significant were knowledge of fats ($p=.25$) and knowledge of cholesterol ($p=.25$).

Participants reported that magazines and newspapers are the main source of nutrition information. Many articles have been published in the past few years regarding fats and cholesterol in the diet. Therefore, one conclusion is that the participants had substantial amount of knowledge on fats and cholesterol before taking part in the study. Participants' mean scores indicated that they increased

knowledge mainly in the area of food composition. The mean scores on all the subscales indicated that a gain of nutrition knowledge between the pretest and posttest occurred. Although participants had a high knowledge level before the study, some of the participants increased their knowledge, especially in the area of food composition with a mean score of 42 for the pretest and 43.1 for the posttest. Included in the materials sent home to the mothers was pamphlet on reading labels. This pamphlet outlines the skills needed to check the compositions of foods. The data collected for the present study do not provide the information needed to determine which pamphlets had an influence on the participants.

It is difficult to compare results with other studies because some studies were conducted using a survey design and others used an experimental design. In spite of the different designs, Bernstein, Bellorado, and Bruvold (1986) used a pretest-posttest design and reported similar findings of a gain in knowledge pertaining to the heart and nutrition. A pretest-posttest design was also used by Coates, Jeffery, and Slinkard (1981). Results indicated substantial changes in knowledge about heart health and food preferences. A third study conducted by Connor et al. (1986) utilized a pretest-posttest design. The results of the Connor et al. study also indicated that there was a significant improvement in knowledge about prevention of heart disease ($t=2.85$, $df=52$, $p < .01$).

Several studies (Bernstein et al., 1986; Coates et al., 1981; Eppright et al., 1970; Kirks et al., 1982; Perron & Endres, 1985; Touliatos et al., 1984) were reviewed from the literature on nutrition

knowledge; all of the studies indicated a gain in information. The results from the present study were not inconsistent with any of the nutrition knowledge studies reviewed.

The primary purpose of the nutrition programs is to increase the amount of information which people have about nutrition. Health professionals anticipate that the more informed people are the more likely they will make good decisions in selecting and preparing meals. Although people may increase their knowledge, information alone may not be enough to cause or enable an individual to alter their nutrition behaviors. Health education materials need to contain activities designed to help individuals to develop good nutrition habits rather than just containing general information about CVD. In this study, the mothers had the knowledge prior to the study, therefore for them information alone may not be sufficient to bring about a change in nutrition behaviors.

Research Questions 2 through 5

The remaining research questions are not presented in the null hypothesis form because the questions were analyzed using descriptive statistics.

Research Question 2

Do children take home materials on nutrition obtained in school to their mothers?

Seventy-two participants answered the question pertaining to receiving AHA materials (item #14 on the nutrition behavior section of the posttest). Of these 72, 54 (75%) received materials from their children and 18 (25%) did not receive any materials. AHA materials

were provided for each child. A possible reason that materials may not have been received is that one teacher asked that the materials be returned for classroom use. Mothers with children in this classroom may not have had time to review the materials; however, only three mothers who participated in the study had children in this teacher's class. Therefore, other explanations need to be explored.

According to King's (1981) theory, perceptions and judgments of individuals are involved in every type of interaction. The children needed to perceive that the materials were important and that the materials would be of interest to their mothers. Possibly, the children of the mothers who did not receive the information may not have perceived the materials as important, or that the materials would be of interest to the mother. Thus, a transfer of the information did not take place. It is also possible that the children forgot the materials, lost them, or had other priorities.

Although, eighteen mothers did not receive the materials, 75% of the mothers did receive the materials. Therefore, it is assumed that these children perceived the information as important to their mothers and carried the information home to them.

Research Question 3

Do mothers read the materials brought home by their children?

Of the 54 participants who received the materials, 52 read them. Mothers in the study already had high knowledge of nutrition as it pertained to CVD. Also, 41% of the mothers were preparing special diets. Therefore, it can be concluded that even mothers who had prior

interest in nutrition participated in the study and were likely to read the materials.

All participants that read the materials found them interesting. Some participants indicated that the information was a good review of previous knowledge; others learned new general information; while some mothers learned specific information of fats, salt, or the heart. The mothers that read the materials, in spite of their high knowledge level, still were able to gain some new facts. This finding is important for developing programs in the future. Mothers who had previous experience with nutrition may have perceived the information as important for the purpose of updating past knowledge. In addition, participants may have other reasons for reading the materials. For example, one father sent a note to the classroom teacher in which he wrote, "as a regular contributor to the Michigan Heart Association, I am please to see how some of the funds are used to publish such booklets as you sent home with the children. There is some good information in them for people of all ages." This parent read the materials because of his financial contribution to AHA and not necessarily because he was interested in changing his health behaviors.

Research Question 4

Do children discuss nutrition information learned in school with their mothers?

More participants (83.3%) indicated that their children discussed the materials with them than indicated that they (75%) received the materials. Bernstein, Bellorado, and Bruvold (1986) asked parents if their children who were participating in a heart program discussed the

program at home. Many parents in the study responded positively and added that the children were very excited about the information they were learning. These same parents indicated that they would like to see the videotape shown to the children so they could help reinforce the concepts at home. Similar results were reported by Conner et al. (1986) who asked parents to what extent did their children talk to them about the school health program. An overwhelming 86% of parents in the Connor study reported that their child talked several times about the health program and 71% of these parents stated that the children talked specifically about the heart health education lessons. The findings from these studies support the findings in the present study that children discuss learning activities in school with their parents.

Two homework assignments were included in the study. One of the assignments asked the children to plan a meal with the person in their home who prepared the meals. Teachers involved with the study, stated that homework assignments were completed by the children. This may account for the high number of children that discussed the information with their mothers.

Research Question 5:

Do mothers who receive materials on nutrition or whose children communicate nutrition information change their nutrition behaviors?

Four items on the posttest (#19, 22, 27 and 30) asked participants if they were influenced by materials and/or discussion to change their nutrition behaviors. Responses were calculated so that each participant was counted only once since the same participant might

have indicated a change for more than one of the items. Thirty-eight (70.4%) participants indicated a positive response for at least one of the items; 16 (29.6%) participants answered with a negative response. Twenty participants did not answer the questions. Of those mothers who reported no changes, the most frequent reason given was that they were already following the guidelines.

Similar findings were reported in two other studies. Behavior changes in nutrition were reported by mothers whose children were participating in a health education program (Gunn & Stevenson, 1985). Fifty-six percent changed selection of foods by limiting salt and reducing the amount of fat. In the study, mothers received newsletters on nutrition from the school. Coates, Jeffery, and Slinkard (1981) reported that families indicated that the selection of heart healthy foods had increased as a result of their childrens' participation in a school health program.

In the following section the two subresearch questions are discussed.

Subresearch Question #1:

Is there an interrelationship between receiving the materials, reading the materials, discussing the materials, and changing behavior?

The Guttman Scaling procedure indicated that mothers who received materials were most likely to read them. This is an important finding since one purpose of this study was to determine if children could be a vehicle by which health education materials enter the home. The Guttman Scale suggests that the mothers who received the information

did read it, although they did not necessarily change behaviors. Nevertheless, regardless of whether or not the mothers changed behaviors, they did read the materials. It is possible that these mothers already followed the guidelines and read the materials because of an interest in nutrition or to reinforce their present nutrition behaviors.

Findings also indicated that mothers who only discussed the materials with their children were not as likely to change behaviors as those mothers who received the materials, read them, and discussed them with their children. Therefore, discussion alone is not enough to bring about a change in mothers' nutrition behaviors. In addition, the design for the present study did not contain a control group, therefore one can not predict that changes in behavior occurred as a result of the school program. Participants, however, specifically indicated that changes made were influenced by the AHA materials and/or discussions with their children.

To summarize, mothers who received the materials also read the materials. More mothers reported that their children discussed the program than mothers who reported receiving the materials. The results of the Guttman Scale implied that mothers who made changes in their behaviors also received the materials and read the materials. Eighteen mothers (25%) reported not receiving the materials. Since materials were provided for each child and the teachers stated that the materials were given to the children to take home, it is possible that the children of the mothers who did not receive the materials, may not have perceived the information as important. Mothers had knowledge of

nutrition as it related to CVD before participating in the study. Yet, 92% of the participants who received the materials read them. Therefore, although the mothers had knowledge, they were interested in expanding that knowledge. Thirty-eight (70.4%) mothers claimed they were influenced by the material and/or discussions with their children to make additional changes. The majority of the mothers in the study were already following the guidelines. One may conclude that those who participated in the study were interested or felt there was some benefit to practicing good nutrition.

Subresearch Question #2

Is there a relationship between any of the intervening variables and nutrition knowledge?

A one way ANOVA was used to determine if there were significant differences between the means of specific intervening variables and items included in the Guttman Scale with the mean scores of the nutrition knowledge subscales and overall knowledge test. As mentioned earlier, only two variables were found to have a relationship with nutrition knowledge; occupation of the mothers and work status. In other studies some of these variables were found to have a significant relationship. A brief review of these findings are presented in the next section.

Education levels of participants were not significantly related to nutrition knowledge in this study. Similarly, Schwartz (1975) did not find a relationship between education and nutrition knowledge. In contrast, Eppright et al. (1970) did find that the more educated the mother, the greater was her nutrition knowledge and the more favorable

were her attitudes toward nutrition and meal planning. In the Eppright study there was a very large sample population in which there was more variability of education levels. The participants in the Schwartz study had a minimum of a high school diploma which is consistent with the minimum education levels of the participants in this study. Therefore, it is possible that no relationship between education level and nutrition knowledge was found because participants with college degrees and post graduate degrees did not have any more nutrition knowledge than those participants that had a high school diploma.

There was a relationship found between occupation of the participants and nutrition knowledge in the present study. Although more than 50% of the mothers in this study were employed only a small number of mothers fell into each occupation category. The fact that the numbers were small may account for the discrepancy in which there was a positive relationship in the pretest and no relationship in the posttest. In addition, mothers' work status was related to nutrition knowledge in this study. In contrast, Touliatos, Wenberg, and Ryan (1984) did not find a relationship between nutrition knowledge and work status in which the researchers concluded that employed and nonemployed mothers appeared to have comparable nutrition knowledge. In the present study, the part-time work group in the pretest had a higher mean score than those participants in the full-time group or occasional group. The mean scores for the full-time group and occasional group increased in the posttest. One would expect that mothers who worked occasionally would have had more time to spend learning nutrition concepts than those mothers who worked full-time or

part-time. No conclusion can be drawn to explain why part-time working mothers would have more nutrition knowledge than the other two groups before the study.

Nutrition knowledge was not found to be related to nutrition behaviors in the present study. Perron and Endes (1985), Touliatos et al. (1975), and Schwartz (1975), however, did find a correlation between nutrition knowledge and nutrition behaviors. These researchers also found a correlation between nutrition knowledge and attitudes. This study did not investigate attitudes; however, attitudes need to be considered in future research studies of nutrition.

Nutrition knowledge and nutrition behaviors were not related in this study, possibly because the majority of the mothers were already following the guidelines. Although changes were reported by the mothers, the actual number of mothers who changed were small. Since these mothers already had knowledge and were following the guidelines, there may not have been too many areas left to make changes.

Summary

The participants in this study were highly educated. Of those who worked most of them did so part-time. The households of the participants differed from the national average with a higher number of members per household and with less money spent on food per person per week. Twenty-eight percent of the participants reported a family member with CVD and on a special diet. Only 50% of the participants stated they wished to be involved along with the teacher and health professional in promoting health education programs to their children.

Only three participants reported receiving nutrition information from nurses and/or dietitians, this was in addition to other sources. Magazines, newspapers, and TV were cited by the majority of the participants as the source of nutrition information entering the home.

The results of the paired sample t-test on the knowledge test and the subscales indicated that participants increased their knowledge between the pretest and posttest. Since the study was exploratory rather than an experimental study, the change in knowledge can not be attributed to the health education program. The subscale on knowledge of food composition showed the most change in mean scores between the pretest and posttest. One of the pamphlets sent home outlines the skills needed to check the compositions of foods and may have contributed to the increased mean scores on the posttest for food composition.

More mothers reported having discussed the information on nutrition with their children than those mothers who received materials. In spite of this, mothers who just discussed the materials were not as likely to have change behaviors as those mothers who received the materials, read them, and whose children discussed the information with them. This finding indicates that children can be a vehicle by which health education materials can enter the home and possibly bring about the alteration of health behaviors in family members.

There was a relationship found between occupation and nutrition knowledge and a relationship between work status and nutrition knowledge. The relationships existed in the pretest but were not

repeated in the posttest for both variables, therefore no conclusion can be drawn to explain these relationships. Future studies need to be done to measure the impact of mothers' occupations and work status on nutrition knowledge and health behaviors.

Limitations of the Study

Limitations of the study are discussed in the following section of this chapter. In this study limitations were found in the following areas: design of the study, knowledge instrument, population, and implementation of the program.

Study Design

Two different designs were integrated into the study. A one group pretest-posttest design without a control group was utilized to examine mothers' nutrition knowledge before and after their children participated in a health education program. A second design, the one-shot case design (Borg & Gall, 1983; Campbell & Stanley, 1963) also without a control group was used to explore mothers' nutrition behaviors after the program was presented to the children. Without a control group, the effect of the health education program on mothers' nutrition knowledge and/or behaviors could not be measured. These designs without a control are used for studies in which the purpose is to describe characteristics of persons, situations, or groups and the frequency with which certain phenomena occur (Polit & Hungler, 1983). Another purpose for utilization of these designs is to explore relationships between variables. The main disadvantage is that cause and effect can not be determined. Therefore, the information obtained

from this study can be used to conduct an experimental study to establish cause and effect. The experimental design is used to control the confounding variables which may bring about changes attributed to a treatment or a program. One suggestion for an experimental study would be to determine the effects of mothers' occupations and work status on nutrition knowledge and nutrition behaviors. To be an experimental study, a control group and random assignment of subjects to the experiment group will be necessary.

Knowledge Instrument

The analysis of the data showed generally low variability and low standard deviations. As a result, the interitem relatedness was also low. Since factor analysis is based on correlation matrixes, the clusters of variables did not have distinct conceptual dimensions. One possible reason for the low interitem relatedness may be that the participants possessed a strong knowledge of nutrition as it related to heart disease. The items used in this study were too easy for the mothers who participated in the present study. A more difficult instrument needs to be developed to test mothers who already have prior nutrition knowledge.

Study Sample

The sample for this study was one of convenience. The particular school site used in the study had already adopted the AHA health education program. Since the sample came from a predominately white, middle class area, the results are not generalizable to the rest of the population. The demographic data also need to be expanded to include income, marital status of the participant, spouses' occupation and age

of participants. Income and marital status were omitted from this study at the request of the school officials who felt this information was too personal. The occupation of the participant was included in the study because those working in health related fields may have entered the study with more knowledge than the average person. The number of participants employed were small and divided over a wide range of occupations. The spouses' occupation would have provided more information on the household since the father was the main supporter for the families in the study. Age of participants was not included in this study but it needs to be considered in future studies because it is a risk factor for CVD. All these variables need to be included in future studies.

Implementation of Health Education Program

A meeting was planned with the teachers prior to the start of the school year, however, the meeting did not take place until after school began. Since the curriculum had been developed for the 1985-1986 school year, the implementation of specific objectives for the program had to be arranged at the discretion of each teacher. As a result, there was a lack of unity in the presentation of the objectives to the students from one classroom to another. The teachers also altered the home assignments, some required the parents to sign the homework, others assigned the homework so that parents had to take an active part. These differences were not a concern because the participants' children were more or less evenly divided among the teachers. In spite of the changes by individual teachers, they all reported completing the

program before the second questionnaires were distributed to the participants.

In summary, the designs utilized in this study could not be used to determine cause and effect of the health education program on mothers' nutrition knowledge. The sample's homogeneity did not allow for generalizing the findings to the total population. The high knowledge level of the participants regarding CVD and nutrition prior to the children's participation, did not allow for a great enough change in scores, therefore resulting in low correlation coefficients. Finally, the inability to implement the program into the curriculum plan prior to the start of the school year resulted in some lack of unity in the presentation of information to the students.

Recommendation for Future Research

The sample in the present study resided in a predominately white, middle class area. A study including a variety of subjects in higher, middle, and low socioeconomic classes and various cultures would produce conclusions applicable to a broader population.

In spite of the participants high knowledge of nutrition and CVD, the mean scores for all the subscales showed an increase in knowledge between the pretest and posttest (difference in mean scores for all knowledge tests was 1.98). Although the increase was not significant in some of the areas, a replication of this study with participants possessing less nutrition knowledge or a study utilizing a more difficult instrument with a similar sample as this study, may reveal a greater difference between pretest and posttest scores.

The knowledge instrument used in this study may need to be refined. A larger pool of more difficult questions for each subscale administered to a number of different groups and factored, with subsequent computation of reliabilities, is recommended. The items used in this study could be rewritten to reflect knowledge related to the application of the principles of nutrition. For example, a knowledge item requiring a true or false response may be stated as follows: the consumption of fat in the diet should not exceed 30% of kcalories per day. In this way, the instrument may discriminate between those participants with a strong understanding of nutrition and those with only general knowledge.

The open-ended questions for reporting the changes in nutrition behaviors were in some instances difficult to classify due to the vague responses. It is suggested that more specific questions be formulated to measure changes in nutrition behaviors. In this way, the participants answers may be easier to categorize. In this study, if individuals did not make any changes in nutrition behavior, they consistently gave one of two answers: "no need to change" or "already follow the guidelines." A checklist for the questions which asked to explain why they did not change would also help to clarify the participant's response. For example, we do not know if the participants who answered "no need to change" did so because they were already following the guidelines or if they felt changes were unnecessary because there was no family history of CVD. In general, the respondents did not appear to have difficulty using the instrument, the difficulty was in the classifying of the open-ended questions. In

addition, the instrument in the future has to measure nutrition behaviors before and after an intervention in order to report meaningful findings.

To explore if behavior change is the result of cumulative exposure to the program, a Guttman's Scaling Procedure was used. The participants were specifically asked if changes in their nutrition behavior were influenced by the materials and/or discussion with the children. The Guttman Scale implied that mothers who received the materials also read the materials. The Scale also indicates that mothers who changed behaviors were more likely to have received the materials, read the materials, and had taken part in discussions about nutrition with the children. In addition, some mothers who did not change behavior had received the materials and read them.

Mothers who just took part in discussions pertaining to nutrition were less likely to change behavior. Future studies are needed to determine if children carrying nutrition materials home from school might have a greater influence on the mothers' behavior than if the children only verbally communicate the nutrition information.

The designs utilized in this study were for exploratory purposes. Experimental studies need to be conducted to measure the cause and effect of health education programs given to children in the schools. The study sample needs to be randomly selected. Confounding variables need to be considered such as history, maturation, and loss of participants which may bring about changes attributed to the experimental treatment. Experimenter bias may be another confounding variable that may need to be controlled. In the present study, the

investigator avoided bias by not taking part in the presentations of the program to the children. The study should not utilize a posttest-only control-group design unless the sample of subjects is large. One suggestion for an experimental study would be to use two separate school districts with similar socioeconomic characteristics. The health education program would be implemented into one district and the other would serve as a control.

The present study did not include a measure for mothers' attitudes toward nutrition. Other studies reviewed found a relationship between nutrition behaviors and attitudes toward nutrition. Therefore, future studies might include a nutrition attitude measure. In this study, no relationships were found between nutrition knowledge and each of the following variables: education, members of the family with CVD problems, types of special diets, or nutrition behaviors. Other researchers found positive relationships between nutrition knowledge and education, father's occupation, and health behaviors. A relationship between the participants' occupation and work status with nutrition knowledge was found in this study. More research is needed to explore the effects of mothers' occupation and work status with nutrition knowledge and nutrition behaviors, now that more mothers with school-aged children are entering the work force (Zitter, 1980).

Participants in the present study indicated that they felt health education in the schools should be taught by teachers and health professionals working together. Fifty percent of the participants stated that parents should also be involved along with the teacher and health professional. It is recommended that studies be carried out

to examine the effect these practices have on the promoting and changing of health behaviors in children and their families.

Children's nutrition behaviors are influenced in part by individual attitudes, knowledge, and food preferences. There are other factors that may have an influence on children's health behaviors. These factors related to family, school and community, are as follows.

Family

Important areas that need to be considered are the parents nutrition beliefs, culture, attitudes toward nutrition, and food preferences. Siblings may also be a factor in relationship to food preferences and their level in the family structure. What types of food are available in the home may be worth considering.

Another area of research which warrants investigation is the effect of step-families on changing health behaviors. Although only two participants reported being a step-mother, there may be a larger number in the population that did not respond to the study and a larger percent in the national population. Some studies have been done on these factors but not sufficiently enough to draw conclusions.

Finally, there are those individuals who did not participate and the 50 participants who returned the first questionnaire but not the second one. In some cases the parents may have planned to take part in the study but had lost the questionnaires, forgot to fill them out, or had others priorities. For these potential participants, a second reminder or mailing of another questionnaire may help. One must consider, however, the cost and the time involved in utilizing such a procedure. The present study did not have the funds or time to send a

reminder. One other possible way to gather information on nonparticipants is to randomly select a number of them for a telephone survey. This method also poses a problem since the school is not authorized to pass out telephone numbers of parents. It would also be difficult to utilize school personnel for this task. If the school administrators felt this information was important to the school, the telephone survey could be conducted.

School

In order to carry out this study, permission and cooperation from the administrators of the school were necessary. Head (1974) found more success with nutrition programs in the school when the teachers, administrators, and food service personnel were committed to the importance of nutrition education.

Four teachers involved in the present study were not eager to take part in the program, they felt that teaching health took time away from academic subjects which were their main concern. After seeing the classroom materials, these teachers decided to cooperate with the study. Some of the teachers who enthusiastically took part in the study had a CVD or their spouses had CVD. In separate studies, the teachers knowledge, attitude and beliefs, as well as personal factors are another area of future investigation. The availability of materials and quality of materials, in addition to teachers' attitudes toward health education need to be considered. Descriptive or correlational studies may be a way to explore these variables. The information obtained from such studies are of value to health agencies and organizations that publish health education materials.

School-aged children are strongly influenced by their peers. This influence increases as the child advances in school. Investigation regarding health issues such as alcohol and drugs, have been done. Nurses interested in educating children on health issues, need to review the methods used in these studies. Peer pressure and nutrition practices may be warranted for other studies. Nutrition programs, especially in relationship to specific diseases, are just beginning to be emphasized in the school health curriculum. Therefore, nurses need to conduct studies to investigate the effects these programs have on children and their family members.

Community

Factors such as economic status in the community may influence children's eating behaviors. Other biases may include the availability of certain foods, fast food restaurants and the media.

All the factors above deserve consideration for future investigating. There is, however, one more area of grave concern for health professionals and that is, what effect will encouraging teachers to assume the responsibility for health education have on the nursing and allied health professionals, especially if there is financial reimbursement for health education to children. The school may be entitled to reimbursement if health education becomes the responsibility of the classroom teacher. This is a complicated issue not addressed in the present study, but definitely needs to be investigated.

Theoretical Model

King's conceptual framework for nursing was used as the theoretical base for the study. This framework incorporates the idea that human beings are open systems interacting with the environment. In order for interaction to take place the boundaries around the systems must be permeable. In this study information transferred from each of the three systems were addressed by King. At the social level, the AHA's education materials, the teacher's personal system, the child's personal system, and the mother's personal system played a role in achieving the goal. The interpersonal system was activated when the child perceived the material as important and transferred the information to the mother. The interpersonal system in which the mother and child interact was the main focus of this study.

The findings indicate that children perceived the AHA materials as important and carried them home to their mothers. Some children also discussed the information with their mothers. In this study both verbal and nonverbal communication were utilized by the participants' children. Ninety-two percent of the mothers perceived the materials as important or interesting by reading them. As a result of either the materials and/or verbal interaction with the children, some mothers increased their knowledge of nutrition as it related to CVD, and 38 out of 54 (70%) mothers reported changes in selection and/or preparation of foods. It is suggested that King's conceptual framework be utilized in the recommended studies to test it's application more explicitly in all three systems.

Implications for Nursing

Nursing implications were derived from the findings in this study in two major areas of nursing. These two areas of nursing are as follows: education and practice.

Nursing Education

In recent years new demands on the nurse and the nursing profession have been made as a result of modern technology, changes in social attitudes, and focus of health care. Emphasis in health care has shifted from acute, episodic, hospital based care to preventive and promotive community based care. In this study, mothers reported that they received written and verbal information pertaining to nutrition and CVD from their fifth graders who participated in a health education program. In addition, some mothers reported changing the selection and preparation of foods for the family as a result of the information. Based on this finding, nurses who are responsible for the education of undergraduate and graduate nursing students, or continuing education programs for nurses, must include in curricula the skills needed for nurses to meet new demands for health promotion in the community.

Both nursing studies and practicing nurses need to promote healthy life-styles at all levels of prevention. The main focus in this study was the promotion of health at the primary level of prevention.

The first level of prevention includes activities toward decreasing the probability of illness. The mothers in this study already had the knowledge to prevent or reduce risk factors of CVD in their family members. Most of the participants had already implemented

good nutrition behaviors before participating in the study. Primary care providers need to be educated in skills to facilitate the development of effective programs within the community that provide an update of information and reinforcement of established behaviors for individuals who are already following the guidelines. For individuals who need to develop good nutrition practices, nursing students must be aware of methods used to facilitate learning, behavior modification techniques, and how to assess behavior for both adults and children.

Nurses need to be taught how to detect early signs of health problems. In the second level of prevention, the goal is early detection of disease to reduce severity. In this study, 17 participants stated that the mother or father of the fifth grader had a diagnosed CVD problem. Studies have shown that children of parents with CVD problems are at a greater risk than children of parents with no diagnosed CVD (Blumental et al., 1975). Childrens' risk to certain illnesses must be incorporated into any learning activities directed at parents.

The third level of prevention refers to rehabilitation in which an individual, after an illness, tries to return as close as possible to their previous state of health. Although this study did not focus on individuals with CVD, participants did indicate that family members were following diets to control hypertension, and other related CVD problems. Family members with health problems were taking the necessary action to maintain or improve their health. Health education programs which provide updated information and provide reinforcement

activities can be of benefit to family members who are reducing their risk to complications.

Educators of nurses may consider a clinical experience in the school system, in addition to other primary care or acute care settings, to teach students how they may take part in health promotion at various areas of the community. At the basic level, students need to have exposure to other settings in the community as well as in the acute care environment.

Student nurses in advance practice may also want to incorporate into their education program an investigation of volunteer health agencies such as AHA, and the part these agencies play in promoting health in the community. In addition, the student in an advance education program needs to continually update teaching skills and knowledge of learning theories. Skills are needed to evaluate the effectiveness of the programs implemented as part of community projects.

It may be necessary for nurse educators to motivate staff nurses to incorporate health promotion in their daily routines. Through in-service programs, staff nurses can be updated on new findings regarding the benefits of health promotion. In addition, they may need to learn new skills in order to assist an individual or group in modifying behaviors.

In the past, nursing curricula have been developed using a medical model. Today, nursing models are emphasized for developing curricula. King's model of human interaction can be useful in helping students to understand the concepts involved in working with people. One of these

concepts is perception. The concept of perception is fundamental in all human interactions. Perception is a central concept in studying human interaction that leads to a transfer of information. Each individual involved in the interaction brings to the situation their previous experiences, attitudes, and beliefs. Therefore, students must have an awareness of their own perceptions and the effect their perceptions will have on the outcome of the goals.

In addition to an understanding of perception, a functional knowledge of family dynamics is also essential to the practice of nursing, especially when the practice involves children's health. It is important for students to understand the significance of intrafamily relationships and their impact on health behaviors. More importantly, the student must recognize the family as a system and also recognize that people may interact differently with each other. King (1981) viewed human beings as open systems interacting with the environment and incorporated perception in her model. This model may provide a good theoretical base for studies to apply to health education programs.

In summary, the implications for nursing education presented are based on the findings of this study. Implications are applicable to undergraduate, graduate, and continuing education nursing programs. Nursing educators must prepare nurses to meet the new demands imposed on the nursing profession. King's concept of the perception in relationship to human interaction was also presented.

Implications for Nursing Practice

The Clinical Nurse Specialist (CNS) is a primary care provider in that the nurse serves the individual, family, and community on their first-contact with the health care delivery system. The focus of primary care is on wellness, and the promotion and maintenance of optimal health.

The role of the CNS is unique in that is can be performed in a variety of settings. Some of these settings include the community, school, home, industry, private office, clinic, and hospital. The CNS' responsibility is to increase the level of health with particular emphasis on prevention. One way this goal can be accomplished is through the participation in community health education programs.

The CNS is a member of the health care team and a member of the community, therefore, there is a dual responsibility for involvement in the community in which the school system is a major part. Teaching children good health behaviors has been a part of the school system for a number of years; however, until recently, these programs have focused on hygiene, now they are disease-oriented. This change in focus has caused concern from some teachers. During this study, teachers stated that they did not feel qualified to teach disease-oriented programs. They also stressed concern for the time required away from academic subjects to teach health. These concerns necessitate the need for nurses to act as resources for the teachers. The CNS is not only responsible for providing information to the teachers but also for helping them to understand the need for health promotion and prevention of disease. In other ways, the CNS may assist by taking an active part

in the presentation of the program, and acting as an ongoing resource to the school and teachers. In addition, the CNS involved in the school setting is also in an excellent position to promote good health behaviors to the teachers and other school personnel. One way this can be accomplished is by the CNS to act as a role model.

The health education used for this study was based on promoting good nutrition behaviors in relationship to CVD. The reason for this focus is that CVD begins early in life, although in most cases does not manifest until adulthood. Health education programs such as the AHA program, may help children to develop the skills needed to prevent or reduce their risk to CVD in the future.

There are, however, many illnesses that can be prevented or severity reduced as a result of early health promotion. Regardless of the disease specific program, the CNS can play a vital role in health education of children. The setting in which the health promotion takes place is not important, the procedure for implementing a program is basically the same.

In the following section, the role of the CNS as a coordinator of a health education program in the school system will be discussed and findings from the study will be included.

To implement a health education program, the CNS may utilize the nursing process. Assessment, planning, implementation, and evaluation are important elements in this process.

Assessment

Factors which may influence the outcome of the study must be assessed. Some factors may be the participants' past experiences with

the subject matter, concept of self, socioeconomic groups, biological inheritance, and educational background. In this study, only two relationships were found between the characteristics of the participants and nutrition knowledge; occupation of mother and work status. Other studies did find relationships with some of the other characteristics, such as education.

Another factor to be considered is the present knowledge level of the learners; in this study the learners were the fifth graders. This age group was chosen because children in this stage of development can understand abstract concepts and they are more likely to carry information home than older children. Health education programs are being implemented at all levels of development. The AHA has a program for the preschooler as well as from kindergarten through twelfth grade. Each level reflects the developmental stage of the children. Other programs are also available and it is the responsibility of the CNS to assess established programs for their appropriateness for age levels of the children. The same assessments and considerations are needed for adult programs.

If the materials presented to the children involve the cooperation of the parents, their present level of knowledge of the subject must also be assessed. In this study, the mothers had a high knowledge level of the subject before the information was presented to the children. The mothers in this study were interested in nutrition and followed the nutrition guidelines for the prevention of CVD. In spite of their good nutrition knowledge and behaviors, 70% of the mothers who received the materials and/or had discussions with their children made

some change in their present selection of preparation of foods. A program which focuses on the basic preventive measures may not be appropriate for these mothers, therefore, update information and reinforcement activities would need to be a part of the children's program.

Not all of the parents participated in the study. This does not mean, however, that these mothers did not utilize the information sent home with the children in altering their food selection and preparation. Nurses need to continue to investigate nonparticipation in studies in order to assess how these nonparticipants differ from those who participate and if the children of nonparticipants are at greater risk.

For those children who are at greater risk, a health education program implemented at each grade level may help children to learn the necessary skills for altering their own health behaviors without reinforcement from home. Seven participants in this study indicated that their children were taking an active part in the selection and preparation of family meals as a result of the program.

Another important factor is the assessment of the teachers and other school personnel's attitude toward the health education program. For example, the teachers in this study that had a CVD problem or who had a family member with a diagnosed CVD problem were eager to take part in the health education program. While other teachers felt it was an added burden to their already busy schedules. The CNS must be aware of the teachers and school officials' attitudes toward health

education programs and toward the particular disease or illness that is the subject of the program.

Planning

In planning a health education program, the CNS must coordinate the program by bringing together professionals from other disciplines. All but two of the 74 participants in the study felt that a health professional needed to be involved in presenting programs to their children. Fifty percent of the 74 parents also wanted to be involved along with the teacher and health professional. In planning a program, parent's involvement has to be considered, especially if nutrition is the topic, since children are not responsible for the selection or preparation of meals in their homes. A survey to determine how and to what extent the parents wish to participate may be taken during the assessing phase and this information used to plan the program. Parents are also role models for children and are an important part of the education process.

Teachers who were reluctant to take part in the study were impressed with the AHA materials and it was this factor that motivated some of them to implement the program in their classrooms. Therefore, the CNS needs to review the materials to be sure they are appropriate and are an asset rather than a burden to the teacher. The teachers need to be included in the review of the materials since they will be responsible for implementing the program into the curriculum. The teachers need to be aware of the information being covered in the printed and audiovisual materials. The CNS must be available to assist the teachers in learning new information. In-service training programs

can be used to introduce health education materials to the teachers. The program needs to be flexible so that teachers may incorporate them into other academic subjects, in this way, time is not taken from academic goals.

Implementation

During the implementation phase, CNS', along with other health professionals, may take an active part in presenting programs to the children. In this way, the correct information can be given since some teachers do not feel qualified and, in many cases, are not qualified to present disease-oriented programs. The CNS must be available during this phase as a resource to the teachers.

Evaluation

Evaluation of the program is very important and needs to be implemented at each step of the program starting with the assessment. The CNS is then responsible for making necessary changes in order to facilitate the process. An evaluation is also a learning process for those involved in the development and implementation of health programs, and the information from the evaluation can contribute to future endeavors.

The implications for practice has been presented in view of health education in the schools; the CNS can apply the same mechanisms to other health education situations. The focus of this study was on nutrition, however, other health related areas can be implemented using the same techniques. Primary care includes health promotion and prevention. The CNS, as a primary care provider, is in a unique position to assess, plan, organize, implement, and evaluate community

health education programs for the purpose of reducing or preventing diseases such as CVD.

Finally, one other implication of advance practice evident from the findings in this study is the sources of nutrition information entering the home. Overwhelmingly, participants reported obtaining nutrition information from magazines and newspapers. This finding suggests that nurses in advance practice need to publish. Articles by nurses relating to health issues need to be submitted to popular magazines and newspapers for the purpose of promoting healthy lifestyles.

King's Model

In this study, King's model was utilized to describe the interaction between mother and child. In practice, interaction occurs at several levels. For example, there is interaction between the nurse and the school officials, teachers, other school personnel, health professionals, children, and parents. Interactions then occurs between each of these groups. According to King (1981) interactions are reciprocal. One initiates an interaction with another, an action takes place, each person reacts to the other, and a reciprocal spiral develops in which individuals continue to interact or withdraw from the situation. If successful, information is transferred and hopefully will bring about the expected outcome. This theory incorporated the idea that human beings are open systems interacting with each other. The conceptual framework was supported by the results of this study.

To summarize, the implications for practice were presented based on the findings of this study. The role of the nurse in promoting

health life-styles through a health education program was outlined. Finally, King's model was reviewed as the theoretical base for understanding the transferring of information from one person to another.

Nurses in advance practice need to accept responsibility for health promotion and prevention in the community. Nurses also need to be aware of sources from which individuals obtain nutrition information. As indicated in this study, major sources of nutrition information were magazines and newspaper articles. Therefore, nurses need to publish as well as develop and implement health education programs.

Summary

In Chapter VI, a summary and interpretation of the research findings were presented. Limitations of the study and implications for future research were also presented. Implications for nursing education and practice were discussed. King's model of human interaction was used as the conceptual framework for this study and was included in the discussion for nursing practice. The findings in this study indicate that, in general, mothers increased their nutrition knowledge. Children did carry health education materials home to their mothers and the mothers who received the materials did read them. Finally, some mothers stated they made changes in their nutrition behaviors as a result of the AHA nutrition materials and/or discussions with their children. The findings in this study are important for nurses working with children and adults in promoting health through education programs.

LIST OF APPENDICES

APPENDIX A

Letter of Permission from School

GRAND BLANC COMMUNITY SCHOOLS
"A Tradition Of Excellence"

G-11920 South Saginaw Road • Grand Blanc, Michigan 48439 • 313 694 8211

May 16, 1985

Lorreta Nimmo
7500 Ore Knob Ct.
Fenton, Michigan 48430

Dear Lorreta,

I have received your proposed research study on Mothers' Nutrition Knowledge and Health Practice Before and After Their Children Participate in a Health Education Program. The Grand Blanc Schools are willing to cooperate with you in this project with the reservation that we have an opportunity to review and approve the final version of the questionnaire prior to mailing.

At this point your items on Family Income and Marital Status come to mind as ones which would be objectionable.

I trust this letter of approval meets your needs and I look forward to talking with you about the details of mailing and other procedures.

Sincerely,

Gary Lipe

Gary Lipe, Ph.D.
Assistant Superintendent
For Instruction

GL:gg

APPENDIX B

Cover Letter Sent with Pretest

January 21, 1986

Dear Parent,

The American Heart Association's education program for youth has been developed to help children learn good health habits that may reduce their risk of heart disease in adulthood. This program is being added to the health education curriculum currently being taught in the Grand Blanc Public School System.

I am conducting a research study involving the nutritional section of the American Heart Association program. This study will be carried out with the support of faculty from the College of Nursing, Michigan State University. The purpose of this study is to investigate nutritional knowledge and practices in the home. Mothers, or the family member responsible for selecting food and preparing meals in the homes of fifth graders are being asked to participate.

Permission to contact you has been obtained from school officials, but the decision to participate in this study is entirely yours. Participants in the study are asked to complete two questionnaires--one enclosed with this letter and a second which will be mailed in April. Each questionnaire will take approximately 20 minutes to complete. To ensure confidentiality, a signature is not requested on the questionnaires. Any publications which result from this study will involve the reporting of group scores only and individuals will not be identified. A code number is assigned for computer analysis. Stamped-addressed envelopes are provided for the return of the questionnaires. A postcard to facilitate the mailing of the second questionnaire is also enclosed.

The return of the questionnaires constitutes your consent to participate. You may withdraw from the study, without explanation, by not returning the second questionnaire. Participation in this study is independent of your child's classroom performance. Therefore, your child's grade is not dependent on your pariticipation in the study. Results will be available at the completion of the study. If you would like to receive a copy of the results, check the section provided on the postcard.

Please complete the enclosed questionnaire and postcard, and return them separately within the next week. If you have any questions, please do not hesitate to telephone me (313 629-8859) in the eveings.

Your participation in this study is greatly appreciated, and I thank you in advance for your cooperation.

Sincerely,

Loretta Nimmo

Loretta Nimmo, RN, BSN

APPENDIX C

Letter of Instructions sent with Posttest

April 10, 1986

Dear Parent:

Your fifth grader has been taking part in a health education program in which good eating habits, to reduce their risk of heart disease in adulthood, were taught. In January, you were asked to participate in a heart-nutrition study by filling out two questionnaires. The first questionnaire was returned to the College of Nursing at Michigan State University. Enclosed is the second questionnaire which consists of two sections.

The first section addresses the materials published by the American Heart Association which your fifth grader may have brought home during the past two months. The second section is a knowledge test similar to the one you received in January. Please complete both sections (three pages) of the enclosed questionnaire and return it within the next week.

To ensure confidentiality, a signature is not requested. A code number is assigned for computer analysis. A stamped-addressed envelop is provided for your convenience.

If you have any questions, please do not hesitate to telephone me (313/629-8859) in the evenings.

Your participation in this study is greatly appreciated and I thank you for your cooperation. The results of this study will be available in the Fall of this year.

Sincerely,

Loretta Nimmo

Loretta Nimmo, R.N., B.S.N

LN/jy

Enclosures

APPENDIX D

American Heart Association Materials Used for Health Education Program

List of AHA Materials Used in the Program

Teachers References	Order Number
Heart and Blood Vessels	50-006-A
Heart Drawings	76-001-A
Heart Facts	55-005-I

Student Resources

About your Heart and Diet	51-040-A
About your Heart and Bloodstream	51-031-A
Dr. Truso's Jet Powered Pedaller	64-009-J

Parent Materials

Piercing Together the Sodium Puzzle	50-065-A
Nutrition Labeling	50-040-A
The Grocery Guide	
Nutritious Nibbles	
AHA Diet	51-018-B

APPENDIX E

Outline of Presentation by Dietitians

16310 W. 12 Mile Road P.O. Box 160 Lathrup Village, Michigan 48076 313-557-9500

American Heart Association
of Michigan
A United Way Agency

Please reply to
American Heart Association of Michigan
2645 Corunna Road
Flint, MI 48503
(313) 238-2801

DATE: APRIL 9, 1986

TO: LORETTA NIMMO

FROM: FAY GANCSOS

SUBJECT: MATERIAL PRESENTED TO 5th GRADE STUDENTS, GRAND BLANC SCHOOL SYSTEM

Material Presented:

1. "Body Fuel" film

2. Mystery Box with food models

3. Flash Cards
   Cholesterol
   Saturated Fats
   Polyunsaturated Fat
   Cardiovascular
   Exercise
   Heart Disease
   Calories
   Salt = Sodium + Chloride

4. Fact Sheet with Self-Quiz

Information presented covered the following ideas:

-salt (sodium)	↓↑ sodium foods
-cholesterol	↑ cholesterol foods
-saturated fats	↑ saturated fat foods
-polyunsaturated fats	↑ polyunsaturated fat foods
-snacks	

American Heart Association
of Michigan
A United Way Agency

American Heart Association of Michigan
2645 Corunna Road
Flint, MI 48503
(313) 238-2801

DO YOU KNOW?

1) Saturated Fats
Saturated fats are found in animal products and in some hydrogenated vegetable fats.
Saturated fats raise cholesterol levels in the blood.
Cheese, butter, coconut oil, fat around meat are examples of saturated fats.

2) Polyunsaturated Fats
Polyunsaturated fats are found in liquid vegetable oils.
Polyunsaturated fats lower cholesterol levels in the blood.
Oils made from corn, cottonseed, safflower, sesame seed, soybean and sunflower seed are examples of polyunsaturated fats.

3) Cholesterol
Cholesterol is a fat-like material used in many body processes. When too much cholesterol circulates in the blood it can build up and block blood flow.
Egg yolks, liver, shrimp are examples of foods high in cholesterol.
Lean meats, fish, poultry, low fat milk are examples of foods low in cholesterol.

4) Salt
Salt is made of sodium and chloride.
Salt may raise blood pressure in some people.
Pickles, hot dogs, processed meats and potato chips are examples of foods high in salt.
Fruits, vegetables, breads, cereals, fresh meats are examples of foods lower in salt content.
Other words for salt are sodium, soda, Na+.

5) Three Tips for Healthy Hearts Are:
-Maintain ideal weight by a nutritious diet and exercise.
-Eat low fat foods like fruit, vegetables, cereals, pasta, low fat milk, low fat cheese, fish, poultry, lean meats.
-Use little salt and limit the amount of highly salted foods or processed foods.

6) Food labels can provide valuable nutrition information.
-Serving size
-Number of servings per container
-Nutrients per serving like fat, calories, carbohydrates, protein, cholesterol, sodium, and other vitamins and minerals

Ingredients are listed in order of concentration. The first ingredient has the largest content. The last ingredient has the smallest content.

TEST YOUR KNOWLEDGE

Are the following statements TRUE or FALSE?

_____ 1. Sodium and chloride is the chemical mixture we know as salt.

_____ 2. Polyunsaturated fats are found in animal products.

_____ 3. Tips for a healthy heart are maintain ideal weight, eat high fat foods, use little galt.

_____ 4. Saturated fats are found in liquid vegetable fats.

_____ 5. We maintain ideal weight by eating a nutritious diet and regular exercise.

_____ 6. The last ingredient on the food label has the smallest content.

_____ 7. The chemical symbol for sodium is Na+.

_____ 8. Too much cholesterol in the blood can build up and block blood flow.

_____ 9. Low fat milk is an example of a food high in saturated fat.

____ 10. Butter is an example of a food high in polyunsaturated fats.

1. T, 2. F, 3. F, 4. F, 5. T, 6. T, 7. T, 8. T, 9. F, 10. F

APPENDIX F

Instruments

Questionaire #1 Demographics

CODE # 1 _ _ _ _ 1-6
CARD 0 1 7
DATE 0 1 2 1 8 8 8-13

"I HAVE READ AND UNDERSTOOD THE DESCRIPTION OF THIS STUDY AND MY RIGHTS AS A SUBJECT. I FURTHER UNDERSTAND THAT THE RETURN OF THESE DATA MATERIALS CONSTITUTES MY INFORMED CONSENT TO PARTICIPATE."

SECTION ONE

14 Do you have primary responsibility for the selection of food for this household? (check one) ___ YES ___ NO

15 Do you have primary responsibility for the preparation of meals for this household? (check one) ___ YES ___ NO

16 What is your relationship to the fifth grader? _____

17 What is the highest education level you attained? (check one)
___ Less than High School
___ Some High School
___ High School Graduate
___ Trade School
___ Some College
___ Junior College Graduate
___ College Graduate (BA/BS)
___ Post-Graduate Degree

18 What is the highest education level your spouse attained? (check one)
___ Less than High School
___ Some High School
___ High School Graduate
___ Trade School
___ Some College
___ Junior College Graduate
___ College Graduate (BA/BS)
___ Post-Graduate Degree

19 What is your occupation? _____

20 If you work outside the home, do you work (check one)
___ Full time? ___ Part-time? ___ occasionally?

21 How many members are in your household? _____

22 Approximately how much money per week is spent on meals for the family (include all household meals, school lunches, and restaurant meals)? write in dollar amount $_____

Does the fifth grader in your household: (check as many answers that apply)

23 carry a lunch to school from home? ___ No ___ Sometimes ___ Every day
24 purchase school lunch? ___ No ___ Sometimes ___ Every day
25 return home for lunch? ___ No ___ Sometimes ___ Every day
26 other (specify): _____

27 Approximately how many main meals per week are purchased for the family at a fast food restaurant? (check one)
___ less than one meal per week
___ 1 to 2 meals per week
___ 3 or more meals per week.

28 Has any member of your household been diagnosed with heart disease, high blood pressure, or diabetes? (check one)
___ Yes ___ No

29 If yes, what is the relationship of the member(s) to the fifth grader? _____

30 Is any member of the household currently on a special diet, for example low salt, low fat, low calorie diet?
___ YES ___ NO

31 If YES specify type of diet: _____

32 In general, do you approve of health education programs as a regular part of a school curriculum? (check one)
___ Yes ___ NO

33 If health education is presented to the children in the classroom, who do you feel should present this information? (check one)
___1. the classroom teacher only
___2. the teacher with assistance from health professionals
___3. the teacher, health professionals and parents in a joint program
___4. no one, schools are for academics not health

Questionaire #2 Knowledge test for
Pretest and Posttest

SECTION TWO

Listed below are statements about nutrition, diet, and heart disease. For each statement, please check the box which best reflects your opinion.

Check the first box if statement is DEFINITELY FALSE
Check the second box if statement is PROBABLY FALSE
Check the third box if statement is PROBABLY TRUE
Check the fourth box if statement is DEFINITELY TRUE

	DEFINITELY FALSE	PROBABLY FALSE	PROBABLY TRUE	DEFINITELY TRUE	
EXAMPLE: A man's heart is the size of his clenched fist.					
1. Raisins, nuts, and fruits are nutritious snacks for children.					1.
2. Liver, tongue, kidneys, and sweetbreads are low in cholesterol.					2.
3. Drinking hard water may be associated with heart disease.					3.
4. Another name for table salt is sodium chloride.					4.
5. If no one in your family has a heart problem you are protected against heart disease.					5.
6. Heart disease is associated with too little fat in the diet.					6.
7. A high salt intake may be associated with high blood pressure.					7.
8. Most salt in our diet is added to food during commercial processing.					8.
9. Graham crackers are not recommended as snacks for children.					9.
10. People who are overweight have a greater chance of a fatal heart attack than people of normal weight.					10.
11. People get enough salt in their diet without adding extra salt at the table.					11.
12. Most breads and cereals are high in cholesterol.					12.
13. Table salt is not an essential mineral.					13.
14. Children taught good nutritional habits may reduce their risk of heart disease.					14.
15. The Fats, Sweets and Alcohol group provides calories but few nutrients.					15.
16. Polyunsaturated oils in the diet are better protection against heart disease than saturated fats.					16.
17. Some snacks may have a nutritional value.					17.
18. Saturated fats are found in beef, cream, and whole milk.					18.

19. Egg yolks are low in cholesterol.					
20. Shrimp is low in cholesterol.					
21. Desserts or snacks made with chocolate are high in saturated fats.					
22. It is unnecessary for healthy people to decrease their intake of cholesterol.					
23. Regular soft drinks contain a large amount of refined sugars.					
24. Hardening of the arteries (artherosclerosis) is a disease which affects only those over 55 years of					
25. White fish such as cod and haddock is lower in fat content than beef.					
26. Ice cream made with whole milk and cream is high in polyunsaturated fats.					
27. Egg whites are cholesterol free.					
28. Much of the sodium we consume comes from salt we add to foods.					
29. Being thin is a guarantee against heart disease.					
30. Saturated fats may promote an increase in the amount of cholesterol in the blood.					
31. A good way to lose weight is to eat a diet high in meat.					
32. People of normal weight do not have to exercise to protect their hearts.					
33. Condiments (such as ketchup, mustard, and soy sauce) are low in sodium.					
34. Coconut and coconut oil contain a high amount of saturated fat.					
35. Cholesterol is only present in foods of animal origin.					
36. Heart disease affects only people who overeat.					
37. Cholesterol serves no purpose in our body and should not be present.					
38. Lowfat flavored yogurt has the same fat content as whole milk.					
39. Non-dairy cream substitutes such as coffeemate, contain saturated fat.					
40. Processed meats such as sausage and salami are high in saturated fat.					

This concludes the first questionnaire. Thank you for your participation in this study. Please return the questionnaire in the envelope provided.

Questionnaire #3 Nutrition Behavior

SECTION ONE DATE

The following questions pertain to information you may have received in the past three months. Please answer the questions only in reference to the time period from February 1986 to the middle of April 1986.

14 Did your fifth grader give you any materials on nutrition published by American Heart Association? (check one)
___ YES ___ NO (go to question #25)

15 Did you read the materials? (check one)
___ YES ___ NO, Why not?

16 Did you find the materials interesting? (check one)
___ YES ___ NO

17 If yes, what was most interesting about the materials?

18 If no, why not?

19 Did the materials influence the foods you selected for the family?
___ YES ___ NO

20 If yes, in what way?

21 If no, why not?

22 Did the materials infuence the method you use to prepare foods?
___ YES ___ NO.

23 If yes, in what way?

24 If no, why not?

25 Regardless of whether or not your fifth grader gave you materials from the Heart Association, did he or she discuss the material on nutrition learned in school?
___ YES ___ NO (Go to question #33)

26 Who initiated the discussion? (check one)
___ Parent ___ Child

27 As a result of the discussion, did you change the selection of foods for your family?
___ YES ___ NO

28 If yes, in what way?

29 If no, why not?

30 As a result of the discussion, did you change the methods used to prepare foods for your family?
___ YES ___ NO

31 If yes, in what way?

32 If no, why not?

33 During the past three months have you obtained information on nutrition from any source other than your fifth grader? (check as many responses that apply)

___ Magazine articles
___ Newspaper articles
___ TV Programs
___ Radio
___ Nurse
___ Friends
___ Community groups
___ Dietician
___ Physican
___ Other, specify: _____

APPENDIX G

Categories for Scoring Nutrition Behaviors

CATEGORIES for NUTRITION BEHAVIORS

Item #17: Reasons given for finding materials interesting.

1=informative
2=review
3=recipes
4=foods containing salt
5=foods containing fats
6=foods containing salt and fats
7=information on label reading
8=information on heart
9=information on risk factors

Item #18: Reasons given for not finding the materials interesting.

1=information not new.
2=feel not applicable to family

Item #20: The way in which materials influenced the foods selected for the family.

1=increase fruits and vegetables
2=read labels before selecting foods
3=select foods with less fat
4=change selection of certain foods
5=select less prepared foods
6=avoid foods high in salt
7=other

Item #21: Reasons materials did not influence the foods selected for the family.

1=no reason to change
2=follow guidelines already
3=other

Item #23: Way materials influenced the methods used to prepare foods.

1=less fried foods
2=roast and bake, broil
3=use less salt and less fat in cooking
4=use less salt in cooking

Item #24: Reasons materials did not influence the methods used to prepare foods.

Same as for Item #21

Item #28: Reasons given for changing the selection of foods as a result of discussion.

1=buy leaner meats
2=reading labels
3=children help in selection
4=selected foods low in salt
5=select less red meat
6=use more chicken
7=less junk food
8=use less prepared foods
9=other

Item #29: Reasons given for not changing the selection of food as a results of discussion.

Same as Item #21

Item #31: Reasons given for changing the preparation of foods as a result of discussion.

1=children help to prepare meals
2=broil and bake more
3=do not fry foods
4=use less salt
5=other

Item #32: Reasons given for not changing preparation of food as a results of discussion.

Same as #21.

Item #33: Other sources of nutrition information.

1=magazine/newspaper articles
2=TV programs
3=radio
4=nurse
5=friends
6=community
7=dietician
8=physician
9=other

APPENDIX H

Study Approval Letter from UCRIHS

MICHIGAN STATE UNIVERSITY

UNIVERSITY COMMITTEE ON RESEARCH INVOLVING
HUMAN SUBJECTS (UCRIHS)
238 ADMINISTRATION BUILDING
(517) 355-2186

EAST LANSING • MICHIGAN • 48824-1046

September 3, 1985

Ms. Loretta Nimmo
College of Nursing

Dear Ms. Nimmo:

Subject: Proposal Entitled, "Is There A Relationship Between Mothers' Nutritional Knowledge And Health Practices Before And After Their Children Participate In A Health Education Program?"

I am pleased to advise that I concur with your evaluation that this project is exempt from full UCRIHS review, and approval is herewith granted for conduct of the project.

You are reminded that UCRIHS approval is valid for one calendar year. If you plan to continue this project beyond one year, please make provisions for obtaining appropriate UCRIHS approval prior to September 3, 1986.

Any changes in procedures involving human subjects must be reviewed by the UCRIHS prior to initiation of the change. UCRIHS must also be notified promptly of any problems (unexpected side effects, complaints, etc.) involving human subjects during the course of the work.

Thank you for bringing this project to my attention. If I can be of any future help, please do not hesitate to let me know.

Sincerely,

Henry E. Bredeck
Chairman, UCRIHS

HEB/jms

cc: Dr. Barbara Given

LIST OF REFERENCES

LIST OF REFERENCES

American Heart Association. (1986, August 25). Update dietary recommendations for healthy Americans. Dallas, TX: American Heart Association.

Anderson, R. (1983). How have people changed their health behavior? Health Education Journal, 42(3), 82-86.

Arlin, M. (1979). Controversies in nutrition. Nursing Clinics of North America, 14(2), 199-213.

Baranowski, T. (1985). Methodologic issues in self-report. Journal of School Health, 55(5), 179-182.

Bartholomew, K., & Vogel, J. (1985). Educating children about health and illness. Patient Education Newsletter, 8(5), 1-3.

Berenson, G.S., Cresanta, J.L., & Webber, L.S. (1984). High blood pressure in the young. Annual Review of Medicine, 35, 535-560.

Bernstein, L.R., Bellorado, D., & Bruvold, W. (1986, June/July). Evaluation of a heart health education curriculum for preschoolers, parents, and teachers. Health Education, 14-17.

Birch, L.L., (1980). The relationship between children's food preferences and those of their parents. Journal of Nutrition Education, 12(1), 14-18.

Blomquist, K.B. (1986, June/July). Modeling and health behavior: Strategies for prevention in schools. Health Education, 8-10.

Blumenthal, S., Jesse, M.J., Hennekens, C.H., Klein, B.E., Ferrer, P.L., & Gourley, J.E. (1975). Risk factors for coronary artery disease in children of affected families. The Journal of Pediatrics, 87, 1187-1192.

Borg, W.R., & Gall, M.D. (1983). Education research (4th ed.). New York: Longman.

Brill, E.L., & Kilts, D.F. (1980). Foundations for nursing, (p. 84). New York: Appleton-Century-Crofts.

Bruhn, J.G., & Parcel, G.S. (1982). Current knowledge about the health behavior of young children: A conference summary. Health Education Quarterly, 9, 142-163.

Burdine, J.N., Chen, M.S., Gottlieb, N.H., Peterson, F.L., & Vacalis, T.D. (1984). The effects of ethnicity, sex, and father's occupation on heart health knowledge and nutrition behaviors of school children: The Texas youth health awareness survey. The Journal of School Health, 54,(2), 87-90.

Burt, J.V., & Hertzler, A.A. (1978). Parental influence on the child's food preference. Journal of Nutrition Education, 10(3), 127-128.

Carter, E.A., & McGoldrick, M. (1980) The family life cycle: A framework for family therapy. New York: Gardner Press.

Clarke, W.R., Schortt, H.G., Leaverton, P.E., Connor, W.E., & Lauer, R.M. (1978). Tracking of blood lipids and blood pressures in school age children: The Muscatine study. Circulation, 58(4), 626-634.

Coates, T.J., Jeffery, R.W., & Slinkard, L.A. (1981). Heart healthy eating and exercise: Introducing and maintaining changes in health behaviors. American Journal of Public Health, 71, 15-23.

Connor, M.K., Smith, L.G., Fryer, A., Erickson, S., Fryer, S., Drake, J. (1986). Future fit: A cardiovascular health education and fitness project in an after-school setting. The Journal of School Health, 56(8), 329-333.

Connor, S.L., & Connor, W.E. (1984). In A. Velazquez & H. Bourges (Eds.), Genetic factors in nutrition (p. 137-153). New York: Academic Press, Inc.

Contento, I. (1981). Children's thinking about food and eating: A Piagetian-based study. Journal of Nutrition Education, 13(1), S86-S90.

Cook, J., Altman, D.G., Moore, D.M., Topp, S.G., & Holland, W.W. (1973). A survey of the nutritional status of school children. Britain Journal of Preventive Social Medicine, 27, 91-99.

Crano, W., & Brewer, M. (1973). Principles of research in social psychology (p. 228-231). New York: McGraw-Hill.

Cronbach, L.J. (1951). Coefficient alpha and the internal structure of tests. Psychometrika, 16(3), 297-334.

Dailey, C.P. (1985). Teaching parents and children preventive health behaviors. Family & Community Health, 7(4), 34-43.

Dielman, T.E., Leech, S., Becker, M.H, Rosenstock, I.M. Horvath, W.J., & Radius, S.M. (1982). Parental and children health beliefs and behavior. Health Education Quarterly, 9, 60-77.

Enos, W.F., & Beyer, J.C. (1955). Pathogenesis of coronary disease in American soldiers killed in Korea. JAMA, 158, 912.

Eppright, E.S., Fox, H.M., Fryer, B.A., Lamkin, G.H., Vivian, V.M. (1970). The North Central Regional study of diets of preschool children: 2. Nutrition knowledge and attitudes of mothers. Journal of Home Economics, 62(5), 327-332.

Eppright, E.S., Fox, H.M., Fryer, B.A., Lamkin, G.H., Vivian, V.M. (1970). The North Central Regional study of diets of preschool children: 3. Frequency of eating. Journal of Home Economics, 62(6), 407-410.

Evans, R.I., & Hall, Y. (1978). Social-psychologic perspective in motivating changes in eating behaviors. Journal of the American Dietetic Association, 72, 378-383.

Fox, H.M., Fryer, B.A., Lamkin, G.H., Vivian, V.M., & Eppright, E.S. (1970). The North Central Regional study of diets of preschool children: 1. Family environment. Journal of Home Economics, 62(4), 241-245.

Frank, G.C., Berenson, G.S., Schilling, P.F., & Moore, M.C. (1977). Adapting the 24-hour recall for epidemiologic studies of school children. Journal of the American Dietetic Association, 71, 26-30.

Frank, G.C., Voors, A.W., Schilling, P.E., & Berenson, G.S. (1977). Journal of the American Dietetic Association, 71, 31-35.

Frank, G.C., Berenson, G.S., & Webber, L.S. (1978). Dietary studies and the relationship of diet to cardiovascular disease risk factor variables in 10-year-old children: The Bogalusa heart study. The American Journal of Clinical Nutrition, 31, 328-340.

Gillespie, A.H. (1981). A theoretical framework for studying school nutrition education programs. Journal of Nutrition Education, 13(4), 150-152.

Gillespie, A.H., & Yarbrough, P. (1984). A conceptual framework for communication nutrition. Journal of Nutrition Education, 16(4), 168-171.

Gillum, R.F., Prineas, R.J., Sopko, G., Koga, Y., Kubicek, W., Robitaille, N.M., Bass, J., & Sinaiko, A. (1983). Elevated blood pressure in school children -- prevalence, persistence, and hemodynamics: The Minneapolis children's blood pressure study. American Heart Journal, 105, 316-321.

Glueck, C.J., & Connor, W.E. (1978). Diety-coronary heart disease relationships reconnoitered. The American Journal of Clinical Nutrition, 31, 727-737.

Gordon, L.V., & Hayes, D.K. (1982). Parental participation in nutrition education homework. Journal of the American Dietetic Association, 81, 445-448.

Green, L.W., & Iverson, D.C. (1982). School health education. Am. Rev. Health, 3, 321-338.

Grotkowski, M.L., & Sims, L.S. (1978). Nutritional knowledge, attitudes, and dietary practices of the elderly. Journal of the American Dietetic Association, 72, 499-506.

Gunn, B.A., & Stevenson, M.L. (1985). Food, fun, and fitness: Nutrition education for a healthy heart. Journal of Home Economics, 77(2), 17-21.

Guthrie, H.A. (1978). Is education not enough? Journal of Nutrition Education, 10(2), 57-58.

Hahn, D.B. (1982). The Malden studies: The first experimental research project in school health education. Health Education, 53, 8-9.

Halfon, S.T., Eisenberg, S., Tamir, D., & Yechezkiel, S. (1983). Risk factors for heart disease among Jerusalem school children: Preliminary findings. Preventive Medicine, 12, 421-429.

Harrison, G.G., Sanchez, P., Mac, P.A., & Young, C.M. (1969). Public health nurses' knowledge of nutrition. Journal of the American Dietetic Association, 55, 133-139.

Harrison, J. (1986, April). Wellness curriculum developed for Michigan's school children (special report). Michigan Medicine, 148-153.

Hataway, H., Raines, J.L., & Weinsier, R.L. (1984, May). Nutrition: Its ever-increasing role. Family & Community Health, 22-35.

1986 Heart Facts (1985). Dallas, TX: American Heart Association.

Head, M.K. (1974). A nutrition education program at three grade levels. Journal of Nutrition Education, 6, 56-59.

Holcomb, J.D., Carbonari, J.P., Weinberg, A., & Nelson, J. (1981). Evaluation of a comprehensive cardiovascular curriculum. The Journal of School of Health, 330-335.

Holcomb, J.D., Carbonari, J.P., Nelson, J., & Wylie, L. (1982). The evaluation of a cardiovascular school health curriculum: An assessment of long-term cognitive retention and attitudinal correlates. The Journal of School Health, 378-382.

Hussey, C.G., & Hirsh, A.M. (1983, April). Health education for children. Topics in Clinical Nursing, 22-28.

Iverson, D.C. (1981). Promoting health through the schools: A challenge for the eighties. Health Education Quarterly, 8(1), 6-10.

Iverson, D.C. (1982). Issues related to designing and conducting school health education research. School Health Research, 50-56.

Kalinss, I., & Love, R. (1982). Children's concepts of health and illness and implications for health education: An overview. Health Education Quarterly, 9, 8-19.

Keltner, B., & Gillett, P. (1984). Family structure. Journal of Nursing Education, 23(8), 361-363.

King, I.M. (1981). A theory for nursing: Systems, concepts, process. New York: John Wiley & Sons.

Kirks, B.A., Hendricks, D.G., & Wyse, B.W. (1982). Parent involvement in nutrition education for primary grade students. Journal of Nutrition Education, 14(4), 137-140.

Kolbe, L.J., Iverson, D.C., Kreuter, M.W., Hochbaum, G., & Christensen, G. (1981, May/June). Propositions for an alternate and complementary health education paradigm. Health Education, 24-30.

Kolbe, L.J., & Newman, I.M. (1982). The role of school health education in preventing heart, lung, and blood diseases. School Health Research, 15-21.

Koster, M.K. (1983, April). Self-care: Health behaviors for the school-age child. Topics in Clinical Nursing, 29-40.

Laskarzewski, P., Morrison, J.A., Khoury, P., Kelly, K., & Glatfelter, L., Larsen, R., & Glueck, C.J. (1980). Parent-child nutrient intake interrelationships in school children ages 6 to 19: The Princeton School District study. The American Journal of Clinical Nutrition, 33, 2350-2355.

Lasser, N.L. (1981). Nutrition and the prevention of coronary heart disease. In C.B. Arnold (Ed.), Advances in disease prevention Vol. 1 (p. 134-221). New York: Springer.

Lauer, R.M., Connor, W.E., Leaverton, P.E., Reiter, M.A., & Clarke, W.R. (1975). Coronary heart disease risk factors in school children: The Muscatine study. Journal of Pediatrics,86(5), 697-706.

Lauer, R.M., Clarke, W.R., & Beaglehole, R. (1984). Level, trend, and variability of blood pressure during childhood: The Muscatine study. Circulation, 69(2), 242-249.

Lenfant, C. (1984). The place of school health education in research within the programs of the National Heart, Lung, and Blood Institute. School Health Research.

Levy, R.I. (1984). Causes of the decrease in cardiovascular mortality. The American Journal of Cardiology, 54, 7C-13C.

Lewis, C.E., & Lewis, M.A. (1982). Children's health-related decision making. Health Education Quarterly, 9, 129-141.

Maurer, K.M. (1984). The national evaluation of school nutrition programs: Program impact on family food expenditures. American Journal of Clinical Nutrition, 40, 448-452.

McGinnis, J.M. (1981). Health problems of children and youth: A challenge for schools. Health Education Quarterly, 8(1), 11-14.

McNamara, J.J., Molot, M.A., Stremple, J.F. (1971). Coronary artery disease in combat casualties in Vietnam. JAMA, 216, 1185-1187.

Michela, J.L., & Contento, I.R. (1984, Spring). Spontaneous classification of foods by elementary school-aged children. Health Education Quarterly, 11(1), 57-76.

Miller, J.R., & Janosik, E.H. (1980). Family focus care. New York: McGraw-Hill Co.

Mullen, P.D. (1981). Children as a national priority: Closing the gap between knowledge and policy. Health Education Quarterly, 8(1), 15-24.

Murray, M., Swan, A.V., Enock, C., Johnson, M.R.D., Banks, M.H., & Reid, D.J. (1982). The effectiveness of the Health Education Council's "My Body" school health education project. Health Education Journal, 41, 126-130.

Nader, P.R., Sallis, J.R., Atkins, C., Patterson, T., & Abramson, I. (1986). San Diego family health project: Reaching families through the schools. The Journal of School Health, 56(6), 227-230.

Natapoff, J.N. (1982). A developmental analysis of children's ideas of health. Health Education Quarterly, 9, 34-35.

Newell, G.K., Fox H.M., Brewer, W.D., & Johnson, N.E. (1985). Strategies to improve nutrition knowledge and food behavior of mothers. Journal of Nutrition Education, 17(1), 10-14.

Olson, J.C., & Sims, L.S. (1980). Assessing nutrition knowledge from an information processing perspective. Journal of Nutrition Education, 12(3), 157-161.

Okuni, M., Hayashi, K., Kiryu, S., Yamauchi, K. (1980). Risk factors of artheroscleosis in Japanese children. Japan Circulation Journal, 44, 69-75.

Parker, F.C., Croft, J.B., Supik, J.D., Webber, L.S., Mac, D., Hunter, S., & Berenson, G.S. (1986). Factors associated with adolescent participation in a cardiovascular risk factor assessment program. Journal of School Health, 56(1), 23-28.

Perron, M., & Endes, J. (1985, May). Knowledge, attitudes, and dietary practices of female athletes. Journal of the American Dietetic Association, 85, 573-576.

Porth, C. (1982). Pathophysiology (p. 112). Philadelphia: Lippincott.

Puska, P., Varitianen, E., Pallonen, U., Salonen, J.T., Poyhid, P., Koskela, K., & McAlister, A. (1982). The North youth project: Evaluation of two years of intervention on health behavior and CVD risk factors among 13 to 15 year old children. Preventive Medicine, 11, 550-570.

Richmond, F. (1980). A political perspective on the diet/heart controversy. Journal of Nutrition Education, 12(4), 186-187.

Roush, R.E. (1980). Cardiovascular disease and diet. Health Education, 23-27.

Schoenrich, E.H. (1974). The potential of health education in health services delivery. Health Services Reports, 89, 3-7.

Schwartz, N.E. (1975). Nutritional knowledge, attitudes, and practices of high school graduates. Journal of the American Dietetic Association, 66, 28-31.

Scipien, G.M., Barnard, M.U., Chard, M. A., & Phillips, P. J. (1975). Comprehensive pediatric nursing (p.156-167). New York: McGraw-Hill.

Sessa, E.J. (1985). Starting young with good health habits. Business & Health, 2(9), 15-17.

Shannon, B., Marbach, E.S., Graves, K., & Sims, L.S. (1981). Nutrition knowledge, attitudes, and teaching effectiveness of K-6 teachers. Journal of Nutrition Education, 13(4), 145-148.

Spadley, B.W. (1975). Contemporary community nursing (p. 38). Boston: Little, Brown & Co.

Staff. (1985). The 1984 report of the Joint National Committee on Detection, Evaluation and Treatment of High Blood Pressure. Nurse Practitioner, 10(7), 9-31.

Staff. (1984). School health education. National Center for Health Education, 2, 16-20.

Stern, M.P., Farquuhar, J.W., Maccoby, N., & Russell, S.H. (1976). Results of a two-year health education campaign on dietary behavior. Circulation, 54(5), 826-832.

Stunkard, A.J., & Waxman, M. (1981). Accuracy of self-reports of food intake. Journal of the American Dietetic Association, 79, 547-551.

Touliatos, J., Lindholm, B.W., Wenberg, M.F., & Ryan, M. (1984). Family and child correlates of nutrition knowledge and dietary quality in 10 - 13 year olds. The Journal of School Health, 54(7), 247-249.

Trevor, B. (1979, April). The American Heart Association and heart health in the young. The Journal of School Health, 196-197.

Von Behren, P.A., & Lauer, R.M. (1977). The significance of blood pressure measurements in childhood. Medical Clinics of North America, 61(3), 487-493.

Walsh, F. (1982). Normal family processes. New York: Guilford Press.

Wang, V.L. (1971). Food information of homemakers and 4-H youths. Journal of the American Dietetic Association, 58, 215-218.

Wilcox, B., Gillies, P., Wilcox, S., & Reid, D. (1981). Do children influence their parents' smoking? An investigation of parental smoking behavior and attitudes to health education. Health Education Journal, 40, 5-10.

Witschi, J.C., Singer, M., Wu-Lee, M., & Stare, F.J. (1978, April). Family cooperation and effectiveness in a cholesterol-lowering diet. Journal of the American Dietetic Association, 72, 384-389.

Wolfgang, J., & Dennison, D. (1982, April). An investigation of cardiovascular disease risk factors in an adolescent population. The Journal of School Health, 218-221.

Zar, J.H. (1974). Biostatistical analysis. New Jersey: Prentice-Hall.

Zitter, M. (1980). Demographics for the 1980's. Journal of Nutrition Education, 12(2), 94-96.