KATEREGGA, CRESCENTIA NAMALWA

A FOLLOW-UP EVALUATION OF THE EFFECTS OF THE MICHIGAN EXPANDED FOOD AND NUTRITION EDUCATION PROGRAM ON HOMEMAKERS' DIETARY ADEQUACY: IMPLICATIONS FOR FUTURE MANAGEMENT

Michigan State University PH.D. 1981

A FOLLOW-UP EVALUATION OF THE EFFECTS OF THE MICHIGAN EXPANDED FOOD AND NUTRITION EDUCATION PROGRAM ON HOMEMAKERS' DIETARY ADEQUACY: IMPLICATIONS FOR FUTURE MANAGEMENT

by

Crescentia Namalwa Kateregga

A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Department of Adult and Continuing Education

1981

DEDICATION

In memory of my grandparents who passed away during the course of my studies, and in honor of my family for their patience, support, understanding, and emphasis on hard work.

ABSTRACT

A FOLLOW-UP EVALUATION OF THE EFFECTS OF THE MICHIGAN EXPANDED FOOD AND NUTRITION EDUCATION PROGRAM ON HOMEMAKERS' DIETARY ADEQUACY: IMPLICATIONS FOR FUTURE MANAGEMENT

By

Crescentia Namalwa Kateregga

The importance of building evaluation into educational programs as a means of improving their effectiveness and efficiency cannot be overemphasized. This research was undertaken as part of a larger evaluation project to generate information that could be used in management decision-making for the Expanded Food and Nutrition Education Program (EFNEP) in Michigan.

The central focus of this study was to assess whether or not the dietary adequacy improvements that occurred during the program are sustained after homemakers have left the program. Four research questions guided this exploratory study: (1) Do homemakers in Michigan who participate in EFNEP improve their diets while in the program and do they maintain those improvements for six months or more after they have left the program? (2) To what extent are length of participation and entry dietary adequacy level related to dietary adequacy changes? (3) Is there a relationship between entry dietary adequacy level and subsequent dietary adequacy changes and selected demographic variables? and, (4) How do the homemakers perceive their dietary changes?

A longitudinal evaluation research design with a 3 x 4 factorial format was used to answer these questions. Eighty-six former EFNEP participants from four randomly selected Michigan counties formed the population for the study. The homemakers, who had been enrolled in and left the program during the period 1974 to 1978, had participated in EFNEP for an average of two years and had left the program for an average of one year prior to the time of the follow-up study. Secondary data from program records and original data from a follow-up questionnaire administered as part of the larger evaluation project provided the data for the study.

The results of the investigation indicate that, on the whole, the program had a positive impact on homemakers' diets and that improvements were sustained after the homemakers left the program. However, the results also demonstrated that the program did not affect all participants the same way. Homemakers who had the poorest diets at time of enrollment benefited the most from the program, while homemakers whose initial dietary scores were high tended to show only slight improvements during and after the program or had a dramatic decrease in their scores.

With the exception of education, the researcher was unable to identify any significant relationship between the entry dietary adequacy level of the homemaker and selected demographic variables (i.e., age, education, monthly income,

participation in food stamp program, and per capita food expenditure). Nor were dietary changes that occurred during and after the program related to these demographic variables.

The homemakers had very positive perceptions of their dietary changes and of the program in general. Homemakers who reported that the program benefited them had a higher overall dietary adequacy change at the time of the follow-up survey than did those who reported no benefits from the program.

In summary, the available evidence from this exploratory study suggests that entry dietary adequacy level could be a useful decision-making tool at program enrollment. However, this finding poses a challenge for policy makers and program managers who may have to decide who should be offered EFNEP educational services and what types of programs might be the most effective for homemakers with different entry dietary adequacy levels.

More focused and carefully controlled research is needed to determine the relationships between entry dietary adequacy level, subsequent dietary adequacy changes, and length of participation. Additional research is also needed on the other effects of the program. Such studies would aid managers in allocating scarce program resources to best serve the needs of low-income families for nutrition education and could be used to enhance the effectiveness of the program.

ACKNOWLEDGMENTS

The production of a dissertation represents the cooperation, encouragement, insights, labor, and patience of many people. They all deserve special appreciation that can only be inadequately expressed in words. Nonetheless, I am indebted to the many people who were instrumental in the development of this study and whose efforts made this dissertation possible.

I would like to thank Dr. Carroll Wamhoff, my academic advisor and chairman of my doctoral committee, for his esteemed counsel, guidance, and encouragement throughout my program. His comments and suggests on the manuscript were very valuable. A very special thanks to Dr. Mary Andrews, who directed the study, for her inspiration at the beginning of the study and for her expertise, detailed criticism on the manuscript, and untiring interest as the research developed. I am also greatly obliged to the other members of my committee. Dr. Ben Bohnhorst, Dr. Howard Hickey, and Dr. Linda Nelson each in their unique way contributed so much to my program of study and the present research.

Many thanks are also extended to the following people. Dr. Larry Lezotte, Gabriella Belli, and Nancy Maihoff for their interest in this study and their ingenuity and

assistance in analyzing the data; Nancy Lee Radtke and Kay J. Kay for editing the manuscript and clarifying poor communication; and Nancy Lee Radtke and Catherine Moehring for their typing services.

My research grew out of data collected as part of an Expanded Food and Nutrition Education Program evaluation project. I therefore would like to express my sincere gratitude to Linda Nierman, Associate Program Director, who gave me the opportunity to participate in the project and who willingly shared information and literature about the program. Many thanks also to the Michigan EFNEP staff for their cooperation, assistance, and interest. Mary Kerr, who was in charge of the project, collected and processed the data and was always willing to answer my many questions as well as to show me many kindnesses. Margaret L. Bucklin, Extension Home Economist for Ingham County, and her staff helped me to study the organization and operation of the program in the field.

This study would not have been possible without the help of the study participants, whom I would like to thank for their willingness to share their knowledge and insights with us. Sincere thanks also to all of the EFNEP directors in the country who responded to my requests and sent me EFNEP literature.

Although I cannot mention everyone personally, my heartfelt appreciation to my friends and fellow students for our

self-teaching experiences. Their kindness and support, sometimes during difficult times, are hereby gratefully acknowledged.

I am grateful to the Food and Agricultural Organization of the United Nations and to the Ugandan Government for awarding me the fellowship that made it possible for me to continue with my studies. My thanks also go to the Michigan State University Graduate Assistantship Program, P.E.O. International Scholarship Fund, Altrusa International Foundation, Sage Foundation, and the Gower family for their financial assistance during my doctoral program.

TABLE OF CONTENTS

LIST OF TABLES

Table | Page

LIST OF FIGURES

Chapter I

INTRODUCTION

There is a growing belief that evaluation research is essential for program management. Only with continuous and extensive scrutiny of program outcomes can educators ensure that the educational programs they design are feasible and efficient and that these programs serve their audiences effectively. This has become particularly crucial in light of limited program resources and the recent emphasis on program accountability.

Many educational programs have operated under the assumption that providing their target populations with the necessary knowledge, attitudes, and skills would result in desired long-term behavior changes. Simmons (1976) noted that questions about how much learners manage to retain or improve the skills they have acquired are seldom asked. Yet the answers to these questions are essential if we are to develop effective programs.

The present study dealt with the above concerns as they relate to a specific program in the area of nutrition education. The Expanded Food and Nutrition Education Program (EFNEP), which is sponsored and administered by the Cooperative Extension Service of the United States Department of

Agriculture, is a national nutrition education program concerned with improving the nutritional status of low-income families in the United States. This research was part of a larger evaluation study of the long-term impact of Michigan EFNEP. The dietary adequacy changes of former EFNEP participants in four Michigan counties were assessed in an effort to gain information that can be used to guide future EFNEP management decisions.

Statement of the Problem

In general, programs that adopt nutrition education as a strategy for combating malnutrition seek to provide their target populations with nutrition knowledge and skills and to change attitudes so as to enable individuals to attain and maintain an adequate diet. Although some success has been achieved in this direction, there is still concern about the effectiveness of nutrition education programs in achieving long-term changes in participants' nutrition behavior.

Whitehead (1970) suggested that most nutrition education programs have had a limited impact on malnutrition despite the tremendous amount of time, money, and other resources that have been allocated to them. He cited as evidence the continuing presence of malnutrition in audiences already reached by nutrition education programs.

The exact causes of the failure to effect changes in nutrition behavior are not well understood, partly because not all nutrition education programs have been evaluated. Where evaluations have occurred, the usual practice has been to evaluate short-term changes in knowledge, attitudes, and skills immediately after the educational process rather than evaluating long-term changes in nutrition behavior. Because of this, there is a gap in our understanding about the long-term effectiveness of nutrition education.

Ex post evaluation is one area of evaluation research that addresses questions related to the long-term effectiveness of educational programs. This research

> is carried out some time after program implementation. It is intended to assess program effects and impact and aims at obtaining information on (1) the effectiveness of the program in achieving its stated objectives and (2) the self-sustaining character of the changes resulting from the program (UNESA, 1978, p. 9).

Gadgil (1955), Simmons (1976), and others have pointed to the growing need for long-term evaluation studies.

Like other nutrition programs, the Expanded Food and Nutrition Education Program has traditionally emphasized the acquisition of nutrition knowledge, skills, and attitudes in an attempt to change the nutrition behavior of its clientele. Numerous evaluation studies at the county, state, and national levels have shown that the 11 year old program, which began in 1969, has had a remarkable educational impact in terms of

achieving short-term changes in nutrition behavior. However, as EFNEP moves into its second decade of operations, a number of questions have arisen:

- To what extent have the behavior changes effected during the program become self-sustaining?

- What will be the future direction of the program as changes occur in its socio-economic environment and the needs of its clientele?

- How can EFNEP reach the millions of families who live at the poverty level? In 1976, 86 percent of the potential audience remained untouched and an estimated 1.8 million families were expected to enter the poverty level each year.

- How can EFNEP respond to the severe economic constraints imposed by rising operating costs and limited appropriations? Program accountability has become particularly important at a time when there is intense competition among agencies and institutions for scarce financial resources.

To meet the challenges posed by these questions, EFNEP must expand its evaluation research to include evaluations of the long-term effects of the program. The information gained from such evaluations can play a vital role in EFNEP decision-making.

Purpose of the Study

The present study is part of a larger evaluation project aimed at examining the overall impact of Michigan EFNEP on participating homemakers and their families. Although the study shared the same general goal as the larger project, its central goal was to assess EFNEP's impact on the dietary adequacy level of participating homemakers.

The primary objectives of the study were

- To determine whether or not dietary adequacy (as measured by a 24-hour food recall) changed during the program and whether or not changes were maintained for six months or more after participants left the program, and,
- To assess the relationship between dietary adequacy changes and certain selected variables (entry dietary adequacy level and length of time in program).

The secondary objectives of the study were

- To examine available descriptive data in order to identify homemakers' perceptions of their dietary adequacy changes, and
- To explore the relationship between demographic variables and entry dietary adequacy level and between these variables and subsequent dietary adequacy changes.

Conceptual Framework

The systems approach was chosen as the most appropriate conceptual framework for investigating the effects of the EFNEP intervention program and for gaining knowledge about the relationships among the various variables selected for the study. It was also seen as the most useful tool for generating feedback information that can be used to improve program operations. (See Chapter II for a discussion of the systems approach.)

EFNEP was considered as a system that strives to attain its goal-state (i.e., to improve the nutritional status of low-income families). It is an open and dynamic system that interacts with other programs (each representing its own system) and that is influenced by its physical and socio-economic environment. Examining the influence of other programs and the outside environment was beyond the scope of this study, although it is important to be aware of these external influences when evaluating the effectiveness of the program.

The major components of the ENFEP educational system are inputs, processes, and outputs (see Figure 1). In the EFNEP educational system, the inputs considered for this study were the homemaker and her family. Two categories of input variables were identified: (1) the personal characteristics of the homemaker (age, education, and

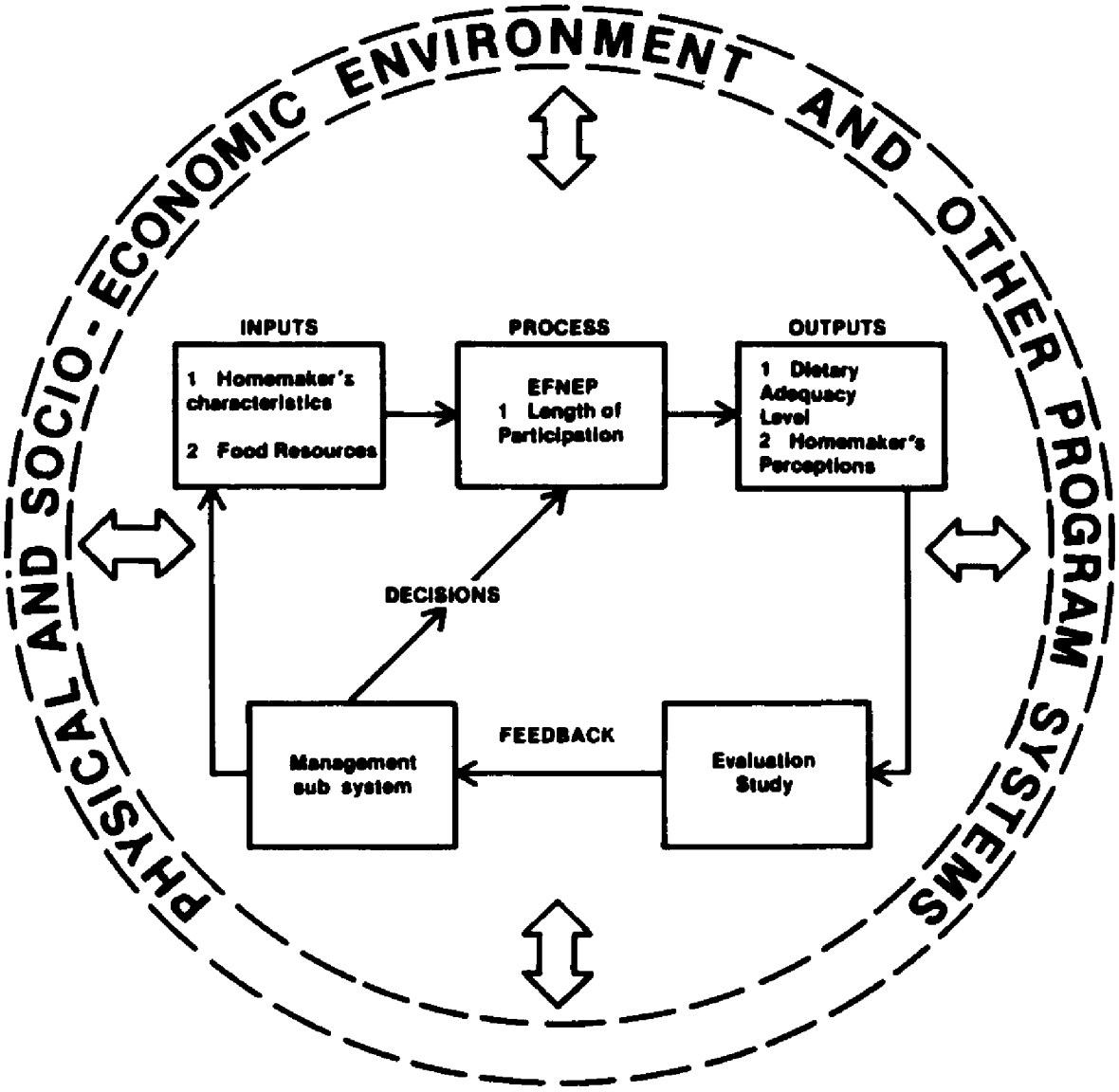

Figure 1. A Conceptual Model for the Study

entry dietary adequacy level) and (2) family food resources (family monthly income, family per capita food expenditure, and participation in a government food stamp program).

The planning, design, and implementation of the educational program form the process component of the EFNEP system. There are, of course, many variables that are related to the effectiveness of the process component, but only length of participation was considered for this study.

The specific output variables considered for the study were changes in the homemakers' food consumption behavior at the time they left the program and at the time of the follow-up study. These changes were measured by using dietary adequacy scores based on the 24-hour food recall.

The input and process variables were treated as independent variables in the EFNEP system, while the output variables were selected because earlier studies had indicated that they were important. However, since the data on the extent of their importance were inconclusive, Michigan EFNEP wished to gain more information about their influence.

As this was an exploratory study with limited numbers of subjects in the sub-categories of each variable, no formal hypotheses were generated for testing. Instead, the research was guided by the following questions:

Primary Questions

- Do EFNEP homemakers improve their diets while enrolled in the program and do

they maintain those improvements for six months or more after they leave the program?

- To what extent are length of participation and entry dietary adequacy level related to dietary adequacy changes that occur during the program and six months or more after the homemakers have left the program?

Secondary Questions

- Is there a relationship between entry dietary adequacy level, any subsequent dietary adequacy changes, and certain demographic characteristics?
- What are the homemakers' perceptions of their dietary changes and how do their perceptions coincide with changes in their dietary adequacy scores?

Significance of the Study

In the absence of other ex post evaluation studies in Michigan, the present study was broad and exploratory in nature. At this preliminary stage, the findings can only be tentative. However, the potential significance of the study is fourfold:

- Insights gained from the study may help to guide future management of EFNEP and to improve program efficiency and effectiveness by targeting program

resources to the most needy.

- As a pilot ex post evaluation study, the study can indicate the main trends in food consumption behavior change, point out some of the gaps in our information about this area, and identify areas in which further research is needed.
- The study's findings will add to the body of knowledge about changes in the food consumption behavior of EFNEP participants, particularly those in Michigan.
- Information gained from the study can be applied to other adult education programs, especially those which work with similar clientele.

Assumptions

The study was based on the following assumptions: (1) the 24-hour food recall is a valid and reliable instrument for estimating dietary adequacy at various points of time; (2) the subjects acquired the cognitive food and nutrition knowledge, attitudes, and skills taught in EFNEP so that they could change their food consumption behavior; (3) the servings reported by homemakers are comparable in size to those used in the Recommended Dietary Allowances (RDA) as designated by the Food and Nutrition Board of the National Research Council at the National Academy of Sciences; (4) if a homemaker's diet changes, it is likely that the diet

of the homemaker's family changed as well; and, (5) secondary data collected by the nutrition aides during the program are reliable and valid.

Operational Definition of Terms

Contact. Learning session conducted with the homemaker by the nutrition aide.

Dietary Adequacy Level. An estimate of the dietary adequacy of the homemaker's diet as measured by the 24-hour food recall. Derived from a score based on the number of servings of foods consumed from the four major food sources (meat, milk, breads/cereals, and vegetables/fruits) as identified in Recommended Dietary Allowances (US National Academy of Sciences, 1980). Three estimates were used in the study: (1) entry dietary adequacy level represents the dietary adequacy level of homemakers at the time they enter the program; (2) termination dietary adequacy level represents the dietary adequacy level of homemakers at the time they left the program; and, (3) follow-up dietary adequacy level represents the dietary adequacy level of homemakers at the time of the follow-up survey (taken six months or more after homemakers had left the program).

Family Income. An estimate of family income received during the month prior to the interview as reported by the homemaker. The estimate excludes the value of food stamps

and donated foods.

Food Consumption Behavior. The number of servings (meat, milk, breads/cereals, fruits/vegetables) consumed in the 24 hours prior to the interview as reported by the homemaker.

Food Expenditure. An estimate of the money spent each month on food for each family member as reported by the homemaker. To derive the monthly per capita food expenditure, the value of the money spent on food during the month prior to the interview was divided by the number of family members. The estimate includes the value of food stamps.

Homemaker. An adult (usually female) who is responsible for food procurement and for planning and preparing meals. Homemakers in this study came from low-income families, participated in the EFNEP educational experience for at least 12 months, and left the program from six months to three years prior to the administration of the follow-up survey.

Homemakers' Perceptions of Dietary Change. Information obtained from descriptive data about dietary changes as reported by the homemaker during the follow-up survey.

Length of Participation. Actual time in program measured in six month intervals from time of enrollment.

Nutrition Education. Education of the public whic seeks a general improvement in nutritional status, mainly through promoting changes in one's food consumption behavior, dietary

practices, and the use of food resources.

Overall Change. The change in the food consumption behavior of homemakers that occurred between the time they entered the program and the time of the follow-up survey. Derived by subtracting the entry dietary adequacy score from the follow-up dietary adequacy score.

Program Change. The change in the food consumption behavior of homemakers that occured between the time they entered the program and the time they left the program. Derived by substracting the entry dietary adequacy score from the follow-up dietary adequacy score.

24-Hour Food Recall. Report of any solid foods and liquids consumed by the homemaker during the 24 hours prior to the interview.

Chapter II

RELATED LITERATURE

Included in this chapter is a discussion of the literature related to the Expanded Food and Nutrition Education Program, dietary adequacy studies, theories of learning and behavior change, and evaluation and program management.

The Expanded Food and Nutrition Education Program

The Expanded Food and Nutrition Education Program (EFNEP) for low-income families was established in 1968 in light of the increasing evidence that nutritional deficiencies increased as income decreased. A ten-state survey had shown that although social, cultural, and geographic factors were associated with nutritional inadequacies, income was the major determinant of nutritional status. Those who lived in households with an annual income of $3,000 or less were more apt to have inadequate diets than were those with higher incomes (USDHEW, 1972). In many cases, nutritional problems were due to insufficient food—families simply could not afford to feed their children. Yet, even when families had access to food, children and adults still suffered from malnutrition because of poorly balanced diets. Furthermore,

the malnourished families were also likely to be isolated from sources of information about nutrition. As existing educational systems were not designed to serve poverty level families, other alternatives had to be found.

In 1968, the U.S. Department of Agriculture provided a ten million dollar grant to start EFNEP. As noted in The Expanded Food and Nutrition Education Program: Historical and Statistical Profile (USDA/SEA-Extension, 1979), EFNEP's primary goal is to

> promote sound nutritional principles among low-income families. Unlike welfare and food assistance programs, EFNEP focuses on nutrition and nutrition-related knowledge and skills. Rather than simply providing food for poor families, EFNEP would concentrate on providing them with the knowledge of how to use the already available food resources and the importance of nutrition (p. 1).

The specific objectives of the program are

- To develop and implement a food and nutrition educational program tailored specifically to the needs of the poor.
- To help low-income families, especially those with young children, to acquire the knowledge, attitudes, and changed behaviors necessary to improve their diets.
- To deliver the food and nutrition education directly to the low-income audiences by employing, training, and supervising para-professional nutrition Aides. These Aides would be indigenous to the communities in which they would be working, and would work with the families in a one-to-one setting or in small groups (p. 3).

USDA personnel hoped that such a program would (1) result in improved diets and health of the families served

by it; (2) add to participants' skills and knowledge in food preparation, production, storage, safety, and sanitation; and, (3) enhance the family's ability to manage food resources (including food stamps and foods from the Commodity Distribution Program) (p. 4).

Programs in each state are coordinated through the Land Grant University Cooperative Extension Service and operated at the county level (see Figure 2). The Cooperative Extension Service was selected to administer EFNEP because (1) it had extensive experience in managing national service programs, (2) it had established linkages with state and local governments and with other federal agencies, and, (3) extension personnel were experienced in using different teaching methods and techniques, developing educational materials, recruiting participants, and evaluating programs. The Michigan program, which was started in 1969, has the same goals and objectives as the national program.

A series of pilot studies were used to identify productive approaches towards establishing and maintaining an educational program for low-income families. As part of a five-year pilot project in Alabama, paraprofessional nutrition aides contacted families on a one-to-one basis and taught the homemakers food and nutrition and other related skills. An evaluation of the project indicated that

> almost three-quarters of the homemakers involved improved the eating habits of their families; two-thirds improved their food preparation skills; over half increased the

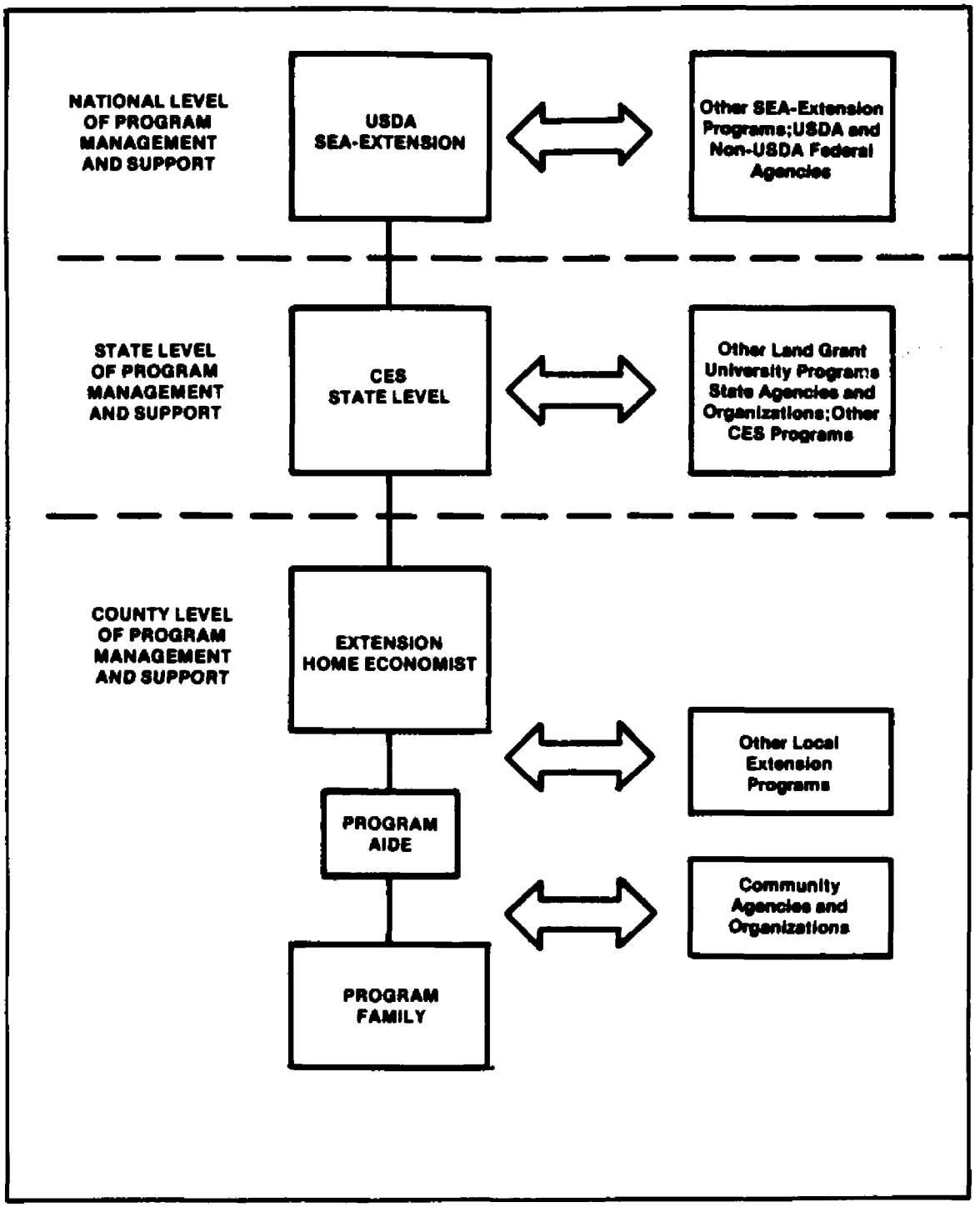

Figure 2. Organizational Structure of EFNEP

> amount of milk consumed by their families, served more balanced meals, and used better food buying practices; and more than a third improved methods of storing, canning, and freezing foods (USDA/SEA-Extension, 1979, p. 4).

The Alabama project demonstrated that an educational program could be effective if it were tailored to the needs, interests, competencies, and economic and educational levels of low-income homemakers. It also showed that paraprofessionals, working under the supervision of home economists, could be effective teachers of low-income homemakers (USDA/SEA-Extension, 1979, p. 4).

Four other studies also significantly affected the evolution of EFNEP as noted in The Expanded Food and Nutrition Education Program: Historical and Statistical Profile:

> The South Providence, Rhode Island Project indicated the feasibility of modifying traditionally rural Cooperative Extension Service (CES) home economics programs for use in urban slum settings (Silverman, 1966, unpublished).
>
> The Texas CES Project examined methods for reaching low-income Mexican-American families. Two clearly stood out as the most productive in extending information to this population —the home visit and circular letters. The home visit in bringing about change, and circular letters in bringing about awareness. The study showed that a successful education program with low-income families must consider the cultural values of the people and the economic circumstances in which they find themselves (Pfansstiel & Hunter, 1968).
>
> The Boston, Massachusetts CES Study indicated the feasibility of CES techniques in tailoring nutrition education programs to the needs of families in a large urban housing development (Eastwood, Knapp, & Hunter, 1963).

> The Missouri CES Project, funded by the Ford Foundation, also showed the viability of CES techniques in working with families living in urban slum neighborhoods. This study combined the efforts of professional Home Economists with follow-up visits by volunteers. The participating homemakers made substantial gains in appropriately using food stamp money and getting the most for their food dollar. The project also indicated the potential of paraprofessionals in helping low-income families to incorporate nutritional principles into their daily lives (Hunter, Greenwood, Norris, & Stackhouse, 1965).

When EFNEP was started in 1969, approximately 5½ million families lived in poverty. Initially, EFNEP focused on reaching low income adults in urban and rural areas; however, in 1970, a program for young people who lived in economically depressed urban areas was added. This program was later expanded to include the 4-H youth program.

In general, the families served by EFNEP are large (4 persons per family as compared to 3.31 persons for the average U.S. family), have an income of below $5,000 per year, and spend about 40 percent of their income on food. EFNEP families frequently participate in government food assistance programs (Michigan EFNEP, 1978, p. 4). This study focused on adult participants in EFNEP, specifically low-income homemakers who are the major target audience in the family. Typically, EFNEP homemakers are young and have less than an eighth grade education. Many of the homemakers are divorced, separated, or are single parents. Dunkleberger, Martin, and Pratt (n.d.) had this comment on the EFNEP

target audience:

> low-income and disadvantaged people do not participate freely in group activities. They do not join many groups and organizations through which they might learn. They do not learn by reading bulletins and other educational materials. They are hard to reach (p. 1).

The EFNEP educational model is based on the theory that learning effectiveness will be enhanced if people of the same background serve as teachers. Therefore, indigenous nutrition aides are a key aspect of the program. Aides, who work closely with county home economists, attend an initial on-the-job six-month training program and receive regular in-service training.

From the beginning, EFNEP has been guided by two fundamental instructional principles:

- Information must be based on the latest available research, taking into account nutrition knowledge and instructional technologies and methodologies for reaching and working with low-income groups.
- Teaching must be focused to provide measurable behavior change in the target population, and measurement of that behavior change must be an integral part of program activity (USDA/SEA-Extension, 1979, p. 8).

The interpersonal relationship between the nutrition aide and the homemaker is emphasized throughout the teaching strategy. Meetings take place in the homemaker's house where the aide may work with an individual homemaker or with a small group. The content is always based on the identified

needs (e.g., the basics of nutrition, food buying, meal planning and preparation, home food preservation, storage and sanitation, money management) and capabilities of the learners. Individuals and groups proceed at their own pace.

The time participants spend in the program and the intensity of their involvement vary a great deal. Participants complete the program when, in the judgement of the nutrition aide, they have learned the most they can. However, many of the homemakers never complete the program for a variety of reasons (e.g., they move, they lose interest, they go back to school, or they get a job).

EFNEP field personnel at the county offices keep extensive records of the homemaker's progress. A 24-hour food recall is taken for each six month period that the learner is in the program. This instrument and other instruments have been used to evaluate EFNEP's effectiveness. These evaluations (most of which have been done immediately after participants left the program) have shown that the program has had an educational impact on its audience. (See the section on dietary adequacy studies for a discussion of EFNEP's effect on food consumption behavior.) Research has also shown that there is a continuing need for EFNEP's services. Eighty-three percent of the potential low-income population had not been reached in 1976, and an estimated 1.8 million families were expected to enter the pool of poverty-level families each year (Vines & Anderson, 1976, pp. 153-154).

Dietary Adequacy Studies

The EFNEP evaluation literature is filled with numerous studies that have sought to identify key variables that influence the effectiveness of the program. Though EFNEP has looked at indicators such as nutrition knowledge and attitudes and money management skills, one of the ways in which its effectiveness has been traditionally measured is by comparing dietary adequacy scores estimated from 24-hour food recall data collected before, during, and after participation in the program. The literature on instruments for measuring dietary adequacy is discussed in this section as is the literature on EFNEP's impact on changes in dietary adequacy level and the relationship between these changes and variables such as entry dietary adequacy level, length of participation, and the demographic characteristics of EFNEP homemakers.

Dietary Instrumentation

For several decades, extensive research has been conducted to develop methodologies for measuring the nutritional status of subjects' diets and for determining the reliability and validity of dietary instruments (see Huenemann & Turner, 1942; Bransky, Daubney, & King, 1948; Young, Hanan, Tucker, & Foster, 1952; Pekkarinen, 1970; and Reshef & Epstein, 1972).

Generally, the objectives of dietary studies have been (1) to determine the dietary or nutrient intake of one or more individuals and to assess the need for appropriate intervention programs; (2) to determine the need for community nutrition programs among various population groups (e.g., maternal, child, adolescent, or geriatric programs); (3) to evaluate ongoing programs and/or compare the dietary status of groups within a given geographic area or of similar groups from other areas, and/or (4) to assess the effectiveness of nutrition education programs (Christakis, 1972).

Food balance sheets, food accounts, weighing, chemical analysis, interviews/questionnaires, and the 24-hour food recall are among the instruments that have been developed to meet the above objectives (see Pekkarinen, 1970, for a description of these instruments). Drawing upon a 1976 World Bank report, Tate (1977) indicated the relative accuracy and cost of each instrument as well as the amount of skill and time required to administer the instrument (see Table 1).

None of these instruments is free from error and there is no single method that is best for all dietary study situations. Each instrument has technical, economic, organizational, and operational feasibility advantages and disadvantages. Tate (1977) summarized the general constraints that affect the use of dietary instruments:

> (1) Lack of local evaluation expertise to execute the methodology properly;

Table 1. Evaluation of Dietary Assessment Methodologies

Method	Criteria			
	Accuracy	Cost	Skill	Time
Food balance sheets	Low	Low	Low	Low
Food account	Low	Low	Medium	Medium
Weighted food intake	High	High	High	High
Chemical analysis	High	High	High	High
Diet history/ questionnaire	Medium	Medium	Medium	Medium
24-hour food recall	Medium	Medium	Medium	Low

SOURCE: J. Austin et al., "Urban Malnutrition: Problem Assessment and Intervention Guidelines," Harvard University report submitted to the World Bank, September 1976. Cited in Tate, 1977.

> (2) Lack of available longitudinal and historical data on which to utilize the methodology;
>
> (3) Methodology which is too complex to implement realistically;
>
> (4) Assumptions made by methodology designers which do not correspond to conditions found in the "real world";
>
> (5) Lack of portability and flexibility of the methodology to meet the needs of different regions of a country; and,
>
> (6) Externalities such as factors outside the scope of the methodology which have as much or more bearing on the results of the program being evaluated as the factors considered (p. 37).

Beal (1967) and Pekkarinen (1970) noted that the choice of method should be determined by the need or purpose of the study, the size of the desired sample, the respondents' characteristics, available human and financial resources, time constraints, the nutrients to be evaluated, and the type of data to be collected (i.e., single, intermittent, or continuous).

Though it has many limitations, the 24-hour food recall was used in this study and has traditionally been chosen as the most suitable instrument for measuring changes in the food consumption behavior of EFNEP participants. The reasons for its use are described in The Expanded Food and Nutrition Education Program: Historical and Statistical Profile:

> The 24-hour food recall was selected for use in EFNEP for a number of reasons. The diet assessment method used by EFNEP must be simple and brief. Program homemakers will not likely tolerate lengthy and involved questioning about their nutritional habits, nor will they submit

> to complicated biochemical and medical tests. Furthermore, the procedure has to be accurately applied by paraprofessional aides, who may not have the background to collect and interpret detailed information on nutrients in food consumed. The method has to serve as a measure of assessing progress during the homemaker's participation in the program. This implies repeated diet assessments, which would not be feasible with complex assessment procedures (USDA/SEA-Extension, 1979, pp. 40-41).

In EFNEP, the 24-hour food recall is used as follows: Respondents report, as accurately as possible, the food and drink they have consumed in the 24-hour period preceding the interview. Using household measures such as glasses, cups, slices, spoons, portions, and food tables, EFNEP personnel estimate the amount of food that has been consumed and its nutritional value. The dietary adequacy score is computed using a progression scale developed by USDA. This scale, which ranges from 0 to 100 points, is based on the recommended number of servings consumed from each of the four basic food groups: two servings each of milk and meat and four servings each of breads and cereals and fruits and vegetables are considered to comprise an adequate diet (see Appendix A for the USDA List of Commonly Used Foods in Four Food Groups). Servings in excess of the recommended amounts are not counted. Thus, a dietary adequacy score of 0 indicates that the person did not eat any recommended combination of foods that day, while a score of 100 indicates that the person had the recommended number of servings in

each food group (see Appendix B). In EFNEP, a diet with at least one serving from each of the four food groups is considered to have minimum adequacy and converts to a score of 42.

The 24-hour food recall has become very popular because it provides a rough estimate of dietary adequacy, is simple to use, costs less than the other methods, and has potential as a teaching tool. It also requires less effort and time on the part of the respondents. However, the instrument does have some weaknesses. Most importantly, only one day's food consumption is measured and so the instrument does not account for the great variation in an individual's or family's diet because of factors such as personal choice, changes in appetite, available food supply, and financial resources. Additionally, not everyone remembers what s/he ate in the preceding 24 hours. In some cases, respondents might report the wrong information because they are not motivated to participate in the study and/or there is poor rapport between the subject and the interviewer. Because of the above limitations, the 24-hour food recall cannot be used for assessing the dietary adequacy of individuals. However, it can be used for groups because under or over-estimates of food consumption by individuals can be balanced by using a large number of respondents.

Limitations such as these have led several researchers to question the validity and reliability of the 24-hour food recall as it is used in EFNEP. Becker, Indik, and

Beeukes (1960) found that using household measures for the food recall tended to result in over-estimation as compared with actually measuring the food. In a study of two parishes in Louisiana, Scott compared estimates based on the 24-hour food recall with those based on measurements of the actual ingestion of selected nutrients. She found that the 24-hour recall tended to represent diets more favorably than they actually were. At least two-thirds of the diets considered nutritionally adequate by the 24-hour food recall were found to be inadequate using the nutrition intake method (Jones & Verma, 1975).

Jones, Munger, and Altman (1975) have suggested a number of steps that interviewers can take to minimize the inaccuracy of the 24-hour food recall: (1) establish rapport at the beginning of the study and solicit the confidence of the respondent by explaining the purpose of the study; (2) ask follow-up questions about the food respondents report; and, (3) verify an individual's response by reading the report at the end and asking if everything has been included.

Researchers are also working on developing different evaluation instruments (see Loomis, 1975, and Morris, 1975). However, until instruments that are more accurate and that are equally practical are developed, one can expect that the 24-hour food recall will continue to be used, provided caution is exercised in making interpretations and drawing conclusions from information collected using this instrument.

Dietary Adequacy Change

Several studies have shown that only a very low percentage of EFNEP homemakers and presumably their families have an adequate diet at the time they enter the program. For example, Tooker (1970), who studied the characteristics of disadvantaged families in Douglas County, Nebraska, found that only 11 percent of the families had well-balanced diets on the first day that the nutrition aides visited them. Nationally, only about 50 percent of entering homemakers have consumed even a minimally adequate diet (USDA/SEA-Extension, 1979).

Numerous evaluations of EFNEP have shown that the program has had an impact on the dietary adequacy level of participating homemakers. In a 1973 experimental study, the Cooperative Extension Service of Michigan State University examined changes in the nutritional attitudes and food shopping behavior of 163 low-income homemakers from randomly selected counties in Michigan. Only 3.5 percent of the homemakers had an adequate diet at the time they entered the program, and the largest percentage of homemakers (42.5 percent) had food recall scores that met EFNEP recommendations for at least one serving from each food group (Kerr, 1973).

When the entry dietary adequacy scores of these homemakers were compared with scores taken nine months later, there was an overall increase in the percentage of homemakers

who ate the recommended number of servings in each food group (see Table 2). The 24-hour mean scores of the study and control groups showed that those in the study group tended to increase the number of adequate servings in the four groups and improve the adequacy of their dietary intake during the course of the study. The researcher observed that the control and study groups were similar in all aspects but one; the non-program group appeared to be better able to deal with their problems than the program group.

Table 2. Changes in the Dietary Adequacy Level of Michigan Homemakers (Entry and Nine Months Later)

Recommended Servings	Percentage of Homemakers	
	Entry	9 Months
2 or more servings of milk	25	42
2 or more servings of meat	60	79
4 or more servings of fruits and vegetables	13	22
4 or more servings of breads and cereals	29	40

SOURCE: Derived from Michigan State University, Cooperative Extension Service, The AIDES Make a Difference, n.d.

Feaster (1972), who studied EFNEP's impact on 10,500 homemakers in 35 states and Puerto Rico, found that about

4 percent of the homemakers had adequate diets when they enrolled in the program. After six months, the percentage of homemakers who had adequate diets had increased from 4 to almost 11 percent. Homemakers who had the poorest initial diets showed more improvement than did those who had better food consumption practices in the beginning.

Feaster and Perkins (1976) had similar findings in their study of dietary changes among program families in selected Florida and Georgia counties. They found that improvement in the consumption of basic food groups (e.g., meat, milk, vegetables and fruits, and breads and cereals) was inversely related to the initial food consumption level for specific groups. In other words, more relative improvement was noted in those food groups that had the lowest initial scores (i.e., fruits and vegetables and milk).

To determine the cost effectiveness of EFNEP, Tate (1977) conducted a study of the program's impact in Georgia, Maryland, Ohio, and Oregon. Participants were divided into four groups according to their entry dietary scores (0-25, 26-50, 50-75, and 76-100). A chi-square test of association was used to examine the relationship between improvements during the program and two other variables: length of time in program and entry dietary adequacy level. Tate found that significant dietary adequacy changes ceased after the two lowest groups had participated for 12 to 18 months, and that the two highest groups (50-75 and 76-100) showed no significant changes in

Table 3. Studies on the Effect of Homemaker's Entry Dietary Adequacy Level

Source	Location	Sample	Comment
Feaster (1972)	National (35 states)	10,500 family records & 2,800 records of homemakers' food consumption behavior	Homemakers with poor initial diets made the greatest improvement during the program
Feaster & Perkins (1976)	Georgia & Florida	964 homemakers	Greater improve-improvement was made in food groups that initially had the poorest scores
Tate (1977)	Georgia, Maryland, Ohio & Florida	511 homemakers' records	Statistically significant improvements were found for homemakers with initial dietary scores of below 60

dietary adequacy scores at any time during the program. Tate concluded that the program was effective only for those homemakers whose dietary adequacy level was below 50 at the time they entered the program. Since a score of 42 is used to indicate an inadequate diet, Tate questioned whether scarce resources should be spent on working with families whose diets are above minimum adequacy or whether resources should be reserved for working with homemakers whose diets are below the minimum adequacy level at the time they enter the program.

A few follow-up studies have been conducted to determine whether or not homemakers sustain the dietary changes that occur during the program. In reporting on a study of 258 homemakers in six parishes in Louisiana, Gassie (n.d.) noted that only 5 percent had adequate diets before the program began. Immediately after the homemakers had completed eight lessons, the percentage of homemakers with adequate diets increased to 23 percent (a change of 18 percent). Four months later, there had been some regression among the 240 homemakers tested in a follow-up study (see Table 4). Gassie concluded that even though few of the homemakers maintained an adequate diet at the time of the follow-up study, many of the changes in the individual food groups were sustained four months after the homemakers had completed the educational program.

Patterson, Workman, and Jones studied 30 homemakers in Barry County, Missouri, to determine whether or not these

Table 4. Changes in the Dietary Adequacy Level of Louisiana Homemakers (Entry, Termination, and Four Months Later)

Recommended Servings	Percentage of Homemakers		
	Entry (n=258)	Termination (n=258)	Follow-Up (n=240)
At least 1 serving of each food group	61	81	81
2 or more servings of milk	37	62	53
2 or more servings of meat	76	90	90
4 or more servings of vegetables and fruits	11	38	18
4 or more servings of breads and cereals	45	64	81
Adequate servings of all food groups	5	23	5

SOURCE: Derived from data included in Gassie (n.d.).

homemakers maintained their improved dietary adequacy levels after they left the program and whether or not periodic educational contacts would help them to maintain or improve their dietary adequacy levels (Nolan, 1976). They found that homemakers maintained some of the improvements achieved while enrolled in EFNEP. However, periodic educational contacts after the regular EFNEP program did not seem to help the homemakers improve their diets beyond the levels initially attained during the program.

In contrast to the above findings, Rountree (1973) found in a study of 31 homemakers in Franklin County, Ohio, that homemakers did not significantly improve the adequacy of their diets during EFNEP and that the improvements that were made were not sustained eight months after the program had terminated. In another study, Duff (1974) reported that it was not possible to find food consumption behavior differences after families had been enrolled in EFNEP.

Length of Participation

Several studies have been conducted in an attempt to determine the most effective length of time for homemakers to participate in EFNEP (see Table 5). In the first external evaluation of the national program, USDA (1969) examined the records of 2,189 families and the results of 438 homemaker interviews. Researchers found that homemakers who had inadequate diets at the time they entered the program started improving their diets after six months of

Table 5. Studies on the Effect of Length of Participation and Number of Contacts with Nutrition Aides

Source	Location	Sample	Comment
USDA (1969)	National (7 states)	2,189 records & 438 homemakers	Program was effective after six months
USDA (1971)	National (10 states)	3,120 records & 698 homemakers	Increased dietary improvement up to 18 months. Rural homemakers and those with better diets, more knowledge, and more economic resources stayed in the program longer
Jones & Verma	Louisiana	822 homemakers	Significant improvement after two months and additional improvement after another two months, after which there was a leveling off in scores
Green, Wang, & Ephross (1972)	Maryland	98 EFNEP homemakers & 58 subjects in a matched group	Maximum dietary improvement after 12 months, 18 months recommended
Morris (1973)	Michigan	163 homemakers	Improvement related to number of contacts with nutrition aide
Feaster & Perkins (1976)	Georgia & Florida	964 homemakers	Most of the improvements were made during the first 18 months, although maximum progress occurred during first 6 months
Tate (1977)	Georgia, Maryland, Ohio & Florida	511 homemakers' records	Significant changes ceased after homemakers with lowest entry scores had participated for 12 to 18 months. Homemakers with highest entry scores did not have significant changes at any time in program

participation. In another study, Munger and Jones (1976) found that two years of program participation was sufficient for most families.

In the second external evaluation of EFNEP, the USDA (1971) studied EFNEP's effectiveness in 21 locations. After examining 3,120 records and conducting 698 interviews, the researchers found that homemakers' dietary scores tended to increase for up to 18 months of program participation. They also noted that many homemakers who were knowledgeable, had good diets, and had relatively high economic resources were retained in the program longer than necessary. Also, rural homemakers tended to remain in the program longer than did urban homemakers.

The different lengths of participation were attributed to several factors: (1) nutrition aides in rural areas kept homemakers in the program longer than did aides in urban areas; (2) fewer economically disadvantaged homemakers were likely to enroll in urban areas than in rural areas; and (3) homemakers in urban areas were likely to increase their family resources through the use of community services more often than were homemakers in rural areas. The study also found that homemakers with the lowest initial dietary levels had a tendency to stay in the program longer, and that this group showed the greatest improvement. The researchers recognized the need for continued contact between the nutrition aide and the homemaker; however, they recommended that a larger proportion of homemakers with average family

nutrition levels and better learning capabilities should complete the individual home visit phase between the 6th and 12th months.

Jones and Verma (1972) studied the nutrition change phenomenon at selected intervals over a period of one year. In their study of 822 homemakers in Louisiana, they found that the group as a whole increased its consumption of foods in all four of the food groups during the study period. However, the most significant changes in food consumption behavior occurred during the homemakers' first two months in the program. During the second two month period there was another significant change, but this was followed by a definite leveling off in dietary improvement. These results led the researchers to recommend that the program should continuously contact new homemakers rather than work indefinitely with the few who are initially in the program. They noted that this would call for a change in the character and intensity of the program. Since individualized contacts are expensive and reach only a few people, they suggested that using volunteer leaders, making fewer and shorter home visits, and increasing the use of mass media and mailed teaching aids (e.g., pamphlets and information leaflets) should be considered as other means of contacting homemakers.

In a three year longitudinal study of the impact of nutrition aides, Green, Wang, and Ephross (1973) compared changes in the knowledge, attidues, and practices of 98

rural homemakers with a matched group of 58 homemakers. One of their research questions concerned whether or not the effectiveness of home visits reached a point of diminishing returns. They found that though the impact of the aide's visits diminished after the first year of contact, improvements made during the first year were not lost. However, by the third year, continued home visits with the same homemaker were of minimal value. The researchers concluded that 18 months represents the optimal program period.

Morris (1973), after studying the effectiveness of nutrition aides in Michigan, found that EFNEP participants improved their food recall scores during the program. These changes were positively correlated with the number of contacts the homemaker had with the nutrition aide.

Feaster and Perkins (1976) found that the length of time spent in the program was highly significant in determining food consumption levels when they studied dietary improvement in 964 families in selected counties in Florida and Georgia. During the early stages of program participation, there was a high rate of improvement which later stabilized. The most progress occurred during the first six months, while less progress was made during each subsequent six month period until the maximum consumption level was reached. Over 40 percent of the improvement was made in each subsequent time period; after 18 months participants had achieved 80 percent of their total progress.

Tate (1977) found that homemakers with the lowest entry scores had no significant changes in their scores after 12 to 18 months of participation in the program. Homemakers with the highest scores did not have any significant changes at any time in the program.

Demographic Characteristics

A number of studies have examined the demographic profiles of the EFNEP target audience and the relationship between these profiles and the changes that occur in participants' nutritional behavior (see Table 6). Consequently, researchers have studied a host of personal and family socioeconomic variables (e.g., age, education, marital status, employment status, occupation, ethnic background, family income, family food expenditure, participation in government food and welfare programs, and place of residence) in an effort to improve program management.

Although eligibility for participation in EFNEP is determined by family income level, the findings about the relationship between income and dietary adequacy level are mixed. In 1943, Hardy, Spohn, Aushin, McGiffert, Mohr, and Peterson linked nutritional status with income level, while a 1955 survey of U.S. families found that the diets of families with low incomes were not as adequate as those of families with higher incomes (USDA, 1956). Even though the results of a similar survey ten years later indicated that a sizeable proportion of families with high incomes

Table 6. Studies on the Effect of Homemakers' Demographic Characteristics

Source	Location	Sample	Comment
USDA (1955)	National (10 states)	n.a.*	Diet was related to income
USDA (1969)	National (7 states)	2,189 records & 438 homemakers	Poor diets were related to location (urban/ rural),education, income, and age
USDA (1973)	National	n.a.*	No relationship between changes and demographic characteristics was identified
Morris (1973)	Michigan	163 homemakers	Weak positive and negative relationship between diet and age, and between income and diet
Rountree (1973)	Ohio	n.a.*	Number of children under 18 in family related to sustained dietary improvements

*not available

also had poor diets, the USDA concluded that families whose income was below the poverty level ($3,000 per year) were more prone to have inadequate diets than were those with higher income levels. They found that 63 percent of the low-income families had diets that failed to meet all of the allowances for one or more nutrients and 36 percent had diets that were poor when compared with the Recommended Dietary Allowance (USDA, Agricultural Research Service, 1968).

Lund and Burk (1969) found that there is a significant relationship between dietary intake of certain nutrients (especially Vitamin A and ascorbic acid) and various socio-economic characteristics—most notably family income and education. Pielemeier, Jones, and Munger (1978) emphasized that studies of malnutrition over the past 20 years have made it abundantly clear that the educational backgrounds and economic and cultural characteristics of a society have an impact on its nutritional status. They added that malnutrition may be the most dramatic indicator of poverty as food intake is highly correlated with income. However, studies such as those by Metheny, Hunt, Patton, and Heye (1962) and the U.S. Department of Health, Education, and Welfare (1972) have shown that income alone does not guarantee an adequate diet.

In 1969, EFNEP conducted a national study of 10,500 homemakers:

> The purpose of the study was to provide a more complete socio-economic profile of families being reached; determine initial

> food consumption practices; improve the food consumption practices of selected socio-economic groups; and to ascertain changes in food practices after participation in the program (USDA, Economic Research Service, 1972, p. 3).

The survey team found that homemakers who had the poorest diets at the time they entered the program tended to be from urban areas, poorly educated, on welfare, and poor. Families with an annual income of $2,700 spent about a third of their income on food, while families with an annual income of less than $1,200 spent nearly one-half of their income for food. Although homemakers did show substantial improvements in their food consumption practices after six months in the program, there were no consistent differences in overall dietary adequacy changes that could be attributed to socio-economic characteristics.

In 1973, another national study compared the socio-economic characteristics of homemakers with the types of government assistance (i.e., food stamps, food from distribution programs, eligible non-participants, and ineligible families) that they received. Significant differences in the socio-economic characteristics of the homemakers were observed among the different categories. While the strongest relationship was seen in the food stamp category, participants in the food distribution program and eligible non-participants ranked below ineligibles in economic and food consumption characteristics. Income and family age were significantly related to food expenditure, while education

and family size were significantly related to family income (USDA, Economic Research Service, 1973).

In the second, in-depth evaluation of EFNEP that was conducted in 1971, an attempt was made to identify socio-economic characteristics that could be used to predict the program's potential impact on the dietary adequacy level of participants. Age, education, ethnic background, and family composition were investigated. However, researchers were unable to develop a profile of homemakers or of family characteristics that could be unambiguously used to identify families that had the greatest potential for benefiting from the program (USDA, Federal Extension Service, 1971, p. 12).

Morris (1973) also examined the relationship between the personal and family characteristics of homemakers and changes in food consumption practices. In her study of the influence of nutrition aides in Michigan, Morris found that 58 percent of the homemakers were white, 29 percent were black, and 12 percent were of Spanish-speaking origin; 85 percent of the homemakers lived in urban areas and 14 percent lived in rural areas. Of the rural homemakers, 0.5 percent lived on a farm. The average homemaker had a 10th grade education and was less than 29 years old, while average family size was 4.5 persons.

Using a correlation matrix, Morris examined the relationships between nine variables (food recall, thiamine excretion level, riboflavin excretion level, nutrition

attitude score, nutrition knowledge score, age, educational level, and family income). Morris found that age is negatively related to food consumption practices ($r = -.076$), but the homemaker's educational level ($r = .138$) and per capita family income ($r = .150$) were positively related to food consumption. Although these correlations indicate that there is a tendency for age, education, and per capita family income to be related to food consumption behavior, the relationships are not significantly different and so are not in any way meaningful for practical purposes.

In a 1973 evaluation of the long-term effects of participation in an EFNEP program in Franklin County, Ohio, Rountree (1973) examined the relationship between improvements in the dietary adequacy level and five variables (income, participation in food stamp programs, education, number of children, and area of residence). He found that family size and the number of children under 18 years of age were significantly related to sustained improvements in dietary adequacy level. Homemakers with small families and a small number of dependent children appeared to have sustained their improvements in their dietary adequacy level.

Summary

Although the results of the above evaluation studies are mixed, the dietary adequacy estimates clearly show that homemakers generally exhibit poor food consumption behavior at the time they enroll in the program and that EFNEP

participants, on the whole, experience positive changes in their food consumption behavior during the enrollment period. The few studies conducted so far have shown that homemakers with low entry dietary scores generally show a greater degree of improvement than do those whose entry scores are relatively high. These findings have led some researchers to suggest that EFNEP programs should be reserved for homemakers whose entry scores indicate that their diets are below the minimum adequacy level.

The findings regarding the relationship between length and intensity of program and improvement of dietary adequacy level vary considerably. However, the majority of studies seem to indicate that dietary adequacy level improves as the length of time in program increases, and that the rate of improvement stabilizes or declines after a certain period of time. The findings regarding the optimal length of time for homemakers to be enrolled in the program are inconclusive with recommended time periods ranging from two months to two years.

The findings on the relationship between the dietary change phenomenon and the socio-economic characteristics of homemakers are also inconclusive. There is no consistent pattern of relationships between various demographic characteristics; instead, the relationships change from study to study and from food group to food group. One problem in studying the influence of demographic variables such as income, education, and food expenditure is that there is an

intrinsic relationship among these variables. For example, poorly educated people generally have a low income and must spend a major portion of their income on food. This relationship is a major methodological constraint in trying to identify the influence of individual demographic variables.

Few studies have been conducted on the long-term effectiveness of EFNEP, and the findings from these studies are also inconclusive. However, these studies suggest that some of the improvements gained during the program are retained over the long term even though there is a slight regression in food consumption behavior after participants leave the program.

Theoretical Perspectives on Learning and Behavior Change

Learning is a complex process that is influenced by the nature of the material, the learner, the purpose, and the context of the learning in question. Definitions of learning also vary according to the theoretical perspective of the researcher. For example, cognition theorists such as Piaget and Montessori have defined learning as primarily an intellectual, rational, and cognitive process, while humanists such as Rogers, Maslow, Coady, and Freire emphasized that learning is the process of developing motivation through greater self-awareness and a more positive self-concept. Skinner, a behaviorist, defined learning as a change in the probability of response under specified conditions. This

change occurs as an organism interacts with its environment.

Though the definitions of learning may differ, there is a general consensus that learning should result in a change in behavior. St. Francis of Assisi noted that no one really knows anything unless s/he can put it into use. Noting that the change in behavior should not be simply ascribable to the process of growth, Gagne (1970) maintained that changes in behavior have to be retained. Carroll (1971) described this type of learning as "mastery learning." In mastery learning, learners are expected to competently apply what they have learned in their life situation.

Cartwright (1949) suggested that three kinds of structures must be created to influence behavior change: cognitive structure, motivational structure, and behavioral structure. Matthews (1975) explained that these factors correspond to learners' beliefs and factual knowledge, their needs and values, and their ability to control their behavior through their cognitive and motivational structures. Educational programs need to take into account all three structures, not just the first structure.

Rosenberg (1956) maintained that one's attitude to an object is the algebraic sum of the products of the "potency" of the object to achieve a value and the importance of the value for all of the values associated with the object. Thus, Rosenberg emphasized the relationship between one's attitude towards an object and the values

associated with that object. Matthews (1975) gave the following example:

> Sometimes we tend to say that health is not a value for people who do not take certain precautions we think they should take. But it may be rather that their perceived potency for this action is different from ours. We all take risks in health which seem to us reasonable.

Lionberger (1960), Rogers (1967), Rogers and Shoemaker (1971) and others have focused on the diffusion theory of behavior change and the adoption of innovations. According to the diffusion theory, the adoption of innovations takes place in five stages: awareness, interest, evaluation, trial, and adoption.

In the area of nutrition, there is a growing interest in understanding nutrition behavior change and in evaluating the effectiveness of nutrition education programs. Researchers such as Sims (1971), Matthews (1975), and Chernichovsky (1979) have developed behavior change theories designed to assist in conducting nutrition-related research and in assessing an educational program's ability to change nutrition behavior.

Sims (1971) developed an ecological theory of behavior change. According to Sims, the syndrome of malnutrition does not occur in isolation but occurs within the context of an entire constellation of environmental factors. She used this theoretical approach to study the nutritional status of preschool children. Focusing on the family,

Sims treated the children's home as their environment and identified variables in that environment (i.e., demographic characteristics, resources, management patterns, and psycho-social characteristics of mothers) that affect children's nutritional status. She concluded that the ecological approach is a viable means of studying the nutritional status of individuals.

Matthews (1975) developed an approach for determining the probability that nutrition education programs will result in behavior change. Matthew's theory, which is based on a combination and modification of the theories of Cartwright, Rosenberg, and Lionberger (see pp. and Table 7), hypothesized that the probability of a change in behavior can be mathematically presented using the formula $P = ip(1 - e)$. P is the probability that a person or group of people will take certain actions; p is the perceived probability that action will lead to a certain goal; i is the perceived importance of that goal in relation to other goals; and e is the perceived fraction of total available resources required for the action (e.g., money, time, effort, etc.). P, p, i, and e have values between 0 and +1.

Thus, the probability that the desired behavior change will take place depends on the product of the perceived probability that the action will lead to a certain goal; the perceived importance of that goal in relation to other goals; and the perceived effort or resources required for the

Table 7. Matthews' Comparison of Behavior Change Theories

Stage	Theorist			
	Cartwright	Rosenberg	Lionberger	Matthews
1.	Cognitive structure	Potency of action	Awareness	Probability of reaching goal*
2.	--	--	Interest	--
3.	Motivational structure	Importance of values	Evaluation	Importance of goal*
4.	Action structure	--	Trial	Resources required*
5.	--	--	Adoption	--

*As perceived by subject

SOURCE: Matthews, 1975

behavior change to take place.

Matthews conducted a participant observation study in a village in South India to test this theory. For two and a half years she studied behavior changes related to malnutrition in preschool children, ineffective use of available health services, and unwillingness to adopt family planning practices. Economic factors, lack of communication between professionals and their audience, traditional beliefs, and a lack of knowledge were important constraints in effecting change among the audience.

Chernichovsky (1979) postulated that the household is the basic socio-economic unit that makes most decisions and that malnutrition results largely from a combination of individual and household consumption behavior decisions and practices. Therefore, in his "economic theory of the household," he emphasized the close link between economics as a behavioral science and measuring the impact of intervention programs. Since changes in practices require active decision-making, Chernichovsky suggested that research based on his theory can be used to predict how much an individual or a household will be influenced by an educational program and what use they will make of the program's resources and services.

In summary, learning and behavior change are subjects of endless fascination. Although scholars from various disciplines have investigated these areas for decades,

there is little consensus as to what determines learning and behavior change or on how to best study these phenomena. In nutrition, research in behavior change is relatively new. Researchers have proposed various theories for studying behavior change and predicting the impact of nutrition programs, but few of these theories are comprehensive or have been extensively tested.

For the purposes of this study, mastery learning was considered to be the most appropriate theoretical perspective on learning because EFNEP homemakers are expected to attain competency in recommended food consumption practices and in the efficient use of food resources. Specifically, learning was treated as a problem-solving endeavor designed to result in the improved nutritional status of the low-income family. It was assumed that participation in the EFNEP educational process enables homemakers to acquire the skills, attitudes, and knowledge needed to change their food consumption behavior in a way that will result in an adequate diet for themselves and their families. The study focused on the homemaker as the unit of analysis because EFNEP assumes that changes in the homemakers' food consumption behavior represent changes in the food consumption behavior of their families.

Evaluation and Program Management

Effective management has increasingly been found to be the lifeblood of programs. As Drucker (1974) noted

> Management is responsible for directing vision and resources to produce maximum results—whether in economic performance. student learning, or patient care—for whatever purpose of which the program exists (p. 3).

If EFNEP's managers are to responsibly direct their vision and resources to produce maximum results in present and future programs, they must have information about the program's impact on its participants and the extent to which it attains its goals.

Several researchers have pointed out that the importance of evaluation's role in program improvement cannot be over-emphasized. Noting that programs are imperfect ventures that always achieve somewhat less than competently what their operators intend, Ward and Dettoni (1974) suggested that evaluation can help programs to better achieve their goals. Steoz (1978) commented that "every serious endeavor deserves to be evaluated, to be put to the test" (p. 1). He pointed out that evaluation is crucial to improving the effectiveness of programs because it provides planners with information and insights that can be used to make sound management decisions. Steoz went on to suggest that evaluation ought to be part of the administrative process of educational programs because resources can be more

efficiently allocated if allocations are done in the context of evaluation findings. Miller (1978) observed that evaluation research is necessary because administrators and those who design and operate educational programs are repeatedly faced with managerial decisions; they need valid information that they can use with confidence in decision-making.

Meaning of Evaluation

Numerous definitions of evaluation have been suggested; however, three definitions are particularly relevant for this study. Worthen and Sanders (1973) maintained that evaluation is

> a process of ascertaining the decision areas of concern, selecting appropriate information, and collecting and analyzing information in order to report summary data useful to decision-makers in selecting among alternatives (p. 150).

Patton (1978) considered evaluation to be a process that involves making judgements about and assigning value to what has been analyzed and interpreted. With that view, he defined evaluation as

> a systematic collection, analysis, and interpretation of information about the activities and outcomes of actual programs in order for interested persons to make judgements about specific aspects of what the program is doing and affecting (p. 268).

Weiss (1972), on the other hand, stated that the purpose of evaluation research is to measure the effects of a program against the goals it has set. This provides a means of contributing to subsequent decision-making about the program

and of improving future programming. He further explained:

> To measure the effects refers to the research methodology that is used. The effects emphasizes the outcomes of the program, rather than its efficiency, honesty, morale, or adherence to rules or standards. The comparison of effects with goals stresses the use of explicit criteria for judging how well the program is doing. The contribution to subsequent decision-making and the improvement of future programming denote the social purpose of evaluation (p. 4).

In general, evaluation may be classified into two major categories (summative and formative) depending on its purpose. According to Scriven (1969), formative evaluation produces information that is fed back during the development of a program to help improve it, while summative evaluation is conducted after the program and is used primarily for accountability, replicability, and program certification purposes.

The specific functions of evaluation, as compiled from the work of Worthen and Sanders (1973), Ward and Dettoni (1974), and Wise (n.d.) are (1) identifying the specific educational needs of target audiences; (2) discovering teaching-learning methods that will bring about desired changes in behavior; (3) assisting in choosing among equally important educational strategies when resources are limited; (4) assessing the effectiveness of educational programs; (5) providing information for responding to questions about programs and professional issues; and (6) providing the basis for professional accountability.

Research and Utilization Concerns

Although some success has been achieved in the area of evaluation, there are still major socio-economic, methodological, and utilization concerns that have implications for evaluation research.

Morris (1975) commented:

> The socio-political context within which evaluation research is planned and conducted poses numerous constraints on undertaking rigorous scientific research to measure program effectiveness. Various groups have an interest in the program under study, including legislators, funding bodies, administrators, practitioners, clients, and the general public. Among these groups there may well be different interests in the evaluative study, especially if the results are expected to influence decisions about the termination, continuation, or expansion of the program (p. 12).

Wise (n.d.) outlined the following problems in evaluation research: conflicts between program and evaluation requirements; (2) lack of cooperation from program implementors; (3) ambiguity in program goals that creates problems in measurement; (4) lack of managerial control over the active part of a program; and (5) the high cost of evaluation research (p. 7).

Other concerns relate to the appropriateness of evaluation methodologies. For example, in a review of 66 nutrition education programs, Gordon (n.d.) found that many of the projects had not been evaluated, partly due to the lack of an established methodology. She identified a need for objective measures, adequate control groups, and some means

of distinguishing between changes resulting from nutrition education and those resulting from other factors.

A key issue in evaluation research is whether evaluation can or should be grounded in well-developed theories. Some researchers believe that well-developed theories are essential if the researcher is to understand the relationships among the variables to be studied. For example, theories can be useful tools in delineating the most important variables to be studied, an especially critical step in exploratory studies. Nye and Berardo (1966) have noted that conceptual frameworks are also useful for describing the relationships among factors that are assumed to be associated with observed behaviors. However, researchers such as Cronbach have noted that theory does not always serve a useful purpose in evaluation research, especially in situations where the naturalistic research approach is used (Patton, 1975). They have suggested that the variables studied in evaluation research are so time and context-bound that they do not lend themselves very well to generalized theory. Furthermore, the findings of such research might be skewed by the evaluator's theoretical predispositions.

Another debate concerns whether or not the traditional scientific method is suitable for evaluation research. As Patton (1975) pointed out, the scientific paradigm involves experimental designs with randomization and control groups, reliable and valid measurement instrumentation,

representative samples that are randomly selected and sophisticated statistical analysis of completely quantitative data. Patton contended that such rigorous research techniques are good, but often they are not suitable for evaluation research as they do not take into account the various factors that influence human behavior. Patton suggested that the naturalistic research techniques used by other social science disciplines such as anthropology and sociology are also a viable approach to evaluation research. Techniques such as participant observation, in-depth interviewing, and detailed description allow the researcher to represent the behavioral phenomenon as it actually exists in its physical and socio-economic environment.

However, Patton recognized the importance of theory and recommended three ways of handling the above concerns: (1) researchers doing evaluative research can explicitly state their own theoretical predispositions and explain how those predispositions might have affected their observations and analyses; (2) they can report and explain whatever causes and consequences emerged during the data analysis, clearly recognizing that such explanations are speculative; and/or (3) they can use "decision-maker theories of action." This approach involves having decision-makers who use evaluation research data examine the degree to which their own ideals and program activities actually achieve desired outcomes through programmatic operation.

The failure to use the findings of evaluation research remains another area of concern. This issue, which first surfaced in the literature in Weiss's (1966) article, "Utilization of Evaluation: Toward Comparative Study," has been the subject of much discussion. Weiss attributed the failure to use evaluation research to (1) inadequate academic preparation for research in action agencies; (2) the low status of evaluation in academic circles; (3) program ambiguities and fluidity; (4) practitioner suspicion and resistance; (5) organizational limitations on boundaries for study; (6) access to data and design requirements; (7) inadequate time for follow-up; (8) inadequacies of money and staffing; and (9) controls on publications.

In their article, "Responding to Local Decision-Makers' Research Needs: The Neglected Topic of Research Utilization," Fear and Carter (1979) postulated that the tenuous linkage between knowledge production and utilization is due to the lack of collaboration between program decision-makers and researchers. They observed that evaluation studies are often designed in a vacuum without the participation of decision-makers. This situation leads to the generation of irrelevant information from the program manager's standpoint. What is needed is a collaborative approach to evaluation research whereby relevant decision-makers or information users are identified and incorporated in the research effort from the early stages of the evaluation research process.

In an attempt to answer the question, "Is Evaluation Working?", Alkin, Daillak, and White (1979) conducted extensive case studies of five school programs and their evaluations, specifically examining the influence of evaluation upon program decision-making and operation. They identified two divergent views on the amount of influence that evaluation research has on educational programs. According to one view, evaluation seldom influences program decision-making and there is little hope that evaluation will ever have a real impact on progress. Those who hold the opposite view assert that evaluation influences programs in important and useful ways (p. 17).

The researchers also noted that an assessment of whether or not evaluation "worked" depends on how one defines "utilization." Some people employ a rather narrow definition of utilization that looks for evaluation to have a rapid and decisive impact on major program activities and decisions. Others broaden the concept of utilization to include impacts that are more subtle and those that are not felt for a period of time. Alkin, Daillak, and White adopted the second perspective; they found that evaluation generally influenced program decision-making and program operation. Where this was not the case, this was due to (1) pre-existing boundaries such as monetary constraints or a difficult working relationship in the program; (2) the orientation of decision-makers (i.e., whether they believe the evaluation addresses their needs); (3) the evaluator's credibility and the approach

used (how the evaluator defined and performed the evaluation task); (4) the appropriateness of the methodology used in the evaluation; (4) the organization factors that usually determine funding decisions, the choice of evaluation methodology, and how the evaluation information will be used; (6) user involvement; and (7) the manner in which the findings are reported.

The Systems Approach

The systems approach has become an increasingly popular approach to evaluating programs. Enthoven (1968) testified that the Navy successfully used the systems approach to clarify issues and lay the foundation for future progress. He defined the systems approach as a systematic attempt to provide decision-makers with a full, accurate, and meaningful summary of information relevant to clearly defined issues and alternatives. He noted that the purpose of the technique is to find the most efficient and economically reasonable method of using one's resources.

The systems approach was adopted for the purposes of this study because of the interest in applying the study's findings to future management decisions. Though the concept of a system has different meanings for different disciplines, Hickey's (1960) definition was adopted as being the most appropriate for this study. Hickey defined a system as "an assemblage of variables by some form of regular interaction

or interdependence, which collectively contributes toward an important complex function" (p. 73).

Systems have unique characteristics. According to Robb (1973), systems can be living organisms or cosmic phenomena, static or dynamic, and open or closed. A system operates in an environment in which there are elements and relevant properties that are not necessarily part of the system, but that impinge on the system. A change in any of these elements can produce a change in the state of the system.

Generally, systems may be said to have five components: input, process, output, goal-state, and feedback. Ward and Dettoni (1974) described "input" as what goes into the system to be processed; "processing" as the series of experiences by which the input is modified; and "output" as what comes out of the system. Sharma (1978) defined "goal-state" as the state towards which a system tends to move and "feedback" as a monitoring device to assess whether or not a system has achieved the predetermined goal-state. Sharma noted that goal-state is the specific measure of performance of the system, while feedback supplies information for modifying plans and policies in order to achieve better results. In discussing the systems approach to education, Sharma commented that resources at our disposal are by definition scarce, thus there is a need for the systems approach to increasing the efficiency of educational systems.

In order to understand the effectiveness of educational systems, one needs to examine the dependent and independent

variables involved in the process. According to Weiss (1972), analyzing program variables can help to explain why programs have given outputs. This helps the researcher and/or program personnel to determine which inputs in the program are associated with success or lack of success so that the variables can be manipulated (if possible) for better results.

Based on Abbott and Levinson's (1974) work, Tate (1977) listed and discussed five criteria for assessing the effectiveness of a nutrition education program: maintenance, coverage and replicability; speed of implementation; feasibility; constraints; and political acceptability. This study was concerned with the "maintenance" aspect of EFNEP, specifically the maintenance of recommended food consumption behavior by EFNEP homemakers. As Tate noted,

> A successful project should be defined as one capable of maintaining its effects. A massive "one-shot" nutrition education program resulting in significant short-term change, for example, but having no lasting benefit would not be considered successful (p. 35).

The specific dependent and independent variables examined in the study are discussed in detail in Chapters I and III.

In summary, despite the problems and concerns associated with evaluation research, evaluation has rapidly grown as a discipline and has been identified as a useful tool in program management. Although it is not the function of evaluation to make management decisions, evaluation research can identify alternatives and present information that contributes to the effectiveness and efficiency of educational

programs. The systems approach was selected as the most appropriate evaluation methodology for this study.

Chapter III

METHODOLOGY

The data for this study were collected as part of a larger evaluation project financed by state allocations to Michigan EFNEP. The goal of the larger study was to explore the overall impact of Michigan EFNEP at a general level. This study focused on an in-depth assessment of the dietary adequacy changes fostered by the program and on the relationship between these changes and selected variables. The proposal for this research was developed during an internship with Michigan EFNEP. Subsequently, the researcher joined the project staff and participated in all aspects of the project (i.e., initial decision-making, constructing the questionnaire, and processing and analyzing the data). Included in this chapter are discussions of the research design; the sample; the instruments and procedures used to collect, process, and analyze the data; and the limitations of the study.

Research Design

Given the interest in providing management information that could be used to help reconcile the need for optimal program performance with limited economic resources, a

longitudinal follow-up evaluation research approach was chosen for the study. This model was considered appropriate because dietary adequacy measurements had been taken at six month intervals during the program and at the time homemakers left the program. These estimates, when compared with estimates taken at the time of the follow-up study (from six months to three years after homemakers left the program), provided a means of exploring dietary adequacy changes as a function of length of participation, homemakers' entry dietary adequacy levels, and homemakers' demographic characteristics.

A descriptive approach was chosen for a number of reasons: (1) although the overall sample size was large (n = 86), the subjects differed by virtue of the varying lengths of time they had spent in and out of the program; therefore, the resultant sub-samples of homemakers were so small that more rigorous statistical techniques could not be used; and, (2) two sources of data were used for the study: secondary data obtained from program records and primary data collected as part of the follow-up evaluation project.

The use of different sources of data also limited the scope of the study. Thus, although the larger evaluation project examined several indicators of program effectiveness (e.g., nutrition knowledge, adoption of recommended practices, food shopping practices, program spin-off effects,

and program visibility) in addition to the 24-hour food recall, these variables could not be examined in the present research because no pre-program measurements had been taken on those variables.

The Sample

The population considered for the larger evaluation project was composed of former EFNEP homemakers who had been enrolled in and left the Michigan program during the period from 1974 to 1978. The research team considered the four year period to be sufficient for determining the long-term effects of the program. Hickerson and Middleton (1975), in discussing the problems of selecting an appropriate time for evaluation, commented:

> When [summative] evaluation should be conducted is a difficult question....If evaluation is conducted too soon after training, the learner will not have had enough opportunity to begin using new skills. If evaluation is conducted too long after training, any number of events may have occurred in the period between training and evaluation which can have prevented new skills from being used (p. 292).

According to EFNEP annual reports, 8,827 homemakers participated in EFNEP programs in 16 Michigan counties from 1974 to 1978. Of these homemakers, 3,525 lived in the five counties (Genesee, Monroe, Kent, Ingham, and Sanilac) that had been randomly selected for the EFNEP evaluation project (see Figure 3).

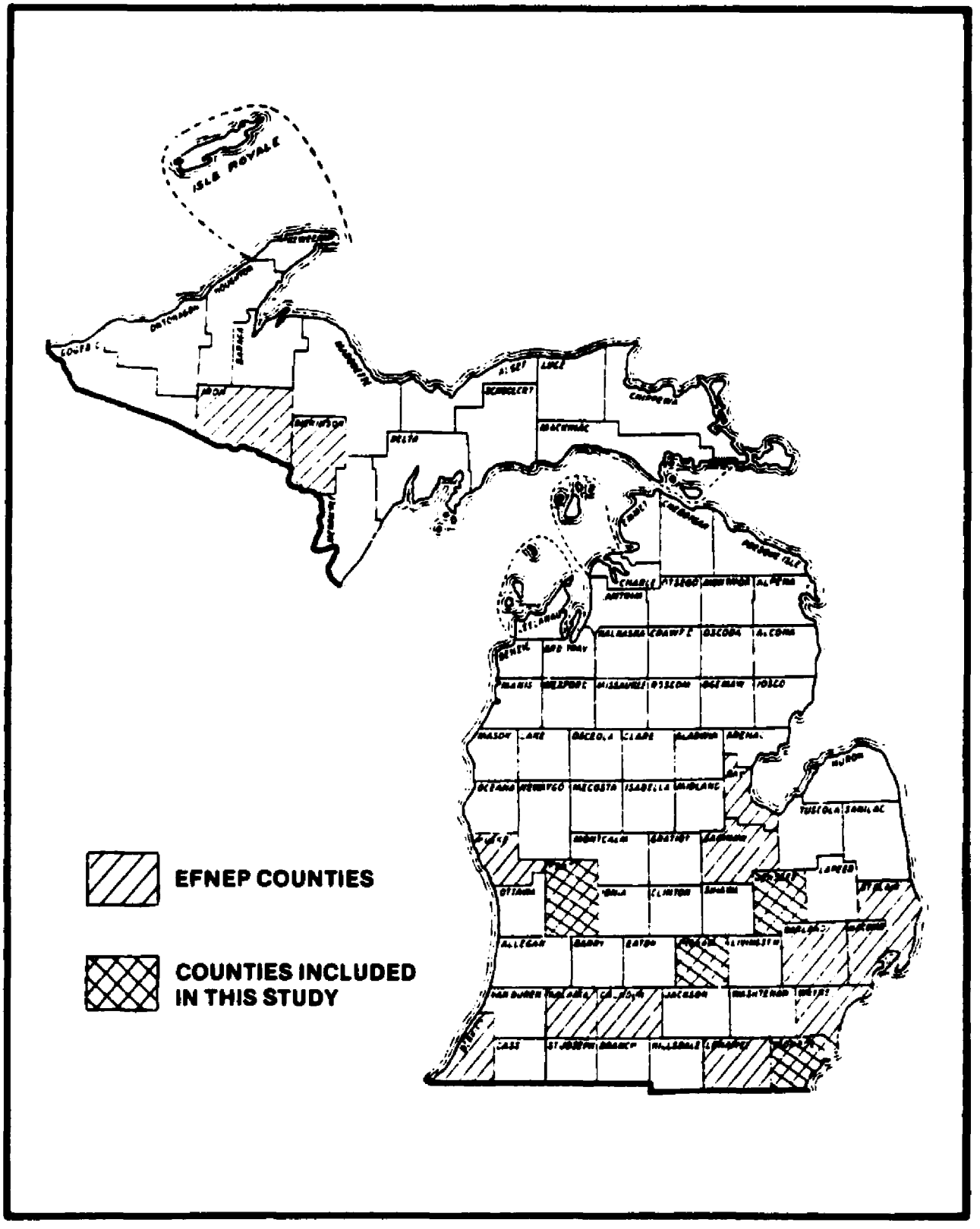

Figure 3. EFNEP Counties in Michigan

A total sample of 100 homemakers was desired; however, due to the high geographic mobility of the participant families, 150 families were sought for follow-up contact. Homemakers were selected by reviewing the records kept at county EFNEP offices. The home economist and program supervisor at the county office pulled all files of homemakers who had been in the program at least one year, had left the program for at least six months prior to the study, and for whom at least four sets of 24-hour food recall data (entry, six months, twelve months, and termination) were available.

County staff members tried to locate these potential subjects by checking telephone listings and listings at the Departments of Social Services and/or Health. The names of those who could be located were alphabetically arranged and assigned numbers starting with one. Using a table of random numbers, the home economist selected 125 subjects for the study. One homemaker declined to participate, and 16 homemakers could not be reached, thus reducing the total sample size for the larger project to 108 (Genesee, n = 20; Monroe, n = 28; Kent, n = 20; Ingham, n = 21; and Sanilac, n = 19).

All of the homemakers from the original sample for the larger evaluation project were initially considered for inclusion in this study. However, subjects from Sanilac County (n = 16) were dropped because the Sanilac program had been phased out before homemakers had completed their educational experience. Six homemakers were also excluded

because their records contained missing data on the 24-hour food recall. Thus, the final sample for this study included 86 homemakers (Genesee, n = 19; Monroe, n = 26; Kent, n = 20; and Ingham, n = 21).

Demographic Characteristics

The personal characteristics of the 86 homemakers in the sample and the socio-economic characteristics of their families are discussed with reference to Tables 8 and 9. Data from records kept by the nutrition aides shows that the time spent in the program ranged from 13 to 42 months. Although the average length of time in program was 28 months, over half of the homemakers (54.6 percent) left the program during the first 12 to 18 months. The period from the time of program termination to the time of the follow-up survey ranged from 6 to 32 months and the average was 13 months (see Table 8). The homemakers had met with the nutrition aides an average of 28 times with the number of contacts ranging from 2 to 75.

The sample was predominantly composed of white homemakers (86.0 percent) who ranged in age from 20 to 74 years. Although the average age for the sample was 33 years, most of the homemakers were either below 25 years (34.0 percent) or over 35 years (39.0 percent). Years of schooling ranged from 0 to 14 years. The average number of years in school was 10, and an overwhelming majority of the homemakers

(83.7 percent) had educations ranging from the 9th through the 12th grades (see Table 9).

Table 8. Distribution of Homemakers According to Length of Participation

Length of Participation	Homemakers	
	Number	Percentage
12 months	21	24.4
18 months	26	30.2
24 months	15	17.4
30 months	14	16.3
36+ months	10	12.6
TOTAL	86	100*

*Totals may not add due to rounding

The families studied were predominantly urban (81.0 percent) and ranged in size from one to six members with an average family size of 4.1 members (as compared with 3.5 members in all U.S. families and 3.7 members in Michigan families). The average numbers of adults and children in the families were 1.5 and 2.9, respectively. Almost half (47.7 percent) were single parent families. Only 2.3 percent of the families had no children, while 68.0 percent of the families had 1 to 3 children, and 30.0 percent had 4 to 9 children.

Table 9. Demographic Characteristics of Homemakers in Sample

Residence	
Urban	81.4 percent
Rural	4.7 percent
Rural non-farm	14.9 percent
Ethnic Background	
White	86.0 percent
Black	10.5 percent
Spanish American	2.3 percent
Other	1.2 percent
Participation in Government Assistance Programs	
Food stamp and welfare programs	74.1 percent
Food stamp only	68.4 percent
Welfare only	5.8 percent
Does not participate in any programs	26.7 percent
Education	
8th grade or less	12.8 percent
9th grade through 12th grade	83.7 percent
Beyond high school	3.5 percent
Monthly Income Distribution	
Under $166	1.2 percent
$167 - $250	2.3 percent
$251 - $333	16.3 percent
$334 - $416	18.3 percent
$417 - $516	16.4 percent
$157 and over	44.2 percent
Missing data	1.2 percent
Other Data	
Average age of homemakers	33 years
Average years of education	10 years
Average number of adults in family	1.5 persons
Average number of children in family	2.9 persons
Average family size	4.1 persons
Average family income	$432.00/month
Average food expenditure	$124.80/month
Average value of food stamps	$352.00/month

The data on economic variables is typical of the data for low income families in general. Homemakers had an average monthly income of $432.00 and spent about 29 percent ($124.80) of that income on food. A total of 74.1 percent of the homemakers reported that their families received some type of government financial assistance. Of this total, 58.1 percent received only food stamps, while 5.8 percent received only welfare. Only 26.7 percent of the homemakers did not participate in any type of government assistance program. The 68.4 percent who participated in the government food stamp program reported that they received an average of $352.00 worth of food stamps per month.

Comparison with Michigan EFNEP Population

Since the sample did not include the entire population of homemakers who participated in EFNEP from 1974 to 1977 and was not a random sample of the population, an attempt was made to explore the extent to which the sample was representative of the larger Michigan EFNEP population. Data on six demographic characteristics of the sample were compared with demographic data collected by the Michigan EFNEP office (see Table 10).

The annual mean income of homemakers in the sample was $5,884.00, which was slightly higher than the mean income ($5,172.00) of the Michigan population. The percentage of families that participated in the government food stamp program was also quite similar: 68.4 percent of the sample

as compared with 69.3 percent for the 1974-1977 EFNEP population in Michigan. The average family size of the sample (4.1 persons) was also close to the average size of families in Michigan EFNEP (4.0 persons). In general, with the exception that the sample included a larger proportion of white homemakers than is characteristic of the Michigan EFNEP population as a whole, the sample was quite similar to the Michigan EFNEP population and could be considered representative of that population.

Table 10. Comparison of Demographic Characteristics of the Sample and the Michigan EFNEP Population

Characteristic	Sample (1978)	Michigan EFNEP Population (1974-1978)*
Average annual income	$5,884.00	$5,172.00
Average monthly income	$ 432.00	$ 378.00
Average monthly food expenditure	$ 124.80	$ 106.00
Average family size	4.1 persons	4.0 persons
Homemakers participating in food stamp program	68.4 percent	69.3 percent
Number of homemakers in study	86	3,525

SOURCE: Michigan EFNEP, Annual Reports. Since figures were computed from aggregated state reports, no standard deviations were available for the population data and no tests of significance were performed. No adjustments were made for inflation.

Data Collection, Processing, and Analysis

Data Collection

As noted earlier, two types of data were used for the study: secondary data from program records and primary data from the follow-up survey.

Program Records. The program records included information on the homemakers' personal and family characteristics collected when homemakers entered and left the program. The records also included information on the number of contacts that the homemakers had with nutrition aides and the results of 24-hour food recall scores taken at entry, termination, and every six months that homemakers were in the program.

The actual instrument that is filed in the program records is the Expanded Food and Nutrition Education Program Family Record. This instrument, which was developed at the national level, is used in the usual operations of the program to gather data regarding the general characteristics of homemakers and their families, homemaker's food consumption patterns, and family income and expenditure (see Appendix C). Data on food consumption practices are collected using the 24-hour food recall which was described in Chapter II.

Though the data in the program records were collected by different individuals, previous research studies by EFNEP indicate that similar data are fairly consistent and that

the use of different individuals does not pose a serious methodological constraint (USDA, Economic Research Service, 1973).

Follow-Up Survey. A survey questionnaire developed for the Michigan EFNEP evaluation project was used to collect follow-up data (see Appendix D). Most of the items in the questionnaire were constructed from a list of important concepts that the Michigan EFNEP field staff had identified as best reflecting the objectives of the program (see Appendix E). The questionnaire also included items from other instruments in the EFNEP evaluation literature. Although this instrument was designed to measure several aspects of the program, only general perceptual data on dietary changes (Items 2, 3, 7, 15, 18, 19, 20, 21, 24, and 69) and on the homemaker's demographic characteristics and food consumption behavior (Items 70 - 102) were used in this study. The questionnaire was designed by a home economist at the Michigan EFNEP office and was reviewed by experienced nutrition aides to explore the appropriateness of the items in terms of what was taught during the program. It was also pilot-tested on 10 former participants from a county not included in the study. The questionnaire was then modified accordingly.

The questionnaire was administered from January to March 1979 by a home economist who had a master's degree in food and nutrition. The county supervisor of each EFNEP program accompanied the home economist during the interviews.

No appointments were made, but at least two attempts were made to reach every family. After having been introduced to the homemaker by the supervisor, the home economist read a description of the purpose of the project and obtained the homemaker's written permission to include the homemaker in the study. Using a structured interview schedule, the home economist then read the items in the questionnaire and used pictures and food models to enhance communication (see Appendix D). The homemaker's responses were recorded on the questionnaire.

Data Processing

Dietary adequacy scores were derived by using the data from the 24-hour food recall scores in the program records and the questionnaire. These scores and the data on the length of participation, number of contacts with nutrition aides, demographic characteristics of homemakers and their families, and the homemakers' perceptions of dietary changes were coded on opscan scoring sheets and machine punched onto standard 80 column computer cards at the Office of Evaluation Services at Michigan State University.

Data Analysis

The goal of the data analysis was to assess the effectiveness of EFNEP and to investigate the relationships between certain variables (i.e., entry dietary adequacy level, length of participation, demographic characteristics

and homemakers' perceptions) and dietary adequacy changes.

The researcher initially intended to develop a statistical profile of dietary adequacy trends for each six months that homemakers were enrolled in the program so that the dietary adequacy change curves for the various groups could be evaluated according to length of time in program. However, because the study in part relied on data routinely collected during the program and because there was not control over the sample size for each interval, the resulting subsamples of homemakers for those variables were small and unequal in size. This precluded using the appropriate multivariate techniques of repeated measures profile analysis as these techniques require an equal number of observations in each treatment level (Kirk, 1969). Neither could joint analysis be used for the whole sample because data for some measure intervals after 12 months were missing since not all of the homemakers were in the program for the same amount of time.

Since the study was basically concerned with describing dietary changes and the nature of the data limited the techniques that could be used, descriptive statistics (i.e., frequencies, percentages, mean, standard deviation, and range) were used extensively. Inferential statistics were also used whenever appropriate. These included correlations, factorial analysis of variance (ANOVA), factorial analysis of covariance (ANCOVA), and a priori comparison tests. An

alpha level of 0.05 was used to determine the significance of the results. The 6.5 version of the Statistical Program for the Social Sciences (Nie, Hull, Jenkins, Steinbrenner, & Bent, 1975) was used for all statistical analyses. Analyses were performed on the CDC 6500 computer at Michigan State University Computer Laboratory. The analysis was done sequentially according to the research questions after the demographic data were analyzed to generate a profile of the homemakers who participated in the study.

Dietary Adequacy Changes. Food consumption behavior descriptive statistics and graph presentations were used to assess whether or not there were any dietary adequacy changes and whether or not these changes were sustained for six months or more after homemakers left the program. These data (entry, termination, and follow-up dietary adequacy scores) were analyzed from two perspectives: (1) for the sample as a whole and (2) for three sub-groups. These sub-groups were formed according to the nature of the impact of the program. The Positive Group included homemakers whose dietary adequacy scores increased during the program, the Neutral Group included homemakers whose dietary adequacy scores did not change during the program, and the Negative Group included homemakers whose dietary adequacy scores decreased during the program.

Entry Level and Length of Participation. The information about the extent to which length of participation and entry

dietary adequacy level were related to dietary adequacy changes was obtained by analyzing entry, termination, and follow-up data. However, two factors were checked before the main analysis: (a) in a study of Michigan EFNEP, Morris (1973) noted that the number of contacts with the nutrition aide was related to dietary adequacy change. Therefore, Pearson Product Moment Correlations were run to examine the relationship between length of participation and number of contacts with the aide. The correlation coefficient was .45 indicating that length of participation and number of contacts were moderately related. Since they were related, a decision was made to use only length of participation in the analysis in order to avoid redundant information. (b) Since homemakers had been out of the program for various lengths of time, Pearson Product Moment Correlations were also performed to find out whether time since termination was related to overall dietary change. As there was no significant relationship between the two variables ($r = -.05$), the time since termination variable was not included in the analysis (see Table 11).

The investigation of length of participation and entry dietary adequacy level proceeded by describing and plotting the entry, termination, and follow-up scores for homemakers. The homemakers were groups according to their entry dietary adequacy level into three sub-groups: the Low Group included homemakers whose entry scores were 0 to 42 points, the

Table 11. Correlation Matrix of Relationships among Length of Participation, Number of Contacts, Time since Termination, and Dietary Adequacy Changes

Variable	Length of Participation	Number of Contacts	Overall Change	Time since Termination	Program Change
Length of Participation	1.00	--	--	--	--
Number of Contacts	.45*	1.00	--	--	--
Overall Change	.09	.01	1.00	--	--
Time since Termination	- .09	.02	- .05	1.00	--
Program Change	- .07	- .11	.76**	- .002	1.00

*p .008 **p .001

Medium Group included homemakers who had scores of 43 to 62 points, and the High Group included homemakers who had scores of 63 to 100 points.

A two-way 3 x 4 factorial analysis of variance and a priori contrasts were also used to test whether the program and overall dietary adequacy changes for varying entry dietary adequacy levels (three levels) and lengths of participation (four levels) were different and/or if these variables interacted.

Entry Level and Demographic Characteristics. Two analyses were performed to establish the relationships between entry dietary adequacy levels, subsequent dietary adequacy changes, and demographic variables: (1) a series of one-way ANOVAs were run with entry dietary scroes as the dependent variable and each demographic characteristic as the independent variable and (2) a series of ANCOVAs were performed with demographic variables as independent variables, program and overall dietary adequacy changes as dependent variables, and entry dietary adequacy level and length of participation as covariates. ANCOVA was used to control for variance in dietary adequacy changes that might be due to the entry level and length of participation variables when determining the effects of the demographic characteristics.

Homemakers' Experiences and their Perceptions of Dietary Change. To ascertain information on how homemakers perceived their dietary changes, the responses to the

general descriptive items (Items 2, 3, 7, 15, 19, 20, 21, 23, 24, 31, and 69) were interpreted using descriptive statistics. Separate ANOVAs on homemakers' perceptions of their dietary changes during and after the program (Items 7, 20, 21, 23, and 24) were also run.

Limitations of the Study

The limited types of information in the program records, the small size of the subsamples, and the homogeneity of the sample posed a number of design, analytical, and interpretive problems. The nature of the data precluded the use of a time-series research design that might have been more appropriate than the descriptive approach. Nor could other, more rigorous statistical tests such as multi-variate analyses or repeated ANOVAs be meaningfully employed to analyze the data.

Furthermore, some of the results should be interpreted with caution. The lack of statistical significance and the low correlation coefficients for some of the variables may be due to the small subsamples used in the analysis and to the demographic homogeneity of the sample.

More importantly, it may be that Michigan EFNEP is more effective than could be documented in this study. The 24-hour food recall measured only one aspect of the multiplicity of subject areas covered in the program and, as noted in Chapter II, the dietary instrument has its own

limitations. Through the use of nutrition aides, EFNEP emphasizes an individualistic approach to offering educational services and offers instruction in an array of nutrition-related subjects and practices.

Data gathered for the larger evaluation project (i.e., nutrition knowledge, food shopping practices, adoption of recommended practices, program visibility, and program spin-offs) could have helped to develop a more comprehensive description of the program's impact. The data could have been treated as dependent variables to indicate the effectiveness of the program and/or as independent variables to explain the variance in dietary adequacy changes. Such data might also have shown that the homemakers who did not show positive dietary changes experienced other positive effects of the program. However, these data could not be used because there were no pre-program measures on these variables.

Chapter IV

RESULTS

Included in this chapter are a description of the findings regarding program and overall dietary adequacy changes; the relationships between these changes and selected variables (entry dietary adequacy level, length of participation, and demographic characteristics); and the homemakers' perceptions of their dietary changes after participation in EFNEP.

Dietary Adequacy Changes

The first research question, Do homemakers improve their diets while enrolled in the program and do they maintain those improvements for six months or more after they leave the program?, focused on program and overall changes in the dietary adequacy level of EFNEP homemakers. Entry, termination, and follow-up scores derived from the 24-hour food recall were used to assess changes for the sample as a whole and for selected sub-groups.

Of the total sample (n = 86), 45 persons (52.3 percent) had dietary adequacy scores at the end of the program that were higher than their entry scores, while 46 persons (53.3 percent) had higher dietary adequacy scores at the time of

the follow-up survey than at the time they entered the program. Of the 45 homemakers whose scores improved during the program, 32 (71.7 percent) still had improved scores at the time of the follow-up survey. Of the 41 homemakers whose scores had not improved by the end of the program, 14 (34.1 percent) had follow-up scores that were higher than their entry scores (see Table 12).

Table 12. Distribution of Homemakers Showing Program and Overall Changes in Dietary Adequacy Scores

Description	Homemakers with improved scores at follow-up	Homemakers without improved scores at follow-up	Total
Homemakers with improved scores at program termination	32	13	45
Homemakers without improved scores at program termination	14	27	41
Total	46	40	86

From these results, it can be seen that the program was effective for slightly more than half of the participants, and that almost three-quarters of those who improved during the program maintained that improvement.

The sample was next divided into three sub-groups according to the impact of the program: the Positive Group

(n = 46) included homemakers whose termination dietary adequacy scores were higher than their entry scores; the Neutral Group (n = 10) included homemakers whose termination scores were the same as their entry scores; and the Negative Group (n = 30) included homemakers whose termination scores were lower than their entry scores. The mean scores for these sub-groups and for the sample as a whole were analyzed to determine dietary adequacy changes (see Table 13 and Figure 4).

Table 13. Changes in Mean Scores of Sample and Positive, Neutral, and Negative Groups

Group	Homemakers		Mean Score			Change	
	N	%	E (SD)	T (SD)	F (SD)	T - E (SD)	F - E (SD)
Positive	46	53.5	43	76	66	+33	+23
	--	--	(20.65)	(18.80)	(24.36)	(18.22)	(24.95)
Neutral	10	11.6	69	69	68	0	- 1
	--	--	(21.03)	(21.03)	(33.57)	-	(33.02)
Negative	30	34.9	70	52	59	-18	-11
	--	--	(18.44)	(18.88)	(25.33)	(13,76)	(28.99)
Sample	86	100	55	72	62	+17	+ 7
	--	--	(23.55)	(21.85)	(25.49)	(10.90)	(30.54)

E = Entry, T = Termination, F = Follow-Up, SD = Standard Deviation

The entire sample had an increase in mean dietary adequacy score of 17 points at termination. At follow-up,

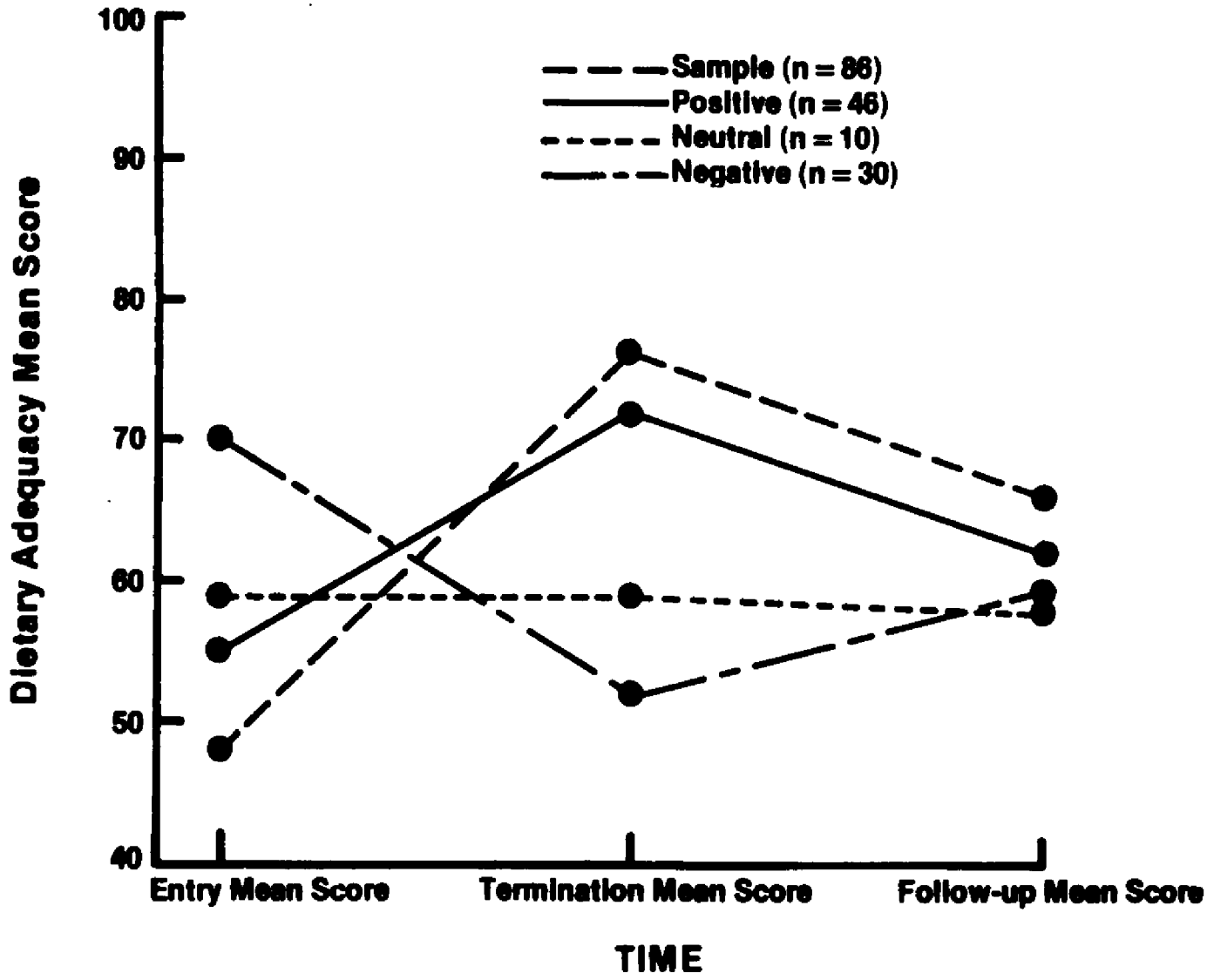

Figure 4. Dietary Adequacy Profiles of Sample and Positive, Neutral, and Negative Groups

the mean score of the sample had decreased 10 points from the termination mean but still showed a net increase of 7 points from the entry mean. Thus, the overall increase for the entire sample was 7 points.

The mean score of the Positive Group increased by 33 points from entry to termination and by 23 points from entry to follow-up. The mean score for the Neutral Group did not change from entry to termination but decreased by 1 point from entry to follow-up. The mean score of the Negative Group decreased by 18 points from entry to termination but only decreased by 11 points from entry to follow-up. Even though this group had an overall decrease of 11 points, there was some improvement between termination and follow-up (7 points).

As shown in Figure 4, entry level scores are inversely related to improvement, indicating that homemakers who had the poorest diets at program enrollment benefited the most from the program. On the other hand, those who had the highest scores at enrollment tended to have a lower dietary adequacy level at program termination. Thus, the results suggest that the program had mixed effects on the homemakers since some homemakers did not improve and others even regressed.

The range of dietary adequacy scores among homemakers also seems to have been affected by the program. The gap between the mean scores of the Positive and Negative groups was 22 points at enrollment and 24 points at follow-up, but

only 8 points at follow-up. Thus, homemakers' dietary adequacy scores were more similar at follow-up than at the beginning of the program.

It appears that a moderating or equalizing effect occurs over time. The mean score at this equalized point is relatively high (62 points) indicating that homemakers have a moderately adequate diet. However, when interpreting the apparent equalizing effect of the program, it is important to remember the statistical phenomenon known as "central tendency." This means that scores tend to equalize when groups have been selected on the basis of their extreme scores (Campbell, 1962).

Relationships between Dietary Adequacy Changes and Selected Variables

The second and third research questions focused on the relationships between dietary adequacy change and selected variables: To what extent are length of participation and entry dietary adequacy level related to dietary adequacy changes that occur during the program and six months or more after the homemakers have left the program? and, Is there a relationship between entry dietary adequacy level, any subsequent dietary adequacy changes, and certain demographic characteristics? Though the results indicate that the program has, in general, had a positive impact on EFNEP homemakers (52.3 percent of the sample had better diets when

they left the program and 53.5 percent had better diets at the time of the follow-up survey than at the beginning of the program), these results may be misleading. The entry dietary adequacy levels and demographic characteristics of the homemakers varied as did their lengths of participation in the program. The effects of these variables on dietary adequacy changes are explored in this section.

Entry Dietary Adequacy Level

The effect of entry dietary adequacy level was examined by computing correlations between entry scores and program gains for the sample as a whole and by dividing the sample into three sub-groups according to their entry level scores: the Low Group (n = 28) included homemakers whose entry scores were 0 to 42 points, the Medium Group (n = 28) included homemakers whose scores were 43 to 62 points, and the High Group (n = 30) included homemakers whose scores were 63 to 100 points. The mean scores of these groups were then analyzed to determine the relationship between entry dietary adequacy level and program and overall dietary change (see Tables 14 and 15).

Significant negative correlations were found between entry dietary adequacy level and both program and overall dietary adequacy changes (r = -.66 and -.58, respectively). Thus, persons who initially score low tend to have scores that decline. The changes in mean scores for the different groups (Low, Medium, and High) clearly show an inverse

Table 14. Changes in Mean Scores of Sample and Groups with Low, Medium, and High Entry Dietary Adequacy Levels

Group	Homemakers		Mean Score			Change	
	N	%	E (SD)	T (SD)	F (SD)	T - E (SD)	F - E (SD)
Low	28	32.5	28 (12.13)	60 (22.59)	58 (26.10)	+32 (25.62)	+29 (25.24)
Medium	28	32.5	56 (6.42)	67 (25.41)	58 (27.09)	+11 (25.66)	+ 2 (25.87)
High	30	35.0	80 (10.95)	71 (16.18)	68 (22.63)	- 9 (17.52)	-11 (25.86)
Sample	86	100.0	55 (23.55)	72 (21.85)	62 (25.49)	+17 (10.90)	+ 7 (30.54)

E = Entry, T = Termination, F = Follow-Up, SD = Standard Deviation

Table 15. Distribution of Sample and Low, Medium, and High Entry Dietary Adequacy Groups Showing Program and Overall Changes in Dietary Adequacy Scores

Group	N	Homemakers with improved scores at termination		Homemakers with improved scores at follow-up	
		N	%	N	%
Low	28	22	78.6	23	82.3
Medium	28	17	60.7	14	50.0
High	30	6	20.0	9	30.0
Sample	86	45	52.3	46	53.5

relationship between entry dietary adequacy level and subsequent dietary adequacy changes. In the Low Group, 78.6 percent of the homemakers had higher termination than entry scores and 82.1 percent had higher follow-up than entry scores. In contrast, only 60.7 percent of the Medium Group and 20.0 percent of the High Group had higher termination than entry scores and only 50.0 percent of the Medium Group and 30.0 percent of the High Group had higher follow-up than entry scores.

The mean score estimates show that the Low and Medium Groups had positive changes during the program and had maintained some of that improvement at the time of the follow-up survey, while the scores of those in the High Group regressed during and after the program. The Low Group had the most dramatic improvement (32 points) during the program and maintained 29 points of total improvement at follow-up. In comparison, the Medium Group improved by 11 points during the program and had an overall improvement of only 2 points at the time of the follow-up survey. The mean score of the High Group decreased by 9 points during the program and was 11 points less at follow-up than at entry.

The findings suggest that the Low, Medium, and High Groups had different program and overall dietary changes and that these changes were related to entry dietary adequacy level. Two way ANOVA tests were performed to test the significance of the relationship. Entry dietary level produced

a statistically significant difference for both the program and overall dietary adequacy change (df = 2, MS = 4894.134, F = 20.170, and p = .001). The ANOVA contrasts showed that (1) changes for the Low Group were significantly greater than those for the Medium and High Groups and (2) changes for the Medium Group were significantly greater than for the High Group.

Length of Participation

The dietary adequacy scores for the Low, Medium, and High Groups were next examined to determine whether or not there was any relationship between length of participation and changes in dietary adequacy level. Each sub-group was further subdivided into groups representing their scores at six-month intervals (see Tables 16 and 17 and Figures 5 and 6).

There appear to be three distinct patterns of dietary adequacy change based on entry dietary adequacy level and length of participation. The scores of those in the Low Group increased dramatically during the first six months of the program, decreased during the next six months of the program, and then stabilized. The scores of those in the Medium Group increased in the first 12 months and leveled off or decreased thereafter. In contrast, the scores of those in the High Group decreased during the first six months, although there was some leveling off during the rest of the program. The results of ANOVA tests for the effect of entry dietary adequacy level and length of participation

Table 16. Distribution of Sample and Low, Medium, and High Entry Dietary Adequacy Groups Showing Changes at Different Times in Program

Time in Program	N	Homemakers with improved scores at termination		Homemakers with improved scores at follow-up	
		N	%	N	%
Low Group					
12 months	7	6	85.7	5	71.4
18 months	11	8	72.7	8	72.7
24 months	3	3	100.0	3	100.0
30+ months	7	5	71.4	7	100.0
Medium Group					
12 months	6	3	50.0	2	33.3
18 months	10	7	70.0	5	50.0
24 months	5	2	40.0	3	60.0
30+ months	7	5	71.4	4	57.1
High Group					
12 months	8	1	12.5	4	50.0
18 months	5	0	--	0	--
24 months	7	1	14.3	2	28.6
30+ months	10	4	40.0	2	30.0
Total	86	45	52.3	46	53.5

Table 17. Changes in Mean Scores of Low, Medium, and High Entry Dietary Adequacy Groups According to Time in Program

Group	N	Mean Score							Change	
		E	6 mos.	12 mos.	18 mos.	24 mos.	30+ mos.	F	T - E	F - E
Low										
12 mos.	7	20	59	55	--	--	--	43	+25	+23
18 mos.	11	30	75	50	58	--	--	52	+28	+22
24 mos.	3	24	33	33	42	62	--	74	+38	+50
30+mos.	7	35	63	58	58	65	69	73	+34	+38
Medium										
12 mos.	6	56	59	70	--	--	--	50	+14	- 6
18 mos.	10	55	66	70	69	--	--	58	+ 9	+ 3
24 mos.	5	59	58	79	72	54	--	68	- 5	+ 9
30+mos.	7	57	57	75	74	68	72	60	+15	+ 3
High										
12 mos.	8	80	67	67	--	--	--	73	-13	- 7
18 mos.	5	76	33	64	64	--	--	51	-12	-25
24 mos.	7	81	80	70	66	74	--	70	- 7	-11
30+mos.	10	82	65	62	70	70	77	73	- 5	- 9

E = Entry, T = Termination, F = Follow-Up.

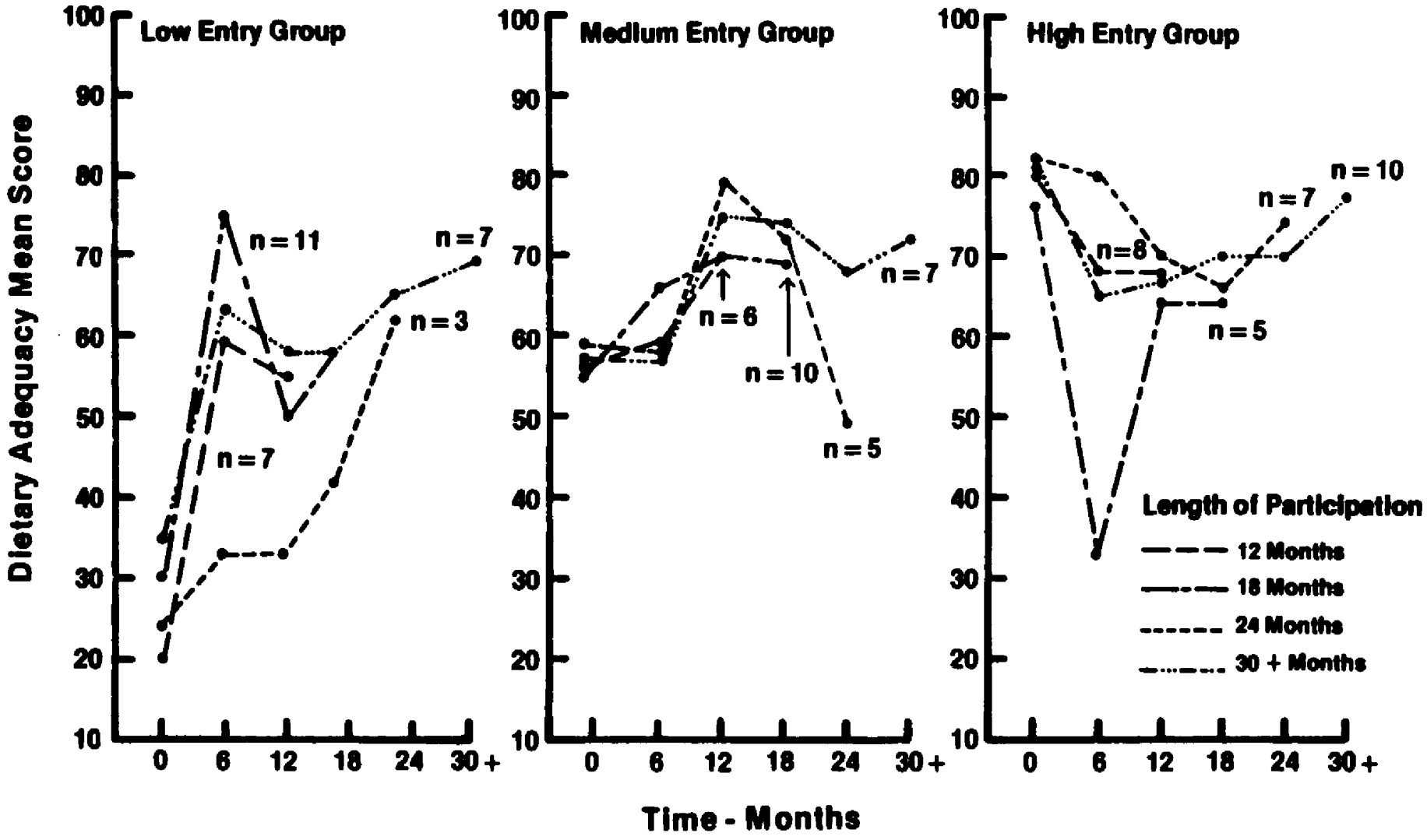

Figure 5. Dietary Adequacy Profiles of Low, Medium, and High Groups During Program

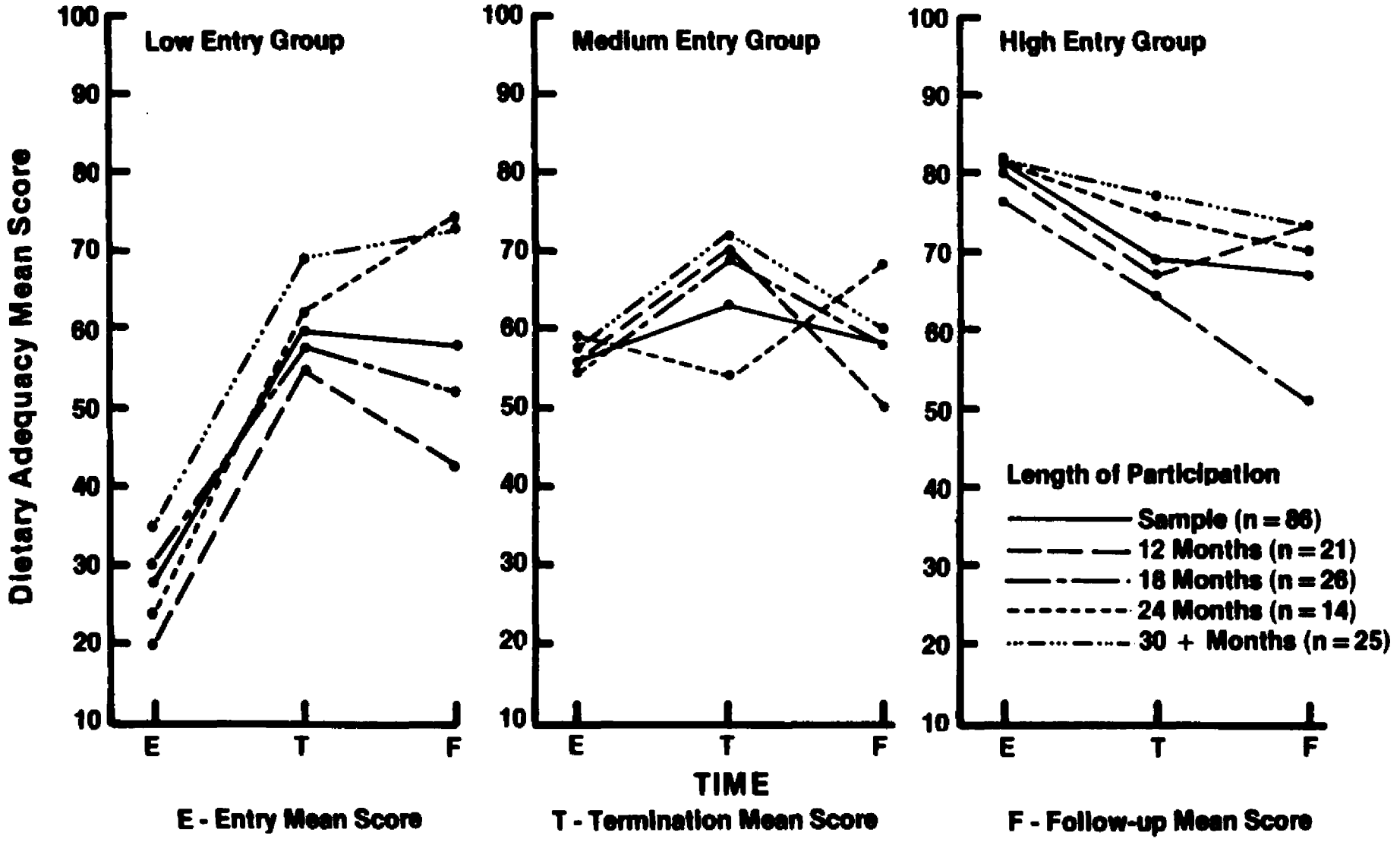

Figure 6. Dietary Adequacy Profiles of Sample and Low, Medium, and High Groups at Entry, Termination, and Follow-up

indicate that there were no discernable effects associated with length of participation (p = .801) or for interaction between entry dietary adequacy level and length of participation (p = .798) (see Table 13).

Table 18. Results of ANOVA Tests on Relationships between Dietary Adequacy Change and Entry Dietary Adequacy Level and Length of Participation

Source of Variance	df	MS	F	p
Entry Dietary Adequacy Level	2	4894.134	20.170	.001*
Length of Participation	3	11472.134	.334	.801
Interaction (Entry by Time)	6	189.724	.511	.798
Residual	74	--	--	--
Total	85	--	--	--

Demographic Characteristics

Age, education, family monthly income, per capita food expenditure, and participation in the food stamp program were examined in relation to entry dietary adequacy level. The probabilities (.918, .966, .266, .471, and .010) from separate one-way ANOVAs for each demographic variable suggest that, with the exception of education, there are no significant differences in entry dietary adequacy level according to demographic variables (see Table 19). The probability

for education was .010, suggesting that homemakers with more education (above the 9th grade) are likely to have better entry dietary adequacy levels. The entry mean score for the group that had more education was 65 compared with 51 for the group with less education.

Table 19. Results of ANOVA Tests on the Relationships between Entry Dietary Adequacy Level and Homemakers' Demographic Characteristics

Variable	df	F	Probability
Monthly income	1 & 84	.035	.918
Age	2 & 85	.011	.966
Education	1 & 84	6.993	.010
Participation in food stamp program	1 & 84	.523	.471
Per capita food expenditure	3 & 81	1.344	.266

The results of ANCOVA tests indicate that entry dietary adequacy level is a significant covariate, but length of participation is not significant. Once variations in these two variables were taken into account, the ANCOVA tests showed that demographic characteristics were not significantly related to program or overall dietary adequacy changes (see Table 20).

Table 20. Results of ANCOVA Tests on the Relationships between Program and Overall Dietary Adequacy Change and Selected Demographic Variables

Variable	Program Change			Overall Change		
	df	F	p	df	F	p
Age	2 x 83	2.501	.088	2 x 83	1,017	.366
Entry Dietary Adequacy Level	1 x 84	73.431	.001*	1 x 84	41.717	.001*
Length of Participation	1 x 84	.327	.569	1 x 84	.000	.985
Education	1 x 84	1.723	.193	1 x 84	1.646	.202
Entry Dietary Adequacy Level	1 x 84	70.647	.001*	1 x 84	41.492	.001*
Length of Participation	1 x 84	.362	.549	1 x 84	.000	.991
Per Capita Food Expenditure	3 x 82	1.518	.217	1 x 84	1.325	.273
Entry Dietary Adequacy Level	1 x 84	67.801	.001*	1 x 84	39.579	.001*
Length of Participation	1 x 84	.534	.467	1 x 84	.003	.953

Homemakers' Experiences and Perceptions of Dietary Change

The fourth and final research question asked, What are homemakers' perceptions of their dietary changes and how do their perceptions coincide with changes in their dietary adequacy scores? Responses to interview questions were used to determine homemakers' perceptions of their EFNEP educational experiences and their views of any dietary changes that may have occurred.

Over half of the homemakers remembered working with a nutrition aide. When asked why they had worked with the aide, about 40 percent of the homemakers indicated that they had wanted to learn new and better ways to feed their families. The homemakers also cited reasons such as the nutrition aide was "nice" and that they worked with her simply because she came to their homes. When asked if they had participated in planning lessons with the nutrition aide, 86 percent of the homemakers said that they had helped the aide plan some lessons. In response to a question that asked what useful information the aide had taught them, 35 percent of the homemakers mentioned that they had learned to use the four basic food groups to balance meals, 21 percent mentioned learning about specific foods as a source of certain nutrients, 20 percent mentioned meal planning, and 24 percent mentioned food preparation.

A majority of the homemakers (82 percent) felt that

the program had had an impact on their food consumption practices. For example, 41 percent of the homemakers reported that their family's eating habits had changed after the nutrition aide's visits, 72 percent reported that they had started eating new foods, 52 percent reported that they had changed their snacking habits, and 54 percent reported that they had changed the way they planned their meals.

When asked about their interest in attending additional educational programs, more than half of the homemakers (52 percent) indicated that they would be interested in participating in future EFNEP activities. More than a third of the homemakers (36 percent) said that they were still receiving food and nutrition information from EFNEP.

The results from separate ANOVAs on the relationship between dietary adequacy changes and the homemakers' perceptions of dietary change are shown in Table 21. The probability figures show that there is no relationship between program and overall dietary adequacy changes and the variables that comprise the homemakers' perceptions of dietary change, except for the area of program benefits. The probability for this area was .037 indicating that there was a significant difference in overall dietary adequacy change between those homemakers who reported that they had benefited from the program and those who reported that they had not benefited from the program. The group of homemakers who reported that they had benefited from the program

Table 21. Results of ANOVA Tests on the Relationships between Program and Overall Dietary Adequacy Change and Homemakers' Perceptions of Dietary Change

Variable	Program Change			Overall Change		
	df	F	p	df	F	p
Change in family's eating habits	3 x 82	1.339	.267	3 x 82	.668	.574
Family ate new foods	1 x 84	.115	.736	1 x 84	.217	.643
Difference in snacks	1 x 84	.301	.584	1 x 84	.123	.728
Difference in meal planning	1 x 84	.078	.782	1 x 84	.078	.782
Program benefit	1 x 84	.019	.886	1 x 84	4.515	.037*

had overall mean scores that were 10 points greater than the scores of those who reported that they did not benefit from the program (+8 compared with -2 respectively). Homemakers' perceptions of benefits were not related to changes during the program, but those who reported having benefited from the program maintained more adequate dietary practices after leaving the program.

Chapter V

CONCLUSIONS AND IMPLICATIONS FOR FUTURE MANAGEMENT

In a preliminary evaluation of EFNEP (USDA, Federal Extension Service, 1969), it was pointed out that, although the evaluation had shown that homemakers' nutritional status had improved by the time they left the program, EFNEP was still faced with a formidable task for any social program—that of demonstrating that it has a real and lasting impact on its audience. The researchers also noted that the program needed to selectively improve its management techniques. The present study was undertaken to examine the effect of Michigan EFNEP on the dietary adequacy of former participants. It was hoped that this information could be used to guide future management decisions. Included in this chapter are discussions of the study's findings and their implications for the future management of Michigan EFNEP.

Summary and Discussion

Changes in the dietary adequacy level of 86 former EFNEP participants and the relationships between these changes and selected variables (entry dietary adequacy level, length of participation, demographic characteristics, and

homemakers' perceptions of their dietary changes) were examined using program records and responses to a follow-up questionnaire. The principal findings of the study are discussed below.

The majority of homemakers had relatively inadequate diets at the time they entered the program. Of the 86 homemakers in the sample, 56 homemakers (65 percent) had entry dietary adequacy scores of 62 points or less. Of these, 28 homemakers (32.5 percent of the sample) had scores of 20 to 35 points, indicating that they had less than minimally adequate diets at the time they entered the program.

The program had a positive effect on the dietary adequacy scores of the majority of homemakers and these effects were sustained after homemakers had left the program. This conclusion is based on the following results: (a) the percentage of homemakers who had improved diets at the end of the program (52.3 percent) and at the time of the follow-up study (53.5 percent); (b) the mean dietary adequacy scores at termination and follow-up were higher than the entry mean scores. The entry mean was 55 points as compared with the termination mean of 72 points and the follow-up mean of 62 points; and, (c) the homemakers' perceptions that the program had a positive effect. Most of the homemakers reported that their diets had changed as a result of their participation in the program. Homemakers' perceptions of change were positively related to their net dietary adequacy

improvements at the time of the follow-up study.

EFNEP homemakers attained dietary adequacy levels that are similar to those of a middle-income population. In a study of three Michigan counties, Story, Padgitt, Fortino, and Booth (n.d.) found that middle class volunteers who had been trained to teach nutrition in elementary school classrooms had a dietary adequacy mean of 69 points. In comparison, the mean score of the low-income homemakers in this study was 72 points at termination and 62 points at the time of the follow-up study. EFNEP's primary goal is to move homemakers towards perfectly adequate diets (100 points). However, the results of this study suggest that EFNEP should set a more realistic dietary adequacy level as its goal since even middle-income homemakers trained in nutrition do not have perfectly adequate diets.

The program was not equally effective for all participants. Over half of the homemakers (46 or 53.5 percent) had higher termination than entry scores, and some of this improvement was sustained at the time of the follow-up study. However, the dietary scores of 10 homemakers did not change and the scores of 30 homemakers decreased during the program. Although the diets of the latter group improved slightly from program termination to follow-up, these homemakers had not recovered their initial dietary adequacy level at the time of the follow-up study.

Entry dietary adequacy level is significantly related to changes in dietary adequacy level during and after the program. The results from the 3 x 4 ANOVA seem to suggest that entry dietary level is a crucial indicator of dietary improvement. Homemakers whose initial scores were low tended to have the greatest increase, while homemakers whose initial scores were high tended to have scores that decreased.

The difference between the mean score of the Low Group and the High Group decreased from entry to follow-up. The Low Group had an entry mean of 28 points, while the High Group had an entry mean of 80 points. At the time of the follow-up survey, the mean for the Low Group was 58 points and the mean for the High Group was 68 points. Thus, whereas the difference in the means was 52 points at the time homemakers entered the program, it was only 10 points at the time of the follow-up survey.

The most dramatic changes in dietary adequacy level occurred during the first 6 to 12 months of participation in the program. The homemakers whose dietary adequacy scores increased during the program tended to have the greatest changes during the first 6 to 12 months. Similarly, those homemakers whose scores decreased during the program also showed the most change during this period (i.e., their scores declined rapidly during the first 6 to 12 months of the program).

Except for education, there was no relationship between homemakers' demographic characteristics and entry dietary adequacy level or dietary adequacy changes during and after the program. Education was found to be slightly related to entry dietary adequacy level, but was not related to dietary adequacy changes.

The above findings are consistent with the findings from short-term evaluation studies. Numerous national and state level studies have indicated that participation in EFNEP results in positive short-term changes in food consumption behavior. The few studies that have examined the post-program impact of EFNEP have also demonstrated that dietary adequacy improvements achieved during the program are maintained to some degree (Gassie, n.d.; Nolan, 1976). However, Rountree's (1973) results conflict with the above findings. Rountree found that dietary adequacy improvements attained during the program were not sustained after the program was terminated.

It is not surprising that the scores of ten of the homemakers did not change during the program. Food consumption patterns can be influenced by a host of factors, including cultural background. Brew (1971) found that personal preference was the most frequently cited reason for food choices. She concluded that homemakers base their food decisions on what they like, rather than on recommended principles of nutrition.

The results for the group of homemakers whose entry scores were high and decreased during the program are astounding. Unfortunately, there is no previous literature to either support or refute these findings as most studies have evaluated dietary adequacy changes at the aggregate level. It is not clear why the dietary adequacy scores for this group decreased during the program and were not recovered by the time of the follow-up study.

The findings regarding length of participation seem to suggest that 6 to 12 months may be the optimum program length. However, these results must be interpreted with caution due to the small number of homemakers in each sub-sample. A repeated measure design with larger sub-groups would have been more appropriate for determining the effects of different lengths of participation.

Caution should also be used in interpreting the findings regarding the relationships between dietary adequacy changes and the homemakers' personal and family characteristics. Education was related to entry dietary adequacy level in that better educated homemakers (9th grade or higher) were more likely to have a higher entry score. However, no differences based on education were evident in the program and overall changes. Thus, the program apparently had an equal impact on participants regardless of educational background or, for that matter, regardless of socio-economic background.

Implications for Future Management

Although the results of the study indicate that the dietary adequacy of the homemakers as a group improved, it is apparent that homemakers with the poorest diets at the time of enrollment made the most improvement and showed the least regression at the time of the follow-up study. These findings have a number of implications for policy makers and program personnel. A major policy-related question that emerges from this finding is who can be best served by EFNEP? A related question is what are the implications of focusing only on some segments of the low-income population (i.e., those with low entry dietary adequacy scores)?

The evidence in the literature and the findings from this study suggest two options for the Michigan program:

> Option 1. Modify the present enrollment procedure so that the program is only offered to those with the least adequate diets. Homemakers with the least adequate diets seem to benefit the most from the program. Three 24-hour food recall scores taken at one-week intervals could be used to screen potential clientele. Homemakers whose entry dietary adequacy scores are above 50 points could be considered ineligible for the program. Using three dietary adequacy scores should result in a more accurate estimate and help to overcome some of the limitations associated with the 24-hour food recall.

Option 2. Redesign the program so that it can benefit the entire target audience. In this option, homemakers with high entry scores would be retained in the program, but different educational activities would be planned for homemakers with high scores than for those with low scores.

The choice of either option has important economic, political, and ethical implications, many of which cannot be fully understood because of the limited amount of information available at this time. For example, a major weakness of this and many other studies is the use of a single criterion (dietary adequacy level) to measure program effectiveness. Though it is clear that there is a relationship between entry dietary adequacy level and changes during the program, EFNEP is a complex program that may have a positive impact on many other areas besides food consumption behavior.

If we are to understand the implications of the above policy options, there is a critical need for additional research in the following areas.

There is a need for more focused study on how the program affects all participants. This is especially important for homemakers with moderate to high entry dietary adequacy levels so that policy decisions may be made regarding the clientele to be enrolled in the program and ways to modify the current program to benefit all eligible clientele.

Given the multiplicity of subject areas covered in the program, there is a need to test and further develop multi-dimensional evaluation instruments. Instruments such as the one used in the larger evaluation project can facilitate analysis of the program in dimensions other than food intake. This is critical if the program is to be able to document that it contributed to the health, social, and economic well-being of families as well as to their nutritional status.

Conducting the above research will require not only a reexamination of the criteria to be evaluated, but also of the theoretical frameworks used in evaluating nutrition education programs. New definitions and conceptual frameworks have emerged in the field of nutrition education in recent years. As Rasmusson (1977) noted, while the improved nutritional status of the individual or the community remains its ultimate purpose, nutrition education has become a concept inclusive of all aspects of education that attempt to improve nutritional status. Therefore, there is a need to expand the traditional method of conducting evaluation research. The theories of Sims, Matthews, and Chernichovsky (see Chapter II) can provide a useful starting point for developing a holistic evaluation framework. In addition to looking at diet and nutrition-related practices, such a framework would look at social, physical, and political variables as well.

Alternative methodologies that reflect the complexity of nutrition education programs are also needed. For example, ethnographic and participatory research methods can be used to provide detailed descriptions of various aspects of program effectiveness and to supplement quantitative data. Qualitative data are important for accountability and program design purposes as they can create an appreciation of the problems faced by EFNEP personnel.

Through the use of participatory research approaches, researchers can create an atmosphere of shared responsibility in identifying and reaching educational goals. Participatory approaches can also provide the program with input from the participants—a vital step in program planning.

Conclusion

One criterion for identifying a successful educational program is the extent to which the audience evolves and maintains desired behavior changes. By studying the dietary adequacy changes of former EFNEP participants, this research, at an exploratory level and in a descriptive manner, sought to provide information that could help EFNEP personnel more efficiently and effectively manage the program.

An estimated 1.8 million families enter the poverty level each year with an annual turnover rate of 33 percent. Even with the remarkable progress EFNEP has made in reaching its potential audience, 83 percent of those families have

not been contacted. Despite the strong federal support for EFNEP, increased operating costs have meant that EFNEP must reexamine its policies regarding whom it will reach and the types of programs it will offer.

The research indicates that EFNEP does have a positive effect on the dietary adequacy scores of a majority of homemakers and that this effect continues after homemakers have left the program. Like other studies, this study also found that homemakers who have low entry dietary adequacy scores tend to show the greatest improvement during the program. Furthermore, it appears that 6 to 12 months is the optimum length of time in program. There were no significant relationships between the demographic characteristics of homemakers and changes in dietary adequacy level although education was somewhat related to entry dietary adequacy level. Therefore, for program management purposes, the only types of information about homemakers that could be used to predict dietary changes are entry dietary adequacy level and education. This information could be used to predict the impact of the program and to develop guidelines about who should participate in the program.

In conclusion, although the findings in this study are tentative, it has been possible to identify some managerial challenges, issues, and questions that, it is hoped, will encourage serious discussion and action. However, there continue to be many gaps in our information about the impact

of nutrition education programs such as EFNEP. More comprehensive research is needed on the effect of the variables examined in this study and on EFNEP's impact on factors other than dietary adequacy. Finally, as nutrition education programs adopt a holistic approach towards education, there is a need to develop theoretical frameworks and methodologies that take into account qualitative as well as quantitative aspects of behavior change.

LIST OF REFERENCES

LIST OF REFERENCES

Abbott, P. C. & Levison, F. J. Assessing alternative nutrition strategies: An application of cost-effectiveness analysis. Cambridge, MA: Massachusetts Institute of Technology, International Nutrition Planning Program, 1974.

Abraham, E., Lowenstein, W., & Johnson, C. L. Preliminary finds of the first health and nutrition examination survey: United States, 1971-1972 (Dietary Intake and Biochemical Findings Publication No. HRA/74-1219-1). Washington, D.C.: U.S. Department of Health, Education, and Welfare, 1974.

Agarwala, R. R. Why is evaluation research not utilized? Evaluation Research (Annual Review), 1977, 2, 327-33.

Alkin, M. C., Daillak, D. R., & White, P. Using evaluation: Does evaluation make a difference? Beverly Hills, CA: Sage Library of Social Research, 1979.

Ashby, W. R. Introduction to cybernetics. New York: John Wiley & Sons, Inc., 1957.

Beal, V. A. The nutritional history in longitudinal research. Journal of the American Dietetic Association, 1967, 57, 426.

Becker, B. G., Indik, B. P. & Beeukes, A. M. Dietary Intake Methodologies—A Review (Technical report, UNRT Project 03188). Ann Arbor, MI: University of Michigan, Office of Research Administration, 1960.

Boone, E. J., & White, E. E. The effect of the extension service's youth nutrition lesson series on behavioral change in EFNEP youth utilizing different educational environments and teachers. Raleigh, N.C.: North Carolina State University, 1976.

Bransky, E. R., Daubney, C. G., & King, J. Comparison of nutrient values of individual diets found by calculation from food tables and by chemical analysis. British Journal of Nutrition, 1948, 2, 232-36 and 89-110.

Brew, E. P. H. A comparison of lower-income and upper-income homemakers relative to their knowledge and practice of nutrition (Findings from Extension Studies, R & T summary No. 25). Baton Rouge, LA: Lousiana State University, 1971. (Summary)

Brown, N. L. Evaluation of nutritional adequacy of diets of children enrolled in the Expanded Nutrition Educational Program. Unpublished master's thesis, Pennsylvania State University, University Park, Pennsylvania, 1972. (Abstract)

Campbell, D. From description to interpretation: Interpreting trends as quasi-experiments. In C. W. Harris (Ed.), Problems in measuring change (Proceedings of a conference sponsored by the Committee on Personality Development in Youth, Social Science Research Council, Madison, Madison, Wisconsin, 1962). Madison, Milwaukee, and London: The University of Wisconsin Press, 1967.

Carroll, J. Problems of measurement related to the concept of learning for mastery. In J. Block (Ed.), Mastery learning theory and practice. New York: Holt, Rinehart, & Winston, Inc., 1971.

Chernichovsky, D. The economic theory of the household and impact measurement of nutrition and related health programs. In R. E. Klein et al. (Eds.), Evaluating the impact of nutrition and health programs. New York: Plenum Publishing Corporation, 1979.

Christakis, G. (Ed.). Nutritional assessment in health programs (Proceedings of the Conference on Nutritional Assessment, Washington, D.C., 1972). Washington, D.C.: American Public Health Association, 1972.

Collier, A. Improving the food management skills of the low-income homemaker in Passaic County: The extension approach. Upper Montclair, NJ: Montclair State College, 1972. (Unpublished)

Cook, F. Nutrition education via people to people. Journal of Nutrition Education, 1969, 1, 9-11.

Cook, T. D. Evaluation studies. Evaluation Research (Annual review), 1973, 3.

Davie, L. E., Robert, O. B., Beverly, W., & Shipman, M. A study of certain personality, skill, and demographic characteristics of Expanded Food and Nutrition Education Program aides and homemakers. Pullman, WA: Washington State University, 1973.

Davis, H. R., & Salasin, S. E. The utilization of evaluation. In E. L. Struening & M. Guttentag (Ed.), Handbook of evaluation research (Vol. I). Beverly Hills, CA: Sage Publications, 1975.

Decker, I. An evaluation study of the Expanded Food and Nutrition Education Program in Delaware. Unpublished thesis, University of Delaware, Newark, Delaware, 1974.

Delp, P., Thesen, A., Motiwalla, J., & Neelakantan, S. Systems tools for project planning. Bloomington, IN: Indiana University, International Development Institute, 1977.

Dexter, L. A. Impressions about utility and wastefulness in applied social science studies. American Behavioral Scientist, 1966, 9, 9-10.

Drucker, P. F. Management tasks, responsibilities, practices. New York: Harper & Row Publishers, 1974.

Duff, D. A. A biological dietary and attitudinal assessment of the effects of nutrition education on families enrolled in the Expanded Nutrition and Family Program. Unpublished master's thesis, Michigan State University, East Lansing, Michigan, 1974.

Dunkleberger, J. E., Martin, N. W., & Pratt, A. B. Reaching the hard to reach with EFNEP. Auburn, AL: Auburn University, n.d.

Eastwood, W., Knapp, E. K., & Hunter, S. M. The families and their living situations: South End Housing Development. Boston, MA: 1963.

Edwards, J. B. A study of the nutritive intake and meal patterns of homemakers participating in the Expanded Nutrition Program. College Station, TX: Texas A & M University, Agricultural Extension Service, 1973.

Enthoven, A. Systems analysis and the Navy. In F. J. Lyden & E. G. Miller (Eds.), Planning, programming, budgeting: A systems approach to management (3rd ed.). Chicago, IL: Markham Publishing Co., 1970.

Fear, F. A. & Carter, K. Responding to local decision makers' research needs: The neglected topic of research utilization. Rural Development Research and Education, 1979, 3(3), 10-16.

Feaster, J. G. The Impact of the Expanded Food and Nutrition Education Program on low-income families—An in-depth analysis (Report No. 220). Washington, D.C.: U.S. Department of Agriculture, Agricultural Research Service, 1972.

Feaster, J. G. Characteristics of the 4-H Expanded Food and Nutrition Education Program (Report No. ERS-627). Washington, D.C.: U.S. Department of Agriculture, Economic Research Service, 1976.

Feaster, J. G. & Perkins, G. B. Families in the Expanded Food and Nutrition Education Program: Comparison of Food Stamp and Food Distribution Program participants and non-participants (Report No. 246). Washington, D.C.: U.S. Department of Agriculture, Economic Research Service, 1973.

Feaster, J. G. & Perkins, G. B. Progress of selected Florida and Georgia families in the Expanded Food and Nutrition Education Program (Report No. ERS-636). Washington, D.C.: U.S. Department of Agriculture, Economic Research Service, 1976.

Fitz-Gibbon, C. T., & Morris, L. L. How to design a program evaluation. Beverly Hills, CA: Sage Publications, 1978.

Gadgil, D. R. Report of investigation into the problem of lapse into illiteracy in the Sahara District. In Primary education in Sahara District: Report of two investigations. Poona, India: Gokhale Institute of Politics and Economics, 1955.

Gagne, R. M. The conditions of learning. New York: Holt, Rinehart, & Winston, Inc., 1970.

Gassie, E. W. An evaluation of the Expanded Nutrition Education Program in six Louisiana parishes. Louisiana Cooperative Extension Service, n.d. (Summary of master's theses by T. Plovanich and L. Williams)

Gibb, M. C. Enhancing behaviors toward adequate nutrition: Continuing education model. Lincoln, NE: University of Nebraska, 1972.

Gordon, G. M. An evaluation of nutrition education given to pregnant and nursing women in six communities in the upper region of Ghana. Accra, Ghana: University of Ghana, n.d. (Available from the Non-Formal Education Information Center, 513 Erickson Hall, Michigan State University, East Lansing, MI 48824)

Green, L. W., Wang, V. L., & Ephross, P. A three-year longitudinal study of the impact of nutrition aides on the knowledge, attitudes, and practices of rural poor homemakers (Paper presented to the Food and Nutrition Section, Centennial Meeting of the American Public Health Association, Atlantic City, NJ, 1972). College Park, MD: University of Maryland, 1972.

Guba, E. G. The failure of educational evaluation. Educational Technology, 1969, 9(5), 28-29.

Handel, G. M., Burk, M. G., & Lund, L. A. Socio-economic factors influence children's diets. Journal of Home Economics, 1965, 57(2), 205-208.

Hardy, M. C., Spohn, A., Aushin, G., McGiffert, S., Mohr, E., & Peterson, A. B. Nutritional and dietary inadequacies among city children from different socio-economic groups. Journal of the American Dietitian Association, 1943, 19, 173-181.

Hickerson, F. J., & Middleton, J. Helping people learn: A module for training trainers. Honolulu, HI: East West Center, East West Communication Institute, 1975.

Hickey, A. E., Jr. The systems approach: Can engineers use the scientific method? Transactions on Engineering Management, June 1960.

Hodges, J. The influence of certain demographic criteria on the change in nutrition habits of the underprivileged In the Expanded Nutrition Program. Unpublished master's thesis, Wichita State University, Wichita, Kansas, n.d.

Huenemann, R. L., & Turner, D. Methods of dietary investigation. Journal of the American Dietitian Association, 1942, 18, 562-568.

Hunter, S. M., Greenwood, M. N., Norris, V., & Stackhouse, E. B. Families in an urban enclave: Leeds Dunbar Community. Kansas City, MO: 1965.

Hustey, J. An evaluation of the Expanded Nutrition Education Program in Pennsylvania. University Park, PA: Pennsylvania State University, 1970. (Summary)

Hyung, J. P., Kyung, K. C., & Dal, S. H. A study of some behavioral problems in sequential processes of adoption in family planning. International Journal of Health Education, 1975, 17(4).

Illich, I. Deschooling society. New York: Harper & Row Inc., 1972.

Jones, J. H. & Verma, S. Comparison of food consumption patterns of homemakers enrolling at various times in the Expanded Food and Nutrition Education Program, Louisiana, as of March 1972. Baton Rouge, LA: Louisiana State University, 1972.

Jones, J. H. & Verma, S. Evaluation of a nutrition education program in Louisiana for low-income clientele. Baton Rouge, LA: Louisiana State University, 1972.

Jones, J. H. & Verma, S. Louisiana Expanded Food and Nutrition Education Program—Are we doing as well as we think? (Findings from Extension Studies, R & T Summary No. 67). Baton Rouge, LA: Louisiana State University, 1975. (Abstracted from master's thesis by S. Scott, Louisiana State University)

Jones, S. J., Munger, E., & Altman, J. W. A field guide for evaluation of nutrition education: An experimental approach to determination of effects of food behavior in less developed countries. Washington, D.C.: U.S. Agency for International Development, Technical Assistance Bureau, Office of Nutrition, 1975.

Kerr, M. E. Demographic characteristics and the nutritional status of families entering the Expanded Nutrition and Family Programs. Unpublished master's thesis, Michigan State University, East Lansing, Michigan, 1973.

Kingdon, L. B. Analysis of the effects of the Expanded Delaware Nutrition Education Program on low-income families in three Delaware counties. Unpublished thesis, University of Delaware, Newark, Delaware, 1975.

Kingdon, L. B. & Toensmeyer, U. C. Food consumption practices of families in the Expanded Delaware Nutrition Education Program in lower Delaware. Newark, DE: University of Delaware, 1975.

Kirk, D. Methods and results of a survey for the evaluation of family planning (Paper presented at the International Union for Scientific Study of Population, London, 1969).

Kirk, R. E. Experimental design: Procedures for the behavioral sciences. Belmont, CA: Brooks/Cole Publishing Co., 1969.

Knowles, M. S. The modern practice of adult education. New York: Association Press, 1974.

Kulp, E. M. Designing and managing basic agricultural programs. Bloomington, IN: Indiana University, International Development Institute, 1977.

Leidenfrost, N. B. EFNEP: Accomplishments and future needs (Report No. HE-89). Washington, D.C.: U.S. Department of Agriculture, Federal Extension Service, 1975.

Leveille, G. A. Issues in human nutrition and their probable impact on foods of animal origin. Journal of Animal Science, 1975, 41, 723.

Lionberger, H. G. Adoption of new ideas and practices. Ames, IA: Iowa State University Press, 1960.

Loomis, M. R. The development of instruments to evaluate the success of homemakers in the Expanded Food and Nutrition Education Program. Unpublished master's thesis, New York State College of Human Ecology, Ithaca, New York, 1973.

Lund, L. A., & Burk, M. C. A multidisciplinary analysis of children's food consumption behavior (Agricultural Extension Station Technical Bulletin No. 265). University of Minnesota, 1969.

Lyden, F. I., & Miller, E. G. (Eds.). Planning, programming, budgeting: A systems approach to management (3rd ed.). Chicago, IL: Markham Publishing Co., 1970.

Lynn, L., Jr. Policy relevant research: What does it look like? Evaluation Studies (Annual Review), 1977, 2, 63-76.

Maier, B. A study of factors associated with low-income homemakers' educational participation in group learning. Tucson, AZ: University of Arizona, 1972.

Makridakis, S. The ways and wherefores of the systems approach. European Business, Summer 1971.

Matthews, C. M. E. A theory for predicting behavioral change. International Journal of Health Education, 1975, 17(2).

Metheny, N. Y., Hunt, F. E., Patton, M. B., & Heye, H. The diets of preschool children, I: Nutritional sufficiency findings and family marketing problems. Journal of Home Economics, 1962, 54(4), 297-302.

Michigan State University, Cooperative Extension Service. Michigan's Expanded Food and Nutrition Education Program.

East Lansing, MI: Author, n.d.

Michigan State University, Cooperative Extension Service. The AIDES make a difference. East Lansing, MI: Author, n.d. (Pamphlet)

Michigan State University, Cooperative Extension Service. EFNEP Annual Report: 1977-78. East Lansing, MI: Author, 1978.

Miller, D. Thoughts on program evaluation. In Approaches to appropriate evaluation: A report on a series of workshops on evaluation. New York: American Council of Voluntary Agencies for Foreign Service, Inc., 1978.

Miller, R. W. Evaluation research in rural development: Concepts, methods, issues. Ithaca, NY: Northeast Regional Center for Rural Development, n.d.

Morris, P. Cooperative agreement no. 12-05-300-187 between the USDA Extension Service and Michigan State University Cooperative Extension Service: Final report. East Lansing, MI: Michigan State University, Cooperative Extension Service, 1975.

Morris, P. The development of a rapid and objective procedure to evaluate progress of nutrition programs: Final report (Special needs project). East Lansing, MI: Michigan State University, Cooperative Extension Service, 1975.

Munger, S. J., & Jones, E. M. A progression model for the Expanded Food and Nutrition Education Program: Development and field demonstration. Allison Park, PA: Synectics Corporation, 1976.

Nie, N. H., Hull, C. H., Jenkins, J. G., Steinbrenner, K., & Bent, D. Statistical package for the social sciences (2nd ed.). New York: McGraw Hill Book Co., 1975.

Nolan, J. The effect of progression from the Expanded Food and Nutrition Education Program on dietary adequacy. Lincoln, MO: University of Missouri, Lincoln University Extension, 1976. (Summary of work by A. Patterson, I. Workman, & D. Jones)

Nye, F. J., & Berardo, F. M. Emerging conceptual frameworks in family analysis. New York: The Macmillan Co., 1966.

Patterson, C. H. Foundations for a theory of instruction and educational psychology. New York: Harper & Row Publishers, 1977.

Patton, M. Q. Alternative evaluation research paradigms. Grand Forks, ND: North Dakota Study Group on Evaluation, 1975.

Patton, M. Q. Utilization-focused evaluation. Beverly Hills, CA: Sage Publications, 1978.

Patton, M. Q. Quantitative evaluation methods. Beverly Hills, CA: Sage Publications, 1978.

Patton, M. Q., Grimes, P. S., Guthrie, K., Brennan, N. J., French, B. D., & Blyth, D. A. In search of impact: An analysis of utilization of federal health evaluation research. Minneapolis, MN: University of Minnesota, 1975.

Pekkarinen, M. Methodology in the collection of food consumption data. World Review of Nutrition Dietetics, 1970, 12, 145-173.

Pfansstiel, D. C., & Hunter, S. M. Extending Cooperative Extension education to Mexican-American families: Programs, methods, and evaluation. El Paso, Texas, 1968.

Pielemeier, N. R., Jones, E. M., & Munger, S. J. Use of the child's growth chart as an educational tool. Washington, D.C.: U.S. Agency for International Development, 1978.

Ramsey, C. Evaluation of side effects of the Expanded Food and Nutrition Education Program: A summary. Mineapolis, MN: University of Minnesota, 1972.

Rasmuson, M. Current practice and future directions of nutrition education in developing countries: A research and policy assessment. Washington, D.C.: U.S. Agency for International Development, 1977.

Reshef, A., & Epstein, L. M. Reliability of dietary questionnaires. American Journal of Clinical Nutrition, 1972, 25, 91.

Robb, C. Notes on a systems approach to management. Henley, UK: Administrative Staff College, 1973.

Rogers, E. M. Bibliography. In Diffusion of Innovations (Research Report No. 6). East Lansing, MI: Michigan State University, 1967.

Rogers, E. M., & Shoemaker, F. Communication of Innovations: A cross-cultural approach (2nd ed.). New York: The Free Press, 1971.

Rountree, M. C. Effectiveness of the Expanded Food and Nutrition Education Program in producing improvements in diets of homemakers. Unpublished Ph.D. dissertation, Ohio State University, Columbus, Ohio, 1973.

Sayles, L. R., & Chandler, M. K. Managing large systems: Organizations for the future. New York: Harper & Row Publishers, 1971.

Scriven, M. The methodology of evaluation. In R. W. Tyler, M. Gragni, & M. Scriven (Eds.), Perspectives of curriculum evaluation (AERA Monograph Series on Curriculum Evaluation, No. 1). Chicago, IL: Rand McNally & Co., 1969.

Seiders, R. W., II, Carter, C. E., Jr., & Dotson, R. S. Dietary adequacy of homemakers participating in Extension's Expanded Food and Nutrition Education Program in selected Tennessee counties, 1971 (Extension Study No. 27, S.C. 803). Knoxville, TN: University of Tennessee, Agricultural Extension Service, 1972.

Sharma, M. Systems approach to education. Shanti, Parkashan, India: Sardav Shahr (Rajasthan), 1978.

Silverman, S. A. Some observations with regard to pilot projects of Cooperative Extension Services in South Providence, Rhode Island. 1966. (Unpublished)

Simmons, J. Retention of cognitive skills acquired in primary school. Washington, D.C.: World Bank, Publications Unit, 1976.

Srinivasan, L. Perspectives on non-formal adult learning. New York: World Education, 1977.

Steoz, E. Why evaluation? In Approaches to appropriate evaluation: A report on a series of workshops on evaluation. New York: American Council of Voluntary Agencies for Foreign Service, Inc., 1978.

Story, J., Padgitt, C., Fortino, S., & Booth, C. Changing nutrition knowledge and food practices of Vitality and Vittles volunteers. East Lansing, MI: Michigan State University, Cooperative Extension Service, n.d. (Summary)

Tate, T. The role and status of cost-effectiveness analysis in federally funded nutrition education programs in the United States. Unpublished master's thesis, Massachusetts Institute of Technology, Cambridge, Massachusetts, 1977.

Tooker, N. F. Characteristics of selected disadvantaged families who are clientele of the Nebraska Extension Service's Expanded Nutrition Program in Douglas County, Nebraska. Unpublished term paper, University of Nebraska, Lincoln, Nebraska, 1970.

Tough, A. The adult's learning projects: A fresh approach to theory and practice in adult learning. Toronto, Ontario: Institute for Studies in Education, 1971.

United Nations, Department of Economic and Social Affairs. Systematic monitoring and evaluation of integrated development programmes: A source-book. New York: Author, 1978.

United States Department of Agriculture, Agricultural Research Service. Food consumption of households in the United States: Household food consumption survey, 1955 (Report No. 1). Washington, D.C.: Author, 1956.

United States Department of Agriculture, Agricultural Research Service, Consumer and Food Economic Institute. Dietary levels of households in the United States (Report No. 6). Washington, D.C.: U.S. Government Printing Office, 1968.

United States Department of Agriculture, Agricultural Research Service. Food intake and nutritive value of diets of men, women, and children in the United States, Spring 1965: A preliminary report. Washington, D.C.: Author, 1969.

United States Department of Agriculture, Federal Extension Service. Program performance: Expanded Food and Nutrition Education Program. Washington, D.C.: Author, 1969.

United States Department of Agriculture, Federal Extension Service. Program Performance: Expanded Food and Nutrition Education Program. Washington, D.C.: Author, 1971.

United States Department of Agriculture, Federal Extension Service. Revised policy guidelines and suggestions for conducting the Expanded Food and Nutrition Education Program. Washington, D.C.: Author, 1976.

United States Department of Agriculture, Science and Education Administration, Extension. The Expanded Food and Nutrition Education Program: Historical and Statistical Profile. Washington, D.C.: Author, 1979.

United States Department of Commerce, Bureau of the Census. Characteristics of the population below poverty level.

United States Department of Health, Education, and Welfare, Health Service and Mental Health Administration, Center for Disease Control. Ten-state nutrition survey: 1968-1970. Washington, D.C.: U.S. Government Printing Office, 1972.

United States, National Academy of Sciences, National Research Council, Committee on Dietary Allowances, and Food and Nutrition Board. Recommended Dietary Allowances. Washington, D.C.: Author, 1980.

United States Senate, Select Committee on Nutrition and Human Needs. Nutrition and health II: Nutrition and health revised with a study of the impact of nutritional health considerations on food policy. Washington, D.C.: U. S. Government Printing Office, July 1976.

Vines, C. A., & Anderson, M. A. (Eds.). Heritage horizons: Extension's commitment to people. Madison, WI: Journal of Extension, 1976.

Ward, T. W., & Dettoni, A. Increasing learning effectiveness through evaluation. In T. W. Ward & W. A. Herzog (Eds.), Effective learning in non-formal education. East Lansing, MI: Michigan State University, Non-Formal Education Information Center, 1974.

Weiss, C. H. Utilization of evaluation: Toward comparative study. In C. H. Weiss (Ed.), Evaluation action programs: Readings in social action and education. Boston: Allyn & Bacon, 1972. (Reprint of a paper presented at a meeting of the American Sociological Association, Miami Beach, Florida, September 1966)

Weiss, C. H. Evaluation research: Methods of assessing program effectiveness. Englewood Cliffs, NJ: Prentice-Hall, Inc., 1972.

Wharton, C. S. The impact of the Expanded Food and Nutrition Education Program on participating families. Unpublished master's thesis, Ohio State University, Columbus, Ohio, 1972.

Whitehead, F. B. Nutrition education research project: Report of feasibility study. Washington, D.C.: U.S. Agency for International Development, Technical Assistance Bureau, Office of Nutrition, 1970.

Wiehl, D. G., & Reed, R. Development of new or improved dietary methods for epidemiological investigations. American Journal of Public Health, 1960, 50, 824-29.

Wise, L. R. Evaluating the impact of public programs: A guide to evaluation research. Bloomington, IN: Indiana University, n.d.

World Health Organization. Research in health education (WHO Technical Report Series No. 432). Geneva, Switzerland: Author, 1969.

Worthen, B. R., & Sanders, J. R. (Eds.). Educational evaluation: Theory and practice. Belmont, CA: Wadsworth Publishing Co., Inc., 1973.

Young, C. M., Hanan, G. C., Tucker, R. E., & Foster, W. D. A comparison of dietary study methods: Dietary history vs. seven-day record vs. 24-hour recall. Journal of Dietetics Association, 1952, 28, 218-219.

Youssef Kandil, S. A. Some factors associated with the homemaker's comprehension, eating practices, and attitudes towards foods and nutrition (Findings from Extension Studies, R & T Summary 28). Baton Rouge, LA: Louisiana State University, 1971. (Summary of dissertation)

APPENDICES

Appendix A

LIST OF COMMONLY USED FOODS IN FOUR FOOD GROUPS

Appendix A

LIST OF COMMONLY USED FOODS IN FOUR FOOD GROUPS
(for classifying foods on Homemaker Food Records)

MEAT GROUP

- Meat:
  - Beef
  - Game
  - Lamb
  - Mutton
  - Pork
  - Veal
- Poultry:
  - Chicken
  - Duck
  - Goose
  - Turkey
- Fish:
  - Fish, of all kinds
  - Shellfish
- Variety Meats:
  - Brains
  - Heart
  - Kidney
  - Liver
  - Tongue
  - Sweetbreads
- Other:
  - Frankfurters
  - Luncheon meats
  - Sausage
  - Mixtures mostly meat such as meatloaf, meat sauce, etc.
  - Eggs
- Peanut butter
- Mature beans and peas
  - dry (cooked from raw or canned)
    - Black beans
    - Blackeye peas
    - Kidney beans
    - Lentils
    - Lima beans
    - Navy beans
    - Soybeans
    - Split peas
    - Whole peas
    - Other dry beans or peas

MILK GROUP

- Milk:
  - Fluid whole
  - Condensed
  - Evaporated
  - Skim
  - Dry
  - Buttermilk
  - Chocolate
- Ice cream
- Ice milk
- Milk shake
- Other:
  - Diet beverages (metrecal)
  - Yoghurt
  - Sour cream
  - Mixtures, mostly milk
- Cheese
  - American or cheddar
    - Natural
    - Processed
  - Cottage
  - Cream
  - Swiss
  - All other types
  - Mixtures mostly cheese, such as cheese dip, cheese sauce, cheese spreads

VEGETABLE AND FRUIT GROUP

- Vegetables:
  - Asparagus
  - Artichokes
  - Beans, green
  - Beans, lima
  - Beets
  - Broccoli
  - Brussels sprouts
  - Cabbage
  - Carrots
  - Cauliflower
  - Celery
  - Chard
  - Collards
  - Corn, sweet
  - Cress
  - Cucumbers
  - Dandelion greens
  - Green peppers
  - Greens, of all kinds
  - Kale

VEGETABLE AND FRUIT GROUP (cont.)

- Kohlrabi
- Lettuce
- Mustard greens
- Okra
- Onions
- Parsnips
- Peas
- Potatoes
- Potato chips
- Potato salad
- Potato sticks
- Pumpkin
- Red peppers, sweet
- Radishes
- Rutabagas
- Sauerkraut
- Snap beans
- Spinach, other dark leafy greens
- Summer squash
- Sweet potatoes
- Tomatoes
- Turnips and turnip greens
- Winter squash
- Soup and mixtures, mostly vegetable
- Vegetable juice

- Fruits:
  - Apples
  - Applesauce
  - Apricots
  - Avocados
  - Bananas
  - Berries of all kinds
  - Cantaloup
  - Cherries
  - Cranberries
  - Currants
  - Dates
  - Figs
  - Fruit Cocktail
- Grapefruit, Grapefruit juice
- Grapes
- Guava
- Lemons
- Limes
- Mango
- Melons
- Oranges, Orange juice
- Papaya
- Peaches
- Pears
- Pineapple
- Plums
- Prunes
- Raisins
- Strawberries
- Tangerines, tangerine juice
- Tomatoes, sauce, puree, juice
- Watermelons
- Mixtures, mostly fruit
- Fruit juice (Do not include fruit drinks, ades, and punches)

BREAD AND CEREAL GROUP

- Biscuits
- Breads, all kinds
- Cakes
- Cereals, cooked--barley, bulgar, oats, rice, rye, wheat, grits
- Cereals, ready-to-eat--all types
- Cookies
- Cornbread
- Corn chips
- Cheese curls
- Chow mein noodles
- Cornmeal mush
- Crackers
- Doughnuts
- Fritos
- Macaroni
- Muffins
- Noodles
- Pancakes
- Pastina
- Pies, pastries, tarts
- Pizza
- Popcorn
- Pop tarts
- Pretzels
- Rice
- Rolls, plain and sweet
- Spaghetti
- Tapioca
- Tortillas
- Mixtures, mostly grains

Appendix B

SCORING TABLE FOR 24-HOUR FOOD RECALL

Appendix B

SCORING TABLE FOR 24-HOUR FOOD RECALL

To find the Twenty-four Hour Diet score:

1. Select the appropriate table (below) on the basis of the number of *milk* servings reported in Item 7, FAMILY RECORD-B (0, 1, (2) or more). NOTE: Circled numbers ((2), (4)) are the highest score possible in a food group. For number of servings larger than the circled number, use the circled number. Example, for 3 servings of milk, use the (2) MILK SERVINGS table.
2. Select the proper column of the table on the basis of the number of *meat* servings reported in Item 8.
3. Select the proper area of the table on the basis of the number of *vegetable/fruit* servings reported in Item 9 (0, 1, 2, 3, (4) or more).
4. Find the proper line of the table on the basis of the number of *bread/cereal* servings reported in Item 10.

The number to the right of this (in type style "74") is the Twenty-four Hour Diet score. Enter the diet score at the appropriate "months in program" time on the homemaker's FOOD AND NUTRITION PROGRESSION RECORD.

0 MILK SERVINGS

0 MEAT SERVINGS			1 MEAT SERVING			(2) MEAT SERVINGS		
Veg-Fruit	Bread Cereal	Score	Veg-Fruit	Bread Cereal	Score	Veg-Fruit	Bread Cereal	Score
0	0	0	0	0	3	0	0	8
	1	2		1	10		1	14
	2	4		2	12		2	17
	3	6		3	16		3	25
	(4)	8		(4)	23		(4)	29
1	0	2	1	0	10	1	0	14
	1	9		1	22		1	27
	2	11		2	25		2	36
	3	13		3	33		3	38
	(4)	21		(4)	37		(4)	43
2	0	4	2	0	12	2	0	17
	1	11		1	25		1	35
	2	13		2	33		2	39
	3	21		3	37		3	43
	(4)	26		(4)	41		(4)	47
3	0	6	3	0	16	3	0	25
	1	13		1	33		1	39
	2	21		2	37		2	43
	3	25		3	41		3	47
	(4)	29		(4)	46		(4)	80
(4)	0	8	(4)	0	23	(4)	0	29
	1	21		1	37		1	43
	2	25		2	41		2	47
	3	29		3	46		3	80
	(4)	33		(4)	58		(4)	86

1 MILK SERVING

0 MEAT SERVINGS			1 MEAT SERVING			(2) MEAT SERVINGS		
Veg Fruit	Bread Cereal	Score	Veg Fruit	Bread Cereal	Score	Veg Fruit	Bread Cereal	Score
0	0	3	0	0	11	0	0	16
	1	10		1	24		1	29
	2	12		2	27		2	37
	3	15		3	35		3	41
	(4)	23		(4)	39		(4)	45
1	0	10	1	0	24	1	0	29
	1	22		1	42		1	52
	2	26		2	50		2	56
	3	33		3	54		3	60
	(4)	37		(4)	58		(4)	64
2	0	12	2	0	27	2	0	37
	1	25		1	50		1	56
	2	33		2	56		2	62
	3	37		3	60		3	66
	(4)	41		(4)	64		(4)	79
3	0	15	3	0	35	3	0	41
	1	33		1	54		1	60
	2	37		2	60		2	66
	3	41		3	64		3	79
	(4)	46		(4)	77		(4)	85
(4)	0	23	(4)	0	39	(4)	0	45
	1	37		1	58		1	64
	2	41		2	64		2	79
	3	46		3	77		3	85
	(4)	58		(4)	82		(4)	91

(2) MILK SERVINGS

0 MEAT SERVINGS			1 MEAT SERVING			(2) MEAT SERVINGS		
Veg Fruit	Bread Cereal	Score	Veg Fruit	Bread Cereal	Score	Veg Fruit	Bread Cereal	Score
0	0	6	0	0	16	0	0	21
	1	14		1	29		1	38
	2	17		2	37		2	43
	3	25		3	41		3	47
	(4)	29		(4)	45		(4)	51
1	0	14	1	0	29	1	0	38
	1	27		1	52		1	58
	2	35		2	56		2	62
	3	39		3	60		3	66
	(4)	43		(4)	64		(4)	80
2	0	17	2	0	37	2	0	43
	1	35		1	56		1	62
	2	39		2	62		2	68
	3	43		3	66		3	82
	(4)	47		(4)	79		(4)	86
3	0	25	3	0	41	3	0	47
	1	39		1	60		1	66
	2	43		2	66		2	82
	3	47		3	79		3	88
	(4)	80		(4)	85		(4)	94
(4)	0	29	(4)	0	46	(4)	0	51
	1	43		1	64		1	80
	2	47		2	79		2	88
	3	80		3	85		3	94
	(4)	86		(4)	91		(4)	100

Appendix C

EXPANDED FOOD AND NUTRITION EDUCATION PROGRAM FAMILY RECORD

Appendix C

EXPANDED FOOD AND NUTRITION EDUCATION PROGRAM
FAMILY RECORD

A. DESCRIPTION

1. AIDE'S NAME | 2. STATE NO. | 3. UNIT NO.

Fill out for each family in unit as soon as possible and every 6 months thereafter. Keep in family file after review by Trainer/Agent.

4. FAMILY ID NO. _____

(a) Name _____
(b) Street _____
(c) City _____ (d) State _____

5. DATE FAMILY ENROLLED _____

6. FAMILY RECEIVED (Some time during the year):
(a) ☐ Participating in USDA Food Stamp/Food Distribution Program
(b) ☐ WIC/CSFP
(c) ☐ Welfare

FAMILY MEMBERS (First name) (7)	AGE (years) (8)	SEX Male (9)	SEX Female (10)	CHECK IF "YES" Now in School (11)	CHECK IF "YES" Participated in Child Nutrition Programs last week (12)
NO. OF FAMILY MEMBERS _____	TOTALS →				

13. HIGHEST GRADE IN SCHOOL COMPLETED BY HOMEMAKER
☐ 8th Grade or less ☐ 9th thru 10th ☐ 11th thru 12th ☐ Beyond High School

14. CHECK FOR HOMEMAKER
(a) ☐ White (not of Hispanic origin) (c) ☐ Hispanic (e) ☐ Asian or Pacific Islander
(b) ☐ Black (not of Hispanic origin) (d) ☐ American Indian/Alaskan Native

15. TERMINATION DATE AND REASON

16. PLACE OF RESIDENCE
☐ Farm
☐ Towns under 10,000 and rural non-farm
☐ Towns and Cities 10,000 to 50,000
☐ Suburbs of Cities of over 50,000
☐ Central Cities of over 50,000

B. HOMEMAKER FOOD CONSUMPTION, FAMILY INCOME, AND EXPENDITURE

1. HOW MANY FOOD RECALL RECORDS HAVE YOU TAKEN ON THIS FAMILY (including this one)? _____

2. DATE

3. WHAT DID HOMEMAKER EAT AND DRINK IN THE LAST 24 HOURS?

To be filled out by Aide or Homemaker

Kind of food and drink (Enter main foods in mixed dishes)	TO BE FILLED OUT BY TRAINER AGENT: Milk	Meat	Veg./ Fruit	Bread/ Cereal
Morning:				
Midmorning:				
Noon:				
Afternoon:				
Evening:				
Before bed:				
TOTAL NO. OF SERVINGS	(5)	(6)	(7)	(8)
5. TOTALS 1 OR MORE SERVINGS OF EACH OF FOUR FOOD GROUPS.	1	1	1	1
	☐ YES ☐ NO			
10. TOTALS 2 OR MORE SERVINGS MILK/MEAT; 4 OR MORE VEG/FRUIT AND BREAD/CEREALS	2	2	4	4
	☐ YES ☐ NO			

4. TOTAL ACTUAL INCOME FOR FAMILY LAST MONTH?

$_____

(Include wages and salaries, social security, welfare and insurance payments, pensions and cash support from others. If family has income from farming, include 1/12th of last year's income after expenses.)

Check one:

- ☐ Under $315
- ☐ $315 - $418
- ☐ $419 - $519
- ☐ $520 - $621
- ☐ $622 - $733
- ☐ $734 - $834
- ☐ $835 - $917
- ☐ $918 and over

GPO 876 667

Appendix D

FOLLOW-UP QUESTIONNAIRE

Appendix A

FOLLOW-UP QUESTIONNAIRE

Interviewer's Introductory Letter

Dear Participant:

The Expanded Food and Nutrition Education Program of the Michigan State University Cooperative Extension Service is currently conducting a study to collect information needed for planning and administering this program in the future.

We strongly feel that information from people like you, who once participated in the program, would be very helpful.

We therefore kindly request that you respond to the following questions. The answers to these questions will be strictly confidential and will be used for this purpose only.

Thank you very much for your cooperation.

Homemaker's Permission Slip

The project has been explained to me. I understand that I will be asked to answer questions about foods and nutrition and about my experiences while working with the nutrition aide. I also understand that I do not have to answer any questions that I do not wish to answer, and that any information I give will be confidential. I am willing to participate in this study.

_____

Participant

_____

Interviewer

_____

Date

Questionnaire*

COUNTY CODE: _____

FAMILY ID: _____

INTERVIEW DATE: _____

SECTION I: General Descriptive Information

1. You remember working with a foods and nutrition aide named _____

   Do you know what office she came from?
   a) Yes — a) ___ (name) _____
   b) No — b) ___

*2. Why did you work with her?
   a) I wanted to learn new and better ways to feed my family — a) ___
   b) She was nice and I liked talking to her — b) ___
   c) She just came to my house every so often — c) ___
   d) Someone told me I should work with her — d) ___
   e) Other _____

*3. How often did you and the aide plan together what to do or talk about? — a) ___ b) ___ c) ___ d) ___
   a) Almost never
   b) Sometimes
   c) Usually
   d) Almost always

4. How often do you prepare breakfast for your family? — a) ___ b) ___ c) ___ d) ___
   a) Almost never
   b) Sometimes
   c) Usually
   d) Almost always

5. How often do you prepare dinner/supper for your family? — a) ___ b) ___ c) ___ d) ___
   a) Almost never
   b) Sometimes
   c) Usually
   d) Almost always

6. Which meals does your entire family eat together? (Check all responses) — a) ___ b) ___ c) ___ d) ___ e) ___
   a) Breakfast
   b) Lunch
   c) Supper
   d) Snacks
   e) None

*Items included in this study.

*7. Is there anything different about the way you plan meals for your family since you have worked with the aide?
a) Yes a)___
b) No b)___

8. Often people can't use some of the suggestions made by the nutrition aide. Was there any suggestion you couldn't use?
a) Yes a)___
b) No b)___

9. What was the suggestion you couldn't use? _____

_____

10. Why couldn't you use the suggestion?
a) It would cost too much money a)___
b) The family wouldn't like it b)___
c) It was too hard to do c)___
d) It would take too much time d)___
e) Didn't have the right equipment e)___
f) My ways were better f)___
g) _____

11. General impression of home cleanliness and sanitation. a)___ b)___ c)___ d)___ e)___
a) Very good d) Poor
b) Acceptable e) Very bad
c) Fair

12. The homemaker appears:
a) Very overweight a)___
b) Mildly overweight b)___
c) Within weight range c)___
d) Slightly underweight d)___
e) Severely underweight e)___

13. There is a male head of household in the family.
a) Yes a)___
b) No b)___
c) No information c)___

14. The male head of household is employed
a) Yes a)___
b) No b)___
c) No information c)___

*15. How helpful do you think the program was to you and your family? a)___ b)___ c)___
a) Very helpful b) Somewhat helpful
c) Not too much help

16. Why did the nutrition aide stop working with you?
    a) She said I had learned a lot and didn't need her help anymore. a)___
    b) She said she had worked with me quite awhile and could not work with me anymore. b)___
    c) I told her I didn't want to work with her anymore. c)___
    d) She just stopped coming to see me. d)___
    e) I moved so we couldn't work together. e)___
    f) I don't know. f)___
    g) Other (explain) _____

17. Since you and the nutrition aide stopped working together, have you received a newsletter or other mail from the Cooperative Extension Service office? a)___
    a) Yes b) No b)___

SECTION II: Adoption of Food and Nutrition Recommended Practices.

*18. What was the most important thing the nutrition aide taught you or showed you how to do?

_____

_____

*19. When you and the nutrition aide worked together, you probably talked about nutrition and foods that are good for health. What two facts about nutrition do you remember that were useful to you?
    a) _____
    b) _____

*20. Using this scale, how much do you think your family's eating habits changed after the aide started to visit you? a)___ b)___ c)___ d)___
    a) Not much c) Some
    b) A little d) A lot

*21. Is your family any different or new foods not that you didn't eat before the aide came? a)___
    a) Yes b) No (skip to question 23) b)___

22. What two or three different or new foods are you and your family eating now? a)_____
    b)_____
    c)_____

23. What is different about the way you plan your meals?

_____

*24. Is there anything different about the snacks you and your family eat since you have worked with the aide? a)___
a) Yes b) No (skip to question 26) b)___

25. What is different?_____

26. What two things did the aide teach you about food shopping that were useful and that you are still using now?
a)_____
b)_____

27. Did you have a vegetable garden last summer or the summer before? a)___
a) Yes b) No (skip to question 29) b)___

28. Have you always gardened or did you start after you began working with the aide?
a) Always gardened and I had no influence from the aide a)___
b) Always gardened but aide suggested other things to grow b)___
c) Aide influenced me to start c)___

29. Do you ever do any canning or freezing?
a) Canning a)___
b) Freezing b)___
c) Both c)___
d) Neither (skip to question 31) d)___

30. Have you always done canning/freezing or did you start after you began working with the aide?
a) Always preserved food and had no influence from the aide a)___
b) Always preserved food but aide showed me how to more safely b)___
c) Aide influenced me to start c)___

31. Since you stopped working with the nutrition aide, where do you get foods and nutrition information? (Listen and check all that apply)

a) Relatives
b) Friends
c) Radio/TV
d) Newspaper, magazines
e) Newsletter
f) Books
g) Health department/ doctor
h) Agency (name) _____
i) Neighborhood meetings
j) Materials from ENP office
k) Other
l) No source of information

a) ___
b) ___
c) ___
d) ___
e) ___
f) ___
g) ___
h) ___
i) ___
j) ___
k) ___
l) ___

SECTION III: Nutrition Knowledge

32. I have some questions with pictures. Suppose you were serving beef stew for your family for dinner (show stew) and suppose you had eaten these foods for breakfast and these foods for lunch (show pictures). From these foods, what would you serve with the beef dinner? (Show cards)

a) Milk
b) Bread
c) Both

a) ___
b) ___
c) ___

Foods added: _____
_____
_____
_____

33. Now I'm going to show you pairs of foods. All foods have some vitamins and minerals and other things good for health, but some have more of certain vitamins and minerals than others. For example, here is a picture of liver and hot cocoa. Which would have the most iron?

a) Liver b) Cocoa

a) ___
b) ___

34. Here is a picture of orange juice and an apple. Which food would you choose for Vitamin C food value?

a) Orange juice b) Apple

a) ___
b) ___

35. Here is some corn and carrots. If you wanted Vitamin A, what would be the best choice?

a) Corn b) Carrots

a) ___
b) ___

36. Here is a hamburger patty and some cheese. Of these two, which would you choose for iron? a)___
a) Patty b) Cheese b)___

37. Here is some bacon and chicken. Which food would provide the most protein for your family? a)___
a) Bacon b) Chicken b)___

38. Here is a glass of milk and some scrambled eggs. They're both good foods but which do you think would provide the most calcium? a)___
a) Milk b) Eggs b)___

39. If your child wanted a snack, what would be more nutritious - potato chips, or a piece of enriched bread and peanut butter? a)___
a) Chips b) Bread and Peanut Butter b)___

40. If you wanted a low-calorie breakfast, what would you choose - a bowl of cereal and milk or coffee and a sweet roll? a)___
a) Cereal and milk b) Coffee and roll b)___

The nutrition aide probably talked with you about food groups and how to use the basic four food guide to plan meals.

41. This is the bread/cereal group. How many servings do you think an adult needs every day from this group? ___

42. This is the meat group; how many servings should an adult have every day? ___

43. How many servings from the fruit/vegetable group do you think an adult should have every day? ___

44. The last group is the milk group. How many servings do you think an adult needs daily? ___

45. How many servings of milk does a child about 10 or 11 years old need daily? ___

46. Suppose someone in your family didn't like to drink milk, which two of the following foods could you serve that person to get the same nutrition as you would in milk? (Show food models) _____
_____

SECTION IV: Shopping Knowledge and Practices

47. When do you decide what to serve at mealtime?
    a) Just before the meal a)___
    b) Whole day at a time b)___
    c) A few days ahead c)___
    d) When I make out my shopping list d)___

48. Most of us have to pick up an extra loaf of bread or carton of milk once in a while, but how often do you do most of your grocery shopping?
    a) 2 times/week or more a)___
    b) Once a week b)___
    c) Every week and a half c)___
    d) Every two weeks d)___
    e) Once or twice a month e)___

These questions are about food buying. I want you to look at this ladder scale and tell me the number that best describes how often you do a certain shopping practice. For example, how often do you consider what your family likes to eat? (Listen and guide response as necessary, but do not record)

Now tell me how often you do these practices:

49. Check supplies and make a written list. a)___
    a) Almost never c) Usually b)___
    b) Sometimes d) Almost always c)___
    d)___

50. Check newspaper or store coupon sheets for sales and/or coupons. a)___
    b)___
    a) Almost never c) Usually c)___
    b) Sometimes d) Almost always d)___

51. Buy in quantity when cheaper. a)___
    a) Almost never c) Usually b)___
    b) Sometimes d) Almost always c)___
    d)___

52. Buy whatever appeals to me. a)___
    a) Almost never c) Usually b)___
    b) Sometimes d) Almost always c)___
    d)___

53. Compare prices of the same kinds of food. a)___
    a) Almost never c) Usually b)___
    b) Sometimes d) Almost always c)___
    d)___

54. Buy foods that are in season. a)___
a) Almost never c) Usually b)___
b) Sometimes d) Almost always c)___
d)___

55. Think about the nutritional value of foods. a)___
a) Almost never c) Usually b)___
b) Sometimes d) Almost always c)___
d)___

56. If you needed milk to make chocolate pudding and you could use either this box of dry milk (show picture) or this quart of fresh milk which would make the cheapest pudding? a)___
a) Dry milk c) Don't know b)___
b) Fresh milk c)___

57. Suppose you were going to buy canned vegetables, and you saw these vegetables on special at 3 cans/ $1.00 and these at 32¢/can. If both cans were the same size which would be a better buy? a)___
a) 3/$1.00 c) No choice b)___
b) 32¢ c)___

58. Here are the wrappers from two loaves of bread that are the same size. If they were the same price, which would you buy?
a) Schafer's Butter Split Top Bread a)___
b) Family Size Butternut Enriched Bread b)___
c) No choice c)___

59. What is the reason for this? _____

_____

SECTION V: Program Spin-off Effects.

Using this scale, please tell me how much the program affected . . .

60. the way you participated in the community. a)___
a) Not much c) Some b)___
b) A little d) A lot c)___
d)___

61. your use of money. a)___
a) Not much c) Some b)___
b) A little d) A lot c)___
d)___

62. the way your family acts toward each other. a)___
a) Not much c) Some b)___
b) A little d) A lot c)___
d)___

63. the way you handle housework. a)___
a) Not much c) Some b)___
b) A little d) A lot c)___
d)___

64. knowing where to get help. a)___
a) Not much c) Some b)___
b) A little c) A lot c)___
d)___

SECTION VI: PROGRAM VISIBILITY

Since you and the nutrition aide stopped working together, have you:

65. visited or phoned the Cooperative Extension office? a)___
a) Yes b) No b)___

66. visited or phoned the nutrition aide? a)___
a) Yes b) No b)___

67. helped with an Extension program? a)___
a) Yes b) No b)___

68. shared the aide's information with someone? a)___
a) Yes b) No b)___

*69. Would you be willing to meet with other homemakers for similar educational programs? a)___
a) Yes b) No b)___

SECTION VII: Entry Family Demographic and Socio-Economic Information

*70. Check for residence: a)___
a) No information c) Rural b)___
b) Urban d) Rural nonfarm c)___
d)___

*71. Date family enrolled. _____

*72. Family received:
a) Participating in USDA Food Stamp/Food Distribution, W.I.C. a)___
b) Not participating in USDA Food Stamp/ Food Distribution, W.I.C. b)___
c) Welfare c)___

*73. Number adults in family. ___

*74. Number youth in family. ___

*75. Number youth participating in school lunch. ___

*76. Highest grade completed by homemaker:
a) 8th grade or less a)___
b) 9th through 12th b)___
c) Beyond high school c)___

*77. Ethnic background of homemaker: a)___
a) White d) American Indian/Alaskan b)___
b) Black native c)___
c) Hispanic e) Asian d)___
f) Pacific Islander e)___
f)___

*78. Total actual income for family last month: a)___
a) Under $166 d) $334 - 416 b)___
b) $167 - 250 e) $417 - 516 c)___
c) $251 - 333 f) $517 and over d)___
e)___
f)___

*79. Annual income. _____

*80. Amount spent for food last month. (Do not include value of food stamps) _____

*81. Value of food stamps received. _____

*82. Homemaker's 24-hour Food Recall

Breakfast: _____

_____

AM Snack: _____

_____

Lunch: _____

_____

PM Snack: _____

Supper: _____

_____

Evening Snack: _____

_____

Number Servings:

a)	Meat group	a) ___
b)	Milk group	b) ___
c)	Vegetable/Fruit group	c) ___
d)	Bread/Cereal group	d) ___
e)	Total dietary adequacy score	e) ___

SECTION VIII: Terminating Family Information

*83. Date terminating from program. _____

*84. Reason for termination:

a)	Not interested	d)	Dropped	a) ___
b)	Not home	e)	Graduated	b) ___
c)	Moved	f)	No information on record	c) ___
				d) ___
				e) ___
				f) ___

*85. Total number of completed visits throughout program:

a)	Individual	a) ___
b)	Group	b) ___

*86. Highest monthly income during program. _____

*87. Lowest monthly income during program. _____

*88. Highest value of food stamps received/ month during program. _____

*89. Lowest value of food stamps received/ month during program. _____

SECTION IX: Present Family Demographic and Socio-Economic Information

*90. What was the last grade of school you completed? _____

*91. How many adults live here? _____

*92. How many children live here? _____

*93. Are you presently receiving food stamps or food from W.I.C.? a)___
a) Yes b) No b)___

*94. Are you receiving assistance like A.D.C., A.D.C.U. or Social Security? a)___
a) Yes b) No b)___

*95. How many of your children participate in school lunch?
a) None a)___
b) (actual number) b)___
c) No applicable or (N/A) (skip to question 97.) c)___

*96. Does your children's school have a school lunch program? a)___
a) Yes b) No b)___

*97. Does your family attend a public health or immunization clinic? a)___
a) Yes b) No b)___

*98. Are you working now? a)___
a) Yes b) No b)___

*99. Which of the following numbers best describes your family's total income last month, including all sources of money? a)___ b)___ c)___ d)___ e)___ f)___
a) Under $166 d) $334 - 416
b) $167 - 250 e) $417 - 516
c) $251 - 333 f) $517 and over

*100. How much money did you spend for food or food stamps last month, including credit? _____

*101. If using food stamps, what was the value of the food stamps you received? _____

*102. Homemaker's Present 24-hour Food Recall
Breakfast: _____
_____
AM Snack _____
_____
Lunch: _____
_____
PM Snack: _____
_____

Supper: _____

_____

Evening Snack: _____

_____

Number Servings:

a)	Meat group	a)___
b)	Milk group	b)___
c)	Vegetable/Fruit group	c)___
d)	Bread/Cereal group	d)___
e)	Total dietary adequacy score	e)___

Illustrations Accompanying Questions

16. Picture of beef stew with carrots, potatoes, and peas.

    Menu card showing pictures of breakfast (small glass of orange juice, one slice of toast with jelly, cup of black coffee), mid-morning snack (banana); lunch (cheeseburger on bun with lettuce, tomatoes, onions, potato chips, pickles, Oreo cookies, diet 7-Up); afternoon snack (M & Ms).

    Pictures of the following foods as possible additions to beef stew dinner: vanilla ice cream, devil's food cake, pear, cottage cheese, chocolate pudding, fried chicken, tossed salad, refried beans, greens, gelatin dessert, apple, green beans, coffee, water, soft drink, milk, corn tortilla, pat of butter, cornbread, white bread, baking powder biscuit, egg noodles.

17-24. Illustrated as described on questionnaire

25. Photograph of bread/cereal group including brown and white bread, buns, Rice Krispies, Cheerios, corn flakes, oatmeal, rice, biscuit, tortillas, cookies, cake, spaghetti, noodles.

26. Photograph of meat group including peanut butter, spam, baked beans, bologna, cheese, dried beans, ham, tuna fish, hot dog, chicken, patty

27. Photograph of fruit/vegetable group including cherries, peaches, orange, bananas, potatoes, canned applesauce, tomato juice, wax beans, Tang, cabbage, carrots, lettuce, turnips, tomatoes, corn, squash.

28. Photograph of milk group including whole milk, dry milk, ice cream cone, creamed soup, cottage cheese, varieties of cheese, chocolate pudding.

30. Pictures of the following foods as possible milk substitutes: American cheese, white bread, black coffee, sweet potato, ice cream, meat patty, baked beans, lettuce

Appendix E

IMPORTANT PROGRAM CONTENT AREAS IDENTIFIED BY NUTRITION AIDES

Appendix E

IMPORTANT PROGRAM CONTENT AREAS IDENTIFIED BY NUTRITION AIDES

I. Current Food Behavior Practices

A. Shopping habits

1. Weekly vs. daily vs. monthly
2. Compares prices and reads labels
3. Uses a shopping list
4. Takes advantage of specials, coupons
5. Purchases food at supermarket, neighborhood store, from farmer
6. How much spent for food per week or month
7. Buys in quantity, in-season, type of food storage available

B. Meal patterns

1. Plans meals for day, week, two weeks, month
2. Meal time habits (family eats together)
3. Type of snacks, how often
4. Variety of foods (green and yellow vegetables, dairy products, fruits)
5. Preparation techniques
6. Use of saturated fat in cooking/frying
7. Use of recipes

II. Use of Community Resources

A. Source of information on recipes, food preparation shopping specials, coupons, etc.

B. What influences eating/buying habits (T.V., ads, neighbors, etc.)

C. Contact with other agencies

1. Uses food stamps
2. Participates in school lunch/breakfast programs
3. Uses public health-immunization clinics