

ASSESSMENT OF THE LONG-TERM EFFECT OF THE EXPANDED
FOOD AND NUTRITION EDUCATION PROGRAM ON
ADEQUACY OF DIETARY INTAKE AND FOOD
BEHAVIOR PRACTICES OF EFNEP HOME-
MAKERS IN MUSKOGEE COUNTY

By

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Render therefore to all their dues; tribute to whom tribute is due; custom to whom custom; fear to whom fear; honor to whom honor.

Romans XIII, 7

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CHAPTER I

INTRODUCTION

During the early 1960's, the attention of Americans was focused on the plight of those less fortunate. A startling reality was that in a land of plenty, many were still hungry and malnourished. "A country that provided food for millions of people in other countries had somehow managed to overlook its own citizens" (U.S. Department of Agriculture, 1979, p. 1). In response to this critical need, the Expanded Food and Nutrition Education Program (EFNEP) of the United States Department of Agriculture's Extension Service was congressionally authorized in November of 1968.

The goal of EFNEP was "to help low-income families, especially those with children to acquire the knowledge, skills and attitudes necessary to improve their diets" (U.S. Department of Agriculture, 1979, p. 3). Trained paraprofessionals were to be utilized to teach low-income homemakers skills and knowledge needed to improve the nutritional status of their families. Homemakers were to be taught on a one-to-one basis in their homes or in small groups (U.S. Department of Agriculture, 1979).

In 1969, the Cooperative Extension Service (CES) implemented the Expanded Food and Nutrition Education Program in several counties in each of the 50 states. Oklahoma was among those states receiving a share of the appropriation. The EFNEP program was introduced in 11 counties in Oklahoma in June of 1969. At the time of this study, there were ten

counties with 66 paraprofessionals and an enrollment of 1,424 families.

From the beginning of EFNEP, evaluation was an integral and important part of the program operation. Some authorities in EFNEP attributed the continued support of the program to the ongoing evaluation. Numerous studies were implemented to evaluate the impact of EFNEP on the target audience. One of the most recent, extensive national studies, was initiated in July 1979, by Congressional mandate (U.S. Department of Agriculture, 1981). A corollary proposal resulting from this study was that an attempt should be made to use state and local project evaluations to document program impact.

Although numerous studies had focused on the impact of the Expanded Food and Nutrition Education Program, few studies examined the long term effect of the program on participant outcomes. A study of the long term effect of EFNEP on participants was important because improved dietary practices must be sustained over time in order to impact the health status of families.

EFNEP administration at the national level identified several areas of EFNEP needing further study. Among those identified were field testing of selected teaching patterns, innovative recruitment practices, social and economic benefits of the program, and studies to measure retention of nutrition knowledge and practice (Leidenfrost, 1982). The focus of this study was directed toward evaluating the retention of nutrition knowledge and practice at the local project level as recommended.

Purpose and Objectives

The purpose of this study was to assess the long term effect of the Expanded Food and Nutrition Education Program on adequacy of dietary

intake and food behavior practices of EFNEP homemakers who had completed the program. The following objectives were proposed to guide this study.

1. To assess if the adequacy of dietary intake of homemakers involved in EFNEP is associated with level of adequacy of dietary intake at the beginning of the program, at completion of the program, and six or more months after completion of the program.

2. To assess if homemaker characteristics such as age, educational level, number of children in the home, income, race, and place of residence (rural or urban) are associated with adequacy of dietary intake and food behavior practices.

3. To assess if food behavior practices of homemakers involved in EFNEP are associated with level of food behavior practices at the beginning of the program, at completion of program, and six or more months after completion of program.

4. To assess if the level of food behavior practices are associated with adequacy of dietary intake at the beginning of the program, at program completion, and six or more months after program completion.

Hypotheses

The following hypotheses are tested in this study:

H_1 : There will be no significant differences between adequacy of dietary intake of homemakers at the beginning of the program, at completion of the program, and six or more months after completion of the program.

H_2 : There will be no significant relationship between adequacy of dietary intake and level of food behavior practices of homemakers at the

beginning of the program and at program completion based on homemaker's personal characteristics.

H₃: There will be no significant differences between food behavior practices of homemakers at the beginning of the program, at completion of program, and six or more months after completion of program.

H₄: There will be no significant relationships between adequacy of dietary intake and level of food behavior practices of homemakers at the beginning of the program, at completion of program, and six or more months after completion of program.

Assumptions and Limitations

The following assumptions were acknowledged for this study:

1. The food recall, as taken by the aides, is an accurate assessment of changes in adequacy of dietary intake.
2. The food behavior checklist, as completed by the aides, is an accurate assessment of changes in food behavior practices of homemakers.

This study was limited by the following factors:

1. The study was limited to EFNEP homemakers in Muskogee County, Oklahoma.
2. There was no comparison group, so there was no control over outside influences except for selected characteristics that were statistically controlled.
3. Only homemakers who completed the program were included in the sample.

Definitions

Definitions of important terms used in this study follow:

1. EFNEP Homemaker--is "the person most responsible for meeting the food and nutrition needs of the family members" (Wang and Ephross, 1970, p. 3).
2. 24-Hour Food Recall--"provides information about the different items of food consumed in a 24-hour period. They could be categorized into basic four food groups and expressed in terms of numbers of servings" (Verma and Jones, 1973, p. 96).
3. Food Behavior Checklist--an instrument containing behavioral objectives and nutrition knowledge and practices utilized for judging achievement in the Family Progression Model (U.S. Department of Agriculture, 1980). See Appendix A.
4. 24-Hour Food Recall Score--a quantified score for measuring dietary intake based on classification of food into four groups. It is a progression indicator and is part of the Family Progression Model (U.S. Department of Agriculture, 1980). See Appendix B.
5. Food Behavior Score--a quantified score that serves as an index for measuring changes in nutrition knowledge and food behavior practices. It is derived from the Food Behavior Checklist. It is a progression indicator and is part of the Family Progression Model (U.S. Department of Agriculture, 1980). See Appendix C.
6. Program Completion--a homemaker who completes a series of food, nutrition, and related lessons, and who scores 90 or above on two successive measurements on the family progression record is considered to have completed the program. A homemaker who is considered to have attained maximum potential achievement but scores less than 90 may also be recognized as having completed the program (U.S. Department of Agriculture,

1980). Most homemakers in Muskogee County were maintained in the program for 24 months and the majority (51%) scored 88 or above.

7. Food Behavior Practices--in this study referred to the 35 behavioral objectives contained in the Food Behavior Checklist (see Appendix A).

8. Paraprofessional, Nutrition Aide, Aide--is "an individual who, as an employee of the Cooperative Extension Service, receives direction from professionals and is employed to extend the efforts of the Extension program professionals" (U.S. Department of Agriculture, 1977, p. ii).

9. Family Progression Model--is a set of instruments utilized in EFNEP to monitor the homemakers' progress in relation to program objectives. It consists of a 24-hour food recall, a scoring table for the 24-hour recall to obtain a total dietary intake score, a food behavior checklist, and a scoring table for the checklist to obtain a score representing adoption of food-related behaviors (U.S. Department of Agriculture, 1980).

10. Farm--is a business with less than ten acres of land yielding at least \$250 income annually from sale of farm products or it is more than ten acres and had \$50 or more annual income from the sale of farm products (U.S. Department of Agriculture, 1980).

11. Rural--towns under 10,000 population and rural non-farm or open country situations not defined as farm (U.S. Department of Agriculture, 1980).

12. Urban--towns and cities with 10,000 to 50,000 population (U.S. Department of Agriculture, 1980).

CHAPTER II

REVIEW OF LITERATURE

This review of literature focused on the need for nutrition education programs and the goals and objectives of EFNEP. Evaluation of the Expanded Food and Nutrition Education Program, factors relating to food practices and dietary adequacy, and a comparison of EFNEP in Muskogee County to Oklahoma EFNEP were also reviewed.

The Need for Nutrition Education

The Expanded Food and Nutrition Education Program was among several federal programs initiated in the 1960's to improve the diets of disadvantaged Americans. Although poor diets were found at all income levels, low-income families were at greater nutritional risk because they had fewer resources to spend on food. Consequently, food purchasing became more critical for them. In addition, the need for nutrition education at the lowest income levels was greater because people at those levels could least afford food waste and medical costs (U.S. General Accounting Office, 1980).

With the increased awareness of hunger and malnutrition existing in the United States during the mid-1960's came the recognition that the problem would have to be clarified and related to causal factors so that effective programs could be developed.

Malnutrition was distinguished from hunger as impairment or risk of impairment to mental or physical health resulting

from failure to meet the total nutrient requirements of an individual. Malnutrition encompasses the serious short and long term effects of improper diets (Kotz, 1969, p. 35).

A report based on the 1968-1970 Ten State Nutrition Survey concluded that income was a major determinant of nutritional status. As income decreased, the percentage of households with diets not meeting recommended dietary allowances increased (Lane, 1975). Other studies further documented this relationship between nutrient intake and the ability to purchase food (Madden and Yoder, 1972; Lane, 1978).

At the same time the influence of income was recognized, nutrition education was identified as one of the important needs for improved nutrition among low-income families (White House Conference on Food, Nutrition, and Health, 1970). In 1973, the American Dietetic Association endorsed nutrition education for all persons (American Dietetic Association, 1973). Nutrition education as a possible solution to the problem was gaining a broad base of support.

Program Goals and Objectives

The overall goal of EFNEP was to develop and implement a nutrition education program (U.S. Department of Agriculture, 1976, p. 3) designed to "Help low-income families, especially those with young children to acquire the knowledge, skills, attitudes and changed behavior to improve their diets in normal nutrition."

Program families were recruited primarily through door-to-door contacts by aides, referrals from enrolled homemakers, and referrals from other community agencies. The homemaker was considered enrolled when the aide completed demographic data in the family record (USDA, 1979).

To facilitate attainment of the EFNEP goal, the following objectives were identified:

1. Improved diets and health for the total family.
2. Increased knowledge of the essentials of nutrition.
3. Increased ability to select and buy food that satisfies nutritional needs.
4. Improved practices in food production, storage, safety and sanitation.
5. Increased ability to prepare and serve palatable meals.
6. Increased ability to manage resources that relate to food, including federal assistance programs such as food stamps (U.S. Department of Agriculture, 1976, p. 3).

These were the areas in which paraprofessionals received training both initially and on a continuing basis.

Evaluation of the Expanded Food and Nutrition Education Program

Numerous studies were conducted to determine the effects of the EFNEP program on the target audience, and to examine various factors influencing dietary improvement. Some of those studies included Wang and Ephross (1970), Feaster (1972), Bowering and Morrison (1973), and Mortvedt (1974). Most studies examined changes in dietary practices of the participants as a measure of effectiveness. Only one study evaluated changes in food behavior practices such as food purchasing, nutrition knowledge, or meal preparation. There was also a very limited number of studies dealing with the long term effects of EFNEP. A summary and discussion of these studies follow.

Delivery Methods

One of the underlying concepts of the Expanded Food and Nutrition Education Program was the utilization of paraprofessionals to expand efforts in reaching the target audience. It was recognized at the beginning

of the program that professional manpower for an intensive one-to-one educational program was limited. Employment of paraprofessionals was utilized to extend the efforts of the professional. Another consideration in utilizing the paraprofessional aides indigenous to the community in which they worked was the ability of the aides to communicate with the target audience. Pilot projects in rural areas of Alabama tended to confirm this feasibility (Cooperative Extension Service, 1969). Since that time, the paraprofessional aides were a major component in the operation of the program.

The typical program aide was around 40 years of age, had completed 11 years of education, and had previous work experience. Literature related to the performance of aides indicated that they can be effective change agents in improving family diets (Bowering, Lowenburg, Tirado, 1976; Wang et al., 1970; Feaster, 1972).

Comparison of EFNEP in Muskogee County and Oklahoma

Muskogee County EFNEP families were found to have family characteristics very similar to EFNEP families in Oklahoma. The mean monthly income for all Oklahoma EFNEP families was \$495 per month; and for Muskogee County, the mean monthly income was \$483. The average members per family was 3.72 for Oklahoma EFNEP compared to 3.86 in Muskogee County (Corey, 1984). The family composition in terms of ages of children was also similar, as shown in Table I.

Muskogee County had a higher enrollment of minority families, i.e., 62.1 percent compared to the State EFNEP mean percent of 45.5. Muskogee County did, however, represent the three predominant races in Oklahoma: Caucasian, Black, and American Indian (see Table II).

TABLE I
DISTRIBUTION OF CHILDREN'S
AGES BY PERCENT

	Under 1 Year	1-5 Years	9-13 Years	14-18 Years	19 Years
Muskogee County EFNEP	10.0	36.5	17.8	34.1	1.6
Oklahoma EFNEP	8.7	37.1	19.6	33.0	1.7

TABLE II
RACIAL-ETHNIC CHARACTERISTICS OF ENROLLED
FAMILIES BY PERCENT

	Caucasian	Black	Hispanic	American Indian	Asian or Pacific Islander
Muskogee County EFNEP	38.0	46.0	---	16.0	---
Oklahoma EFNEP	54.5	30.2	3.3	9.1	2.9

Muskogee County also had a 10 percent higher participation of families in the Food Stamp program with 63 percent of the homemakers receiving Food Stamps compared to the State EFNEP mean percent of 53. Participation in the Women, Infants, and Children's (WIC) program, however, was the same for both Muskogee County and Oklahoma EFNEP, with a 28 percent enrollment (Corey, 1984):

A final characteristic examined was family enrollment by place of residence. The farm and rural population in Muskogee County was very similar to Oklahoma EFNEP. Muskogee County also had 45 percent of the enrolled families residing in urban areas with populations between 10,000 and 50,000 (Corey, 1984). There were no families in Muskogee County residing in central cities over 50,000 in population. Oklahoma and Tulsa counties were the only areas that had a central city (see Table III).

TABLE III
ENROLLED PROGRAM FAMILIES BY PLACE OF
RESIDENCE BY PERCENT

	Farm	Towns Under 10,000	Towns and Cities 10,000 to 50,000	Central Cities Over 50,000
Muskogee County EFNEP	2.0	53.0	45.0	---
Oklahoma EFNEP	2.0	43.0	18.0	37.0

In summary, it was determined that Muskogee County EFNEP was representative of EFNEP in Oklahoma. The family characteristics and composition including income, ages of children, members per family, and participation in WIC were essentially the same. Although Muskogee County had a higher minority enrollment, it represented the three predominant races in Oklahoma EFNEP. Food Stamp enrollment was slightly higher (10%) than the average in Oklahoma EFNEP; however, increasing participation in the Food Stamp program was a recommendation of federal administrators.

Methods of Evaluation

Twenty-Four Hour Food Recall. In addition to effective delivery methods in reaching target audiences, evaluation was to be an important facet of the EFNEP program. The 24-hour food recall expressed in terms of food group consumption was the main criterion of success used in EFNEP since its beginning for assessing changes in dietary practices. A review of literature related to this method of assessment follows.

A study to compare the use of the "food group approach" with a "nutrient analysis approach" in dietary assessment was conducted in an East Harlem area of New York City (Bowering, Morrison, Lowenberg, and Tirado, 1977). Both assessments were based on the 24-hour food recall. The findings indicated that the USDA Four Food Groups yielded the same results as nutrient analysis with respect to initial dietary status and to the effect of the aides. Greger and Etnyre (1978) conducted a study with adolescent girls. Results indicated that the food recall provided valid estimates of some nutrients but not others.

In tests of internal validity, the 24-hour recall was found to provide accurate data on mean nutritional intake, although low intakes tended

to be overreported and overconsumption tended to be underreported (Gersovitz, 1978). According to Munger and Jones (1976),

The 24-hour food recall originated in the sphere of dietary research where the concern was with aggregate data for a community or subpopulation. Even in the research sphere, the validity of resultant data is the subject of much controversy. There is among experts, however, general agreement that the technique is the best cost-to-benefit tradeoff among available methods for measuring food intake in non-institutional settings (p. 21).

It appeared that the 24-hour food recall was an appropriate assessment tool within the context of the Expanded Food and Nutrition Education Program. It had the advantage of being simple enough for use by the paraprofessional with the intended audience. The limitations were not considered to preclude validity of the recall for partial evaluation of EFNEP (Verma and Jones, 1973; Bowering, Morrison, Lowenberg, and Tirado, 1976). This implied that other measures of evaluation strengthened the use of the 24-hour food recall.

Family Progression Model. To further strengthen the evaluation of the EFNEP program, a Family Progression Model was developed by Munger and Jones (1976) in a federally funded research study. The objectives of EFNEP were translated into behavioral statements that were sequentially refined during a series of Cooperative Extension Service workshops and discussions with Extension Service nutrition specialists. These objectives were then incorporated into a food behavior checklist that was used along with the 24-hour food recall to evaluate progress of individual homemakers. These two instruments, the 24-hour food recall and the food behavior checklist, became the major evaluative components of the Family Progression Model. The reliability of the model was demonstrated in field tests in a sample of 511 EFNEP homemakers and 49 aides (Munger and Jones, 1976). The Family Progression Model became the recommended

method of assessing progress of individual homemakers (U.S. Department of Agriculture, 1980).

EFNEP Evaluation of Impact on Target Audience

Several studies were conducted to examine the effects of the Expanded Food and Nutrition Education Program on the target audience. A summary of these with emphasis on selected factors examined for their effect on participant outcomes was included in this review.

Feaster (1972) evaluated food knowledge and dietary adequacy as measured by the 24-hour food recall. Results of the study on a national sample of over 10,500 EFNEP homemakers indicated that adequacy of dietary intake for each food group improved significantly. Food recalls taken at the beginning of the program and six months later were the basis for the findings. Results indicated that aides were effective in helping low-income homemakers improve dietary practices.

Bowering et al. (1976) found ethnic factors to have an influence on dietary practices of pregnant EFNEP homemakers participating in an East Harlem obstetric clinic. They suggested that evaluators need to recognize the importance of both ethnic differences and non-nutritional factors such as education and duration at a place of residence in a community which may affect the progress achieved. Wang and Ephross (1970) reported that race was not associated with dietary practices.

Sumita (1973) examined personal characteristics as related to adoption of selected food behavior practices of EFNEP homemakers in three counties in Ohio. Homemakers were enrolled for at least one year. Number of family members, presence of children in the home, marital status, age, and race were found to be significantly associated with adoption of

Brown and Pestle (1981) studied the long term effects of the EFNEP program in Georgia. Follow-up data were collected on 225 homemakers one year after they had completed the program. Instruments utilized for evaluation were quantified scores for the 24-hour food recall and food behavior checklist. Results of this study indicated that homemakers' scores for adequacy of dietary intake and food behavior practice improved significantly during program participation. There were no significant differences between scores for dietary intake and food behavior practices at program completion and one year later which indicated that the significant improvements had been maintained. Residential patterns, age of homemaker, and age of homemakers' children were not found to be associated with improvement of adequacy of dietary intake and food behavior practices.

In one Oklahoma county, a study utilizing the 24-hour food recall compared dietary adequacy at the time of progression out of the program and three or more years later. Findings from this study showed that the majority, 90 percent or 45 homemakers, successfully maintained their dietary levels as defined by two-thirds or more of the Recommended Dietary Allowances for protein, calcium, iron, vitamin A, thiamine, riboflavin, and vitamin C (Montgomery, 1983).

Summary

The EFNEP program provided food and nutrition education to low-income families since November, 1968. The 24-hour food recall was used as an objective measure of estimated dietary adequacy in numerous studies evaluating EFNEP. Most of the studies reviewed indicated that dietary practices of homemakers did improve during program participation. There

was, however, a gap in the literature regarding the long term effect of participation in EFNEP on the dietary intake and food behavior practices of homemakers. The studies that were conducted on the long term effect of EFNEP varied in length of program participation and the length of time that had elapsed before collection of follow-up data. Results of these studies were also varied, suggesting that further research was needed.

CHAPTER III

RESEARCH DESIGN

This longitudinal study was conducted to determine if homemakers completing the Expanded Food and Nutrition Education Program significantly improved adequacy of dietary intake and food behavior practices during participation in the program. Furthermore, the retention of these progression indicators were assessed after program completion. The first 24-hour food recall score and the first food behavior practice score taken at the beginning of the beginning of the program provided a benchmark measurement for assessing changes in later scores.

Homemakers' personal characteristics of age, educational level, number of children, income, race, and place of residence (i.e., rural or urban) were examined to determine if there was any association between these characteristics and adequacy of dietary intake or food behavior practices. The relationships of food behavior practices to the adequacy of dietary intake of homemakers during and after program completion were also examined.

Type of Research

This study utilized the single group longitudinal design which was quasi-experimental. Periodic observations of the program participants were observed over time with the first observation, O_1 , taken at the beginning of the program; O_2 , taken at the completion of the program; and

O_3 , taken six or more months after program completion. This method was limited by the lack of a control group for comparison, but it did provide a comparison of the past and current performance of a single group. It was recommended as an appropriate evaluation design for the EFNEP program (French, 1983). The research design is illustrated in Table IV.

TABLE IV
QUASI-EXPERIMENTAL DESIGN FOR EFNEP EVALUATION

Progression Indicator	Time of Measurement		
	Program Entry (0 Months)	Program Completion (18-24 Months)	Post-Completion (6-36 Months)
Adequacy of Dietary Intake	R O_1 -----	X -----	O_2 O_3
Level of Food Behavior Practices	R O_1 -----	X -----	O_2 O_3

X = Treatment of participation in EFNEP.

Population and Sample

In the adult phase of EFNEP, the target audience was identified as homemakers with priority given to families with young children. Other criteria considered appropriate for EFNEP eligibility included isolated poor families who were eligible for USDA food assistance programs, families receiving welfare payments, families in which there was a low

educational level among adults, families subsiding in poor housing, and/or families with a relative high proportion of children, youth, or elderly family members in one home (U.S. Department of Agriculture, 1979).

The ten EFNEP counties in Oklahoma represented 46.8 percent of the total Oklahoma population. Muskogee County ranked fourth among Oklahoma EFNEP counties in total population; however, 19 percent of all EFNEP families enrolled in the State at the time of this study were participants in the Muskogee County EFNEP program. Muskogee County had 12 paraprofessional nutrition aides, followed by Oklahoma (9), Comanche (9), Tulsa (8), Bryan (6), Pittsburg (5), LeFlore (5), Atoka (4), and Pottawatomie (3) (Corey, 1984).

Sample Population

The sample in this study was randomly selected from a population of 289 homemakers who had completed the Muskogee County EFNEP program between October 1, 1981, and April 30, 1984. The population included all homemakers who had been out of the program for a minimum of six months up to a maximum of 36 months. Forty-five percent of the homemakers in the sample had been out of the program for two or more years, 28 percent had been out of the program for one to two years, and 27 percent had been out of the program from six months to one year. The random sample of 164 homemakers was selected by computer. This was the sample size determined to be representative of a population of 289 (Krejcie and Morgan, 1970).

Attempts were made to locate all homemakers in the random sample. If the homemaker had moved, several efforts were made to obtain her current address. Of the 164 homemakers in the random sample, one was

deceased, one was unavailable for an interview, three had incomplete records, and 38 had moved and could not be located. The 121 homemakers who participated represented 74 percent of the original random sample and 42 percent of all homemakers completing the program within the 36-month time period.

Research Instruments

The national EFNEP administration recommended the use of a Progression Model to measure the progress of individual families (U.S. Department of Agriculture, 1980). This model consisted of two primary instruments: (1) the 24-hour food recall, and (2) a food behavior checklist. The model assisted the aide in identifying areas that needed educational emphases and helped determine the homemakers' progress and completion of the program. The two instruments contained in the model were utilized in this study to determine changes in food behavior practices and adequacy of dietary intake.

The 24-hour food recall documented the homemakers' food consumption from the four basic food groups. Measurements were taken by the aide, according to a prescribed method, at the time a homemaker began the program and every six months during program participation. A quantified score was determined for each measurement from a scoring table of the 24-hour recall (see Appendix D). This method allowed information to be translated into a set of numerical scores ranging from 0 to 100 (see Appendix B). A score of 100 was based on the recommended diet of two servings each of meat and milk or milk products; four servings each of fruit and vegetables, and bread and cereals (U.S. Department of Agriculture, 1980).

The food behavior checklist was a set of 35 behavioral statements that represented program objectives (see Appendix A). It included knowledge of nutrition, food purchasing patterns, storage and sanitation practices, meal planning skills, and food preparation skills. It was completed by the aide for each homemaker at the beginning of the program and every six months thereafter. A quantified score ranging from 0 to 100 was calculated for each measurement using a scoring table for the food behavior checklist (see Appendix C). It was used in comparing overall progress in relationship to the categories of food behavior practices (U.S. Department of Agriculture, 1980).

Collection of Data

Since this study was limited to homemakers who had completed the program, the 24-hour food recalls and food behavior checklists taken during program participation were included in the longitudinal data. Information on each of the 121 homemakers in the sample was obtained from records maintained by the Muskogee County aides. The data included the family record which contained family composition, place of residence, race, homemaker's age and education, monthly income, and value of food stamps received (see Appendix E).

The follow-up data were obtained from the homemakers during personal home visits by the aides. The aides received specific training and instructions for collection of the follow-up data. The training was conducted by the supervising home economist and included a review of the standardized procedures for completing the 24-hour recall and food behavior checklist according to national guidelines (U.S. Department of Agriculture, 1980).

It should be noted that the aides in Muskogee County had extensive experience collecting this type of information. The years of experience as an EFNEP aide ranged from a minimum of 5 to a maximum of 13. In all but two instances, the same aide who recorded the original information collected the post-completion data. This provided consistency in the data collection methods.

Analysis of Data

Hypotheses one and three were analyzed by the paired t test statistical procedure. This method was used to determine statistical differences between scores recorded at O_1 and O_2 , O_2 and O_3 , and O_1 and O_3 . The t test is a parametric statistical test especially appropriate in a repeated measure design (Spatz and Johnston, 1981). A random sample is required for this method. A minimum level of significance of .05 was established as a basis for retaining or rejecting all null hypotheses in this study.

Analysis of variance (ANOVA) was used to test hypothesis two, which examined the association between family characteristics and adequacy of dietary intake and level of food behaviors. ANOVA is an appropriate procedure for determining significant differences between mean scores of two or more groups (Comptom and Hall, 1972). Place of residence was analyzed, however, by the t test since there were only two categories, rural and urban. All characteristics were analyzed at the beginning of the program (O_1); and mean score differences were analyzed at program completion (O_2-O_1).

If a statistically significant difference for a characteristic was found by ANOVA, then Duncan's multiple range test was performed using

Kramer's approximation to determine where the statistical differences were. Kramer's approximation is one of two methods appropriate for determining significant differences between groups of unequal cell size (Steel and Torie, 1980).

The Pearson product-moment correlation was used to analyze hypothesis four. It is an appropriate statistical procedure for determining significant relationships between two sets of scores (Compton et al., 1972). Coefficients of correlation for adequacy of dietary intake and level of food behavior practices were determined at the beginning of the program, at program completion, and six or more months after completion of the program.

Statistical analyses were performed by the Computer Center at Oklahoma State University. The Statistical Analysis System Package of the SAS Institute, North Carolina, was utilized in the computer analysis of data.

CHAPTER IV

RESULTS AND DISCUSSION

Introduction

The purpose of this study was to assess changes in the nutritional adequacy of dietary intake and food behavior practices of homemakers who had completed the EFNEP in Muskogee County. The study also assessed whether or not changes in dietary adequacy and food behavior practices were sustained over time. The results of the statistical analysis and a profile of the sample population are reported in this chapter.

Description of the Sample

A total of 121 randomly selected EFNEP homemakers participated in this study. All homemakers had completed the program and had not received nutrition instruction from an aide for a minimum of six months. Forty-five percent of the homemakers had been out of the program for two or more years, 28 percent had been out of the program for one or two years, and 27 percent had been out of the program for six months to one year. The majority (68%) of the homemakers had participated in the program for two years. The minimum time of participation was 18 months.

Age

Homemakers were divided into three age groups (see Table V). The

TABLE V
 PROFILE OF SAMPLE POPULATION
 (TOTAL N = 121)

Characteristic	Frequency	Percent
<u>Age</u>		
20 Years or Less	14	12
21-35 Years	67	55
35 Years or Older	40	33
<u>Educational Level</u>		
8th Grade or Less	15	12
9th-10th Grade	31	26
11th-12th Grade	64	53
Beyond 12th Grade	11	9
<u>Number of Children</u>		
0-1 Children	36	30
2 Children	33	27
3-4 Children	44	36
5 or More Children	8	7
<u>Race</u>		
Black	54	45
Caucasian	43	35
American Indian	24	20
<u>Place of Residence</u>		
Urban	79	65
Rural	42	35

largest group of homemakers was between the ages of 21 and 35. This group represented 55 percent of the total sample. Twelve percent of the homemakers were under the age of 21; 33 percent were over age 35. The oldest homemaker was 66, the youngest was 16, and the mean age for all groups was 31.

Educational Level

The majority (53%) of the homemakers had completed the eleventh or twelfth grades. Twenty-six percent had completed the ninth or tenth grade. Twelve percent had less than a ninth grade education. Only nine percent of the homemakers had an education beyond the twelfth grade (see Table V).

Number of Children in the Home

Homemakers were divided into four groups according to the number of children living in the home (see Table V). Among the participants, 30 percent had no children or one child. Only two homemakers had no children, and one was pregnant at the time the data were collected. Twenty-seven percent of the homemakers had two children, 36 percent had three or four children, and 7 percent had five or more children. The mean number of children per family was 2.4.

Income Level

Income was measured at the beginning of the program and at program completion. The dollar value received in food stamps was added to the monthly income of families participating in the Food Stamp program to more accurately represent the spendable income available to the family.

An examination of Table VI indicated that income increased slightly during program participation. The greatest change observed from beginning to completion was a 14 percent decrease of families in the lowest income group (under \$525). At program completion, 35 percent of the homemakers had incomes above \$670 per month. Monthly income ranged from \$229 to \$920. The mean income at the beginning of the program was \$524 and increased to \$602 at program completion. Inflation could account for part of the increase.

TABLE VI
HOMEMAKERS' MONTHLY INCOME BY
FREQUENCY AND PERCENTAGE

Income Group	Beginning of Program		Completion of Program		Change	
	N	%	N	%	N	%
\$524 or Less	59	48.7	42	34.7	-17	-14.0
\$525-\$670	40	33.0	36	29.8	-4	-3.3
\$671-\$722	8	6.6	14	11.6	+6	+5.0
\$723-\$814	9	7.4	15	12.3	+6	+5.0
\$814 and Over	5	4.1	14	11.6	+6	+7.4

Race

Homemakers in the sample represented the three races participating in the EFNEP in Muskogee County at the time of the study (see Table V).

Thirty-five percent of the homemakers were Caucasian, 45 percent were Black, and 20 percent were American Indian.

Place of Residence

Homemakers were divided into two groups according to place of residence (see Table V). Homemakers were classified as urban if they resided in a city of more than 10,000 population. Homemakers residing in areas with a population of less than 10,000 were classified as rural. Sixty-five percent of the homemakers lived in an urban area and 35 percent resided in rural areas. The only urban area in Muskogee County was the city of Muskogee. Only four homemakers lived on a farm and they were classified as rural. Few EFNEP families owned enough land or equipment to be able to produce income from farming.

Summary

The analysis of the sample population indicated that the EFNEP was reaching the intended audience. All but two of the families had children and the income levels were well within the poverty range. Furthermore, the families had a limited amount of education, over half of them received food stamps, and 62 percent of the families were minorities.

Discussion of Hypotheses

Hypothesis One

The first research objective was developed to assess if the nutritional adequacy of homemakers' diets changed significantly during or after participation in the EFNEP. The following null hypothesis was

proposed: H_1 --There will be no significant differences between adequacy of dietary intake of homemakers at the beginning of the program, at completion of program, and six or more months after completion of program.

Adequacy of dietary intake increased from the beginning of the program to completion (see Table VII). Mean score differences for adequacy of dietary intake were given in Table VIII. There was a mean score increase of 29.58 between the beginning food recall scores and food recall scores at program completion. The paired t test resulted in a t value of 11.55, which was highly significant at an alpha level of .0001.

The food recall scores six or more months after program completion were also significantly higher than beginning recall scores. There was a mean score increase of 29.60 which yielded a t value of 11.58. The level of significance was .0001.

It was concluded that the adequacy of dietary intake of homemakers completing the program improved significantly during participation in the EFNEP (see Table VIII). This finding adds to an increasing number of studies with similar conclusions (Feaster, 1972; Bowering et al., 1976; Seiders et al., 1972; Brown and Pestle, 1981; Montgomery, 1983).

The mean score differences in adequacy of dietary intake between program completion and a follow-up score six or more months later were also statistically analyzed by the paired t test method. The very slight increase of .02 was not significant. Dietary scores were essentially the same six or more months after program completion as they were at the time of completion. The significant improvements in adequacy of dietary intake were found to be sustained as long as three years after the homemakers had completed the program. This finding was in agreement with similar studies of Brown and Pestle (1981) and Montgomery (1983).

TABLE VII
 ADEQUACY OF DIETARY INTAKE OF
 HOMEMAKERS BY GROUP MEANS

Time of Measurement	Group Means of Food Recall Scores
Program Beginning	56.12
Program Completion	85.70
Follow-Up	85.71

TABLE VIII
 PAIRED t TESTS FOR ADEQUACY OF DIETARY INTAKE
 (N = 121, DF = 120)

Food Recall Comparisons	Mean Score Differences	t Value	Probability
Beginning to Completion	+29.58	11.55	.0001*
Beginning to Follow-Up	+29.60	11.60	.0001*
Completion to Follow-Up	+0.02	0.01	.9931

*Significant alpha level.

It is important to observe that homemakers in this study and those of Brown and Pestle (1981) and Montgomery (1983) had completed the program. Homemakers in the Louisiana study (Gassie and Jones, 1972) were only involved for eight weeks with a follow-up measurement four months later. The level of diets was found to be the same as before the program began. Results of the Louisiana study indicated a need for more extensive educational programs with repeated learning experiences to bring about sustained improvements. The criterion of participation in the Rountree (1973) study was a minimum of 12 months involvement in the EFNEP, but completion of the program was not required. Adequacy of dietary intake did not improve significantly and improvements were not sustained. Comparisons of results of these studies suggested the need for homemakers to complete the program for significant improvements in adequacy of dietary intake to be made and sustained. This was an area that warranted further study.

Hypothesis Two

Hypothesis two was formulated to statistically control for selected characteristics that could possibly influence adequacy of dietary intake and food behavior practices. The characteristics that were tested for their relationship to dietary scores and food behavior practice scores were age, race, educational level, number of children in the family, income, and place of residence (i.e., rural or urban). The following null hypothesis was developed: H_2 --There will be no significant relationship between adequacy of dietary intake and food behavior practices of homemakers at the beginning of the program and at program completion based on homemakers' personal characteristics.

Following is a discussion of the results of the analysis of variance statistical procedure for each selected characteristic. Scores for adequacy of dietary intake and food behavior practice for each characteristic are given in the accompanying tables.

Age. Homemakers were classified into three age groups. Scores for adequacy of dietary intake and food behavior practices were similar for all groups at each time of measurement (Table IX). Beginning dietary scores ranged from a low of 51 for the oldest group of homemakers to 59 for the youngest group. Beginning food behavior practice scores ranged from a low of 33 for the youngest group to 41 for homemakers in the oldest category. All three groups of homemakers increased adequacy of dietary intake and food behavior practices from the beginning of the program to completion. The least amount of variation in scores among groups was found at program completion. There was less than one point difference in scores for adequacy of dietary intake and only three points difference among groups for food behavior practices at the completion of the program.

An analysis of variance (ANOVA) was performed to test for statistical differences between the groups. None of the determined F values reported in Table X was found to be significant. Age was not found to be associated with adequacy of dietary intake or level of food behavior practices. This finding was consistent with those of Parsons (1979) that indicated age was not associated with adequacy of dietary intake. Although not statistically significant, the adoption rate of food behavior practices decreased as age increased. Sumita (1973) reported similar findings for selected food behavior practices.

TABLE IX
 ADEQUACY OF DIETARY INTAKE AND FOOD
 BEHAVIOR PRACTICES BY AGE

Age Groups and Time of Measurement	N	Group Means	
		Dietary Adequacy	Food Behavior Practices
<u>20 Years or Less</u>	14		
Beginning		59.36	33.00
Change		+26.43	+48.00
Completion		85.79	81.00
<u>21-35 Years</u>	67		
Beginning		58.33	35.66
Change		+27.43	42.80
Completion		85.76	78.46
<u>35 Years or More</u>	40		
Beginning		51.30	41.05
Change		+33.70	+38.85
Completion		85.00	79.90

TABLE X
ANALYSIS OF VARIANCE FOR ADEQUACY OF DIETARY INTAKE
AND FOOD BEHAVIOR PRACTICES BY AGE

Progression Indi- cators by Time of Measurement	DF	Sums of Squares	Mean Square	F Value	Proba- bility
<u>Food Recall Scores</u>					
Beginning					
Age	2	1402.70	701.38	1.28	0.28
Error	118	64642.00	547.82		
Beginning to Completion					
Age	2	1036.03	518.01	0.65	0.52
Error	118	94219.40	798.47		
<u>Food Behavior Scores</u>					
Beginning					
Age	2	998.87	499.44	1.23	0.29
Error	118	48075.00	407.42		
Beginning to Completion					
Age	2	943.23	471.62	0.98	0.37
Error	118	56789.57	481.27		

Race. An examination of Table XI indicated that group means for all three racial groups increased from the beginning of the program to program completion. Table XII contained the results of the ANOVA statistical procedure. None of the F values was found to be statistically significant. Race was not found to be associated with adequacy of dietary intake or level of food behavior practices. Wang et al. (1970) reported that race was not associated with dietary practices. Knowledge of nutrition was one of five categories of food behavior practices; thus the findings of the two studies were in agreement.

Education. Group means for adequacy of dietary intake and food behavior practices increased for all educational levels (Table XIII). The beginning group means for dietary adequacy increased as educational level increased. Homemakers completing the eighth grade or less had a mean score of 45, those completing grades nine through twelve had a mean score of 56, and those with education beyond high school had the highest mean score of 67 on food recalls at the beginning of the program. Homemakers in the two lowest educational levels, however, also scored highest--87 and 88, respectively--at program completion. The scores on food behavior practices were very similar for all educational levels both at the beginning of the program and at completion.

When food recall scores and food behavior practice scores were analyzed for statistical differences using ANOVA, only one F value was found to be significant as shown in Table XIV. The mean difference for food recalls between program beginning and completion yielded an F value of 2.71 which was significant at the .04 alpha level.

TABLE XI
ADEQUACY OF DIETARY INTAKE AND FOOD
BEHAVIOR PRACTICES BY RACE

Time of Measurement by Race	N	Group Means	
		Dietary Adequacy	Food Behavior Practices
<u>Caucasian</u>	43		
Beginning		51.15	36.74
Change		+37.58	+46.16
Completion		88.70	82.90
<u>Black</u>	54		
Beginning		56.35	34.07
Change		+24.43	+42.07
Completion		80.78	76.14
<u>American Indian</u>	24		
Beginning		64.58	44.71
Change		+26.74	+34.88
Completion		91.33	79.59

TABLE XV
 DUNCAN'S MULTIPLE RANGE TEST WITH KRAMER'S
 APPROXIMATION FOR ADEQUACY OF DIETARY
 INTAKE BY EDUCATION^a

Educational Level	N	Mean Score Differences Beginning to Completion	Grouping ^b
<u>Group 1</u>			
8th Grade or Less	15	43.33	A
<u>Group 2</u>			
9th-10th Grade	31	31.41	AB
<u>Group 3</u>			
11th-12th Grade	64	28.38	AB
<u>Group 4</u>			
Beyond 12th Grade	11	12.64	B

^aData shown for significant ($p \leq .05$) findings only.

^bMeans with the same letter are not significantly different at the .05 level.

Possible explanations may include a combination of factors. Homemakers with less education may be more receptive to learning or help from an aide. The need to improve may be more easily recognized when diets are severely inadequate. These families may have been experiencing more symptoms of malnutrition. Aides could possibly have been more highly motivated to help families with less education and poorer diets. The needs of these families are greater than others; consequently, there is greater potential for achievement and success may be more readily recognized by the aides.

Number of Children in Family. Homemakers were divided into four groups according to the number of children in the family (see Table XVI). Adequacy of dietary intake and level of food behavior practices increased for all groups. Group means for beginning scores and scores at the completion of the program were very similar. The results of the ANOVA statistical procedure as shown in Table XVII yielded no F values that were statistically significant. As a result, number of children in the family was not associated with adequacy of dietary intake or level of food behavior practices. Parsons (1979) and Seiders et al. (1972) reported similar findings.

Income. The group means for income are shown in Table XVIII. Homemakers in all five income levels improved adequacy of dietary intake and food behavior practices. Homemakers with monthly income above \$813 tended to have higher dietary scores than homemakers with income below this level--74 as compared to a range of 52 to 53. However, scores for adequacy of dietary intake at program completion were very similar. There

TABLE XVI
ADEQUACY OF DIETARY INTAKE AND FOOD BEHAVIOR PRACTICES
BY NUMBER OF CHILDREN IN FAMILY

Number of Children by Time of Measurement	N	Group Means	
		Dietary Adequacy	Food Behavior Practices
<u>0-1 Children</u>	35		
Beginning		58.75	43.17
Change		+29.22	+39.67
Completion		87.97	82.84
<u>2 Children</u>	33		
Beginning		54.00	34.67
Change		+33.36	+42.79
Completion		87.36	85.46
<u>3-4 Children</u>	44		
Beginning		56.20	33.29
Change		+25.89	+43.98
Completion		82.09	77.27
<u>5 or More Children</u>	8		
Beginning		52.63	41.25
Change		+35.88	+39.88
Completion		88.51	81.13

TABLE XVII
 ANALYSIS OF VARIANCE FOR ADEQUACY OF DIETARY
 INTAKE AND FOOD BEHAVIOR PRACTICES BY
 NUMBER OF CHILDREN IN FAMILY

Progression Indi- cators by Time of Measurement	DF	Sums of Squares	Mean Square	F Value	Proba- bility
<u>Food Recall Scores</u>					
Beginning					
Children	3	495.35	165.12	0.29	0.83
Error	117	65549.78	560.25		
Beginning to Completion					
Children	3	1394.34	464.78	0.58	0.63
Error	117	93861.17	802.23		
<u>Food Behavior Scores</u>					
Beginning					
Children	3	2294.89	764.96	1.91	0.13
Error	117	46778.99	399.82		
Beginning to Completion					
Children	3	423.44	141.15	0.29	0.83
Error	117	57309.37	489.82		

was little variation in food behavior practice scores either at the beginning of the program or at program completion.

Food recall scores and food behavior practice scores for income were analyzed by ANOVA for statistical differences at program beginning and program completion. The F score of 2.64 for food recall scores at the beginning of the program was the only significant value obtained. It was significant at the .05 alpha level (see Table XIX).

Duncan's test using Kramer's approximation was applied to the beginning mean dietary scores to determine where the actual differences were. The results indicated that homemakers in the highest income level, \$814 and over, had significantly higher dietary scores at the beginning of the program than homemakers with incomes less than \$814 per month. There was a narrow range of variation among beginning dietary scores for homemakers in the four income groups below \$814 per month (52 to 55). A summary of the test results follows (see Table XX).

Based on the results of the statistical analysis, income was not found to be associated with adequacy of dietary intake or food behavior practices with the following exception. Homemakers with income above \$814 had significantly better diets than other homemakers at the beginning of the program only. This finding is in agreement with Seiders et al. (1972) and Parsons (1979) who reported no association between income and adequacy of dietary intake. Sumita (1973) similarly reported no association between income and adoption of food behavior practices.

Place of Residence. There was very little variation in scores of urban or rural homemakers. Scores at the beginning of the program and

TABLE XIX
ANALYSIS OF VARIANCE FOR ADEQUACY OF DIETARY INTAKE
AND FOOD BEHAVIOR PRACTICES BY INCOME

Progression Indicators by Time of Measurement	DF	Sums of Squares	Mean Square	F Value	Probability
<u>Food Recall Scores</u>					
Beginning					
Income	4	5232.72	1308.18	2.64	0.046*
Error	116	60812.42	524.24		
Beginning to Completion					
Income	4	4987.01	1246.75	1.60	0.180
Error	116	90268.50	778.17		
<u>Food Behavior Scores</u>					
Beginning					
Income	4	2822.82	705.71	1.77	0.140
Error	116	46251.06	398.72		
Beginning to Completion					
Income	4	2632.62	658.15	1.39	0.240
Error	116	55100.20	475.00		

*Significant alpha level.

TABLE XX
 DUNCAN'S MULTIPLE RANGE TEST WITH KRAMER'S
 APPROXIMATION FOR ADEQUACY OF DIETARY
 INTAKE BY INCOME^a

Income Group	N	Mean Score Differences Beginning to Completion	Grouping ^b
<u>Group 5</u>			
\$814 and Over	14	74.00	A
<u>Group 2</u>			
\$525-\$670	36	55.31	B
<u>Group 3</u>			
\$671-\$722	14	54.14	B
<u>Group 4</u>			
\$723-\$813	15	53.80	B
<u>Group 1</u>			
\$524 or Less	42	52.33	B

^aData shown for significant ($p \leq .05$) findings only.

^bMeans with the same letter are not significantly different at the .05 level.

at completion for both adequacy of dietary intake and food behavior practices were extremely similar (see Table XXI).

Homemakers were classified as rural or urban since only four homemakers lived on a farm as defined in the EFNEP guidelines. A comparison of food recall scores and scores on food behavior practices was made utilizing the t -test statistical procedure. No t values as reported in Table XXII were significant. Place of residence was not associated with adequacy of dietary intake or level of food behavior practices. Sumita (1973) reported that food behavior practices were not associated with place of residence.

Hypothesis Three

The third research objective of this study was to assess if the level of food behavior practices of homemakers changed significantly during or after participation in the EFNEP. The following null hypothesis was developed to satisfy this objective: H_3 --There will be no significant differences between food behavior practices of homemakers at the beginning of the program, at completion of program, and six or more months after completion of program.

Food behavior scores of homemakers increased from a mean of 37 at the beginning of the program to 79 at program completion. The follow-up mean score six or more months after program completion had increased to 84 as shown in Table XXIII.

The paired t test statistical procedure for changes in food behavior practices from program beginning to completion resulted in a t value of 21.11 which was a highly significant increase at the .0001 alpha

TABLE XXI
ADEQUACY OF DIETARY INTAKE AND FOOD BEHAVIOR
PRACTICES BY PLACE OF RESIDENCE

Time of Measurement by Place of Residence	N	Group Means	
		Dietary Adequacy	Food Behavior Practices
<u>Urban</u>	79		
Beginning		57.37	37.64
Change		+26.76	+41.57
Completion		84.13	79.21
<u>Rural</u>	42		
Beginning		53.78	37.64
Change		+30.60	+41.62
Completion		84.38	79.26

TABLE XXII

t TESTS FOR ADEQUACY OF DIETARY INTAKE AND FOOD
BEHAVIOR PRACTICES BY PLACE OF RESIDENCE

Progression Indicators by Time of Measurement	<u>t</u> Value	Probability
<u>Food Recall Scores</u>		
Beginning	.79	.42
Completion	-.13	.90
<u>Food Behavior Scores</u>		
Beginning	-.20	.84
Completion	-.02	.99

TABLE XXIII
 FOOD BEHAVIOR PRACTICES OF HOME-
 MAKERS BY GROUP MEANS

Time of Measurement	Group Means for Food Behavior Practice Scores
Program Beginning	37.13
Program Completion	79.23
Follow-Up	84.22

TABLE XXIV
 PAIRED t TESTS FOR FOOD BEHAVIOR
 PRACTICES (N = 121)

Food Behavior Practice Score Comparisons	Differences	t Value	Proba- bility
Beginning to Completion	+42.09	21.11	.0001*
Beginning to Follow-Up	+47.09	26.26	.0001*
Completion to Follow-Up	+4.90	5.17	.0001*

*Significant alpha level.

level (see Table XXIV). Thus food behavior practices improved significantly during participation in the program.

The food behavior practice scores six or more months after program completion were also significantly higher than beginning food practice scores. There was a mean score increase of 47.09 which yielded a t value of 26.26. The level of significance was .0001. Thus food behavior practices were sustained after completion of the program.

The mean score differences between program completion and a follow-up measurement six or more months later were also statistically analyzed by the paired t test. The mean score increase of 4.9 yielded a t value of 5.17 which was highly significant at the .0001 level. It was concluded that homemakers continued to improve food behavior practices after completion of the program. The increase was, however, only 4.9 points compared to the increase of 42.09 during program participation.

Based on the results of the paired t test, the null hypothesis was rejected. The conclusions were very similar to those for adequacy of dietary intake. Homemakers improved significantly food behavior practices during participation in the program and those practices were not only sustained but significantly improved after homemakers had been out of the program for 6 to 36 months. In a similar Georgia study by Brown and Pestle (1981), food behavior practices were found to be sustained. It is possible that the EFNEP created an awareness for the need to improve food behavior practices that extended beyond the completion of the program. Participation in the EFNEP might also create a receptiveness to nutrition information from other sources such as the media. Food behavior practices also cover a broader range of behavior changes than the food recall. It may, therefore, more readily reflect changes in behavior.

The EFNEP objective of helping families, especially those with children living in or near poverty, to acquire knowledge, skills, and changed behavior necessary to achieve adequate diets was met by the EFNEP. This conclusion was strengthened by the design of the study which included both the 24-hour food recall and food behavior practices as measures of evaluation. Since both measures of evaluation were found to be sustained, the impact of the EFNEP on low income homemakers became even more significant. Learning is most valuable when achieved at the adoption level which includes changes in knowledge, attitudes, skills, and ultimately behavior.

Hypothesis Four

The fourth research objective was developed to assess if changes in the level of food behavior practices were associated with changes in adequacy of dietary intake. The following null hypothesis was proposed to meet this objective: H_4 --There will be no significant relationships between adequacy of dietary intake and level of food behavior practices of homemakers at the beginning of the program, at completion of the program, and six or more months after completion of the program.

The mean scores for dietary adequacy and food behavior practices of homemakers increased from the beginning of the program to completion and six or more months after program completion. As shown in Table XXV, the mean scores for food behavior practices were lower overall than the mean scores for adequacy of dietary intake. The greatest differences were found at the beginning of the program. The dietary mean was 56 as compared to a mean of 37 for food behavior practices. However, by the time of the follow-up measurement, the mean for food behavior practices was

only slightly less than the mean for adequacy of dietary intake, i.e., 84 compared to 86.

TABLE XXV
ADEQUACY OF DIETARY INTAKE AND FOOD BEHAVIOR
PRACTICES OF HOMEMAKERS BY GROUP MEANS
(N = 121)

Time of Measurement	Food Recall Scores	Food Behavior Practice Scores
Program Beginning	56.12	37.13
Program Completion	85.70	79.23
Follow-Up	85.72	84.22

Pearson's product-moment correlation statistical procedure was used to analyze for correlations between adequacy of dietary intake and food behavior practices. A correlation coefficient of .47 was found between adequacy of dietary intake and food behavior practices at the beginning of the program. This correlation was determined to be statistically significant at the .0001 alpha level (see Table XXIV).

The correlation coefficient for adequacy of dietary intake and food behavior practices at program completion was .29. This correlation was determined to be significant at the .001 level (Table XXVI).

A correlation coefficient of .21 was determined for adequacy of dietary intake and food behavior practices for a follow-up measurement

six or more months after program completion. This correlation was found to be significant at the .02 alpha level (Table XXVI).

TABLE XXVI
PEARSON PRODUCT-MOMENT CORRELATION BETWEEN
ADEQUACY OF DIETARY INTAKE AND
FOOD BEHAVIOR PRACTICES
(N = 121)

Time of Measurement	Coefficient of Correlation	Probability
Beginning of Program	.47	.0001*
Completion of Program	.29	.001*
Follow-Up	.21	.02*

*Significant alpha level.

The results of Pearson's product-moment correlation indicated significant associations between adequacy of dietary intake and food behavior practices at the beginning, completion, and follow-up of participation in the EFNEP. It was found that as the level of food behavior practices increased, the adequacy of dietary intake also increased. Furthermore, low scores on adequacy of dietary intake were associated with low food behavior practice scores and homemakers with higher scores on adequacy of dietary intake tended to have higher food behavior practice scores at each time of measurement. Because of these results, hypothesis four was rejected.

Although adoption of food behavior practices and improvements in adequacy of dietary intake were found to be significantly correlated, the highest correlation coefficient was found at the beginning of the program and was only .47. Squaring the coefficient yielded a coefficient of determination of .2209. This meant that scores for dietary adequacy and food behavior practices had only 22 percent of their variance in common. This was, therefore, identified as an area that warranted further study. If future research could identify the food behavior practices that have the greatest impact on changing dietary adequacy, then teaching could be concentrated on those areas and possibly bring about quicker change.

A summary of the conclusions and findings is discussed in the following chapter. Recommendations for further studies or research are also made.

CHAPTER V

SUMMARY OF FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

The purpose of the Expanded Food and Nutrition Education Program is to influence low-income families to make desirable changes in adequacy of dietary intake and food-related practices. Emphasis is placed on the knowledge and skills needed to improve quality of diets and promote proper nutritional practices. Teaching is done by trained paraprofessionals on a one-to-one basis.

From the beginning of the EFNEP in 1968, evaluation was an integral and important facet of the program. Evaluations were targeted at measuring the short-term effect of the program. Assessment of the long-term effect of EFNEP was identified as a needed area of research in 1980. Evaluation of the long-term effect was important because improved dietary practices must be sustained to have an impact on the health status of families.

The purpose of this study was to determine if homemakers completing the EFNEP significantly improved adequacy of dietary intake and food behavior practices and to determine if those changes were sustained over time. A comparison of the characteristics of EFNEP families in Muskogee County to EFNEP families in Oklahoma indicated that Muskogee was representative of EFNEP in the State; therefore, conclusions from this study could be generalized to the Oklahoma EFNEP.

A randomly selected sample of 121 low-income homemakers participated in this study. All homemakers had completed the program and had been out of the program for a minimum of six months to a maximum of three years. Forty-five percent of the homemakers in the sample had been out of the program for two or more years, 28 percent had been out of the program for one to two years, and 27 percent had been out of the program from six months to one year. The majority (68%) of the homemakers had participated in the EFNEP for two years. The minimum time of participation was 18 months.

Findings and Conclusions

Adequacy of Dietary Intake

A major finding of the study was that the adequacy of dietary intake of homemakers completing the program improved significantly during participation in the EFNEP. Furthermore, the significant improvements in adequacy of dietary intake were found to be sustained as long as three years after the homemakers had completed the program. Comparisons of the results of several studies indicated the need for homemakers to complete the program for adequacy of dietary intake to be significantly improved and sustained.

Adoption of Food Behavior Practices

The adoption of food behavior practices was also examined by statistical analysis. The conclusions were very similar to those for the adequacy of dietary intake. Homemakers' food behavior practices improved significantly during participation in the program and those practices

were not only sustained but improved significantly after homemakers had been out of the program for 6 to 36 months.

The EFNEP objective of helping families, especially those with children living in or near poverty, to acquire knowledge, skills, and changed behavior necessary to achieve adequate diets was met by the EFNEP. This conclusion was strengthened by the design of the study which included both adequacy of dietary intake and food behavior practices as measures of evaluation. Both were found to be sustained; consequently, the impact of EFNEP on low income homemakers was even more significant.

Homemakers' Personal Characteristics

Homemaker characteristics of age, income, educational level, place of residence, race, and number of children in the family were examined to determine whether adequacy of dietary intake or food behavior practices were associated with selected characteristics. There were no significant differences between food behavior practices for any of the homemaker characteristics. Although not statistically significant, it was observed that the adoption rate of food behavior practices decreased as age increased.

Age, place of residence, race, and number of children in the family were not found to be significantly associated with adequacy of dietary intake. It was concluded that income was related to the families' ability to obtain an adequate diet. It was further concluded, however, that the EFNEP was effective in helping low-income homemakers overcome the disadvantage of limited income in acquiring an adequate diet. At the time the program was completed, all homemakers' diets had improved significantly and were essentially the same.

An association was also found between educational level and adequacy of dietary intake. At completion of the program, the least educated group of homemakers made significantly greater improvements in adequacy of dietary intake than homemakers with education beyond high school. The results indicated that the EFNEP was effective in teaching nutrition and food behavior practices to homemakers with limited education.

Based on the statistical analysis of all data on homemaker characteristics, it was concluded that the significant improvements in adequacy of dietary intake and food behavior practices were not due to differences in family characteristics. This supports the conclusion that positive changes were due to participation in the EFNEP.

The analysis of the sample population indicated that the EFNEP was reaching the intended audience. The income levels were well within the poverty range and 98 percent of the families had children. Furthermore, the families had a limited amount of education, over half of them received food stamps, and 62 percent of the families were minorities.

Associations Between Dietary Adequacy and Food Behavior

Food behavior practices and improvements in adequacy of dietary intake were found to be significantly correlated; however, adequacy of dietary intake and food behavior practices had only 22 percent or less of their variance in common. This was, therefore, identified as an area that warranted further study.

Recommendations

An analysis of the conclusions of this study led to the following recommendations:

1. Homemakers with the lowest incomes and educational levels had the poorest diets initially but achieved the greatest improvements in the EFNEP. Priority should be given to involving these families.

2. EFNEP as currently implemented on a one-to-one teaching basis is effective in improving and sustaining adequacy of dietary intake and food behavior practices of low-income homemakers who complete the program. Since malnutrition continues to be a problem among low-income families, it is recommended that EFNEP be continued and/or expanded to meet the needs of low-income families in the United States. We still cannot afford to overlook the nutritional needs of our own citizens. Considering the high cost of health care for the poor, "limited funds for EFNEP may be a false economy" (Ramsey and Cloyd, 1975, p. 20). The high degree of public interest in nutrition and fitness and its promotion in the media contribute to an extremely teachable moment for this audience.

3. It is suggested that homemakers are more likely to make significant improvements in adequacy of dietary intake and food behavior practices if they remain in the program to completion. Improvements are also more likely to be sustained if homemakers complete the program. Homemakers should be encouraged to complete the program.

4. It is recommended that selected food behavior practices be considered for inclusion in the national EFNEP reporting system to strengthen evaluation currently based on the 24-hour food recall.

Recommendations for Further Study

The following questions are suggested for further study:

1. Since this study was limited to homemakers who completed the program, it would be valuable to know what happened to homemakers who did not complete the program. Did their food intake and food behavior practices change significantly and, if so, were those changes sustained? What minimum length of participation in the program resulted in sustainment of significant behavior changes?
2. Did the diets of other family members besides the homemaker improve significantly and, if so, were they sustained?
3. Which of the areas on the food behavior checklist (i.e., nutrition knowledge, food purchase, food storage and sanitation, meal planning, or food preparation) have the greatest impact on changing adequacy of dietary intake?

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APPENDIX A
FOOD BEHAVIOR CHECKLIST

HOMEMAKER NAME	NUMBER	AGE	DATE OF ENROLLMENT
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FOOD BEHAVIOR CHECKLIST

INSTRUCTIONS

1. For each question put a check (✓) in the appropriate block indicating Homemaker's behavior.
2. Count the number of checks (✓) in each column (NA, DK, YES, NO) and enter totals below.
3. Add the "YES" scores to the "NO" scores and enter the sum on the appropriate line.
4. Refer to SEA Form 173 (SCORING TABLE) and enter the scores on the bottom line of this form.
5. Copy the dates and scores onto the bottom two lines of the **FOOD AND NUTRITION PROGRESSION RECORD** (SEA Form 271) under the appropriate months in program time.

	NA = Not applicable YES = Homemaker does this		DK = Don't know NO = Homemaker doesn't do this		DATE	DATE	DATE	DATE	DATE			
	FIRST	SECOND	THIRD	FOURTH	FIFTH							
KNOWLEDGE OF NUTRITION												
1. Can name the number of servings from each food group appropriate for his/her needs and those of each family member. (For example, adults need 2 servings of milk; children need 3-4 servings.)	NA	DK	YES	NO	NA	DK	YES	NO	NA	DK	YES	NO
2. Can name two foods from each of the food groups.												
3. Can describe the recommended serving size of a food in each food group. (For example, one slice of bread, 8 oz. of milk, 2-3 oz. of meat, 1/2 cup cooked vegetables.)												
4. Can name at least one good source each of Vitamin A, Vitamin C, Calcium and Iron.												
5. Can name at least one example of a high and low calorie food in each food group.												
FOOD PURCHASE												
6. Plans before food shopping in at least two of the following ways: makes a list; writes a memo; checks food advertisements for store specials; checks loyalty of food in the house.	NA	DK	YES	NO	NA	DK	YES	NO	NA	DK	YES	NO
7. Stretches the food dollar using at least two of the following: compares food prices; uses minimal dry milk; uses store brands or plain-label products when they are cheaper; buys day-old bread; buys specials; uses free or reduced price food.												
8. Knows how to obtain food stamps and does so when family needs them.												
9. Budgets food money and/or food stamps so the family has enough food throughout pay period.												
10. Buys food in amounts to meet needs and gets the best buy in terms of unit price and cost per serving.												
11. Uses one or more free or cheaper sources of food such as home grown food, wild game, fresh fish, stable manure and barnyard or exchange manure for food (barter system).												
12. Grows vegetables for family use.												
FOOD STORAGE AND SANITATION												
13. Stores perishable foods safely and keeps hot food hot and cold food cold.												
14. Keeps dishes, utensils, appliances and cabinets clean.												
15. Stores non-perishable foods properly.												
16. Disposes of garbage properly.												
17. Uses recommended food preservation methods for canning, freezing and drying.												
18. Practices proper control methods for insects, rodents and pets in the kitchen.												
FOOD AND MEAL PLANNING												
19. Schedules meals around activities of family members.												
20. Provides family members with servings and portions as recommended by the food guide.												
21. Serves a variety of foods from each food group daily.												
22. Serves food each day which are good sources of iron.												
23. Provides nutritious snacks when needed.												
24. Serves whole grain bread and cereal daily.												
25. Serves Vitamin A and C food to meet needs.												
26. Watches food intake of overweight and underweight family members.												
27. Plans ways to prevent breakfast in family.												
FOOD PREPARATION												
28. Conserves nutrient value of food in three of the following ways: uses small amounts of fat/oil for fruit/vegetable cooking; uses appropriate cooking times and temperatures; retains cooking liquid for future use; avoids rinsing rice and noodle products before and after cooking.												
29. Can follow recipes. (Can measure and mix according to directions and obtain an acceptable finished product.)												
30. Makes an effort to serve nutritional food that family enjoys.												
31. Prepares food to use edible parts and avoid waste. (For example, removes a minimum of flesh when canning; prepares amount family will eat or plans for and uses leftovers.)												
32. Conserves fuel energy in cooking practices and food handling. (For example, bakes several things at once; does not let water run needlessly; efficiently uses range top burners.)												
33. Practices at least three methods of serving/cooking vegetables and fruits, including a low calorie method.												
34. Practices at least three methods of cooking meat or meat substitutes, including a low calorie method.												
35. Practices at least three methods of serving/preparing dairy products, including a low calorie method.												
TOTAL												
YES + NO												
SCORE												

APPENDIX B

QUANTIFICATION OF THE 24-HOUR DIETARY RECALL

QUANTIFICATION OF THE 24-HOUR DIETARY RECALL

Within the milk and meat categories there are three discriminators (0, 1, 2); within the fruit/vegetable and bread/cereal categories there are a possible five discriminators (0, 1, 2, 3, 4). Thus, the number of possible combinations is calculated by:

$$C = 3 \times 3 \times 5 \times 5 = 225 \text{ combinations}$$

Derivation of Food Recall Scores

A quantification scheme which takes into account several nutrition-related factors was devised. The basic assumption is that any one food group, while it contributes in a unique way, has importance in the diet equal to that of any other food group. The factors entering into the scoring scheme and the method of quantification are described below.

- ✓ Total Number of Servings of Food. Intake of food is essential to life. This factor is included in the quantification with incrementally weighted scores for the number of servings, irrespective of food categories. The weighted scores are:
 - 1 to 4 servings = a weight of "1" (number of servings x 1)
 - 5 to 8 servings = a weight of "2" (number of servings x 2)
 - 9 to 12 servings = a weight of "3" (number of servings x 3)
 Any servings beyond 12 are ignored.
- ✓ Number of Food Groups Included. Variety of food in the diet is essential to good health. This factor is included in the quantification with incrementally weighted scores for the number of food groups, irrespective of number of servings. The weighted scores are:
 - 1 food group = 0
 - 2 food groups = 5
 - 3 food groups = 15
 - 4 food groups = 30
- ✓ Percent of Target Diet Achieved. The target diet is: 2 servings in the milk group, 2 servings in the meat group, 4 servings in the fruit/vegetable group, and 4 servings in the bread/cereal group. By examining each food category separately for "percent of achievement of target" and combining across all four food groups, a composite "percent of achievement of the target" of "2-2-4-4" is derived. This factor is included in the quantification by establishing incremental scores for composite percent of target diets, as follows:

QUANTIFICATION OF THE 24-HOUR DIETARY RECALL (Cont.)

25% = 1 point	175% = 10 points	325% = 23 points
50% = 2 points	200% = 12 points	350% = 26 points
75% = 3 points	225% = 14 points	375% = 29 points
100% = 4 points	250% = 16 points	400% = 32 points
125% = 6 points	275% = 18 points	
150% = 8 points	300% = 20 points	

✓ Bonus Points. Since it is possible to have a rather high cumulative composite percentage on the preceding component score basis, but to be severely deficient in one of the food groups, two (2) bonus points are awarded when at least 50% of the required number of daily servings is achieved for each food group.

Figure 6 illustrates the derivation of each component score and the resultant diet score for two food recalls.

The quantification technique described above was applied to all possible diet patterns derivable, from 0-0-0-0 to 2-2-4-4. The result was 52 categories of diet patterns and of related scores ordered from 0 to 100. Table 2 presents the scores for each of the 225 possible dietary patterns.

Example A Food Recall = 0-0-2-1		Example B Food Recall = 2-2-3-4	
Score Component	Weighted Score	Score Component	Weighted Score
Number of Servings $0 + 0 + 2 + 1 = 3$ $3 \times 1 \text{ weight} = 3$	3	Number of Servings $2 + 2 + 3 + 4 = 11$ $11 \times 3 \text{ weight of } 3 =$	33
Number of Food Groups $0 + 0 + 1 + 1 = 2$	5	Number of Food Groups $1 + 1 + 1 + 1 = 4$	30
Percent of Target Diet $(0 \div 2) + (0 \div 2) + (2 \div 4) + (1 \div 4) =$ $0\% + 0\% + 50\% + 25\% = 75\%$	3	Percent of Target Diet $(2 \div 2) + (2 \div 2) + (3 \div 4) + (4 \div 4) =$ $100\% + 100\% + 75\% + 100\% = 375\%$	29
Bonus Only 1 of 4 categories at 50% or greater	0	Bonus 4 of 4 categories at 50% or greater	2
Composite Score Total	11	Composite Score Total	94

Figure 6. Examples of derivation of food recall scores.

QUANTIFICATION OF THE 24-HOUR DIETARY RECALL (Cont.)

The Scoring Table for Food Recalls

Look-up of a diet score is simplified by design of a scoring table directly related to the information the aide has in the existing program record. The food recall record gives the information in the following pattern:

	Milk	Meat	Fruit Vegetable	Bread & Cereal
Total Number of Servings				

The scoring table is shown in Figure 7.⁴ Each food group, in the order in which it appears to the aide, sequentially reduces the area of search. The number of servings in the milk group tells her whether the score is in the right, left, or middle block of the scoring table. For example, if the food recall shows 1 milk serving, the diet score is in the middle block of scores. The number of servings in the second food group tells the aide whether the score is in the first, second, or third column of the larger block. For example, if the food recall shows 1 milk serving and 1 meat serving, the score is somewhere in the middle column of the middle block. The scoring table is further subdivided so that the number of servings of fruit/vegetable and bread/cereal sequentially delimit the area of search and identifies the correct score.

The Food and Nutrition Progression Record

The function of the Food and Nutrition Progression Record within the progression model is to assemble in one place the essentials of the history of a homemaker's participation in the program. Only those elements of information of importance to ultimate decisions about the homemaker are included. The record is created incrementally from scores derived by use of the other progression tools—the Scoring Table for the 24-Hour Diet and the Scoring Table for the Food Behavior Checklist—and at the time of the sequential six-month assessments of progress.

Information about the history of the homemaker's progress is presented against a background designed to enhance its quantitative and qualitative

The scoring table used in the field demonstration was laminated with heavy plastic and served also as handy ruler for plotting scores on the Progression Record.

Table 2

Summary of Scores for Twenty-four Hour Diet Patterns

(Based on 2-2-4-4 minimum number of daily serving requirements. Order is milk, meat, vegetables and fruit, bread and cereal.)

CATEGORY	SCORE	DIET PATTERNS	NO. OF DIET PATTERNS
A	0	0000	1
B	2	0001, 0010	2
C	3	0100, 1000	2
D	4	0002, 0020	2
E	6	0003, 0030, 0200, 2000	4
F	8	0004, 0040	2
G	9	0011	1
H	10	0101, 0110, 1001, 1010	4
I	11	0012, 0021, 1100	3
J	12	0102, 0120, 1002, 1020	4
K	13	0013, 0022, 0031	3
L	14	0201, 0210, 2001, 2010	4
M	15	0103, 0130, 1003, 1030	4
N	16	1200, 2100	2
O	17	0202, 0220, 2002, 2020	4
P	21	0014, 0023, 0032, 0041, 2700	5
Q	22	0111, 1011	2
R	23	0104, 0140, 1004, 1040	4
S	24	1101, 1110	2
T	25	0024, 0033, 0042, 0112, 0121, 0203, 0230, 1012, 1021, 2003, 2030	11
U	27	0211, 1102, 1120, 2011	4
V	29	0034, 0043, 0204, 0240, 1201, 1210, 2004, 2040, 2101, 2110	10
W	33	0044, 0113, 0122, 0131, 1013, 1022, 1031	7
X	35	0212, 0221, 1103, 1130, 2012, 2021	6
Y	37	0114, 0123, 0132, 0141, 1014, 1023, 1032, 1041, 1202, 1220, 2102, 2120	12
Z	39	0213, 0222, 0231, 1104, 1140, 2013, 2022, 2031, 2201, 2210	10
AA	41	0124, 0133, 0142, 1024, 1033, 1042, 1203, 1230, 2103, 2130	10
BB	42	1111	1
CC	43	0214, 0223, 0232, 0241, 2014, 2023, 2032, 2041, 2202, 2220	10
DD	45	0134, 0143, 1034, 1043, 1204, 1240, 2104, 2140	8
EE	47	0224, 0233, 0242, 2024, 2033, 2042, 2203, 2230	8
FF	50	1112, 1121	2
GG	51	2204, 2240	2
HH	52	1211, 2111	2
II	54	1113, 1131	2
JJ	56	1122, 1212, 1221, 2112, 2121	5
KK	58	0144, 1044, 1114, 1141, 2211	5
LL	60	0234, 0243, 1123, 1132, 1213, 1231, 2034, 2043, 2113, 2131	10
MM	62	1222, 2122, 2212, 2221	4
NN	64	1124, 1133, 1142, 1214, 1241, 2114, 2141	7
OO	65	0244, 2044	2
PP	66	1223, 1232, 2123, 2132, 2213, 2231	6
QQ	68	2222	1
RR	77	1134, 1143	2
SS	79	1224, 1233, 1242, 2124, 2133, 2142	6
TT	80	2214, 2241	2
UU	82	1144, 2223, 2232	3
VV	85	1234, 1243, 2134, 2143	4
WW	88	2224, 2233, 2242	3
XX	91	1244, 2144	2
YY	94	2234, 2243	2
ZZ	100	2244	1
		TOTAL	225

APPENDIX C

SCORING TABLE FOR FOOD BEHAVIOR CHECKLIST

SCORING TABLE FOR FOOD BEHAVIOR CHECKLIST

To find the food behavior score:

1. Enter the table at the line indicating the number of YES responses.
2. Holding your left finger at that line, locate the column indicating the sum of YES + NO responses. With your right finger, follow this column down the page to the point where the YES row and the YES + NO column intersect. The number in the block is the food behavior score.

EXAMPLE: YES = 19, YES + NO = 31. The food behavior score is 61.

NOTE: If you have scored fewer than 15 checklist questions, you do not have a scorable record. See your supervisor for guidance.

Enter the food behavior score in the scoring block on the FOOD BEHAVIOR CHECKLIST at the appropriate "months program" time on the homemaker's FOOD AND NUTRITION PROGRESSION RECORD.

		YES + NO																					
		30	34	38	32	35	39	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	*
30	100																						
29	97	100																					
28	94	97	100																				
27	91	94	97	100																			
26	89	91	94	97	100																		
25	86	88	91	94	97	100																	
24	83	85	88	91	94	97	100																
23	80	82	85	88	90	93	97	100															
22	77	79	82	84	87	90	93	96	100														
21	74	76	79	81	84	87	90	93	96	100													
20	71	74	76	78	81	83	86	89	93	96	100												
19	69	71	73	75	77	80	83	86	89	92	96	100											
18	66	68	70	72	74	77	79	82	85	88	92	96	100										
17	63	65	67	69	71	73	76	79	81	85	88	92	96	100									
16	60	62	64	66	68	70	72	75	78	81	84	88	91	95	100								
15	57	59	61	63	65	67	69	71	74	77	80	83	87	91	95	100							
14	54	56	58	59	61	63	66	68	70	73	76	79	83	86	90	95	100						
13	51	53	55	56	58	60	62	64	67	69	72	75	78	82	86	90	95	100					
12	49	50	52	53	55	57	59	61	63	65	68	71	74	77	81	85	89	94	100				
11	46	47	48	50	52	53	55	57	59	62	64	67	70	73	76	80	84	88	94	100			
10	43	44	45	47	48	50	52	54	56	58	60	63	65	68	71	75	79	83	88	94	100		
9	40	41	42	44	45	47	48	50	52	54	56	58	61	64	67	70	74	78	82	88	93	*	
8	37	38	39	41	42	43	45	46	48	50	52	54	57	59	62	65	68	72	76	81	87	*	
7	34	35	36	38	39	40	41	43	44	46	48	50	52	55	57	60	63	67	71	75	80	*	
6	31	32	33	34	35	37	38	39	41	42	44	46	48	50	52	55	58	61	65	69	73	*	
5	29	29	30	31	32	33	34	36	37	38	40	42	43	45	48	50	53	56	59	63	67	*	
4	26	26	27	28	29	30	31	32	33	35	36	38	39	41	43	45	47	50	53	56	60	*	
3	23	24	24	25	26	27	28	29	30	31	32	33	35	36	38	40	42	44	47	50	53	*	
2	20	21	21	22	23	23	24	25	26	27	28	29	30	32	33	35	37	39	41	44	47	*	
1	17	18	18	19	19	20	21	21	22	23	24	25	26	27	29	30	32	33	35	38	40	*	
0	14	15	15	16	16	17	17	18	19	19	20	21	22	23	24	25	26	28	29	31	33	*	
0	11	12	12	13	13	13	14	14	15	15	16	17	17	18	19	20	21	22	24	25	27	*	
0	9	9	9	9	10	10	10	11	11	12	12	13	13	14	14	15	16	17	18	19	20	*	
0	6	6	6	6	6	7	7	7	7	8	8	8	9	9	10	10	11	11	12	13	13	*	
0	3	3	3	3	3	3	4	4	4	4	4	4	4	5	5	5	5	6	6	6	7	*	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*

*See your supervisor for guidance.

APPENDIX D

SCORING TABLE FOR 24-HOUR DIETARY RECALL

SCORING TABLE FOR TWENTY-FOUR HOUR DIET*

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 "77") 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									1 MILK SERVING									2 MILK SERVINGS								
0 MEAT SERVINGS			1 MEAT SERVING			2 MEAT SERVINGS			0 MEAT SERVINGS			1 MEAT SERVING			2 MEAT 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	Veg Fruit	Bread Cereal	Score	Veg Fruit	Bread Cereal	Score	Veg Fruit	Bread Cereal	Score	Veg Fruit	Bread Cereal	Score	Veg Fruit	Bread Cereal	Score	Veg Fruit	Bread Cereal	Score
0	0	0	0	0	3	0	0	6	0	0	3	0	0	11	0	0	16	0	0	6	0	0	16	0	0	21
	1	2		1	10		1	14		1	10		1	24		1	29		1	14		1	29		1	39
	2	4		2	12		2	17		2	12		2	27		2	37		2	17		2	37		2	42
	3	6		3	15		3	25		3	15		3	35		3	41		3	25		3	41		3	47
	(4)	8		(4)	23		(4)	29		(4)	23		(4)	39		(4)	45		(4)	29		(4)	45		(4)	51
	0	2		0	10		0	14		0	10		0	24		0	29		0	14		0	29		0	35
	1	9		1	22		1	27		1	22		1	42		1	52		1	27		1	52		1	60
	2	11		2	25		2	35		2	25		2	60		2	66		2	35		2	66		2	67
	3	13		3	33		3	39		3	33		3	64		3	60		3	39		3	60		3	66
	(4)	21		(4)	37		(4)	43		(4)	37		(4)	58		(4)	64		(4)	43		(4)	64		(4)	60
	0	4		0	12		0	17		0	12		0	27		0	37		0	17		0	37		0	43
	1	11		1	25		1	35		1	25		1	50		1	56		1	25		1	56		1	62
	2	13		2	33		2	39		2	33		2	58		2	62		2	33		2	62		2	68
	3	21		3	37		3	43		3	37		3	60		3	66		3	43		3	66		3	62
	(4)	25		(4)	41		(4)	47		(4)	41		(4)	64		(4)	79		(4)	47		(4)	79		(4)	60
	0	6		0	15		0	25		0	15		0	35		0	41		0	15		0	41		0	47
	1	13		1	33		1	39		1	33		1	64		1	60		1	13		1	60		1	66
	2	21		2	37		2	43		2	37		2	60		2	66		2	21		2	66		2	62
	3	25		3	41		3	47		3	41		3	64		3	79		3	25		3	79		3	68
	(4)	29		(4)	45		(4)	50		(4)	45		(4)	77		(4)	85		(4)	29		(4)	85		(4)	76
	0	8		0	23		0	29		0	23		0	39		0	45		0	8		0	45		0	51
	1	21		1	37		1	43		1	37		1	58		1	64		1	21		1	64		1	60
	2	25		2	41		2	47		2	41		2	64		2	79		2	25		2	79		2	66
	3	29		3	45		3	50		3	45		3	77		3	85		3	29		3	85		3	76
	(4)	33		(4)	58		(4)	65		(4)	58		(4)	87		(4)	91		(4)	33		(4)	91		(4)	100

* From Hunger and Jones. A Progression Model for the Expanded Food and Nutrition Education Program, 1976.

APPENDIX E

FAMILY RECORD

VITA

Carlene Bolz Jordan

Candidate for the Degree of

Master of Science

Thesis: ASSESSMENT OF THE LONG-TERM EFFECT OF THE EXPANDED FOOD AND NUTRITION EDUCATION PROGRAM ON ADEQUACY OF DIETARY INTAKE AND FOOD BEHAVIOR PRACTICES OF EFNEP HOMEMAKERS IN MUSKOGEE COUNTY

Major Field: Food, Nutrition, and Institution Administration

Biographical:

Personal Data: Born in Stroud, Oklahoma, August 23, 1947, the daughter of Carl R. and Vella King Bolz; married to James C. Jordan, August 25, 1967, in Chandler, Oklahoma.

Education: Graduated from Chandler High School, Chandler, Oklahoma, in May, 1965; attended Oklahoma State University and the University of Oklahoma from 1965 to 1970; received the Bachelor of Science degree in Food, Nutrition, and Institution Administration from Oklahoma State University in January, 1970; completed requirements for registration in the American Dietetic Association in 1977; completed requirements for the Master of Science degree in Food, Nutrition, and Institution Administration at Oklahoma State University in July, 1985.

Professional Experience: Extension Home Economist, Food and Nutrition, Muskogee County, 1970 to the present.

Professional Organizations: American Dietetic Association, Oklahoma Dietetic Association, National Association of Extension Home Economists, Oklahoma Association of Extension Home Economists, and Phi Kappa Phi Honor Society.