

**THE EFFECTIVENESS OF COMPUTER-AIDED FEEDBACK
ON NUTRITION-RELATED PRACTICES OF EFNEP HOMEMAKERS**

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Approved:



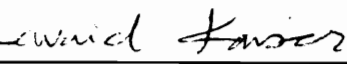
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(ABSTRACT)

A Food Behavior Checklist (FBC) was developed, validated, and pilot-tested with homemakers in Virginia's Expanded Food and Nutrition Education Program (EFNEP). The FBC was designed to measure nutrition-related practices that are taught in EFNEP, but cannot be measured by the 24-hour recall.

During development, 20 EFNEP paraprofessionals in Virginia and 20 randomly selected state EFNEP coordinators helped to identify items that are most important in evaluating the overall effectiveness of EFNEP, and which could be used to establish content, face, and construct validity of a behavior assessment instrument. The Food Behavior Checklist contained 30 items, and responses were recorded on a Likert scale with four response levels: 0 = "never or seldom", 1 = "sometimes", 2 = "usually", and 3 = "almost always". Cronbach-alpha revealed a reliability coefficient of 0.86.

During the field test phase of this study, the FBC was used before and after EFNEP intervention to collect data on the nutrition-related practices of 147 low-income homemakers in three rural counties and one urban area in Virginia. In this phase, the experimental group, which consisted of 79 homemakers,

received computer-aided feedback on their dietary practices, via a Diagnostic Report, which was used as a teaching tool. Paraprofessionals thoroughly explained the content of the diagnostic report to the homemaker at program entry and program exit. The control group, which consisted of 68 homemakers, did not receive computer-aided feedback on their dietary intakes, in that no mention was made of the computer print out to them.

Results indicated that this instrument (FBC) may be useful in evaluating the overall effectiveness of EFNEP nationwide and may be useful in other nutrition programs. No significant differences were observed in the nutrient intake or Food Behavior Checklist practice change scores between the group who received computer-aided feedback and the group who did not received computer-aided feedback. The author concluded that the dietary analysis contained in the computer generated Diagnostic Report needs to be simplified if it is to become an effective tool with EFNEP homemakers. More research is needed on the use of computerized diet analysis as a teaching tool with low-income homemakers.

To my mom, dad, sisters, and brothers and
four invaluable friends: Arlena,
James, Kathy, and Malone,
who encouraged me constantly
and assured me that I could do it.
Without their support, and love,
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CHAPTER I

INTRODUCTION

Limited-resource families are more susceptible to ill-health and inadequate nutritional practices, due to insufficient funds to purchase food and lack of management and food preparation skills. These families also lack access to health care. High unemployment rates, inadequate housing conditions, and low literacy skills are predominant among limited-resource families and have a detrimental impact on nutrition-related practices.

Many low-income homemakers terminate their education before completing high school which puts them at an economic disadvantage. Economically deprived families are more likely to be influenced by misleading nutritional advertisements, than those of other income levels (Vermeersch & Swenerton, 1986), because low-income homemakers have problems with reading and interpreting nutrition labels and advertisements (Vermeersch & Swenerton, 1986; Schafer, 1978; Block & Kellerman, 1977; Sims, 1976; Suter & Barbour, 1975).

In many instances, money available for food in low-income households is less than that required to provide the family with nutritious meals. Homemakers often lack the nutritional awareness needed to utilize available funds to purchase foods that would most benefit the family. They are more likely to purchase name

brand items, which usually are more expensive than store brand items. Moreover, limited-resource families are less efficient at bargain hunting and spend less time shopping for groceries (Emmons, 1986).

Transportation is a problem for some limited-resource families, and getting to the larger supermarkets may be a hardship (Awa, 1974). Limited-resource families usually live in areas where supermarkets are scarce and neighborhood stores do not stock a wide variety of goods. Food prices are usually higher at small neighborhood stores, but they may offer the convenience of credit to families when money for food has run out (Suter, & Barbour, 1975; Goodman, 1968). Credit attracts, and solves the emergencies of today (Knapp, 1991), but may result in long-term problems tomorrow.

Thus, there are many problems associated with low-income living that affect nutrition practices. Several federally funded programs have been established to assist limited-resource families to improve the quality of their diets. These programs include the Women, Infants, and Children Supplemental Feeding Program (WIC), Food Stamps, Commodity Distribution and the Expanded Food and Nutrition Education Program (EFNEP). The majority of these programs provide direct assistance in the form of food and other commodities, while EFNEP teaches families how to effectively utilize their food and nutrition resources. This study focuses on efforts that have been undertaken in the adult component of EFNEP to assist low-income families.

The Expanded Food and Nutrition Education Program employs paraprofessionals who are sometimes referred to as aides or technicians (Ramsey & Cloyd, 1975). Paraprofessionals go into the homes of low-income families and provide nutrition education. Paraprofessionals also teach homemakers how to plan and prepare nutritious meals and snacks as well as many other skills.

Programs that provide nutrition education to individuals need to be evaluated on a continuous basis to determine if they are achieving their objectives and if additional funding is justified. Evaluating nutrition programs that serve low-income families is complicated by the complex instruments that are often used to collect data and assess program impact. Low-income individuals lack reading and writing skills that are required to record dietary intake information on dietary intake forms. Many low-income individuals have a poor knowledge of serving sizes that are used to estimate food portions; therefore, dietary recalls collected from low income individuals are not necessarily representative of their actual intake. An instrument that allows homemakers to report the frequency of their nutrition-related practices by placing a simple check in the column that corresponds to the frequency of their practices may prove to be valuable. Such an instrument would minimize reporting errors, save time for both the homemaker and the paraprofessional and may receive wider acceptance among EFNEP audiences.

EFNEP Nationwide

The Cooperative Extension Service of the United States Department of Agriculture is one of the three missions of all land-grant Universities which originated as a result of the Smith-Lever Act passed by Congress in 1914. The Expanded Food and Nutrition Education Program, a program of the Cooperative Extension Service, was piloted in 1967 in Alabama and then expanded nationwide in 1968 (Randall, Brink, & Joy, 1989). The program is federally funded through the United States Department of Agriculture (USDA). The overall goal of EFNEP is to bring about improved dietary practices by teaching participating families the benefits of a nutritious diet and encouraging them to put these ideas into practice. Specific objectives of the program are:

- To increase knowledge of the essentials of human nutrition.
- To improve practices in food production, storage, safety and sanitation.
- To increase ability to manage food budgets and related resources such as food stamps and WIC vouchers.
- To improve diets and nutritional well-being for the total family (Cox, Allison, Kelpien, Houck, Smith & Walton, 1991).

Paraprofessionals, indigenous to the clientele community, are employed to provide education in the areas of basic nutrition, food buying, preparation, preservation, storage, safety, sanitation and money management. The Expanded Food and Nutrition Education Program has been evaluated in many states and

findings show that EFNEP has been effective in helping homemakers and youth acquire the knowledge, skills, attitudes and changed behavior necessary for nutritionally sound diets and nutritional well-being (Chipman & Kendall, 1989; Torisky, Hertzler, Keller, Frary, Hodges, Mifflin, 1989; Brown & Pestle, 1981; Loomis, 1973; Linn, 1972; Brew, 1971).

EFNEP in Virginia

The Expanded Food and Nutrition Education Program was initiated in Virginia in 1968 and by 1969 was operating in 20 locations. Currently, EFNEP operates in twenty-seven counties and cities (Appendix A). Each year the Virginia EFNEP reaches over 5,000 families. In the 1992 reporting year, the state EFNEP report showed that 3,537 new EFNEP families were enrolled with 2,000 of these homemakers being enrolled in EFNEP prior to the beginning of this study. Whites made up 29% of the newly enrolled homemakers, while blacks, hispanics, and Asians accounted for 64%, 4%, and 2%, respectively. Five percent of the newly enrolled homemakers were from farm areas. Twenty-three percent lived in towns with under 10,000 people and rural non-farm areas. Nine percent of these homemakers lived in towns and cities with a population ranging from 10,000 to 50,000. Fifteen percent lived in suburbs of cities with populations over 50,000. A large percent of homemakers (49%) were from central cities with a population of over 50,000 (Cox, 1992).

Fifty-one percent (3012) graduated from the program; seventy-four

percent (2,223) of these individuals graduated from the program at six months or less. Several studies show that the maximum amount of changes in diet (Feaster, 1972) and nutrition-related behaviors occur within the first few months of the program. After this time period, homemakers' behavior change reaches a point of diminishing returns (Verma, Montgomery, & Cyrus, 1987; Kingdon, 1973; Feaster, 1972;).

Virginia's paraprofessionals are trained and supervised by home economists employed by the local Cooperative Extension Offices. Paraprofessionals work with low-income homemakers, individually or in small groups, teaching them the basics of adequate nutrition and the skills needed to provide a balanced diet for themselves and their families. Eligible families are recruited through referrals from other agencies or through door-to-door visits by the paraprofessionals. Eligibility is based on the family either having an income of 125% or less of the poverty level, or being a participant in other government programs which use the poverty guidelines for eligibility. Families remain in the program for up to a year, after which they are graduated, based on their achieving some level of improvement in diet and food-related practices (Cox et al., 1991).

The majority of educational materials used in the Virginia EFNEP are those included in the Eating Right is Basic-2 Series (Nierman & Anderson, 1987). Additional lessons have been adapted from other states or have been developed by a state Nutrition Specialist (Cox, 1991). Evaluation of the Virginia EFNEP

shows that homemakers are maintaining improved dietary practices three months to three years after completing the program (Torisky et al., 1989).

Definition of Terms

1. Diagnostic Report - computer printout containing a dietary analysis of the homemakers' 24-hour recall; it is generated after the Family Record has been entered into the computer. The Diagnostic Report (Appendix C) provides the following for each homemaker: a brief description of the family, an analysis of the Food Behavior and Nutrition Knowledge Checklist, and an analysis of nutrient intake (calories, carbohydrates, protein, fat, iron, calcium, and vitamin A and vitamin C).
2. Food Behavior and Nutrition Knowledge Form - Part B of the Family Record Form which has been used to determine nutrition and food-related behavior or practices of EFNEP homemakers (Appendix B).
3. Food Behavior Checklist - an instrument which measures change on 30 food-related practices identified as the most important behaviors to be taught to homemakers in EFNEP. The areas covered by the checklist include meal planning and food shopping, preparation, preservation, storage, and sanitation.
4. Homemaker - the adult in the home who is responsible for preparing the family meals and who is the recipient of EFNEP lessons.
5. Nutrient Adequacy Ratio Score (NAR) - the ratio of one's daily intake of a particular nutrient compared to the appropriate age-sex specific RDA for that

nutrient.

$$\text{NAR} = \frac{\text{actual intake of the selected nutrient}}{\text{RDA for the same nutrient}}$$

6. Nutrition-related Practices - behaviors or practices that affect the quantity and quality of the diet consumed; these are measured using the Food Behavior Checklist.

7. Paraprofessional (PA) - (sometimes referred to as program assistants; technicians, or aides) staff member employed by EFNEP to deliver EFNEP lessons to enrolled families and youth. Working title which refers to EFNEP paraprofessionals in Virginia. Paraprofessionals who are employed by EFNEP are usually indigenous to the target population.

8. Practice change - alterations in nutrients assessed and practices measured by the Food Behavior Checklist from program entry to program exit.

9. Problem nutrients - those nutrients not consumed at the levels recommended by the American Heart Association will be considered as problem nutrients (calories, carbohydrate, protein, fat, fiber, and cholesterol) and those nutrients consumed at levels of less than two-thirds of the Recommended Dietary Allowance (RDA) for vitamins and minerals. For this study problem nutrients are kilocalories, carbohydrates, protein, fat, fiber, iron, folacin, calcium, and vitamins A, B₆, and C, as measured by Nutritionist III computerized diet analysis program (Nutritionist III).

10. **Program Family** - a family who is enrolled in EFNEP and on whom an EFNEP Family Record (Parts A, B, and C) has been completed.
11. **Program Intervention** - a period of 3 to 5 months in which EFNEP lessons are taught to homemakers on a weekly basis in the usual manner, with the exception that half of the homemakers receive feedback on their status and progress via the Diagnostic Report (computer printout).
12. **Rural** - counties with a population of under 10,000 as defined by the EFNEP Family Record.
13. **Urban** - a locality with a population of greater than 10,000 as defined by the EFNEP Family record. According to the 1990 survey of the urban city used in this study, Petersburg, the population size is 38,386.

Statement of the Problem

Currently, there is no valid, standardized instrument available for use in EFNEP to measure nutrition-related practice change. The Virginia EFNEP has used the Food Behavior Checklist developed by the New York EFNEP staff; however, it has not been tested for validity or reliability.

One purpose of the present study was to develop, validate and pilot test an instrument that measures change in nutrition-related practices of homemakers in the EFNEP program in Virginia. Measuring improvement in nutrition-related practices of homemakers is expected to help determine overall program effectiveness. A second purpose of the study was to determine whether

geographic location would influence changes in Food Behavior Checklist scores and nutrient intake as assessed by a 24-hour recall.

A third purpose of the study was to determine whether a computer printout could be a useful tool in bringing about desired dietary changes with low-income clientele. A comparison was made of improvement in nutrition-related practices and nutrient intake when the results of computer analysis were discussed directly with homemakers using a Diagnostic Report, versus not discussing these results with homemakers. The effect of computer-aided feedback on rural versus urban homemakers was assessed also. With the increasing use of computers in EFNEP nationwide, there is need to determine whether a computer printout can be used as an effective teaching tool with low-income clientele.

Delimitations

1. This study was limited to EFNEP homemakers in three rural counties in Virginia (Appomattox, Amelia, Buchanan) and one urban area (Petersburg). However, the homemakers were representative of the EFNEP population in Virginia.
2. The above mentioned locations were not randomly selected.
3. EFNEP homemakers in the above mentioned locations, who were enrolled during the period May 15, 1992 through September 30, 1992, were chosen to participate in this study.

Limitations

1. It was assumed that all paraprofessionals followed the protocol as outlined in the training sessions; however, there was no way to document this.
2. Paraprofessionals may not have used the Diagnostic Report effectively.
3. The results of this study can be generalized only to the population of EFNEP homemakers in Virginia.
4. The period between pre-test and post-test may have been too short to allow for changes in nutrition-related practices.

Objectives

1. To develop, validate, and pilot-test a Food Behavior Checklist that reflects the nutrition-related practices that are taught in the EFNEP curriculum.
2. To use the Food Behavior Checklist to measure changes in rural and urban homemakers' nutrition-related practices after nutrition intervention.
3. To determine the effects of using a computer printout as a teaching tool with low-income homemakers in EFNEP.

Research Hypotheses

The following hypotheses were tested in this study.

HO₁: There will be a significant difference in the increases in the Food Behavior Checklist post-test scores observed between rural and urban homemakers.

HO₂: There will be a significant difference in the increases in the Food

Behavior Checklist post-test scores observed between homemakers who receive computer feedback and the homemakers who do not receive computer feedback.

HO₃: There will be a significant difference in the increases observed in the NAR post-test scores between homemakers who receive computer feedback and the homemakers who do not receive computer feedback.

HO₄: There will be a significant differences in the NAR post-test scores of rural and urban homemakers.

Variables

The independent variables in this study were:

1. Feedback provided to participants using a computer printout.
2. Locale (rural and urban).

The dependent variables in this study were:

1. Intake of calories, protein, fat, cholesterol, and fiber.
2. Food Behavior Checklist scores.
3. NAR scores (values for vitamins A, B₆, C, iron and folic acid).

Summary

Limited resources, inadequate housing, lack of transportation and little or no education are factors that affect the nutritional well-being of low-income families. In recognition of these constraints on health, federal programs have targeted low-income families to receive education and/or financial assistance.

The Expanded Food and Nutrition Education Program is such a program

in which paraprofessionals, indigenous to the targeted population, are employed to work with clientele. These paraprofessionals teach low-income homemakers the basic skills and concepts needed to acquire a balanced diet for themselves and their families. The total extent to which this program is changing homemakers' practices has not been assessed because there are no reliable and valid instruments to measure many of the nutrition-related behaviors taught in the program.

The 24-hour recall has been used since the inception of EFNEP as the data gathering tool to assess food intake. The Basic-4 Food Groups have been used as the criteria by which to measure adequacy of homemakers' diets (Chipman & Randall, 1989). However, the 24-hour recall and Basic-4 Food Groups cannot measure homemakers' practices in food buying, resource management, food safety, and food preservation. Therefore, the goal of this study was to develop an instrument that measures nutrition-related practices taught in EFNEP. A reliable, and valid, instrument will provide decision makers with the necessary information needed to make changes in program content and/or allocate EFNEP funding.

CHAPTER II

REVIEW OF THE LITERATURE

INTRODUCTION

This literature review is divided into five sections. The first part describes methods for determining validity and reliability. Part two focuses on the importance of evaluating EFNEP. Part three provides a discussion of assessment methods and tools that have been used in recent years in EFNEP. Specific emphasis is placed on the description of the instrument, length of the instrument, response format, measures taken to establish validity and reliability, and training procedures used to assist the interviewers with using the instrument. Part four provides a review of food practices and nutrition needs of low-income homemakers. The last part contains a review of several studies that have documented the effects of using computer-generated data as a teaching tool.

VALIDITY AND RELIABILITY

The purpose of this research is to develop, validate, and pilot-test a Food Behavior Checklist for potential use in EFNEP. Research data generated with instruments that are not valid and whose reliability has not been established cannot be assumed to be accurate. The reliability of a measurement procedure is the technical term for its consistency or the degree to which it can be expected to provide similar results for the same subjects under different conditions (Jager, 1984; Borg & Gall, 1979). Leehan, McGuire, and Boyd (1989) described three

approaches to determine the reliability of instruments: 1) Test-retest reliability is the process by which the investigator readministers the original instrument to the same group of individuals within a specified period of time. 2) Proxy reliability involves a comparison of dietary interviews between the subject and another person who is in a position to observe the subject's dietary intake. 3) The last method to determine reliability is inter-rater reliability in which two or more individuals rate, examine or observe the same individual (Lee-han et al., 1989).

Validity is a determination of how well a method measures what it is intended to measure. When determining validity, "We are inquiring whether the test measures what we want it to measure, all of what we want it to measure, and nothing but what we want it to measure," (Murphy, 1977). Methods of validation must be considered in relation to the intended purposes of the measurement, and whether it will be used to assess individuals or groups of subjects (Leehan et al., 1989; Talmadge & Rosher, 1981; Borg & Gall, 1979; Murphy, 1977; Magnusson, 1967).

Content Validity

Content validity is the degree to which the sample of test items represents the content that the test is designed to measure. A review of pertinent literature will identify nutrition-related behaviors that may be potential problems for the target population. To reach an agreement on the specific material to be addressed by an instrument, the following steps were outlined by researchers.

1. **Define the target population.** The target population should be defined in detail since characteristics of the target population must be considered in many of the decisions that must be made on such questions as item type, test length, and type of directions (Talmadge & Rasher, 1982).
2. **Define objectives.** Any test development effort should start with careful thought about the specific outcomes that the measure is to achieve (Leehan et al., 1989). Thought should be given to the content area to be measured, the type of items to be used, and the length of the instrument.
3. **Prepare a prototype.** The first form is usually longer than the final form since several items will be discarded after tryout (Leehan et al., 1989; Borg & Gall, 1979; Perfonataine, 1975).
4. **Evaluate the prototype.** A critical review should be obtained from an expert panel on test construction. The instrument is ready to be field tested with a sample from the target population. Item analysis is performed on the sample responses to identify items to be retained (Leehan et al., 1989; Borg & Gall).

Face Validity

Face validity is a subjective judgement that indicates that the test appears to cover relevant content area (Borg & Gall, 1979). Face validity refers to the

evaluator's appraisal of what content the test measures (Borg & Gall, 1979).

Validity and reliability alone do not ensure the appropriateness of the instrument for its evaluation or research intent (Talmadge & Rasher, 1982). An investigator must always consider the purpose of the data collection when developing or selecting measurement instruments (Talmadge & Rasher, 1982).

Construct Validity

Construct validity is the extent to which a particular test can be shown to measure a hypothetical construct (Borg & Gall, 1979; Jager, 1984). Lee-han et al. (1989) and Borg and Gall (1979) proposed four methods by which to develop construct validity for diet assessment instruments: 1) indirect validation, 2) biochemical validation, 3) known-groups method-similar and 4) known-groups method-different. Each of these methods is discussed below.

Indirect validation involves the comparison of one dietary method against another method that is known to yield valid data. This method has been used frequently in dietary studies (Lee-han et al., 1989; Block, 1982; Guthrie & Scheer, 1981; Bowering, Morrison, Lowenberg & Tirado, 1977; Madden, Goodman, & Guthrie, 1976; Christenson, 1973;). Biochemical validation involves comparing the nutrient intakes estimated from a dietary method with biochemical indices of nutritional status. Known-group method-similar uses two or more defined groups sharing similar dietary habits; thus, the dietary method used could be validated by demonstrating that results obtained from both groups are the same (Leehan et al.,

1989; Dwyer, Stolyrow, & Orr, 1981). **Known-groups method validation** (different) involves two groups who are known to have different dietary habits; thus, the dietary method used could be validated by demonstrating that different results were obtained from both groups using the same methods (Leehan et al., 1989; Borg & Gall, 1979).

IMPORTANCE OF EVALUATING EFNEP

Evaluation is important to good planning which is crucial to effective implementation which is a prerequisite to improving the nutritional well-being of people (Austin, 1978). Resources are scarce, relative to needs in the absence of information on the relative effectiveness of nutrition programs, and there is no solid basis upon which to allocate funds (Austin, 1978; McNutt, 1992). Evaluation provides information to policy makers and to program practitioners about the operation, implementation, or effectiveness of a program (Pierre, 1982). Evaluative studies of federally-funded food and nutrition programs are important in demonstrating program effectiveness, in determining the degree to which the target populations are being served, and in providing feedback for those involved in decision-making (Vermeersch, 1973; Talmadge & Rasher, 1982; McCool, 1979; Austin, 1978;).

The growing demand for health services and the increased competition for funds in all areas of the public sector have stimulated the need for more systematic planning and formal evaluation of health programs (Vermeersch &

Swenerton, 1980). A survey of nutrition programs around the world showed that, of 140 nutrition programs, only 3% reported having analyzed nutritional status data and only 15% stated they had analyzed their program's cost data (Austin, 1978). For EFNEP to continue as a federal program, each state must conduct sound evaluation, document and report their successes, and note their failures (Amstutz & Dixon, 1986).

In conducting evaluation, evaluators need to remember that the achievement of long-range goals may not be measurable after short-term programs (Pierre, 1982; McCool, 1979). Many evaluations have failed to find program effects, not because the program was ineffective in a proximate sense, but because the only measured outcomes were distant ones that are affected by many factors and cannot easily be changed by a single intervention (Pierre, 1982). The problem of using specified behavioral outcomes in evaluation is further complicated because evaluations of nutrition education programs have not shown consistent effects of knowledge gained on food-related attitudes or behaviors (Pierre, 1982). However, because behavior change is significant to nutrition educators and policy makers, it will continue to be used as a criterion of success (Pierre, 1982).

Program developers and evaluators should approach behavioral measurements with the warning that in spite of their importance, behavioral effects are likely to be small and attribution of effects to a program is likely to be

difficult (Pierre, 1982). Evaluation studies of some programs for low-income audiences have yielded only fragmentary findings of success in reaching and meeting presumed needs of the target population. These studies have been commonly plagued by absence of locally-defined objectives, reporting systems, and valid and reliable measuring instruments, as well as inaccurate determination of community needs, and lack of criteria for judging success of a program (McCool, 1979; Nelson, Jacoby, Shannon, 1978).

Clients should be involved in the initial phase of evaluation to insure that program objectives are based on accurate assumptions of their needs (Edwards, Mullis, Clarke, 1986). Gathering local evaluation data is the most economical and logical means of facilitating progressive improvement of programs (Jones, 1970). Thus, the use of local evaluation for determining appropriate changes and adjustments to keep programs on target is most critical at the local level (Hanson & Schutz, 1981). Local evaluation is crucial to the success of EFNEP because it is feasible to involve clients in local program evaluations. If EFNEP does not address clients' needs, they will lose interest and drop out of the program (Nelson, Jacoby, & Shannon, 1977).

Since paraprofessionals play a major role in the operation of EFNEP, they should also be a part of the evaluation process. Furthermore, paraprofessionals need to be educated on the importance of evaluation to EFNEP, as well as being trained on how to use evaluation instruments effectively. Many paraprofessionals

are resistant to the use of evaluation tools because they think the objective is to see how well they personally are doing their jobs. Murphy (1977) used a questionnaire that solicited responses from paraprofessionals about their opinions of using an evaluation instrument with homemakers. Results showed that some of the paraprofessionals did not understand why they were asked to use the instrument and interpreted the effort as a one-time survey, rather than an attempt to develop a working tool (Murphy, 1977). Data seem to indicate that paraprofessionals need to know and understand how individual results, both positive and negative, are averaged together to yield group data (Murphy, 1977). They also need to understand that group data, rather than individual results, are used to evaluate the overall program impact (Murphy, 1977; Kindgon, 1973).

In order for evaluation to be effective, it must begin at inception, and continue throughout the course of the program (Jones, 1970). As homemakers' needs change, methods of evaluation need to be developed to document these changes. Learning what consumers want to know, rather than what nutrition educators think they should know, may be the key to improving the effectiveness of many nutrition education programs (McNutt, 1992).

EVALUATION METHODS USED IN EFNEP STUDIES

Data Gathering Methods

The 24-hour recall has been used extensively in EFNEP to collect food intake data from homemakers at program entry and exit. A recall is taken by the

EFNEP paraprofessional at the beginning of individualized, home based instruction. In the past, the Basic-4 Food Group Guide was used as a standard to indicate whether homemakers were consuming adequate types and amounts of foods. Program effectiveness has been based on the percentage of homemakers who showed an increase consumption in the number of servings from the Basic-4 Food Groups. The ideal diet consisted of 2 servings of milk or milk products, 2 servings of meat or meat substitutes, 4 servings of fruits and vegetables, and 4 servings of breads and cereals (Randall et al., 1989; Cloyd, 1975). In some studies, additional recalls were taken at six month intervals for as long as the homemaker participated in the program (Murphy, Smiciklas-Wright, Heasley, & Hamilton, 1980). In recent years, many states, including Virginia, have collected only an entry and an exit 24-hour recall, as this meets federal requirements.

The use of the Basic-4 Food Group Guide in EFNEP as a standard for nutritional adequacy may be problematic. Analysis of EFNEP homemakers' diets has indicated that diets meeting the Basic-4 Food Groups' 2-2-4-4 pattern for milk, meat, fruits/vegetables and breads/cereals, respectively, provide less than 100% of the RDA for vitamin E, vitamin B₆, folacin, magnesium, iron, and zinc (Guthrie & Scheer, 1981).

Throughout the history of EFNEP, internal and external studies have documented dietary improvement of homemakers during program enrollment (Leidenfrost, 1988; Rumps, Caster, & Peisher, 1983). Amstutz and Dixon (1986)

examined the diets of a group of graduated homemakers and a group of newly enrolled homemakers who had participated in EFNEP in Maryland. Learning was indicated by dietary changes in relation to the Basic-4 Food Group pattern and also in relation to recommendations concerning the Fifth Food Group (fats, sweets, and alcohol group) of the Daily Food Guide.

Two types of diet analysis were used to assess adequacy of homemakers' diets. The first type compared homemakers' reported food consumption from the 24-hour recall with the optimum level recommended by the Basic-4 Food Groups. A scoring table was used for the 24-hour dietary intake which enabled the authors to compute a numerical diet score based on the recommended number of servings from four of the Basic-4 Food Groups. Scores ranged from a minimum of 0 to a maximum of 100 points (Amstutz & Dixon, 1986). A score of 100 was an indication that the homemaker was consuming the recommended 2-2-4-4 pattern from the Basic-4 Food Groups. Graduated homemakers' diet scores were higher than the diet scores of newly enrolled homemakers. These findings indicated that positive dietary changes occurred and were evident by improved post-program diet scores as compared to pre-scores (Amstutz & Dixon, 1986).

The second type of diet analysis examined the number of servings reported from the Fifth Food Group. For the purposes of this study, the Fifth Food Group was defined to include certain foods that were high in fats, sweets and alcohol, and also low-nutrient dense foods (Amstutz & Dixon, 1986).

Homemakers showed a decrease in their consumption of foods from the Fifth Food Group from program entry to graduation, which is an indication of improvement.

Romero, Mederios, and Melcher (1988) evaluated the diets of homemakers in Wyoming's EFNEP using the 2-2-4-4 pattern of the Basic-4 Food Groups. Pre-test means were below the recommended number of servings for all food groups. At graduation, post-test mean intakes reached the recommended number of servings for all groups except for the fruit/vegetable group.

Verma and Jones (1973) evaluated the impact of various training methods on homemakers' progress in EFNEP. Data were collected from sample homemakers on the Family Record forms used in EFNEP. Diets were analyzed based on the ability of the homemakers' diets to supply the recommended 2-2-4-4 pattern of the Basic-4 Food Groups.

Verma and Jones (1973) concluded that length of participation and type of learning experience did not influence homemakers' intake from the Basic-4 Food Groups as measured by 24-hour recalls. The authors concluded that using the 24-hour recall as the only criterion for determining dietary changes has definite limitations (Verma & Jones, 1973). The 24-hour recall was not sensitive enough to show improvement in nutrient intake as a result of teaching methods and length of exposure to nutrition education (Verma & Jones, 1973). It is highly possible that certain teaching methods may have been more effective in bringing

about changes in some other factors, such as better food management, food preparation, or food preservation practices (Verma & Jones, 1973). Therefore, the authors recommended that evaluation procedures be developed to obtain more in-depth feedback on various skills taught in the program.

The 24-hour recall has been used in EFNEP to document food intake because it has been shown to be inexpensive, relatively easy to administer, useful with illiterate individuals and results in high cooperation of participants (Sanjur, 1982; Sanjur & Scoma, 1971). There are several limitations to using the 24-hour recall and Four Food Group analysis as the only assessment tool in EFNEP. The 24-hour recall is not regarded as an accurate measure of food intake of a single individual. Portion sizes are usually underestimated and, in many instances, plate waste is not taken into account. Another disadvantage is that 24-hour recalls may not measure the usual dietary intake of individuals (Block, 1982; Madden, Goodman et al., 1976).

Use of multiple 24-hour recalls on the same individual may provide a more accurate assessment of individual nutrient intake than the single 24-hour recalls. Knowledge of inter-individual variation, perhaps obtained through replicate examinations for a subsample of the population, may help in interpreting data in surveys in which the basic dietary methodology is a single day's dietary intake (Beaton, Milner, & Corey, 1979). Use of multiple 24-hour recalls may improve the ability to assess potential relationships among nutrient intakes and may help

to avoid erroneous conclusions (Beaton et al., 1979).

Recent analysis of food consumption surveys have identified "problem nutrients", some of which are not specifically considered in the Basic-4 Food Groups (Pennington, 1986). In order for nutrition education tools to be useful in combatting nutrition misinformation and to have credibility with the public, they should address the health and nutrition issues that have been presented in recent reports and guidelines (McNutt, 1992; Pennington, 1986).

In recent years, the United States Department of Agriculture's Human Nutrition Information Service Division has developed a new food guide as a standard for food consumption patterns of Americans. This new food guide is called the Food Guide Pyramid and was designed to be compatible with the Dietary Guidelines for Americans. The Food Guide Pyramid suggests intakes of various foods which reflect dietary guidelines, nutrients consumed in excess, and those that should be consumed in larger amounts. The new Pyramid can be used with EFNEP clientele, as the visual presentations are simple enough to be understood by children and those who are not well educated; however, it is not so simple as to insult the moderately well-educated people (Pennington, 1986).

The instruments that were described in this sections do not measure intake of specific nutrients. Increasing evidence has shown that diseases, related to specific nutrients and specific food behavior patterns, are prevalent among the poor (Campbell & Desjardins, 1989; Kent, 1988; McKenzie, 1974). Therefore,

instruments need to be developed that assess intake of specific nutrients. The Expanded Food and Nutrition Education Program needs to address problem nutrients and food-related skills in an effort to improve health, reduce health care costs, and improve nutrition-related behaviors. As EFNEP addresses chronic disease prevention, evaluation methods must be developed to assess the impact of those efforts.

Other Instruments Used to Evaluate EFNEP

The Expanded Food and Nutrition Education Program defines its overall objectives in terms of projected behavioral change. This definition is consistent with its purpose, which is to educate, to effect change in behavior, rather than simply to increase knowledge (Emmons, 1987; Murphy et al., 1976). In order to assess EFNEP's success in reaching its objectives, several instruments have been developed to measure homemakers' progress and perception of paraprofessionals in EFNEP. These instruments and the methods used to develop them will be reviewed in this section.

The Expanded Food and Nutrition Program has been evaluated in nearly every state in which it currently operates. Research findings have agreed that EFNEP is reaching its target population (Anderson, 1988; Romero et al., 1988; Brown & Pestle, 1981; Murphy et al., 1980) and improving the lives of its homemakers, three (Torisky et al., 1989) and five years after graduation (Amstutz & Dixon, 1986).

In 1976, the Federal Extension Service developed a tool, " the Progression Model", to measure food-related practices of EFNEP that are not measured by the 24-hour recall. The instrument covered eight areas: food purchase, food obtained through non-purchase, food storage, sanitation, food and meal planning, food preparation, serving and distributing food, and food preservation (Murphy, 1977; Feaster, 1972). The purpose of the Progression Model was fourfold: 1) to produce a standard tool to ensure that families make progress, 2) to establish nutrition education objectives and criteria identifying what homemakers should learn before they moved out of the EFNEP program, 3) to foster a philosophy that program families are not static, and 4) to improve cost efficiency.

After six months of EFNEP intervention, data collected with the Progression Model revealed that homemakers showed substantial improvements in both food knowledge and consumption practices (Leidenfrost, 1985; Feaster, 1971).

In an attempt to evaluate the educational tasks of paraprofessionals in promoting change in the dietary practices of homemakers, Wang and Ephross (1971) developed a questionnaire for use with EFNEP homemakers. County Extension agents were involved in revising the proposed study instrument so that questions were clearly understandable to paraprofessionals and homemakers. Data were gathered by face-to-face interviews. The instrument provided data relevant to : 1) the extent to which homemakers feel their nutrition practices have changed, 2) the extent to which the paraprofessionals conveyed a sense of greater

hope for homemakers and their families, 3) the extent to which paraprofessionals' and homemakers' perceptions of change are similar, 4) the time at which paraprofessionals consider a family ready for discharge from the program, and 5) the criteria for success (Wang & Ephross, 1971).

Homemakers' responses to questions related to the paraprofessionals' helpfulness, indicated a high rating. Moreover, homemakers felt that the majority of the help was with nutritional practices, including food buying and wise use of food stamps (Wang & Ephross, 1971). The authors concluded that the low-income homemakers served as patient, thoughtful, and capable sources of information and that reliable data can be collected from low-income homemakers; Furthermore, low-income homemakers can speak well for themselves (Wang & Ephross, 1971).

Paraprofessionals are also considered to be reliable sources of information since they may be the only representative of any agency who has direct contact with the family and who has gained the homemakers' trust (Wang & Ephross, 1971). Furthermore, paraprofessionals are likely to be the only official persons to make frequent home visits and, thus, observe the families in their own natural setting (Wang & Ephross, 1971). Using the paraprofessionals to collect data can prove to be a reliable means of obtaining data on the nutrition-related practices of low-income homemakers.

The effectiveness of EFNEP at two Land-Grant institutions was

determined by Verma et al. (1987). The 1862 Land-Grant Colleges originated as a result of the Land-Grant Act, which provided grants of federal land to every state which would agree to teach agriculture and the mechanical arts as the primary focus of the instructional program along with offering other scientific and classical subjects (Verma et al., 1987). In 1890, a second Land-Grant Act provided additional federal funds to the states and territories and authorized the establishment of separate Land Grant institutions in each state to serve black citizens who were not being served at the existing Land-Grant schools (Verma et al., 1987). The instrument used to collect data from homemakers addressed three major topics (1) food buying, preparation, and consumption practices, (2) nutrition and health beliefs; and (3) frequency of serving various food items.

Part one of the survey contained questions on nineteen practices taught by Extension. Twelve questions addressed food-buying and preparation practices. Response choices were on a 4-point Likert scale (3 = most of the time, 2 = some of the time, 1 = seldom, or 0 = never). The remaining seven questions on food consumption were on a 3-point Likert scale: 2 = most of the time, 1 = seldom, 0 = never (Verma et al., 1973).

Group means were evaluated for food buying and preparation practices and scores in the range of 2.00 to 3.00 were ranked as fair to high performance; scores lower than 2.00 were considered unsatisfactory (Verma et al. 1987). For food consumption practices, scores ranging from 1.00 to 2.00 were satisfactory,

and scores below 1.00 unsatisfactory (Verma et al., 1987).

Part two of the survey contained thirteen questions on nutrition and health belief statements. Response choices for each belief statement were "strongly agree", "agree", "disagree", or "strongly disagree", with corresponding values of 3, 2, 1, and 0, respectively. Scores ranging from 2.00 to 3.00 were considered to indicate appropriate beliefs about nutrition practices, and scores below 2.00 were considered to indicate inappropriate beliefs.

Part three of the instrument contained questions on frequency of serving for ten food items. In addition, this section elicited information about sources of nutrition information.

As many other studies have shown, participants in Extension scored higher on practices than their non-Extension counter-parts. Homemakers from the 1862 Land-Grant College showed better food buying, preparation, and consumption practices than their non-Extension counter-parts (Verma et al., 1987). In contrast, Extension and non-Extension groups of historically black Land-Grant institutions showed significant differences for only three practices (Verma et al., 1987).

Extension homemakers from 1862 Land-Grant institutions held more appropriate beliefs than did the non-Extension group. A statistical difference was observed between these groups in response to eight of the thirteen belief questions (Verma et al, 1987). Smaller differences were observed between

Extension and non-Extension groups at historically black colleges.

With regard to serving frequency of selected foods, a statistically significant difference was observed between five of the ten selected food items for the two Extension institutions. A significantly ($< .005$) smaller percentage of homemakers surveyed through historically black institutions served skim milk (43% to 53%, respectively), margarine (83% to 93%, respectively), and low-sodium/salt-free foods (39% to 46%, respectively) when compared to homemakers from the 1862 Land-Grant universities. Butter (75% to 37%, respectively) and whole milk (86% to 63%, respectively), were served more by homemakers surveyed through the historically black college than homemakers surveyed through the 1862 Land-Grant universities.

The instrument used by Verma et al. (1987) addressed several important aspects of Extension. Response categories used to determine "appropriateness" and "inappropriateness" of nutrition and health beliefs seemed rational. However, there is no evidence and no report given on the reliability of the survey instrument. Therefore, it cannot be concluded that the instrument measured what it purported to measure.

Brown and Pestle (1981) used total diet scores and food behavior practice scores at program entrance, at graduation, and at 12 months after graduation to determine the long-term effects of EFNEP in Georgia. Data were collected from 225 homemakers using a Food Behavior Checklist and the Homemakers' Food

Consumption, Family Income, and Food Expenditure Form. A scoring table for total diet score was used to generate a score between 0 and 100 for the diet of each subject (Brown & Pestle, 1981).

Paraprofessionals went through the list and checked the appropriate block that indicated the behavior practices of each homemaker and then a food behavior score was calculated for each homemaker. Results showed that homemakers' scores at graduation were higher than scores at program entry. The authors did not report a relationship between diet scores and food behavior scores.

In Wyoming, a homemakers' questionnaire was developed and used with a cost cutter lesson series to evaluate EFNEP (Romero et al., 1988). A 35-item Food Behavior Checklist developed by the USDA served as the source from which researchers derived their questions. The 35-item food behavior checklist is usually used in Wyoming's EFNEP and contains specific food-related behaviors that are not food consumption behaviors. Areas addressed by the 35-item food behavior checklist included nutrition knowledge, food purchases, food-storage, and food-preparation techniques. Checklist items were evaluated by paraprofessionals for relevance, clarity, nutritional content, and the extent to which they felt that the homemakers would accept the material (Romero et al., 1988).

The homemakers' questionnaire, which was developed to evaluate the

effectiveness of a shortened curriculum, consisted of five parts. Part one consisted of a household information sheet. Part two contained 24 questions on food shopping practices which were rated on a Likert-type scale, with the highest possible score for each item being five points. Part three of the questionnaire contained multiple-choice questions designed to assess food selection and shopping skills. Part four contained multiple choice questions designed to assess knowledge of food groups, serving sizes, and nutrients. Part five consisted of a form that collected 24-hour food recall data (Romero et al., 1988).

Paraprofessionals collected data using the homemakers' questionnaire with each homemaker at program entry and program exit. Results from part five were presented in the previous section on Data Gathering Methods.

Participants' post-test mean scores for food-shopping practices in part two of the questionnaire increased. Before exposure to EFNEP lessons, scores on the food-selection and shopping skills ranged from 14% to 66%. Post-test scores increased and were in the range of 63 to 91%. Post-test scores also increased for food selection skills, knowledge of food groups, serving sizes and nutrient intake. Results from this study support the hypothesis that homemakers, who participated in the lesson series, would show a significant improvement in food-shopping and management skills (Romero et al., 1988). However, the authors noted that the results of this study cannot be generalized since the validity and reliability of the homemaker questionnaire used in the nutrition knowledge section were not

established.

Murphy et al. (1976) developed an instrument to measure nutrition-related practice changes of Pennsylvania EFNEP homemakers. The questionnaire covered three nutrition-related practices: A) food storage and safety, B) kitchen sanitation and C) food money management. Specific criteria for the instrument were: (1) that it be formatted so that the information obtained was derived from observation, (2) that the language of the instrument be stated in simple, yet specific language, (3) that the questionnaire be short enough so that paraprofessionals could memorize the questionnaire and record the data from memory and, lastly, (4) that the questionnaire be structured to accommodate pre-coded, as opposed to open-ended, responses (Murphy et al., 1980).

The final instrument was reviewed by a Pennsylvania EFNEP committee, and then given to 210 EFNEP paraprofessionals for final testing. Each paraprofessional was instructed to collect data on 10 homemakers. Results showed that the majority of homemakers followed acceptable food storage and safety practices. Favorable responses were also shown for kitchen sanitation and food money management; however, these were not as favorable as those for food storage and safety (Murphy et al., 1980).

Statistical analysis revealed no significant relationship between the time a homemaker participated in the program and nutrition-related practices. The authors gave three possible explanations for why no statistically significant

relationship was found. First, such a relationship might have existed, but the instrument was not sensitive enough to detect it. Secondly, such a relationship did not exist, and the instrument confirmed this. Lastly, a relationship did not exist because paraprofessionals did not spend as much time in the area of nutrition-related practices as they did in teaching nutrition principles (Murphy et al., 1980).

Researchers in Colorado evaluated EFNEP using a Simplified Progression Form, because the checklist that was developed for national use was excessively long and required a considerable amount of time to administer (Anderson, 1988). In an effort to reduce the number of questions and the time required to administer the questionnaire, Anderson (1988) designed an instrument that could be administered quickly, but would still measure the overall impact of EFNEP.

Colorado's EFNEP 18-lesson core curriculum was used as a basis for developing a list of questions that reflected changes in homemakers' program-related knowledge and practices. Supervising agents and state staff reviewed the questions to ensure content validity. This process resulted in 14 questions that covered the domain of the 18 lessons and related to the overall objectives of the program. The questionnaire was divided into two parts: part one addressed nutrition knowledge and part two addressed behavioral changes. Questions were structured to be answered by the EFNEP community workers on the basis of their observations. The authors noted that data from the Simplified Progression Form

were somewhat subjective, in that they were based on EFNEP community workers' observations and knowledge of homemakers. Such judgments may be difficult at enrollment when the paraprofessionals are not familiar with the homemakers. The author concluded that the Simplified Progression Form used to collect data in this study had proved to be a valuable tool in evaluating Colorado's EFNEP (Anderson, 1988).

FOOD-RELATED PRACTICES OF LOW-INCOME HOMEMAKERS

When considering what food practices to include in an assessment tool to be used with low-income families, it is important to identify the critical food-related practices that significantly impact their diets (Emmons, 1987). That is, what practices have led to inadequate diets among low-income families? Some of these practices are discussed in this section.

Some low-income families still live in areas where the types of grocery stores are limited (Awa, 1974). As pointed out in one study of the "inner city" of Philadelphia, residents of low-income areas often do not have the same opportunity to shop in chain supermarkets as do residents of high-income areas (Fitzgerald, 1979; Dixon & McLaughlin, 1968;). However, in a similar study in Philadelphia, other researchers found that most low-income families shopped at supermarkets even though these stores were located outside the immediate low-income neighborhood (Goodman, 1968).

Goodman (1968) interviewed 520 households with median income between

\$4,000 and \$5000; 92% of these families went out of the interview area for major groceries. Eighty-one percent shopped at supermarkets and 8% at competitively priced, moderate sized stores (Dixon & McLaughlin, 1968). A majority of the families shopped at small stores for emergency type items (Knapp, 1991; Coltrin & Bradfield, 1970).

Goodman (1968) reported that low-income families made a special effort to go outside the immediate area to obtain suitable food. Of the group surveyed, 45% used automobiles, 14% used local bus lines and the remainder walked in order to accomplish their shopping. Few differences were found in the shopping behavior between the extremely poor (less than \$3,000) and the other income (\$3,000 to \$5,000) households. However, differences in shopping practices were noted between the low-income groups and the higher income (those above \$5,000). The distance traveled to both independent and fill-in stores was less for low-income than for higher income families. Transportation limitations may account for the lower distances traveled by low-income families (Goodman, 1968; Knapp, 1991; Sloan, Leone, Powers, & McNutt, 1984; Block, 1977; Coltrin & Bradford, 1970).

Types of groceries purchased by low-income consumers tend to reflect their income, age, and ethnicity (Awa, 1974; Mckenzie, 1974). Older white persons and black families, with limited incomes, buy fewer frozen vegetables and fresh fruits and more meat items, such as pork chops, chicken and canned meat

and more starchy commodities, such as bread, rice, potatoes, and pork and beans than the higher income families (Inano & Pringle, 1975; Jalso, Burns, & Rivers, 1965).

Peterkin, Kerr, & Hama (1982) examined diets of 4,408 households that were eligible for, but not necessarily participating in, the Food Stamp Program to determine the cost of food used by low-income households and to examine the nutritional adequacy of self-selected low-cost diets. In an interview, homemakers provided information about the kinds and amounts of all foods and prices of purchased foods used by the household for a seven day period. Food cost was expressed as a percentage of the maximum allotment at the time of the survey for the appropriate number of members in the household. Diets of 622 households, whose food expenditures were within plus or minus 10% of their Food Stamp Allotment, were analyzed for nutritional content. The content of the following nutrients was assessed: protein, calcium, phosphorus, iron, magnesium, and vitamins A, B₁, B₂, B₆, B₁₂, and C content were compared with the appropriate category of the 1974 RDA. Approximately 14% of the sample households used food valued within 10% above or below the maximum allotment level for a given family; 17% used food at less than 90% of the allotment (Peterkin et al., 1982).

Forty-two percent of all homemakers in the study consumed diets that provided the full RDA for the eleven key nutrients, and 61% consumed diets that furnished at least 80% of the RDA for eleven nutrients. The nutritional quality

of diets, as measured by the percentage of diets meeting the RDA, increased as money expenditure increased (Peterkin et al., 1982). However, high food costs did not necessarily ensure that the RDA would be met (Peterkin et al. 1982; Johnson, Nitzke, & Vandenberg, 1974). Among categories of households with food expenditures over 150% of the allotment, approximately 12% selected foods that did not furnish at least 80% of the RDA for the eleven nutrients (Peterkin et al., 1982).

For the entire sample, 80% or more of the households met the RDA for seven nutrients: protein, iron, phosphorus, vitamins B₁, B₂, B₁₂, and C. The percentage of households meeting the RDA for calcium, magnesium, vitamin A and vitamin C was 61 - 76% (Peterkin et al., 1982).

Households (210) that met 80% of the RDA for protein, iron, phosphorus, vitamins B₁, B₂, B₁₂, and C spent most of their money on milk and dairy products, eggs, dry legumes, nuts, vegetables, and fruit and grain products, and less of the food dollar for meat, poultry, fish, soft drinks, and alcohol beverages than did households (417) that did not meet 80% of the RDA for protein, iron, phosphorus, vitamins B₁, B₂, B₁₂, and C. The majority of low-income households in this study used food that cost more than would have been covered by the food stamp allotment. The results of this study showed that it is possible to select nutritionally adequate diets within the food stamp allotment but that the large majority of households in this survey either spent more for food or made unwise

food choices from a nutrition perspective (Peterkin et al., 1982).

Seone (1971) conducted a survey of a selected sample of 237 low-income families in New York State to see if they conformed to the reported pattern of increased use of convenience-foods. A questionnaire was used to collect background information and to determine homemakers' use of 93 convenience foods which were placed in six major categories: main course, dessert, breakfast food, breads/related products, and miscellaneous.

Results showed that frozen dinners, frozen pre-cooked meats, canned meats and frozen casseroles were not consumed as a main course item to any noticeable degree. The same findings were reported for ethnic foods such as chow mein, chili and pizza. Prepared items that were purchased in this category were luncheon meat, bologna and canned pork and beans (Seone, 1971). It was concluded that main course food items may have been rejected because they usually cost more. A majority of the main course food items were frozen and some low-income families may not have adequate freezer storage for such items (Warren, Hillers, & Jennings, 1988; Seone, 1971).

Canned vegetables were popular among low-income families, which may have been due to the fact that such vegetables are usually sold at reduced prices. Also, canned products are not perishable and do not require refrigeration. Seasonal availability may have accounted for the noted popularity of processed vegetables (Seone, 1971). Items such as frozen and canned vegetables were

classified as secondary to the main course and were equally purchased by low-income homemakers. The most popular dessert items in descending order of consumer preference were ice cream, canned fruit, gelatin desserts, cake mixes, and puddings. Only six homemakers reported that they never used ready-to-eat cereals (Seone, 1971). As a group, sugar coated cereals were consumed in 53.1% of the households; however, no one product was more favorable than the other. All of the families regularly consumed white bread. Crackers, macaroni and spaghetti were consumed at least one or two times per week in over 50% of the households. Approximately 11.4% of the families admitted buying enriched, quick cooking rice one or more times per week, but the majority ate the regular, unfortified variety (40.8%).

The use of powdered milk, evaporated milk, and flavored milk powders was popular among families and consumption patterns followed a similar trend for the three types. Age was not a factor that determined the type of milk consumed by the families (Seone, 1971). The popularity of powdered milk could be a residual of the donated food program (Leverett, Miller, Wefenast, Yepes-Baraya, & Scheider, 1986; Seone, 1971). Snacking was found to occur in most families with potato chips, soft drinks, donuts, and pastries being the predominant snack foods.

Campbell and Desjardins (1989) undertook a study to assess the nutritional needs of twenty low-income families with young children in Toronto, Canada, and

to investigate the strategies such families used to manage their limited food resources. Semi-structured interviews and record-keeping procedures were used to collect data. Questions were designed to obtain information on food practices as they related to the family situation (Campbell & Desjardins, 1989).

According to the authors, there were four categories of household management that had some experiential relevance to all the participants: (1) food acquisition, (2) supply management, (3) preparation, and (4) allocation and consumption. In terms of consumption, the key differentiating dimension among the households was the adequacy of the mother's diet, in particular her caloric intake .

Both the supply management and food acquisition categories represent the financial and material context within which the social and individual activities occurred (Campbell & Desjardins, 1989). The maintenance of adequate food supplies was a challenge for the mothers. The key differentiating characteristics among the mothers were the degree and frequency of food insecurity, worry, or anxiety that they experienced (Campbell & Desjardins, 1989).

Homemakers utilized all possible sources as a means of obtaining food. Food was acquired through multiple loci, including different types of stores, restaurants and sources of "free" or non-cost meals. In addition to the source of food, issues of transportation, shopping frequency, types of stores available and options for food short falls were important (Campbell & Desjardins, 1989; Awa,

1974). No simple or single most efficient strategy of food acquisition was found. Most households used multiple approaches to take maximum advantage of their resource environments.

Managing limited food resources was a task accomplished with varying degrees of success by all the families. Most of them experienced the commonly noted problems for low-income families, such as difficulty with transportation, lack of freezers, micro-strategies for rationing food within the family, and stretching of staples (Campbell & Desjardins, 1989; Sims, 1976; McKenzie, 1974).

Iked (1975) developed an instrument to measure expressed needs of low-income homemakers in California. Some questions used to elicit responses were open-ended and some included ranked responses. Both types of questions were related to nutrition topics and allowed the researchers to make comparisons on nutrition practices. The following subtopics were addressed: cooking and recipes, meal planning, food preservation, shopping and storage.

Fifty-seven percent of the homemakers indicated that the subcategory in which there was the greatest need for further instructions was food shopping. The main concern was how to stretch available money to feed their families (Iked, 1975; McKenzie, 1974). In the area of food preparation, homemakers wanted help with cooking and recipes. They were interested in recipes for meat, vegetables, casseroles and quick dishes. In terms of meal planning, homemakers were interested in learning techniques to make their meals fit within their budget

(Sullivan, Gere, Nowlin, & Kloe, 1976; Iked, 1975; Ramsey & Cloyd, 1975;).

In response to the section containing general questions on nutrition, homemakers indicated that they were interested in learning how to feed their families nutritious foods (Iked, 1975; McKenzie, 1974). Questions were expressed concerning vitamins, minerals, iron-rich foods, protein, and carbohydrates and how the body uses them. A few homemakers expressed concerns about weight control, with homemakers specifically wanting to know how to lose weight and how to prepare low-calorie recipes. The area of least interest was food chemicals and additives (Iked, 1975). The authors concluded that low-income homemakers are interested in information on nutrition and getting the most nutritious food with available money (Iked, 1975).

Efforts were made to identify food-related values of low-income mothers in Oklahoma (Suter & Barbour, 1975). Forty-two homemakers provided information pertaining to the following categories: family life, economy, health, friendship, work efficiency, and education. Results indicated the following hierarchal ranking of food-related values in descending order: (1) family life, (2) work efficiency, (3) health, (4) economy, (5) friendship, and 6) education. The authors concluded that low-income homemakers are most concerned about relating to members of their families.

Fitzgerald (1979) studied the eating patterns of 100 southern low-income families (82 white, 18 blacks) in North Carolina. When asked if, they ever read

labels on products while shopping, 35% of the whites and 27% of the blacks said "sometimes". The majority said simply, "hardly ever" (Fitzgerald, 1979).

Homemakers expressed the fact that putting information on product labels was a good idea, but many recognized that, without some simplification, the labels would never be understood (Fitzgerald, 1979).

Most studies with low-income families address practices related to nutrient intake from the Basic-4 Food Groups. Haider and Wheeler (1979) studied specific nutrients in the diets of black and Hispanic mothers in a Brooklyn ghetto. Results showed that fiber, carbohydrate, fat, calcium, iron, riboflavin, vitamin A and calorie intakes were inadequate. Only protein, phosphorus, and vitamin C intakes met two-thirds or more of the 1974 RDA. Inadequate intake of energy, calcium, and iron was also reported for low-income families in southwest Mississippi (Koh & Caples, 1979).

COMPUTER USE IN NUTRITION PROGRAMS

Computer programs have been used for more than ten years in EFNEP for record keeping and to summarize EFNEP data; however, the use of computer generated data as a teaching tool with EFNEP homemakers has only been considered in the past five years. Computers have also been used to teach EFNEP 4-Hers (Cranford, 1974). EFNEP 4-H members nationwide are learning about computers, programming, and how to use computers in 4-H project areas such as animal genetics, crops, fashion, or gardening (Cranford, 1974).

Computers can be used for a variety of tasks in the field of nutrition. Some benefits of using microcomputers in nutrition education include minimal cost, maximum teaching effectiveness, and flexibility to meet individual learning needs (Taylor, O'Malley, Heger, Trudgett, Mayo, & Gardner, 1987). Immediate feedback and application of facts provided by computers may encourage consumers to modify their eating habits.

Analyzing the nutrient content of diets with the aid of a microcomputer is already a common practice in most health care and food service settings (Crockett, Brown, Pelican & Eisel, 1986). Significant accomplishments have been made in the use of computer technology for dietary assessment (Hoffman, 1991; Dunphy & Bratton, 1983; Graziado-Marques, Kennedy & Anderson, 1981). Computerized nutrient analysis has gained momentum, as dietitians have become aware of the speed and accuracy of obtaining detailed nutrient information, and reports generated via data processing (Flook & Alford, 1974). Various institutions have extended applications of computerized dietary analysis beyond the boundary of direct patient care (Youngwirth, 1983), with computer generated data being used to teach medical students (McConnell & Wilson, 1976). Computers have been used to teach menu planning and food service management to college level students (Youngwirth, 1983) and have proven to be effective.

Nutrient analysis output can be designed to meet individualized needs. One system, in particular, is designed to present a nutrient profile in terms of

percent of RDA and/or index of nutritive quality (INQ). The Index of Nutrient Quality is the ratio of nutrients provided to caloric requirements (Sorenson, Wyse, Hansen, & Wittwer, 1976).

Although the use of microcomputers in nutrition education has been largely limited to school-age students and adults, potential use of microcomputers at the preschool level has been documented (Turner & Evers, 1987; Hoffman, 1986). Turner and Evers (1987) developed a computer program for four and five year old children who were assumed to be non-readers. The purpose of the computer lesson was to enable students to identify certain types of food. Three pre-school facilities participated in this study with one facility being a university affiliated child development laboratory. Two classrooms at the development laboratory were used, one as a computer group and the other as a traditional (non-computer) group. Two county day-care facilities, that gave enrollment priority to children of single parent and children of low-income parents, were also included in the study. One facility was designated as the computer group and the other as the traditional group (Turner & Evers, 1987).

Pre-test and post-test scores were determined for all groups. There were no differences in pre-test scores between the computer and traditional groups at the university facility. Improvement in test scores were called "gain" scores and were computed for all groups (Turner & Evers, 1987). No differences were noted between the traditional groups; however, a gain score of 8.7 points was observed

for the day-care computer group compared to a gain score of 3.9 for the university laboratory computer group. (Turner & Evers, 1987). The differences in gain scores between the computer groups suggest that the computer is an effective tool to engage children from lower socioeconomic groups in learning (Turner & Evers, 1987).

Teachers were very receptive to the use of computers as a teaching tool and reported that children in the computer group seemed more intensely interested than those in the traditional groups (Turner & Evers, 1989). Teachers concluded that using a microcomputer might help teachers in the future to revitalize their classroom performance (Turner & Evers, 1987; Ries, Granell, & Zemel, 1984). Educators can use microcomputers to stimulate student interest and to reinforce important concepts as students discover, for themselves, facts about their own eating styles (Graziado-Marques et al., 1991; Hoffman, 1986). However, it is important that users be able to interpret the computer printouts to students.

Researchers in Pennsylvania conducted a study to determine how well older adults were able to comprehend information from a printout of a computer-analyzed 24-hour food record and an accompanying explanation booklet (Smiciklas-Wright, Pelican, Byrd-Bredbenner & Shannon, 1984). A sample was drawn from pensioners who were participating in a project, designed to determine whether pension check envelopes were a feasible delivery vehicle for nutrition

information. Respondents were instructed to record the types and amounts of food eaten in one day which was then used to assess their dietary intake.

The "EATS" computer program, was used to generate percent RDA for eleven nutrients; milligrams of sodium; kilocalories; and percent of kilocalories from protein, carbohydrate and fat (Smiciklas-Wright et al., 1984). Printouts were returned to respondents, along with an explanation booklet and a questionnaire designed to determine respondents' general understanding of the RDA and their ability to read and interpret information taken from a sample printout (Smiciklas-Wright et al., 1984). Results showed that questions, paralleling statements in the explanation booklet, received correct responses. The high percentage of correct responses to questions suggests that supplementing computer printouts with good explanatory material enhances the recipient's understanding of printout information (Smiciklas-Wright et al., 1984).

Computer printouts should be easily understood and should maximize the use of words instead of codes (Danford, 1981). The most problematic aspect of nutrition education by computer is the client's inability to correctly interpret data without assistance from a health-care provider (Smiciklas-Wright et al., 1984). If computer printouts are to be effective teaching tools, the information generated must be readable and understandable (Smiciklas-Wright et al., 1984).

SUMMARY

EFNEP has continuously reached limited-resource homemakers nationwide for more than 23-years. Several states, including Virginia, are currently using the EFNEP Family Record Form, developed by New York EFNEP staff. Part B of the Family Record Form is used to assess changes in nutrition-related behavior and nutrition knowledge of homemakers in several states. However, certain professionals in the area of test design say that , the questions on this behavior checklist are stated in such a way as to violate practically every rule of test design (Dr. Robert Frary & Dr. Javid Kaiser personal communication, October 15, 1991). According to experts, questions are not stated in proper form and most of them are ambiguous.

The 24-hour recall (Part C of the Family Record) has been used to collect data on dietary intake of homemakers. Currently, the 24-hour dietary recall is the easiest and least expensive method available to collect dietary information from EFNEP homemakers; however, the 24-hour recall does not assess many of the important practices taught in EFNEP. Researchers agree that the 24-hour dietary recall method measures changes in only one area, specifically the homemakers' diet. The program's other expected results, such as changes in nutrition-related practices, has not monitored and evaluated to the same degree or with the same continuity as diet (Murphy et al., 1976).

Instruments have been developed by various investigators to measure the

effectiveness of EFNEP. These investigators have recognized the importance of using simple instruments to collect data from EFNEP homemakers (Amstutz & Dixon, 1986) as most homemakers have poor literacy skills. Most of the questionnaires have been developed with the assistance of EFNEP paraprofessionals, since they are the ones who are familiar with EFNEP lessons and with homemakers. None of the studies reviewed discussed construct, and face validity, or reliability of the instruments. Therefore, it is not known if these instruments are valid and it cannot be assumed that they measure what they purport to measure.

Nutrient content of the diet is important to health and homemakers are responsible for planning and preparing nutritious meals for their families. Low-income homemakers make decisions daily which affect their families' health; therefore, it is important to assess their needs and to determine how to effectively provide information that will help them select foods that meet the nutritional needs of each family member.

The EFNEP model of using paraprofessionals to teach limited-resource homemakers has proved to be successful. Nonetheless, methods need to be developed to enhance the learning experiences. The use of computerized analysis as a teaching tool may be an effective method, since research findings have shown that computerized feedback may enhance teaching instruction (Crockett et al., 1986). Feedback via computer generated printouts may have an impact on low-

income homemakers' nutrition-related practices, but this has never been tested. Therefore, the potential benefits of computer generated nutrient analysis (Diagnostic Report) needs to be determined for EFNEP homemakers.

In view of the limitations of dietary methods to adequately assess progress of individual homemakers and the impact of nutrition education programs with low-income clientele, there is a need for additional assessment tools. Thus, the current study will be undertaken to develop and test a Food Behavior Checklist as a tool to assess progress in EFNEP and to test the use of computer generated feedback with EFNEP homemakers.

CHAPTER III

METHODOLOGY

The purposes of this study were threefold: (1) to develop a valid and reliable instrument to measure nutrition-related practices in EFNEP; (2) to determine if significant differences were found between homemakers' entry and graduation Food Behavior Checklist and NAR values; and (3) to determine the effectiveness of using computer feedback with low-income homemakers.

This study was conducted in two phases. In Phase I a Food Behavior Checklist that measures the nutrition-related practices taught in EFNEP was developed and validated. In Phase II the Food Behavior Checklist was used in a field test to collect information on homemakers' nutrition-related practices. Food consumption data were collected with the 24-hour recall section of the Family Record (Appendix B).

Information from the 24-hour recall was used to assess the adequacy of vitamins A, B₆, C, calcium, iron and folic acid in the homemakers' diet. A computer printout called a Diagnostic Report (Appendix C) was generated based on information in the EFNEP Family Record. The Diagnostic Report was used as a teaching tool with one group of homemakers (designated as the experimental group), but was not used with the control group. Paraprofessionals explained the Diagnostic Report to homemakers in the experimental group and emphasized nutrients that were consumed in amounts that were too high or too low.

Recommended intake and sources of nutrients were also discussed with the homemaker.

PHASE I: DEVELOPMENT OF THE FOOD BEHAVIOR CHECKLIST

Validity and Reliability

A Food Behavior Checklist was developed to assess selected nutrition-related practices that are taught in the EFNEP curriculum. This instrument was designed, as an ongoing evaluation tool in EFNEP, to be used in conjunction with the 24-hour recall. The Food Behavior Checklist and the 24-hour recall were completed at program entry and at program exit or graduation. Homemakers received a score on their Food Behavior Checklist with comparisons being made between the initial Food Behavior Checklist scores and exit scores. The difference between the two scores was used to determine nutrition-related practice change for each homemaker.

During the developmental stages of the Food Behavior Checklist, certain procedures, described below in steps 1 through 3, were used to develop content, construct, and face validity of the checklist. This phase of the development of the Food Behavior Checklist occurred over a seven-month period.

Content Validity

Step 1.

Lessons in the core EFNEP curriculum were reviewed by the investigator and a list of nutrition-related practices addressed by each lesson was compiled.

Using this list, an instrument was developed entitled "Selection and Prioritization of Practices Taught in EFNEP: Part I" (Appendix D), for use in establishing content validity of items to be included in the Food Behavior Checklist. This instrument addressed the following questions:

1. Were the practices listed on the instrument actually taught in that lesson? "Yes" or "No"
2. Were there additional practices taught in each lesson? If so, please list them.
3. In order of most importance to least importance, rank the practices for each lesson separately, using number one (1) to represent the most important practice.
4. Were there other practices that EFNEP teaches which were not addressed by any single EFNEP lesson and, thus, were not placed on the list of practices? Please list them.

Step 2.

Sample

Twenty paraprofessionals in Virginia were selected to participate in this part of the study with the following procedure being used to select the paraprofessionals. A list of all paraprofessionals in Virginia was obtained from Virginia's state EFNEP coordinator. Each paraprofessional was assigned a number and the numbers were placed in a container. Numbers were drawn one

at a time, until 20 different paraprofessionals were selected.

Ranking of Practices by Paraprofessionals

Each of the 20 paraprofessionals received a copy of "Selection and Prioritization of Practices Taught in EFNEP: Part I" with a set of instructions (Appendix E). Paraprofessionals were asked to confirm that the items listed on Selection and Prioritization of Practices Taught in EFNEP: Part I, were actually taught in the lessons. In addition, they were asked to identify additional principles, that are taught in EFNEP, but were not listed. Paraprofessionals then ranked the importance of each item within each lesson, by designating the most important items as number one.

After receiving all responses from paraprofessionals, the researcher reviewed all the responses on "Part I: Selection and Prioritization of Practices Taught in EFNEP" and computed a total score and average ranking for each practice. Items that were ranked as most important were retained and all others were eliminated from the list.

Practices identified in Step 2 by priority ranks, were compiled into a second instrument entitled "Selection and Prioritization of Practices Taught in EFNEP: Part II" (Appendix F). The purpose of this instrument was to further establish content validity of items to be included on the Food Behavior Checklist. All the high priority-ranked practices were formed into a single list, with no division according to lessons. Four columns (A, B, C, and D) were provided

under which responses could be recorded to the following questions:

1. For each individual practice check "yes" or "no" in Columns A or B as to whether this is an important practice taught in EFNEP.

2. From the items on which you have checked "yes" above, place a check in Column C next to the top 20 practices that you feel are the most critical to use in assessing the impact of EFNEP with individual homemakers and as a total program.

3. After checking the top 20 practices in column C, prioritize these practices by placing a number from 1 to 20 in Column D beside the 20 practices. Number 1 designated the most important practice and number 20 designated the least important.

Sample

The Part II instrument (Appendix F) and instructions (Appendix G) were sent to a randomly selected sample of 20 state EFNEP coordinators. State EFNEP coordinators were selected using the following procedures. A list of state coordinators was obtained from Virginia's state EFNEP coordinator. The state coordinators were assigned a number from one to 50. A random number table was used to select 20 of the 50 state coordinators. During the selection process, if a number appeared twice it was omitted the second time and the selection process continued until 20 different coordinators were selected. The states represented by the sample were Arkansas, Connecticut, Delaware, Florida,

Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Missouri, Minnesota, New Hampshire, North Carolina, New Mexico, Ohio, Oklahoma, Pennsylvania, Texas, and Rhode Island.

All state coordinators, who were selected, agreed to complete Part II of the instrument. The coordinators were asked to review each individual practice on the "Selection and Prioritization of Practices Taught in EFNEP: Part II" and to place a check mark under the column labeled "yes" or "no". From the list of items that received checks in the "yes" column, the state coordinators were instructed to rank the top 20 practices that were most critical for use in assessing the impact of EFNEP with individual homemakers and as a total program. Number "1" designated the most important practice and number "20" designated the least important practice. The completed instruments were returned to the investigator.

Upon receipt by the researcher, all Selection and Prioritization of Practices Taught in EFNEP:Part II were reviewed for completeness, comments, and suggestions. All practices which were not ranked in the top 20 by any state coordinator were eliminated. The ranks for all other practices were totaled and average ranks were computed for each item. Items with the lowest average rank were retained as the practices to be included in a the Food Behavior Checklist, since "1" was designated as most important. In order for an item to be included in the item pool, it had to have been ranked by at least half of the state

coordinators.

The Food Behavior Checklist (Appendix H) was developed by the researcher from the items identified in the above process. Statements were constructed about the behaviors, using wording that homemakers could understand. A 4-point Likert scale was used for homemakers to respond to each item. Columns for responses were labeled with "never or seldom", "sometimes", "usually", or "always" with values of 0, 1, 2, and 3, respectively. "Never or seldom" represented very little use of a practice taught in EFNEP while "always" represented a highly used practice. Never and seldom were grouped together since either response to practices measured by the Food Behavior Checklist was considered to represent little if any potential benefit. The checklist was designed to be administered in written or oral form. In this study, it was tested both as a face-to-face interview and as a self-administered questionnaire.

Efforts were made to minimize the number of items on the Food Behavior Checklist because the National EFNEP Reporting/Evaluation committee has recommended that the length of any behavior checklist be limited to approximately 15 items (Dr. Ruby Cox, personal communication August 2, 1992). Past experience in EFNEP has shown that lengthy forms and questionnaires result in frustration and non-response on the part of clientele (Minutes of meeting of National EFNEP Record and Reporting Committee, 1991). To determine homemakers' acceptance of an instrument that contains more than 15 items,

homemakers were asked to respond to the following questions: (1) Compared to other questionnaires that have been used in EFNEP, Is this one too long? Yes or No, (2) What is the maximum number of questions that you think should be on a questionnaire used in EFNEP?

Face Validity

After the instrument was developed, a committee of experts reviewed the instrument for face validity. Included among these experts were: Virginia's state EFNEP coordinator, three faculty members and one graduate student in the Department of Human Nutrition and Foods at Virginia Polytechnic Institute and State University (VPI & SU), one faculty member in the Division of Vocational and Technical Education at VPI & SU, one faculty member in the Department of Administration and Education, and the Director of the Measurement and Research Services at VPI & SU. The instrument was revised based on the comments of these individuals.

Step 3: Pilot-Testing of the Food Behavior Checklist

Construct Validity: Different-Groups Method

The Food Behavior Checklist was pilot-tested with EFNEP homemakers in one rural county and two cities. These locations were chosen because they were accessible to the investigator and were representative of other EFNEP cities. Pilot-testing was conducted over a 2 month period. Supervisors of the EFNEP units identified a group of homemakers who met regularly for lessons with an

EFNEP paraprofessional and who could read and write moderately well.

Sample

Group 1 consisted of 28 newly enrolled homemakers in EFNEP from Roanoke and Lynchburg, Virginia, who were identified by the EFNEP paraprofessional as not having the desirable food behavior practices being measured on the Food Behavior Checklist. Group 2 consisted of 28 recent graduates of EFNEP in Lynchburg and Roanoke, Virginia, who were identified as having the desirable practices being measured. Paraprofessionals identified homemakers, having desirable practices, through conversation concerning their practices and by directly observing the homemakers in their homes or in group meetings.

Administration of the Instrument

The researcher and paraprofessionals administered the Food Behavior Checklist during regular group meetings. Homemakers were asked to respond to the statements about nutrition-related practices. For each question, the homemakers were instructed to place a check in the appropriate column that corresponded to the frequency of their current use of that practice. Homemakers were encouraged to answer the questions to reflect their true practices as closely as possible. They were also encouraged to ask questions about any item that they did not understand.

After the instrument was completed by the homemakers, the researcher

solicited homemakers' input on each item to simplify the language as much as possible and to insure that the language was specific to EFNEP clientele. All questions, comments, and criticisms were recorded. The instruments were collected from the homemakers and reviewed, to make sure all items were completed, before the group was dismissed. Following these meeting, any necessary rewording of the items on the checklist was made based on the comments and responses of the homemakers and paraprofessionals. It was expected that the scores for newly enrolled homemakers would be significantly higher, if the Food Behavior Checklist gave valid results. Data were analyzed using the "known- groups" (different) method of validation.

Means and standard deviations were calculated for each test item using the Statistical Analysis System (SAS: SAS Institute Incorporated). Items not discriminating between the two groups were eliminated from the Food Behavior Checklist. Factor analysis (SAS: SAS Institute Incorporated) was performed on the tasks on the Food Behavior Checklist to determine which items were measuring the same behavior and, therefore, could be eliminated to reduce the length of the Food Behavior Checklist.

PHASE II: FIELD TEST PHASE

Experimental Design

Permission was granted to conduct this study by the University's Institutional Review Board for Research Involving Human Subjects (Appendix I).

A "pre-test--post-test" control-group design was used in the field test in this study. The experimental and the control groups consisted of 79 and 68 newly enrolled homemakers, respectively. All homemakers received the EFNEP nutrition education intervention; however, only the experimental group received feedback via a computer printout (Diagnostic Report). The computer printout served as the treatment variable in this experimental design. Baseline data were collected on both the experimental and control group. The intervention occurred over a three to five month period with post-test data being collected at the end of the intervention.

Sample Selection for Field Test

Three rural EFNEP counties (Appomattox, Buchanan, and Amelia) and one urban area (Petersburg) were selected to participate in the study. These counties and cities were selected because they were easily accessible to the researcher and, according to Virginia's EFNEP state report, were representative of the EFNEP units. Each EFNEP supervisor was contacted and asked to participate in the study. Once a unit was selected and the supervisor and paraprofessionals agreed to participate, all EFNEP paraprofessionals in the unit were included in the study. Three paraprofessionals participated from one city and four paraprofessionals participated from the rural counties.

The first 147 homemakers who were enrolled in EFNEP during the months of May through September, 1992, agreed to participate in the study.

Homemakers were given an explanation of the purpose of the study and what would be expected of them (Appendix J).

Study participants were assigned to one of the following groups:

Group A Homemakers were given feedback on their status and progress by means of a Diagnostic Report being discussed with them. A copy of the Diagnostic Report was left with the participant.

Group B Homemakers were not given computer feedback on their status and progress by the paraprofessional, i.e. the Diagnostic Report was not shared with them.

Paraprofessionals used a systematic random method to assign homemakers to one of the two groups. As paraprofessionals enrolled homemakers in EFNEP, they assigned the first homemaker to Group A, and the second homemaker to Group B, the third to Group A and the fourth to Group B, and so on. This process continued until a total of 147 homemakers were selected and assigned to Group A or B.

Field testing of the instrument occurred during a three to five month period during which 147 homemakers were taught lessons, in the usual manner, from the EFNEP curriculum. Homemakers were taught once a week, either individually or in groups. The Food Behavior Checklist was administered at the beginning and end of the period. Another purpose of the field test was to

determine the effect of using a Diagnostic Report as a teaching tool.

The field test phase began on May 15, 1992, and ended on December 30, 1992. During this period, a total of 839 program families were involved in EFNEP in the city and three counties included in this study; however, only 454 new homemakers were enrolled during the duration of the study. Thus, the sample represented one-third of the newly enrolled homemakers.

The Food Behavior Checklist was used, along with the EFNEP Family Record (including a 24-hour recall), to collect assessment data. On the first visit with the homemaker, the paraprofessionals completed the Family Record and the Food Behavior Checklist in face-to-face interviews. The Family Records were then entered into a computer program. A computer printout, called a Diagnostic Report, was generated from the homemakers' Family Records and 24-hour recalls to provide feedback on their status and needs in regard to nutrition-related practices and dietary intake.

Feedback was provided to the experimental group (Group A) by the EFNEP paraprofessionals. Feedback information consisted of a thorough explanation of nutrition behavior and dietary analysis, including nutrient intake as a percentage of the RDA and which foods contributed to the intake of specific nutrients, as well as lesson topics needed by the homemaker. One-half of the homemakers were given feedback using the Diagnostic Report at program entry and at program exit. The Diagnostic Report was also used to identify additional

information to be taught to homemakers.

Training of EFNEP Paraprofessionals for Field Test

Paraprofessionals in the selected cities were trained by the investigator, during a one-day workshop at the local EFNEP offices. Training was provided on administering the Food Behavior Checklist, using the Diagnostic Report with homemakers, and on methods for collecting the 24-hour recall. Procedures for collecting the Food Behavior Checklist and collecting the 24-hour recall are located in Appendices K and L, respectively. The researcher demonstrated the procedures for taking a 24-hour recall and using food models to estimate portion sizes. A special kit, designed to assist paraprofessionals in EFNEP with collection of the 24-hour recall, was examined during the training. Training also included role-playing in which paraprofessionals observed each other and made suggestions to improve the process for collecting the 24-hour dietary recall. Paraprofessionals were also trained on asking probing questions and how to record amounts of food consumed. Furthermore, paraprofessionals were given training regarding the intervention phase of the study and administering the Diagnostic Report (Appendix M).

DATA COLLECTION

Demographic data, responses to the Food Behavior Checklist, and dietary data were collected on all homemakers at program entry (pre-test) and at program exit (post-test). The standard EFNEP Family Record (parts A & B) was

completed on all participants (both Group A and Group B) through an interview with the homemaker using the traditional procedures. Part A of the Family Record was used to collect demographic data which consisted of place of residence, racial characteristics, family income, family size, gender, and highest grade in school completed by the homemaker.

The 24-hour food recall was collected on Part C of the Family Record according to standardized procedures described in Appendix L. Efforts were made to collect the 24-hour recall on a day when the homemaker had eaten her usual diet. For example, sick days were not included in the recalls.

Paraprofessionals asked probing questions to determine portion sizes and method of food preparation. Food models and other visual aids were used as outlined in Procedures for Collecting a 24-Hour Recall (Appendix L).

The Nutritionist III Dietary Analysis Computer Program (Nutritionist III) was used to analyze the 24 hour recalls. This program calculates nutrient values and percent of the RDA, according to individual age and sex, for 58 nutrients. In addition, the program computes protein, carbohydrates, fat and alcohol as a percentage of total calories. The Nutritionist III program has 4010 foods in the data base. The nutrient values of these foods are based on USDA's Handbooks (Postasi & Orr, 1976) and on information from manufacturers. Nutritionist III was used to analyze the recalls for the following problem nutrients: Kilocalories, carbohydrates, protein, fat, fiber, iron, folacin, calcium, and vitamins A, B₆, and C.

Carbohydrates, protein, and fat intakes were assessed in terms of their contribution as a percent of total calories. The American Heart Association Guidelines (1989) were used to compare homemakers' carbohydrate, protein, fat, fiber, and cholesterol intakes. Caloric intake was compared with the National Research Council's suggested intakes for this age group. The RDA was used as the standard to which the homemakers' vitamin and mineral intakes were compared.

The categories below were used to assess the adequacy of homemakers' intake. An intake of less than 1500 was considered very low. Homemakers consuming 1500 to 2200 calories were considered to be consuming adequate amounts. Kilocalories consumed in excess of 2200 were considered to be poor practice. A carbohydrate intake that contributed less than 30% of the total calories was considered as poor, intakes at 30 - 55% of total calories were considered as fair, and values higher than 55%, but not greater than 70%, were considered to be good.

A homemaker's diet was inadequate in protein if it contributed less than 15% of total caloric intake. A protein intake of 15% - 20% was considered adequate, while an intake greater than 20% was considered to be an excessive protein consumption.

Homemakers who consumed 30% or more of their caloric intake from fat were considered to be consuming excess amounts of fat. A fat intake of less than

30%, but more than 20%, was considered to be adequate.

Fiber and cholesterol intakes were assessed in terms of number of grams and milligrams consumed, respectively. The American Heart Association guidelines were used to evaluate the adequacy of the homemakers' diets. This organization recommends that fiber intake should be at least 15 to 30 grams daily. It is recommended that cholesterol intake not exceed 300 milligrams daily (American Heart Association, 1989).

The guidelines below were used to assess homemakers diets for fiber and cholesterol. Homemakers who consumed less than 15 grams of fiber were considered to have inadequate intakes of fiber. A fiber intake of greater than 15 grams was considered to be adequate.

Cholesterol intakes of less than 300 milligrams were considered to be good. Homemakers consuming more than 300 milligrams were considered to be consuming excessive amounts of dietary cholesterol.

A nutrient adequacy ratio score (NAR) was calculated for homemakers for each vitamin and mineral. A NAR score is the ratio of one's daily intake of a particular nutrient compared to the appropriate age-sex specific RDA for that nutrient.

$$\text{NAR} = \frac{\text{actual intake of the selected nutrient}}{\text{RDA for the same nutrient}}$$

All of the NARs were truncated at 1.00, since there is no additional nutritional

advantage to obtaining nutrients in excess of the RDA (Guthrie & Scheer, 1981). This also eliminated scores for homemakers above 1.00 which would compensate for homemakers who had scores below 1.00 when data were averaged for groups.

The EFNEP supervisors of the units in this study reviewed all completed Family Records and Food Behavior Checklists for accuracy and completeness. If there were missing or unclear items, the paraprofessionals made the corrections on the next visit with the homemaker. The local unit EFNEP secretary entered data from the standard Family Record into the EFNEP computer program (Cornell EFNEP Program, 1991) for each homemaker a Diagnostic Report was generated. The Diagnostic Report gave a summary of demographic data and the homemaker's responses to the Food Behavior Checklist, and provided an analysis of the homemakers' dietary intake. Dietary deficiencies, excesses and adequacies were readily identified. The Diagnostic Report was used as a teaching tool with experimental homemakers (Group A); however, no other information generated by the Cornell Program was used as data in this study.

Paraprofessionals followed the usual EFNEP procedures in reviewing the Diagnostic Report, to identify needs and to select lessons to be taught to EFNEP homemakers (Group A and Group B). Lesson needs were recorded on the standard EFNEP Lesson Log (Appendix N). In addition to receiving lessons that were identified from the assessment of homemakers' 24-hour recalls, homemakers also received lessons covered by the Food Behavior Checklist developed in this

study. To ensure that all homemakers received all lessons assessed by the Food Behavior Checklist before the study was completed, paraprofessionals were instructed to first teach the lessons that were covered by the Food Behavior Checklist. EFNEP supervisors, who were employed by EFNEP in these counties, reviewed the completed EFNEP Lesson Logs and the Diagnostic Reports to insure that lesson were appropriately identified and taught by the paraprofessionals.

On the second visit to participants during the field test phase, paraprofessionals shared a copy of the Diagnostic Report with participants in Group A. In going over the Diagnostic Report, the paraprofessional explained nutrients that were adequate and those that were deficient in the homemaker's diet. The paraprofessional discussed with the homemaker the food sources that provide specific nutrients. Lesson needs identified by the Diagnostic Report were also discussed with the homemaker.

Group B participants were not informed of the existence of the Diagnostic Report; however, the paraprofessional explained that selected lessons were based on individually identified needs. No mention was made of the computer analysis with Group B participants.

Paraprofessionals made weekly visits to all homemakers, teaching the lessons identified on the EFNEP Lesson Log as well as subjects covered by the Food Behavior Checklist. As soon as all lessons, identified on the EFNEP

Lesson Log and the Food Behavior Checklist, had been taught to a homemaker, a second Family Record and Food Behavior Checklist were completed and a second Diagnostic Report was shared with homemakers in group A. The time period between the first and second record collections varied from one homemaker to another depending on the number of lessons each homemaker needed and their time of enrollment. However, in all cases, the intervention lasted three to five months. The completion and processing of the second set of records were handled using the same procedure as with the first.

STATISTICAL ANALYSIS

The significance level was set at the .05 level of probability before the study was conducted. All data were analyzed by SAS statistical package (SAS; SAS Institute Incorporated) using the general linear model (GLM). Demographic data included race, gender, age, family size, and level of educational attainment for the homemakers.

Food Behavior Checklists and Family Records on study participants were analyzed by the investigator in the following manner. All information from the Food Behavior Checklist was hand coded by the investigator. A Food Behavior Checklist was coded with the appropriate responses and made into a transparency. The transparency was then superimposed over each homemaker's Food Behavior Checklist and each item was scored. Scores for each item were recorded in the margin next to the item. An overall Food Behavior Checklist

score was calculated for each homemaker, since the Food Behavior Checklist measures a variety of nutrition-related practices. The highest possible score that a homemaker could receive was 90 (3 X 30). For homemakers who were not pregnant, or who had not recently given birth, the highest possible score was 84, since questions 29 and 30 were related to pregnancy. Means and standard deviations were calculated to show homemakers' responses to specific items on the Food Behavior Checklist (SAS; SAS Institute Incorporated).

The Cronbach-alpha procedure was used to determine the reliability of the Food Behavior Checklist. A student t -test was used to determine if the means for kilocalories, carbohydrates, protein, fiber, and cholesterol were equal for homemakers by location and group assignment at post-test. A two-by-two analysis of covariance (ANCOVA), using pre-test Food Behavior Checklist scores as covariates, was used to test the hypothesis of equal means between the homemakers by group and locale. A two-by-two multivariate analysis of covariance (MANCOVA), using pre-test NAR scores as covariates, was used to test the hypothesis of equal means between the groups on the NAR variables (SAS; SAS Institute Incorporated). In this procedure, Wilk's Lambda is calculated to identify the effect of each independent variable on the dependent variables.

There were two independent variables in this study: (1) computer feedback, and (2) locale. There were thirteen dependent variables: (1)

kilocalories, (2) carbohydrates, (3) protein, (4) fat, (5) fiber, (6) cholesterol, and NAR scores for: (7) vitamin A, (8) vitamin B, (9) vitamin C, (10) iron, (11) folic acid, (12) calcium, (13) Food Behavior Checklist score.

CHAPTER IV

RESULTS

The results of this study will be presented in the following order: (1) demographic data of the subjects; (2) format and content of the Food Behavior Checklist; (3) findings from the Food Behavior Checklist; and (4) the effects of the computer-aided feedback on nutrient intake.

Demographics of the Sample

Table 1 shows the demographic profile for homemakers by region. One hundred and forty-seven homemakers participated in the study. Initially, plans included assigning 100 homemakers to each group for a total of 200 homemakers. However, this number was not achievable because of the low enrollment in the EFNEP Program during the study period.

Fifty-four (68%) of the rural homemakers were white, 24 (30%) were black, and one (1%) was a Native American. The urban group consisted of three (4%) white and 65 (96%) black homemakers. Two males (3%) were in the rural group and six males (9%) were in the urban group. Females accounted for 77 (97%) homemakers in the rural group and 62 (91%) homemakers in the urban group. Based on the 1992 Virginia state EFNEP report, this sample was representative of the population of EFNEP homemakers in Virginia.

Eleven homemakers (14%) were under the age of 20 in the rural group, while only five (7%) were under the age of 20 in the urban group. Homemakers

Table 1. Demographic Profile of Homemakers

	Rural		Urban		Total	
	N	%	N	%	N	%
Race						
White	54	68	3	4	57	39
Black	24	30	65	96	89	61
Other	1	1	0	0	1	1
Sex						
Male	2	3	6	9	8	5
Female	77	97	62	91	139	96
Age (years)						
< 20	11	14	5	7	15	10
20 - 35	49	62	47	69	96	65
36 - 50	17	22	16	24	33	22
> 50	2	3	0	0	2	3
Family Size	3		3			
Educational Attainment						
≤ 8th	33	42	12	18	45	31
9th - 11th	17	22	31	46	48	33
12th/GED	21	27	17	25	38	26
Beyond HS	8	10	8	12	16	11

N = number of homemakers

GED = graduate equivalency diploma

HS = high school

between the ages of 20 and 35 accounted for 49 (62%) and 47 (69%) in the rural and urban groups, respectively. Seventeen homemakers (22%) ranged in age from 36 to 50 years in the rural group; 16 (24%) were in this age range in the urban group. Two homemakers (3%) were over the age of 50 in the rural group, while none of the homemakers in the urban group was above the age of 50.

Thirty-three (42%) of the rural homemakers had an eighth grade education or less. Seventeen (22%) rural homemakers were in the ninth to eleventh grade category. Twenty-one (27%) rural homemakers were in the twelfth grade or GED category. Eight (10%) rural homemakers were in the beyond high school category. Twelve (18%) homemakers were in the eighth grade or less category among the urban group. Thirty-one (46%) urban homemakers were in the ninth to eleventh grade category. Seventeen (25%) urban homemakers were in the twelfth grade or GED category, and eight (12%) were in the beyond high school category.

Distribution of homemakers by group is shown in Table 2. Seventy-nine (54%) of the 147 homemakers were from rural counties in Virginia (Appomattox, Amelia, and Buchanan); while, sixty-eight (46%) were from an urban city in Virginia (Petersburg). Forty-four (57%) homemakers from the rural areas and thirty-five (44%) urban homemakers were in group A and received computerized feed-back. Thirty-five (51%) rural homemakers and 33 (49%) urban homemakers were in group B and did not receive computerized feedback (Table 2).

Table 2. Distribution of Subjects by Groups

Location	Group A Computer Feedback		Group B No Computer Feedback	
	N	%	N	%
Rural	44	46	35	51
Urban	35	44	33	49
Total	79	100	68	100

DEVELOPMENT OF THE FOOD BEHAVIOR CHECKLIST

Food Behavior Checklist Content

The Food Behavior Checklist was developed over an eleven-month period (July 1991 to May 1992), which included the validation and pilot-testing stages. The field test in which the Food Behavior Checklist was used occurred over an eight-month period (May 1992 to December 1992).

Content Validity

One-hundred-twenty nine food-related practices were identified as being taught in the Eating Right is Basic-2 lesson series (Appendix D). Included in these practices were some items that could be measured with the 24-hour recall. Paraprofessionals' ranking of the items based on their importance, and the elimination of items that were measurable by the 24-hour recall, resulted in a list of 45 practices (Appendix G).

These forty-five practices were constructed into a second list entitled, "Selection and Prioritization of Practices Taught in EFNEP: Part II". Items were stated in an objective format, rather than as questions. This list was sent to 20 randomly selected state EFNEP coordinators (Arkansas, Connecticut, Delaware, Florida, Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Missouri, Minnesota, New Hampshire, New Mexico, North Carolina, Ohio, Oklahoma, Pennsylvania, Texas, and Rhode Island) whose ranking resulted in an initial Food Behavior Checklist of 35 items.

Face Validity

Before the 35-item instrument was pilot-tested with EFNEP homemakers in Roanoke and Lynchburg, Virginia, it was reviewed by professionals in the fields of nutrition, vocational education, statistics, and test design for face validity, clarity, and objectivity. Experts' review and comments resulted in the rewriting of two items and the elimination of three items to which the answers were obvious.

PILOT-TESTING OF THE FOOD BEHAVIOR CHECKLIST

Construct Validity: Different Groups Method

The 32-item Food Behavior Checklist was pilot-tested with 28 homemakers who were known to practice the behaviors taught and 28 homemakers who did not practice the behaviors taught. Both groups of homemakers consisted of a mixture of homemakers from Roanoke and Lynchburg, Virginia, who did not participate in the actual study. Overall, homemakers and paraprofessionals made favorable comments about the Food Behavior Checklist. A term that seemed to be used among low-income families is "sitting out", meaning "leave out of the refrigerator" as used in questions six and seven of the Food Behavior Checklist. Homemakers commented that "make" and "fix" are used interchangeably. Some homemakers said that the Food Behavior Checklist was too long and others said it was not too long. Suggested length for a questionnaire ranged from 5 to 30 items. After performing a factor analysis on the items on the Food Behavior Checklist, the number of items was reduced to

23. The question that addressed label reading habits of homemakers was divided into seven components, at the suggestion of committee members. Some homemakers may check the labels for the amount of a specific nutrient, but may not consider this as reading the label.

There were 30 items on the final Food Behavior Checklist. The final form of the Food Behavior Checklist represents a structured, written response format, designed to be administered orally or in written form.

Instrument Format and Content

The first page of the Food Behavior Checklist contained a set of basic instructions asking homemakers to respond to the items so as to indicate as closely as possible, their actual practices (Appendix H). The nutrition-related practices measured by the Food Behavior Checklist reflect food preparation and money management skills, sanitation practices, and label reading habits taught in EFNEP. All nutrition-related behaviors were worded in a question format, with questions 2, 3, 7, 8, 10, 17, 21, 29, and 30 being worded negatively. Thus, a "never or seldom" response to these questions represented the best practice and was assigned a point value of three. The Food Behavior Checklist was three pages in length. Family data were not collected on this form, as the instrument is designed to be used with the EFNEP Family Record Form which is used to collect demographic data.

The reliability of the instrument was determined using Cronbach-alpha.

This procedure revealed a reliability coefficient of 0.86. Reliability coefficients can take on values between zero and one. A reliability of one means that the observed scores on the instrument consist entirely of true scores. The reliability coefficient of the magnitude observed for this instrument indicates that the scores obtained with the Food Behavior Checklist are highly reliable.

Collection Mode and Response Format

Homemakers in EFNEP served as the primary sources of data in this study, with EFNEP paraprofessionals conducting all of the interviews. In some instances, the individual under study provided oral responses that were recorded by the paraprofessionals. Homemakers who were not pregnant and who did not have a newborn baby were instructed to reply to questions 29 and 30 with NA (not applicable). Fifty-three homemakers responded with a "NA" response to questions 29 and 30.

Findings From the Food Behavior Checklist

Table 3 shows the average pre-test, post-test, and practice change scores for the experimental group on each item on the Food Behavior Checklist. Homemakers' scores improved from pre-test to post-test on most items. Less than a one point change was observed for some practices. On the other hand, more than one point improvement was observed among several of the practices on the Food Behavior Checklist. The following practices showed a one point increase and contained smaller standard deviations at post-test: "preplan

Table 3. Summary of Average Responses to the Food Behavior Checklist for the Experimental Group

Item	Pre-test Mean \pm SD	Post-test Mean \pm SD	Practice Change
1. Preplan meals	0.75 \pm 0.81	2.04 \pm 0.79	1.29
2. Nutritious snacks	1.18 \pm 0.75	1.94 \pm 0.74	0.76
3. Child snack	1.25 \pm 0.87	2.06 \pm 0.73	0.81
4. Plan food budget	1.18 \pm 0.10	2.49 \pm 0.55	1.31
5. Plan before shop	1.48 \pm 0.91	2.32 \pm 0.59	0.84
6. Food out > 2hrs	1.88 \pm 0.83	2.82 \pm 0.38	0.94
7. Cover leftovers	1.52 \pm 1.01	2.52 \pm 0.78	1.00
8. Use food on hand	1.25 \pm 0.72	2.36 \pm 0.58	1.11
9. Cooking vegetables	1.11 \pm 0.80	1.49 \pm 1.06	0.38
10. Trim visible fat	0.77 \pm 0.75	2.06 \pm 0.76	1.29
11. Pan fry meats	1.16 \pm 0.83	2.00 \pm 0.68	0.84
12. Cook meat in oven	1.12 \pm 0.67	1.69 \pm 0.84	0.57
13. Deep fry meat	1.58 \pm 0.79	2.38 \pm 0.61	0.80
14. Gravies with meat	1.47 \pm 0.75	2.05 \pm 0.58	0.58
15. Bake with fat	1.06 \pm 0.82	2.03 \pm 0.84	0.97
16. Season with fat	1.29 \pm 0.91	2.25 \pm 0.78	0.96
17. Pour off grease	1.54 \pm 0.93	2.35 \pm 0.75	0.81
18. Use lowfat foods	0.61 \pm 0.71	1.82 \pm 0.94	1.21
19. Thaw on counter	1.30 \pm 0.91	2.58 \pm 0.76	1.28
20. Obtain free food	1.97 \pm 0.95	2.41 \pm 0.74	0.44
21. Read labels	0.78 \pm 0.83	1.85 \pm 0.93	1.07
22. Sugar content	0.42 \pm 0.61	1.68 \pm 0.89	1.26
23. Cholesterol content	0.41 \pm 0.67	1.56 \pm 1.00	1.15
24. Fat content	0.50 \pm 0.77	1.65 \pm 0.89	1.15
25. Sodium content	0.44 \pm 0.75	1.43 \pm 0.98	1.02
26. Mineral content	0.35 \pm 0.75	1.20 \pm 1.05	0.85
27. Vitamin content	0.59 \pm 0.94	1.52 \pm 1.00	0.93
28. Ingredients	0.68 \pm 0.97	1.87 \pm 0.87	1.19
29. Pregnancy Caffeine	2.44 \pm 0.79	2.65 \pm 0.54	0.21
30. Pregnancy drugs	2.56 \pm 0.68	2.80 \pm 0.44	0.24

SD = Standard Deviation

family meals" (1.29), "cover leftovers that are sitting out" (1.00), "use food that is on hand to prepare meals" (1.11), and "thaw food on the counter" (1.28).

Initially, homemakers scored less than one point on the items that related to reading labels. At post-test, this value increased to at least one point for all items. Although the average value increased for the items on reading labels, several items had larger standard deviations at post-test. Thus, the variability in homemaker's responses was widely dispersed.

The smallest increase from pre-test to post-test was observed on items 29 (0.21) and 30 (0.24). Although the smallest improvements were observed for these questions, homemakers scored high on them initially. This may suggest that low-income homemakers are aware that a poor diet may adversely affect the unborn child.

The same trend in improvements was observed among the control group that was observed among the experimental group; however, amount of change was not significant. Fewer practices showed an improvement of one point or greater. The following practices showed a one point or greater change from pre-test to post-test with smaller standard deviations: "plan food budget" (1.22), "use food on hand" (1.02), "trim visible fat from meats" (1.04), and "thaw frozen foods on the counter" (1.23) (Table 4).

As with the experimental group, all of the pre-test scores for the control group for questions 21 through 28 (on reading food labels) had an initial score

Table 4. Summary of Average Responses to the Food Behavior Checklist for the Control Group

Item	Pre-test Mean \pm SD	Post-test Mean \pm SD	Practice Change
1. Preplan meals	0.84 \pm 0.78	1.72 \pm 0.91	0.88
2. Nutritious snacks	1.10 \pm 0.69	1.62 \pm 0.83	0.52
3. Child snack	1.25 \pm 0.66	1.90 \pm 0.65	0.65
4. Plan food budget	1.13 \pm 0.81	2.35 \pm 0.64	1.22
5. Plan before shop	1.35 \pm 0.89	2.29 \pm 0.62	0.94
6. Food out > 2hrs	1.94 \pm 0.67	2.81 \pm 0.50	0.87
7. Cover leftovers	1.52 \pm 0.97	2.40 \pm 0.85	0.88
8. Use food on hand	1.37 \pm 0.73	2.39 \pm 0.58	1.02
9. Cooking vegetables	0.96 \pm 0.82	0.85 \pm 1.04	-0.11
10. Trim visible fat	0.90 \pm 0.79	1.94 \pm 0.77	1.04
11. Pan fry meats	1.21 \pm 0.76	1.72 \pm 0.79	0.51
12. Cook meat in oven	1.17 \pm 0.60	1.54 \pm 0.76	0.37
13. Deep fry meat	1.51 \pm 0.87	2.27 \pm 0.48	0.77
14. Gravies with meat	1.35 \pm 0.75	2.10 \pm 0.60	0.75
15. Bake with fat	1.04 \pm 0.76	1.66 \pm 1.03	0.62
16. Season with fat	1.19 \pm 0.70	2.04 \pm 0.74	0.85
17. Pour off grease	1.37 \pm 0.77	2.21 \pm 0.82	0.84
18. Use lowfat foods	0.69 \pm 0.76	1.68 \pm 0.91	0.99
19. Thaw on counter	1.21 \pm 0.87	2.44 \pm 0.78	1.23
20. Obtain free food	1.78 \pm 0.91	2.24 \pm 0.88	0.46
21. Read labels	0.94 \pm 1.02	1.79 \pm 0.84	0.85
22. Sugar content	0.47 \pm 0.56	1.56 \pm 0.66	1.09
23. Cholesterol content	0.56 \pm 0.76	1.52 \pm 0.78	0.96
24. Fat content	0.48 \pm 0.63	1.50 \pm 0.70	1.02
25. Sodium content	0.47 \pm 0.72	1.35 \pm 0.77	0.88
26. Mineral content	0.37 \pm 0.54	1.19 \pm 0.83	0.82
27. Vitamin content	0.53 \pm 0.74	1.44 \pm 0.84	0.91
28. Ingredients	0.60 \pm 0.85	1.57 \pm 0.85	0.97
29. Pregnancy Caffeine	2.21 \pm 0.74	2.87 \pm 0.34	0.66
30. Pregnancy drugs	2.37 \pm 0.75	2.89 \pm 0.32	0.52

that was less than one point. Questions 29 and 30 had values of 2.21, and 2.37, respectively. Again, homemakers showed some knowledge that poor diets might be harmful to their babies.

Comparison of Nutrient Intake to Recommended Guidelines

Table 5 shows the distribution of homemakers in the experimental group consuming various levels of the American Heart Association (AHA) guidelines and the Food and Nutrition Board recommendations for several nutrients. The number of homemakers consuming less than 1500 kilocalories decreased from 33 (42%) to 17 (22%) at post-test. Homemakers consuming kilocalories in the 1500 to 2200 range increased from 28 (35%) to 33 (42%) at post-test. Initially, 18 (23%) homemakers consumed more than the recommended 2200 kilocalories. This value increased to 29 (37%) at post-test. Caloric consumption in excess of the recommended intake may not be beneficial to most people.

The number of homemakers in the experimental group, consuming less than 30% of the total calories from carbohydrate decreased from 16 (20%) to 15 (19%) at post-test. Fifty-eight (73%) homemakers consumed carbohydrate in the 30% to 55% range. Only 50 (63%) of the homemakers were consuming 30% to 55% of their calories from carbohydrates at post-test. The greatest increase in carbohydrate consumption was seen among homemakers who increased their intake above 55% of their total calories. Health experts generally recommend that a higher percent of calories be consumed as carbohydrate. Thus, there was

Table 5. Mean Intake of Selected Nutrients for the Experimental Group Compared With the Food and Nutrition Board (FNB) Recommendations and the American Heart Association Guidelines

Nutrient	Pretest		Posttest		FNB/AHA
	N	%	N	%	
Kilocalories					
< 1500	33	42	17	22	2200
1500 - 2200	28	35	33	42	
> 2200	18	23	29	37	
Carbohydrates (%)					
< 30	16	20	15	19	55
30 - 55	58	73	50	63	
> 55	5	6	14	18	
Protein (%)					
< 15	22	28	25	32	15
15 - 20	30	38	27	34	
> 20	27	34	27	34	
Fat (%)					
< 20	2	3	12	15	30
20 - 30	9	11	9	11	
> 30	68	86	58	73	
Fiber (grams)					
< 15	67	85	51	65	30
15 - 30	11	14	28	35	
> 30	1	1	0	0	
Cholesterol (milligrams)					
< 150	19	24	5	6	300
150 - 300	25	32	37	47	
> 300	35	44	37	47	

N = number of homemakers

an increased number of experimental homemakers who consumed more of their calories from carbohydrates at post-test.

Experimental group homemakers who consumed less than 15% of their calories from protein increased from 22 (28%) to 25 (32%) at post-test. Thirty homemakers (38%) consumed between 15% and 20% of their caloric intake from protein. Twenty-seven homemakers (34%) were in this range of protein intake at post-test. The number of homemakers consuming more than 20% of their calories from protein remained at 27 (34%) from pre-test to post-test.

Two homemakers (3%) consumed less than 20% of their calories from fat at pre-test; this number increased to 12 (15%) at post-test. Nine homemakers (11%) consumed 20% to 30% of their calories from fat; the number of homemakers consuming fat in this range remained the same at post-test. The majority of homemakers consumed fat in excess of the 30% requirement. At pre-test, 68 homemakers (86%) consumed more than 30% of their calories from fat. Fifty-eight (73%) of the homemakers consumed fat in excess of the recommended 30% of total calories. This decrease in fat intake represents an improvement in the diet of the experimental group.

Sixty-seven homemakers (85%) consumed less than 15 grams of fiber at pre-test, but this number decreased to 51 (65%) at post-test. Eleven homemakers (14%) consumed between 15 and 30 grams of fiber at pre-test, while 28 homemakers (35%) were consuming 15 to 30 grams of fiber at post-test. One

homemaker (1%) consumed more than thirty grams of fiber at pre-test. None of the homemakers consumed more than 30 grams of fiber at post-test. However, there was generally an improvement in fiber intake of the experimental group.

Cholesterol was consumed in excess of the recommended 300 milligrams. At pre-test, only 19 homemakers (24%) in the experimental group consumed less than 150 milligrams of cholesterol; this number decreased to 5 (6%) at post-test. Twenty-five homemakers (32%) consumed between 150 and 300 milligrams of cholesterol at pre-test. The number of homemakers consuming cholesterol in this range increased to 37 (47%) at post-test. Experimental homemakers consuming cholesterol in excess of the recommended 300 milligrams of cholesterol increased from 35 (44%) at pre-test to 37 (47%) at post-test. Cholesterol intake in this range may be associated with cardiovascular diseases.

Table 6 shows the average consumption pattern for the energy nutrients, fiber, and cholesterol for the control group. Homemakers consuming less than 1500 kilocalories decreased from 28 (41%) to 20 (29%) at pre-test and post-test, respectively. The number of homemakers consuming between 1500 and 2200 kilocalories increased from 27 (40%) at pre-test to 28 (41%) at post-test. Thirteen homemakers (19%) consumed kilocalories in excess of the recommended intake; this value increased to 20 homemakers (29%) at post-test. Thus, homemakers in the control group increased their caloric intake from pre-test to post-test.

Table 6. Mean Intake of Selected Nutrients for the Control Group Compared With the Food and Nutrition Board (FNB) Recommendations and the American Heart Association Guidelines

Nutrient	Pretest		Posttest		FNB/AHA
	N	%	N	%	
Kilocalories					
< 1500	28	41	20	29	2200
1500 - 2200	27	40	28	41	
> 2200	13	19	20	29	
Carbohydrates (%)					
< 30	14	21	11	16	55
30 - 55	44	65	49	72	
> 55	10	15	9	13	
Protein (%)					
< 15	30	44	25	37	15
15 - 20	20	29	29	43	
> 20	18	26	14	21	
Fat (%)					
< 20	1	1	3	4	30
20 - 30	10	15	10	15	
> 30	57	84	58	85	
Fiber (grams)					
< 15	57	84	49	72	30
15 - 30	10	15	18	26	
> 30	1	1	1	1	
Cholesterol (milligrams)					
< 150	13	19	11	16	300
150 - 300	20	29	30	44	
> 300	35	51	27	40	

N = number of homemakers

Caloric intake in excess of the recommended guidelines is associated with obesity and may have a negative effect on health.

Fourteen homemakers (21%) consumed less than 30% of their caloric intake from carbohydrates; with this number decreasing to eleven (16%) at post-test. The majority of homemakers consumed carbohydrate in the range of 30% - 55% of their total calories. Initially, 44 (65%) homemakers were in this category, with the number increasing to 49 (72%) at post-test. Ten homemakers (15%) consumed carbohydrate in excess of 55% of their calories at pre-test; this number decreased to nine (13%) at post-test. Overall, there was a decrease in carbohydrate intake among the control group from pre-test to post-test.

Protein contributed less than 15% of the total calories for 30 (44) homemakers at pre-test. At post-test, protein accounted for less than 15% of the total calories for 25 (37%) homemakers. Homemakers consuming protein in the acceptable range of 15% to 20% of their total caloric intake increased from 20 (29%) at pre-test to 29 (43%) at post-test. Eighteen homemakers (26%) consumed protein in excess of 20% of their calories at pre-test. The number of control homemakers in this group decreased to fourteen (21%) at post-test.

One control homemaker (1%) consumed less than 20% of her calories from fat initially, while at post-test, the number of homemakers consuming 20% of calories as fat increased to three (4%). Ten homemakers (15%) consumed between 20% to 30% of their calories from fat at pre-test, while this number

remained the same at post-test. Fifty-seven control group homemakers (84%) consumed fat in excess of the recommended 30% of total calories at pre-test. At post-test, 58 (85%) of these homemakers were consuming excessive amounts of fat.

Although it has been shown that moderate consumption of fiber may be beneficial to health, most homemakers in this study consumed less than 15 grams of fiber at pre-test and post-test. Fifty-seven homemakers (84%) consumed less than fifteen grams at pre-test and 49 homemakers (72%) consumed less than 15 grams at post-test. The number of control homemakers consuming fiber in the acceptable range of 15 to 30 grams increased from 10 homemakers (15%) at pre-test to 18 homemakers (26%) at post-test. One homemaker (1%) consumed more than 30 grams of fiber at pre-test and post-test.

Cholesterol values for thirteen control homemakers (19%) were below 150 milligrams at pre-test, while eleven homemakers (16%) remained in this category at post-test. Twenty homemakers (29%) consumed cholesterol in the 150 to 300 milligram range at pre-test, and 30 homemakers (44%) were in this range at post-test. Thirty-five homemakers (51%) consumed cholesterol in excess of 300 milligrams at pre-test, whereas, twenty-seven homemakers (40%) were in this group at post-test. The decrease observed in the number of control homemakers consuming cholesterol in excess of the recommended intake was not significant; however, it does represent an improvement in cholesterol intake.

Energy Nutrients

Table 7 shows the pre-test, post-test, and practice change scores for homemakers in the experimental group. A significant ($p = 0.0031$) difference was observed in caloric intake from pre-test to post-test. Initially, carbohydrates provided 39% of the total calories; whereas, this value increased significantly ($p = 0.0410$) to 43% at post-test. A decrease was observed in the percent of calories supplied by fat (4), which was statistically significant ($p = 0.0001$).

Fiber intake increased significantly ($p = 0.0001$) from nine grams at pre-test to fourteen grams at post-test. Cholesterol values were well above the recommended 300 milligrams at pre-test and increased to 404 milligrams at post-test; however, the increase was not statistically significant, possibly due to the large variations observed in cholesterol intake among experimental homemakers.

Table 8 shows the average pre-test, post-test and practice change scores for the control group. Kilocalories increased significantly ($p = 0.0028$) from 1673 at pre-test to 2010 at post-test. The percent of calories supplied by carbohydrates increased by three percent. There was no change in protein consumption pattern from pre-test to post-test. Fat consumption decreased by three percent; however, this decrease was not statistically significant.

Fiber values increased by four grams at post-test among the experimental group and was found to be statistically significant ($p = 0.0043$). Again, homemakers initially consumed more than the recommended 300 milligrams of

Table 7. Average Practice Change Values for Energy Nutrients, Fiber, and Cholesterol for the Experimental Group

	Pre-test	Post-test	Practice Change	<u>F</u>	<u>p</u>
Kilocalories	1706	2017	311	9.38	0.0031*
Carbohydrate (%)	39	43	4	4.28	0.0410*
Protein (%)	20	20	0	0.11	0.7390
Fat (%)	41	37	-4	5.81	0.0185*
Fiber (g)	9	14	5	21.85	0.0001*
Cholesterol (mg)	387	404	16	0.18	0.6747

* $p < 0.05$

Table 8. Average Practice Change Values for Energy Nutrients, Fiber, and Cholesterol for the Control Group

Nutrients	Pre-test	Post-test	Practice Change	<u>F</u>	p
Kilocalories	1673.10	2009.62	336.52	9.55	0.0028*
Carbohydrate (%)	39.87	42.47	2.60	1.77	0.1873
Protein (%)	17.96	18.21	0.25	0.06	0.8043
Fat (%)	42.01	39.25	2.76	2.08	0.1537
Fiber (g)	9.04	12.78	3.74	8.70	0.0043*
Cholesterol (mg)	383.16	442.68	59.52	0.80	0.3724

*p < 0.05

cholesterol, with mean intake increasing to 443 milligrams at post-test. This increase was not statistically significant.

Nutrient Adequacy Ratio Values

Average practice change NAR values for the experimental group are shown in Table 9. No significant differences were observed in any of the NAR values. Table 10 shows the average NAR values for the control group. Again, no significant differences were observed for any of the NAR values.

Table 9. Average Practice Change in NAR values for the Experimental Group

Nutrients	Pre-test Mean \pm SD	Post-test Mean \pm SD	Practice Change
Vitamin A	0.63 \pm 0.35	0.82 \pm 0.28	0.19
Vitamin B ₆	0.65 \pm 0.33	0.79 \pm 0.29	0.14
Vitamin C	0.61 \pm 0.35	0.81 \pm 0.31	0.20
Iron	0.59 \pm 0.27	0.78 \pm 0.25	0.19
Folic Acid	0.65 \pm 0.32	0.84 \pm 0.24	0.19
Calcium	0.67 \pm 0.33	0.85 \pm 0.25	0.18

Table 10. Average Practice Change in NAR Values for the Control Group

Nutrients	Pre-test Mean \pm SD	Post-test Mean \pm SD	Practice Change
Vitamin A	0.61 \pm 0.34	0.77 \pm 0.32	0.16
Vitamin B ₆	0.61 \pm 0.31	0.75 \pm 0.28	0.59
Vitamin C	0.60 \pm 0.33	0.73 \pm 0.34	0.13
Iron	0.57 \pm 0.28	0.75 \pm 0.27	0.18
Folic Acid	0.70 \pm 0.30	0.83 \pm 0.25	0.13
Calcium	0.62 \pm 0.29	0.82 \pm 0.28	0.20

Multivariate analysis of Variances

Table 11 shows a two-by-two analysis of covariance (ANCOVA) of post-test Food Behavior Checklist scores using pre-test Food Behavior Checklist as covariates. The main effect of locale had no significant effect on post-test Food Behavior Checklist scores. Therefore, Hypothesis 1 which states that there will be a significant difference in the post-test Food Behavior Checklist scores of rural and urban homemakers cannot be accepted. No differences were observed between the homemakers who received computer feedback and the homemakers who did not received computer feedback. Thus, Hypothesis 2 which states that there will be a significant difference in the post-test Food Behavior Checklist scores between homemakers who received computerized feedback and homemakers who did not received computerized feedback cannot be accepted.

Table 12 shows the adjusted mean values for the two-by-two analysis of covariance of post-test Food Behavior Checklist scores when pre-test Food Behavior Checklist scores were used as covariates. The mean post-test Food Behavior Checklist scores of urban homemakers who received computerized feedback were significantly different from all other homemakers. The mean Food Behavior Checklist score of urban homemakers who received computerized feedback was significantly higher ($f = 6.40$; $p = 0.0017$) than the means of rural homemakers who did not received feedback. Average post-test Food Behavior Checklist scores of urban homemakers who did not receive feedback were

Table 11. Two-by Two Analysis of Covariance of Post-test FBCS Using Pre-test FBCS as Covariates

Source	df	SS	MS	F	p
PFBCS	1	687.63	687.63	6.41	0.0125*
Group	1	6.68	6.68	0.06	0.8034
Locale	1	101.55	101.55	0.95	0.3324
G x L	1	119.79	119.79	1.12	0.2926
P x G x L	3	1155.72	385.24	3.59	0.0154*
Error	140	14815.00	107.36	-	-
Total	141	16686.39	-	-	-

*p < .05

PFBCS and P = pre-test Food Behavior Checklist score

G = Group

L = Locale

Table 12. Adjusted Mean for Two-by-Two Analysis of Covariance of Post-test FBCS Using Pre-test FBCS as Covariates

Group	Local	N	Mean	SEM	LMS	SELMs	F	p
No Feedback (NFB)	Rural	35	48.71	1.44	49.11	1.75	-	-
	Urban	33	51.84	1.77	51.49	1.80	1.8801 _a	0.3488 ^a
Feedback (FB)	Rural	44	52.31	1.54	52.44	1.55	2.8402 ^b 0.7946 ^d	0.1578 ^b 0.6917 ^d
	Urban	34	57.38	2.17	57.14	1.77	6.4156 ^c 0.0543 ^e	0.0017 ^c * 0.0485 ^e *

* p < .05

N = number of homemakers

SEM = standard error mean

LMS = least mean squared

SELMs = standard error of least mean squared

a = NFB rural vs. NFB urban

b = FB rural vs. NFB rural

c = FB urban vs. NFB rural

d = NFB urban vs. FB rural

e = NFB urban vs. FB urban

significantly lower ($f = 0.0534$; $p = 0.0485$) than the post-test Food Behavior Checklist scores of urban homemakers who received feedback.

Table 13 shows a multivariate analysis of covariance (MANCOVA) of post-test NAR scores when pre-test NAR scores were used as covariates. A significant difference was not found between the experimental and control group on their post-test NAR values. Therefore, Hypothesis 3 which states that there will be a significant difference between the post-test means of the control and experimental group cannot be accepted. The main effect of location was statistically significant ($f = 17.43$; $p = 0.001$). Thus, Hypothesis 4 which states that there will be a significant difference between rural and urban homemakers can be accepted. The interaction effect was not significant.

Table 13. Two by Two Multivariate Analysis of Covariance of Post-test NARs with Pre-test NARs Being Covariates

Source	Wilk's Lambda	F	df	p
Group	0.9706	0.67	6 - 132	0.6778
Locale	0.5578	17.43	6 - 132	0.0001*
Group X Locale	0.9822	0.40	6 - 132	0.8791

* p < .05

DISCUSSION

The Food Behavior Checklist that was developed consisted of 30 items. The response choice was ranked on a four-point Likert scale. The checklist was designed to be used in either face-to-face interview, with the homemakers or as a self-administered test. Face-to-face interviews were used in this study because they provide data not otherwise available through written response format (Talmadge & Rasher, 1982). Furthermore, interviews allow for probing and follow-up questions that help clarify the information and avoid ambiguities (Talmadge & Rasher, 1982).

Unlike paraprofessionals in other studies, who were reluctant to use new instruments to collect data from EFNEP homemakers (Murphy et al., 1980), the paraprofessionals in this study were eager to try the new Food Behavior Checklist. Paraprofessionals were told in the beginning of the study that the Food Behavior Checklist was being tested to determine if it could replace the old Food Behavior Checklist.

Response choices represented both extremes of the continuum. The choices "never" and "seldom" were grouped together because it is very important that homemakers perform the nutrition-related practices measured by the Food Behavior Checklist more often than is suggested by "seldom" to benefit from the program. In other words, a "seldom" response to items measured by the Food Behavior Checklist was viewed as having no potential benefit.

This instrument can be used to collect data from low-income homemakers since the validity and reliability was well established. Content validity was established with the aid of EFNEP paraprofessionals, supervisors, and 20 state coordinators. Face validity was determined by professionals who are familiar with nutrition practices of low-income families and who are experts in writing test items. The known-groups (different) method of validation was used in this study to develop construct validity for the Food Behavior Checklist.

No significant differences were found in any of the homemakers' nutrition-related practices that are measured by the Food Behavior Checklist after EFNEP intervention. This finding agrees with those of Murphy (1977), who found no significant differences on homemakers' nutrition-related practices in Maryland's EFNEP. Items that assessed label reading habits of EFNEP homemakers ranked lowest at pre-test. Fitzergald (1979) reported similar practices among low-income families in North Carolina.

The literature supports the positive effect of computer feedback as a teaching tool; however, no significant differences were observed between homemakers in this study who received computer feedback and those who did not receive feedback. This finding was not consistent with that of Turner and Evers (1987). They reported gain scores of 8.7 and 3.9 for computer groups at a day care and laboratory school, respectively. Although these researchers were working with low-income, non-reading preschoolers, the material covered was

much simpler than the material on the diagnostic report that was used in this study. Also, age differences may affect the way one accepts computerized data as a teaching tool.

The finding of no effect of a computer printout on improvement observed in the present study may possibly be explained by several factors: First, paraprofessionals may not understand the information on the Diagnostic Report (computer printout) well enough to explain it to the homemakers. Second, the information provided on the Diagnostic Report may be too complicated for the homemakers to understand. Nitze (1992) and others expressed the importance of simplifying the language for low-income and illiterate audiences (Knapp, 1991; Inano & Pringle, 1975; Awa, 1974). According to Smiciklas-Wright et al. (1984), pensioners were unable to utilize computerized nutrition information without the aid of an explanation booklet. Lastly, the amount of time spent on the Diagnostic Report may not have been adequate for the homemakers to comprehend and use the information after the paraprofessional left the home; therefore, they became frustrated with the Diagnostic Report and did not use it.

Although no significant difference was observed among the two groups in this study, the use of a computer printout as a teaching tool should not be dismissed. Simplifying the contents of the Diagnostic Report may result in wider acceptance among homemakers and paraprofessionals.

Reading ability of many low-literacy groups is below grade level for age,

and in some cases even basic reading skills are lacking. Thus, in selecting printed materials that can be read, comprehended, and used by low-income groups, readability, as well as other variables influencing the effectiveness of printed materials, must be considered (Nitze, 1992; Anderson, Olson, & Rhodes, 1980).

The Diagnostic Report might be more effective if the paraprofessional uses it throughout the entire time that the homemakers are enrolled in EFNEP. This would allow the paraprofessional to spend more time covering specific nutrients and behaviors and the computer printout could be used to reinforce what is being taught.

It is of paramount importance for educators to select materials which are appropriate for the intended audience. An evaluation instrument, that would rate features common to most printed education materials and that could be adapted to analyze the appropriateness of materials for special topics and/or audiences, would be of great value to the selection process (Anderson et al., 1980).

CHAPTER V

SUMMARY AND RECOMMENDATIONS FOR FUTURE RESEARCH

SUMMARY

The Food Behavior Checklist that was developed and validated proved to be a useful tool for gathering data on the nutrition-related practices of EFNEP homemakers. This instrument has implications for national use since its validity was determined with the assistance of 20 state coordinators, EFNEP supervisors, paraprofessionals, and homemakers. Cronbach-alpha revealed a reliability coefficient of 0.86.

This 30-item instrument response format was a Likert scale with four response levels: "never or seldom," "sometimes," "usually," and "almost always". This format is simple and allows the homemaker to check the answer which corresponds to their practice and requires little effort on the part of the homemaker. Data were collected by written responses which provides more reliable information than that collected by observation (Anderson, 1988).

Both control and experimental homemakers consumed fat in excess of the recommended intake, at both pre-test and post-test. However, the amount of fat consumed in excess amounts were smaller at post-test, which represents some improvement.

Significant differences were observed in homemakers' intake of kilocalories

and fiber for both groups of homemakers. Fat and carbohydrate intakes were also statistically significant from pre-test to post-test for the experimental group.

The differences observed in Food Behavior post-test scores between the experimental and control groups were not significant. Also, computerized feedback did not affect NAR post-test scores. One possible reason that computer feedback did not influence homemakers' nutrition-related behaviors and Food Behavior Checklist scores is that paraprofessionals may not have felt comfortable with the use of computerized feedback. However, this was not tested in this study. Secondly, paraprofessionals may not have spent enough time discussing the Diagnostic Report; therefore, the homemakers may not have known how to interpret and use the Diagnostic Report. Lastly, the material on the report may need to be simplified if it is to be of practical use with low-income groups.

RESEARCH IMPLICATIONS

The results of this research showed that instruments can be developed, validated, and their reliability determined for nutrition education programs when scientific procedures are followed. Homemakers, paraprofessionals, supervisors, and state coordinators, who are employed by EFNEP, were willing to join forces to insure that EFNEP has good evaluation instruments.

The results from this study indicated that computer generated data, in its present form, may not be an effective tool for teaching EFNEP homemakers.

However, EFNEP homemakers are capable of providing reliable and helpful evaluation data. Therefore, they may be helpful in identifying methods to simplify the computer printout, to make it into an effective teaching tool.

RECOMMENDATIONS FOR FUTURE PRACTICES IN EFNEP

1. Paraprofessionals need to be provided with an indepth training on evaluation procedures and the importance of data collection to document EFNEP's effectiveness.

2. Homemakers should be given more lessons on cooking methods that allows the greatest retention of nutrients. Homemakers who scored high on the Food Behavior Checklist tend to have unfavorable practices on the question about preparing vegetables. When preparing vegetables, most homemakers reported that they covered them with water.

3. More emphasis needs to be placed on strategies to reduce fat intake among EFNEP homemakers.

RECOMMENDATIONS FOR FUTURE RESEARCH

1. The Food Behavior Checklist should be pilot tested nationally to determine if it can be adopted at the national level.

2. Paraprofessionals' and homemakers' attitudes should be assessed relative to the use of computerized feedback as a teaching tool.

3. Paraprofessionals' and homemakers' input should be sought in an effort

to simplify the Diagnostic Report to maximize its effectiveness.

4. Item 9 on the Food Behavior Checklist developed, in this study, should be restated to read as follows: Do you cook green or yellow vegetables by covering them with water? In its present form, the use of the qualifier "enough" may bias homemakers' response. The revised Food Behavior Checklist should be re-tested with EFNEP homemakers and the results should be compared to those found in this study.

5. The statement regarding label reading habits on the Food Behavior Checklist should be restated to read as follows: When buying food, how often do you read the label for the following? A copy of the revised Food Behavior Checklist is located in Appendix O.

CONCLUSION

1. Homemakers' Food Behavior Checklist scores did not increase significantly at post-test between rural and urban homemakers.

2. There was no significant difference in the post-test Food Behavior Checklist scores of homemakers who received computerized feedback and homemakers who did not received computerized feedback.

3. There was not a significant difference in the NAR scores of homemakers who received computer feedback and the group who did not received computer feedback.

4. There was a significant difference in the improvement observed in the NAR scores of rural and urban homemakers.

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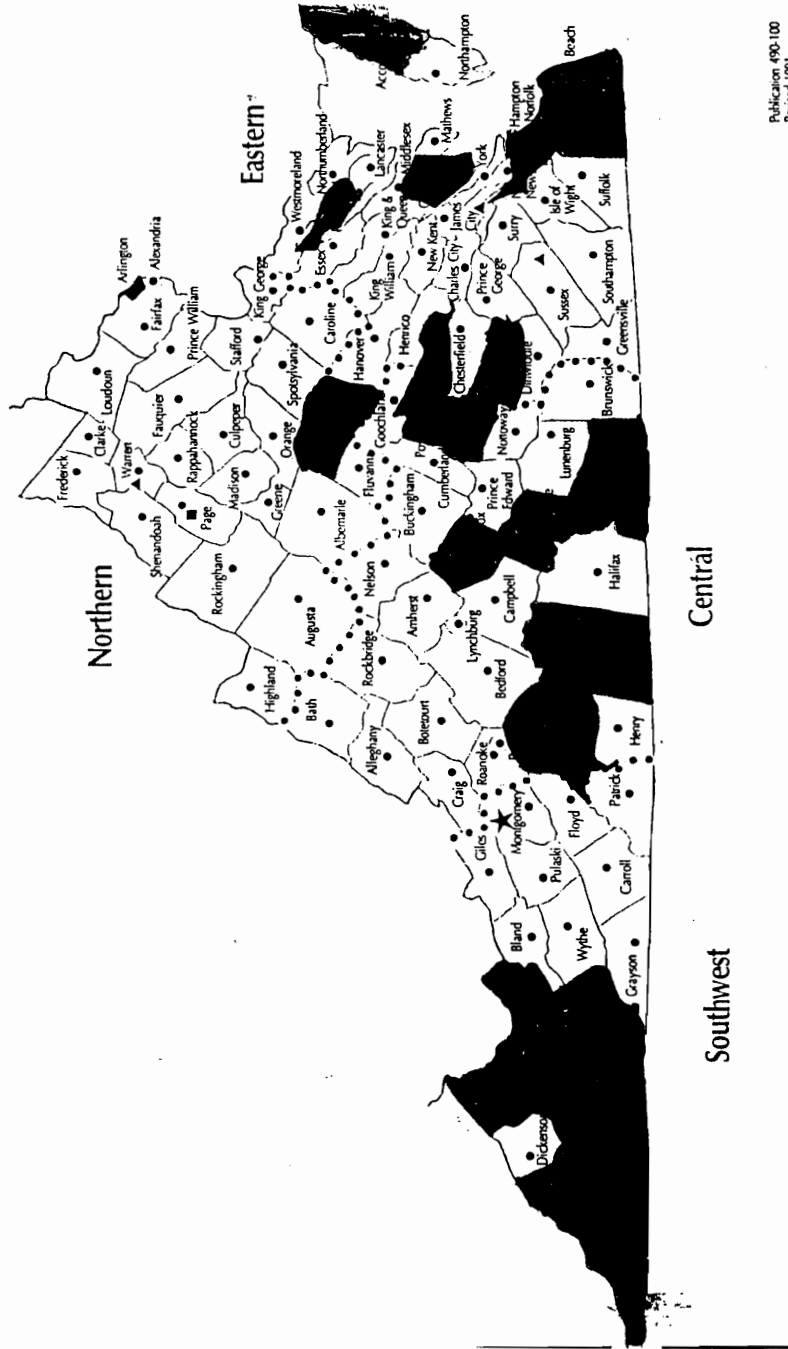
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APPENDIX A
LOCATIONS IN VIRGINIA IN WHICH EFNEP OPERATES

Virginia Cooperative Extension



Publication 490-100
Revised 1991

APPENDIX B
FAMILY RECORD FORM

EXPANDED FOOD AND NUTRITION EDUCATION PROGRAM
Family Record-Part A-Description

Unit ID # [][][] Aide ID # [][]
Family ID # [][][]
Date Family Enrolled
Month [][] Day [][] Year [][]
Date Record Completed
Month [][] Day [][] Year [][]
AIDE NAME _____
FAMILY NAME _____
STREET _____
CITY _____
PHONE _____

Place of Residence
[1] Farm
[2] Towns (rural non-farm) under 10,000
[3] Places 10,000 to 50,000
[4] Suburbs over 50,000
[5] Central Cities

Homemaker's Racial/Ethnic Characteristics
[1] White (not Hispanic Origin)
[2] Black (not Hispanic Origin)
[3] Hispanic
[4] American Indian/Alaskan Native
[5] Asian or Pacific Origin

Total Actual Income for Family Last Month (round to the nearest dollar)
\$ [][][][] .00
NOTE
Place one number in each box. For incomes below \$1,000, place zeros in the leading box(es).

Family Received (some time during the year)
Yes No
[] [] USDA Food Stamps/Food Distribution Program
[] [] WIC/CSFP
[] [] Child Nutrition Programs (school lunch and/or breakfast, milk, Head Start, summer programs, child care)
[] [] Public Assistance

Family Members table with columns for Age (Years, Months) and Gender (M, F). Includes rows for Homemaker and Total Family Members [][]

Highest Grade Completed by Homemaker
[1] 8th Grade or Less
[2] 9th-11th Grade
[3] 12th Grade or GED
[4] Beyond High School

Ending Date
Month [][] Day [][] Year [][]
Reasons
[1] Completed Program
[] Did Not Complete
Reasons for Incompletion:
[2] Moved
[3] Not Interested
[4] Working, Returned to School
[5] Aide Vacancy
[6] Other _____

Adapted with permission from the New York EFNEP, Cornell University, Ithaca, N.Y., by Ruby Cox, State EFNEP Coordinator, Virginia Tech, Blacksburg, Virginia

FAMILY RECORD - PART B

Record #

DIRECTIONS: Place a check (✓) for the appropriate response.	Almost Never (1)	Sometimes (2)	Often (3)	Almost Always (4)
1. How often do you use canned, pre-packaged or frozen main dishes?				
2. When you prepare food from scratch, how often does it turn out the way you expect?				
3. When you prepare food, how often do you reduce or remove some of the fat?				
4. Do you leave cooked food on the table, counter, or stove for two hours or more?				
5. When you thaw frozen foods, how often do you thaw them at room temperature?				
6. Do you place garbage in a closed container at least daily?				
7. How often do you run out of food, food money, or food stamps?				
8. How often do you compare prices before you make a food purchase?				
9. How often do you buy a particular food item because you heard about it on the radio or TV or saw it in a magazine?				
10. How often do you shop with a grocery list?				
11. How often do you eat something within 2-3 hours after getting up each day?				

FOOD BEHAVIOR AND NUTRITION KNOWLEDGE

DIRECTIONS:

Please CIRCLE one answer for each question.

12. When do you decide what food you will make for your family?
 - a) just before you make it
 - b) sometime during the day
 - c) a day or more ahead
 - d) each family member makes own decision

13. What is missing from this meal? **chicken, carrots, milk**
 - a) meat or dry beans
 - b) bread or cereal
 - c) milk or cheese
 - d) vegetable or fruit

14. What is missing from this meal? **baked beans, rice, broccoli**
 - a) meat or dry beans
 - b) bread or cereal
 - c) milk or cheese
 - d) vegetable or fruit

15. Which of the following groups of food provides the most **iron**?
 - a) whole grain breads, dry beans, ground beef
 - b) winter squash, sweet potatoes, carrots
 - c) dark green leafy vegetables, milk, cheese
 - d) I don't know

16. How often should you include foods with **calcium** in your diet?
 - a) 3-4 times a week
 - b) once a day
 - c) 2 or more times a day
 - d) I don't know

Special Situations:

Directions: Please respond only to those questions that apply.

Put NA, if not applicable	NA	Yes	No
Since you are not currently receiving food stamps, 17. do you know how to get food stamps?			
Since you are pregnant or breast-feeding, 18. are you eating more high calcium foods?			
19. are you eating more high iron foods?			
When you can meats and/or vegetables such as green beans, 20. do you use a pressure canner?			

FAMILY RECORD - PART C - FOOD RECALL

<p>Record Number <input type="checkbox"/></p> <p>Number of Teaching Contacts since last Record:</p> <p><input type="checkbox"/> Individual <input type="checkbox"/> Group <input type="checkbox"/> By Mail</p> <p><input type="checkbox"/> Telephone <input type="checkbox"/> Other</p> <p>Homemaker: Pregnant <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Breast-feeding <input type="checkbox"/> Yes <input type="checkbox"/> No</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 25%;">Column 1</th> <th style="width: 50%;">Name of Meal</th> <th style="width: 25%;">Column 4</th> </tr> <tr> <td>B</td> <td>Breakfast</td> <td>1</td> </tr> <tr> <td>L</td> <td>Lunch</td> <td>2</td> </tr> <tr> <td>D</td> <td>Dinner</td> <td>3</td> </tr> <tr> <td>S</td> <td>Snack</td> <td>4</td> </tr> </table> <p style="text-align: center;">-- To Be Coded --</p>	Column 1	Name of Meal	Column 4	B	Breakfast	1	L	Lunch	2	D	Dinner	3	S	Snack	4
Column 1	Name of Meal	Column 4														
B	Breakfast	1														
L	Lunch	2														
D	Dinner	3														
S	Snack	4														

1 Meal	2 Food Item	3 Amount Eaten	4 Meal Code	5 Food ID Number	6 Amount Code

TBSP=Tablespoon tsp.=teaspoon c=cup oz.=ounce

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 Virginia Cooperative Extension, Virginia State University and State University, Virginia State University, and the U.S. Department of Agriculture cooperating. James F. Johnson, Director, Virginia Cooperative

APPENDIX C
DIAGNOSTIC REPORT

DIAGNOSTIC REPORT
EXPANDED FOOD AND NUTRITION EDUCATION PROGRAM

Homemaker's name: Family ID No.: 4064
 Family's income last month: \$349
 Family received:
 Food Stamps/Food Dist. Program
 WIC/CFSP
 Child Nutrition Programs
 Public Assistance

Assessment number: 1 Date of assessment: 06/29/92

Analysis of Food Behavior and Nutrition Knowledge

- 1) Current use is O.K.
- 2) Teach to follow recipes/basic skills.
- 3) Teach ways to reduce fat when cooking.
- 4) Usually stores cooked foods safely.
- 5) Usually thaws food safely.
- 6) Teach safe disposal of garbage.
- 7) Teach food budget management.
- 8) Teach comparison shopping.
- 9) Teach reasons for evaluating ads.
- 10) Teach to make a grocery list.
- 11) Eat within 2-3 hours after arising.
- 12) Teach to plan meals ahead.
- 13) Teach meal planning.
- 14) Teach meal planning.
- 15) Great! Knows iron sources.
- 16) Teach calcium needs.

MEAL	FOOD#	FOOD NAME	AMOUNT
BREAKFAST	905	BEV COFFEE	1.00 CUP
BREAKFAST	436	DONUT CAKE-TYPE PLN	1.00 DONUT
LUNCH	198	LUNCHMT BOLOGNA 1 OZ	2.00 OZ
LUNCH	24	CHEESE PRCSSD FOOD AMER	2.00 OZ
LUNCH	342	BREAD WHITE	2.00 SLICE
LUNCH	693	BEV CARBONATED COLA	8.00 FLUID OZ
DINNER	898	SALAD TOSSED	2.00 CUP
DINNER	50	MILK WHOLE	1.00 CUP

DIAGNOSTIC REPORT

The following sections pertain to the calories and nutrients that were provided by the foods you reported eating.

This first portion pertains to calories and the nutrients which supply calories. One gram of fat furnishes 9 calories. Proteins and carbohydrates each supply about 4 calories per gram. While not a nutrient, alcohol provides 7 calories per gram.

	Calories	Carbohydrates (gm)	Fats (gm)	Protein (gm)	Alcohol (gm)
	1087	96	62	42	0
RDA	2200	**	**	50	**
Difference	-1113	96	62	-8	0
% of RDA	49%	**	**	84%	**

these analyses of your diet indicate that the total calories are less than the suggested value and the calories from fat are greater than the suggested range. Consider ways in which you could increase the total calories in your diet from nutrient-dense foods.

Of the calories supplied by the food and beverages consumed, the calorie distribution among the sources are:

	Carbohydrates	Fats	Protein	Alcohol
Your intake	34%	50%	15%	0%
Suggested range	50-60%	25-30%	10-15%	**

Iron, calcium, vitamin A and vitamin C are the nutrients most often lacking in American diets. This is how HACKNEY, SUE's diet compares to the recommended dietary allowance.

	Iron (mg)	Calcium (mg)	Vit. A (i.u)	Vit. C (mg)
	5.0	687	2517	37
RDA	15.0	800	4000	60
Difference	-10.0	-113	-1483	-23
% of RDA	33%	86%	63%	62%

** There is no RDA value for this category.

DIAGNOSTIC REPORT

This is how the food items fit into the daily food guide for

Item -----	Servings -----
MILK GROUP -----	
CHEESE PRCS SD FOOD AMER	1.00
MILK WHOLE	1.00
MEAT GROUP -----	
LUNCHMT BOLOGNA 1 OZ	0.66
FRUIT AND VEGETABLE GROUP -----	
SALAD TOSSED	2.77
BREAD AND CEREAL GROUP -----	
BREAD WHITE	2.00
OTHER (FATS, SUGAR AND ALCOHOL) -----	
BEV COFFEE	1.00
DONUT CAKE-TYPE PLN	1.00
BEV CARBONATED COLA	1.00

DIAGNOSTIC REPORT

IRON

The following foods provided iron:

SALAD TOSSED

VITAMIN A

The following foods provided vitamin A:

SALAD TOSSED

VITAMIN C

The following foods provided vitamin C:

SALAD TOSSED

CALCIUM

The following foods provided calcium:

CHEESE PROCSSD FOOD AMER
MILK WHOLE

APPENDIX D

**SELECTION AND PRIORITITIZATION OF PRACTICES IN EFNEP:
PART I**

PART I: SELECTION AND PRIORITIZATION OF PRACTICES TAUGHT IN EFNEP

Lesson Title	Behaviors Expected as Result Of Lesson Being Taught	Is this behavior taught by this EFNEP lesson?		Place number of your ranking with "1" being highest*
		YES	NO	
Introducing Eating Right is Basic -2	1. Plan low-cost meals			
	2. Prepare food several different ways			
	3.			
	4.			
Other behaviors taught in lesson:				
Making Meals from What's On Hand	1. Use available food on hand to prepare meals and snacks			
	2.			
	3.			
Planning Makes the Difference	1. Plan meals and snacks in advance			
	2. Store left-overs properly and only use them if they have been stored properly			
	3. Use a shopping list when buying groceries			
	4. Use any available space for gardening			
	5.			
	6.			
Let's Make Something Simple	1. Thaw frozen food in the refrigerator			
	2. Practice safety in the kitchen			
	3. Keep the kitchen clean			
Other behaviors taught in lesson:				
Home Invaders	1. Protect food from contamination by bacteria			
	2. Wash all utensils immediately after each use			
	3. Store garbage in a closed container			
	4. Remove garbage from home at least weekly			
	5. Store fresh or frozen meats and dairy products in refrigerator or freezer			
Other behaviors taught in Lesson:	6.			
	7.			

* Number 1 indicates this item has highest priority within that lesson, to be measured to show impact of EFNEP.

Lesson Title	Behaviors Expected as Result Of Lesson Being Taught	Is this behavior taught by this EFNEP lesson?		Place number of your ranking with "1" being highest*	PRIORITY RANK
		YES	NO		
Shopping Basics	1. Budget your money to allow enough for food.				
	2. Use generic brand items				
	3. Use a grocery list				
	4. Shop at large a large grocery store				
	5. Check to see if items are on sale				
	6. Use coupons only for those items that you really need and regular use				
	7. Read labels				
Other behaviors taught in Lesson:					
Nutrients We Need	1. Consider specific nutrients choosing foods				
	2. Drink 6 - 8 glasses of water daily				
	3. Eat a variety of and nutritious snacks				
	4. Limit the use of foods low in nutrients and high in fat and sweet				
	5. Eat foods lower in calories and increase exercise if weight loss is needed				
Other behaviors taught in Lesson:					
Fruits	1. Buy and serve fresh fruits				
	2. Store fresh fruits properly				
	3. Eat the right amount of fruits daily				
	4. Buy lower priced brand and grade of fruits				
	5. When cooking fruits, use little water and cook only until tender				
	6. Store canned dried fruits in a cool dry place				
	7. Store fresh fruits in the refrigerator				
Other behaviors taught in Lesson:					
Vegetables	1. Store fresh vegetables properly				
	2. Eat 3 or more servings of vegetables daily				
	3. Store left-over vegetables properly				
	4. When cooking vegetables, use little water and cook only until tender				
Other behaviors taught in Lesson:					

Lesson Title	Behaviors Expected as Result Of Lesson Being Taught	Is this behavior taught by this EFNEP lesson?		Place number of your ranking with "1" being highest*
		YES	NO	
Milk and Cheese	<ol style="list-style-type: none"> Use non-fat dry milk Get 2 or more servings of milk or milk products daily Buy cheese in large quantities and grate them yourself Store powdered milk in cool, dry place and fresh milk in refrigerator Store cheese properly 			
Other behaviors taught in Lesson:				
Meat, Poultry, Fish and Eggs	<ol style="list-style-type: none"> Eat 2 or more servings of meat daily Buy whole chicken and cut it up themselves Clean cutting utensils after use Store meat properly Trim away visible fat from meat 			
Other behaviors taught in Lesson:				
Bread, Cereal, and Pasta	<ol style="list-style-type: none"> Include 4 to 5 serving from this group Read labels and select enriched and fortified breads, cereals, and pasta To save money, buy day-old bread To save money, buy cereal that you cook, instead of ready-to-eat cereal Buy ready-to-eat cereal in family size boxes Buy cereal with little or no added sugar Store bread and cereals properly Do not wash rice, macaroni, or pasta 			
Other behaviors taught in Lesson:				

Lesson Title	Behaviors Expected as Result Of Lesson Being Taught	Is this behavior taught by this EFNEP lesson?		Place number of your ranking with "1" being highest*
		YES	NO	
Dried Beans and Peas and Protein Pairs	<ol style="list-style-type: none"> 1. Choose protein foods that are high in nutrients and low in cost 2. Eat legumes with grains to get higher quality protein 3. Purchase raw dried bean and peas and cook them yourself to save money. 4. Buy nuts in bulk quantities when they are in season 5. Store beans, peas, and lentils in air-tight containers, in a cool, dry place 6. Store cooked beans properly 7. Soak beans overnight before cooking them 8. Use protein pairs to get a complete protein 			
Other behaviors taught in Lesson:	<ol style="list-style-type: none"> 9. 10. 			
Eating Right and Light	<ol style="list-style-type: none"> 1. Eat a variety of food 2. Eat more fresh fruit, vegetables, and foods high in fiber 3. To lose weight, eat smaller portions and avoid second helpings. 4. Exercise at 3 - 4 times a week 5. Use salt sparingly 6. Achieve or maintain healthy weight preparation 7. Use small amount or no fat in food 8. Bake or broil rather than fry 9. Avoid or reduce sugar and in food preparation 			
Other behaviors taught in Lesson:	<ol style="list-style-type: none"> 10. 11. 			
Putting it all Together	<ol style="list-style-type: none"> 1. Budget grocery money or foods stamps 			
Other behaviors taught in Lesson:	<ol style="list-style-type: none"> 2. 3. 4. 			

Lesson Title	Behaviors Expected as Result Of Lesson Being Taught	Is this behavior taught by this EFNEP lesson?		Place number of your ranking with "1" being highest PRIORITY RANK
		YES	NO	
Food Preservation	<ol style="list-style-type: none"> Use a pressure canner to can vegetables, meats, poultry, seafood, and soups Use hot water bath to can fruits, most tomatoes, jellies, jams, and preserves Store canned items in a cool, dry, place Dry fruits and vegetables properly 			
Other behavior taught in Lesson:				
Gardening Basics	<ol style="list-style-type: none"> Plant a garden Use containers or whatever space you have for gardening purposes 			
Other behaviors taught in Lesson:				
Eating Right for Two: Feeding Your Baby	<ol style="list-style-type: none"> Eat foods that are high in protein, calcium, iron, and folic acid Avoid dieting during pregnancy Gradually gain weight during pregnancy Eat a variety of foods Avoid the following during pregnancy: smoking, alcoholic beverages, foods high in caffeine, and non-prescription medicine Get regular check-ups Drink a lot of fluids 			
Other behaviors taught in Lesson:				
Feeding Baby Solid Food	<ol style="list-style-type: none"> Introduce solid food when baby can sit without being supported Introduce juices at 5 to 6 months Introduce strained vegetables at 6 to 7 months Do not add salt, sugar or fat to baby's food Discard all uneaten baby food at end of feeding Prepare some of your own baby food Store home-prepared and opened jars of baby food safely 			
Other behaviors taught in lesson:				

Lesson Title	Behaviors Expected as Result Of Lesson Being Taught	Is this behavior taught by this EENEP lesson?		Place number of your ranking with "1" being highest*
		YES	NO	
Feeding Your Pre-school Children	1. Feed pre-school children 4 to 6 small meals daily			
	2. Do not let children skip breakfast			
	3. Feed children a variety of foods			
	4. Give children 2 to 3 glasses of milk daily			
	5. Give children plenty of water			
	6. Feed children snacks from Daily Food Guide			
	7. Avoid giving children snacks 1 to 2 hours before meals			
	7. Do not use candy or other sweets to reward children for eating or other good behavior			
	8. Have children rest before meal or snack time			
	10.			
Other behaviors taught in Lesson:				
Dietary Guidelines for Americans	1. Eat a variety of foods			
	2. Select food from each of the five food groups			
	3. Avoid taking vitamin and/or mineral pills unless recommended by your doctor			
	4. Maintain healthy weight			
	5. Avoid crash weight loss diets			
	6. Avoid using the following for dieting: vomiting, laxatives, diet pills, diuretics			
	7. Encourage children to exercise			
	8. Decrease caloric intake and exercise often			
	9. Choose foods low in fat, saturated fat, and cholesterol			
Other behaviors taught in Lesson:	10.			
	11.			

Lesson Title	Behaviors Expected as Result Of Lesson Being Taught	Is this behavior taught by this EFNEP lesson?		Place number of your ranking with "1" being highest PRIORITY RANK
		YES	NO	
Food Preservation	<ol style="list-style-type: none"> Use a pressure canner to can vegetables, meats, poultry, seafood, and soups Use hot water bath to can fruits, most tomatoes, jellies, jams, and preserves Store canned items in a cool, dry, place Dry fruits and vegetables properly 			
Other behavior taught in Lesson:				
Gardening Basics	<ol style="list-style-type: none"> Plant a garden Use containers or whatever space you have for gardening purposes 			
Other behaviors taught in Lesson:				
Eating Right for Two: Feeding Your Baby	<ol style="list-style-type: none"> Eat foods that are high in protein, calcium, iron, and folic acid Avoid dieting during pregnancy Gradually gain weight during pregnancy Eat a variety of foods Avoid the following during pregnancy: smoking, alcoholic beverages, foods high in caffeine, and non-prescription medicine Get regular check-ups Drink a lot of fluids 			
Other behaviors taught in Lesson:				
Feeding Baby Solid Food	<ol style="list-style-type: none"> Introduce solid food when baby can sit without being supported Introduce juices at 5 to 6 months Introduce strained vegetables at 6 to 7 months Do not add salt, sugar or fat to baby's food Discard all uneaten baby food at end of feeding Prepare some of your own baby food Store home-prepared and opened jars of baby food safely 			
Other behaviors taught in lesson:				

Lesson Title	Behaviors Expected as Result Of Lesson Being Taught	Is this behavior taught by this EFNEP lesson?		Place number of your ranking with "1" being highest*
		YES	NO	
Sugars	1. Teach homemakers to avoid too much sugar			
	2. Read labels for sugar content			
	3. Identify sugars by various names			
	4. Reduce sugar when cooking			
	5.			
	6.			
	7.			
	8.			

Are there any practices taught in EFNEP that are not a part of a specific lesson and are not listed above?

Yes No

If yes, please list:

- 1.
- 2.
- 3.
- 4.

APPENDIX E

**INSTRUCTIONS FOR SELECTION AND PRIORITIZATION OF
PRACTICES TAUGHT IN EFNEP: PART I**

Instructions for Completing Selection and Prioritization of Practices Taught in EFNEP: Part I

A process is underway to develop a validated instrument that can be used to measure nutrition-related practice changes homemakers make as a result of being in EFNEP. Your input is needed to make sure this instrument measures the most important practices taught in the EFNEP curriculum (ERIB-2 plus additional lessons). It is hoped that this instrument will provide a more effective way for EFNEP to measure the skills and improved practices that homemakers' gain as a result of the program.

The attached form, "Part I: Selection and Prioritization of Practices Taught in EFNEP" contains some the practices that may be taught in EFNEP curriculum. You are being asked to identify additional practices and to prioritize all practices according to their importance for inclusion in a Food Behavior Checklist.

Please review all lessons in **Eating Right Is Basic-2** curriculum and any other lessons you use in EFNEP. Using the attached form, please go through the following steps:

1. For each lesson, determine if the practices listed on the form actually taught in that lesson. Place a check () under the "yes" or "no" column that corresponds to your opinion.
2. Determine whether there are additional practices taught by each lesson. If so, list them on the available space under each lesson.

After you have completed items 1 and 2 on all 8 pages of the form, go to Step 3.

3. For each lesson separately, rank the practices for that lesson in order from most important to least important for inclusion on a Food Behavior Checklist for assessing the impact of EFNEP. For purposes of ranking allow "1" to designate the **most important** practice to be included.
4. Determine whether there are other practices taught by EFNEP that are not addressed by any single EFNEP lesson, and thus, has not been placed on the list? If so, please list them on the last page of the form (Page 8).

Please rank them in order of most important to least important with "1" representing the most important practice.

Thank you for your time and effort. Upon completion of the new Food Behavior Checklist, you will be receiving feedback relative to its' use.

Your input will be very helpful to the success of this project.

Supervisors should return completed forms to: Dr. Ruby H. Cox
State EFNEP Coordinator
411 Femoyer Hall
Blacksburg, Virginia 24061-
0228

APPENDIX F
SELECTION AND PRIORITIZATION OF PRACTICES TAUGHT IN
EFNEP: PART II

PART II: SELECTION AND PRIORITIZATION OF PRACTICES TAUGHT IN EFNEP

PRACTICES TO USE IN ASSESSING IMPACT OF EFNEP	IMPORTANT TO USE IN ASSESSING IMPACT? (A)YES (B)NO	CHECK(✓) TOP 15 (C)	RANK FROM 1 - 15 (D)
1. Use available food on hand to prepare meals and snacks			
2. Plan meals and snacks in advance			
3. Store left-overs properly and only use them if they have been stored properly			
4. Use a shopping list when buying groceries			
5. Thaw frozen food in the refrigerator			
6. Practice safety in the kitchen			
7. Keep the kitchen clean			
8. Protect food from contamination by bacteria			
9. Wash all utensils immediately after each use			
10. Store fresh or frozen meats and dairy products' in the refrigerator or freezer			
11. Budget money to allow enough for food			
12. Use a grocery list when shopping			
13. Consider specific nutrients when choosing foods			

PRACTICES TO USE IN ASSESSING IMPACT OF EFNEP	(A) YES	(B) NO	IMPORTANT TO USE IN ASSESSING IMPACT?	CHECK (✓)	TOP 15 (C)	RANK FROM 1 - 15 (D)
14. Limit the use of foods low in nutrients and high in fat and sweet						
15. Buy and serve fresh fruits						
16. Eat 2 or more servings of fruit daily						
17. Store fresh vegetables properly						
18. Eat 3 or more servings of vegetables daily						
19. Store left-over vegetables properly						
20. When cooking vegetables, use little water and cook only until tender						
21. Get 2 or more servings of milk or milk products daily						
22. Eat 2 or more servings of meat daily						
23. Store meat properly						
24. Include 6 or more servings from the bread, cereal, and pasta group						
25. Read labels and select enriched and fortified breads, cereals, and pasta						

PRACTICES TO USE IN ASSESSING IMPACT OF EFNEP	IMPORTANT TO USE IN ASSESSING IMPACT? (A) YES (B) NO	CHECK(S) TOP 15 (C)	RANK FROM 1 - 15 (D)
26. Choose protein foods that are high in nutrients and low in cost			
27. Eat legumes with grains to get higher quality protein			
28. Eat more fresh fruit, vegetables, and foods high in fiber			
29. Budget grocery money or food stamps			
30. Use containers or whatever space you have for gardening purposes			
31. Eat foods that are high in protein, calcium, iron, and folic acid			
32. Avoid the following during pregnancy: smoking, alcoholic beverages, foods high in caffeine, and non-prescription medicine			
33. Feed pre-school children 4 to 6 small meals daily			
34. Do not let children skip breakfast			
35. Feed children a variety of food			
36. Select food from each of the five food groups			
37. Serve breakfast daily.			

PRACTICES TO USE IN ASSESSING IMPACT OF EFNEP	IMPORTANT TO USE IN ASSESSING IMPACT? (A) YES (B) NO	CHECK (✓) TOP 15 (C)	RANK FROM 1 - 15 (D)
38. Encourage family members to eat a nutritious meal or snack within two hours of getting out of bed			
39. Prepare a nutritious and appealing breakfast			
40. Teach homemakers to budget the family's money			
41. Teach homemakers the benefits of consuming adequate amounts of calcium in the diet			
42. Help homemakers learn to identify foods that are rich sources of calcium			
43. Reduce fat when preparing and cooking food			
44. Teach homemakers to avoid too much sugar			
45. Read labels for sugar content			
46.			
47.			
48.			
49.			

APPENDIX G

**INSTRUCTIONS FOR SELECTION AND PRIORITIZATION OF
PRACTICES TAUGHT IN EFNEP: PART II**

**Instructions for Selection and Prioritization of
Practices Taught in EFNEP:Part II**

Please answer the following questions:

1. For each individual practice check "yes" or "no" in columns A or B as to whether this is an important practice taught in EFNEP.
2. From the items on which you have checked "yes" above, place a check in column C next to the top 20 practices that you feel are the most critical to use in assessing the impact of EFNEP with individual homemakers and as a total program.
3. After checking the top 20 practices in column C, prioritize these practices by placing a number from 1 to 20, in column D beside the 20 practices. Number 1 will designate the most important practice and number 20 will designate the least important practice.

Please mail completed forms, by _____ to:

Dr. Ruby H. Cox
State EFNEP Coordinator
411 Femoyer Hall
Virginia Polytechnic Institute
and State University
Blacksburg, Virginia 24061-0228

APPENDIX H
FOOD BEHAVIOR CHECKLIST



FOOD BEHAVIOR CHECKLIST
EXPANDED FOOD AND NUTRITION EDUCATION PROGRAM

Date: _____ Homemaker ID Number: _____
 Name of EFNEP Paraprofessional _____

Who in your household usually buys the groceries? _____

Who in your household usually prepares meals and snacks? _____

Please answer the following questions as to who does each activity/task (names listed above). If you, the enrolled homemaker, usually do these tasks respond to all questions based on what you do. If someone besides you does a task, you should tell what that person does. It is important that all responses be based on what is actually done in the household, not what should be done. Show your answer by placing a check (✓) in the chart under the response that most closely matches what is done by you or another household member.

Activity/Task	Never or Seldom	Sometimes	Usually	Always
1. Do you plan at least a few days ahead what your family will eat for meals?				
2. When choosing a snack for yourself, do you eat only what you think will taste good at the time.				
3. When choosing a snack for your child (children), do you give them what they want to eat at the time.				
4. Do you plan a certain amount of money to spend on food when you decide how to spend the family's money?				
5. Do you check to see what you already have on hand before you go to the grocery store?				



Activity/Task	Never or Seldom	Sometimes	Usually	Always
6. Do you leave leftover foods sitting out on the table or counter for 2 hours or longer?				
7. Do you cover food that is sitting out on the counter or table?				
8. Do you use foods-on-hand when you decide what to make for family meals?				
9. Do you cook green or yellow vegetables by using enough water to cover them?				
10. Do you trim off all visible fat before cooking meat?				
11. Do you pan fry meats?				
12. Do you cook meat in the oven?				
13. Do you deep fry meats?				
14. Do you use gravy with meats?				
15. Do you use butter, lard, or solid shortening for making baked foods (bread, cake, pies)?				
16. Do you use butter, lard, bacon grease, or other animal fat to season food?				
17. Do you pour the grease off of meat after it is cooked?				
18. Do you select low-fat foods?				
19. Do you thaw frozen food by letting it sit out on the counter or table?				
20. Do you obtain free food from any where?				
21. Do you read labels when buying foods?				



Activity/Task	Never or Seldom	Sometimes	Usually	Always
When buying foods, how often is your choice affected by the following?				
(22) sugar content				
(23) cholesterol content				
(24) fat content				
(25) sodium content				
(26) mineral content				
(27) vitamin content				
(28) list of ingredients				
29. Do you use drinks or foods that are high in caffeine during pregnancy or when breast feeding?				
30. Do you use non-prescription drugs during pregnancy or when breast feeding?				



APPENDIX I

INSTITUTIONAL REVIEW BOARD EXEMPTION FORM

INVOLVING HUMAN SUBJECTS

Principal Investigator(s): Juanita Bowens

Department(s): Human Nutrition and Foods

Project Title: The Effectiveness of Using Feedback with Low-income Homemakers in the Expanded Food and Nutrition Education Program

Source of Support: Departmental Research Sponsored Research _____ Proposal No. _____

1. The criteria for "exemption" from review by the IRB for a project involving the use of human subjects and with no risk to the subject is listed below. Please initial all applicable conditions and provide the substantiating statement of protocol.

- a. The research will be conducted in established or commonly established educational settings, involving normal education practices. For example:
- 1) Research on regular and special education instructional strategies;
 - 2) Research on effectiveness of instructional techniques, curricula or classroom management techniques.
- b. The research involves use of education tests (___ cognitive, ___ diagnostic, ___ aptitude, achievement), and the subject cannot be identified directly or through identifiers with the information.
- c. The research involves survey or interview procedures, in which:
- 1) Subjects cannot be identified directly or through identifiers with the information;
 - 2) Subject's responses, if known, will not place the subject at risk of criminal or civil liability or be damaging to the subject's financial standing or employability;
 - 3) The research does not deal with sensitive aspects of subject's own behavior (illegal conduct, drug use, sexual behavior or alcohol use);
 - 4) The research involves survey or interview procedures with elected or appointed public officials, or candidates for public office.
- d. The research involves the observation of public behavior, in which:
- 1) The subjects cannot be identified directly or through identifiers;
 - 2) The observations recorded about an individual could not put the subject at risk of criminal or civil liability or be damaging to the subject's financial standing or employability;
 - 3) The research does not deal with sensitive aspects of the subject's behavior (illegal conduct, drug use, sexual behavior or use of alcohol).
- e. The research involves collection or study of existing data, documents, recording pathological specimens or diagnostic specimens, of which:
- 1) The sources are publicly available; or
 - 2) The information is recorded such that the subject cannot be identified directly or indirectly through identifiers.

2. I further certify that the project will not be changed to increase the risk or exceed exempt condition(s) without filing an additional certification or application for use by the Human Subjects Review Board.

Note: If children are in any way at risk while this project is underway, the chairman of IRB should be notified immediately in order to take corrective action.

Ruby H Cox 1-24-92
Principal Investigator(s) Date

Juanita Bowens 1/24/92
Principal Investigator(s) Date

Phillip A. Whitehead 1/24/92
Chair, Institutional Review Board Date

[Signature] 2/6/92
Chair, Institutional Review Board Date

APPENDIX J

HUMAN AGREEMENT FORM

Human Agreement Form

For study: **The Effectiveness of Using Feedback on Nutrition-Related Practices of Low-income Homemakers in the Expanded Food and Nutrition Program.**

I have received oral and written information about the study. I understand that people in the Expanded Food and Nutrition Education (EFNEP) are doing the study to develop a new assessment form. The study has been explain to me in a way that I understand. I agree to take part in the study and to fill out the forms or I will provide the information for someone else to fill out the form. I understand that every thing I write down or tell will be kept confidential. Information I give will be used only to improve the EFNEP program and my name **will not** be used on any forms or reports.

I understand that I will be asked the following information:

- where I live
- my race
- my family income
- what government help I receive
- what grade I finished in school
- what foods I eat
- some of the things I do when I buy, store, and cook food.

I will allow an EFNEP technician to come to my home and teach me nutrition lessons for a period of 3 to 6 months. The technician will fill out some forms with the information I give her on the above topics.

If I have any questions concerning the study, I will contact:

Dr. Ruby Cox
Virginia State EFNEP Coordinator
412 Femoyer Hall
Dept. of Human Nutrition and Foods
Virginia Tech
Blacksburg, Virginia 24061-0228

Phone Number: 703-231-7156

APPENDIX K

**PROCEDURES FOR ADMINISTERING THE FOOD BEHAVIOR
CHECKLIST**

Procedures for Administering the Food Behavior Checklist

- 1) Explain the purpose of the study. You may want to use the purpose that is stated below

PURPOSE - These questions will be asked to determine what practices need to be taught to EFNEP homemakers and to improve the EFNEP program. There are no right or wrong answers. Please answer them as closely as possible to your actual practices. By providing these answers, you will help EFNEP to better serve others.

- 2) Read the Human Subject Form to each homemaker and obtain her/his signature.
- 3) You are to read each question on the Food Behavior Checklist to the homemaker and give her the 3 possible choices to chose from.
- 4) After asking 2 to 3 questions repeat the possible answer choices for the homemaker.
- 5) If homemakers want to fill out the Food Behavior Checklist themselves you may allow them to do so. However, let them know that they may ask you any thing about the questions that they do not understand.
- 6) After the homemaker has filled out the Food Behavior Checklist, review all of them for completeness.

APPENDIX L
GUIDELINES FOR COLLECTING A 24-HOUR RECALL

Guidelines for Collecting a 24-hour Dietary Recall

GUIDELINES FOR TAKING RECALLS - Amounts should be as accurate as possible. By using the items in the kit, you should be able to be more accurate with amounts. Homemakers may not be able to give amounts of ingredients in their portions of mixed dishes, salads and casseroles. You should try to probe for others. Do not ask leading questions or make judgements about what or how much was eaten.

Start with the most recent meal or snack that the homemaker ate or drank. Work backwards to cover all foods and beverages consumed in the last 24 hours.

Use some of the following questions to find what foods have been eaten. These examples of open-ended questions pertain to when food was eaten, activities that might involve eating, and specific information about reported items.

- 1) The first type of probing is related to time.
Examples: "At what time was this? Did you eat or drink anything after that?"

"What did you have at that time?"

"At what time did you go to bed?"

- 2) The second type of probe is related to the respondents's activities.
Examples: "While you were working around the house did you take a break to have something to eat or drink?"

"Did you watch TV last night? When you watched TV, did you eat anything? Did you have anything to drink with this?"

- 3) The third type of probe tries to get more complete information about foods already reported.
Examples: "Do you remember anything else that you ate or drank with this foods?"

"What else did you have at this meal?"

"Was the (bread, vegetable) eaten plain or did you put something in your coffee?"

"Did you have a second helping?"

After all foods are named by the homemaker, go back over the lists to obtain additional information and amounts. Ask whether all of the food was eaten or if some was left.

Tips to keep in mind while obtaining additional information.

- a) Encourage the homemaker to describe foods as clearly as possible. The aide may have to restate questions to get more information.
- b) Describe combination dishes carefully. Mixtures such as sandwiches, soups, stew, pizza, casseroles, etc. can be prepared in many ways.
- c) If nutrition questions are being asked by the homemaker during the time the recall is being taken note them and ask if you may answer them when you have completed the recall.

KIT - To assist you in taking the assessment, a kit has been prepared for your use. It contains the following:

Cup - 1 8 oz. plastic measuring cup

Bowls - 2 different shapes - 1 cup each

Small sauce dish - 1/2 cup measure

Spoons - 1 Tablespoon

- 1 teaspoon

10 Plastic shapes include:

example to measure

A - 1" square

1" cube cheese

B - 2" square

brownies

C - 1/16 of a layer cake

cake

D - 1/12 of a layer cake	cake
E - 1/8 of a 9" pie	pie, quiche
F - 1/7 of a 9" pie	pie, quiche
G - 1/6 of a 9" pie	pie, quiche
H - 3" square	1/9 of a 9" sheet cake
I - 4" circle	danish, pancake
J - 1/4 of a 10" pizza	pizza

Each technician will add two plastic containers with tight fitting lids to the kit. One will be filled with rice and the other with beans. Rice will be used as an example for measuring more dense foods such as mashed potatoes and oatmeal. Beans may be used for foods that are loosely packed, such as cereal or vegetables.

When in doubt have the homemaker pour the beans or rice into a bowl or onto a plate to show how much she has eaten. Then pour the rice or beans into the 1/2 cup measure or into the 8 ounce cup to determine the amount she ate.

This kit is provided to you to help the homemaker better estimate how much she ate. It is very important that we have accurate amounts of each food and beverage that was consumed. The contents of the food recall kit should be placed to one side of the table between you and the homemaker while taking the recall. After the foods are listed, the models should be used to help the homemaker estimate the amounts.

Please report the amounts in the following ways:

- a) **NUMBERS** - Some foods are reported in numbers. For example, an egg, donut, fruit, etc.
- b) **SHAPES** - Foods may also be described by the shape commonly used in referring to the food. For example, a pat of butter, a stalk of celery.
- c) **DIMENSIONS** - For some foods that size of the portion eaten should be obtained by using the plastic shapes in the kit. For

example, ask the homemaker which pie shape is the closest to the size piece of pie she ate. Record the size of the letter of the piece so that coding will be easier later.

- d) **VOLUME** - All liquids and many foods will be measured by volume. The food kit contains a measuring cup, bowls and spoons, some of which are marked with ounces and cups. When appropriate, ask the homemaker to select the size and type of modes used to indicate what she has eaten.
- e) **WEIGHT** - some amounts are expressed in weight. Cheese, fish, chicken, beef, pork, etc. are examples of food measure in ounces. For hamburgers made at home, ask the homemaker how many she maker from one pound of meat. If she says she usually makes 4 hamburgers from 1 pound of meat then 3 ounces would be recorded.

REMEMBER - Coffee, tea, milk and kool-aid are coded in cups (1 cup is equal to 8 ounces). If a homemaker has a mug or cup she normally drinks from, have her fill that cup or mug with water and then pour it into the cup from the kit to determine the actual amount she drinks. You may find that a mug holds more than 1 cup and so it should be recorded as 1 cup plus the additional amount.

Carbonated and alcoholic beverages are coded in ounces and usually the homemaker can indicate the bottle or can size. You may record ounces by using the measuring cups as well.

APPENDIX M
INSTRUCTIONS FOR USING THE DIAGNOSTIC REPORT

Instructions for Using the Diagnostic Report

1. Tell the homemaker that this is a computerized assessment of the 24-hour recall that you collected on the previous visit.
2. Go over all 16 items on the first page of the diagnostic report and describe in details what the results mean. Enforce positive findings and let the homemaker know what areas need to be addressed. **NEVER CRITICIZE A HOMEMAKER FOR POOR-NUTRITION RELATED PRACTICES.**
3. Go over page 2 with the homemaker and identify the five food groups and foods that were eaten and contribute to the intake from that group.
4. Go over page 3 with the homemaker and explain the homemakers actual intake and what the RDA are for specific nutrients.

APPENDIX N
EFNEP LESSON LOG

Virginia Cooperative Extension

VIRGINIA TECH AND VIRGINIA STATE

VIRGINIA'S LAND GRANT UNIVERSITIES

Publication 360-023

Revised 1990

EFNEP LESSON LOG

Technician's Name _____ Homemaker's Name _____
 Date Enrolled _____ End Date _____

Title of Lesson	Check (✓) If Needed	Date Taught	Check (✓) Type		Comments
			Indiv.	Group	
How Food Affects You					
Nutrients We Need					
Iron and Your Health					
Calcium and Your Health					
Fruits					
Vegetables					
Milk and Cheese					
Bread, Cereal and Pasta					
Meat, Poultry, Fish and Eggs					
Dried Beans/Peas Protein Pairs					
Planning Makes the Difference					
Let's Make Something Simple					
Shopping Basics					
Making Meals from What's On Hand					
Breakfast Is Smart					
Home Invaders					
Food Safety and Storage (Advanced)					
Putting It All Together					
Gardening					
Food Preservation					
Dietary Guidelines for Americans					
Eating & Cooking the Low-Fat Way					

(Continued on back)

EFNEP LESON LOG CONTINUED

Title of Lesson	Check (✓) If Needed	Date Taught	Check (✓) Type		Comments
			Indiv.	Group	
Shake the Salt Habit (Sodium Reduction)					
Sugar: Know the Facts					
Eating Right and Light					
Weight Control					
Eating Right... For Two					
Feeding Your Infant					
Feeding Baby Solid Food					
Feeding Your Preschool Child					
Other (list:					

RECORD OF PLANNED VISITS WHEN HOMEMAKER NOT HOME

Date of Visit	Title of Planned Lesson	Reason Homemaker Not Home (If Known)

Virginia Cooperative Extension programs, activities, and employment opportunities are available to all people regardless of race, color, religion, sex, age, national origin, handicap, or political affiliation. An equal opportunity/affirmative action employer.

Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, and September 30, 1977, in cooperation with the U. S. Department of Agriculture. James F. Johnson, Director, Virginia Cooperative Extension, and Virginia Polytechnic Institute and State University, Blacksburg, Virginia; Clinton V. Turner, Administrator, 1890 Extension Program, Virginia State University, Petersburg, Virginia.

APPENDIX O
REVISED VERSION OF THE FOOD BEHAVIOR CHECKLIST

Version After Pilot-Test

**FOOD BEHAVIOR CHECKLIST
EXPANDED FOOD AND NUTRITION EDUCATION PROGRAM**

Date: _____ Homemaker ID Number: _____
Name of EFNEP Paraprofessional _____

Who in your household usually buys the groceries? _____

Who in your household usually prepares meals and snacks? _____

Please respond to the following statements in regard to who does each activity (names listed above). If you, **the enrolled homemaker**, usually do these task respond to all statements in regard to what **you do**. If someone besides you does a task, you should tell what that person does. It is important that all responses be based on what is actually done in the household, not what should be done. Show your response by placing a check () in the chart under the response that most closely matches what is done by you or another household member.

Activity/Task	Never or Seldom	Sometimes	Usually	Always
1. Do you plan at least a few days ahead what your family will eat for meals?				
2. When choosing a snack for yourself, do you eat only what you think will taste good at the time?				
3. When choosing a snack for your child (children), do you give them what they want to eat at the time?				
4. Do you plan a certain amount of money to spend on food when you decide how to spend the family's money?				
5. Do you check to see what you already have on hand before you go to the grocery store?				

Activity/Tasks	Never or Seldom	Sometimes	Usually	Always
6. Do you have leftover foods sitting out on the table or counter for 2 hours or longer?				
7. Do you cover food that is sitting out on the counter or table?				
8. Do you use foods-on-hand when you decide what to make for family meals?				
9. Do you cook green or yellow vegetables by covering them with water?				
10. Do you trim off all visible fat before cooking?				
11. Do you pan fry meats?				
12. Do you cook meat in the oven?				
13. Do you deep fry meats?				
14. Do you use gravy with meats?				
15. Do you use butter, lard, or solid shortening for making baked foods (bread, cake, pies)?				
16. Do you use butter, lard, bacon grease, or other animal fat to season food?				
17. Do you pour the grease off of meat after it is cooked?				
18. Do you select low-fat foods?				
19. Do you thaw frozen food by letting it sit out on the counter or table?				
20. Do you obtain free food from any where?				
21. Do you read labels when buying foods?				

Activity/Tasks	Never or Seldom	Sometimes	Usually	Always
When buying foods, how often do you read the label for the following?				
(22) Sugar content				
(23) Cholesterol content				
(24) Fat content				
(25) Sodium content				
(26) Mineral content				
(27) Vitamin content				
(28) List of ingredients				
29. Do you use drinks or foods that are high in caffeine during pregnancy or when breast feeding?				
30. Do you use non-prescription drugs during pregnancy or when breast feeding?				

VITA

Juanita Bowens was born October 12, 1962 in Pineville, South Carolina. She was raised in a small rural town and attended public school in St. Stephen, South Carolina.

She attended South Carolina State College (SCSC), Orangeburg, South Carolina, where she majored in biology and minored in chemistry. She received her Bachelor of Science Degree in 1985. She enrolled in the Master's Program in Nutritional Science at SCSC in 1986. She received her Master of Science Degree in 1988. In August 1989, Juanita enrolled in the Ph.D program in Human Nutrition and Foods at Virginia Polytechnic Institute and State University (VPI &SU). She received her Doctor of Philosophy Degree from VPI & SU in 1993. Her professional activities included teaching science and health courses in the secondary school and at the collegiate level, presenting nutrition lectures, working as a computer operator, and academic counselor for students with special academic needs.

Presently, Juanita holds membership in the American Dietetic Association, Society for Nutrition Education, and Alpha Kappa Sorority, Incorporated. She has been invited to become a member of Omicron Nu, and Phi Upsilon Omicron.

Juanita Bowens