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# Comparisons Among Dietary Parameters for Wayne County, Tennessee, Homemakers, Preschool Children, and Families Enrolled in the Expanded Food and Nutrition Education Program

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To the Graduate Council:

I am submitting herewith a thesis written by Patsy A. Ezell entitled "Comparisons Among Dietary Parameters for Wayne County, Tennessee, Homemakers, Preschool Children, and Families Enrolled in the Expanded Food and Nutrition Education Program." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Nutrition.

Gail W. Disney, Major Professor

We have read this thesis and recommend its acceptance:

Jean D. Skinner, Cecil Carter, Etta Mae Westbrook

Accepted for the Council:
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Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

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# COMPARISONS AMONG DIETARY PARAMETERS FOR WAYNE COUNTY, TENNESSEE, HOMEMAKERS, PRESCHOOL CHILDREN, AND FAMILIES ENROLLED IN THE EXPANDED FOOD AND NUTRITION EDUCATION PROGRAM

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ABSTRACT

This study was conducted in conjunction with the Wayne County Expanded Food and Nutrition Education Program (EFNEP), Tennessee Agricultural Extension Service. The primary objectives of the study were to compare EFNEP dietary scores (based on the number of servings from the four food groups) of homemakers with scores for foods served to all family members, to compare the dietary scoring method currently in use by EFNEP with scores derived from nutrient analysis, and to identify factors which may influence low income homemakers to eat differently than other family members.

The study involved 45 families, homemakers, and preschool children enrolled in EFNEP in Wayne County. A 24-hour dietary recall was obtained from the homemaker for herself, her oldest preschool child, and for foods made available to all family members. An information sheet was also used to collect other pertinent dietary data. The family records kept by EFNEP were made available to provide background information for the study. All food recalls were evaluated and scored by the EFNEP scoring method and by computer nutrient analysis.

Families were served significantly ($P < 0.05$) more adequate diets than were consumed by homemakers or preschool children when evaluated by the EFNEP scoring method based on servings from the four food groups. Homemakers and preschool children consumed a mean of 100% or more of the RDA for niacin, phosphorus, protein, riboflavin, thiamin, and vitamin A. The mean percentages of the RDA consumed by homemakers for kilocalories and ascorbic acid were above the two-thirds level, as were the mean

percentages of the RDA consumed by preschool children for kilocalories, calcium, and ascorbic acid. The mean percentages of the RDA for calcium and iron consumed by homemakers fell below the two-thirds level of the RDA, while only the mean percentage of iron fell below the level of two-thirds of the RDA for the preschool children's group. When evaluated by the mean percentage of the RDA per 1,000 kilocalories, the mean percentages of all nutrients consumed by homemakers and preschool children were above the two-thirds level of the RDA per 1000 kilocalories.

When homemakers' and preschool children's mean scores derived by the EFNEP, dietary, and nutrient density methods were compared, no significant differences were found. A lack of significant correlation between scores led to further investigation which revealed that the EFNEP scoring system did not consistently identify individuals with low or high nutrient intake. The EFNEP scoring system tended to underestimate the nutrient quality of diets and rarely overestimated.

Preschool children's mean EFNEP scores were significantly higher ($P < 0.05$) when their mothers had completed more than eight years of formal education, while the number residing in the household was found to be negatively correlated ($P < 0.01$) with the homemakers' thiamin and ascorbic acid ratings. Farm preschoolers' mean EFNEP scores were significantly higher ($P < 0.05$) than were preschoolers' scores who resided in a rural non-farm setting.

Results of this study indicated that the homemakers' and their preschool children's diets were closely related. No significant differences were found in their dietary intake when evaluated according to needs based on age and sex.

Based on findings in this study and the experience of the investigator with the Expanded Food and Nutrition Education Program, the following recommendations were made to strengthen the accuracy of the EFNEP scoring method:

1. A re-evaluation of EFNEP's generalized approach to scoring foods from the four groups is needed in order to more adequately reflect food choices with vitamin A and ascorbic acid content.
2. EFNEP program aides should be thoroughly trained and periodically evaluated to determine the reproducibility of recall results and scores.
3. Food recalls recorded in actual serving sizes would more accurately reflect dietary intake than the food contact method of evaluating recalls presently used by EFNEP.
4. A series of 24-hour food recalls, rather than the single recall would increase the reliability of the 6 month assessment of individual dietary intakes.

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# CHAPTER I

## INTRODUCTION

Sociological changes over the years have had a profound impact on patterns of food consumption in the United States. In many instances, change has had adverse effects on the nutritional status of the population (1). There is abundant evidence to indicate that many Americans are not optimally nourished (2).

In 1968, the United States Department of Agriculture released its first results from the Household Food Consumption Survey (2). The report stated that the percentage of U.S. households having "good" diets (per person daily intake equal to or above the full Recommended Dietary Allowance for seven nutrients) declined from 60 to 50% from 1955 to 1965. The percentage with "poor" diets (less than two-thirds of the RDA for one or more nutrients) increased from 15 to 20% in the same time period.

The decline in the quality of American diets seemed largely to be a phenomenon reflecting a combination of socio-economic and cultural factors associated with increasing urbanization, mobility, and changes in lifestyles accompanying affluence (3). Therefore, evidence indicated that a massive program of nutrition education was the most appropriate method to use to combat deteriorating American diets. Consequently, foods and nutrition education programs became a high priority item across the country.

Several types of foods and nutrition programs were established to aid various audiences in need of dietary assistance. One such program

was established through the Agricultural Extension Service. The federally funded Expanded Food and Nutrition Education Program (EFNEP) set up as its objective to help low income families acquire knowledge and skills, and to change behavior so as to achieve more adequate diets for all family members (4).

The primary target audience of the Expanded Food and Nutrition Education Program are homemakers of low-income families. Through paid paraprofessional program aides who are trained and supervised by professional home economists, homemakers enrolled in EFNEP receive instruction and assistance in nutrition, meal planning, food buying, storage, preparation, serving, and sanitation practices (5).

The Expanded Food and Nutrition Education Program uses the 24-hour food recall to collect dietary information to assist in evaluating progress of the program. When a family is enrolled, an initial recall is taken from the homemaker. As long as the family remains on the program, recalls are taken at six month intervals. The recall information collected is based on what the homemaker has consumed during the past 24 hours. No recalls are collected for other family members. Research shows that the EFNEP homemaker is often the least well fed member of the family (5,6).

Comparisons between the recalls taken at six month intervals are made by evaluating the number of servings from each of the four food groups for each recall. Food practices are then evaluated by comparing the number of servings from each food group to the number of servings recommended by USDA's Guide to Good Eating (7). Comparisons between food recalls are used as a measurement device to determine if progress is being made in helping homemakers and other family members improve the quality of their diets.

In this study, comparisons among dietary parameters for Wayne County, Tennessee, EFNEP homemakers, their oldest preschool child, and foods made available to all family members during a 24-hour time period were made. The objectives of the study were:

1. To compare the EFNEP scores for 24-hour dietary recalls of low-income homemakers with the EFNEP scores for foods served to their families during the same 24-hour time period.
2. To compare the nutrient intake of low-income homemakers with the nutrient intake of the oldest preschool child based on calculated nutrient totals derived from 24-hour dietary recalls provided by the homemaker.
3. To compare the dietary scoring method currently in use by EFNEP with a score derived from nutrient analysis of 24-hour dietary recalls taken from the homemakers.
4. To identify factors which may cause low income (EFNEP) homemakers in Wayne County to eat differently than other family members.

It was hypothesized that low-income (EFNEP) homemakers do not always eat the same foods in the same amounts that they serve other family members. The preschool child was the family member chosen for direct comparison because he/she would be the family member most apt to have the same eating experiences as the homemaker. This information was essential to establish the relationship between what was served to other family members and what they actually consumed.

# CHAPTER II

## REVIEW OF LITERATURE

A review of available literature on topics relevant to the Expanded Food and Nutrition Education Program and other pertinent information is presented in this chapter. The topics are discussed under the headings of (A) dietary data collection methodologies, (B) dietary evaluative tools, (C) dietary intake of the family, the homemaker, and the preschool child, and (D) factors affecting the dietary intake of the families, homemakers, and preschool children.

### A. Dietary Data Collection Methodologies

A review of the literature indicates that there are a variety of methods used to study dietary habits and food consumption patterns of individuals and groups. The advantages as well as the limitations of each method must be considered (8). Selection of a viable method should depend on the objectives of the study, the characteristics of the population being surveyed, and resources available.

Several different methods have been used for the collection of information from subjects about their personal food consumption habits. Data of this type may be collected by the use of written questionnaires or by personal interview. Currently, methods most commonly used to collect data from individuals include food records, diet histories, food intake frequencies, and food recalls (8,9,10).

Food Record

Food records require the subject to keep a written account of all food consumed for a specific period of time, usually one to seven days (11). The amounts of food eaten may be recorded in actual weights or in common household measures (12). A literate sample is required if the food record is to be self-recorded. This method of data collection produces very precise data (8); however, the technique is expensive, and often requires constant supervision from the investigator when weighed measurements are used. In addition, self-recorded food records may influence the diets of the subjects involved; subjects may have a tendency to selectively delete or add foods which may make their dietary intake appear to be more adequate.

Diet History

The diet history is used to identify the usual food consumption patterns of an individual over a period of time (13). Extensive information is collected through a personal interview with each subject. The interview includes questions about usual food patterns and a listing of recent food intake. Because the data reflect the long-term food habits of the subject, data from diet histories can be correlated with clinical and biochemical results (10). This method is also applicable to group surveys (14,15). Beal (14) observed that the major disadvantages of the diet history method are the need for highly skilled and trained interviewers, and the expense involved with the lengthy interview process.

## Food Frequency

The food frequency technique is useful for both individual and group data collection (16). This method also focuses on usual food habits rather than food intake. The food frequency method differs from the diet history in that attention is focused on a limited number of specific foods rather than the general food and dietary pattern.

## Dietary Recall

Another method of collecting dietary information is the dietary recall. In a personal interview, the subject is asked to recall from memory all foods eaten during a specified period (9). Amounts of foods consumed are estimated and recorded by the interviewer in household measures. Food models may be used to assist subjects with estimating the amount of foods eaten.

Food recalls over varying time periods have been used in dietary evaluations. Adelson (17) concluded that as the time period of the recall increased, data were less accurate. Therefore, the 24-hour recall is widely used as a data collection tool. It has been found to be an accurate technique for gathering group data (18). According to Marr (8), women recall their food intakes more accurately than men.

Young et al. (19), in a frequently cited study, reported that the 24-hour recall will produce the same results and values as the 7-day food record when used with groups of roughly 50 persons or more and when a 10% error factor can be tolerated. It should be noted that Young did not study the validity of the methods of dietary data collection, only whether these methods gave similar values, and not if the values themselves were accurate (20).

For group evaluation, there is a widespread agreement that a 24-hour recall can provide valid information on usual nutrient intake (21). In a recent study, Gersovitz (22) reported that the 24-hour recall and the 7-day food record do provide equally accurate estimates of the mean intake of a group. Beal (23) concluded that the use of the 24-hour recall as the sole basis for evaluation may be justified in group surveys in which time, money, or personnel are limited.

Guthrie (24) suggested several advantages of using the 24-hour recall. Since the food recall interview session is not announced beforehand, the subject has no chance to alter his food habits (9,24). Subject cooperation is generally good; therefore a large sample is easily attainable. The 24-hour food recall has been used successfully with a variety of age groups, including elementary school children (21,25).

The 24-hour food recall is not, however, without its limitations. Marr (8) reported that a 24-hour recall would correctly classify 65% of the individuals for caloric intake; however, 5% would be grossly misclassified. When evaluating the results obtained from 24-hour food recalls on the basis of nutrient content, several investigators observed that it underestimated consumption (9,18). Trulson (26) found that when compared with 7-day dietary records and food patterns determined through interviews, the 24-hour recalls provided the lowest mean value for milk and protein consumption. In 1967, Pekkarinen (9) reported that recalls gave a considerably higher mean figure of the intake of many nutrients than weighed food records.

In a study conducted by Linusson et al. (27) in 1974, the investigators raised serious questions as to the use of the 24-hour recall

for group comparisons. The results of the study indicated that for 8 of the 14 groups tested, the mean obtained from 24-hour recalls significantly ($P < 0.05$) underestimated the actual mean intake. Regression analysis between the recalls and actual intake values showed the characteristic "flat slope syndrome"--a tendency to overestimate when consumption is low, and to underestimate when consumption is high.

In a 1976 study, Madden et al. (18) attempted to measure the internal validity of the 24-hour recall. When validity was tested using the paired-t test, no significant difference was found between the mean recalled and the mean actual intake of nutrients, with the exception of calories. These results indicated that the reported intake of calories probably underestimated the mean intake of the group being tested. When regression analysis was applied, results indicated that for three of the eight nutrients considered, a significant difference ($P < 0.05$) between actual and recalled intake was reported. Small intakes tended to be over-reported and large intakes under-reported. These results indicated that the 24-hour food recall seems to be statistically conservative for group comparisons. Madden et al. (18) stated that this situation would seldom result in reporting a "false negative." The importance of this observation lies in the use of dietary survey data to evaluate the impact of nutritional supplementation and education programs.

A drawback in the use of the 24-hour food recall as a dietary data collection method is that it may not present a typical picture of the subject's long-time food intake (9,23). This method, therefore, is not an appropriate one for determining the nutrient intake of individuals (19). Another problem in using the food recall method is that some foods eaten

may be forgotten on the recall, resulting in incomplete data. Subjects may also give untruthful information on purpose to make their diet appear to be adequate--a problem with any self-reported method of dietary data collection (9). A tendency to underestimate caloric intake has been reported in studies using food recalls (18,27). Accuracy of the recall can be increased, however, with the use of trained interviewers (2). The attitude of the interviewer may be a decisive factor in determining the success of the food recall (9).

Other factors which may influence the accuracy of the 24-hour food recall are pointed out in the Expanded Food and Nutrition Education Program publication Basic Lessons for Training Extension Aides (28). These include the number of times the 24-hour recall has been administered to the homemaker, the interviewer's ability to write down what she thinks the homemaker means, and the effect of interviews on people.

## B. Dietary Evaluative Tools

### Food Guides

Food guides have been used by nutritionists since the 1920's as a device for teaching how to plan adequate diets and to make wise food selections (29). The Guide to Good Eating (7) was originally established by the United States Department of Agriculture in 1956, and was based on the 1953 Recommended Dietary Allowances. It was established to help homemakers prepare nutritionally adequate meals for their families (30,31). The Guide presently in use (Hassle Free Guide to Good Eating, 1979) suggests a minimum number of servings daily from each of four groups to provide a basis for a nutritionally adequate diet. For adults, the guide

recommends two or more servings daily from the milk group; two or more servings daily from the meat group; four or more servings daily from the vegetable/fruit group; and four or more servings daily from the bread/cereal group. A fifth group was also added to the new revision--fats, sweets, and alcohol. However, due to the non-nutritive nature of foods included in this group, no number of recommended daily servings have been established.

The Guide to Good Eating has been an accepted dietary evaluative tool for many years. It has been used intensively for teaching nutrition principles and for comparing the nutritional quality of diets. Kohrs et al. (32) stated that the Food Guide is an educational tool for nutritionists to help non-professionals translate nutrient needs into foods.

With a growing concern for the gap between knowledge and application in the daily eating patterns of children and adults, there are increased questions concerning the effectiveness of teaching nutrition by food groups (10,29,30). Skinner (10) observed that our youth are ready for a more sophisticated approach to nutrition. Poolton (29) and Skinner (10) stated that food groups tell students what to learn and thus imply that is all there is to know about nutrition. Using the Basic Four Food Guide may exclude application of the discovery method of learning. Learning through problem solving activities could promote the discovery of meaningful nutrition principles; Poolton (29) asserts that the Basic Four Food Guide does not encourage this type of learning experience.

Poolton (29) suggests that the Basic Four Food Guide may impose restrictions that many persons are not willing to accept and practice.

This may occur when favorite popular foods are not included in the evaluative grouping.

A major criticism of the Basic Four Food Guide as a dietary evaluative tool is that it does not insure a diet which meets the Recommended Dietary Allowance for all nutrients (30). Since 1953, the Recommended Dietary Allowances have been revised five times, and the allowances for all nutrients except calcium have been changed. In addition, recommendations for eight nutrients have been added. King et al. (30) questioned whether the Basic Four Food Guide remains an adequate guide for selecting a well-balanced diet as judged by the 1974 Recommended Dietary Allowances. In a study conducted by King et al. (30) the nutrient content of 20 published menus based on the Basic Four Food Guide was determined by computer analysis. The menu analysis showed that one-half of the 16 nutrients evaluated other than energy did not meet the 1974 RDA, even though the menus were cited in nutrition publications as examples of good diets. Five nutrients in the Basic Four menu items were below two-thirds of the recommended allowance. King et al. (30) concluded that the Basic Four Food Guide needs modification to better meet the current nutritional recommendations for adults. It has also been suggested that a focus on nutrients might be preferable to one on food groups for future dietary evaluations (10,29).

## Recommended Dietary Allowances

The Recommended Dietary Allowances (RDA), established by the Food and Nutrition Board of the National Academy of Science-National Research Council (33,34), is set up as a guideline for attainment of optimum nutrition (35). It is designed for maintenance of good nutrition in most healthy persons in the United States, including infants, children of all

ages, adults, and pregnant and lactating women.

Criticism of the RDA as a measure of nutritional status is based on the fact that they allow for an excess of over and above what some individuals really need (35,36). Kohrs et al. (32) reported that the RDA does not necessarily represent the amount of nutrients required by an individual to maintain health. It is designed, however, to meet the needs of 97.5% of the healthy population. The RDA was purposely designed with a built-in safety factor. The safety factor provides for a public preventive measure based on the objectives of good health for the population of the United States (35).

Food Composition Tables

There are several food composition tables presently being used in evaluating dietary information. Frequently used examples are the USDA publications Home and Garden Bulletin No. 72 (37) and Composition of Foods, USDA Handbook No. 8 (38) as well as Food Values of Portions Commonly Used (39). Each table lists the nutrient content of foods in either 100 gram units or in common household measures. Tables of food composition report nutrient content of foods as average values (10,30,40). The information used in preparing data for the tables is usually derived from several laboratories (41).

Food composition tables have several limitations. Hunscher and Macy (42) stated the importance of recognizing the fact that there are wide differences in the composition of the same foods at different times and under varying conditions. Differences may occur due to ripeness, species, type of soil, growing conditions, geographic origins, marketing and storage conditions, and food preparation techniques (10,40,42). Due

to these differences in foods under various conditions, Beal (14) and Harris (43) pointed out that food composition tables introduce obvious error into a study.

Not all foods have been analyzed for nutrient content; this is especially true of new and combination foods (10). Although food tables are periodically revised to include new and additional items, there is a time lag. Whenever an item is not found in the food table being used, the investigator must use his best judgment in making substitutions (40).

In less exacting studies, Hunscher and Macy (42) suggested that it may be satisfactory to estimate the approximate dietary intake of individuals using standard food composition tables. The researchers pointed out that dietary intake of an individual must not be confused with the nutritional status of an individual. Dietary intake can be estimated and analyzed through the use of recalls and food composition tables; however, nutritional status, which involves the actual condition of the person, cannot be determined from such data alone.

## Scoring Methods

A single measure of dietary adequacy is necessary if dietary data are to be compared with other characteristics of an individual or group (10). Researchers have developed and used a variety of dietary scoring methods. Variation of dietary scores are based on degrees of adequacy of intake for several nutrients (10,44).

A common method of dietary scoring assesses dietary adequacy by comparing intakes with the Recommended Dietary Allowances of the Food and Nutrition Board. Since the allowances do include a safety factor, two-thirds of the allowance is usually considered as a limit below

which dietary adequacy may be questionable (44,45).

Seiler and Fox (44) developed a dietary scoring method based on the RDA. Scores were calculated for each subject by comparing intakes of calories and individual nutrients, including supplements, with the appropriate RDA. Nutrient intakes below 25% of the RDA, from 25 to 75% of the RDA, and above 75% of the RDA received ratings of -1, 0, and +1, respectively. Since the subjects in this study were pregnant, 75% of the RDA was used as a measure of dietary adequacy instead of the frequently used two-thirds level. The separate nutrient ratings were added to provide a single dietary score with 10 being the highest score attainable.

Skinner (10) used an adaptation of the scoring method developed by Seiler and Fox. Each subject's daily intake of eight specified nutrients plus calories was compared with the RDA for the appropriate age and sex group. Intakes for each nutrient equal to or less than 33% of the RDA were awarded 0 points; intakes of 34-65% of the RDA received 1 point; and intakes equal to or above 66% of the RDA received 2 points. The maximum dietary score was 18.

In a study conducted by Dierks and Morse (46), dietary scores based on the RDA were grouped according to the percentage of those whose intake exceeded 75% of the RDA, those whose intake fell between 50 and 75%, and those whose intake was less than 50%. The diets were designated as good, fair, and poor, respectively.

Using a nutrient analysis program developed by the University of Missouri Extension Service, Kohrs et al. (32) developed a computer program to calculate the percentage of the 1974 RDA consumed by an

individual. The computed percentage of the RDA was based on the age and sex of the subject. Four nutrient levels were delineated, based on the RDA for each nutrient: (a) greater than or equal to 100% of the RDA, (b) 67% to 99% of the RDA, (c) 50% to 66% of the RDA, and (d) less than 50% of the RDA. The overall quality of the diets were rated excellent (amounts of eight nutrients and calories equal to or above the 1974 RDA for that person), good (one or more of the eight nutrients in amounts less than 100%, but with all nutrients supplying 67% or more of the required allowances), or poor (one or more nutrients consumed in amounts below 67% of the RDA).

In an earlier study of 104 preschool children conducted by Metheny et al. (47) dietary analysis was also based on the percentage of the RDA. Class I included all subjects whose intakes met 100% or more of the RDA for all nutrients; Class II included subjects reporting intakes of less than 100% for some nutrients, but a minimum of 67% for all nutrients; and, Class III included subjects who reported intakes of at least one nutrient below 67% of the RDA.

A more simple but less precise scoring method is based on the total number of servings consumed from each of the four food groups using the recommended number of servings as a measure of dietary adequacy (48). A study conducted by Michigan State University Cooperative Extension Service and the USDA Extension Service (49) scored food recalls by assigning a value of 16 (four for each of the four food groups) to the recall containing the recommended number of servings in all groups. A proportionate score was assigned to recalls reporting less than the recommended number of servings. Another method of scoring based on the

recommended number of servings consumed from each food group is based on a score of 100 (5). This method, presently in use by the Expanded Food and Nutrition Education Program, bases its score on a progression system utilizing first the number of servings from the milk group, followed by the meat, vegetable and fruits, and grain groups, respectively.

## C. Dietary Intake of the Family, the Homemaker, and the Preschool Child

### Family

The 1977 Nationwide Household Food Consumption Survey (50), conducted by the United States Department of Agriculture, pointed out several trends which have developed in the food habits of the American family since 1965 when a similar survey was conducted (2). The study indicated that several of the trends may affect the nutritional status of families and individuals.

A major trend reported is that of eating away from home. The proportion of total money used for food that was spent on food away from home increased from 17% in 1965 to 24% in 1977 (50). Households with relatively higher incomes used more of their money for food away from home than did lower income households in both surveys. One reason why this trend is of concern is that foods consumed at fast food restaurants and other establishments--and possibly their caloric and nutritive content--differ from the foods they replace in diets consumed at home (51,52).

Compared with the 1965 Food Consumption Survey (2), in 1977 substantially less of the home food dollar was spent on eggs, legumes, nuts, fats and oils, sugar, syrup, jelly, and candies (50). However, more of the family's home food dollar went for soft drinks, punches, and prepared desserts in 1977 (50).

The 1977 Household Food Consumption Survey's findings (50) indicated a 10% decline in the level of food energy consumed from 1965 to 1977. However, the decline in food energy was not coupled with a decline in the level of vitamins or iron consumed, indicating that the foods consumed in 1977 had a higher nutrient density than those consumed in 1965.

Nutrients showing the greatest increase from the 1965 study to the 1977 study were ascorbic acid and thiamin, while calcium decreased significantly (50). The decline in the level of calcium intake may be related to the smaller proportion of children and teenagers in the population.

The 1977 Food consumption Survey pointed out the fact that the quantitative food consumption of Americans appears to be at a very low level (50). Other researchers have presented information which indicates that many households in the United States are existing at less than optimum nutritional quality levels. In a study conducted in Mississippi in 1967, the average diet of 60% of the families studied supplied less than two-thirds of the RDA for one or more nutrients. Thirty-one percent of the Caucasian families and 64% of the Negro families studied had less than 90% of the recommended servings of dairy products (53).

In a study conducted by Eppright et al. (54), calories from candy and soft drinks increased significantly with the total caloric value of the diet. The investigation revealed that the larger the number of calories from candy and soft drinks, the lower the vitamin A value of the diet.

There is common agreement that most families accept meats and protein-rich foods as a regular part of their daily diet. However, vegetables are not so regularly consumed (55). In a study conducted by the Michigan State University Cooperative Extension Service (49) on main food preparers and EFNEP program aides, the food group most frequently found to be adequate was the meat group. The food group least often meeting the Basic Four standard was the vegetable/fruit group.

Another trend that has developed in recent years is that of meal skipping (3). Parrish (3) indicated that 11% of the U.S. adults voluntarily skip the evening meal, 16% skip breakfast, and 20% skip lunch. Much of the loss in nutrient variety from meal skipping is not apt to be made up fully by other meals.

The results of the 1965 Household Food Consumption Survey (2) revealed that the percentage of U.S. households having "good" diets (per person daily intake equal to or above the full RDA for seven nutrients) declined from 60 to 50% from 1955 to 1965. The percent with "poor" diets (less than two-thirds of the RDA for one or more nutrients) increased from 15 to 20% in the same time period. Hegsted (56) pointed out that the low levels of food consumption indicated in the findings of the 1977 Food Consumption Survey make it increasingly difficult for many Americans to achieve the generous levels of nutrients specified in the RDA.

Another factor which may affect the dietary status of families is the use of nutritional supplements. In a 1965 study conducted by Dierks and Morse (46), the investigators reported that 71% of the 121 preschool children involved in the dietary analysis received nutrient supplements of some type daily throughout the year. Ten percent reported receiving supplements occasionally.

In a study conducted by Kohrs et al. (32) in 1978, the results indicated that the wide differences in the use of vitamin and mineral supplements between main food preparers and EFNEP program aides substantiated the influence of nutritional training. The program aides were more aware that nutrient supplements were generally not necessary if a variety of foods were consumed daily.

Eppright et al. (57), in a 1970 study, suggested that mothers who had favorable attitudes toward nutrition gave more vitamin and mineral supplements to family members than other mothers; however, they did no better or worse than others in food selection for their children.

In an investigation of preschool children, Guthrie et al. (58) found that children being given supplements received 50% more iron, 60% more niacin, and over 100% more vitamin A, thiamin, riboflavin, and ascorbic acid than did children who received no supplements. Except for iron, average intakes of these nutrients for the unsupplemented group were above the RDA for preschool children, indicating that supplements would provide little additional advantage.

Homemaker

Past research has indicated that EFNEP homemakers are generally the least well fed member of the family unit (6). Some factors which

may contribute to the homemakers' lower nutritional status are weight reduction and/or special diets, dislike for certain foods, and limited food resources, resulting in other family members consuming foods not available in large enough quantities for all family members.

Results of the 1977 Household Food Consumption Survey (50) indicated that for women 19 to 34, 35 to 50, and 65 years and over, average caloric intakes were more than 20% below the recommended allowance for their respective age groups. Protein intakes for women age 19 to 65 averaged 64 to 67 grams. Although the average protein intakes were lower in 1977 than in 1965, the 1977 levels were more than adequate to meet the 1974 RDA (50).

Calcium levels in female diets in the 1977 Food Consumption Survey were below the 1974 RDA for all age groups over 12 years of age (50). These groups reported average calcium intakes that ranged from 64 to 74% of the 1974 RDA. Since these are averages for age groups, it must be concluded that many individuals had intakes of calcium that were much below the recommended level.

In the 1977 Food Consumption Survey (50), average intakes of iron in female age groups 12 through 50 years of age met about 60 to 65% of the 1974 RDA for their respective age group. Although 1977 intakes of vitamin A were down from 1965, they were still sufficient to meet the 1975 RDA for all female groups. The 1977 study indicated that older adults are consuming more vitamin A foods. In contrast to other nutrients in the diet, the average vitamin A intake for adults generally increased for successively older age groups.

The 1977 Food Consumption Survey (50) also revealed that average intakes of thiamin in all age groups exceeded the 1974 RDA except for the 19 to 34 age women's group, whose intake just missed meeting the recommended level. Ascorbic acid and riboflavin intakes for all female age groups, when expressed as a percentage of the RDA, exceeded the 1974 recommendations by a large margin.

Preschool Child

Preschoolers are reputed to be problem eaters, yet, they have been the subject of relatively few nutritional studies (46). The rate of growth of a child is fastest during the first two years of life. During the preschool years (2½ to 6 years), physical growth levels off and nutritional needs decrease in ratio to body size. This phenomenon is usually accompanied by an indifference to food and eating (46).

Eppright et al. (54), reported that by three years of age, many children have developed a dislike for certain foods or type of foods, especially vegetables. The general distaste for vegetables among young children is a familiar finding, and has also been reported by Beal (23), Dierks and Morse (46), and Bryan and Lowenberg (59). It is at this point that mothers may have a tendency to overestimate the food needed by preschoolers and encourage overeating (54).

In the study by Dierks and Morse (46) involving 121 preschool children, the mean total nutrient intake met or exceeded the 1958 Recommended Dietary Allowances in calories, protein, iron, vitamin A, thiamin, riboflavin, and ascorbic acid in all age groups and both sexes. Niacin was the only nutrient reported low according to the 1958 RDA. However, when compared with the 1964 RDA, Dierks and Morse (46) found

that all values for both sexes and age groups fell below recommended allowances. When compared with the 1964 RDA, more than 90% of the children consumed diets containing more than 75% of the allowances for calories, protein, calcium, iron (4 to 6 year olds only), vitamin A, thiamin, riboflavin, and ascorbic acid (4 to 6 year olds only). The data also revealed that a substantial number of children had intakes of iron and niacin which fell between 50 and 74% of the 1964 RDA. The study indicated that a large number of the preschool children had diets below 50% of the 1964 RDA for ascorbic acid.

In an investigation conducted by Metheny et al. (47), 104 preschool children's diets were studied. Using 67% of the RDA as a "good" diet, Metheny et al. reported that slightly over 77% of the preschool children involved in the study had "good" diets. The study revealed that vitamin A was supplied in more nearly sufficient amounts, while iron was the nutrient least well supplied in the preschoolers' diets. The finding that iron commonly fails to meet the RDA for preschool age children concurs with Beal's findings (60) in a longitudinal study of 58 children ages 2½ to 5 years. Beal reported that as many as 75% of the children between 2½ to 5 years of age had iron intakes less than the established RDA. Metheny et al. (47) reported calcium, energy value, and thiamin were also among the least well supplied nutrients in the diets of preschool age children. Beal (60) found that preschool children had the lowest calcium intake at 2 to 3 years of age. By age five, there appears to be an acceleration of intake.

In a 1971 study conducted by Bell (61) based on criteria set up by the Interdepartmental Committee on Nutrition for National Defense, the

investigator reported that 18% of the low income children (monthly family incomes averaging $222) studied had low vitamin A levels, with 6% being classified as deficient. Six percent of the children also had low ascorbic acid serum levels. Fifty percent of the preschool children studied by Bell (61) had deficient levels of at least one nutrient; 8% of the population studied had low or deficient levels of two nutrients; 6% of the population had low or deficient levels of three nutrients. Overall, 64% of the population evaluated exhibited deficient or low levels of nutrition based on laboratory and dietary analysis.

In a sample of 163 children attending either a nursery school or public health clinic in Lansing or East Lansing, Michigan (mean age 4 years), Sims and Morris (62) reported that the children appeared to be adequately nourished for the most part. On the average, all nutrients except iron met or exceeded the 1974 RDA. The few children who had intakes below two-thirds of the RDA for any one nutrient usually reported deficient intakes of iron, ascorbic acid, calcium, or vitamin A.

Owen and Kram (63) reported in their 1968 survey of Mississippi preschool children that the lower income children had low intakes of calories, iron, ascorbic acid, and riboflavin. Their study revealed that dietary intakes of ascorbic acid paralleled income level: as income increased, so did the intake of ascorbic acid. The higher intakes of ascorbic acid by higher income groups were partially attributed to increased use of vitamin supplements. One-third of the lowest income group (less than $500 per year per capita) had ascorbic acid intakes of less than 15 mg daily.

In a 1967 study conducted by Armes (64), one-third of the 5,000 children enrolled in the Memphis Head Start Program were found to be anemic. Zee et al. (65) reported in a 1970 study of preschool children from impoverished black families in Memphis that his findings substantiated the evidence of undernutrition gathered by other investigators. Zee et al. (65) also reported that anemia was a common problem. Twenty-five percent of the children 3 to 6 years of age included in the study had deficient hemoglobin levels. However, these children did not show clinical evidence of iron deficiency.

The Health and Nutrition Examination Survey (HANES) (66) indicated that in 1971 and 1972, 14% of the white and 23% of the black children 1 to 5 years of age included in the study consumed food providing less than 1,000 calories daily--considerably less than the established RDA for that age group. Average iron intakes were also below the 1968 RDA for this age group.

The 1977 Household Food Consumption Survey (50) reported that children 1 to 5 years of age had average caloric intakes that were 15% less than in 1965. Intakes for this age group were about 10 to 20% below the 1974 RDA for caloric intake. Average calcium intakes for children 1 to 5 years met about 90% of the 1974 RDA for their age group. Vitamin A levels declined from 6 to 18% from 1965 to 1977 in the 1 to 5 year age group. Although 1977 intakes of vitamin A were down from 1965, they were still sufficient to meet the 1974 RDA for this age group. Intakes of ascorbic acid, thiamin, and riboflavin all met or exceeded the 1974 RDA as established for the preschool age groups (50).

Owen and Kram's 1969 study (63) confirmed the 1965 Household Food Consumption Survey (2) results that reported intakes of calcium, ascorbic acid, and riboflavin were the most limiting factors in the American diet. Decreasing consumption of milk and dairy products in general after 2 years of age could account for the apparently limiting supply of calories, calcium, and riboflavin in the diet of lower income children during the preschool years (63).

## D. Factors Affecting the Dietary Intake of Families and Individuals

The socioeconomic and demographic composition of the United States population has changed dramatically during the last decade, as have lifestyles. Factors such as increased numbers of mothers and homemakers in the work force, higher household incomes, inflation, increased availability of a variety of foods, and easier access to inexpensive fast food restaurants appear to have had a marked impact on the way families and individuals eat--and what they eat (1,50).

According to past research, the major factors which may affect the nutritional status of families and individuals include income, educational level of the homemaker, exposure to nutrition education, the number of persons in the household, the age of the homemaker, the family's place of residence, the amount of money spent for the family's food, and whether any type of nutritional or financial assistance is utilized (2,18,47,49, 53,57).

Income

The 1965 Household Food Consumption Survey (2) reported that dietary adequacy was related to family income. Each successively higher income level had a larger percentage of households with adequate diets. Among families making $3,000 or less per year, 20% used fewer milk products per person and 40% used more grain products per person than did families making $10,000 or more.

In a 1962 study, Metheny et al. (47) also found that the level of nutrient content tended to vary with family income. The greatest percentage of diets low in nutrient content was observed among children from the lowest income group. Using 67% of the RDA as a "good" diet, 81% of the children involved in the study had "good" diets in the $5,501-$7,250 income interval, 79% had "good" diets in the $3,751-$5,500 income range, and 72% had "good" diets in the income range under $3,750.

The 1977 Household Food Consumption Survey (50) revealed that the average money value of food used at home per person was 20% higher for the highest income group than for the lowest income group. Away from home food expenditures accounted for only 14% of the total money value of food for the lowest income level (under $5,500), whereas 29% was spent on food away from home by families in the highest income interval.

It is interesting to note that the money value of food per person for the lowest income group (under $5,000) in the 1977 Food Consumption Survey (50) averaged $15.42 per week, which was comparable with that for three middle income groups. The possible reason may be that the Food Stamp program provided a boost in expanding the food dollar in low income households. However, when respondents were asked if they had enough and

the kinds of food they wanted to eat, 9% of the lowest income group (under $5,000) responded that, sometimes or often, they did not have enough to eat (50).

The 1977 Household Food Consumption Survey (50) results indicated that the average nutrient levels for households in the lowest income group (under $5,000) improved more than those in other income ranges when compared with the results of the 1965 Food Consumption Survey (2). The level of energy in food used by the low income group showed less of a decline (9%) than the middle income groups (11%), primarily because of a smaller decline in fat use. With the exception of calcium, the levels of vitamins and minerals in the low income group increased between 1965 and 1977.

Households in the low income group (under $5,000) in the 1977 Household Food Consumption Survey (50) have traditionally used more bread and cereal products than higher income households. However, with the low income group reporting decreased use of these products in 1977, differences between the groups' use of bread/cereal products were smaller than in 1965. The 1965 study (2) indicated that the lowest income group ($3,000 and under) used 40% more bread/cereal products than families whose income was $10,000 or more.

The 1977 Household Food Consumption Survey (50) revealed that although the use of foods from the milk group by low income families declined, the consumption of foods from the meat, poultry, fish, and legume group and the vegetable/fruit group increased from the levels reported in the 1965 Household Food Consumption Survey (2). The 1965 survey reported that the low income group used 20% less milk products

per person than did higher income groups. It appears that the trend has continued through 1977.

In the 1977 Household Food Consumption Survey (50), the low income group used more dark-green and deep-yellow vegetables in 1977 than did higher income households. The low income group also decreased their use of eggs and dried beans. This group consumed more pork, poultry, fish, and luncheon meat, and less beef than other income groups.

Owen and Kram (63) reported that children from families who had yearly per capita incomes ranging from $1,000 to $1,500 had higher caloric intakes than did children from families with yearly per capita incomes less than $1,000. The higher income children received proportionately more calories from dairy foods and less from legumes and grains than the lower income children. In the lowest income group of children, Owen and Kram (63) reported that one-third had calcium intakes below 400 mg. daily.

In a study conducted by Eppright et al. in 1970 (57), the researchers used multiple correlation analysis to determine the order of importance of various factors in determining the nutritional quality of diets. Income was found to be of the greatest importance.

Kohrs et al. (32) reported that although an adequate income did not insure good nutrition, those below $3,000 were more likely to have poor diets (based on information from the 1965 Household Food Consumption Survey) (2). Metheny et al. (47) pointed out that income alone does not assure a good diet for family members. Many other factors play an integral part in determining the nutritional status of families and individuals.

Homemaker's Formal Education

Previous studies have indicated that the intake of certain nutrients, particularly vitamin A and ascorbic acid may be associated with certain family environmental characteristics, such as the mother's level of education (65,66). The positive effect of increased formal education of the homemaker on the nutritional status of families has also been documented by several other researchers (49,58,69). Wilson et al. (70) reported that the majority of homemakers whose diets were adequate were high school graduates or had some college experience. When the education of the homemaker and family income were compared together, Wilson et al. (70) found that the influence of education was apparently greater than that of income.

In a comparison of Expanded Food and Nutrition Education Program families in Louisiana, Jones and Satish (69) found that homemakers with more education were more likely to consume adequate quantities of milk than those who had less education. Eppright et al. (57) determined that as the educational level of the mother increased, intakes of calcium, iron, thiamin, riboflavin, and ascorbic acid increased significantly. The study revealed that mothers with more education appeared to stress vitamin and mineral-rich foods to a greater degree than energy-rich foods more often than did mothers with less education.

Jones and Satish (69) found that in a comparison of the number of servings of milk before and after the EFNEP training was administered, the homemakers with no formal education made the greatest change from initial to last food recall, and those with the most formal education made the second greatest change.

However, all past research does not support the theory that the nutritional level of families improves with increased education of the homemaker. Madden and Yoder (71) concluded, in a study of low income food stamp recipients, that education did not appear to be significantly related to dietary adequacy of the family.

Nutrition Education

Eppright et al. (57) determined that the nutritional knowledge of the mother varied directly with the educational level of the mother. In a study conducted by Jones and Satish (69) on EFNEP families, the investigators reported that 19% of the homemakers with no education had adequate numbers of servings of milk on the initial food recall, while 52% had adequate numbers of servings of milk on the final recall after the EFNEP training had been administered. However, Jones and Satish (69) found no relationship between increased nutrition education and the number of servings of meat consumed.

In a study conducted by Michigan State University Cooperative Extension Service on EFNEP homemakers (49), results showed that under the influence of EFNEP aides, there was an improvement in nutrition knowledge, food recall scores, and riboflavin excretion levels. These changes were positively correlated with the number of aide visits to the homemaker's residence.

Number in Household

Eppright et al. (57) concluded in a 1970 study that the number residing in the household was significantly and positively related to the food energy content of the family's diet. A significant relationship

was also shown between the number in the household and the niacin content of the family's diet. The study revealed that larger families showed a greater emphasis on the food energy content of the family's diet than on the mineral and vitamin content.

In a study conducted by Seiders (72), homemakers with 6 or more members in their family had the highest percentage of diets adequate in the bread/cereal group; those who lived alone had the lowest percentage of homemakers with adequate diets in this food group.

In a 1969 study, Eppright et al. (54) found that the larger the household and the greater the amount of money spent for food, the greater the consumption of candy and soft drinks by preschool children. Eppright et al. (57) reported that the larger the household, the less the mother knew about nutrition, and the less favorable were her attitudes about nutrition and meal planning. In a survey of 149 Negro children (73), two-thirds of the families had five or more members. When the families' diets were evaluated, fruit was the only group not adequately represented in the mothers' diets, although it was supplied to the children. Eppright et al. (57) found that as the number in the household increased, the ascorbic acid content of the family's diet decreased significantly.

Age of Homemaker

In a 1970 study conducted by Fox (74), 44% of the mothers with preschool age children were over 30 years of age. The age of the homemaker was found to be negatively related to the adequacy of the family's diet in a study conducted by Madden and Yoder (71). In a study of 149 preschool children conducted by Sanjur and Scoma (73), two-thirds of the

families had mothers over 30 years of age. Fruit was the only food group not adequately represented in the mothers' diets, although it was supplied adequately to the children. Seiders (72) reported that young homemakers (under 25) had significantly fewer servings of milk when initially enrolled in EFNEP than did older homemakers.

Area of Residence

The findings of the 1965 Household Food Consumption Survey (2) suggested that farm families tended to have better diets than other families because they often paid less for food than urban families, and they also grew a larger amount of their own food. However, the U.S. Department of Agriculture Report on Dietary Levels in the U.S. (75) reported that in households with incomes under $3,000 per year, about the same percentage of diets from urban, rural non-farm, and farm families were rated as "poor" (75). The 1965 survey also reported that farm families used more milk and milk products than other families. Eppright et al. (57) found that farm families consumed less meat than rural non-farm families.

Seiders (72) reported that the homemaker's place of residence did influence the adequacy of her diet. He observed that farm families had the highest percentage of homemakers with adequate diets, and urban families had the lowest percentage of homemakers with adequate diets.

Amount Spent for Food

Eppright et al. (57) found that the amount of money spent for food was more highly correlated with energy and nutrient content of the diet than were family income, number residing in the household, or education

of the mother. The amount of money spent for food was most influential in the quality of the diets of children. Eppright et al. (57) also concluded that dietary iron and vitamin A were unrelated to the amount spent for food for the family.

Families Receiving Assistance

Kelsay (53) reported that food stamps and commodities appeared to improve the diets of participants in the few studies which have been carried out. According to an Agricultural Economic Report on Families in EFNEP--Comparison of Food Stamp Participants and Non-Participants (76), homemakers receiving food stamps had better diets, larger families, and higher incomes than those families who were eligible but not participating in the Food Stamp program.

Seiders (72) reported that food stamps and donated food commodities influenced dietary adequacy in certain food groups. Where the donated food program was available, the homemakers studied had significantly more adequate intakes of breads and cereals than those where food stamps were available. However, the homemakers receiving food stamps consumed more servings from the meat food group. Seiders' (72) study also revealed that homemakers from welfare families tended to have less adequate diets than those from non-welfare families.

# CHAPTER III

# EXPERIMENTAL PROCEDURE

## A. General Plan

The dietary intakes of 45 Wayne County Expanded Food and Nutrition Education Program homemakers, their families, and each homemaker's oldest preschool child were evaluated. The sample included all Wayne County EFNEP families who met the criteria of (1) homemaker not employed outside the home, (2) family had preschool child 36 to 72 months of age, and (3) family was enrolled in EFNEP a minimum of six months. Informed written consent was obtained from each homemaker during the initial contact (see Appendix I).

Twenty-four hour food recalls were taken from each homemaker during the aides' initial visit. The recalls, administered by EFNEP program aides, collected information from the homemaker on (1) what the homemaker made available to all family members, (2) what the homemaker consumed, and (3) what the homemaker's oldest preschool child consumed during the previous 24-hour time period. An information sheet was also used to collect other pertinent dietary data. The family records kept by EFNEP were made available to the investigator to provide background information for the study. All food recalls were evaluated and scored by the EFNEP scoring method and by computer nutrient analysis.

## B. Data Collection

### The EFNEP Aide as Interviewer

One of the most effective national nutrition education systems reaching a large percentage of our low-income population is the Expanded Food and Nutrition Education Program (77). Nutrition information, as well as a variety of other food-related subjects is disseminated by the program nutrition aides. The EFNEP aides are paid workers who are trained to work as a member of a County Extension Home Economics Staff. They are often indigenous to the group with whom they work (6).

The aides visit homes of the families recruited by themselves for the purpose of teaching nutrition. They work primarily on a one-to-one basis; therefore,they establish a close relationship with their clients (6). It has been established by past research (22,41,78) that results of the accuracy of food recalls are affected by the interviewer and the relationship between the subject and the interviewer. For this reason, the five Wayne County EFNEP program aides were utilized in collecting all recall information for this study.

During their regularly scheduled visits to the homes of their homemakers, the aides collect 24-hour food recalls from the homemakers at six month intervals. The food recalls are used as one measurement of how the EFNEP program is improving the family's diet (6). Wayne County EFNEP aides were asked to collect the food recalls necessary for this study during their regularly scheduled visits to the selected homes.

The five EFNEP aides were assigned an average of nine families each to interview. Since past research does reveal that the interview and subsequently the food recall may be affected by the relationship of

the interviewer and the subject, care was taken to assign the homemakers involved in the study to the aide with whom they were familiar.

Previous investigations indicate that different interviewers can obtain comparable results when (1) the background of the interviewers are similar, (2) the interviewers receive the same nutritional and interview training, and (3) all interviewers are given the same set of instructions (78). Church (78) also concluded that differences due to different interviewers would not appreciably alter the results of a dietary survey. The investigator reported that differences between interviewers rarely exceeded 10% of the allowance for each nutrient.

In a study conducted by Gersovitz (22), home interviews were conducted by five program aides, all of whom had similar nutrition training and prior experience in administering the 24-hour food recall. The aides reportedly produced acceptable results, with no significant differences noted in the dietary information collected. Lack of a problem in the use of different interviewers to collect dietary information is, therefore, well documented in the literature.

The program aides utilized in this study attended two training sessions to acquaint themselves with necessary techniques to be used in collecting data. A set of guidelines was developed to assist them in keeping their interview techniques constant, thus minimizing error (see Appendix II). Several criteria were set up for collecting the information from the homemakers to minimize the effect of using different interviewers to administer the 24-hour recalls. The criteria included: (1) recalls were to be taken during a personal visit to the family's home, (2) the three recalls (family, homemaker, the oldest preschool child) for each

family were to be taken during the same visit; they should each reflect the same time period, (3) all information and food recalls were to be collected directly from the homemaker, including the preschool child's recall, (4) no recalls were to be taken on Monday, Friday, or during the last week of the month, (5) the Family Food Record (see Appendix III) was to be completed first, followed by the homemaker's Food Recall Record (see Appendix III), and the Preschool Child's Food Recall Record (see Appendix III), and (6) food models, measuring cups, and spoons were to be used in assisting the homemaker to determine portions and serving sizes. Amounts were to be recorded by the aides in household measures.

The 24-Hour Food Recall

A Family Food Record (see Appendix III) was developed for this study to collect recall information from the homemaker on all foods served to her family during the previous 24-hour time period. The Family Food Record is based on EFNEP's official Food Recall Record (see Appendix III), which was used in this study to collect the homemaker's food recall. Another recall form was developed to assist in recording the preschool child's food recall taken from the homemaker (see Appendix III). An additional information sheet was attached to EFNEP's Food Recall Record for the purpose of collecting supplementary dietary information to be used in evaluating the data (see Appendix III).

As previously stated, the EFNEP aides involved in the study received instructions on interview techniques to be used in collecting the 24-hour food recalls. Several techniques were stressed as essential parts of the data collection technique, including when the recalls were to be taken and from whom, as well as using food models, measuring cups

and spoons to assist the homemaker in determining portions and serving sizes (see Appendix II). Researchers do not agree as to whether the 24-hour food recall is or is not affected by the day on which it is taken. Chalmers et al. (11) concluded that it is immaterial which day or days one selects for food recalls for group studies, but does indicate that the factor needs further investigation. Eppright et al. (79) reported that data collection results were affected by the day of the week as well as the season. The investigators indicated that weekend food habits are likely to differ significantly from those of the five week days, especially when school children are involved.

The use of food models has been established in the literature as a successful method of improving quantitative dietary data (11,22,32,80). Moore et al. (80) reported that in a 1967 study in which food models were used, respondents tended to select models representing larger amounts than described without the aid of the food models. This encourages the use of the models, since experience shows that respondents normally tend to underestimate consumption.

In a study conducted by Kohrs et al. (32) in 1978, the amount of each food item usually consumed was determined by allowing the subjects to identify their usual serving sizes from a set of polystyrene food models of graduated sizes. Moore's study (80) made use of ordinary cups and glasses for a more realistic effect.

The use of food models has advantages other than that of collecting more accurate dietary information. Moore et al. (80) observed that the models lessened the time needed for the interview and reduced the frustration of having to search for descriptions of size, volume, or

weight. The difficulty of handling the data to be recorded was reduced also since all answers were definite and comparable.

Food models were used in this study to assist the EFNEP aides in recording accurate dietary information. Drinking glasses and cups of graduated sizes, measuring cups, measuring spoons, and sized paper food models were used to help the homemaker accurately recall all types of foods.

In this study, all food recalls were collected from the homemaker, since she is the family member most likely to be familiar with what her family was served, and what they actually consumed. Past research indicates that the age at which a child can serve as a valid respondent is an important criterion to determine (25). Researchers have reported that the 24-hour food recall has been used successfully with a variety of age groups, including school children (21,25). Emmons et al. (21) observed that the ability to recall foods correctly improved with age. The investigators found that first graders accurately recalled 60.5% of foods eaten while fourth graders accurately recalled 80.6% of the foods eaten. Emmons et al. (21) pointed out that young children, especially above the second grade, can give fairly comprehensive and accurate dietary information. Beal, however, in a 1967 study (14), reported that with few exceptions girls under 12 and boys under 13-14 were unlikely to give reliable nutritional histories and information. Since this study deals with preschool children 3 to 6 years of age, it was decided to collect all dietary information from the homemaker.

## C. Scoring Methodologies

In consultation with The University of Tennessee, Knoxville Computer Center, a program was developed which calculated total energy and nutrient intakes (excluding supplements) based on intakes reported in 24-hour food recalls in this study, as well as making comparisons of the total energy and nutrient intakes with the 1980 RDA (81) for the appropriate age/sex groups. The program also calculated the dietary adequacy scores utilized in this study. A computer tape of USDA Handbook No. 72 (37) provided the data base for analyzing the nutrient content of food.

The EFNEP dietary rating utilizes the recommended number of servings from each of the four food groups and is based on a score of 100 (5). All food recalls in this study were evaluated by the investigator using the EFNEP scoring method. Consistent serving sizes were used throughout the evaluation for all recalls. The score was determined by a progression system utilizing first the number of servings from the milk group, followed by the meat, vegetable/fruit, and bread/cereal groups, respectively (See Appendix IV). This method is presently in use in the Expanded Food and Nutrition Education Program.

The dietary rating assessed levels of dietary intake by comparing intakes with the appropriate RDA. Scores for each subject were calculated by comparing intakes of kilocalories and nine nutrients (calcium, iron, niacin, phosphorus, protein, riboflavin, thiamin, vitamin A, and ascorbic acid), excluding supplements, with the appropriate RDA. Nutrient intakes equal to or below 33% of the RDA, from 34% to 66% of the RDA, and 67% or more of the RDA received numerical ratings of 0, 5, and 10, respectively.

The separate nutrient ratings were added to provide a single dietary score with 100 being the highest score available.

The nutrient density rating assessed dietary quality by comparing intakes with the appropriate RDA per 1000 kilocalories consumed, and is similar to the nutrient density scoring method developed by Skinner (10). Scores for each subject were calculated by comparing intakes of the individual nutrients with the appropriate RDA per 1000 kilocalories. The same rating system was applied in this method as was used in the dietary rating system previously discussed. Since kilocalories could not be evaluated in this method, a single dietary score of 90 was the highest attainable; therefore, to make scoring methods more comparable, the nutrient density scores were weighted proportionately by computer analysis so that a score of 100 was the highest attainable.

## D. Statistical Analyses

Data collected were analyzed at The University of Tennessee, Knoxville Computer Center using the Statistical Analysis System (SAS) developed by Barr et al. (82). Means, standard error of the means, and analysis of variance were determined for the dietary data by the educational level of the homemaker, family income, area of residence, father's presence in the household, food assistance received, and the length of time enrolled in EFNEP. Duncan's Multiple Range Test was utilized for testing significant differences among group means. Pearson correlation coefficients among family characteristics and dietary data were also calculated.

# CHAPTER IV

# RESULTS

## A. Description of Population

A general description of 45 families included in this study is shown in Table 1. The homemakers ranged in age from 18 to 43 years, averaging 29.4 years. The preschool children ranged in age from 36 to 66 months, averaging 46.6 months at the time the food recall was administered.

The average family in this study had been enrolled in EFNEP 31.89 months at the time the food recall and questionnaire was administered. Household size ranged from two to ten persons, averaging 4.89 persons per household (Table 1). Average monthly income for families included in this study was $422.04 (Table 1). The mean amount spent monthly for food was $121.20 per family. It should be noted, however, that five families spent no actual money for food during the month, but relied entirely on food stamps for their families' food. Eighteen families included in this study did receive food stamps valued from $50.00 to $337.00, with a mean of $146.35 monthly. The total dollar value the families spent for food (actual dollars and food stamp value) averaged $163.02 per month, and ranged from $50.00 to $337.00 (Table 1).

Table 2 shows that over one-half (57.8%) of the preschool children included in the study were female. This study included only three black families (6.7%); these were the only minority families enrolled in Wayne County EFNEP which met the criteria for this investigation.

TABLE 1

Description of Population (Mean, ± SEM, Range)

| | Mean ± SEM | Range |
|---|---|---|
| Homemaker's age (years) (n=45) | 29.40 ± 0.979 | 18-43 years |
| Child's age (months) (n=45) | 46.6 ± 1.270 | 36-66 months |
| Time enrolled in EFNEP (months) (n=45) | 31.89 ± 2.896 | 6-68 months |
| No. in household (n=45) | 4.89 ± 0.281 | 2-10 persons |
| Income (monthly) (n=45) | $422.04 ± 21.461 | $122.00-$840.00 |
| Money spent for food (n=45) | $121.20 ± 8.593 | $ 0.00-$240.00[1] |
| Value of food stamps received (n=18) | $146.35 ± 23.746 | $ 50.00-$337.00 |
| Total $ value spent for food (n=45) | $163.02 ± 9.622 | $ 50.00-$337.00 |

[1]Five families enrolled in the Food Stamp Program reported spending no actual money for food.

TABLE 2

Description of Population (Category, Number and Percent)

| | Category | Number | Percent |
|---|---|---|---|
| Child's sex (n=45) | Male | 19 | 42.2 |
| | Female | 26 | 57.8 |
| Race (n=45) | White | 42 | 93.3 |
| | Black | 3 | 6.7 |
| Family's area of residence (n=45) | Rural Non-Farm | 36 | 80.0 |
| | Farm | 9 | 20.0 |
| Homemaker's education (n=45) | ≤ 8th Grade | 25 | 55.6 |
| | > 8th Grade | 20 | 44.4 |
| Father residing in household (n=45) | Yes | 40 | 88.9 |
| | No | 5 | 11.1 |
| Families receiving assistance[1] (n=18) | Yes | 18 | 40.0 |
| | No | 27 | 60.0 |

[1]Food Stamps and/or welfare.

Eighty percent of the families included in the study lived in a rural non-farm setting while the remaining 20% lived on farms (Table 2). Less than one-half (44.4%) of the homemakers had completed more than eight years of formal education. The father resided in the household of 88.9% of the families involved in this study. Eighteen families (40.0%) did receive food stamps at the time the food recall and questionnaire was administered. Two of the families receiving food stamps also received monthly welfare allotments.

## B. Dietary Intake of Families, Homemakers, and Preschool Children

### Evaluation Based on Food Groups and EFNEP Scores

The EFNEP scoring method of evaluating dietary intake is based on the reported number of servings consumed from each of the four previously established food groups (7). When servings from the food groups made available to family members and servings consumed by homemakers and preschool children were compared, no significant differences were found (Table 3). When the percentages consuming an adequate number of servings were compared for the homemaker versus the preschool child, the homemaker consumed a lesser percentage from the milk group but greater percentages for the remaining groups; the child's consumption of breads and cereals was much lower than the homemaker's (46.7% and 80.0%, respectively). Although no significant differences were found, fewer homemakers reported consuming one or more servings from each food group than did preschool children or families. Only one preschool child was reported meeting the four food group recommendations while two homemakers and ten families

TABLE 3

Comparisons of Dietary Parameters Among Wayne County EFNEP Families, Homemakers, and Preschool Children Based on EFNEP Scoring Method

| | Adequate servings from four food groups | | | | | | | | One serving or more from all food groups | | Meets four food group rec. | | Mean EFNEP scores[1] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Milk | | Meat | | Veg/fruit | | Bread/ cereal | | | | | | | |
| | No. | % | No. | % | No. | % | No. | % | No. | % | No. | % | Mean | SEM |
| Family[2] | 38 | 84.4 | 44 | 97.8 | 18 | 40.0 | 28 | 62.0 | 43 | 95.6 | 10 | 22.0 | 86.0[a3] | 2.85 |
| Homemaker[2] | 12 | 26.7 | 42 | 93.3 | 9 | 20.0 | 36 | 80.0 | 29 | 64.4 | 2 | 4.4 | 69.2[b] | 4.10 |
| Preschool child[2] | 21 | 46.7 | 38 | 84.4 | 5 | 11.1 | 21 | 46.7 | 37 | 82.2 | 1 | 2.2 | 70.8[b] | 3.60 |

[1]Overall dietary rating based on number of servings from four food groups based on scale of 100.

[2]n=45

[3]Values followed by same superscript are not significantly different ($P < 0.05$).

met the same requirements. Again, no significant differences among groups were noted for compliance to the food group recommendations. The families' mean EFNEP score was significantly higher ($P < 0.05$) than the mean EFNEP scores for the homemakers or their preschool children (Table 3).

Figure 1 reveals that all families were served one or more servings from the milk group; however, no significant differences were found among the mean number of servings from the milk group consumed by any group. The largest number of families (35.6%) had two servings of milk products included in their day's menu. The number of homemakers consuming at least two servings from the milk group (the recommended amount for adults) (7) was 24.4%, while 28.9% of the preschool children consumed two servings from the milk group. More homemakers (46.7%) reported consuming only one serving from the milk group than any other amount, while more preschool children (28.9%) reported consuming two servings. Only 46.6% of the preschool children consumed the recommended three or more servings from the milk group (7).

Figure 2 shows the number of servings from the meat group served to the family and the number of servings consumed by homemakers and their preschool children. All families had one or more servings included in their day's diet; all homemakers also consumed one or more servings from the meat group. However, 2.2% of the children involved in the study consumed no servings from the meat group on the day the food recall was taken from the mother.

The recommended two or more servings daily from the meat group (7) was consumed by 93.3% of the homemakers and 84.4% of their preschool children (Figure 2). Only 6.7% of the homemakers and 15.5% of the children

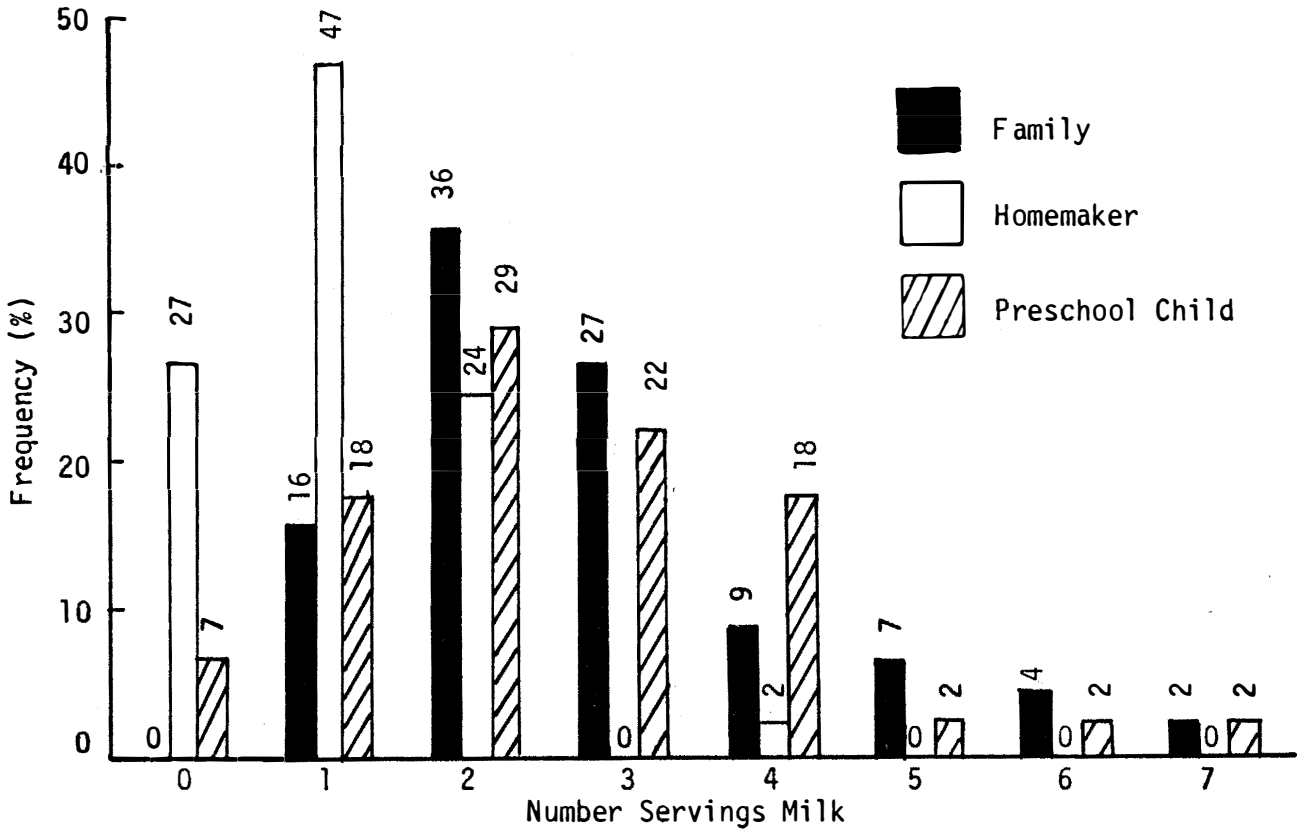


Figure 1. Number of Servings from Milk Group by Family, Homemaker, and Preschool Child.

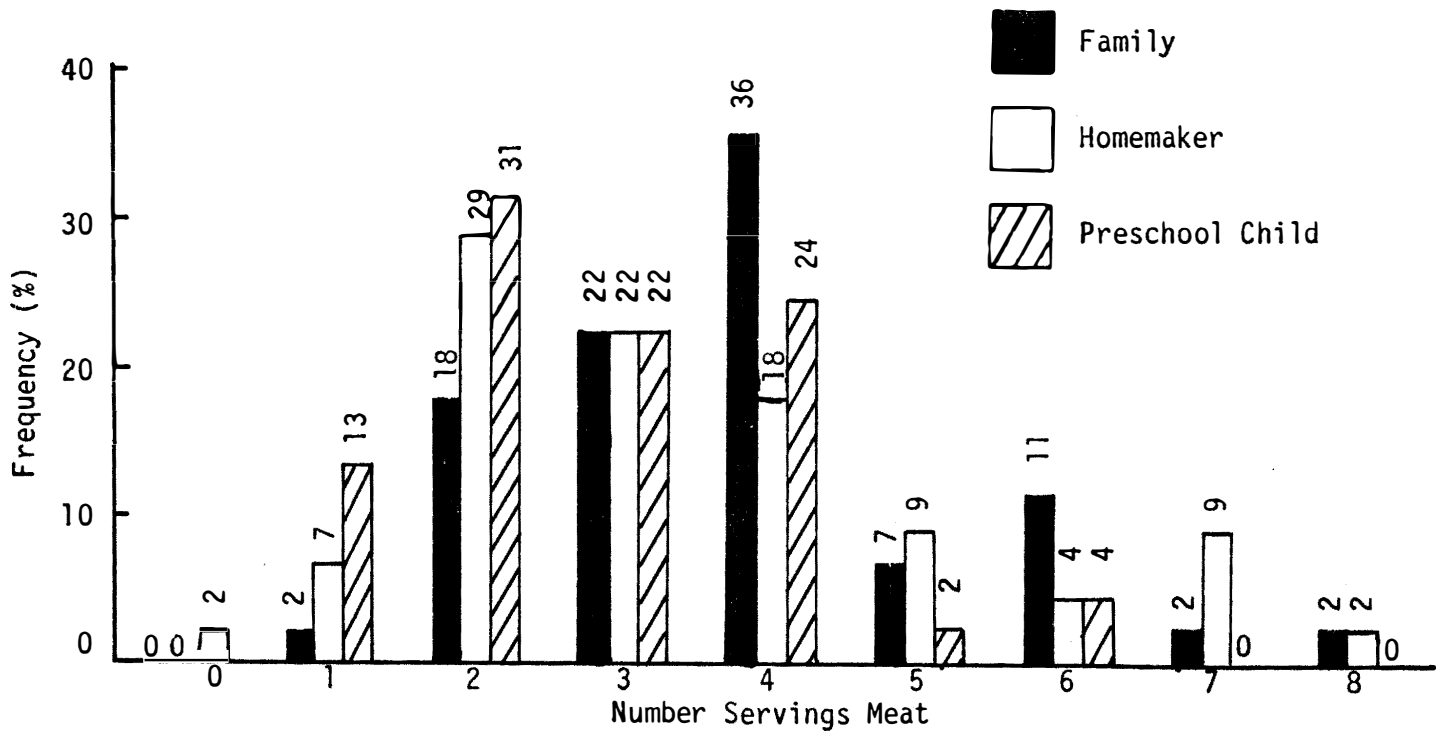


Figure 2. Number of Servings from Meat Group by Family, Homemaker, and Preschool Child.

consumed less than the recommended amount from this group. However, 80.0% of the families were actually served three or more servings from the meat group, while 64.4% of the homemakers and 53.2% of the preschool children consumed three or more servings from the meat group. There were no significant differences found between mean number of servings consumed by families, homemakers, or preschool children.

Only 40.0% of the families were served the recommended four or more servings from the vegetable/fruit group, while an even smaller number of homemakers (20.0%) and preschool children (11.1%) reported actually consuming the recommended four or more servings (Figure 3). Although no significant differences were found among group means, a larger percentage of homemakers (11.1%) consumed no servings from the vegetable/fruit group than did preschool children (8.9%). Figure 3 also shows that 4.4% of the families were actually served no foods from the vegetable/fruit group.

All families, homemakers, and preschool children had one or more servings from the bread/cereal group included in their daily diet (Figure 4). The recommended four or more servings from the bread/cereal group were consumed by 80.0% of the homemakers and 46.7% of their preschool children. No significant differences were found among group means.

The largest percentage of homemakers (26.7%) consumed two servings from the "other foods"[1] group while the largest number of preschool children (46.7%) consumed only one serving from this group (Figure 5).

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[1]The "Other Foods" group was established by USDA in 1979 and included fats, sweets, and alcohol. Recommended daily servings from this group are not established due to the non-nutritive status of foods included in this group.

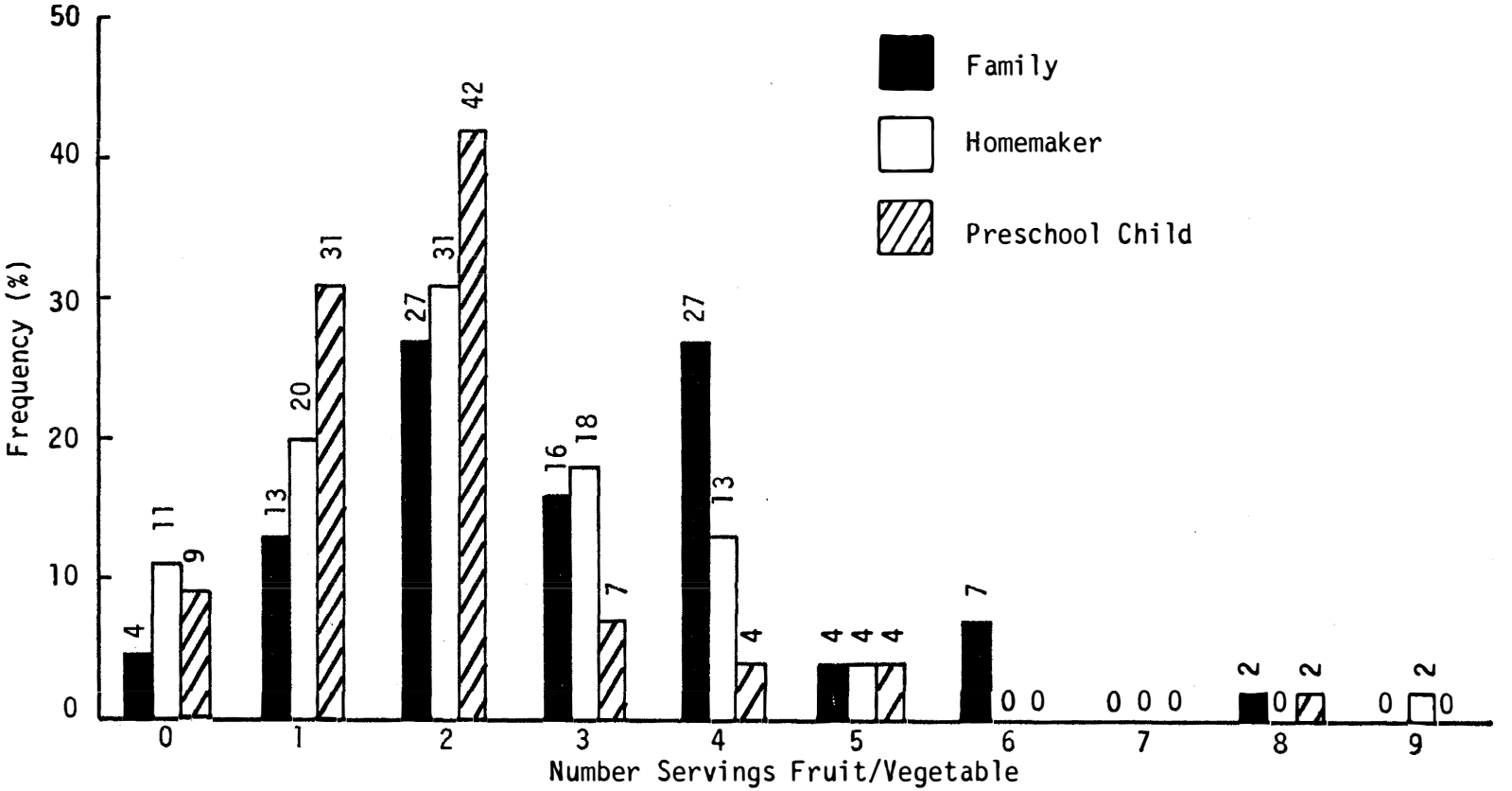


Figure 3. Number of Servings from Fruit/Vegetable Group by Family, Homemaker, and Preschool Child.

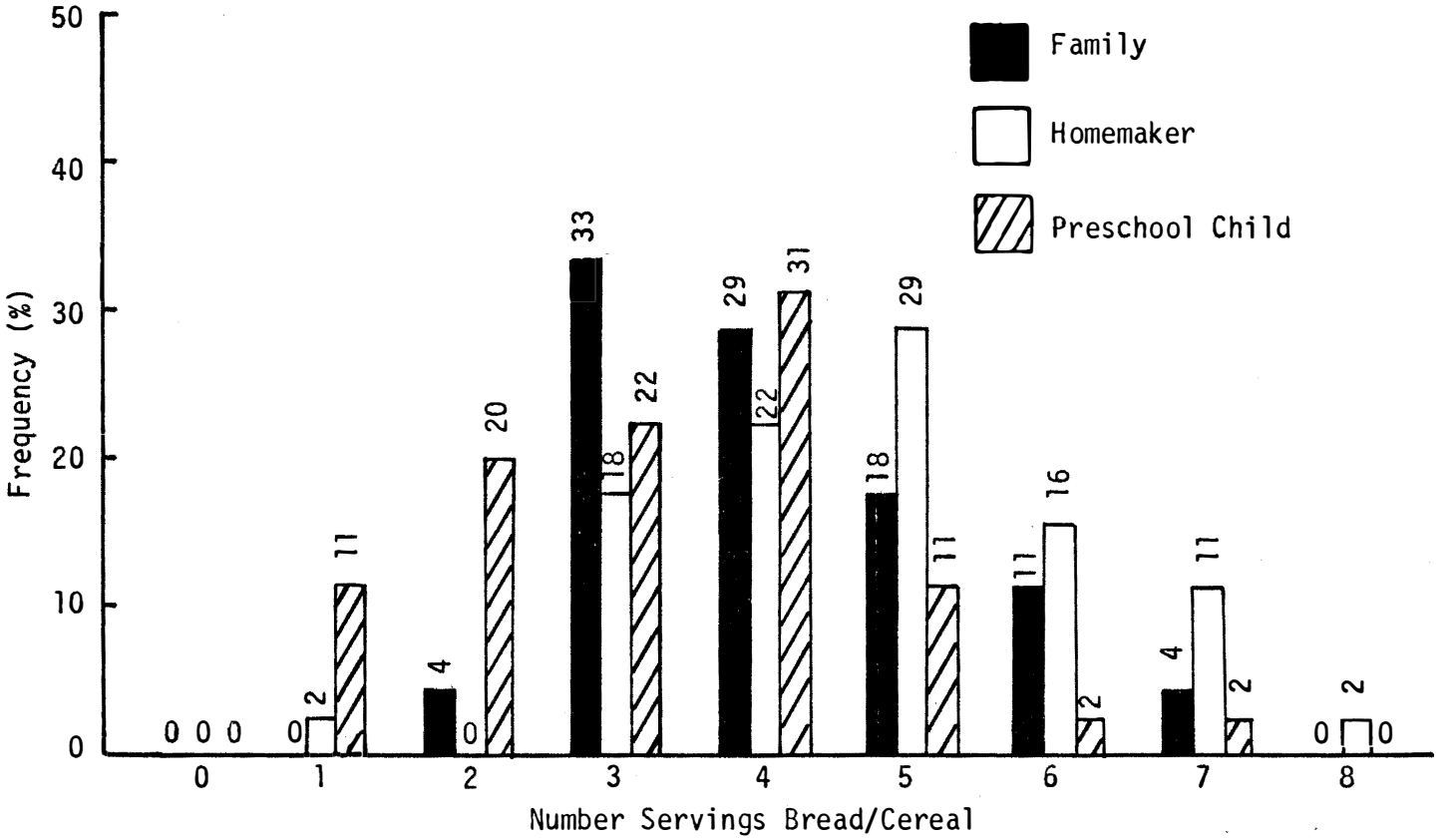


Figure 4. Number of Servings from Bread/Cereal Group by Family, Homemaker, and Preschool Child.

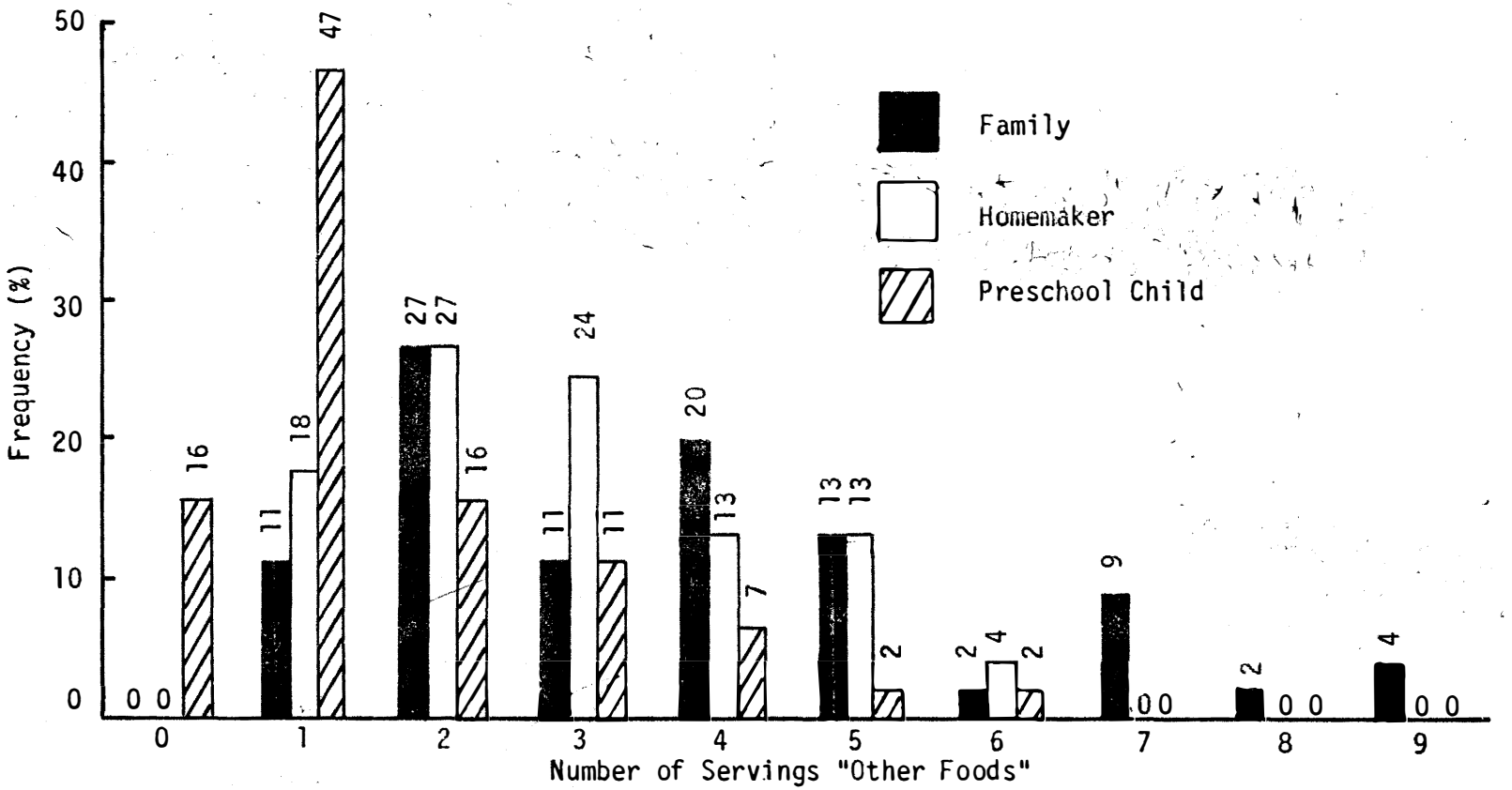


Figure 5. Number of Servings from "Other Foods" Group by Family, Homemaker, and Preschool Child.

Nine servings from the "other foods" group were served to 4.4% of the families, but no homemakers or children consumed that amount. The children's group was also the only group reporting a percentage of subjects (15.6%) who consumed no servings from the "other foods" group.

When the mean number of servings from the food groups consumed by homemakers and preschool children and served to all family members was compared with the four food group recommendations (Table 4), only servings from the meat group met or exceeded the recommended amounts for families, homemakers, and preschool children. The mean number of servings from the vegetable/fruit group for families, homemakers, and preschool children was the least well supplied, while only the mean number of servings from the milk group made available to all family members met the recommended number of servings. Homemakers and preschool children in this study did not consume adequate mean servings from the milk group. Adequate mean servings from the bread/cereal group were made available to all family members and were consumed by homemakers. However, the mean number of servings from the bread/cereal group consumed by preschool children did not meet the recommended amount.

Pearson correlation coefficients were calculated for the number of servings from each food group consumed by homemakers and their preschool children, as well as for the EFNEP scores for each group. Results are reported in Table 5. A significant correlation ($P < 0.01$) was found between the number of servings from each food group consumed by homemakers and preschool children. The homemakers' EFNEP scores and the preschool children's EFNEP scores were also found to be significantly correlated ($P < 0.05$). Significant correlations were found between the homemakers'

TABLE 4

Comparisons of Recommended Number of Servings with the Mean Number of Servings from Food Groups Consumed by Homemakers and Preschool Children, and Made Available to Family Members (n=45)

| | Homemakers | | | | Preschool children | | | | Families | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean no. servings | SEM | Range | Recommended servings | Mean no. servings | SEM | Range | Recommended servings | Mean no. servings | SEM | Range | Recommended servings |
| Milk | 1.04 | 0.13 | 0.00-4.00 | 2+ | 2.53 | 0.22 | 0.00-7.00 | 3+ | 2.78 | 0.22 | 1.00-7.00 | 2-4+ |
| Meat | 3.53 | 0.27 | 1.00-8.00 | 2+ | 2.78 | 0.20 | 0.00-.00 | 2+ | 3.80 | 0.22 | 1.00-8.00 | 2+ |
| Veg/ fruit | 2.31 | 0.25 | 0.00-9.00 | 4+ | 1.93 | 0.22 | 0.00-8.00 | 4+ | 3.00 | 0.25 | 0.00-8.00 | 4+ |
| Bread/ cereal | 4.78 | 0.22 | 1.00-8.00 | 4+ | 3.27 | 0.21 | 1.00-7.00 | 4+ | 4.11 | 0.19 | 2.00-7.00 | 4+ |
| Other foods | 2.91 | 0.22 | 1.00-6.00 | - | 1.62 | 0.21 | 0.00-6.00 | - | 3.77 | 0.32 | 1.00-9.00 | - |

TABLE 5

Pearson Correlation Coefficients Among Homemakers' and Preschool Children's EFNEP Scores[1] and Number of Servings Consumed from Food Groups by Homemakers[2] and Preschool Children[3] (n=45)

| | Homemaker | | | | | | Preschool child | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | milk | meat | veg/fr | br/cer | other | score | milk | meat | veg/fr | br/cer | other |
| Homemaker | | | | | | | | | | | |
| meat | -0.312[a] | | | | | | | | | | |
| vegetable/ fruit | 0.245 | -0.094 | | | | | | | | | |
| bread/cereal | 0.008 | 0.238 | 0.132 | | | | | | | | |
| other | -0.348[a] | 0.027 | 0.030 | -0.032 | | | | | | | |
| score | 0.642[b] | -0.194 | 0.620[b] | 0.245 | -0.438[b] | | | | | | |
| Preschool Child | | | | | | | | | | | |
| milk | 0.390[b] | -0.451[b] | 0.005 | -0.279 | 0.064 | 0.044 | | | | | |
| meat | -0.312 | 0.666[b] | 0.001 | 0.246 | -0.093 | -0.135 | -0.474[b] | | | | |
| vegetable/ fruit | 0.330[a] | -0.184 | 0.535[b] | -0.168 | 0.029 | 0.231 | 0.285 | -0.206 | | | |
| bread/cereal | 0.047 | -0.040 | -0.144 | 0.427[b] | -0.169 | 0.020 | 0.170 | 0.021 | -0.214 | | |
| other | 0.062 | 0.128 | 0.374[a] | 0.184 | 0.437[b] | -0.040 | -0.316[a] | -0.022 | 0.244 | -0.076 | |
| score | 0.211 | -0.128 | 0.277 | 0.135 | -0.184 | 0.323[a] | 0.329[a] | -0.121 | 0.407[b] | 0.536[b] | 0.027 |

TABLE 5 (Continued)

[1]EFNEP score based on scale of 100.

[2]Number of servings actually consumed by homemakers

[3]Number of servings actually consumed by preschool children.

[a]$P < 0.05$

[b]$P < 0.01$

EFNEP scores and the number of servings consumed by the homemakers from the milk group ($P < 0.01$) and the vegetable/fruit group ($P < 0.01$). A significant negative correlation was found between the homemakers' EFNEP scores and the number of servings consumed by homemakers from the "other foods" groups ($P < 0.01$). The number of servings homemakers consumed from the milk group was also found to be negatively correlated to the number of servings homemakers consumed from the meat group ($P < 0.05$) and the "other foods" group ($P < 0.05$). It should be noted that correlations between EFNEP scores and specific food groups are based on a spurious relationship, indicating there is normally a dependent relationship among these variables. The preschool children's EFNEP scores were found to be significantly correlated with the number of servings consumed by the children from the milk group ($P < 0.05$), the vegetable/fruit group ($P < 0.01$), and the bread/cereal group ($P < 0.01$). A significant negative correlation was found between the number of servings the preschool children consumed from the milk as compared to the meat ($P < 0.01$) and the "other foods" groups ($P < 0.05$).

Pearson correlation coefficients were also calculated for the number of servings from each food group made available to family members and the number of servings actually consumed by homemakers (Table 6). Significant correlations were found between the number of servings made available to family members and the number of servings actually consumed by homemakers for all food groups except the bread/cereal group. In addition, a significant negative correlation was found ($P < 0.01$) between the number of servings made available to family members from the milk group and the number of servings consumed by homemakers from the meat group. The number of

TABLE 6

Pearson Correlation Coefficients Among Family and Homemaker EFNEP Scores[1], Number of Servings from Food Groups Made Available to Family Members[2], and Number of Servings Actually Consumed by Homemakers[3] (n=45)

| | Family | | | | | | Homemaker | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | milk | meat | veg/fr | br/cer | other | score | milk | meat | veg/fr | br/cer | other |
| Family | | | | | | | | | | | |
| meat | -0.116 | | | | | | | | | | |
| veg/fr | 0.456[b] | -0.307[a] | | | | | | | | | |
| br/cer | 0.405[b] | -0.098 | 0.075 | | | | | | | | |
| other | 0.360[a] | 0.281 | 0.396[b] | 0.143 | | | | | | | |
| score | 0.522[b] | -0.324[a] | 0.748[b] | 0.393[b] | 0.335[a] | | | | | | |
| Homemaker | | | | | | | | | | | |
| milk | 0.304[a] | -0.262 | 0.126 | 0.124 | -0.277 | 0.023 | | | | | |
| meat | -0.477[b] | 0.634[b] | -0.248 | -0.310[a] | 0.025 | -0.578[b] | -0.312[a] | | | | |
| veg/fr | -0.027 | -0.248 | -0.633[b] | -0.245 | 0.094 | 0.366[a] | 0.245 | -0.094 | | | |
| br/cer | -0.286 | -0.064 | -0.177 | 0.299 | -0.183 | -0.091 | -0.008 | 0.238 | 0.132 | | |

TABLE 6 (Continued)

| | Family | | | | | | Homemaker | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | milk | meat | veg/fr | br/cer | other | score | milk | meat | veg/fr | br/cer | other |
| Homemaker other | 0.165 | 0.267 | 0.186 | 0.107 | 0.762[b] | 0.150 | -0.348[a] | 0.027 | 0.030 | -0.032 | |
| score | -0.035 | -0.327[a] | 0.248 | -0.035 | -0.379[a] | 0.241 | 0.642[b] | -0.194 | 0.620[b] | 0.245 | -0.438[b] |

[1] EFNEP score based on scale of 100.

[2] Number of servings made available to all family members.

[3] Number of servings actually consumed by homemakers.

[a] $P < 0.05$

[b] $P < 0.01$

servings homemakers consumed from the meat group was also negatively correlated with the number of servings from the bread/cereal group made available to family members ($P < 0.05$).

The number of servings made available to family members from the milk group was significantly correlated with the number of servings made available to family members from all other food groups except meat. A negative significant relationship was found between the number of servings made available to family members from the meat group and the number of servings made available to family members from the vegetable/fruit group ($P < 0.05$). The number of servings made available to family members from the vegetable/fruit group was significantly correlated with the number of servings made available to family members from the "other foods" group ($P < 0.01$). A significant negative correlation was found between the number of servings consumed by homemakers from the milk group and the meat group ($P < 0.05$), as well as between the "other foods" group and the milk group ($P < 0.05$).

The families' EFNEP scores were significantly correlated with the number of servings made available to the family from all food groups except meat, where a significant negative correlation was noted ($P < 0.05$). Homemakers' EFNEP scores were significantly correlated with the number of servings they consumed from the milk and vegetable/fruit groups ($P < 0.01$). Significant negative correlations were found between the homemakers' EFNEP scores and the number of servings homemakers consumed from the "other foods" group ($P < 0.01$). Significant negative correlations were also found between the homemakers' EFNEP scores and the number of servings made available to family members from the meat and "other foods" groups

($P < 0.05$). The families' EFNEP scores were significantly correlated with the number of servings homemakers consumed from the vegetable/fruit group ($P < 0.05$), as well as a significant negative correlation with the number of servings homemakers consumed from the meat group ($P < 0.01$).

Evaluation Based on Nutrient Analysis

Mean nutrient intakes for homemakers and preschool children and the ranges of intakes are shown in Table 7. Nutrient intakes expressed as percentages of the RDA are shown in Figure 6.

When the mean percentages of the 1980 RDA for nine nutrients and kilocalories consumed by homemakers and their preschool children were compared (Figure 6), both homemakers and their children consumed a mean of 100% or more of the RDA for six nutrients: protein, niacin, phosphorus, riboflavin thiamin, and vitamin A. Three other nutrients--calcium, iron, and ascorbic acid--all fell below the RDA for homemakers and their children, as did kilocalories for both groups. The mean percentages of the RDA consumed by homemakers for kilocalories (73.96%) and ascorbic acid (71.38%) were above the two-thirds level of the RDA as were the mean percentages of the RDA consumed by preschool children for kilocalories (81.00%), calcium (75.10%), and ascorbic acid (72.78%). The mean percentages of the RDA for calcium (65.0%) and for iron (57.77%) consumed by the homemakers fell below two-thirds of the RDA. Only the percentage of RDA for iron (55.41%) fell below two-thirds of the RDA in the preschool children's group.

Table 8 shows a breakdown of individual nutrient intake by the homemaker and the preschool child, based on the percentages of the 1980 RDA. Twenty-four (53.3%) homemakers' dietary intakes of calcium fell below two-thirds of the RDA, while twenty-one preschool children's (46.7%) calcium

TABLE 7

Comparison of Mean Nutrient Intakes for Homemakers and Preschool Children with 1980 Recommended Dietary Allowances (n=45)

| | Homemakers | | | | Preschool children | | | |
|---|---|---|---|---|---|---|---|---|
| | Mean intake | SEM | Range | RDA[1] | Mean intake | SEM | Range | RDA[2] |
| Kilocalories | 1508.72 | 76.10 | 717.50-2903.75 | 2000-2100 | 1165.39 | 58.64 | 448.10-2507.15 | 1300-1700 |
| Protein (g) | 62.19 | 3.71 | 22.00-142.45 | 44 | 46.75 | 2.61 | 15.90-94.46 | 23-30 |
| Calcium (mg) | 546.06 | 43.85 | 45.00-1731.90 | 800 | 600.77 | 42.39 | 127.00-1610.39 | 800 |
| Phosphorus (mg) | 973.49 | 56.60 | 347.00-2199.55 | 800 | 820.32 | 44.14 | 343.99-1725.00 | 800 |
| Iron (mg) | 10.82 | 0.61 | 4.59-23.25 | 18 | 6.90 | 0.30 | 3.45-14.20 | 10-15 |
| Vitamin A (I.U.) | 5952.76 | 2123.28 | 30.00-92740.00 | 4000 | 3105.29 | 691.74 | 247.50-25030.00 | 2000-2500 |
| Thiamin (mg) | 1.14 | 0.06 | 0.23-1.98 | 1.0-1.1 | 0.83 | 0.04 | 0.36-1.68 | 0.7-0.9 |
| Riboflavin (mg) | 1.48 | 0.17 | 0.37-8.39 | 1.2-1.3 | 1.27 | 0.08 | 0.48-3.02 | 0.8-1.0 |

TABLE 7 (Continued)

| | Homemakers | | | | Preschool children | | | |
|---|---|---|---|---|---|---|---|---|
| | Mean intake | SEM | Range | RDA[1] | Mean intake | SEM | Range | RDA[2] |
| Niacin (mg) | 15.38 | 1.41 | 4.50-51.20 | 13-14 | 10.10 | 0.79 | 2.60-22.45 | 9-11 |
| Ascorbic acid (mg) | 44.03 | 5.76 | 0.00-148.50 | 60 | 32.75 | 4.60 | 2.00-122.50 | 45 |

[1]Based on 1980 RDA for females 19-50 years of age.

[2]Based on 1980 RDA for children 1-6 years of age.

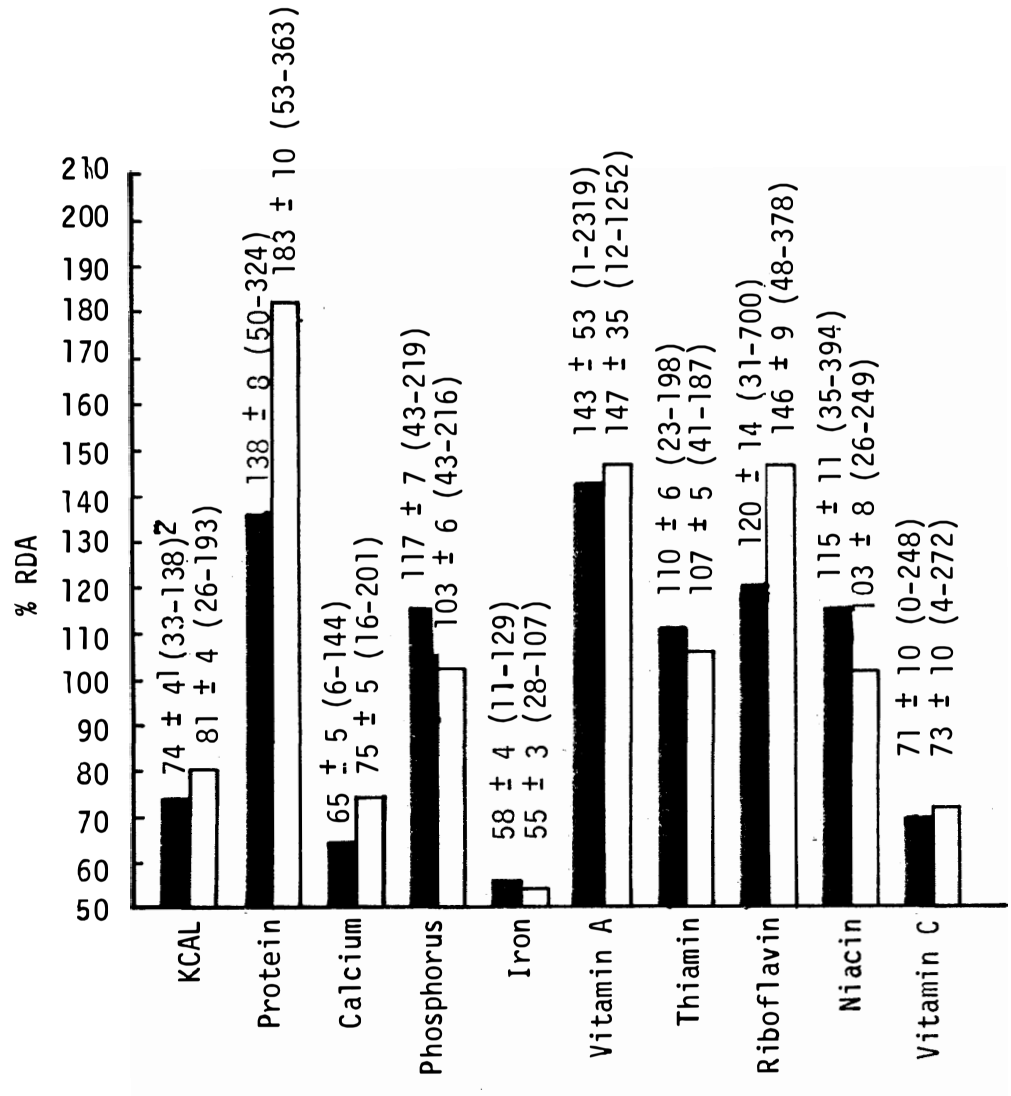


Figure 6. Mean Percentage of RDA for Selected Nutrients Consumed by Homemakers and Preschool Children.

[1]Standard Error of the Mean

[2]Range

TABLE 8

Comparison of Homemakers' and Preschool Children's Dietary Intakes Based on Percentage of RDA (n=45)

| | ≤ 33% RDA | | | | 34%-66% RDA | | | | ≥ 67% RDA | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Homemaker | | Child | | Homemaker | | Child | | Homemaker | | Child | |
| | No. | % | No. | % | No. | % | No. | % | No. | % | No. | % |
| Kilocalories | 0 | 0.00 | 1 | 2.22 | 18 | 40.00 | 15 | 33.33 | 27 | 60.00 | 29 | 64.44 |
| Protein | 0 | 0.00 | 0 | 0.00 | 3 | 6.67 | 1 | 2.22 | 42 | 93.33 | 44 | 97.78 |
| Calcium | 7 | 15.56 | 2 | 4.44 | 17 | 37.78 | 19 | 42.22 | 21 | 46.67 | 24 | 53.33 |
| Phosphorus | 0 | 0.00 | 0 | 0.00 | 6 | 13.33 | 6 | 13.33 | 39 | 86.67 | 39 | 86.67 |
| Iron | 6 | 13.33 | 4 | 8.89 | 24 | 53.33 | 27 | 60.00 | 15 | 33.33 | 14 | 31.11 |
| Vitamin A | 7 | 15.56 | 3 | 6.67 | 24 | 53.33 | 14 | 31.11 | 14 | 31.11 | 28 | 62.22 |
| Thiamin | 1 | 2.22 | 0 | 0.00 | 6 | 13.33 | 4 | 8.89 | 38 | 84.44 | 41 | 91.11 |
| Riboflavin | 1 | 2.22 | 0 | 0.00 | 7 | 15.56 | 1 | 2.22 | 37 | 82.22 | 44 | 91.11 |
| Niacin | 0 | 0.00 | 3 | 6.67 | 10 | 22.22 | 8 | 17.78 | 35 | 77.78 | 34 | 75.56 |
| Ascorbic acid | 12 | 26.67 | 17 | 37.78 | 17 | 37.78 | 12 | 26.67 | 16 | 35.56 | 16 | 35.56 |

intakes fell in the same category. The percentages of the RDA for iron consumed by homemakers and children that fell below two-thirds of the RDA were 66.7% and 68.9%, respectively. Similar nutrient intakes by homemakers and preschool children were noted for niacin, phosphorus, protein, riboflavin, and thiamin. Table 8 shows that a large percentage (75.0% or more) of both groups consumed two-thirds or more of the RDA for these nutrients. Homemakers' and preschool children's intakes of ascorbic acid were also similar; however, 64.4% of each group fell below two-thirds of the RDA. A variation is noted in the dietary intake of vitamin A for the homemakers and their children. A larger percentage of homemakers' vitamin A intakes (68.89%) fell below two-thirds of the RDA than did the children's vitamin A intakes (37.78%). Table 8 also shows that 15.56% of the homemakers consumed 33% or less of the RDA for vitamin A, compared with 6.67% of the preschool children whose vitamin A intakes fell into this category.

Dietary intakes for kilocalories are also reported in Table 8 and show that 60% of the homemakers involved in the study and 64.44% of the preschool children met two-thirds or more of the RDA requirements for kilocalories. No homemaker's kilocaloric intake fell in the lowest group ($\leq$ 33% of RDA), while one preschool child's kilocaloric (2.22%) intake did fall in this group.

Table 9 shows Pearson correlation coefficients among homemakers' and preschool children's dietary ratings for nine nutrients and kilocalories. Significant correlations were found between the homemakers' and children's dietary ratings for calcium ($P < 0.05$), niacin ($P < 0.01$), phosphorus ($P < 0.01$), protein ($P < 0.01$), and ascorbic acid ($P < 0.01$). Significant

TABLE 9

Pearson Correlation Coefficients Among Selected Individual Nutrient Dietary Ratings for Homemakers and Preschool Children

| | Homemakers' dietary ratings | | | | | | | | | | Preschool children's dietary ratings | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | kcal | Ca | Iron | Niacin | Phos | Pro | Ribo | Thi | Vit. A | Asc. Acid | Ca | Niacin | Phos | Pro |
| Homemakers' dietary ratings | | | | | | | | | | | | | | |
| Calcium | 0.350[a] | | | | | | | | | | | | | |
| Iron | 0.577[b] | 0.432[b] | | | | | | | | | | | | |
| Niacin | 0.546[b] | 0.082 | 0.327[a] | | | | | | | | | | | |
| Phosphorus | 0.480[b] | 0.529[b] | 0.520[b] | 0.262 | | | | | | | | | | |
| Protein | 0.327[a] | 0.238 | 0.355[a] | 0.500[b] | 0.157 | | | | | | | | | |
| Riboflavin | 0.441[b] | 0.597[b] | 0.587[b] | 0.355[a] | 0.694[b] | 0.473[b] | | | | | | | | |
| Thiamin | 0.399[b] | 0.315[a] | 0.436[b] | 0.272 | 0.589[b] | 0.299 | 0.720[b] | | | | | | | |
| Vitamin A | 0.123 | 0.361[a] | 0.338[a] | -0.036 | 0.190 | -0.205 | 0.325[a] | 0.248 | | | | | | |
| Ascorbic acid | 0.431[b] | 0.069 | 0.313[a] | 0.333[a] | 0.295 | -0.083 | 0.238 | 0.241 | 0.528[b] | | | | | |

TABLE 9 (Continued)

| | Homemakers' dietary ratings | | | | | | | | | | Preschool children's dietary ratings | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | kcal | Ca | Iron | Niacin | Phos | Pro | Ribo | Thi | Vit. A | Asc. Acid | Ca | Niacin | Phos | Pro |
| Preschool children's dietary ratings | | | | | | | | | | | | | | |
| Calcium | -0.094 | 0.321[a] | -0.058 | -0.286 | 0.436[b] | -0.061 | 0.203 | 0.080 | 0.083 | 0.002 | | | | |
| Niacin | 0.262 | -0.086 | -0.069 | 0.625[b] | 0.126 | 0.161 | 0.017 | 0.044 | -0.217 | 0.156 | 0.220 | | | |
| Phosphorus | 0.214 | 0.349[a] | 0.120 | 0.105 | 0.423[b] | 0.219 | 0.405[b] | 0.289 | -0.007 | 0.211 | 0.883[b] | 0.563[b] | | |
| Protein | 0.185 | 0.273 | 0.046 | 0.282 | 0.384[b] | 0.564[b] | 0.267 | 0.284 | -0.191 | 0.017 | 0.278 | 0.497[b] | 0.245 | |
| Ascorbic acid | 0.350[a] | 0.047 | 0.207 | 0.236 | 0.143 | 0.097 | 0.238 | 0.287 | 0.084 | 0.533[b] | 0.119 | -0.123 | 0.241 | 0.171 |

[a] $P < 0.05$

[b] $P < 0.01$

relationships were also found between the homemakers' dietary ratings for phosphorus and children's ratings for calcium ($P < 0.01$), as well as between the homemakers' dietary ratings for calcium and the children's dietary ratings for phosphorus ($P < 0.05$). A significant correlation was also found between the children's dietary rating for phosphorus and the homemaker's dietary ratings for riboflavin ($P < 0.01$). The children's dietary ratings for protein were significantly correlated ($P < 0.01$) with the homemakers' dietary ratings for phosphorus. A significant relationship was also found between the children's dietary ratings for ascorbic acid and the homemakers' dietary ratings for kilocalories ($P < 0.05$).

Significant correlations were also found among dietary ratings for some nutrients within groups. The homemakers' dietary ratings for kilocalories were significantly correlated with the homemakers' dietary ratings for all nutrients except vitamin A. Significant relationships were also found between the homemakers' dietary ratings for calcium and thiamin ($P < 0.05$), vitamin A ($P < 0.05$), iron ($P < 0.01$), phosphorus ($P < 0.01$), and riboflavin ($P < 0.01$). A significant correlation was also found between the homemakers' dietary ratings for iron and all other nutrients and kilocalories. The homemakers' dietary ratings for niacin were significantly correlated with the homemakers' dietary ratings for protein ($P < 0.01$), riboflavin ($P < 0.05$), and ascorbic acid ($P < 0.05$). Significant correlations were also found between the homemakers' dietary ratings for phosphorus and riboflavin ($P < 0.01$) and thiamin ($P < 0.01$). The homemakers' dietary ratings for riboflavin were significantly correlated with the homemakers' dietary ratings for protein ($P < 0.01$), vitamin A ($P < 0.05$), and thiamin ($P < 0.01$).

Among the dietary ratings for the preschool children's group (Table 9), significant correlations were found between the children's dietary ratings for calcium and phosphorus ($P < 0.01$), niacin and phosphorus ($P < 0.01$), and niacin and protein ($P < 0.01$).

When the mean percentages of the RDA per 1000 kilocalories consumed by the homemakers and their preschool children for nine nutrients were evaluated (Figure 7), 100% or more of the mean percent intake of the RDA per 1000 kilocalories for six nutrients--niacin, phosphorus, protein, riboflavin, thiamin, and vitamin A--was consumed by the homemakers and their children. The mean percentages of the RDA per 1000 kilocalories consumed for the remaining nutrients, including calcium, iron, and ascorbic acid, all fell below 100% of the RDA per 1000 kilocalories for the homemakers and their children. However, the mean percentages of these nutrients included in the diets of both groups was above two-thirds of the RDA.

Homemakers and preschool children demonstrated similar intakes of most nutrients when analyzed by the nutrient density method (Table 10). Nutrient density scores indicated that 73% or more from each group reported intakes of two-thirds or more of the RDA per 1000 kilocalories for calcium, niacin, phosphorus, protein, riboflavin, thiamin, and vitamin A. Ascorbic acid intakes were also similar when analyzed by the nutrient density method; however, only 53.33% of the homemakers and 51.11% of the children had ascorbic acid intakes of two-thirds or more of the RDA per 1000 kilocalories. The two groups' iron intakes did vary, however. Table 10 shows that 75.56% of the homemakers had a nutrient intake of two-thirds or more of the RDA per 1000 kilocalories for iron, while only 51.11% of the preschool children met the same criterion.

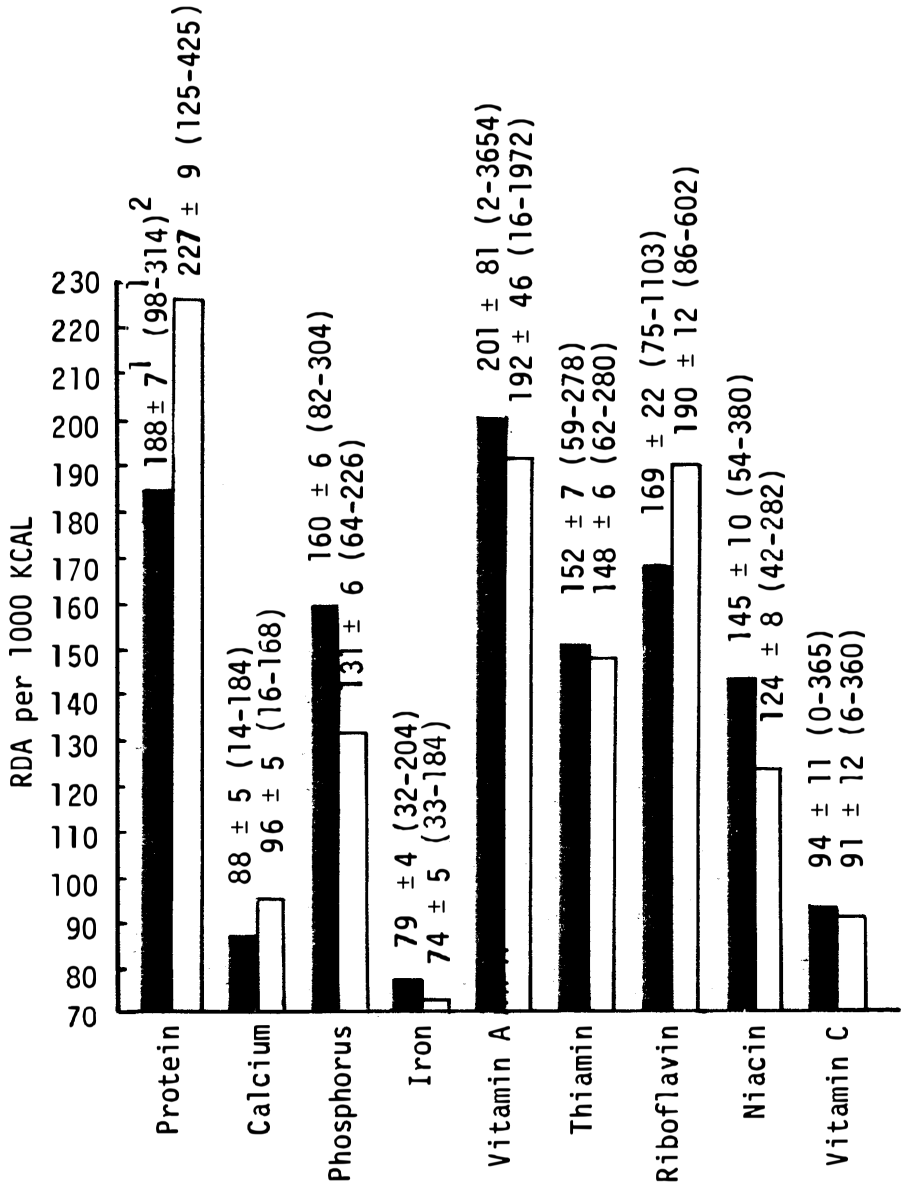


Figure 7. Mean Percentage of RDA per 1000 Kilocalories for Selected Nutrients Consumed by Homemakers and Preschool Children.

[1]Standard Error of the Mean

[2]Range

TABLE 10

Comparison of Homemakers' and Preschool Children's Dietary Intakes
Based on Nutrient Density as a Percentage of RDA (n=45)

| | ≤ 33% RDA/1000 kcal | | | | 34%-66% RDA/1000 kcal | | | | ≥ 67% RDA/1000 kcal | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Homemaker | | Child | | Homemaker | | Child | | Homemaker | | Child | |
| | No. | % | No. | % | No. | % | No. | % | No. | % | No. | % |
| Protein | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 45 | 100.00 | 45 | 100.00 |
| Calcium | 3 | 6.67 | 2 | 4.44 | 9 | 20.00 | 9 | 20.00 | 33 | 73.33 | 34 | 75.76 |
| Phosphorus | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 2 | 4.44 | 45 | 100.00 | 43 | 95.56 |
| Iron | 1 | 2.22 | 1 | 2.22 | 10 | 22.22 | 21 | 46.67 | 34 | 75.56 | 23 | 51.11 |
| Vitamin A | 5 | 11.11 | 2 | 4.44 | 9 | 20.00 | 10 | 22.22 | 31 | 68.89 | 33 | 73.33 |
| Thiamin | 0 | 0.00 | 0 | 0.00 | 1 | 2.22 | 1 | 2.22 | 44 | 97.78 | 44 | 97.78 |
| Riboflavin | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 45 | 100.00 | 45 | 100.00 |
| Niacin | 0 | 0.00 | 0 | 0.00 | 2 | 4.44 | 5 | 11.11 | 43 | 95.56 | 40 | 88.89 |
| Ascorbic acid | 6 | 13.33 | 14 | 31.11 | 15 | 33.33 | 8 | 17.78 | 24 | 53.33 | 23 | 51.11 |

No official RDA has been established for oleic acid, linoleic acid, fat, carbohydrate, or saturated fatty acids; therefore, daily recommendations as suggested by Hansen and Wyse (83) were used in this study (Table 11). Both groups reported intakes of 100% or more of the recommended allowance per 1000 kilocalories of oleic acid, saturated fatty acid, and fat. Carbohydrate intakes for the two groups were similar, with the homemakers consuming an average of 79.7% of the recommendation per 1000 kilocalories, while the preschool children consumed an average of 80.6% of the recommendation per 1000 kilocalories. A different trend was noted in linoleic acid intake, where homemakers consumed 70.8% of the recommendation per 1000 kilocalories, while the children only consumed 55.8% of the recommendation per 1000 kilocalories. However, no significant differences were found between group mean intakes.

Table 12 shows the mean percentage of kilocalories derived from protein, fat, and carbohydrate by the homemakers and their preschool children. The homemakers' mean percentage of kilocalories derived from protein (16.6%) and fat (40.4%) was slightly higher than that of the preschool children (16.3% and 39.9%, respectively), although not significantly so. The remaining percentage of kilocalories (43.8% for homemakers and 44.3% for preschool children) was derived from carbohydrate.

## Interrelationships Among Dietary Evaluations

Table 13 shows Pearson correlation coefficients for selected homemaker dietary ratings and the mean number of servings from specific food groups. A significant correlation was found between the homemakers' dietary ratings for thiamin and the number of servings from the bread/cereal group consumed by the homemakers ($P < 0.05$), as well as between the

TABLE 11

Comparison of Selected Mean Nutrient Intakes by Homemakers and Preschool Children with Suggested Daily Recommendations per 1000 Kilocalories[1]

| | Recommendations per 1000 kcal | Homemaker (n=45) | Preschool child (n=45) |
|---|---|---|---|
| | Grams | Mean % of recommendation per 1000 kcal | |
| Oleic acid | 12.25 | 128.79 | 121.73 |
| Linoleic acid | 10.00 | 70.75 | 55.81 |
| Fat | 39.00 | 115.10 | 113.89 |
| Carbohydrate | 137.50 | 79.72 | 80.55 |
| Saturated fatty acids | 14.25 | 110.49 | 126.99 |

[1]Hansen & Wyse (81).

TABLE 12

Mean Percentage of Kilocalories Derived from Protein, Fat, and Carbohydrate by Homemakers and Preschool Children

| Dietary components | Homemaker (n=45) | Preschool child (n=45) |
|---|---|---|
| Protein | 16.608 ± 0.603[1] | 16.343 ± 0.651[1] |
| Fat | 40.402 ± 1.248 | 39.975 ± 1.217 |
| Carbohydrate | 43.847 ± 1.567 | 44.303 ± 1.586 |

[1]Mean percent ± SEM.

TABLE 13

Pearson Correlation Coefficients Among Selected Dietary Parameters for Homemakers and Families (n=45)

| | HDR[1] calories | HDR thiamin | HDR iron | HND asc. acid | HPKC fat | HPKCCHO | F milk | H milk | H veg/fr |
|---|---|---|---|---|---|---|---|---|---|
| HDRthiamin[2] | 0.395[b] | | | | | | | | |
| HDRiron[3] | 0.597[b] | 0.436[b] | | | | | | | |
| HNDasc. acid[4] | 0.076 | 0.229 | 0.019 | | | | | | |
| HPKCfat[5] | -0.227 | -0.189 | -0.154 | -0.278 | | | | | |
| HPKCCHO[6] | 0.221 | 0.181 | 0.110 | 0.337[a] | -0.895[b] | | | | |
| Fmilk[7] | 0.191 | 0.257 | 0.095 | 0.175 | -0.454[b] | 0.368[a] | | | |
| Hmilk[8] | 0.259 | 0.203 | 0.307[a] | -0.067 | -0.119 | 0.090 | 0.304[a] | | |
| Hveg/fr[9] | -0.011 | 0.015 | 0.004 | -0.331[a] | 0.130 | -0.219 | -0.027 | 0.245 | |
| Hbread[10] | -0.127 | 0.313[a] | -0.167 | 0.022 | 0.139 | -0.130 | -0.286 | 0.008 | 0.132 |

[1]Homemakers' dietary ratings for kilocalories.
[2]Homemakers' dietary ratings for thiamin.
[3]Homemakers' dietary ratings for iron.
[4]Homemakers' nutrient density rating for ascorbic acid.
[5]Percent kilocalories homemakers derived from fat.
[6]Percent kilocalories homemakers derived from carbohydrate.

TABLE 13 (Continued)

7
8 Number servings made available to family members from milk group.
9 Number servings homemakers consumed from milk group.
10 Number servings homemakers consumed from vegetable/fruit group.
Number servings homemakers consumed from breads/cereal group.

homemakers' dietary ratings for iron and the mean number of servings from the milk group consumed by the homemaker ($P < 0.05$). A significant negative correlation was found between the homemakers' nutrient density ratings for ascorbic acid and the number of servings from the vegetable/fruit group consumed by homemakers ($P < 0.05$). The percentage of kilocalories homemakers derived from fat was negatively correlated with the number of servings from the milk group served to family members ($P < 0.01$), while the percentage of kilocalories homemakers derived from carbohydrate was positively correlated ($P < 0.05$) with the number of servings made available to family members from the milk group.

A comparison of the percentages of homemakers' and preschool children's dietary intakes based on three methods of evaluation is shown in Table 14. While only 4.4% of the homemakers and 2.2% of the preschool children attained EFNEP scores of 100, 6.7% of the homemakers and 8.9% of the preschool children scored 100 when evaluated by the dietary rating method based on mean nutrient scores. When dietary intake was evaluated by the nutrient density method (percentage of RDA per 1000 kilocalories), 20.0% of the homemakers and 15.6% of the preschool children scored 100 based on mean nutrient intake per 1000 kilocalories.

Table 15 shows the number and percentages of homemakers' and preschool children's dietary, nutrient density, and EFNEP ratings which fell into each of the three delineated categories. Although no significant differences were found between mean scores, one homemaker's dietary rating and EFNEP rating (2.2%) fell in the lowest category (< 33), while no children's scores fell into this category. Twenty percent of the homemakers' dietary scores and 51.1% of their EFNEP scores fell into the middle category

Table 14

Comparison of Homemakers' and Preschool Children's Dietary Intakes Based on Three Methods of Evaluation (n=45)

| | Number | Percentage |
|---|---|---|
| Homemakers | | |
| EFNEP score = 100 | 2 | 4.4 |
| Dietary score = 100 | 3 | 6.7 |
| Nutrient density score = 100 | 9 | 20.0 |
| Preschool children | | |
| EFNEP score = 100 | 1 | 2.2 |
| Dietary score = 100 | 4 | 8.9 |
| Nutrient density score = 100 | 7 | 15.6 |

TABLE 15

Comparisons of Dietary Ratings[1], Nutrient Density Ratings[2] and EFNEP Ratings[3] for Homemakers and Preschool Children (n=45)

| | Score[4] | | | | | |
|---|---|---|---|---|---|---|
| | ≤ 33 | | 34-36 | | ≥ 67 | |
| | No. | % | No. | % | No. | % |
| Homemakers | | | | | | |
| EFNEP rating | 1 | 2.22 | 23 | 51.11 | 21 | 46.67 |
| Dietary rating | 1 | 2.22 | 9 | 20.00 | 35 | 77.78 |
| Nutrient density rating | 0 | 0.00 | 1 | 2.22 | 44 | 97.78 |
| Preschool children | | | | | | |
| EFNEP rating | 0 | 0.00 | 18 | 40.00 | 27 | 60.00 |
| Dietary rating | 0 | 0.00 | 4 | 8.89 | 41 | 91.11 |
| Nutrient density rating | 0 | 0.00 | 1 | 2.22 | 44 | 97.78 |

[1]Overall nutrient rating based on percentages of RDA.

[2]Overall nutrient rating based on percentages of RDA/1000 kcal.

[3]Overall dietary rating based on number of servings consumed from four food groups.

[4]Based on scale of 100.

(34-66), while only 8.9% of the children's dietary scores and 40.0% of their EFNEP scores fell into this division. The largest portion of homemakers' dietary scores (77.8%) and children's dietary scores (91.1%) fell into the highest category ($\geq$ 67), while only 46.7% of the homemakers' and 60.0% of the children's EFNEP scores fell into the highest category. When the nutrient density rating method was utilized, no scores fell in the lowest category (< 33), while only one homemaker's score (2.2%) and one child's score (2.2%) fell into the middle category (34-66). The remainder of the homemakers' and preschool children's nutrient density scores (97.8% in each group) fell in the highest category ($\geq$ 67).

A comparison of the homemakers' and preschool children's mean scores derived by the EFNEP dietary rating and nutrient density scoring methods is shown in Figure 8. Although no significant differences were found between mean scores, the EFNEP method reported slightly lower mean scores for the homemakers (69.2) and for the preschool children (70.8), while the nutrient density mean scores for the homemakers (90.4) and for children (88.26) were highest when comparing the three scoring methods. Dietary scores fell intermediately, with the homemakers' mean dietary scores averaging 77.8 and the preschool children's mean dietary scores averaging 81.4. The EFNEP scoring method and the dietary scoring method both indicated that the homemakers' mean scores were slightly lower than the preschool children's mean scores. However, the nutrient density scores indicated that the homemakers' mean score was slightly higher than the preschool children's mean score.

When Pearson correlation coefficients were calculated among EFNEP, dietary, and nutrient density scores for homemakers and preschool children, (Table 16) significant correlations were found among the homemakers' dietary ratings and nutrient density ratings ($P < 0.05$), as well as among

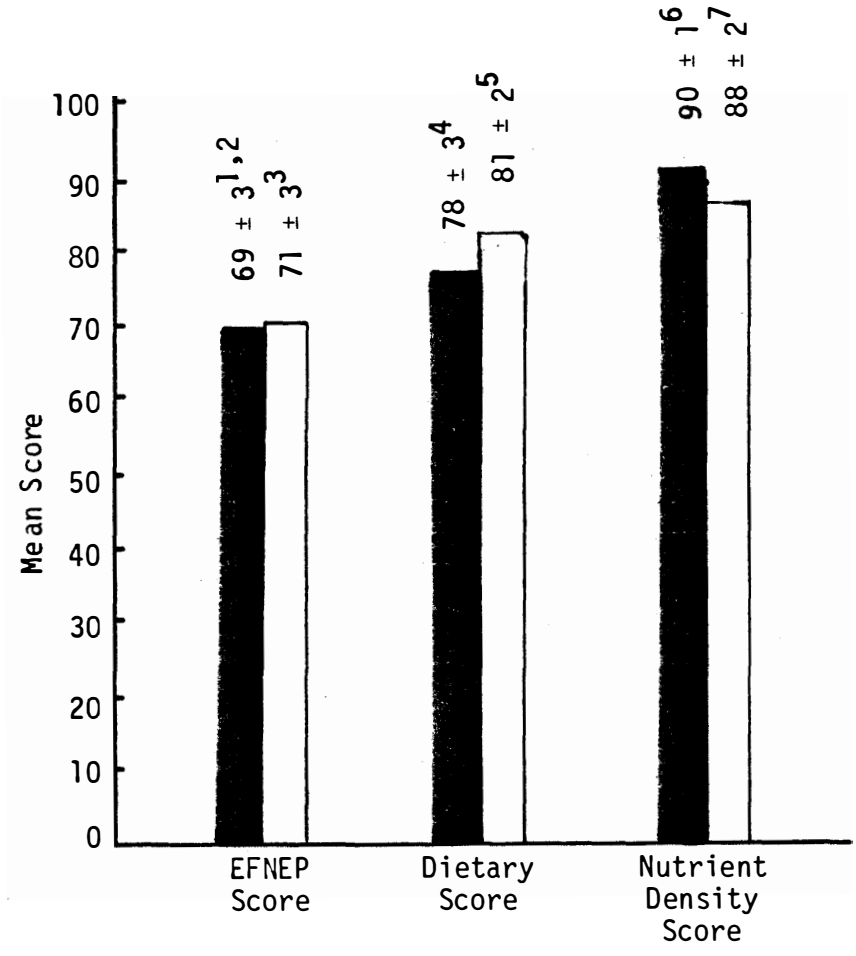


Figure 8. Comparison of Homemakers' and Preschool Children's Mean Scores Derived by Three Methods (P>0.05).

[1]Standard Error of the Mean

[2]Range = 29-100

[3]Range = 35-100

[4]Range = 30-100

[5]Range = 40-100

[6]Range = 61-100

[7]Range = 56-100

TABLE 16

Pearson Correlation Coefficients Among Dietary, Nutrient Density, and EFNEP Ratings for Homemakers and Preschool Children

| | Homemakers' | | | Preschool children's | |
|---|---|---|---|---|---|
| | Dietary rating[1] | Nutrient density rating | EFNEP score | Dietary rating | Nutrient density rating |
| Homemakers'[2] | | | | | |
| Nutrient density rating | 0.480[a] | | | | |
| EFNEP[3] score | 0.074 | -0.099 | | | |
| Preschool children's | | | | | |
| Dietary rating | 0.287 | -0.055 | 0.025 | | |
| Nutrient density rating | 0.174 | 0.282 | 0.170 | 0.329[a] | |
| EFNEP score | 0.188 | -0.044 | 0.323[a] | 0.207 | -0.197 |

TABLE 16 (Continued)

[1]Overall nutrient score based on percentage of RDA.

[2]Overall nutrient score based on percentage of RDA/1000 kcal.

[3]Overall dietary score based on servings from four food groups.

[a]$P < 0.05$.

the preschool children's dietary ratings and nutrient density ratings ($P < 0.05$). In addition, a significant correlation was found between the homemakers' and preschool children's EFNEP scores ($P < 0.05$). However, no significant correlations were found among other dietary ratings.

A lack of correlation between EFNEP scores and dietary ratings led to further investigation of individual scores. When the homemakers' EFNEP scores were ranked from lowest to highest and compared with the appropriate dietary rating (see Appendix V), 64.4% of the EFNEP scores and dietary ratings fell in the same category ($\leq$ 33, 34-66, or $\geq$ 67). However, 35.5% of the homemakers had EFNEP and dietary ratings which fell into different scoring categories. In 33.3% of the cases, EFNEP ratings fell into a lower category than dietary ratings, while 2.2% of the subjects' EFNEP ratings fell into a higher scoring category than did the dietary rating.

When the preschool children's EFNEP ratings were ranked from lowest to highest (see Appendix V) and compared with the appropriate dietary ratings, 57.8% of the subjects' EFNEP ratings and dietary ratings fell into the same scoring category ($\leq$ 33, 34-66, $\geq$ 67). However, 42.2% of the children had EFNEP ratings and dietary ratings which fell into different scoring categories. In 37.8% of the cases, the EFNEP ratings fell into lower categories than the dietary ratings, while 4.4% of the subjects' EFNEP ratings fell into a higher scoring category than did the dietary ratings.

## C. Factors Affecting the Dietary Intake of Families, Homemakers, and Preschool Children

Pearson correlation coefficients were calculated for selected family characteristics and dietary parameters for families, homemakers, and their preschool children and are shown in Table 17. A significant correlation was found between the families' income and the actual dollars spent for food ($P < 0.01$), as well as between the actual dollars spent for food and the total dollar value spent for the families' food ($P < 0.01$). A significant relationship was also found between the food stamp value families received and the total dollar value spent for the families' food ($P < 0.01$). The length of time enrolled in EFNEP was significantly correlated with the actual dollars spent for food by the families ($P < 0.01$). The number of family members residing in the household was significantly correlated with the value of food stamps received ($P < 0.01$), as well as with the total dollar value spent on the families' food ($P < 0.01$). The homemakers' age was also significantly correlated with the number of persons residing in the household ($P < 0.01$). A significant correlation was also found between the preschool children's EFNEP scores and the families' EFNEP scores ($P < 0.05$), as well as between the preschool children's EFNEP scores and the homemakers' EFNEP scores ($P < 0.05$).

### Income

The effect of family income on dietary parameters and other family characteristics is shown in Table 18. No statistical differences were found between income groups. The lower income group ($\leq$ \$333/month) reported spending less money on food (\$149.33) monthly than the higher

TABLE 17

Pearson Correlation Coefficients Among Selected Family Characteristics and EFNEP Dietary Scores for Families, Homemakers, and Preschool Children (n=45)

| | Income | Actual $ spent on food | Food Stamp value | Total $ value spent on food | Time enrolled in EFNEP | Number residing in household | Homemaker's age | Child's age | Families' EFNEP scores | Homemakers' EFNEP scores |
|---|---|---|---|---|---|---|---|---|---|---|
| Actual $ spent on food | 0.674[b] | | | | | | | | | |
| Food Stamp value | 0.141 | -0.058 | | | | | | | | |
| Total $ value spent on food | 0.245 | 0.551[b] | 0.847[b] | | | | | | | |
| Time enrolled in EFNEP | 0.392 | 0.411[b] | 0.095 | 0.180 | | | | | | |
| Number residing in household | 0.217 | 0.152 | 0.691[b] | 0.627[b] | 0.163 | | | | | |
| Homemaker's age | 0.016 | 0.064 | 0.163 | 0.187 | 0.101 | 0.450[b] | | | | |
| Child's age | 0.169 | 0.098 | -0.419 | -0.135 | 0.156 | 0.037 | -0.058 | | | |
| Family EFNEP scores[1] | 0.180 | 0.025 | -0.170 | 0.056 | 0.139 | -0.114 | -0.078 | -0.040 | | |

TABLE 17 (Continued)

| | Income | Actual $ spent on food | Food Stamp value | Total $ value spent on food | Time enrolled in EFNEP | Number residing in household | Home-maker's age | Child's age | Families' EFNEP scores | Homemakers' EFNEP scores |
|---|---|---|---|---|---|---|---|---|---|---|
| Homemakers' EFNEP scores[1] | 0.072 | 0.084 | 0.055 | 0.049 | -0.110 | -0.011 | -0.280 | -0.006 | 0.241 | |
| Preschool children's EFNEP scores[1] | -0.122 | -0.184 | -0.131 | -0.138 | -0.248 | -0.088 | -0.291 | 0.262 | 0.307[a] | 0.323[a] |

[1]Based on scale of 100.

[a]$P < 0.05$

[b]$P < 0.01$

TABLE 18

Effect of Income on Family Characteristics and Dietary Parameters[1]

| Family characteristics | Income ≤ $333 per month[2] Mean | SEM | Income ≥ $333 per month[3] Mean | SEM |
|---|---|---|---|---|
| Number residing in household | 4.62 | 0.39 | 5.13 | 0.40 |
| Actual $ spent for food | 87.39 | 13.10 | 148.86 | 7.34 |
| Value of Food Stamps received | 130.25 | 25.49 | 185.00 | 53.39 |
| Total $ amount spent for food | 149.33 | 14.64 | 175.00 | 12.48 |
| Time enrolled in EFNEP (months) | 23.24 | 3.59 | 39.46 | 3.87 |
| EFNEP family scores[4] | 82.24 | 3.12 | 89.33 | 12.57 |
| EFNEP homemaker scores[4] | 67.62 | 4.33 | 70.50 | 3.88 |
| Dietary homemaker scores[4] | 77.62 | 4.08 | 77.92 | 3.21 |
| Nutrient density homemaker scores[4] | 87.33 | 1.99 | 93.13 | 1.40 |
| EFNEP preschool children scores[4] | 72.10 | 3.52 | 69.59 | 3.68 |
| Dietary preschool children scores[4] | 82.38 | 2.66 | 80.63 | 2.84 |
| Nutrient density preschool children scores[4] | 86.86 | 2.24 | 89.50 | 2.05 |

[1]No significant differences were found ($P < 0.05$).
[2]n=21
[3]n=24
[4]Based on scale of 100.

income group (> $333/month). It should also be noted that families in the higher income group received food stamps of higher average value ($185/month) than did the lower income group ($130.25). The average mean time enrolled in EFNEP was longer for the higher income group (39.5 months) than for the lower income group, which averaged an enrollment period of 23.2 months at the time the food recall was administered.

When evaluated by the dietary rating scoring method, a significant difference ($P < 0.05$) was found between income groups for the homemakers' dietary intake of iron. Seventy-five percent of the homemakers in the higher income group and 57.1% of the homemakers from the lower income group had iron dietary ratings below 66. When the children's iron dietary ratings were evaluated, 66.67% from the lower income group, and 70.80% from the higher income group had iron dietary ratings below 66. However, no significant differences were found between the children's iron dietary ratings.

Homemakers' Formal Education

The effect of the homemaker's educational level on family characteristics and dietary parameters is shown in Table 19. Homemakers with an eighth grade education or less had less total family income per month ($378.78) than did families in which the homemaker had more than eight years of formal education ($476.35). In addition, homemakers with eight years or less education spent fewer actual dollars for food for the family, but received a larger amount of food stamps than did families in which the homemaker had more than eight years of formal education. When the total dollar value spent for food was considered, families in

TABLE 19

Effect of Homemaker's Educational Level on Family Characteristics and Dietary Parameters

| Family characteristics | ≤ 8th grade[1] | | > 8th grade[2] | |
|---|---|---|---|---|
| | Mean | SEM | Mean | SEM |
| Family income (monthly) | $378.60 | 22.91 | $476.35 | 35.94 |
| Actual $ spent for food | $107.52 | 13.75 | $136.32 | 8.97 |
| Value of Food Stamps received | $160.17 | 31.53 | $113.20 | 26.83 |
| Total $ amount spent for food | $167.20 | 14.44 | $157.80 | 12.26 |
| EFNEP family scores[3] | 84.04 | 3.08 | 88.50 | 2.51 |
| EFNEP homemaker scores[3] | 66.08 | 3.67 | 73.00 | 4.49 |
| Dietary homemaker scores[3] | 76.20 | 3.77 | 79.75 | 3.25 |
| Nutrient density homemaker scores[3] | 88.68 | 1.85 | 92.60 | 1.51 |
| EFNEP preschool children scores[3] | 66.36[a] | 3.75 | 76.25[a] | 2.91 |
| Dietary preschool children scores[3] | 83.40 | 2.32 | 79.00 | 3.26 |
| Nutrient density preschool children scores[3] | 90.04 | 1.91 | 86.05 | 2.37 |

[1] n=25
[2] n=20
[3] Based on scale of 100.
[a] Values are significantly different ($P < 0.05$).

which the homemaker had an eight grade education or less actually spent more than families whose homemakers had more education. No significant differences were found between mean values.

When the preschool children's mean EFNEP scores were evaluated, those whose mothers had more education had significantly higher ($P < 0.05$). EFNEP ratings than those whose mothers had less education. No significant differences were found between mean EFNEP scores for families or homemakers.

Number Residing in Household

Table 20 reports the range of family sizes included in this study. Although mean family size was 4.8 members, eleven families (24.4%) had six or more family members residing at home. When an evaluation of dietary parameters according to household size was computed using Pearson correlation coefficients (Table 21), significant negative correlations were found between household size and the homemakers' thiamin dietary and nutrient density ratings ($P < 0.01$), as well as with the homemakers' ascorbic acid nutrient density ratings ($P < 0.01$), indicating that as family size increased, the homemakers' intake of thiamin and ascorbic acid decreased. Table 17 (page 88) has already pointed out the significant relationships found between the number of persons residing in the household and the homemakers' age, the value of food stamps received, and the total dollar value spent for food ($P < 0.01$).

Length of Time Enrolled in EFNEP

Fifty-one percent (23) of the families included in this study had been enrolled in EFNEP 30 months or less, while 48.9% (22) of the families were enrolled longer than 30 months at the time the food recall was

TABLE 20

Number of Persons Residing in Households[1]

| No. persons in household | Frequency | Percent | Cumulative percent |
|---|---|---|---|
| 2 | 2 | 4.45 | 4.44 |
| 3 | 6 | 13.33 | 17.78 |
| 4 | 15 | 33.33 | 51.11 |
| 5 | 11 | 24.45 | 75.56 |
| 6 | 5 | 11.10 | 86.67 |
| 7 | 1 | 2.22 | 88.89 |
| 8 | 1 | 2.22 | 91.11 |
| 9 | 2 | 4.45 | 95.56 |
| 10 | 2 | 4.45 | 100.00 |

[1] n=45

TABLE 21

Evaluation of Selected Dietary Parameters According to the Number of Persons Residing in the Household

| Variable | Correlation coefficient[a] |
|---|---|
| Homemakers' thiamin dietary ratings | -0.434 |
| Homemakers' thiamin nutrient density ratings | -0.413 |
| Homemakers' ascorbic acid nutrient density ratings | -0.533 |

[a]Pearson correlation coefficients are all significant ($P < 0.01$).

administered (Table 22). Although no significant differences were found between group means, those families who were enrolled 30 months or less had somewhat lower mean family incomes than did families enrolled longer than 30 months. Families enrolled 30 months or less also averaged spending fewer actual dollars for food, receiving fewer food stamps monthly, and spending a smaller total dollar value for the families' food than did families who had been enrolled in EFNEP longer than 30 months. No significant differences were found between mean EFNEP dietary or nutrient density ratings for families, homemakers, or preschool children when evaluated according to the length of time enrolled in EFNEP.

Homemakers' Age

The homemaker's age is one factor which some researchers have found may affect the dietary intake of family members (71, 72, 73). In this study, significant correlations were found between the homemakers' age and the number of servings from the meat and "other foods" groups made available to family members ($P < 0.01$), as well as the number of servings the homemaker consumed from the meat group ($P < 0.01$) (Table 23). A significant negative correlation was found between the homemakers' age and their dietary ratings for riboflavin ($P < 0.05$); thus as the homemakers' age increased, their riboflavin dietary ratings decreased.

Area of Residence

The effects of the area of residence on family characteristics and dietary parameters are shown in Table 24. Although no significant differences were found between mean incomes, families living on farms had slightly higher mean monthly incomes ($465.89) than did rural non-farm

TABLE 22

Effect of Time Enrolled in EFNEP on Family Characteristics and Dietary Parameters[1]

| Family characteristics | ≤ 30 months[2] Mean | SEM | > 30 months[3] Mean | SEM |
|---|---|---|---|---|
| Family income (monthly) | $377.48 | 29.37 | $468.64 | 28.76 |
| Actual $ spent for food | $104.90 | 11.13 | $137.50 | 12.30 |
| Value of Food Stamps received | $136.10 | 29.66 | $161.00 | 41.30 |
| Total $ amount spent for food | $150.39 | 12.35 | $176.23 | 14.61 |
| EFNEP family scores[4] | 86.35 | 2.75 | 85.68 | 3.11 |
| EFNEP homemaker scores[4] | 72.13 | 3.96 | 66.05 | 4.15 |
| Dietary homemaker scores[4] | 77.83 | 3.62 | 77.73 | 3.62 |
| Nutrient density homemaker scores[4] | 88.96 | 1.93 | 91.95 | 1.56 |
| EFNEP preschool children scores[4] | 75.04 | 3.37 | 66.27 | 3.65 |
| Dietary preschool children scores[4] | 81.74 | 2.45 | 81.14 | 3.10 |
| Nutrient density preschool children scores[4] | 85.39 | 2.16 | 91.27 | 1.94 |

[1]No significant differences were found ($P < 0.05$).
[2]n=23
[3]n=22
[4]Based on scale of 100.

TABLE 23

Pearson Correlation Coefficients Among Selected Dietary Parameters

| | Homemakers age | Families' servings from meat group | Families' servings from other group | Homemakers' servings from meat group |
|---|---|---|---|---|
| Families' servings from meat group[1] | 0.369[b] | | | |
| Families' servings from "other foods" group[2] | 0.398[b] | 0.281 | | |
| Homemakers' servings from meat group[3] | 0.407[b] | 0.634[b] | 0.025 | |
| Homemakers' dietary rating for riboflavin[4] | -0.336[a] | -0.127 | -0.091 | -0.088 |

[1]Number of servings made available to all family members from meat groups.

[2]Number of servings made available to all family members from "other foods" group.

[3]Number of servings actually consumed by homemakers from meat group.

[4]Overall nutrient rating based on percentage of RDA.

[a]$P < 0.05$

[b]$P < 0.01$

TABLE 24

Effect of Area of Residence on Family Characteristics and Dietary Parameters

| Family characteristics | Rural non-farm[1] Mean | SEM | Farm[2] Mean | SEM |
|---|---|---|---|---|
| Family income (monthly) | $411.08 | 22.15 | $465.89 | 61.46 |
| Time enrolled in EFNEP (months) | 34.28 | 3.26 | 22.33 | 5.55 |
| Actual $ spent for food | $127.10 | 9.07 | $100.89 | 21.72 |
| Value of Food Stamps received | $167.69 | 28.54 | $ 77.00 | 9.82 |
| Total $ amount spent for food | $170.00 | 10.93 | $135.11 | 18.22 |
| EFNEP family scores[3] | 85.78 | 2.44 | 87.00 | 3.26 |
| EFNEP homemaker scores[3] | 67.47 | 3.33 | 75.89 | 5.05 |
| Dietary homemaker scores[3] | 76.11 | 3.00 | 84.44 | 4.04 |
| Nutrient density homemaker scores[3] | 90.81 | 1.49 | 88.89 | 2.05 |
| EFNEP preschool children scores[3] | 67.67[a] | 2.94 | 83.11[a] | 1.52 |
| Dietary preschool children scores[3] | 80.56 | 2.25 | 85.00 | 3.63 |
| Nutrient density preschool children scores[3] | 88.78 | 1.74 | 86.22 | 2.93 |

[1] n=36
[2] n=9
[3] Based on scale of 100.
[4] Values are significantly different ($P < 0.05$).

families ($411.08). Farm families on the average spent less actual dollars for food, received fewer food stamps, and spent less total dollar value for food for the family than did rural non-farm families. Rural non-farm families were enrolled in EFNEP an average of 34.3 months at the time the food recall was administered, while farm families had been enrolled in EFNEP 22.33 months.

When the preschool children's mean EFNEP scores were evaluated by area of residence, farm preschoolers' mean EFNEP scores were significantly higher ($P < 0.05$) than rural non-farm preschoolers. Although no significant differences were found, the preschool children's mean dietary ratings followed a similar pattern, with farm preschoolers producing slightly higher average dietary ratings. No significant differences were found between mean scores for homemakers or families.

Food Assistance

The effect of assistance[1] (food stamps and/or welfare) on family characteristics and dietary parameters is shown in Table 25. Families receiving no assistance had mean monthly incomes of $471.48, while those receiving assistance had mean monthly incomes of $350.71. Although no significant differences were found between group means, families receiving no assistance spent slightly more actual dollars for food monthly ($145.93) than did families receiving assistance ($71.50). However, those receiving assistance received an average of $146.35 monthly in food stamps. The

[1]Eighteen families received assistance in the form of food stamps; in addition, two families also received monthly welfare allotments.

TABLE 25

Effect of Assistance[1] on Family Characteristics and Dietary Parameters[2]

| Family characteristics | Families receiving assistance[3] Mean | SEM | Families not receiving assistance[4] Mean | SEM |
|---|---|---|---|---|
| Family income (monthly) | $350.71 | 31.92 | $471.48 | 25.80 |
| Time enrolled in EFNEP (months) | 25.24 | 4.28 | 36.67 | 3.78 |
| Actual $ spent for food | $ 71.50 | 13.87 | $145.93 | 7.42 |
| Value of Food Stamps received | $146.35 | 23.75 | 0.00 | 0.00 |
| Total $ value spent for food | $196.82 | 19.61 | $145.93 | 7.42 |
| EFNEP family scores[5] | 86.12 | 3.37 | 86.70 | 2.61 |
| EFNEP homemaker scores[5] | 67.65 | 4.48 | 69.41 | 3.86 |
| Dietary homemaker scores[5] | 81.47 | 4.49 | 75.19 | 3.10 |
| Nutrient density homemaker scores[5] | 88.65 | 2.42 | 91.59 | 1.42 |
| EFNEP preschool children scores[5] | 72.12 | 3.78 | 69.56 | 3.52 |
| Dietary preschool children scores[5] | 81.18 | 3.22 | 81.48 | 2.57 |
| Nutrient density preschool children scores[5] | 87.12 | 2.71 | 89.19 | 1.86 |

[1] Food Stamps (18), welfare (2).
[2] No significant differences were found ($P < 0.05$).
[3] n=18
[4] n=27
[5] Based on scale of 100.

mean total dollar value spent for food was $196.82 for families receiving assistance, while families receiving no assistance spent only $145.93 monthly. Families receiving food assistance were enrolled an average of 25.2 months when the food recall was administered, while those receiving no assistance were enrolled an average of 36.7 months. When mean EFNEP, dietary, and nutrient density scores were evaluated, no significant differences were found between mean scores for families, homemakers, or preschool children.

Father's Presence in the Household

The effect of the father's presence in the household on family characteristics and dietary ratings for kilocalories and nine nutrients was examined by analysis of variance. A table of data is not shown, however, due to the small sample size of families with fathers not residing in the household (five families). The small sample size may affect results of this study, and therefore, it is not included; no significant differences were found between mean scores when these data were evaluated.

## D. Supporting Dietary Information

Supporting dietary information was collected from homemakers on the same day that food recalls were recorded. An information sheet (see Appendix III) was used to collect dietary information for the homemakers and their preschool children. None of the homemakers or preschool children were dieting at the time the interview was administered, nor were they on special diets for any reason. Only one homemaker (2.22%) reported fixing or saving certain foods for other family members. Seven homemakers (15.56%) revealed that they served foods to other family members that they did not

eat. Two homemakers (4.44%) reportedly had food allergies, while none of the children had allergies. Only one homemaker (2.2%) was pregnant at the time of the interview, while two homemakers (4.44%) were breastfeeding. Four homemakers included in the study reported being enrolled in the federally-funded Women, Infant, and Children (WIC) nutrition supplementation program at the time the interview was administered.

## E. Dietary Supplements

Only eight homemakers (17.78%) reported taking a dietary supplement, while 23 of their preschool children (51.11%) were given supplements. Table 26 shows the various types of dietary supplements taken by the homemakers and the preschool children. Twenty-five percent of the homemakers who took supplements took a multi-vitamin type; twenty-five percent also reported taking multi-vitamins with iron. One homemaker who was pregnant took a prenatal supplement. The remainder of the homemakers who received supplements (3) took a single vitamin supplement, a multi-vitamin/mineral supplement, or calcium and iron supplements. A large percentage (78.26%) of the preschool children were given multi-vitamin supplements. Four other preschool children (17.39%) received multi-vitamins with iron. The remaining child (4.35%) took a multi-vitamin with fluoride supplement.

TABLE 26

Type of Dietary Supplements Received by Homemakers and Preschool Children

| | Homemaker | | Preschool child | |
|---|---|---|---|---|
| | No. | Percentage[1] | No. | Percentage |
| Single vitamin | 1 | 12.50 | 0 | 0.00 |
| Multi-vitamin | 2 | 25.00 | 18 | 78.26 |
| Multi-vitamin/mineral | 1 | 12.50 | 0 | 0.00 |
| Multi-vitamin/iron | 2 | 25.00 | 4 | 17.39 |
| Multi-vitamin/fluoride | 0 | 0.00 | 1 | 4.35 |
| Prenatal supplement | 1 | 12.50 | 0 | 0.00 |
| Calcium & iron | 1 | 12.50 | 0 | 0.00 |

[1]Percentage of those receiving supplement.

# CHAPTER V

# DISCUSSION

## A. Dietary Intake of Families, Homemakers and Preschool Children

### Evaluations Based on Food Groups and EFNEP Scores

When EFNEP scores for the families, homemakers, and preschool children were compared, family scores were significantly higher than those for homemakers or preschool children. More families had adequate servings made available to them from the milk, meat, and vegetable/fruit groups than were consumed by homemakers or preschool children. The findings indicate that a higher quality diet than is being consumed by homemakers and preschool children is available to family members. Since more nutritional foods were available in the household, reasons for lower EFNEP scores in this study may include: (1) dislike for a variety of foods needed for an adequate diet; (2) the quantity of food available not sufficient for all family members; (3) food allergies; or (4) nutrition knowledge not adequate to select an adequate diet for all family members.

As in previous studies (49,55), foods from the meat group were the most well supplied in the diets of families, homemakers, and children, while fruits and vegetables were the least well supplied. Fewer homemakers (64.4%) consumed diets supplying one or more servings from each food group than did preschool children (82.2%), while only 2.2% of the preschool children and 4.4% of the homemakers consumed diets meeting the four food group recommendations (Table 3, page 46). In comparison,

22.0% of the families had foods made available to them which met the four food group recommendations.

When Pearson correlation coefficients were calculated among the number of servings from all food groups consumed by homemakers and preschool children (Table 5, page 56), a significant negative correlation was found between the number of servings consumed by homemakers from the "other foods" group and the homemakers' EFNEP scores. The number of servings from the "other foods" group does not affect the scoring structure of the EFNEP rating; however, a negative correlation suggests that an inverse relationship between the homemakers' EFNEP scores and the number of servings consumed from the "other foods" group does exist, indicating that "other foods" may displace more nutritious foods in homemakers' diets.

The preschool children's diets appear to be closely related to that of the homemakers. Significant correlations in all food groups between the number of servings consumed by homemakers and preschool children indicate that the homemaker's food choices play a major role in determining the quality of diet consumed by her preschool child. The number of servings from the milk group consumed by preschool children was found to be negatively correlated with the number of servings consumed by preschool children from the "other foods" group. Although the number of servings from this group does not affect the EFNEP rating, it does indicate that an inverse relationship exists between milk and "other foods" consumption for preschool children. It may be assumed that non-nutritive foods from the "other foods" group may take the place of milk and milk products in the diets of many preschoolers. Research shows that preschoolers tend to be problem eaters (46). By three years of age, children have developed

taste patterns which may include dislikes for certain foods, especially vegetables (23,46,55,59). This appears to be the time when preschool children begin substitution of servings from the "other foods" group for foods they do not like. However, the children's group was the only group in this study which had subjects (15.6%) consuming no servings from the "other foods" group. Although a significant correlation was found between the number of servings consumed by homemakers and preschool children from the "other foods" group, 62.2% of the children consumed one serving or less from the "other foods" group, while only 17.78% of the homemakers consumed an amount that small (Figure 5, page 53).

When Pearson correlation coefficients were calculated for the number of servings from each food group made available to family members and the number of servings actually consumed by homemakers (Table 6, page 59), a significant negative correlation was found between the number of servings made available to family members from the meat and vegetable/fruit groups. This inverse relationship suggests that some families are served an increased number of servings from the meat group while fewer servings from the vegetable/fruit group is included in the day's menu. Significant negative correlations were also found between the number of servings consumed by homemakers from the milk and meat groups, as well as between the milk and "other foods" groups. These findings suggest that servings from the meat group and servings from the "other foods" group may have a tendency to replace milk and milk products in the diets of homemakers. This is reiterated when the actual number of servings consumed by homemakers is reviewed (Figures 1 & 2, pages 48 & 49). Only 26.3% of the homemakers had adequate servings from the milk

group while 93.3% of the homemakers had adequate servings from the meat group. When EFNEP scores were examined, significant negative correlations were found between the homemakers' EFNEP scores and the number of servings made available to family members from the "other foods" and meat groups. Although servings from the "other foods" group did not affect the EFNEP scoring method, a trend developed for families, homemakers, and preschool children in this study in which servings from the "other foods" group were inversely related to EFNEP scores.

Evaluations Based on Nutrient Analysis

The homemakers' mean kilocaloric intake in this study averaged 1,508.7 kilocalories (Table 7, page 63). The mean percent of the RDA for kilocalories consumed by this group was 73.9% (Figure 6, page 65). Individually, 60.0% of the homemakers met two-thirds or more of the RDA for kilocalories for their particular age group, while only 13.3% met 100% of the RDA for energy intake. No homemaker's kilocaloric intake placed them in the lowest level ($\leq$ 33% of RDA). The 1977 Household Food Consumption Survey (50) reported that women of various ages averaged a kilocaloric intake of more than 20% below the recommended allowances for their specific age group. These findings are similar to those in this study. However, the mean percentage of the RDA for kilocalories consumed by homemakers (73.96%) tends to obscure the fact that 28.88% of the homemakers included in this study consumed foods providing 1200 kilocalories or less daily. On examining information obtained through a questionnaire (see Appendix III), none of the homemakers were on a weight-loss or special diet.

The preschool children in this study consumed a higher mean percentage of the RDA for kilocalories (81.0%) than did the homemakers (Figure 6, page 65). Mean kilocaloric intake for preschool children was 1165.4 kilocalories (Table 7, page 63). A larger percentage of preschool children (64.4%) met two-thirds or more of the RDA for kilocalories than did homemakers, while 20.0% met 100% of the RDA for kilocalories. However, one child's kilocaloric intake did fall into the lowest grouping ($\leq$ 33% of RDA). It should be noted that the 1980 RDA (81) adjusted the mean daily energy needs for children age 4 to 6 from 1800 to 1700 kilocalories daily. The 1980 recommendation for kilocalories were used in this study. In 1971-1972, the Health and Nutrition Examination Survey (HANES) (66) found that 14% of the white children and 23% of the black children in the preschool age group studied consumed food providing less than 1000 kilocalories daily, which is considerably less than the established RDA for that age group. The 1977 Household Food Consumption Survey (50) also reported that preschool children had kilocaloric intakes which were 10% to 20% below the 1974 RDA for kilocaloric intake. Although the mean percentage of the RDA for kilocalories consumed by the preschool children in this study is fairly high (81.0%), an examination of individual intakes shows that 37.8% of the preschool children consumed diets providing less than 1000 kilocalories daily. Owen and Kram (63) reported that energy was poorly supplied in the diets of preschoolers. Examination of a questionnaire administered to the homemaker (see Appendix III) indicates that none of the preschool children were on a weight-loss or modified diet. Reasons for the limited kilocaloric intake by some preschoolers may be: (1) a limited food supply made available to them;

(2) the child's indifference to food and eating during the preschool years (46); (3) the development of dislikes for specific foods by age 3 (23,46,54,59); or (4) the recall was taken on an atypical day when the children's food intake was not their usual one.

Calcium levels reported in the 1977 Household Food Consumption Survey (50) for female diets were below the 1974 RDA for all age groups over 12 years of age. Average calcium intakes ranged from 64% to 74% of the 1974 RDA. In this study, the mean percentage of the RDA for calcium consumed by homemakers was 65.0%, fairly consistent with earlier findings (Figure 6, page 65). It should be noted that 53.3% of the homemakers had an intake of calcium that was below two-thirds of their RDA (Table 8, page 66). However, when the homemakers' calcium intake was evaluated by the percent of the RDA per 1000 kilocalories consumed (Table 10, page 73), all homemakers' calcium intakes were above the two-thirds level of the RDA which indicates a wise choice of calcium-rich foods within the limits of the kilocaloric intake.

Metheny et al. (47) reported that calcium was among the least well supplied nutrients in the diets of preschool children, and this study concurs with that finding. Although the mean percentage of the RDA for calcium consumed by the preschool children in this study was 75.1% (Figure 6, page 65), it was one of the three least well supplied nutrients in the preschoolers' diets. Twenty-one (46.9%) of the preschool children's calcium intakes fell below the two-thirds level of the RDA (Table 8, page 66). When the preschool children's calcium intakes were assessed by percent of RDA per 1000 kilocalories (Table 10, page 73), all subjects met two-thirds or more of the RDA. One preschool child's calcium intake

remained in the lowest category ($\leq$ 33% of RDA per 1000 kilocalories), however.

The homemakers' mean iron intake in this study was found to be slightly lower than that of females in the 1977 Household Food Consumption Survey (50). The 1977 survey reported that females age 12 to 50 years met 60% to 65% of the RDA for their respective age group. Homemakers in this study met a mean of 57.8% of the RDA for their appropriate age group (Figure 6, page 65). However, when the homemakers' dietary iron intake was evaluated as a mean percentage of the RDA per 1000 kilocalories (Figure 7, page 72), 78.97% of the recommended amount of dietary iron was consumed, indicating a selection of quality food choices within their limited kilocaloric intake.

Mean dietary iron intakes by preschool children in this study (55.4% of the RDA) were slightly lower than that of the homemakers (Figure 6, page 65). Iron was the only nutrient for which mean values fell below two-thirds of the RDA for the preschool children's group. These findings reinforce a study conducted by Dierks and Morse (46) which revealed that a substantial number of children had intakes of iron which fell between 50% and 74% of the RDA. When the preschool children's mean dietary iron intake was evaluated as a percentage of the RDA per 1000 kilocalories (Figure 7, page 72), 73.9% of the RDA per 1000 was consumed, revealing that although the RDA is not being met, the iron nutrient density level of foods consumed is fairly high.

The mean percentages of the RDA consumed by homemakers and children for ascorbic acid (71.4% and 75.1%, respectively) (Figure 6, page 65) were above the two-thirds level of the RDA. When ascorbic acid intake

was evaluated as a percentage of the RDA per 1000 kilocalories, the homemakers' and preschool children's intakes of ascorbic acid increased to 93.9% and 90.7%, respectively (Figure 7, page 72). The 1977 Household Food Consumption Survey (50) reported that average intakes of ascorbic acid by females age 12 to 50 and preschool children 4 to 6 exceeded the 1974 recommendations by a large margin. Findings in this study tend to support these data, since all mean intakes for ascorbic acid were above the two-thirds level of the RDA. In addition, this study used the 1980 RDA (81) for comparisons. The new revision of the RDA raised the recommended allowances for ascorbic acid from 40 to 45 milligrams for children 4 to 6 years of age, and from 45 to 60 milligrams daily for females of all ages. This would account for scores slightly lower than those reported in the literature based on comparisons with the 1974 RDA (34).

Homemakers and preschool children in this study had mean intakes of 100% or more of the RDA for six nutrients; niacin, phosphorus, protein, riboflavin, thiamin, and vitamin A. Results from the 1977 Household Food Consumption Survey (50) support the finding that these nutrients are usually well supplied in the diets of females and preschool children. In contrast, a study conducted by Metheny et al. (47) reported low thiamin intakes by preschool children, while Bell (61) concluded that 18% of the low income children studied had low vitamin A levels, and 6% had low ascorbic acid serum levels. Owen and Kram's 1969 study (63) found that riboflavin was a limiting factor in preschool children's diets.

The extremely high mean percentage of the RDA for protein consumed by homemakers and preschool children (Figure 6, page 65) points out the

acceptance and importance of protein foods in the American diet. The 1980 RDA (81) lowered recommended protein allowances for females ages 9 to 50 from 46 to 44 grams daily.

An examination of individual nutrient intakes by the homemaker and the preschool child points out low dietary intakes of some nutrients which are masked by mean nutrient scores (Table 8, page 66). It may be assumed that several homemakers and preschool children with dietary ratings $\geq$ 67% of the RDA for calcium, iron, vitamin A, and ascorbic acid consumed greater than 100% of the RDA for their particular age/sex group since mean scores for all of these nutrients approached or exceeded two-thirds of the RDA, while several subjects consumed 33% or less of the RDA for these nutrients. Table 7 (page 63) shows that low levels of each nutrient were consumed by one or more of the homemakers and children. Mean ascorbic acid intake by homemakers, for example, ranged from 0.00 to 148.50 milligrams, indicating the wide ranges of nutrient intakes included in this study. It should be noted that in most cases in this study where extremely high intakes of a nutrient were reported (Table 7), examination of actual food intake revealed consumption of one or more foods uncharacteristically high in certain nutrients. This was especially true when vitamin A intake was evaluated for homemakers and preschool children.

When Pearson correlation coefficients were calculated for homemakers' and preschool children's dietary scores for nine nutrients and kilocalories (Table 9, page 68), the homemakers' dietary ratings for kilocalories were significantly correlated with the same groups' dietary ratings for all nutrients except vitamin A. Most foods high in vitamin A are not

high in kilocalories; therefore, a significant relationship would not normally be established between these dietary parameters. Expected correlations were found between the children's dietary ratings for calcium and phosphorus, niacin and phosphorus, and niacin and protein.

When individual nutrient intake is expressed as a percentage of the RDA per 1000 kilocalories, quality dietary judgments may be derived (83). This fact is pointed out when dietary ratings based on a percentage of the RDA (Table 8, page 66) are compared with nutrient density ratings based on a percentage of RDA per 1000 kilocalories (Table 10, page 73). A higher percentage of homemakers and preschool children had dietary intakes of more than two-thirds of the recommended allowances for all nutrients when assessed by the nutrient density method. This suggests that the homemakers' and preschool children's dietary intake quality-wise may be better than dietary ratings and EFNEP ratings show; however, low kilocaloric intake in many cases limits the intakes of other nutrients in the diets of homemakers and preschool children.

Hansen and Wyse (83) defined arbitrary guidelines for intakes of fat, carbohydrate, oleic acid, linoleic acid, and saturated fatty acids per 1000 kilocalories (Table 11, page 75). Homemakers and preschool children's mean percentage intakes of oleic acid, fat, and saturated fatty acids exceeded recommendations established by Hansen and Wyse (83), while mean linoleic acid and carbohydrate intakes were below recommended levels. Hansen and Wyse's (83) guidelines (Table 11, page 75) defined a daily standard of 35% of calories from fat, or 39 grams per 1000 kilocalories; twenty-five grams per 1000 kilocalories from protein, or 10% of kilocalories, and the remaining 55% of the kilocalories, or 137.5 grams per 1000 kilocalories,

from carbohydrate. Hansen and Wyse (83) stated that palatable diets can be planned within their standards using readily available foods. Homemakers and preschool children's diets in this study were proportionately high in protein and fat (Table 12, page 76) according to the standards set by Hansen and Wyse (83). Their diets were also low in carbohydrates when compared to the same standards. The high percentage of carbohydrate set up as a recommended intake was established to encourage decreased fat intake by individuals of all ages. New dietary guidelines established by USDA in 1980 recommend an even lower percentage of kilocalories be derived from fat (84) (30.0%).

Interrelationships Among Dietary Evaluations

When Pearson correlation coefficients were calculated for selected dietary parameters and the number of servings from the food groups consumed by homemakers (Table 13, page 77), a significant negative correlation was found between the homemakers' nutrient density ratings for ascorbic acid and the number of servings from the vegetable/fruit group consumed by the homemaker. This finding suggests that as more fruits and vegetables were added to the homemakers' diets, they were not ones which were rich in ascorbic acid.

When the homemakers' and preschool children's mean EFNEP, dietary and nutrient density scores were compared, no significant differences were found between mean scores (Figure 8, page 83). Guthrie and Scheer (85) found that a simple dietary scoring system based on the four food groups can serve as a reliable scoring system for the rapid evaluation of dietary adequacy and as a basis for education programs. An evaluation of 24-hour dietary intakes showed that an assessment using a nutrient adequacy score and comparing actual nutrient intakes to Recommended

Dietary Allowances was similar to an assessment with a dietary score based on food groupings (85).

When Pearson correlation coefficients were calculated among EFNEP, dietary and nutrient density ratings (Table 14, page 80), a significant correlation was found between dietary and nutrient density ratings for homemakers and preschool children. While the homemakers' and preschool children's EFNEP scores were also significantly correlated, no correlation was found between EFNEP scores and dietary ratings or nutrient density ratings for either group.

The lack of correlation between scoring methods led to further investigation of individual scores. Since no correlation was found between EFNEP ratings and dietary ratings, a ranking of EFNEP scores from lowest to highest was made for homemakers and children. Each homemaker's and child's EFNEP and dietary ratings were directly compared to determine if the two scoring methods were identifying the same persons as having low and high dietary intakes. The results showed that homemakers' EFNEP and dietary ratings fell into the same scoring category ($\leq$ 33, 34-66, or $\geq$ 67) for 64.4% of the subjects, while preschool children's EFNEP and dietary ratings fell into the same scoring category 57.8% of the time. When the EFNEP rating and dietary ratings fell into different scoring categories, the EFNEP score fell into a lower category for 33.3% of the homemakers and for 37.8% of the children; only 2.2% of the homemakers' and 4.4% of the children's EFNEP scores fell into a higher scoring category than did the dietary rating. These findings suggest that from 35.56% to 42.20% of the subjects' dietary intakes were misclassified by the EFNEP method when compared to dietary ratings

based on a percentage of the RDA. However, only 6.3% to 10.5% of the subjects' EFNEP scores reported higher intakes than the dietary ratings, suggesting that the EFNEP scoring method tends to under-report dietary intake. The conservative nature of the EFNEP scoring method may be due to its scoring system which evaluated diets by a progression system based on the four food groups (see Appendix IV). The number of servings from the milk group is the first criterion, followed by servings from the meat, vegetable/fruit, and bread/cereal groups. If a subject consumes no servings from the milk group, the highest score attainable is 65, whereas nutrient analysis evaluates specific food intake and assesses a score based on the percentage of RDA included in the diet, regardless of number or size of servings.

It may be concluded that since no significant differences were found between mean EFNEP and dietary scores, the EFNEP scoring method may be an adequate evaluative tool when measuring the dietary intake of a population; however, when evaluations on individual dietary intake are conducted using the EFNEP scoring method, a larger percentage of families may be identified as "at risk" nutritionally than if a more discriminating method of evaluation, such as one based on actual nutrient intake, were used. Because the EFNEP score is based on a single 24-hour food recall, it may not be as representative of actual dietary intake for individuals over a period of time as for populations or groups.

## B. Factors Affecting the Dietary Intake of Families, Homemakers, and Preschool Children

### Income

Although no statistical differences were found between mean income levels (Table 18, page 90), slight differences were noted in various dietary parameters. The lower income group ($\leq$ \$333/month) spent less money for food than the higher income group (> \$333/month). However, families in the higher income group received food stamps of higher average value than did the lower income group, perhaps due to larger family size, less property and real estate owned, or increased knowledge concerning procedures to use to acquire food stamps for the family.

No significant differences were found between mean dietary scores for the two income levels. These findings contrast with those of the 1977 Household Food Consumption Survey (50), Metheney et al. (47), and Eppright et al. (57) which determined that dietary adequacy was related to family income. Reasons for finding no differences in dietary scores between income groups may include the fact that all families in this study were considered "low income" by the Expanded Food and Nutrition Education Program's standards. The highest mean monthly family income reported in this study was \$840.00, with 10 persons residing in the household. Other studies previously discussed (47,50,57) included more diverse income ranges than did this study, which may account for their findings that dietary adequacy was related to family income.

Evidence has shown that families with limited resources often have other priorities more demanding than their food budget. These priorities, including clothing, shelter, and medical expenses, often leave little

money for low income families to spend for food (86).

When individual nutrient intake was evaluated by mean family income, only dietary iron ratings for the homemakers were found to be significantly different for the two income levels. Seventy-five percent of the homemakers in the higher income group and 57.1% of those from the lower income group had iron dietary ratings below 67. In addition, 47.6% of the homemakers from the lower income group and 58.3% of the homemakers from the higher income group had dietary iron ratings of 34 to 66, while 9.5% of the lower income homemakers and 16.67% of the higher income homemakers had iron dietary ratings of 33 or less.

Homemakers' Formal Education

Past research shows varied findings concerning the effect of increased education of the homemaker on family dietary parameters. In this study, a significant difference was found between the homemakers' educational level only when the preschool children's EFNEP scores were compared (Table 19, page 92). Children from families whose mothers had completed more than eight years of formal education had slightly higher EFNEP dietary scores than did children whose mothers had eight years or less formal education. However, no significant differences were found between educational levels for other dietary scores for families, homemakers, or preschool children.

The positive effect of increased formal education of the homemaker on the nutritional status of families has been documented by several researchers (47,56,67). All research, however, does not agree that education has a decisive influence on the dietary adequacy of family members. In a study of low income food stamp recipients, Madden and Yoder

(71) concluded that education did not appear to be significantly related to dietary adequacy of the family.

Number Residing in Household

In line with the concentration on families with young children and the need to benefit as many people as possible, EFNEP usually focuses its efforts on large families (87). Mean family size for all families enrolled in EFNEP nationally is 4.1 persons per household, while 4.8 persons resided in households included in this study on the average (Table 20, page 94), ranging from two to ten persons. According to family size groups, Seiders (72) found that homemakers with six or more members in their families reported the highest percentage of homemakers consuming adequate servings from the bread/cereal group, while homemakers living alone had the lowest percent of homemakers consuming adequate servings from this group. In contrast, this study reports that as family size increased, homemakers had lower thiamin dietary and nutrient density ratings. Foods from the bread/cereal group are the major source of thiamin.

Length of Time Enrolled in EFNEP

The Expanded Food and Nutrition Education Program evaluates Program families' progress by using the 24-hour food recall and the food behavior checklist. Homemakers who achieve and reach a designated level using the Progression Model are graduated from the program. Homemakers who progress too slowly or not at all may be dropped from the program unless there are unusual circumstances. Families will be dropped when it is felt that continuing work with them may not be the best utilization of

resources (87). In some cases, families may be retained for a longer period of time when progress is slow or limited due to factors such as extremely limited family resources, illiteracy, or physical or mental handicaps.

Although no significant differences were found between mean scores for families enrolled 30 months or less and those enrolled for longer than 30 months, mean nutrient density ratings for homemakers and preschool children were slightly higher for those enrolled in EFNEP longer than 30 months (Table 22, page 97). Since the nutrient density method for scoring is a qualitative rating, its results may be most accurate in reporting the dietary quality of diets of homemakers and preschool children. EFNEP and dietary scoring methods in this study reported that families, homemakers, and preschool children enrolled in EFNEP for 30 months or less scored slightly higher than those enrolled for a period longer than 30 months. Previous studies have indicated that there is no significant relationship between an improvement in nutrition knowledge or food recall scores with the length of time enrolled in the EFNEP (72). However, other investigators report that for lasting improvements, families should be in the program long enough to develop new food habit patterns and new food skills. The White House Conference on Food, Nutrition, and Health (86) recommended that the hard-to-reach poor need person-to-person intensive educational effort over extended periods of time before behavioral changes can be expected.

Age of Homemaker

Madden (71) concluded that the age of the homemaker was negatively correlated to the adequacy of the family's diet (Table 23, page 98).

Results of this study show that as the homemakers' age increased, significantly more servings from the meat and "other foods" groups were made available to family members; in addition, significantly more servings from the meat group were consumed by older homemakers. High protein diets in America are an established fact of life. Non-nutritive foods such as soft drinks, candy and other sweets, and potato chips have also become a frequent menu item for the typical family. Findings in this study may indicate that younger homemakers may be more aware of dietary needs for family members and are providing fewer protein-rich foods and non-nutritive foods for this reason. Another conjecture is that younger homemakers may have lower family incomes than older ones and are not financially able to provide additional protein-rich and prepared snack foods and sweets for family members.

Area of Residence

The 1965 Household Food Consumption Survey (2) found that farm families tended to have better diets than other families, while Seiders (72) reported that farm families had the highest percentage of homemakers with adequate diets. This study found that preschool children residing on farms had significantly higher mean EFNEP scores than those residing in a rural non-farm setting (Table 24, page 99). Mean dietary or nutrient density ratings for families, homemakers, or preschool children were not significantly different when evaluated according to the area of residence.

Amount Spent for Food

Previous investigations have found that the amount of money spent for food was more highly correlated with energy and nutrient content of

the diet than were family income, the number residing in the household, or education of the mother (72). In contrast, results of this study found no correlation between money spent for food and EFNEP, dietary and nutrient density ratings for families, homemakers, or preschool children.

A significant correlation was found between the actual dollars spent on food and the time enrolled in EFNEP (Table 17, page 88). This statistic may indicate that as homemakers receive nutrition education through increased contacts with EFNEP aides, an increased priority on dollars spent for food may develop. There was not, however, a significant correlation found between the time enrolled in EFNEP and the total dollar value spent on food.

Families Receiving Assistance

This study found no significant differences between mean EFNEP, dietary and nutrient density scores for families, homemakers, or preschool children receiving assistance and those receiving no assistance (Table 25, page 101). These results are contrary to findings by Kelsay (53) and Seiders (72), who reported that food stamps appeared to improve the diets of participants. The importance of food stamps for families included in this study is illustrated by the fact that the mean dollar value of food stamps received by families was $146.35, while the average total dollar value (dollars and food stamps) spent for food by families receiving assistance was $196.82. Families in this study receiving assistance had mean monthly incomes of $350.71, compared to $471.48 for those receiving no assistance. Families with such limited financial resources may depend on food stamps as the major source for their families' food.

Father's Presence in Household

Previous studies have indicated that the presence of the father in the household has an effect on the dietary intake of family members. Seiders (72) found that the father's presence influenced milk intake; the study concluded that there were significantly fewer servings from the milk group consumed by homemakers from families in which no adult male was present. This study found no significant effect of the father's presence on mean EFNEP, dietary or nutrient density scores for families, homemakers, or preschool children.

It should be noted that few families in this study (five families, or 11.1%) reported living in households where the father was not present. The small sample size, therefore, should be taken into consideration when evaluating the relative importance of the father's presence in the household.

## C. Supporting Dietary Information

Previous studies have indicated that many EFNEP homemakers have a lower nutritional status than other family members (6). Factors found to contribute to their lowered nutritional status were weight reduction diets, modified diets, dislikes for nutrient-rich foods, and limited food and financial resources.

Supporting information collected from the homemakers in this study indicate that none of the homemakers or preschool children were on special diets of any type; therefore, the larger percentages of homemakers and children with relatively low daily kilocaloric intakes in this study cannot be attributed to dieting. One factor in this study which may

have influenced dietary intakes was that 15.56% of the homemakers served foods to family members which she does not eat. This may account for the significantly higher mean EFNEP family ratings when compared to mean EFNEP scores for the homemaker. These factors may also indicate that homemakers are aware of the nutritional needs of family members and may believe that it is more important for family members to receive adequate servings from all food groups than for themselves to be adequately nourished.

## D. Dietary Supplements

The results of this study indicate that in many cases homemakers feel it is more important for their preschool children to receive dietary supplements than themselves. Approximately 50% of the preschool children included in this study did receive some type of nutrient supplement, while only 18% of the homemakers were reportedly taking dietary supplements. Past research reports that supplements may affect the nutritional status of individuals (46). Eppright et al. (57) suggested that mothers who had favorable attitudes toward nutrition gave more dietary supplements to family members than other mothers; however, they did no better than others in food selection for their children.

Dietary supplements were not included in the nutrient analysis conducted in this study for homemakers and preschool children, since the major goal was to evaluate food choices; therefore, subjects receiving dietary supplements had increased nutrient intake not reported in this study.

## E. Conclusions

1. Low income homemakers provide more adequate servings from the four food groups to other family members than they consume themselves. Preschool children also consume less adequate servings from the four food groups than are made available to them.
2. Low income homemakers' and their preschool children's diets are closely related. There is no significant difference in their dietary intake when evaluated according to needs based on age and sex.
3. When the number of servings consumed from the four food groups by homemakers and preschool children was evaluated, the ranking from most to least adequate was meat, bread/cereal, milk, and vegetable/fruit for both groups.
4. Preschool children whose mothers have completed more than eight years of formal education consume more adequate servings from the four food groups than those whose mothers have eight years or less formal education ($P < 0.05$).
5. As the homemaker's age increases, she provides significantly more servings to her family from the meat food group and the "other foods" group ($P < 0.05$).
6. Preschool children residing on farms consume more servings from the four food groups than do preschool children residing in a rural non-farm setting ($P < 0.05$).

7. When homemakers' and preschool children's mean scores derived by the EFNEP, dietary and nutrient density methods were compared, no significant differences were found. A lack of significant correlation between scores led to further investigation which revealed that the EFNEP scoring system did not consistently identify individuals with low or high nutrient intake. The EFNEP scoring system tended to underestimate the nutrient quality of diets and rarely overestimated.

## F. Recommendations

Based on findings in this study and the experience of the investigator with the Expanded Food and Nutrition Education Program, the following recommendations are made to strengthen the accuracy of the EFNEP scoring method:

1. A re-evaluation of EFNEP's generalized approach to scoring foods from the four food groups is needed in order to more adequately reflect food choices with vitamin A and ascorbic acid content.
2. EFNEP program aides should be thoroughly trained and periodically evaluated to determine the reproducibility of recall results and scores.
3. Food recalls recorded in actual serving sizes would more accurately reflect dietary intake than the food contact method of evaluating recalls presently used by EFNEP.

4. A series of 24-hour food recalls, rather than the single recall, would increase the reliability of the 6 month assessment of individual dietary intakes.

# CHAPTER VI

## SUMMARY

The primary purposes of this study included comparing EFNEP dietary scores of low income homemakers with the EFNEP scores for foods served to their families, comparing the nutrient intake of low income homemakers with that of the oldest preschool child, comparing the dietary scoring method currently in use by EFNEP with scores derived from nutrient analysis, and identifying factors which may influence low income homemakers in Wayne County to eat differently than other family members.

Families in this study were served significantly more adequate diets ($P < 0.05$) than was consumed by homemakers or preschool children when evaluated by the EFNEP scoring method based on servings from the four food groups.

The percentage of homemakers consuming at least two servings from the milk group was 24.4%, while 46.6% of the preschool children consumed the three or more servings recommended for this age group. The recommended two or more servings from the meat group was consumed by 93.3% of the homemakers and 84.4% of their preschool children. Forty percent of the families were served the recommended four or more servings from the fruit/vegetable group, while only 19% of the homemakers and 10% of the preschool children reported actually consuming the recommended amount. The recommended four or more servings from the bread/cereal group were consumed by 80% of the homemakers and 46.6% of their preschool children. When the number of servings consumed by homemakers and preschool children

from the four food groups was evaluated, the ranking from most to least adequate was meat, bread/cereal, milk, and vegetable/fruit.

Significant correlations were found between the number of servings from each food group consumed by homemakers and preschool children. The homemakers' EFNEP scores and the preschool children's EFNEP scores were also found to be significantly correlated ($P < 0.05$). Significant negative correlations ($P < 0.01$) were found between the homemakers' EFNEP scores and the number of servings they consumed from the "other foods" group. In addition, significant negative correlations were found ($P < 0.01$) between the number of servings preschool children consumed from the milk group and the "other foods" group.

Homemakers and preschool children consumed a mean of 100% or more of the RDA for niacin, phosphorus, protein, riboflavin, thiamin, and vitamin A. The mean percentages of the RDA consumed by homemakers for kilocalories and ascorbic acid were above two-thirds of the RDA, as were the mean percentages of the RDA consumed by preschool children for kilocalories, calcium, and ascorbic acid. The mean percentages of the RDA for calcium and for iron consumed by homemakers fell below two-thirds of the RDA, while only the mean percentage for iron fell below two-thirds of the RDA for the preschool children's group.

When evaluated by the mean percentage of the RDA per 1000 kilocalories, the mean percentages of all nutrients consumed by homemakers and preschool children were above two-thirds of the RDA.

When the homemakers' and preschool children's three dietary scores were compared, 77.8% of the homemakers and 91.1% of the children scored above 66 when the dietary rating method was used, compared to 46.7% of

the homemakers and 60.0% of the preschool children when the EFNEP rating was implemented. The nutrient density rating provided the highest percentages, with 97.8% of the homemakers' and children's diets scoring above 66.

When homemakers' and preschool children's dietary intakes of individual nutrients were analyzed, the largest percentage of homemakers and children had scores for all nutrients which fell into the highest category ($\geq$ 67) when analyzed by the nutrient density method.

A comparison of the percentages of homemakers and preschool children meeting the four food group recommendations and 100% of the RDA revealed that only 4.4% of the homemakers and 2.2% of the preschool children met the four food group recommendations, while 6.7% of the homemakers and 8.9% of the children met 100% of the RDA. When dietary intakes were evaluated by the percentage of RDA per 1000 kilocalories, 20.0% of the homemakers' and 15.6% of the preschool children's diets met 100% of the RDA per 1000 kilocalories.

When homemakers' and preschool children's mean scores derived by the EFNEP, dietary and nutrient density rating methods were compared, no significant differences were found; however, lack of significant correlation between scores led to further investigation, revealing that the EFNEP scoring system did not consistently identify individual diets which were low or high in nutrient content. The EFNEP scoring system tended to underestimate the nutrient quality of diets and rarely overestimated.

When evaluated by the dietary rating scoring method, a significant difference ($P < 0.05$) was found between income groups for the homemakers'

dietary intakes of iron. Homemakers from the lower income groups had significantly higher iron intakes than those from the higher income groups.

When the preschool children's mean EFNEP scores were evaluated, those whose mothers had more education scored significantly higher ($P < 0.05$) than those whose mothers had less education.

The number residing in the household was found to be negatively correlated with the homemakers' thiamin and ascorbic acid ratings ($P < 0.01$).

Farm preschool children's mean EFNEP scores were significantly higher ($P < 0.05$) than were preschoolers' scores who resided in a non-farm setting.

Results of this study indicated that the homemakers' and their preschool children's diets were closely related. No significant differences were found in their dietary intake when evaluated according to needs based on age and sex.

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# APPENDIXES

# APPENDIX II

## Guidelines for Collecting Food Recall Information

FAMILY I.D. NO._____

INFORMED CONSENT FORM

I,_____agree to take part in a nutrition study as a volunteer. I understand that the purpose of this study is to find the difference between what the homemaker eats and what she serves other family members.

I understand that I will only give information about what I eat, what my oldest pre-school child eats, and what I serve my family. I am also willing to answer other questions concerning the way my family eats.

I understand that:

---I can refuse to answer any specific item or question;

---all information will be confidential; no individual family information will be used; and

---I may withdraw my consent at any time during the study.

_____ _____

DATE HOMEMAKER'S SIGNATURE

_____ _____

DATE INTERVIEWER'S SIGNATURE

# APPENDIX I

## Informed Consent Forms

Patsy A. Ezell
Assistant Extension Agent
Wayne County

## GUIDELINES FOR COLLECTING FOOD RECALL INFORMATION

1. No information should be collected on Mondays, Fridays, or during the last week of the month.
2. Be sure that all the information is collected during one visit, and that each recall from the same family reflects the same twenty-four hour time period.
3. Collect all information directly from the homemaker, including the pre-school child's food recall.
4. Be sure to collect information for the specific child which is to be included in the study.
5. When possible, questionnaires and food recalls should be completed at the same time that 6 month food recalls are taken (these can serve as the recall if it is taken during the proper month).
6. When all information is collected, turn the questionnaire in to the Extension Office as soon as possible.

## STEPS IN COLLECTING FOOD RECALL INFORMATION

STEP I Read the "Informed Consent Form" to the homemaker, making sure that she understands it. This form must be signed by the homemaker before you can continue.

STEP II Using the "Family Food Record," ask the homemaker to list all the foods she made available to her family during the past twenty-four hour time period. Be sure to start with the last meal or snack served, and go backward. Serving sizes and portions will not be recorded on this form.

STEP III Using the "Homemaker's Food Recall," ask the homemaker to list all foods she actually ate during the past twenty-four hour time period. Be sure to start with the last meal or snack eaten, and go backward. Serving sizes of each portion of food must be recorded. Use measuring spoons, measuring cups, and paper food models to help in determining serving size for each food item consumed.

STEP IV Using the "Pre-school Child's Food Recall" ask the homemaker to list all food the designated preschool child actually ate during the past twenty-four hour time period. Be sure to start with the last meal or snack eaten by the child, and go backward. Serving sizes of each portion of food must be recorded. Use measuring spoons, measuring cups, and paper food models to help in determining serving size for each food item consumed.

STEP V Complete the sheet titled "Additional Information." Be sure answers are clear, and where appropriate, answers are given for the homemaker and for the designated preschool child.

## HOW TO RECORD FOOD PORTIONS

All food recall information for the homemaker and the preschool child should be recorded by serving size. This should be in cup size (or number), tablespoons, cups (1/4 cup, 1/2 cup, etc.), or portions such as 1 medium raw apple.

All foods consumed must be recorded in this manner on the recall forms.

You will not be expected to mark the number of servings on the recall sheets. This information will be tabulated at a later date.

Be sure to list all food and beverages consumed, including coffee, beer, alcoholic beverages, and soft drinks.

*LIQUIDS Paper cups in different sizes will be lettered. Indicate serving size of liquids consumed by recording the "letter" of the cup which indicates the correct serving size.

FRUITS & VEGETABLES
Raw: Number and size eaten (Example--2 medium apples).
Cooked: Number of tablespoons for small servings. Use measuring cups as a guide to record portions eaten (1/4 cup, 1/2 cup, etc.).

MEATS Use paper models as a guide; record size of serving as indicated on the food models.

BREADS Use paper models as a guide; record size of serving as indicated on the food models. If purchased bread is consumed, record number of slices. Be sure to indicate the kind of bread served (whole wheat, rye, etc.).

COMBINATION FOODS
Try to record an accurate measurement of amount consumed. Then list the major ingredients. (Example: Chicken Casserole--1 cup; includes boiled chicken, rice, green peas).

MISCELLANEOUS
Use as accurate measurements as possible and record number eaten, tablespoons eaten, or serving size eaten, such as 1/4 cup, 1/2 cup, etc.

*MILK Should be recorded according to kind of milk. Example: whole milk, skim milk, chocolate milk, 2% milk, buttermilk, etc.

# APPENDIX III

Family Food Record, Homemaker Recall Record (EFNEP Family Record), Preschool Child Recall Record, Information Sheet

STEP II

FAMILY FOOD RECORD

| What did the Homemaker serve other family members during the last 24 hours? | MILK | MEAT | VEG/FRUITS | BREAD/CER. | OTHER |
|---|---|---|---|---|---|
| MORNING | | | | | |
| MIDMORNING | | | | | |
| NOON | | | | | |
| AFTERNOON | | | | | |
| EVENING | | | | | |
| BEFORE BED | | | | | |
| TOTAL NO. SERVINGS | | | | | |
| Totals 1 or more servings of each of the Four Food Groups | 1 | 1 | 1 | 1 | |
| | YES | | | NO | |
| Totals 2 or more servings milk/meat; 4 or more veg./ fruits and bread/ cereal | 2 | 2 | 4 | 4 | |
| | YES | | | NO | |

FAMILY I.D. NUMBER_____

HOMEMAKER'S NAME_____

## ADDITIONAL INFORMATION

1. During the 24-hour recall period, was the homemaker on any type of special diet? YES NO
   If yes to above, what kind of special diet?
   ____Weight loss diet ____Diabetic diet
   ____Weight gain diet ____Other (Please specify)_____
2. During the 24-hour recall period, was the pre-school child in question on any type of special diet? YES NO
   If yes to above, what kind of special diet?
   ____Weight loss diet ____Diabetic diet
   ____Weight gain diet ____Other (Please specify)_____
3. Were there any foods that the homemaker "saved" or fixed just for certain family members? YES NO
   If yes, what?_____
4. Did the homemaker serve any foods to her family during the recall period that she does not eat? YES NO
   If yes, what?_____
5. Is the homemaker allergic to any foods?
   YES NO
   If yes, what?_____
6. Is the pre-school child in question allergic to any foods?
   YES NO
   If yes, what?_____
7. Is the homemaker pregnant? YES NO
8. Is the homemaker breastfeeding?
   YES NO
9. Is the homemaker participating in the WIC Program?
   YES NO
10. Is the homemaker taking any type of vitamin or mineral supplement?
    YES NO
    If yes, what kind (brand)?_____
    How often does she take them?_____
11. Is the pre-school child in question taking any type of vitamin or mineral supplement? YES NO
    If yes, what kind?_____
    How often does he/she take them?_____

## EXPANDED FOOD AND NUTRITION EDUCATION PROGRAM
## FAMILY RECORD

A. DESCRIPTION

| 1. Aide's Name | 2. State Number | 3. Unit Number |
|---|---|---|
| | | |

Fill Out For Each Family in Unit As Soon As Possible and Every 6 Months Thereafter.
Keep in Family File After Review by Trainer – Agent.

4. Family ID Number _____

a. Name _____
b. Street _____
c. City _____ d. State _____
e. Urban _____ Rural Nonfarm _____ Farm ____

5. Date Family Enrolled

6. Family Received *(some time during year)*:

a. USDA Food Stamps _____ d. Welfare _____
b. USDA Family Food Donation _____
c. USDA/FHA Assistance _____

| Family Members *(First Name)* (7) | Age Yrs. (8) | Sex | | Check If "Yes" | |
|---|---|---|---|---|---|
| | | Male (9) | Female (10) | Now In School (11) | Participated In School Lunch Program Last Week (12) |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| (Number of Members _____) | Totals | | | | |

13. Highest Grade in School Completed by Homemaker

8th Grade or Less _____ 9th Thru 12th _____ Beyond High School _____

14. Check for Homemaker

a. White _____
b. Negro or Black _____
c. Spanish Surname _____
d. American Indian _____
e. Oriental _____
f. Other _____

15. Date Record Completed or Updated

OMB Approved
40R3610

B. HOMEMAKER FOOD CONSUMPTION, FAMILY INCOME, AND EXPENDITURE

1. Food Record Number

2. Date Taken

3. What Did Homemaker Eat and Drink in the Last 24 Hours?

| To Be Filled Out by Aide on Homemaker<br>Kind of Food and Drink (Enter Main Foods in Mixed Dishes) | To Be Filled Out By Trainer Agent<br>Milk | Meat | Veg./ Fruit | Bread Cereal |
|---|---|---|---|---|
| Morning | | | | |
| Midmorning | | | | |
| Noon | | | | |
| Afternoon | | | | |
| Evening | | | | |
| Before Bed | | | | |

4. Total actual income for family last month $ _____ .
*(Include wages & salaries, social security, welfare & insurance payments, pensions and cash support from others. If family has income from farming, including 1/12 of last year's income after expenses.)*

Check one:

Under $ 84 _____
$ 84 – $167 _____
$168 – $250 _____
$251 – $333 _____
$334 – $417 _____
$418 and Over _____

| Total Number of Servings | (7) | (8) | (9) | (10) |
|---|---|---|---|---|
| 11. Totals 1 or more servings of each of four food groups | 1 | 1 | 1 | 1 |
| | Yes _____ No _____ | | | |
| 12. Totals 2 or more servings milk/meat; 4 or more veg/fruit and bread/cereals | 2 | 2 | 4 | 4 |
| | Yes _____ No _____ | | | |

5. How much did homemaker spend for food last month, including cash and credit? $ _____
*(Do not include value of foods received under Family Food Donation or other food assistance programs. If in the Food Stamp Program, include only amount spent to purchase food stamps or coupons.)*

6. If in the Food Stamp Program, what was the value of bonus stamps received? $ _____

STEP IV

PRE-SCHOOL CHILD'S FOOD INTAKE RECORD

| What did the pre-school child consume during the last 24 hours? (RECORD SERVING SIZE) | FOOD GROUPS | | | | |
|---|---|---|---|---|---|
| | MILK | MEAT | VEG./FRUIT | BREAD/CER. | OTHER |
| MORNING | | | | | |
| MIDMORNING | | | | | |
| NOON | | | | | |
| AFTERNOON | | | | | |
| EVENING | | | | | |
| BEFORE BED | | | | | |
| TOTAL NO. SERVINGS | | | | | |
| Totals 1 or more servings of each of Four Food Groups | 1 | 1 | 1 | 1 | |
| | | | YES | NO | |
| Totals 3 or more servings milk; 2 or more servings meat; 4 or more servings veg./fruits and bread/ cereals | 3 | 2 | 4 | 4 | |
| | | | YES | NO | |

FAMILY I.D. NO._____
HOMEMAKER'S NAME_____
CHILD'S NAME_____
CHILD'S AGE_____
MALE FEMALE (Circle answer)

# APPENDIX IV

## EFNEP Progression Scoring Chart

## SCORING TABLE FOR TWENTY-FOUR HOUR DIET

To find the Twenty-four Hour Diet score:

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

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

### 0 MILK SERVINGS

| 0 MEAT SERVINGS | | | 1 MEAT SERVING | | | (2) MEAT SERVINGS | | |
|---|---|---|---|---|---|---|---|---|
| Veg. Fruit | Bread Cereal | Score | Veg. Fruit | Bread Cereal | Score | Veg. Fruit | Bread Cereal | Score |
| 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 6 |
| | 1 | 2 | | 1 | 10 | | 1 | 14 |
| | 2 | 4 | | 2 | 12 | | 2 | 17 |
| | 3 | 6 | | 3 | 15 | | 3 | 25 |
| | (4) | 8 | | (4) | 23 | | (4) | 29 |
| 1 | 0 | 2 | 1 | 0 | 10 | 1 | 0 | 14 |
| | 1 | 9 | | 1 | 22 | | 1 | 27 |
| | 2 | 11 | | 2 | 25 | | 2 | 35 |
| | 3 | 13 | | 3 | 33 | | 3 | 39 |
| | (4) | 21 | | (4) | 37 | | (4) | 43 |
| 2 | 0 | 4 | 2 | 0 | 12 | 2 | 0 | 17 |
| | 1 | 11 | | 1 | 25 | | 1 | 35 |
| | 2 | 13 | | 2 | 33 | | 2 | 39 |
| | 3 | 21 | | 3 | 37 | | 3 | 43 |
| | (4) | 25 | | (4) | 41 | | (4) | 47 |
| 3 | 0 | 6 | 3 | 0 | 15 | 3 | 0 | 25 |
| | 1 | 13 | | 1 | 33 | | 1 | 39 |
| | 2 | 21 | | 2 | 37 | | 2 | 43 |
| | 3 | 25 | | 3 | 41 | | 3 | 47 |
| | (4) | 29 | | (4) | 45 | | (4) | 60 |
| (4) | 0 | 8 | (4) | 0 | 23 | (4) | 0 | 29 |
| | 1 | 21 | | 1 | 37 | | 1 | 43 |
| | 2 | 25 | | 2 | 41 | | 2 | 47 |
| | 3 | 29 | | 3 | 45 | | 3 | 60 |
| | (4) | 33 | | (4) | 58 | | (4) | 65 |

### 1 MILK SERVING

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

### (2) MILK SERVINGS

| 0 MEAT SERVINGS | | | 1 MEAT SERVING | | | (2) MEAT SERVINGS | | |
|---|---|---|---|---|---|---|---|---|
| Veg. Fruit | Bread Cereal | Score | Veg. Fruit | Bread Cereal | Score | Veg. Fruit | Bread Cereal | Score |
| 0 | 0 | 6 | 0 | 0 | 16 | 0 | 0 | 21 |
| | 1 | 14 | | 1 | 29 | | 1 | 39 |
| | 2 | 17 | | 2 | 37 | | 2 | 43 |
| | 3 | 25 | | 3 | 41 | | 3 | 47 |
| | (4) | 29 | | (4) | 45 | | (4) | 51 |
| 1 | 0 | 14 | 1 | 0 | 29 | 1 | 0 | 39 |
| | 1 | 27 | | 1 | 52 | | 1 | 58 |
| | 2 | 35 | | 2 | 56 | | 2 | 62 |
| | 3 | 39 | | 3 | 60 | | 3 | 66 |
| | (4) | 43 | | (4) | 64 | | (4) | 80 |
| 2 | 0 | 17 | 2 | 0 | 37 | 2 | 0 | 43 |
| | 1 | 35 | | 1 | 56 | | 1 | 62 |
| | 2 | 39 | | 2 | 62 | | 2 | 68 |
| | 3 | 43 | | 3 | 66 | | 3 | 82 |
| | (4) | 47 | | (4) | 79 | | (4) | 88 |
| 3 | 0 | 25 | 3 | 0 | 41 | 3 | 0 | 47 |
| | 1 | 39 | | 1 | 60 | | 1 | 66 |
| | 2 | 43 | | 2 | 66 | | 2 | 82 |
| | 3 | 47 | | 3 | 79 | | 3 | 88 |
| | (4) | 60 | | (4) | 85 | | (4) | 94 |
| (4) | 0 | 29 | (4) | 0 | 45 | (4) | 0 | 51 |
| | 1 | 43 | | 1 | 64 | | 1 | 80 |
| | 2 | 47 | | 2 | 79 | | 2 | 88 |
| | 3 | 60 | | 3 | 85 | | 3 | 94 |
| | (4) | 65 | | (4) | 91 | | (4) | 100 |

# APPENDIX V

## Comparisons of Homemakers' and Preschool Children's EFNEP and Dietary Ratings

| Family No. | Homemaker's EFNEP scores | Homemaker's dietary ratings |
|---|---|---|
| 71 | 29 | 30 |
| 134 | 34 | 45 |
| 82 | 41 | 90 |
| 150 | 43 | 50 |
| 35 | 43 | 65 |
| 114 | 43 | 70 |
| 218 | 43 | 65 |
| 46 | 45 | 85 |
| 133 | 45 | 95 |
| 225 | 47 | 95 |
| 34 | 51 | 65 |
| 83 | 60 | 50 |
| 52 | 60 | 60 |
| 222 | 60 | 75 |
| 65 | 60 | 90 |
| 131 | 64 | 40 |
| 104 | 64 | 80 |
| 137 | 64 | 80 |
| 78 | 64 | 85 |
| 136 | 64 | 85 |
| 105 | 65 | 95 |
| 110 | 65 | 95 |
| 126 | 66 | 70 |
| 128 | 66 | 70 |
| 13 | 79 | 75 |
| 119 | 79 | 75 |
| 196 | 79 | 85 |
| 74 | 79 | 100 |
| 128 | 79 | 100 |
| 100 | 80 | 70 |
| 145 | 85 | 55 |
| 69 | 85 | 75 |
| 93 | 85 | 80 |
| 217 | 85 | 90 |
| 125 | 85 | 95 |
| 106 | 88 | 75 |
| 127 | 88 | 85 |
| 220 | 88 | 85 |
| 44 | 91 | 85 |
| 121 | 91 | 90 |
| 29 | 91 | 95 |
| 190 | 91 | 100 |
| 21 | 94 | 70 |
| 67 | 100 | 90 |
| 206 | 100 | 95 |

| Family No. | Preschool Children's EFNEP scores | Preschool children's dietary ratings |
|---|---|---|
| 71 | 35 | 60 |
| 65 | 39 | 80 |
| 196 | 39 | 78 |
| 78 | 41 | 80 |
| 128 | 43 | 65 |
| 150 | 43 | 75 |
| 34 | 47 | 80 |
| 82 | 47 | 85 |
| 74 | 50 | 85 |
| 69 | 52 | 60 |
| 93 | 62 | 75 |
| 136 | 74 | 75 |
| 131 | 64 | 90 |
| 119 | 66 | 65 |
| 29 | 66 | 80 |
| 137 | 66 | 85 |
| 29 | 66 | 80 |
| 44 | 66 | 85 |
| 52 | 66 | 85 |
| 126 | 68 | 75 |
| 110 | 68 | 95 |
| 83 | 79 | 40 |
| 105 | 79 | 90 |
| 46 | 79 | 95 |
| 13 | 80 | 65 |
| 127 | 80 | 75 |
| 21 | 80 | 80 |
| 130 | 80 | 85 |
| 225 | 80 | 90 |
| 121 | 80 | 90 |
| 114 | 80 | 95 |
| 133 | 80 | 100 |
| 134 | 80 | 100 |
| 190 | 82 | 70 |
| 220 | 82 | 82 |
| 218 | 82 | 90 |
| 222 | 82 | 90 |
| 35 | 88 | 75 |
| 100 | 88 | 85 |
| 106 | 88 | 85 |
| 217 | 88 | 85 |
| 104 | 88 | 90 |
| 121 | 88 | 90 |
| 206 | 80 | 100 |
| 145 | 91 | 90 |
| 67 | 100 | 100 |

# VITA

Patsy Anderson Ezell was born in Lawrenceburg, Tennessee, on October 3, 1950. She attended elementary schools in Lawrenceburg and Nashville, and graduated from Perry County High School, Linden, Tennessee, in May, 1968.

She received the Bachelor of Science degree in home economics education from The University of Tennessee, Knoxville, in March 1972.

In August 1974, she entered Graduate School at Louisiana State University in Baton Rouge, Louisiana where she accepted a position as a graduate research assistant in the Nutrition Department of the School of Home Economics.

In March 1976, she enrolled in Graduate School at The University of Tennessee, Knoxville and was employed as a laboratory assistant by The University of Tennessee, Knoxville from March 1976 until December 1976.

In December 1976, she accepted a position with the Tennessee Agricultural Extension Service as an Assistant Extension Agent in Waynesboro, Tennessee.

In September 1978, she re-entered Graduate School at The University of Tennessee, Knoxville, while employed by the Agricultural Extension Service. She received a Master of Science degree from The University of Tennessee, Knoxville with a major in nutrition science in June, 1981.