DEMOGRAPHIC CHARACTERISTICS AND THE NUTRITIONAL STATUS OF FAMILIES ENTERING THE EXPANDED NUTRITION AND FAMILY PROGRAMS

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ABSTRACT

DEMOGRAPHIC CHARACTERISTICS AND
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By

Mary Elisabeth Kerr

The Expanded Nutrition and Family Programs (EFNP) were started in January, 1969, to improve the nutritional status of low-income families. Several aspects of the program have been researched, but none have objectively measured change within the family beginning with family entry into the program. The present evaluation method, the homemaker's 24-hour food recall, is limited in its accuracy and reliability.

This study provides the baseline data to describe the nutritional status and demographic characteristics of 176 families as they entered the program. The families were enrolled in their usual manner by nutrition aides. Information on the family's grocery shopping pattern, the homemaker's nutrition knowledge, and the collection of random urine specimens were obtained in two home interviews. Urine samples were collected from available family members. The urine specimens were analyzed for thiamin, riboflavin, and creatinine. The excretion levels of the vitamins/gram of creatinine for each individual were classified as deficient, low, acceptable, or high using ICNND (1963) standards. Demographic information, as well as the homemaker's 24-hour food recall, was obtained from the family record form completed by the nutrition aide at the time of enrollment.

The adequacy of the 24-hour food recalls was determined by comparison with Basic Four adult standard: two servings from the meat group; two from the milk group; four from the fruit-vegetable group; and four from the bread-cereal group. Based on the 24-hour food recalls, the diets of the homemakers were seriously inadequate. The diets of most of the homemakers met only one out of four of the food groups. The food group most frequently met was meat, and the group most frequently lacking was fruit-vegetable. Milk was also used infrequently.

Homemakers did the majority of the grocery shopping and preferred to shop at supermarkets. Transportation was usually by means of a family car or a friend or relative's car. Food purchases were influenced most frequently by cost. Family preference, needing a food item, and nutritional value followed in that order.

Biochemical results from urine specimens of all available family members showed that thiamine nutriture appeared to be acceptable. Over one-fourth of the families showed low or deficient levels of riboflavin excretion. This may be a reflection of the inadequate use of milk.

The responses to the nutrition statements revealed that the homemakers had limited knowledge of nutrition. There is a great opportunity for nutrition aides to expand the homemakers' nutrition knowledge and their families' eating patterns.

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Mary Elisabeth Kerr

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DEDICATION

To my mother,

who first taught me

the importance of good nutrition

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"Abide in me... for without me ye can do nothing."
John 15: 4, 5

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CHAPTER I

INTRODUCTION

Despite the general affluence of American society, there is growing concern over the actual nutritional status of the American family and more particularly, of the low-income family. The United States Department of Agriculture has initiated several programs to aid low-income families in improving their nutrition, among which is the Expanded Family and Nutrition Education Program (EFNEP).

Davis (1968) reported that staff members of the Cooperative Extension Service recognized that low-income families do not participate in group activities, nor do they learn through bulletins or other conventional educational materials. Personal and frequent contact with these homemakers is necessary to induce any change in their food consumption patterns. Because of the limited time of professional staff, para-professionals, known as nutrition aides could be used to provide personal assistance to these families.

Since its inception in January, 1969, various studies have been done to determine the effectiveness and the needs of the Expanded Nutrition Program on a national level. The USDA Economic Research Service (1969) studied program operation from January through July, 1969, gathering data from seven sample locations. From the 24-hour food recalls taken by the aides, they found an increased use of bread and cereal foods, but more especially, an increase in the use of milk, fruits, and vegetables. It was observed that "local programs have

little guidance on how to conduct self-evaluation and no systematically use-tested procedures."

The USDA Federal Extension Service (1971) conducted a second in-depth study of the Expanded Nutrition Program from April 1, 1970, through March 31, 1971, at ten selected locations. The data was collected from family records and interviews with program participants and personnel. This study examined managerial aspects of the program, as administration and personnel, more than examining changes in family eating patterns. Data showed that nutrition related practices were being promoted, but there were only indirect means available for demonstrating achievement. Data obtained from the 24-hour food recall did indicate a shift toward greater use of milk, fruit, and vegetable products and less use of bread and cereals. The authors concluded that measures of the homemakers' nutritional knowledge needed to be improved.

The USDA Economic Research Service (1972) published a report based on information from approximately five percent of the families enrolled before October, 1969. On the basis of data from initial 24-hour food recalls, more than 90% of the homemakers reported fewer servings from at least one of the Basic Four food groups than is recommended. The milk group and the fruit-vegetable group were most often lacking.

Several groups have conducted isolated studies on specific aspects of the EFNEP program. Prichard and Hall (1971) in Nebraska studied the attitudes of aides and clients toward the program. Seoane (1971) studied the shopping practices of EFNEP families for convenience foods. In Maryland, some of the changes resulting from

the Expanded Nutrition Program were that homemakers used new foods, prepared some foods differently, and learned the principles of planning balanced diets and wise food shopping. Although eating habits improved, the majority had not yet attained adequate diets (Wang and Ephross, 1970).

The reliability and validity of periodic 24-hour food recalls of the homemaker's food intake for assessing the adequacy of the family's diet has been questioned by several groups. Huenemann and Turner (1942) emphasized the flexibility of the diet from day to day. Krehl and Hodges (1965) discussed the inaccuracies resulting from insufficient knowledge of the quantity of food consumed by the individual.

Beal (1967) believed it to be a memory test, valid only in surveys where time, money, and personnel were limited. Eppright and associates (1952) mentioned the importance of chosing a period of time representing the usual behavior of the subjects, as well as recognizing the fact that girls are more variable in their food intake than are boys. Hunscher and Macy(1951) stated several problems: incomplete knowledge of food composition; the fact that common foods vary widely in composition; and the variations that exist in methods of preparing raw foods, which affect their nutrient content. Trulson and McCann (1959) believed daily dietary records to be useful only when the subjects were literate and reliable.

Leverton (1960) noted two further problems with food recalls: what happens to ingested food may be different from one individual to another; and we don't really know what differences in nutritional status mean in terms of performance and well-being of the individual.

As a means of overcoming some of the inadequacies of the dietary history, urinary excretion of thiamin and riboflavin has been used to express nutritive status. The validity of assessing nutritional status by means of random urine specimens is based on the ability to analyze the vitamin levels and express them as a ratio of the creatinine excretion. Clarke et al (1966) and Lowry (1952) concluded that random urine specimens could be used well for studies of population groups, relating the vitamins to creatinine excretion was convenient, and the use of creatinine tended to correct for the size of the individual. Louhi et al (1952) concurred, suggesting that the ratio of the thiamin per gram of creatinine could be used as well as 24-hour collection for a rough estimate of the nutriture of the individual.

Objectives

The main objective of this thesis was to develop a descriptive profile of the demographic characteristics and the nutritional status of 176 families as they entered the Expanded Nutrition and Family Programs (ENFP). This would provide baseline data from which to assess change. Among the areas of interest were family income, age and education of the homemaker, size of the family, the homemaker's 24-hour food recall, her responses to various statements related to nutrition knowledge, and levels of vitamin excretion.

Another objective was to determine what relationships might exist between 24-hour food recalls, vitamin levels, nutrition knowledge, and income of the homemaker.

CHAPTER II

LITERATURE REVIEW

Dietary Patterns in America

Ethnic groups, income groups, age groups, and various population groups have been studied to determine their nutritional status. Beal (1955) studied upper middle-class Denver families to obtain a picture of the nutrient intake of healthy children living at home during the first five years of life. Using 24-hour food recalls, she found that thiamin intake increased steadily during the first 15 months, leveled until just after three years of age, then increased again. The median intake was slightly above the RDA. Riboflavin, after an initial rise in the first year, decreased in the second and third years with decreased milk consumption, but then increased again. More than 75% of the children consumed more riboflavin than recommended by RDA standards during the first three years.

Further work by Beal (1961) among upper middle-income families showed that healthy, growing children tend to have superior food and nutrient intake more often than intakes that do not meet the Recommended Dietary Allowance (RDA) standards.

Calcium, iron, and vitamins A and C intakes are frequently shown to be low in nutrition surveys. Brown and associates (1970), studying two- and three-year old children of low- and middle-income families in Honolulu, found low-income children more likely to have

low intakes of calcium, vitamin C, vitamin A (to a lesser extent) and riboflavin than were middle-income children. Both income groups tended to show somewhat low calcium and iron intakes.

Ho and Brown's (1970) investigation of food intakes of infants attending well-baby clinics in Honolulu indicated that all the nutrients met at least two-thirds of the RDA except for iron. The iron intake of slightly more than half of the infants was just below 50% of the RDA. Fox et al (1971) concur. In their study of pre-schoolers in twelve north central states, they found that calcium and phosphorous compared favorably with the RDA, but iron was low.

Morgan (1959) reported that during 1947-1958, about 12,000 individuals in 39 states participated in a nutrition research project. Seven-day food records were kept, and dietary adequacy was measured by the 1958 National Research Council recommended daily intake of nutrients. Physical examinations were provided, which included biochemical analysis of blood and urine, and in some cases, dental exams and x-rays of bones and teeth.

Nutritional status, as measured by dietary intake, on the whole was very good. Boys from 5-12 years of age showed excellent dietary intakes of all nutrients, while the calcium intake of girls in this age group tended to be slightly lower. Boys aged 13-20 showed adequate intake of all nutrients except vitamin C. Girls in this age bracket showed borderline intakes of calories and protein, and were seriously low in calcium, iron, thiamin, and vitamin C. Adult men showed high intakes of all nutrients except calories and thiamin, while adult women showed good average intake of all nutrients except calories, thiamin, calcium, and riboflavin. Morgan concluded

that vitamins A and C and the minerals calcium and iron were lower than the RDA more frequently than any other nutrients.

Davis and associates (1969) found that a significant proportion of the population had dietary intakes below one-half the RDA in certain nutrients. After puberty males showed nutrient intakes that were usually more adequate than females. There was evidence that a substantial number of infants were poorly nourished, and this situation existed in high-income groups as well as low. Economic status was not necessarily a good predictor of nutrient intake except in the cases of calcium and vitamins A and C.

Factors Affecting Nutrient Intake

The factors influencing food consumption behavior and food attitudes have been researched by several groups. Lund and Burk (1969) pointed out that

> we know in considerable detail what our population is consuming and what the nutritive value of its consumption is. What we don't know is why people choose the foods they do, how food habits are established, and how they can be modified. It is in our knowledge of the behavioral aspects of nutrition that serious gaps exist.

In their study of children's food consumption behavior, they found that only about 20% of the families used mealtime for educating children about food. Vitamin A intakes seemed most closely related to food attitudes and experiences of mothers and children, but the fathers' attitudes were not significant. In regard to vitamin C intakes of children, the important factors in determining intake were "parental attitudes toward critical foods and children's behavior while eating."

An interesting study by Hardy and associates (1943) in the Chicago area investigated the diets of two- to eight-year old children from different socioeconomic groups. They concluded that economic conditions affected nutritional adequacy since there were improvements in diets following a marked increased in the food budget. The Negro population exhibited poor diets more frequently than white children, and all the dietary inadequacies resulted most often from lower consumption of fruits and vegetables. Inadequate use of protein foods was seldom observed.

Fryer et al (1971) found that family income was not significantly related to the intake of carbohydrates, protein, and fat in the children they studied. Fox et al (1971) stated that the amount of money spent for food seemed more important than income or education of the mother in positively influencing nutrient intake.

Eppright et al (1970) concurred that the amount of money spent for food was important in improving the diet. Hiemstra (1972) pointed out that food or nutrient expenditures do not necessarily increase with an increase in income.

Young and associates (1956) looked at homemakers' nutrition knowledge in Syracuse and Rochester, New York. They found that the educational level of the homemaker showed a greater relationship to nutrition knowledge than did income. As educational level increased within an income bracket, the percentage of homemakers using the basic seven increased. This did not prove true as income increased at an educational level. Nutritional knowledge did improve the homemaker's performance in feeding her family, but many homemakers performed better in feeding their families than their nutrition knowledge would indicate.

The relationship between the educational level of the mother and nutrition has been investigated further. Morse et al (1967) found that the more education the mother possessed, the better answers she gave to practical nutrition questions, although there were exceptions on both sides. A course in nutrition appeared to be directly beneficial to nutrition knowledge without being related to higher education. Studies by Hinton and associates (1963), Hendel et al (1965), and Eppright et al (1970) suggested that the mother's education was very important in influencing her family's dietary intake. Dickens and Ferguson (1958), on the other hand, in a study of homemakers' use of dairy products, found a low relationship between a homemaker's use and her knowledge of dairy products.

Allen et al (1970) approached the study of nutritional adequacy from the standpoints of family commensality and academic performance. Family commensality was determined from the number of meals eaten together, what family member prepared the meals, and the quality of the cooking. Family commensality was associated with increased food likes, dietary adequacy, and good health. Correlations suggested a positive influence on the childrens' academic performance.

> We must conclude from these facts that the daily routine of the family sharing of meals--breakfast, lunch, and dinner--exerts a consistent positive and beneficial influence on the personal, academic, and social development of the child and on his maturation and progress toward vocational adequacy.

There appear to be other sociological factors which influence the nutritional status of children. Hinton et al (1963) found that various social factors influenced the eating behavior and dietary intake of girls 12-14 years old. The girls who scored best in emotional stability, conformity, adjustment to reality, and family

relationships missed fewer meals and had better diets than girls scoring less well in these areas. Girls maturing either early or late had poor eating habits and demonstrated feelings of inadequacy and isolation. If the girls considered health an important factor in food selection, their diets were much more adequate than the diets of those girls who considered the enjoyment of food an end in itself.

Sims (1971) studied nutritional status of pre-school children in moderate-income families in relation to various environmental factors. She grouped mothers into two categories. Type I mothers were non-authoritarian, valued freedom, possessed low feelings of powerlessness, exhibited high family centrism or cohesiveness, felt a high regard for education, and had attained high socioeconomic status. Type II mothers were authoritarian, had some feelings of powerlessness, prestige and religion were of high importance, and they tended to possess lower socioeconomic status. Type I mothers felt nutrition was very important, scored higher on nutrition tests and use of the Basic Four, and spent less money on food than type II mothers. Children in type I families had higher calcium and vitamin C intakes than children of type II families, although the latter group tended to consume more calories, carbohydrates, iron, and thiamin than the former. Type II children were generally heavier for their height than were type I children, who appeared to show a more balanced physique.

Meyers (1970) summarized some of the extra costs poor families face which may make it more difficult for them to afford greater food expenditures. They often cannot take advantage of seasonal

sales, and they may be limited to buying in their own neighborhood where costs may be high. The quality of their purchase is limited to the quality they can afford at a particular time, and credit costs are high. Their consumer education may also be limited, and thus they don't know how to use certain foods or how to extend their purchasing power.

Bryan and Lowenberg (1958) looked at the father's influence on young children's food preferences. There was a slight correlation between the fathers' and childrens' reactions to vegetables. Eighty-nine percent of the mothers did not serve certain foods if the father did not like them. Thus it appeared that the father's main influence on the child's preferences was of limiting the variety of food offered to the child. Sanjur and Scoma (1971) supported the conclusion that foods unfamiliar to or disliked by the parents were also unfamiliar to the child.

USDA Nutrition Programs

The effectiveness of the USDA school lunch and food stamp programs in improving the nutrition of low-income families has been investigated. Schaefer (1969) reported that in San Diego, Texas, where over 90% of the children in the low-income area were served free lunches, the nutritional status of children in that area was far superior to other low-income areas surveyed. Callahan's (1971) study in Massachusetts indicated that Type A lunches were nutritionally superior to bag lunches or other alternatives. Madden and Yoder (n.d.) reported that in rural areas of central Pennsylvania total food expenditures could be increased by the food stamp program, showing higher intakes of iron and thiamin and riboflavin by stamp

recipients in one of two counties studied. Reese (1971) also reported that food expenditures could be increased through the food stamp program.

Hiemstra (1972) summarized and evaluated some of the USDA food programs. With every 10% increase in disposable income, consumers tend to increase food expenditures by four to six percent. The difficulty, however, is that in terms of nutrients or pounds of food, not much additional food is purchased as income rises. Therefore, if nutrient intake is to increase, there must be an incentive for the consumer to buy food, or a restriction of other purchases to encourage food buying. The food stamp program appeared to be making favorable impacts on the nutrient intake of the families receiving the food stamps.

Urinary Excretion of Vitamins

The difficulties in assessing nutriture by dietary recalls or dietary records have been discussed in the introductory chapter. Urinary excretion of thiamin and riboflavin has been used in surveys to assess intakes of these vitamins.

Using Pearson's (1962) vitamin excretion tables, Meyers et al (1968) found that 20% of the children in a depressed area of urban Boston showed thiamin excretions in the low range. Riboflavin excretions tended to be in the normal ranges. Owen et al (1969), on the other hand, found the urinary excretions of both thiamin and riboflavin to be acceptable in 585 Mississippi pre-school children. Brin et al (1965) studied thiamin and riboflavin excretions among the elderly in New York state. He concluded that 18% of the subjects were thiamin deficient using the ICNND (1963) tables, or 21% using

Pearson's tables (1962). None were deficient with respect to riboflavin. Tzeng (1971) researched primary school children in Danville, Illinois. Using ICNND (1963) values for urinary thiamin and riboflavin, she determined that 9% of the males and 14% of the females had unacceptable thiamin values. With regard to race, 9% or the whites and 16% of the non-whites showed unacceptable thiamin values. Seven percent males, 10% females, 7% whites and 11% non-whites had unacceptable values of riboflavin.

McGanity (1969) examined 4,497 individuals in Texas who represented the lower 25% of socioeconomic status. Median urinary values for thiamin and riboflavin were in the acceptable range. The percentage of individuals showing low thiamin values was twice as large in the non-Latin white subjects as in either Mexican American or Negro American. Low riboflavin was seen one and one-half times as often in non-Latin whites as in the other groups.

Variability of Thiamin Excretion

Friedemann and his associates (1949) studied the utilization of low and high thiamin and riboflavin intakes, examining the effects of work and rest. The urinary excretions of thiamin and riboflavin suggest that the tissue concentration of these vitamins may depend on the physical state and the diet of the individual, as well as the daily vitamin intake. Thiamin excretion was not related to riboflavin excretion. The excretion of these vitamins was generally lower at full activity than at rest or during limited activity.

Arroyave et al (1964) investigated the excretion of thiamin and riboflavin by 36 children in a home for poor children in Guatemala City. Initial examinations of their diets showed deficient intakes

of these vitamins according to RDA standards of the National Research Council. As the diets of these children were gradually increased to meet the RDA standard, he observed a three-fold increase in riboflavin excretion over a ten-week period. It was interesting, however, that urinary thiamin decreased despite the increased uptake. Because the diets were increased 100% in calories and 65% in carbohydrates, Arroyave theorized that the increased demand for thiamin was greater than the increased thiamin intake.

Other groups have added to our knowledge of rates of thiamin excretion. Mickelsen and associates (1947) found a linear relationship between intake and excretion when the diets were varied to include 0.6, 1.0, 1.8, and 2.0 mg/day of thiamin. Melnick et al (1939) noted that the percentage of available thiamin for urinary excretion was a function of how great an excess was present. Mason and Williams (1942), Ferrebee et al (1942), and Robinson et al (1940) agree that deficient individuals generally excrete less thiamin than normal subjects.

Several investigators have studied the relationships between clinically diagnosed thiamin deficiency and urinary excretion levels. Elson et al (1942) found that human subjects which showed clinical signs of thiamin deficiency on intakes of 0.35 mg/1000 kcal had average urinary excretions of 42 mcg/day. Robinson, Melnick and Field's (1940) study of thiamin deficient subjects showed that half of the patients had urinary thiamin excretion levels which suggested insufficient intake. Another interesting observation was that six of the seven patients with organic heart disease had low excretion levels. Patients on antacid or achlorhydra medication excreted small

small amounts of thiamin even when the diet was adequate. Tanphaichitr and associates (1970) concluded that transketolase activity in erythrocytes was a better indicator of sub-clinical beriberi in Thailand than was urinary thiamin, but urinary thiamin excretion was useful for surveying large population groups.

Variability of Riboflavin Excretion

There is considerable evidence which relates riboflavin excretion to nitrogen balance in human subjects. Pollack and Bookman (1951) studied riboflavin excretion in normal, injured, and diabetic individuals. Patients in positive nitrogen balance excreted less than 50% of the ingested riboflavin, while patients in negative nitrogen balance always excreted more than 50% of the dietary riboflavin. They concluded that most of the riboflavin in the body is probably bound as flavoproteins and that the excess urinary riboflavin in negative nitrogen balance must be due to the breakdown of flavoproteins. Windmueller *et al* (1964) also observed increased riboflavin excretion in negative nitrogen balance.

Horwitt *et al* (1950) studied varying intakes of riboflavin to assess correlation of urinary excretion with deficiency signs. At excretion rates of less than 50 mcg/day or 27 mcg/gram of creatinine, he observed riboflavin deficiency signs in the adults.

Tucker, Mickelsen, and Keyes (1960) examined the influence of several factors on riboflavin excretion. Meals tended to increase, and sleep to decrease, the rate of excretion. During short periods of labor, they observed decreased excretion of riboflavin, but acute starvation and hard physical labor for three and seven days increased the excretion threefold and fivefold, respectively. Diuresis had no

effect on riboflavin excretion. Thiamin deficiency alone increased riboflavin excretion. When riboflavin and thiamin were both deficient, there was increased riboflavin excretion only after four weeks of deprivation. Five mg/day of thiamin brought the riboflavin excretion rate to normal.

Relationship of Vitamins to Creatinine Excretion

Timed, 24-hour, and test doses of urine are difficult to obtain from population groups; therefore, researchers frequently resort to random specimens. Mason and Williams (1942) believe that random samples generally give about as much information as test doses. Louhi et al (1952) found that, as with thiamin, assessing riboflavin excretion per gram of creatinine appeared to be quite constant, making it a useful parameter to measure random urine samples collected during population studies. Hegsted et al (1956) demonstrated that duplicate random samples obtained from individuals are more reliable than single samples.

Folin (1905) wrote that "the chief factor determining the amount of kreatinine [sic] eliminated appears to be the weight of the person." Waterlow et al (1972) studied the effect of different diets, infection, and age on creatine turnover in rats. Their findings showed that turnover was not affected appreciably by age, sex, or level of creatine intake. The turnover rate was increased, however, by fasting five days and by severe infection.

Vestergaard and Leverett (1958) investigated the constancy of urinary creatinine excretion in 18 individuals. Some individuals tended to show fairly constant rates of excretion, while others did not. They also found no correlation between meats eaten and creatinine excreted.

Groups have examined the advantages of random urine specimens for nutrition surveys. Johnson and associates (1945) compared fasting specimens, random specimens, and oral loading tests. They concluded that all three tests could be used well together, but that a fasting specimen was preferred over oral load tests and random samples. Plough and Consolazio (1959) also concluded that fasting specimens were more accurate than random samples.

Kelsay (1969), Pearson (1962), and Stearns et al (1958) all stressed the need for using separate interpretative guides of thiamin and riboflavin status for children since children tend to excrete lower levels of creatinine, and urinary thiamin per gram of creatinine appeared to be higher for children than for adults.

CHAPTER III

EXPERIMENTAL PROCEDURES

Urinary excretion of thiamin and riboflavin by family members and the nutrition knowledge of the homemakers were the methods used to describe the nutritional status of newly-enrolled Expanded Nutrition Program families. This chapter deals with the selection of the sample families, the instruments used, and the collection and analysis of the data.

Selection of the Sample

A sample of 176 newly-enrolled families was obtained from four randomly selected Michigan counties: Lenawee, Saginaw, St. Joseph, and Wayne. The sample was randomized by including each consecutively enrolled family within a specific time period. The time period within a specific county began when the researcher started collecting data in that county and ended when that county's quota of families was reached. The county quota was equivalent to six times the number of full-time aides.

Instrument

Characteristics of families, the homemaker's 24-hour food recall, and information about households were obtained by the nutrition aide on her initial visit to enroll the homemaker in the Expanded Nutrition and Family Programs (ENFP). This information is required

by law of new families and is recorded on a special form (Appendix A). To minimize the length of the interview and to avoid redundancy, this information was copied.

Two interviews were required to collect data. On the first interview random urine specimens were collected from available family members, as well as additional information about the family, such as grocery shopping practices (Appendix B). During the second interview, the homemaker's responses to various statements dealing with nutrition knowledge were obtained (Appendix C).

The questionnaires were pre-tested on low-income families prior to actual data collection. Because of the large number of Spanish-speaking families enrolled in the program, the questionnaire was translated into Spanish.

Preparation for Data Collection

Researchers were trained in a specific interviewing procedure (Appendix D). All the researchers visited the county staffs before initiation of data collection. During these visits county Extension personnel learned about the project. In a later session with the aides and Extension Home Economist, the project was explained in detail through role-playing involving the aides.

Nutrition aides were asked to enroll families in their usual manner, except to ask the homemaker for permission to bring someone else on her second visit. The aides were asked not to explain the evaluation project in any way.

Data Collection

Data collection began in November of 1972 and continued through early April, 1973.

A researcher collecting biological data accompanied the aide on her second visit to the homemaker. The researcher explained the evaluation project to the homemaker and obtained her permission to be included (Appendix E).

All available family members were provided with plastic cups in which to collect urine specimens. The specimens were tested immediately for hemoglobin, ketones, glucose, albumin, and pH using Labstix Reagent Strips, produced by the Ames Company, division of Miles Laboratories. Positive tests were referred to physicians using an explanatory referral slip (Appendix E). The urine was bottled in brown bottles and acidified with 1 N HCl at 5 ml HCl per 50 ml urine. Samples were brought back to the university and frozen immediately until they could be analyzed.

The urine specimens were analyzed for creatinine, thiamin, and riboflavin using a Technicon Auto-Analyzer with pump number one. Technicon Auto-Analyzer method N-11b I/II was used for creatinine. Thiamin was analyzed using Leveille's (1972) method as modified and automated by Romsos (1973) and Kirk (1973). Riboflavin was determined according to Kirk's automated method (1973). The urinalyses were run by a university technician.

The thiamin and riboflavin levels were calculated as micrograms of vitamin per gram of creatinine. To describe the vitamin adequacy levels, the subjects were divided by age group and compared to the ICNND (1963) standards for that age group.

The homemaker was asked several questions concerning the family's use of vitamin supplements, her grocery shopping practices, and available cooking equipment (Appendix B). Information on family

income, family size, education of the homemaker, the homemaker's 24-hour food recall, and other pertinent information was obtained from the aide's enrollment sheet (Appendix A).

On the aide's third visit to the homemaker, a second researcher accompanied her to obtain attitudinal information related to the homemaker's knowledge of nutrition. Each statement was read to the homemaker, and she responded by either disagreeing strongly or mildly or agreeing strongly or mildly (Appendix C).

Analysis of Data

Data from 176 families were examined. Due to incomplete data for some of the families, N varied from one set of data to another.

Demographic data included residence location, age and ethnic background of the homemaker, family size and income, aid received by the family, grocery shopping variables, use of vitamin pills, and availability of equipment and utilities for food preparation. For analysis of the participation of children and families in school lunch programs, families without school-age children were excluded.

Homemakers were grouped into three educational categories: eighth grade or less; ninth through twelfth grades; and beyond high school. For correlation purposes, these were assigned values of one, two, and three in order of ascending educational levels.

For analysis of the adequacy of the homemakers' 24-hour food recalls, the diets were compared to the Basic Four adult standard: two servings from the meat group; two from the milk; four from the fruit-vegetable group; four from the bread-cereal group daily. If a food group was adequate in a homemaker's diet, it was assigned a score of one; if it was inadequate, a score of zero. This information was

used to describe the adequacy of individual food groups. Scores from each food group were totalled, so that a homemaker receiving a score of four had a diet meeting the Basic Four standard. A score of two or three indicated she met two or three out of four of the food groups. Ratings of "A", "B", "C", "D", and "E" were assigned to diets which met four, three, two, one, and zero out of four food groups, respectively.

In an effort to determine the degree of inadequacy, the diets were also scored according to their meeting one-half the Basic Four adult standard, i.e., one serving from the meat group, one from the milk group, two from the fruit-vegetable group, and two from the bread-cereal group. If a homemaker met one-half the recommended number of servings for each of the four food groups, the diet was assigned a rating of "A/2". Similarly, if the diet met one-half the recommended number of servings for three, two, one, and zero of the four food groups, the diets were assigned ratings of "B/2", "C/2", "D/2", and "E/2", respectively.

The nutrition statements were evaluated by the researcher and her major professor by designating the most appropriate response to each statement. This response was assigned a value of four. The most appropriate response is underlined in Appendix C. The other responses were assigned values of three, two, and one in descending order of appropriateness. The statements were also analyzed separately, with a compilation of the number of homemakers responding "strongly agree, mildly agree, mildly disagree, and strongly disagree" to each statement.

A correlation matrix was computed from all possible pairs of six variables: family income in dollars; homemaker's educational

level; adequacy of 24-hour food recall; her levels of thiamin and riboflavin excretion; and her score on nutrition information interview.

Data for all the variables of the correlation matrix were complete for only 121 homemakers. The reasons for such a reduction from 176 families include missing data on the aide's enrollment form, the inability or unwillingness of the homemaker to provide a urine specimen, incomplete information on the urinalyses, and lack of the homemaker's participation in the second interview.

Calculations were run on the Control Data Corporation (CDC) 6500 model computer, utilizing programs written by the research unit within the College of Human Ecology at Michigan State University.

CHAPTER IV

RESULTS

Description of Sample

The largest number of homemakers lived in an urban area and had at least some high school education (Table 1). Nutrition aides record the educational level of the homemaker by category, as described previously, but it might have been more meaningful to know the average grade completed by the homemakers, rather than knowing that the majority had some high school education.

The ethnic background of the homemaker showed a greater number of white than of black or of Spanish American homemakers (Table 1). Yet there were about as many Spanish American and black homemakers combined as there were white homemakers.

The majority of these families were receiving assistance through the welfare program, including Aid to Dependent Children and Aid to Dependent Children of the Unemployed, and through use of food stamps (Table 2). Most of the families receiving welfare also received food stamps, but there were some families who did not receive both.

The homemakers ranged in age from 16 years to 70 years, with a mean age of almost 29 years (Table 3). Approximately two-thirds of the homemakers were within the age range of about 19.5 years and 38.5 years.

Table 1.--Residence, ethnic background, and education of the homemaker

	Number	%
A. Residence (N=176)		
Urban	149	84.7
Rural non-farm	26	14.8
Farm	1	.5
B. Education (N=171)		
No information	1	.6
Eighth grade or less	32	18.7
Ninth-twelfth grades	131	76.6
Beyond high school	7	4.1
C. Ethnic background (N=175)		
Caucasian	86	49.1
Negro	56	32.0
Spanish American	29	16.6
Oriental	1	.6
American Indian	2	1.1
Other	1	.6

Table 2.--Aid received by family (N=174)

	Number		%	
	Yes	No	Yes	No
Food Stamps	95	77	55.2	44.8
USDA/FHA Assistance	7	166	4.0	96.0
Welfare	97	77	55.8	44.2
Social Security	10	164	5.7	94.3
Other	9	163	5.2	94.8

The family size varied from one to twelve members, with the mean family size of 4.5 (Table 3). The family income per month varied widely as shown by the range and standard deviation. Two-thirds of the families had incomes between $200 and $514 per month.

Table 3.--Age of homemaker and family size and income per month

	N	Min.	Max.	Mean	Std. Dev.
Age	165	16	70	28.9	9.6
Family size	176	1	12	4.5	2.2
Income/month	165	$20	$1000	$357.76	$157.58

The appearance of some families whose income was above the poverty level is explained by the fact that the majority of the aides from one county were employed under Emergency Employment Act funds. They may not have been restricted to families of a certain income bracket, even though they received guidance and administrative services through the Expanded Nutrition Program.

Only slightly more than half of the families with school-age children had at least one child participating in the school lunch program (Table 4). For those with school-age children who did not participate in school lunch, it is not known whether or not the lunch program was available to them.

Table 4.--Participation in school lunch

	Number	%
A. Families with school-age children (N=69)		
At least one child in school lunch	39	56.5
No children in school lunch	30	43.5
B. Children in school (N=209)		
Children in school lunch	119	56.9
Children not in school lunch	90	43.1

The majority of the homemakers appeared to have adequate cooking facilities (Table 5). Stoves, working ovens, refrigerators, electricity, and running water were each present in homes more than 95% of the time. A freezer was counted only when it was a completely separate unit from the refrigerator, which excluded all refrigerator-freezer combination units. The presence of a piece of equipment, such as an electric frying pan or a hot plate, does not mean that it was used by the homemaker; it only indicates that it was available to her in her home.

Table 5.--Food preparation equipment and utilities available to homemaker (N=164)

	Number		%	
	Yes	No	Yes	No
Electricity	164	0	100.0	0.0
Running water	161	1	99.4	.6
Refrigerator	162	1	99.4	.6
Stove/range	163	1	99.4	.6
Oven	156	6	96.3	3.7
Electric frying pan	56	98	36.4	63.6
Freezer	30	118	20.3	79.7
Hot plate	10	137	6.8	93.2
Icebox	2	120	1.6	98.4
Other	9	98	8.4	91.6

Food Purchasing Practices

The grocery shopping information revealed that the homemaker herself did most of the food buying and that she preferred to buy at a supermarket most of the time, although there was occasional use of small, neighborhood stores (Table 6). The majority of the homemakers were able to shop within five miles of their homes. A car, owned by the family or some relative or friend, was the most frequently used transportation.

Table 6.--Grocery shopping data (N=163)

	Number	%
A. Person doing the shopping		
Mother alone	139	85.3
Father alone	8	4.9
Children alone	0	0.0
Other relative	3	1.8
Non-relative	1	.6
Mother & father together	9	5.5
Other combination	3	1.9
B. Favorite grocery store		
Supermarket	159	97.6
Small neighborhood store	3	1.8
Specialty food store	0	0.0
Other	1	.6
C. Second choice grocery store		
Supermarket	82	50.3
Small neighborhood store	60	36.8
Specialty food store	8	4.9
Other	13	8.0
D. Distance from favorite store		
Less than 1 mile	57	35.0
1-5 miles	76	46.6
Greater than 5 miles	30	18.4
E. Transportation for grocery shopping		
Family car	84	51.5
Neighbor, friend, relative's car	58	35.6
Walk	13	8.0
Taxi	6	3.7
Bus	2	1.2

The homemakers were asked to state two factors, if possible, that influenced their food purchases. The homemakers reported verbally. The researcher categorized these into the groups listed in Table 7.

Since the homemakers did not necessarily state their responses in the order of importance, both decisions of 163 responding homemakers were grouped to compile Table 7. In a few cases the homemakers were only able to indicate one factor; therefore, there were only 305 decisions rather than 326.

The cost of the food and family preference were mentioned most frequently, and accounted for almost 50% of the responses together. Needing a food item and nutritional value together represented almost 25% of the responses. The author considers it surprising that convenience of preparation was mentioned by only three individuals.

Table 7.--Factors influencing food purchases (N=305

	Number	%
Cost--I can afford it	80	26.2
The family likes it	71	23.3
I'm out of it/need it	38	12.5
Nutrition--it's good for us	34	11.2
It's on my grocery list	20	6.6
It's on sale	16	5.2
It's a specific brand	8	2.6
It's a new product I wanted to try	6	1.9
Convenience--it's easy to prepare	3	1.0
It's in season	0	0.0
Other	21	6.8
No decision	8	2.6

Homemakers were also asked if they had a vegetable garden of their own. Their response was not considered "yes" unless they had grown some vegetables during the previous summer at their own home.

If they were planning on having a garden or had used produce from a relative's garden, their response was considered "no", since there was some question about the availability of food from others" gardens, and since best intentions for planting a garden do not always come to fruition. Of 160 responses, 24 or 15% of the homemakers had a garden, and 136 or 85% did not.

Homemakers' 24-Hour Food Recalls

The food recalls were analyzed first on adequacy of individual food groups (Table 8). The meat group was adequate more frequently than any other food group. This was particularly noteworthy, considering the rising meat costs at the time of the research. The fruit-vegetables group was most frequently inadequate.

Table 8.--Adequacy of food groups from 24-hour food recalls (N=174)

	Number		%	
	Adequate	Inadequate	Adequate	Inadequate
Meat	119	55	68.4	31.6
Milk	40	134	23.0	77.0
Fruit-vegetables	23	151	13.2	86.8
Bread-cereal	44	130	25.3	74.7

The diets were next analyzed on the basis of total adequacy for each homemaker (Table 9). Homemakers were grouped on the basis of how many of the four food groups in their diets met the Basic Four standard. Only 3.5% of the homemakers reported diets in which all of the four food groups were met ("A" rating). The majority of the homemakers (42.5%) had food recalls that met recommendations for only one of the food groups ("D" rating). Dietary recalls rated "B", "C",

and "E" met recommendations for three, two, and none of the food groups, as described in Chapter III, "Analysis of Data".

Table 9.--Homemakers meeting basic four standard (N=174)

Number of Food Groups Met	Rating	Number of Homemakers	%	Cum. %
4 of 4	A	6	3.5	3.5
3 of 4	B	16	9.2	12.7
2 of 4	C	40	23.0	35.7
1 of 4	D	74	42.5	78.2
0 of 4	E	38	21.8	100.0

Looking at the diets of those who met the minimum requirements for three or two of the food groups ("B" and "C" rated diets) revealed that, in both cases, the fruit-vegetable group was most frequently inadequate. The milk group was adequate more often that the fruit-vegetable group, but less often than the meat group or bread-cereal group (Table 10).

Table 10.--Dietary information on those meeting two and three of the Basic Four food groups

	Number		%	
	Adequate	Inadequate	Adequate	Inadequate
A. Three groups met (N=16) (B rating)				
Meat	16	0	100.0	0.0
Milk	12	4	75.0	25.0
Fruit-vegetable	5	11	31.2	68.8
Bread-cereal	15	1	93.8	6.2
B. Two groups met (N=40) (C rating)				
Meat	36	4	90.0	10.0
Milk	16	24	40.0	60.0
Fruit-vegetable	10	30	25.0	75.0
Bread-cereal	18	22	45.0	55.0

In an effort to further describe dietary inadequacy, the 24-hour food recalls were examined to determine whether or not they met one-half the Basic Four standard, as described under "Analysis of Data", Chapter III. Only 25% had an A/2 rated diet, i.e., one serving of meat or meat substitute, one serving of milk, two servings of fruit-vegetables, and two servings of bread-cereals (Table 11). On the basis of what the homemakers reported their previous day's food intakes had been, the diets appear to be grossly inadequate.

Table 11.--Homemakers meeting one-half or more Basic Four standard (N=174)

Number of Food Groups Met	Rating	Number of Homemakers	%	Cum. %
4 of 4	A/2	44	25.3	25.3
3 of 4	B/2	71	40.8	66.1
2 of 4	C/2	37	21.3	87.4
1 of 4	D/2	18	10.3	97.7
0 of 4	E/2	4	2.3	100.0

Results of Biochemical Analysis

Urine Specimens were collected from family members who were available. As a service to the family, these samples were tested immediately at the home for hemoglobin, ketones, glucose, protein, and pH. Out of 324 samples, only two tested positively for glucose. These were referred to physicians for further examination.

The urine samples were brought back to the university where they were analyzed by a technician for thiamin, riboflavin, and creatinine.

Thiamin excretion levels per gram of creatinine were compared by age group to ICNND standards (Table 12). All urinary thiamin levels,

except one adult, were judged to be acceptable or high. By far the majority of samples fell within the range "high" (97.2%).

Table 12.--Thiamin excretion levels by age group (based on ICNND standards of adequacy)

Age in Years	Deficient	Low	Acceptable	High
1-3: (N=54)				
Number	0	0	4	50
Percent	0.0	0.0	7.4	92.6
4-6: (N=58)				
Number	0	0	2	56
Percent	0.0	0.0	3.4	96.6
7-9: (N=24)				
Number	0	0	0	24
Percent	0.0	0.0	0.0	100.0
10-15: (N=27)				
Number	0	0	1	26
Percent	0.0	0.0	3.7	96.3
16 & older (N=161)				
Number	0	1	1	159
Percent	0.0	0.6	0.6	98.8
Total number	0	1	8	315
Total percent	0.0	0.3	2.5	97.2

All age groups showed a wide range of levels, but the age group 10-15 years exhibited the narrowest range. There were, however, a small number of samples (27) from this age range (Table 13).

Table 13.--Thiamin excretion levels (mcg/gram of creatinine)

Age in Years	Min.	Max.	Mean	Std. Dev.
1-3 (N=54)	232	13537	2302	2176
4-6 (N=58)	216	6844	1821	1362
7-9 (N=24)	434	8030	1809	1741
10-15 (N=27)	233	2997	1162	717
16 & older (N=161)	64	8712	900	1342

Riboflavin excretion levels were assessed by age group according to ICNND standards (Table 14). A total of 8.0% of the individuals showed deficient levels, with 20.7% showing low levels. In other words, over one-fourth of the sample population showed low or deficient levels of riboflavin. The 7-9 years age group was the only group not showing a deficient subject, but it was also the smallest sample.

Table 14.--Riboflavin excretion levels by age group (based on ICNND standards of adequacy)

Age in Years	Deficient	Low	Acceptable	High
1-3: (N=54)				
Number	7	11	15	21
Percent	12.9	20.4	27.8	38.9
4-6: (N=58)				
Number	2	15	6	35
Percent	3.5	25.9	10.3	60.3
7-9: (N=24)				
Number	0	9	7	8
Percent	0.0	37.5	29.2	33.3
10-15: (N=27)				
Number	4	7	4	12
Percent	14.8	26.0	14.8	44.4
16 & older (N=161)				
Number	13	25	70	53
Percent	8.1	15.5	43.5	32.9
Total number	26	67	102	129
Total percent	8.0	20.7	31.5	39.8

The 7-9 year old group exhibited the narrowest range for riboflavin excretion. Two individuals in the youngest and oldest age group showed very high levels of riboflavin, probably the result of using some vitamin supplement (Table 15).

Table 15. Riboflavin excretion levels (mcg/gram creatinine)

Age in Years		Min.	Max.	Mean	Std. Dev.
1-3	(N=54)	16	17927	1638	2753
4-6	(N=58)	18	8242	1503	1994
7-9	(N=24)	116	4444	656	885
10-15	(N=27)	26	7005	716	1353
16 & older	(N=161)	5	20749	504	1757

The homemakers were asked if any family member had been using some vitamin pills recently. Although the data does not show which family members were using them, the information does tell that in 69 (42.3%) of the families, there was at least one person using some vitamin supplement.

Nutrition Knowledge

The homemakers were interviewed regarding their knowledge of nutrition. On the basis of a score of four for the most appropriate answer, and descending numbers to one for the least appropriate answer, each homemaker's responses were evaluated. The mean score was 67.86%, with a range from 49% to 92% and a standard deviation of 7.67%.

The responses were also examined individually to see what percentage of homemakers responded appropriately to each statement. Statements evaluated inappropriately by 75% or more of the homemakers are listed in Table 16.

Table 16.--Nutrition statements missed by 75% or more of the homemakers (N=163)

Statement Number	% Approp. Responses	Statement
17	6.75	Adults should avoid fat in their diets in order to prevent heart diseases and strokes.
19	7.96	Lemonade and orange juice have about the same amounts of vitamin C.
3	7.97	Gelatin desserts are a good source of protein.
6	11.04	School-age children need to have vitamin pills every day for good health.
5	11.66	Eating bacon for breakfast is a very good way to get the protein that is needed for the day.
8	14.11	Apples have a lot of vitamin C.
22	14.72	A reducing diet should not contain bread or potatoes.
21	15.95	Most fat children and adults have a problem with their glands.
18	17.79	Milk is needed mainly by infants and growing children.
15	17.79	Eating cheese causes constipation.
9	20.86	Healthy, active young children need some sweets, such as candy or cake, each day for energy.
11	22.09	Adding soda while cooking vegetables and dried beans makes them easier to digest.
24	24.54	Eating carrots helps a person see better.

Nutrition statements answered appropriately by 75% or more of the homemakers are listed in Table 17.

Table 17.--Nutrition statements answered appropriately by 75% or more homemakers (N=163)

Statement Number	% Approp. Responses	Statement
1	92.03	Meat, milk, and eggs all have lots of nutrients which are needed for the growth of small children.
13	88.96	Year-old babies should eat different kinds of foods, since drinking only milk may not be enough for growth.

Correlations

Six variables were correlated with each other in all possible pairs: income; education; adequacy of diet; thiamin; riboflavin; and nutrition information score, as described in Chapter III, "Analysis of Data". Nutrition information and educational level showed a slight positive correlation (Table 18). Thiamin and riboflavin also showed a positive relationship.

The correlation between educational level and nutrition knowledge was significant at the .01 level using regular two-variable tables. Using tables designed for six variables, the correlation was not significant.

The correlation between thiamin and riboflavin levels was significant at the .05 level using a six-variable table. It was significant at the .01 level using regular two-variable correlation tables which do not adjust for randomization due to six variables.

Table 18.--Correlations between six variables

Income	1.0000					
Educ.	-.0975	1.0000				
Diet	-.0701	.0334	1.0000			
Thia.	-.0363	-.0086	.1102	1.0000		
Ribo.	.0320	.0585	.0762	.3316	1.0000	
Nutr. Sc.	.1051	.3035	.1341	.0027	.1825	1.000
	Income	Educ.	Diet	Thia.	Ribo.	Nutr. Sc.

CHAPTER V

DISCUSSION

The target audience of the Expanded Nutrition Program is low-income families with young children. The percent distribution of the families among ethnic groups appears to be consistent with the Michigan Nutrition Survey (1971) for white families (49.1%) and the 1967 Bureau of Census, which reported one-third of the poor families are black. Over one-half of the families (55%) in this study were receiving public assistance. Although the data is inconclusive regarding the average age of children in the families, the average family size (4.5 members) and the average age of the homemaker (29) would seem to indicate there were young children living at home.

Nutrition aides often report limited cooking and food storage facilities. The data indicate that this is apparently not a major problem with Michigan families. The Rural Electrification Program in Michigan may account for the presence of electricity in 100% of the families surveyed. Mothers receiving Aid to Dependent Children (ADC) assistance are also eligible to be furnished with a refrigerator. Many of the homemakers may be taking advantage of this provision.

The homemaker herself does, by far, the majority of the food shopping. Nearly 98% were able to shop at a supermarket. The small, expensive neighborhood stores were a second choice for only 37% of

the homemakers. This suggests that the low-income homemakers may not be limited to buying in their own neighborhood, a problem poor families sometimes face (Meyers, 1970). This was further verified by the use of the family car or a friend's car by 87% of the homemakers for grocery shopping. It would appear that these homemakers were relatively free to shop where they wished.

The availability of a family car or friend or relative's car for grocery shopping would also seem to refute the idea that these homemakers were home-bound. The limited participation of low-income families in group meetings is probably not due to transportation problems, but to other factors.

Cost was the primary factor in influencing food purchases, followed by family preference. Being "out of" a certain food was mentioned third most frequently. These data imply that homemakers may be limiting their food purchases to familiar items, seldom experimenting with a new food or new method of preparation. Meyers (1970) suggested that low-income homemakers may be limited in their knowledge of how to use certain foods. Trying a new product was mentioned as influencing food purchases by only 2% of the homemakers.

Low-income families have difficulty taking advantage of seasonal sales (Meyers, 1970). None of the homemakers surveyed mentioned the seasonality of food as an influential factor.

Only 1% of the homemakers stated convenience as a factor in food purchasing, although Seoane's (1971) study of shopping practices of EFNEP families indicated wide use of convenience foods. It may be that the homemakers surveyed in Michigan were also making wide use of convenience items, but were not considering them as such.

Analysis of the homemakers' 24-hour food recalls indicated agreement with other studies of low-income families. The examination of diets of EFNEP families by the USDA Economic Research Service (1972) also indicated inadequate use of these food groups. Because of the limited use of milk and fruits and vegetables by these homemakers, one would expect the diets to be most limiting in vitamins A and C and the minerals iron and calcium. These nutrients were also seen to be most limiting in American diets by Morgan (1959), Brown et al (1970), and Hardy et al (1943).

These families appeared to have acceptable thiamin excretion levels. This was surprising in that the Michigan Nutrition Survey (1971) showed unacceptable thiamin levels for 6% of the population. The mean levels of thiamin were higher in each age group of this study than in each age group of the Ten-State Nutrition Survey (1972). Meyers et al (1968), Brin et al (1965), and Tzeng (1971) also found unacceptable thiamin excretion levels in their population groups. Owen et al (1969) did not find unacceptable levels.

The riboflavin excretion levels of over 25% of the sample were low or deficient. This high prevalence of low and deficient values is surprising because riboflavin levels in other studies were either acceptable or less deficient than thiamin (Meyers et al, 1968; Owen et al, 1969; Brin et al, 1965; Tzeng, 1971; McGanity, 1969). The Ten-State Nutrition Survey (1972) revealed that there were riboflavin deficiencies among blacks and among young people of all ethnic groups. The mean levels of riboflavin excretions in each age group were more than those found by this study. The Michigan Nutrition Survey (1971) showed overall 14% deficient riboflavin

excretion levels. It would appear that the very low riboflavin excretion levels for so many individuals may be due in part to lower milk consumption.

There are few comparable studies with which to compare the homemakers' responses to the nutrition statements. Cornely et al (1963) did find that education of the respondent was closely related to rejection of folk beliefs. Although the correlation between education and nutrition score in this study does not appear to be highly significant, this may have been due to the grouping of homemakers into three educational categories, as explained previously.

It should also be mentioned that although less than 25% of the homemakers responded appropriately for 13 of the 25 statements, in several cases a large percentage gave a response very close to the appropriate one. This was true for the statement, "Adding soda while cooking vegetables and dried beans makes them easier to digest", for which 58% responded either mildly or strongly disagree. The response "mildly disagree" was considered most appropriate for the statement, "Milk is needed mainly by infants and growing children". Although only 18% responded in this manner, 33% strongly disagreed.

One would have expected educational level to correlate with dietary adequacy (Morse et al, 1967; Hinton et al, 1963; Hendel et al, 1965; Eppright et al, 1970). There is some evidence, however, that education may not always be related to dietary adequacy or nutrition knowledge (Young et al, 1956). It was not surprising that income did not correlate with dietary adequacy since other studies have shown this lack of relationship (Young et al, 1956; Hiemstra, 1972; Fryer et al, 1971).

Limitations of the Present Research

1. The inadequacies of the dietary recall have been examined in the introductory chapter. It was also observed by the author that different nutrition aides used somewhat different approaches in obtaining this data. In some cases, the aides were careful to secure information regarding snacking; in other cases, they were not. Nevertheless, the data obtained concur with other studies.

2. The 24-hour food recall data does give some information regarding the homemaker's food intake, but it provides only a limited picture of the children's and other family members' food intakes. It may be valid to assume, however, that if the homemaker's diet is adequate, other family members are likely to have adequate diets.

3. A picture of family nutriture has been obtained for the vitamins thiamin and riboflavin. Since vitamins A and C and the minerals iron and calcium are most frequently lacking in American diets, it would have been desirable to obtain this information. Since this would have involved a blood sample, it is doubtful that the high percentage of cooperation would have resulted.

4. Responses to the nutrition statements represent attitudes of these homemakers. Although there are some responses which seem more appropriate than others, the statements do not imply strictly "right or wrong" answers. There is little with which to compare the results. The nature of homemakers' responses suggest that a statistical analysis of deviation from the appropriate response might be very meaningful.

Summary and Conclusions

This study has provided a picture of the nutritional status of low-income families and nutrition attitudes of low-income homemakers as they enter the Expanded Nutrition Program. It has also revealed some of the food shopping practices of these families.

The families did not appear to be restricted to purchasing food in expensive, neighborhood stores, nor were they limited in food preparation facilities. The homemaker herself did the majority of the grocery shopping, and she most frequently chose to shop at a supermarket. She was influenced by cost, family preference, needing a food item, and nutritional value.

The diets of these homemakers appeared to be grossly inadequate as measured by the 24-hour food recalls. Despite rising meat costs, the majority of the homemakers consumed the recommended amount of meat daily. Milk and fruit and vegetable consumption was seriously low.

The family nutriture with regard to thiamin appeared to be satisfactory. Riboflavin intake, however, seemed to be a problem for over one-fourth of the individuals. This may be a reflection of limited milk consumption.

The responses to the nutrition statements revealed that these homemakers had limited knowledge of nutrition. There is a great opportunity for nutrition aides to expand the homemakers' knowledge.

Suggestions for Future Research

This study provided a picture of the Expanded Nutrition Program families as they entered the program. Since the objective of the program is to change the homemakers' nutrition practices and knowledge, it is recommended that these families be re-surveyed after an interval of six to nine months to assess change. Such a re-survey is being included in a larger study.

Since the focal point of the Expanded Nutrition Program is low-income families and families with young children, it is recommended that the income for each family be examined in terms of size and sex of head of household to determine how many of the families are at or below the poverty level. Grouping the families by ages of children would provide a picture of the number of families with pre-school children.

The school lunch program has improved the nutritional status of children in low-income areas (Schaefer, 1969; Callahan, 1971). Determining the availability of a school lunch program would provide direction to nutrition aides as they seek to help the homemakers improve their families' diets.

BIBLIOGRAPHY

Suggestions for Future Research

This study provided a picture of the Expanded Nutrition Program families as they entered the program. Since the objective of the program is to change the homemakers' nutrition practices and knowledge, it is recommended that these families be re-surveyed after an interval of six to nine months to assess change. Such a re-survey is being included in a larger study.

Since the focal point of the Expanded Nutrition Program is low-income families and families with young children, it is recommended that the income for each family be examined in terms of size and sex of head of household to determine how many of the families are at or below the poverty level. Grouping the families by ages of children would provide a picture of the number of families with pre-school children.

The school lunch program has improved the nutritional status of children in low-income areas (Schaefer, 1969; Callahan, 1971). Determining the availability of a school lunch program would provide direction to nutrition aides as they seek to help the homemakers improve their families' diets.

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APPENDICES

APPENDIX A

Aide's Family Enrollment Form

APPENDIX A

Aide's Family Enrollment Form

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:
   a. Food Stamps ____
   b. Food Donation ___
   c. USDA/FHA Assis ___
   d. Welfare _____

Family Members (First Name) (7)	Age Yrs. (8)	Male (9)	Female (10)	Now In School (11)	Partic. 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 h. s. ____

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

B. HOMEMAKER FOOD CONSUMPTION, FAMILY INCOME, AND FOOD 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

Kind of Food and Drink	To Be Filled Out by Trainer Agent: Milk	Meat	Veg/fr.	Br/cer.
Morning				
Midmorning				
Noon				
Afternoon				
Evening				
Before Bed				
Total No. of Servings	(7)	(8)	(9)	(10)

4. Total actual income for family last month $_____

11. Totals 1 or more servings of each of four food gr.	Yes ____ No ____
12. Totals 2 or more servings milk/mt; 4 or more veg/fr & br/cer.	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? $_____

APPENDIX B

Biological Data Recording Form

APPENDIX B

Biological Data Recording Form

County Code _____

Family ID Number _____

Part III. Family Interview

Date _____

Time of day _____

Number of prior aide visits to family _____

Has anyone in your family been taking vitamin pills in the last week or so?

____no information

____no

____yes

If so, who has been taking the vitamin pills? ___no information

Yes	No	
___	___	Pre-school children (ages 0-5)
___	___	School-age children (ages 6-12)
___	___	Teen (s) (ages 13-18)
___	___	Adult (s) (19 and over)

Who does the grocery shopping for your family most of the time?

_____ no information

_____ mother

_____ father

_____ children

_____ other relative

_____ non-relative

Where do you (or other person) usually shop for your groceries?

_____ no information
_____ supermarket
_____ small neighborhood store
_____ specialty food store
_____ other (specify) _____

How far away from your home is this store?

_____ no information
_____ less than 1 mile
_____ 1-5 miles
_____ 6 miles or more

How do you usually get to the store?

_____ no information
_____ family car
_____ neighbor, friend, relative drives their car
_____ walk
_____ bus
_____ taxi
_____ bicycle
_____ other (specify) _____

Is there any other store where you occasionally buy groceries?

_____ no information
_____ supermarket
_____ small neighborhood store
_____ specialty food store
_____ other (specify) _____

When you go grocery shopping, there are many, many different kinds of food you could buy. What kinds of things help you decide what to buy? (Record 2 responses)

_____ no information

_____ cost--whether I can afford it

_____ I or someone in my family likes it

_____ it is on my grocery list

_____ I am out of it or need it for something special

_____ it is on sale

_____ it is easy to prepare--convenient

_____ it is a new product someone wanted to try

_____ it is good for us--nutrition

_____ it is in season

_____ it is a specific brand

_____ other (specify) _____

County Code _____ Family ID Number _____ Part IV. Individual Information

Name	Individual ID Number	Rel. to Homemaker	Sex	Age	School Lunch	Ht.	Wt.	Urine Specimen					
								Number	Hb.	Ket.	Glu.	Alb.	pH

County Code _____

Family ID Number _____

Part I. General Family Information

Date aide's first visit _____

Check for residence location: _____ no information
_____ urban
_____ rural non-farm
_____ farm
_____ other

Check for aid received by family: _____ no information

Yes	No	
_____	_____	USDA Food Stamps
_____	_____	USDA/FHA Assistance
_____	_____	Welfare
_____	_____	Social Security
_____	_____	Other (specify) _____

Total family income for last month $ _____

Does the family have a garden? ____ Yes ____ No

Part II. Homemaker Information

Homemaker's age _____

Check for education of homemaker: _____ no information
_____ 8th grade or less
_____ 9-12 grade
_____ beyond high school
_____ other (specify) _____

Check for background of homemaker:

_____ no information _____ Caucasian
_____ Negro _____ Spanish American
_____ Oriental _____ American Indian
_____ Other (specify) _____

Check for homemaker: _____ no information _____ pregnant
_____ non-pregnant _____ lactating

Homemaker's 24-hour food recall (record actual number of servings)

_____ No information

_____ Meat group

_____ Milk group

_____ Fruit-vegetable group

_____ Bread-cereal group

Check for equipment available: _____ no information

Yes	No	
_____	_____	Stove/range
_____	_____	Oven
_____	_____	Hot plate
_____	_____	Electric frying pan
_____	_____	Freezer
_____	_____	Refrigerator
_____	_____	Ice box
_____	_____	Electricity
_____	_____	Running water
_____	_____	Other (specify) _____

APPENDIX C

Nutrition Information Recording Form

APPENDIX C

Nutrition Information Recording Form

1.	SA	MA	MD	SD	Meat, milk, and eggs all have lots of nutrients which are needed for the growth of small children.
2.	SA	MA	MD	SD	When children have enough food to satisfy their appetites, they are getting enough nutrients.
3.	SA	MA	MD	SD	Gelatin desserts are a good source of protein.
4.	SA	MA	MD	SD	It is better not to have orange juice and milk in the same meal because the orange juice causes the milk to curdle in the stomach.
5.	SA	MA	MD	SD	Eating bacon for breakfast is a very good way to get the protein that is needed for the day.
6.	SA	MA	MD	SD	School-age children need to have vitamin pills every day for good health.
7.	SA	MA	MD	SD	A good easy to lose weight is to skip breakfast.
8.	SA	MA	MD	SD	Apples have a lot of vitamin C.
9.	SA	MA	MD	SD	Healthy, active young children need some sweets, such as candy or cake, each day for energy.
10.	SA	MA	MD	SD	It is best to avoid eating milk and fish together.
11.	SA	MA	MD	SD	Adding soda while cooking vegetables and dried beans makes them easier to digest.
12.	SA	MA	MD	SD	Dried beans contain many of the same nutrients as meat.
13.	SA	MA	MD	SD	Year-old babies should eat different kinds of foods, since drinking only milk may not be enough for growth.
14.	SA	MA	MD	SD	White bread and cereals that are enriched are better for both children and adults than those that are not.
15.	SA	MA	MD	SD	Eating cheese causes constipation
16.	SA	MA	MD	SD	It is important to eat many kinds of foods from day to day.

17. SA MA MD <u>SD</u> Adults should avoid fat in their diets in order to prevent heart diseases and strokes.

18. SA MA <u>MD</u> SD Milk is needed mainly by infants and growing children.

19. SA MA MD <u>SD</u> Lemonade and orange juice have about the same amounts of vitamin C.

20. <u>SA</u> MA MD SD Peanut butter is a nutritious food for both children and adults.

21. SA MA MD <u>SD</u> Most fat children and adults have a problem with their glands.

22. SA MA MD <u>SD</u> A reducing diet should not contain bread or potatoes.

23. <u>SA</u> MA MD SD Skim milk has about the same amount of minerals and protein as whole milk.

24. SA <u>MA</u> MD SD Eating carrots helps a person see better.

25. SA MA MD <u>SD</u> If a person drinks enough orange juice, he won't get a cold.

APPENDIX D

1. Interviewing Procedure for Biological Data
2. Interviewing Procedure for Attitudinal Data

APPENDIX D-1

Interviewing Procedure for Biological Data

"Hello! I am _____, a graduate student from Michigan State University.

"We are adding something new to the Expanded Nutrition Program. It is something only for new families now being enrolled. It is something you can participate in if you want to, but you don't have to. We would like to provide a free mini-health check-up for the new families. We do this with a urine sample.

"Now, if you've ever gone to the doctor, he's probably asked you for a urine sample. He probably gave you a cup like this, (show collection cup) for you to collect the urine in. Some doctors test urine with dip-sticks like these (show Labstix). He dips it into the urine, then checks the colors against those on the bottle here (show chart on bottle).

"This tells him a few things about your general health; it doesn't tell him everything. One thing it does check for is sugar, though. It also tests for blood in the urine.

"This urine test is very quick and easy to do. We can do it right here in your home and tell you the results right away. We feel it is a very good thing to have done. Would you be interested in participating in this mini-health check? (Pause) Do you have any questions? (Pause)

"After we test the urine here, we would like to take the sample back to Michigan State University and there we'll check it for certain vitamins. Your sample will be given a number so no one will know it's yours. We want to get an idea of how well families in the

Expanded Nutrition Program are getting these vitamins. We hope this will help us make the program better for you and other families. Do you have any questions?

"I would also like to weigh and measure your preschool children, and I have just a few questions for you.

"Next week when the aide comes, she'd like to bring another girl with her. This girl will bring a series of statements about things like nutrition, children, and education. These are statements that people have many different opinions about. There are no right and wrong answers; she'll just be interested in learning how you feel about these things. Do you have any questions?

"The information which you give us will be combined with that from other families, but it will never be identified as coming from a particular person by name. We are interested in group information. After you have worked with the aide for about 9 months or so, I would like to come back and visit with you again. Would you like to participate in our project? (If 'yes', proceed.)

"I have to show my supervisor that I was here and have your permission to do this. I'll read this statement (read permission slip.) Since you want to participate, would you please sign here? I'll have the aide sign also."

APPENDIX D-2

Interview Procedure for Attitudinal Data

"We are interested in knowing what you think or feel about some things. These are things that a lot of people have different ideas about, but that doesn't mean that any of them are right or wrong. For example, you and your neighbor or best friend may not agree about many of them; what we really want to know, then, is what you think about each one.

"For each item, I'd like for you to say whether you strongly agree, mildly agree, mildly disagree, or strongly disagree. I have some cards that have these different responses on them, so you can look at them while you think about each item and then show me which one is the closest to your opinion for that item. Here are the cards. (Present cards in the order SA-MA-MD-SD, labeling each as it is presented, so that the SA is on the respondent's left and the SD on her right.)

"I'll also give you a copy of the statements so that you can follow while I read them if you'd like.

"Let's try a sample item first. For example, if I gave you this statement --

> People generally base their decisions on past experiences.

-- how would you respond to it? (Be sure that respondent indicates her response by pointing to a card and verbalizing the response, if possible, so that you are sure she understands the procedure. Clarify if necessary.)

"Good. Are there any questions?

APPENDIX E

1. Permission Slip
2. Physician Referral Slip

APPENDIX E-1

Permission Slip

Permission--Proof of Home Call

The Expanded Nutrition Evaluation Project has been explained to me.

I am willing to participate and have members of my family participate in the project.

I understand that I will be interviewed at agreed upon times, that my young children (if I have any) may be weighed and measured, and we will be asked to supply urine samples.

_____
Homemaker

_____
Aide

_____
Date

APPENDIX E-2

Physician Referral Slip

Date: _____ Time: _____

To Whom It May Concern:

In doing a routine urinalysis for a research project of the Expanded Nutrition Program, subject _____ showed a positive test for _____. The test was made using Labstix produced by the Ames Company, a division of the Miles Laboratories.

Signed: _____
Research Assistant